

ENERGIA ITALIA SYSTEMS

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REMOTE

TOTALLY CUSTOMIZABLE on your specific needs

Manual Remote

1. Overview

- Handheld Pendant with 2pcs AA battery 1 pc.
- Receiver unit 1 pc



2. Function

2.1 Code Protection

Before operate the controller, you need to activate the remote control by safety code. The code protection can be removed on request.

2.2 Emergency Stop

If you press this button, it will snap into its lower place. All crane movements are stopped. To release this button you have to turn it by 90 degree clockwise. The system will check all the things and in case that everything is OK. The LED of the safety relays will on again and you can operate the crane again.

2.3 Start/Horn Button

When you press the button 3s in it's ON position. Then the system will start . First it is performing a self test routine and then it is ready for operation. The "A" indication LED of the Transmitter will be stay "ON" , while the Power and Com LED of the Receiver are stay "ON" and the LED of Status is "blinking". When you press this button during the operation, the crane is connected and the Horn will be activated.

2.4 Stop Button

If you press these button in 3s, all the crane movements are stopped. The LED of the Comm. will be extinguished.

2.5 Light Button

When you press these button during the operation, the crane is connected and the light will be activated.

2.6 A+B Button

When you press the "A+B" button , first the relay of A button will be activated. When you press this button again, then the relay of B button will be activated and the relay of A button will be released. When you press this button again, the both relays of A+B are activated.

When you need to deactivated the relays of "A+B " button , you need to press these button again and release.

2.7 UP, DOWN, LEFT, RIGHT, FORWARD, BACKWARD TWO STEPS SWITCH

You press these button lightly, they are performing first step (low speed) , then press hardly will be second step (fast speed).

2.8 Antenna

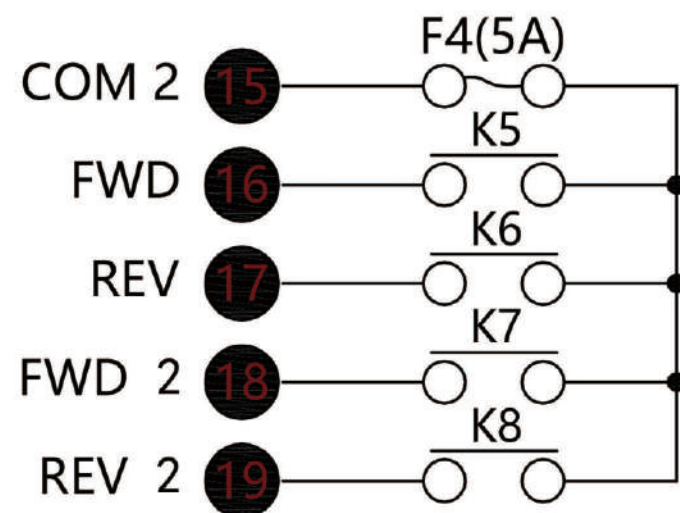
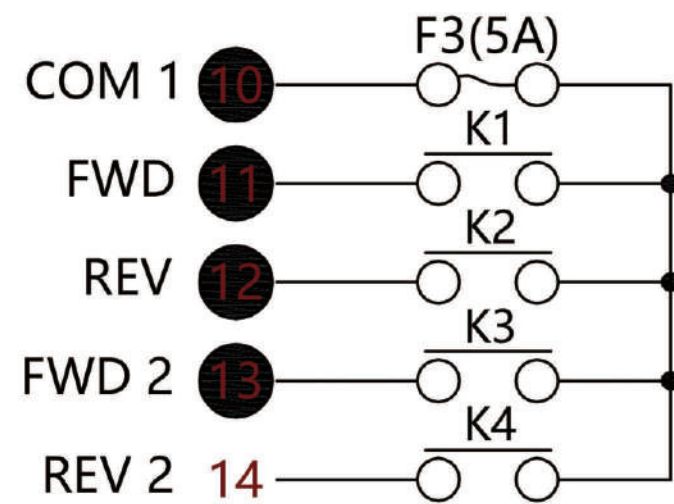
Antenna inside the receiver box.

2.9 Inactive mode

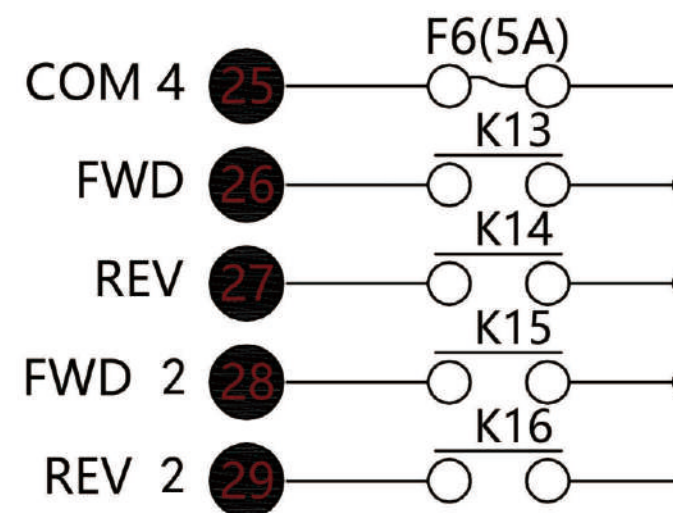
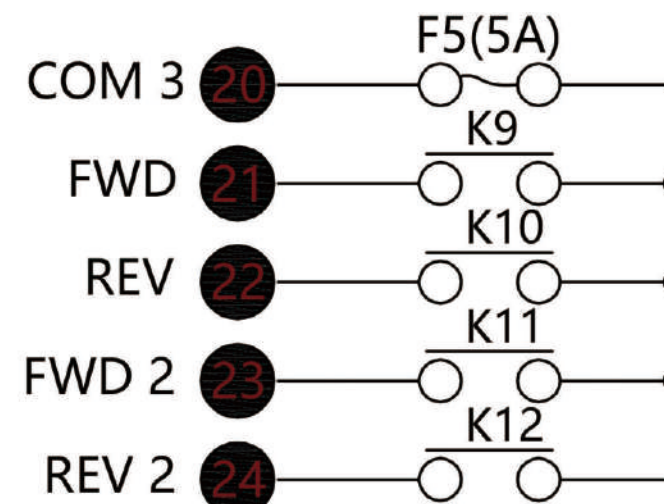
The system will be off if it has not been active which longer than five minutes.

RECEIVER	
Article no.	GGT-R01
Frequency	2.4GHz
No. of function relays	24 8A, 250V AC LED Display
No. of Estop relays	2
Power supply	24V/42V/48V AC 50/60HZ
Radio type	PLL Synthesizer/LoRa
Dimensions	260X205X70 (mm)
Protection	IP65
Temperature	-20 to +55°C
Safety level	EU Standard
Certifications	NIL
Bus system	None
Antenna type	Intern
2.4G Encryption	Address+ Encrypted
Fail Safe Features	Automatically shut down
Interference of Signals	FEC
Operatiing Range	50-100M
No. of Channels	48 Channels
TRANSMITTER	
Article no.	GGT-T01
Frequency	2.4GHz
Radio type	PLL Synthesizer/LoRa
Buttons	10 Two Speed Buttons
No. of Batteries	2*1.5V
Battery	Exchangeable
Type of Batteries	AA
Operating time with continuous usage	100 hrs
Dimensions	220x72x37 (mm)
Protection	IP65
Temperature	-20 to +55°C
Safety level	EU Standard
Certifications	NIL
On/off switch	1
2.4G Encrytion	Address+ Encrypted
Fail Safe Features	Automatically shut down
Interference of Signals	FEC
Operatiing Range	50-100M
No. of Channels	48 Channels

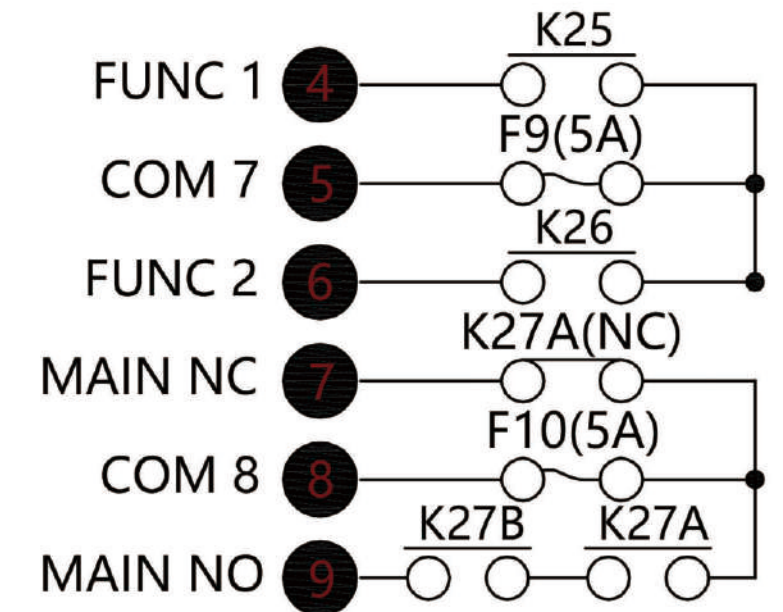
PB 1~4



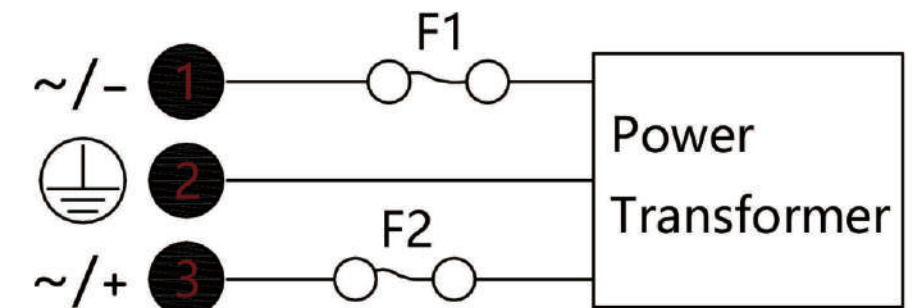
PB 5~8



MAIN / FUNC



Power



1. Overview

The terminal assignments and button functions for the Remote control system. It includes directional control (slow/fast), function buttons, illumination, start/alarm, and emergency stop.

2. Button-to-Terminal Mapping

BUTTON FUNCT	TERMINAL NO.	WIRING NO.	COMMON PT.**
Up Button (Slow)	K2	12	COM 1
Up Button (Fast)	K4	14	COM 1
Down Button (Slow)	K1	11	COM 1
Down Button (Fast)	K3	13	COM 1
Left Button (Slow)	K6	17	COM 2
Left Button (Fast)	K8	19	COM 2
Right Button (Slow)	K5	16	COM 2
Right Button (Fast)	K7	18	COM 2
Forward Button (Slow)	K10	22	COM 3
Forward Button (Fast)	K12	24	COM 3
Backward Button (Slow)	K9	21	COM 3
Backward Button (Fast)	K11	23	COM 3
A / FUNC1 Button	K25	4	COM 7
B / FUNC2 Button	K26	6	COM 7
Light Button	K13、K15	26、28	COM 4
Start + Alarm Button	K14、K16	27、29	COM 4
Stop Button	OFF K27A	7	COM 8
Emergency Stop Button	OFF K27A、K27B	9	COM 8

****COM1(WIRING NO.10), COM2(WIRING NO.15), COM3 (WIRING NO. 20), COM4(WIRING NO.25), COM7(WIRING NO. 5), COM8(WIRING NO.8)**

3. Stop Button Function

- When the remote stop button is activated , the Relays K27A is energized and the normal close contact will be opened, a signal wire can be connected from the NC contact K27A to a control system or indicator light to provide feedback in a stopped state.

4. Emergency Stop System

- *Relays K27A and K27B* are normally closed (NC) emergency stop relays.
- Pressing the *Estop Button* will open both relays, cutting power to the system immediately.
- This function ensures rapid shutdown in case of malfunction or hazard.

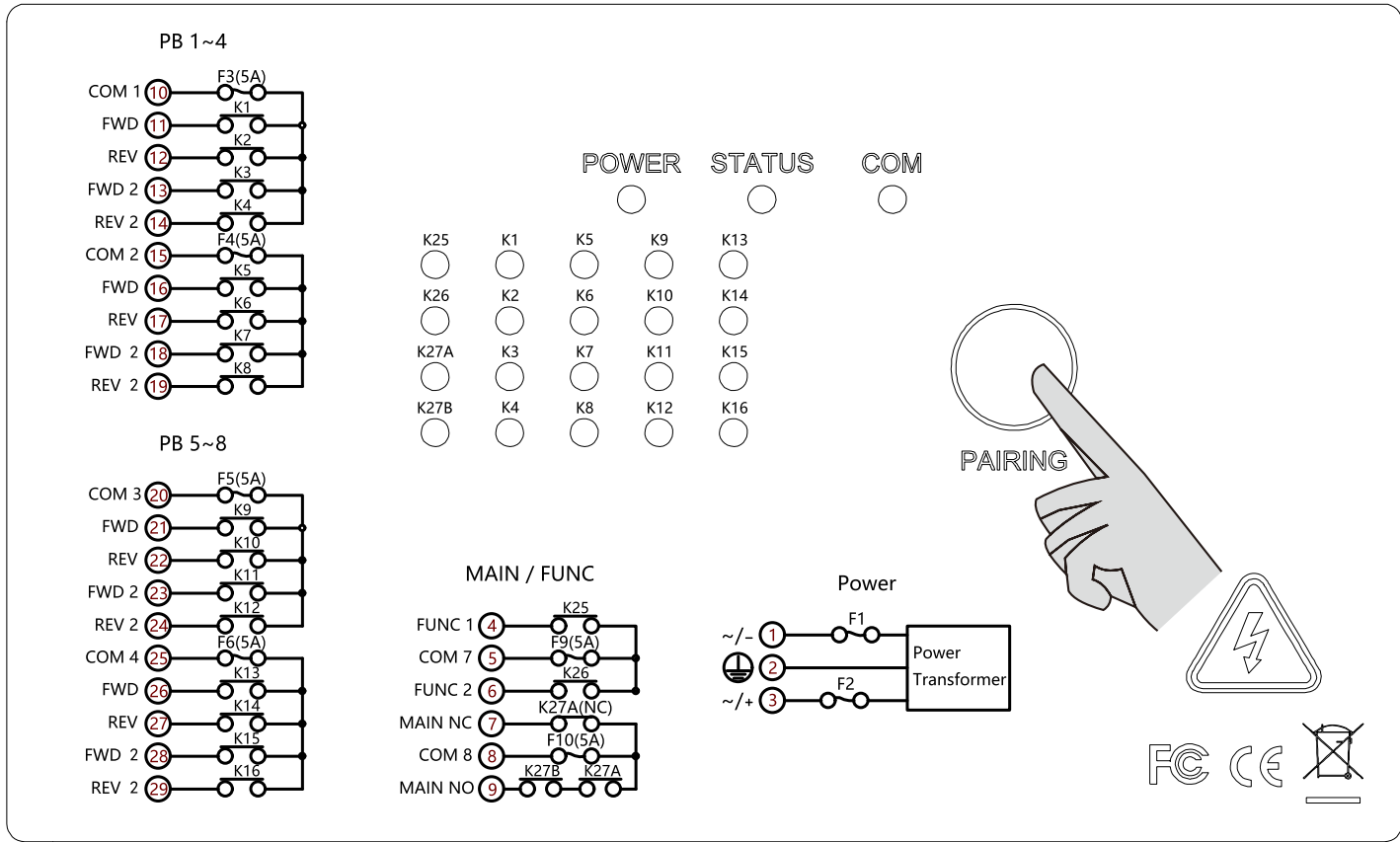
5. Power Supply

- | | |
|---------------------------|------------------------|
| - 24-72VAC/DC | -110VAC/220VAC |
| TERMINAL NO. 3(+) & 1 (-) | TERMINAL NO. 3 NEUTRAL |
| TERMINAL NO.2 EARTH | TERMINAL NO. 2 EARTH |
| | TERMINAL NO. 1 LIVE |

- All terminals are located on the main control panel and should be wired according to the schematic diagram.
- Ensure proper insulation and secure connections to avoid short circuits or signal loss.
- The system supports dual-speed directional control for precise and rapid movement.

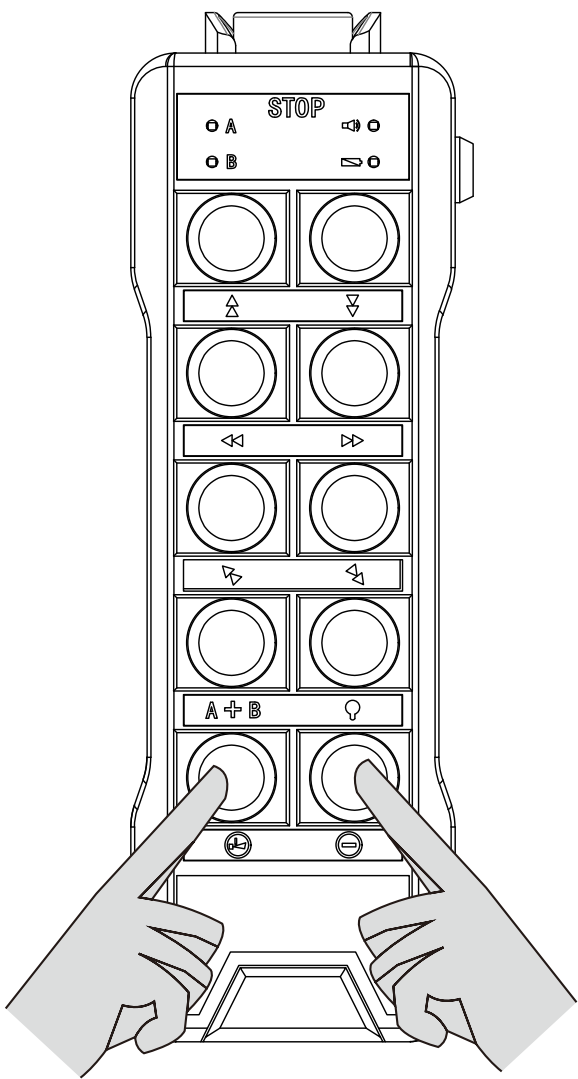
RC Pairing Instructions

Step One: Press and hold the "Pairing Button" on the receiver board for more than 2 seconds. The location is indicated by the arrow in the image below. The STATUS blue light will flash, and the device will enter pairing mode.



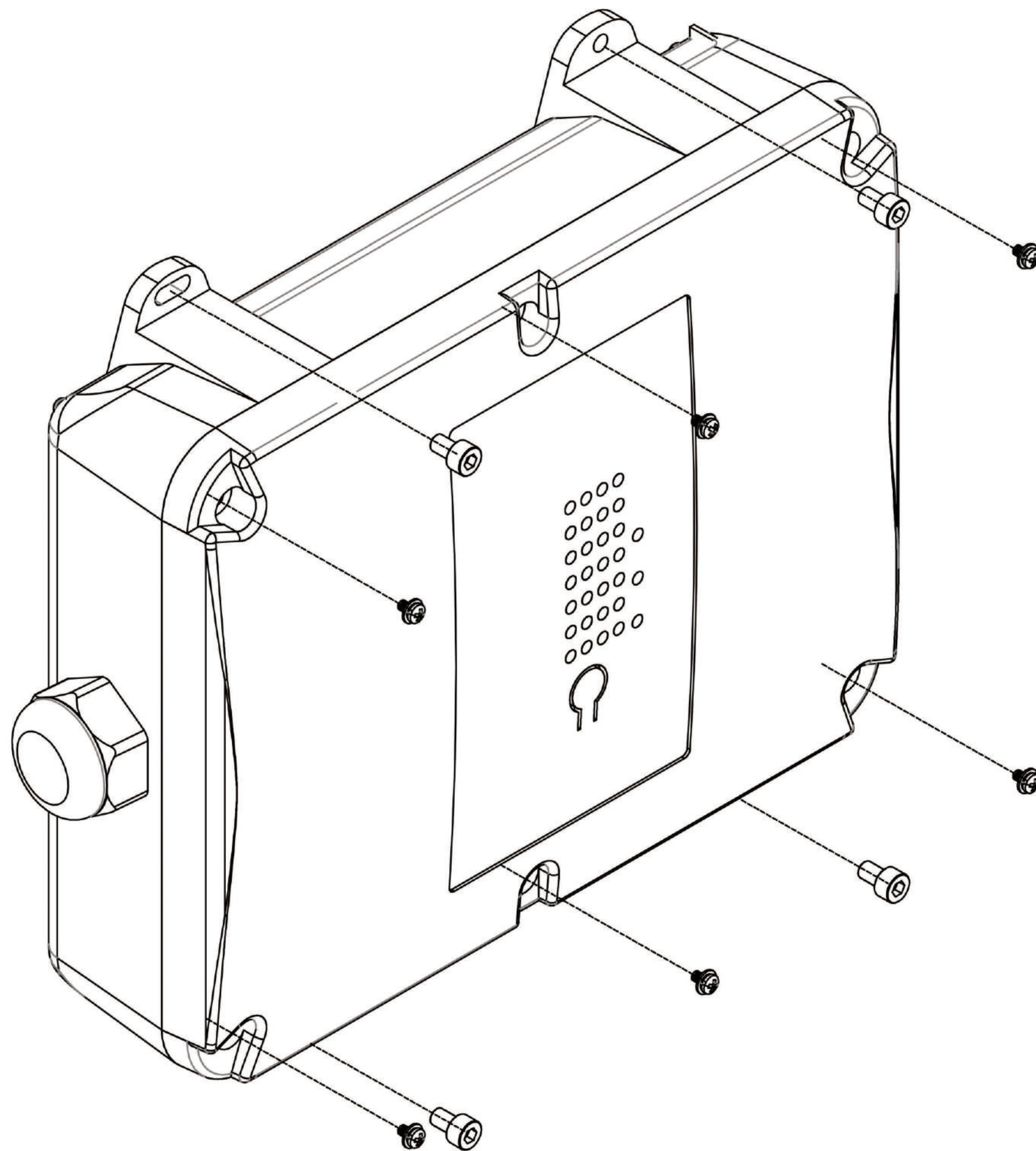
PICTURE 1

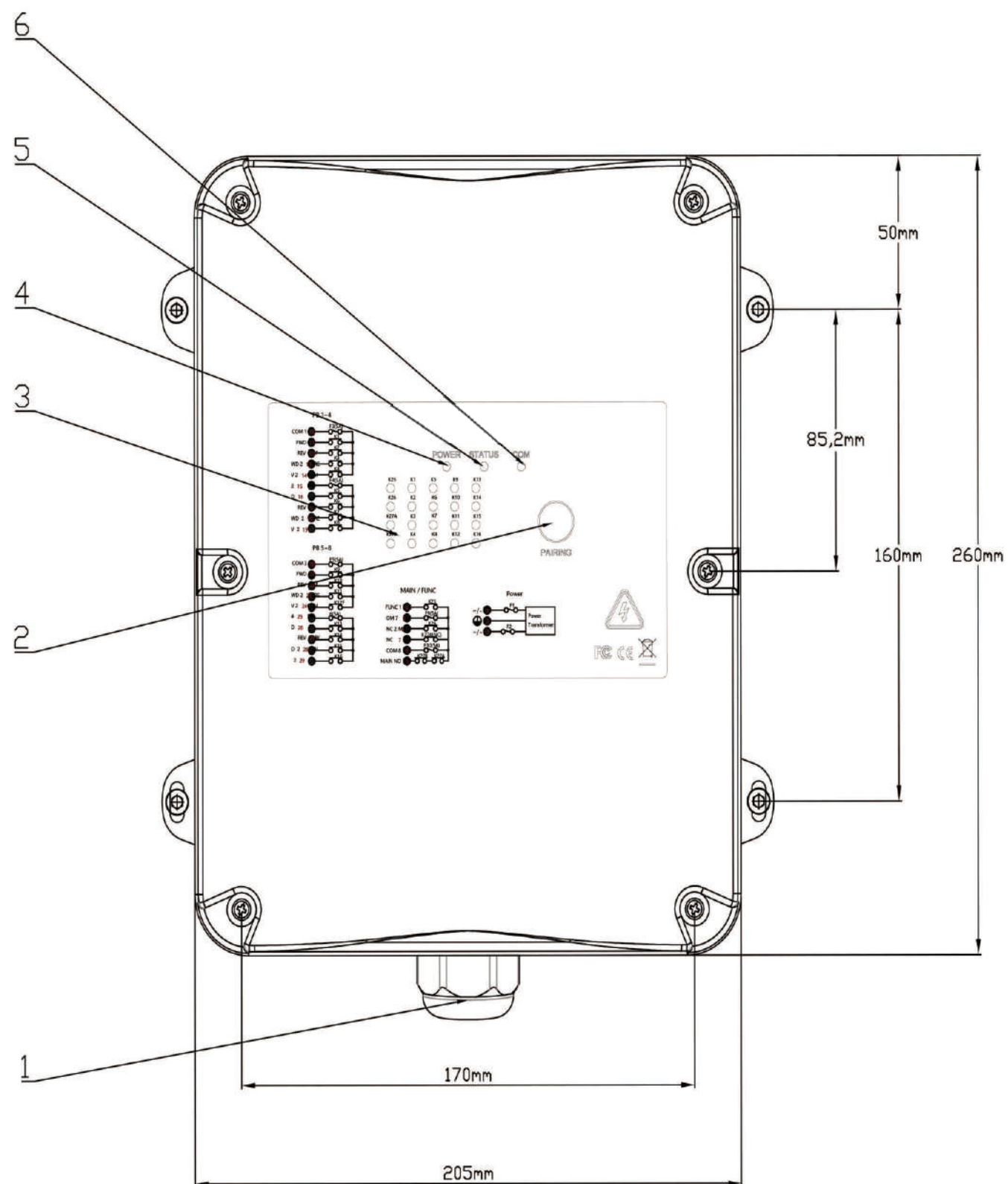
Step Two: Remove the battery from the remote control. Press and hold the two buttons shown in the image below without letting go. Reinstall the battery, then release the buttons. The remote control will now enter pairing mode.



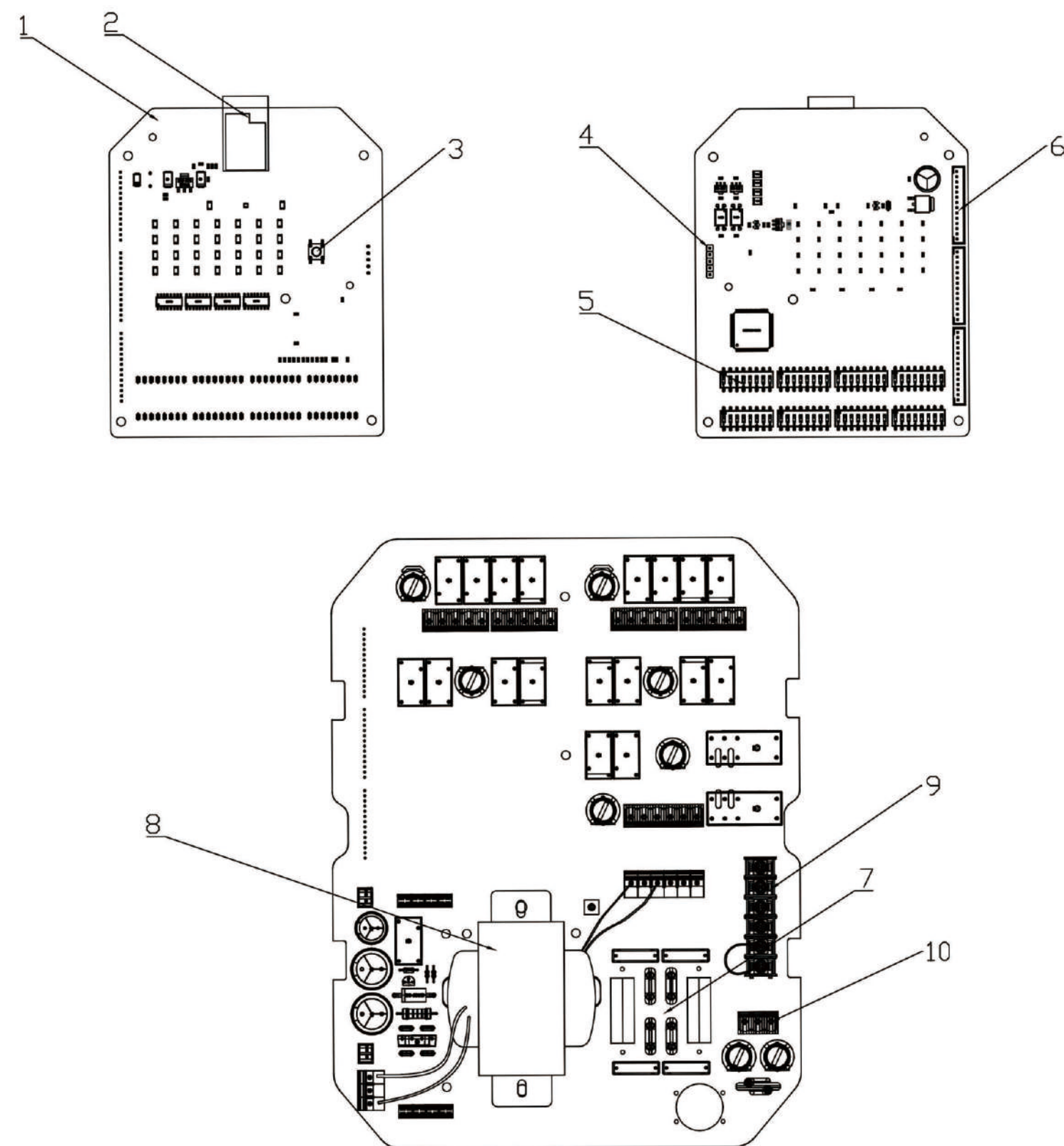
PICTURE 2

Step Three: Once pairing is successful, the blue light will stop flashing, and the green light will flash.



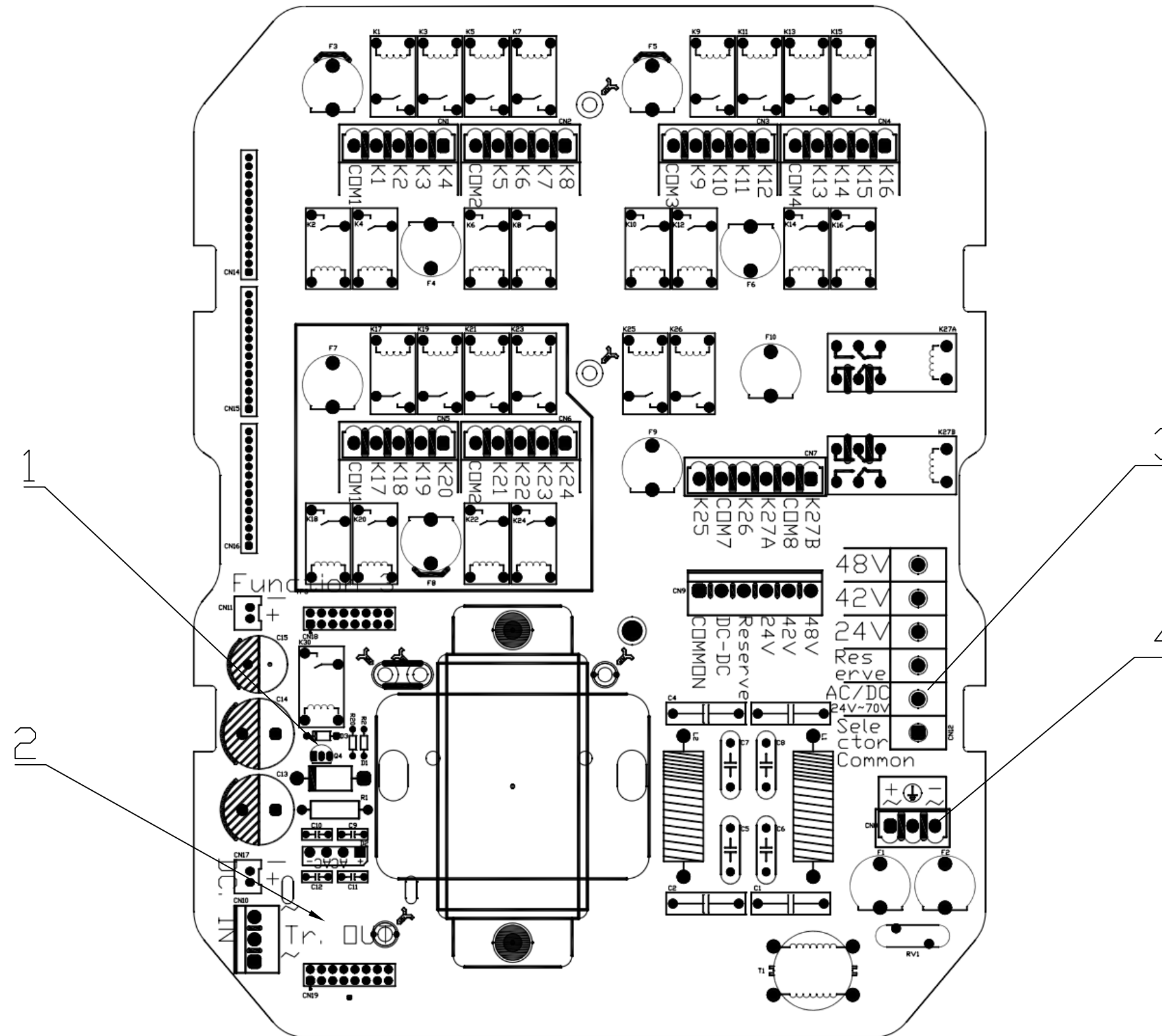


- 1. PG24 Cable Gland
- 2. Frequency Pairing Switch
- 3. Output LED
- 4. Power LED
- 5. Status LED
- 6. Com LED

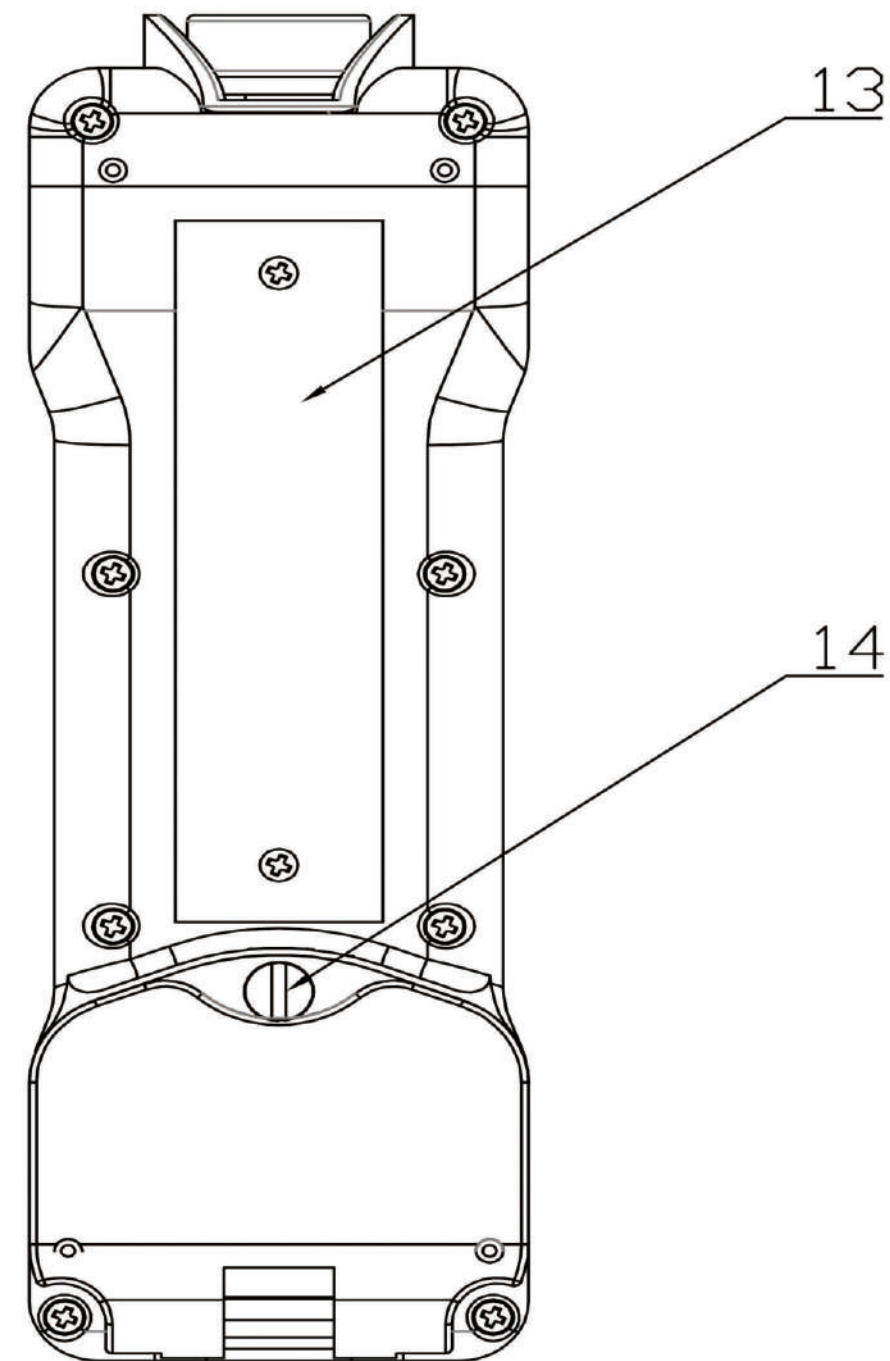
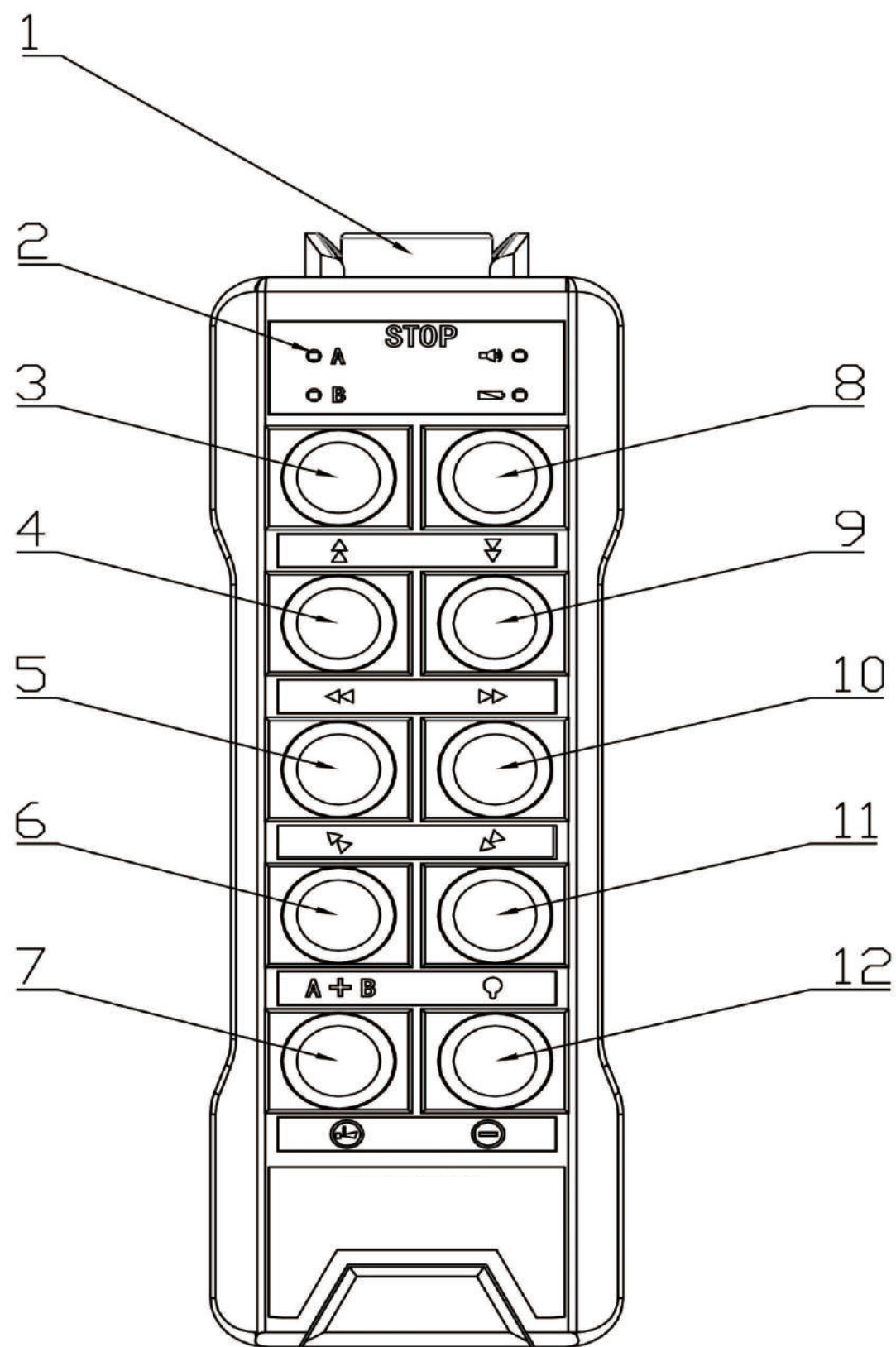


- 1. Receiver PCB
- 2. Lora 2.4 GHz wireless Module
- 3. Pairing switch
- 4. Data Up loading Connection Port
- 5. Function Dip Switches
- 6. Connection Terminals
- 7. EMC Filters
- 8. 110/220VAC Transformer
- 9. Voltage Selection Jumper
- 10. 110V/220VAC Input

AC/DC 24-70V Jumper Selection

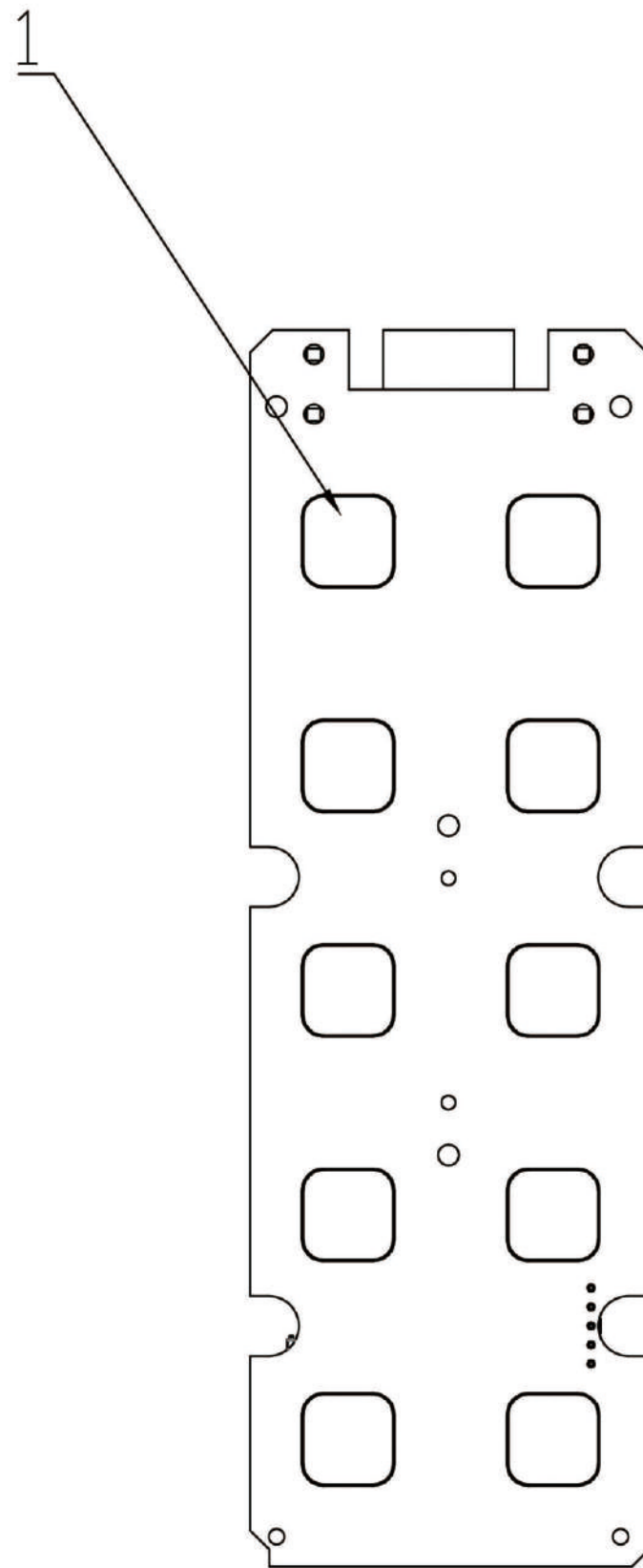


1. Power PCB
2. Connecting Line
3. AC/DC 24-70V Jumper
4. AC

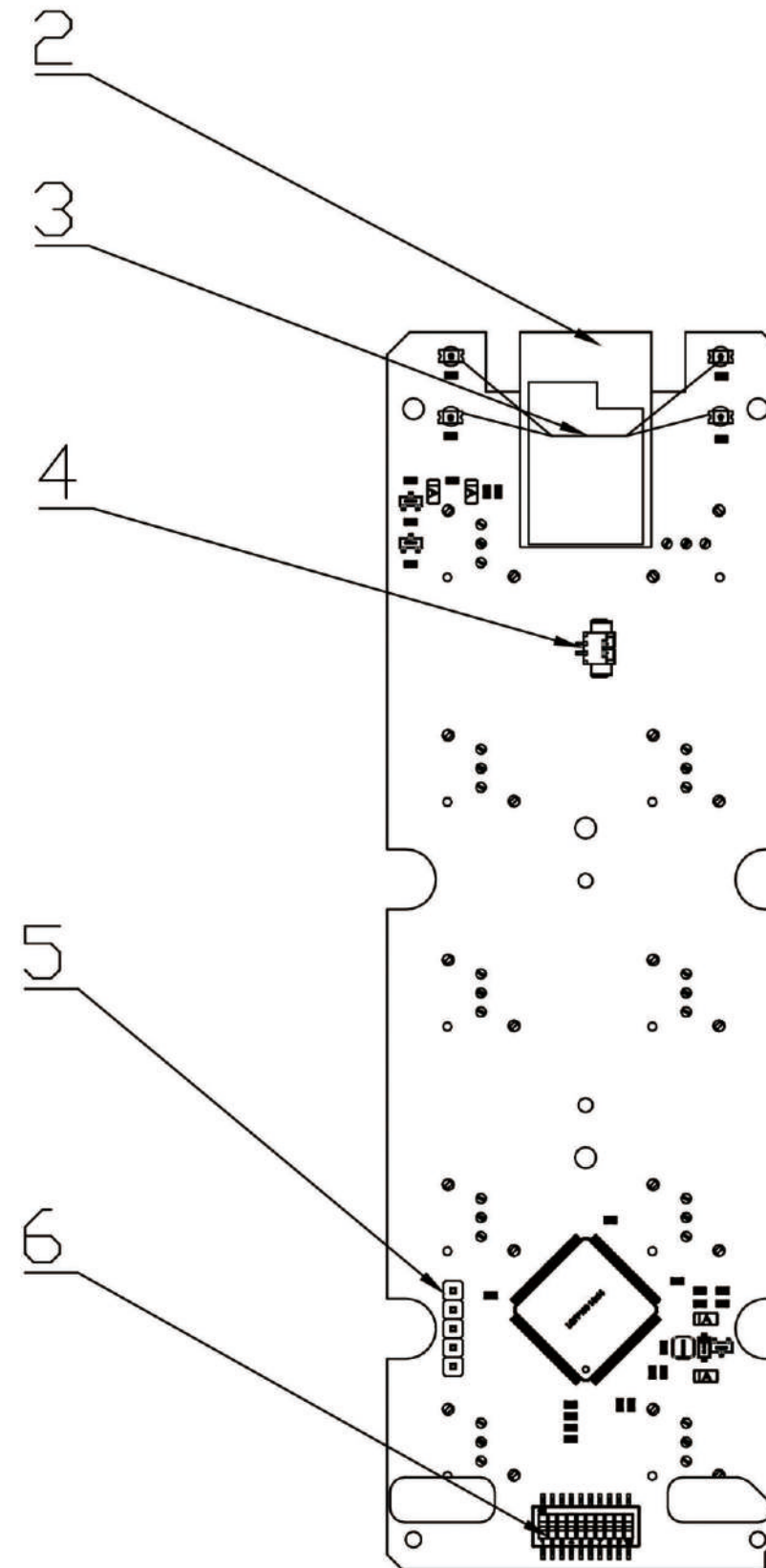


- | | |
|----------------------|-----------------------------|
| 1. Estop Button | 5. Forward Button (PB5) |
| 2. Status LED | 6. A+B Button (PB7) |
| 3. Up Button (PB1) | 7. Start/Alarm Button (PB9) |
| 4. Left Button (PB3) | 8. Down Button (PB2) |

- | | |
|---------------------------|------------------|
| 9. Right Button (PB4) | 13. Holding Belt |
| 10. Backward Button (PB6) | 14. Battery Lid |
| 11. Light Button (PB8) | |
| 12. Off Button (PB10) | |



1. Button
2. Lora 2.4 GHz wireless Module
3. Indicator lights



4. Estop button interface
5. Program update port
6. Function setting guidance

In-depth report on wireless remote control technical characteristics, mandatory safety requirements, and operating procedures

Executive Summary and Compliance Mandate

This report aims to systematically summarize and professionally analyze the key information in the Supplemental Instructions for the Wireless Remote Controller. This device is designed for remote control operation of industrial heavy machinery, including various overhead cranes, hoists, and material handling systems. The report will present, in a structured manner, the product's core technological advantages, mandatory safety requirements stipulated by laws and industry standards, and stringent regulations regarding operator qualifications, training, and conduct. The recommendations in this manual are supplementary elements of the industrial safety system. Their application must be based on specific usage scenarios and combined with the following mandatory requirements: compliance with and implementation of the operating instructions, recommendations, and safety warnings for cranes or other control and processing equipment; compliance with and implementation of the relevant rules and procedures of the employer or facility owner; and compliance with and implementation of the industrial safety standards of the country in which the equipment is located. This manual does not contain stand-alone safety warnings for cranes or other equipment. Employers, facility owners, and users have the ultimate responsibility to ensure that users fully understand, comply with, and implement all of the above requirements and receive appropriate training. Insight into critical safety isolation requirements: The core of compliance in equipment installation lies in external redundant security mechanisms. The instruction manual requires the installation of mainline contactors and brakes on the connected equipment, and the direct output of the equipment is absolutely prohibited from being connected to safety critical maintenance functions (such as magnets and vacuum pumps). To ensure fault isolation, a mechanical locking intermediate relay system with independent power supply must be provided. This is a key strategy designed to ensure a Fail safe state to address the risk of control logic and relay physical adhesion.

Chapter 1 Industrial Applications and Core Technology Architecture Analysis

1.1. Product Application Scenarios and Advanced Communication Technologies

The wireless remote control is designed for harsh industrial environments and has a wide range of applications, including overhead cranes

Machines suitable for wireless control, such as cranes, bridge cranes, overhead conveyor cranes, cantilever cranes, gantry cranes, tower cranes, electric lifts, monorail lifts, conveyor belts, and mining equipment.

1.1.1. Controller and Encoding Mechanism

The system adopts advanced technological architecture in terms of control accuracy and safety. The system core adopts dual advanced microprocessor control, which ensures the reliability and speed of control instruction processing through redundant design. To ensure the integrity of data transmission, the system is equipped with 32-bit CRC (cyclic redundancy check) and Hamming code, which enables the system to provide ultra fast, secure, accurate, and error free encoding and decoding. In industrial control, dual processor architecture and advanced encoding/verification mechanisms are key strategies for dealing with electrical noise and system failures, which can minimize the risk of unexpected operations or system loss of control caused by data errors.

1.1.2. Frequency Hopping Transceiver and Bidirectional Transmission

To ensure continuous and stable operation in complex electromagnetic environments, the remote controller uses frequency hopping radio transceiver technology. The system automatically searches for and locks onto the most ideal channel upon power-on. If interference is encountered during operation, the system will immediately switch to another interference-free channel, thus providing an uninterrupted operating environment. Furthermore, the system supports bidirectional transmission, meaning the transmitter and receiver can communicate with each other, enabling safe, precise, and uninterrupted operation. The receiver can transmit its own status, relay output status, and external device status back to the transmitter display. Bidirectional communication overcomes the limitations of traditional unidirectional control, significantly enhancing the operator's situational awareness. It allows operators to confirm the execution status of commands in real time, rather than simply sending commands, which is crucial for high-risk material handling. The system also supports...

Wireless pairing function: Enables transmitter and receiver pairing and transmitter duplication through simple wireless transmission.

1.2. Structural Durability and Power Management Design

1.2.1. Housing Material and Environmental Protection

The remote control housing is made of a robust and durable nylon and fiberglass composite material, which exhibits extremely high resistance to cracking and deformation even in the harshest environments. For fire and water resistance, the receiver housing and output cable meet UL94-V0 fire-retardant standards, while both the transmitter and receiver housings have an IP66 protection rating. The IP66 rating ensures reliable operation of the equipment in dusty, humid, or water-splashed industrial environments, maintaining system integrity.

1.2.2. Operational Reliability and Power Supply

The transmitter button is independently developed with gold-plated contacts and a perfect mechanism design, providing over 2 million press cycles. The button design emphasizes ergonomics to ensure clear tactile feedback even when the operator wears work gloves. In terms of power management, the transmitter adopts a power-saving design and only requires two AA alkaline batteries to operate continuously for more than 100 hours.

Chapter 2 Mandatory Installation and Maintenance Safety Compliance Requirements (In-depth Analysis of WARNINGS)

The safety warnings and precautions listed in this chapter are mandatory and designed to protect the safety of operators and equipment. Any failure to strictly comply may result in serious personal injury, death, or equipment damage. These rules are supplementary to existing regulations and industry standards and should not be ignored or superseded.

2.1. Device Integration and Absolute Safety Requirements

2.1.1. Mandatory Installation Requirements for External Devices

Before installing and operating this device, the user must read and thoroughly understand this manual and the operating manuals of the connected devices. For all connected equipment, such as crawler cranes, hoists, lifting devices, and similar equipment, the following two independent physical safety components must be installed:

1. Main contactor: Responsible for isolating the equipment's power supply.
2. Brake: Responsible for stopping the equipment's movement.

This ensures that even if the wireless remote control system fails, the machine itself still has an independent and reliable physical stopping mechanism.

2.1.2. Warning Devices Isolated from Safety-Critical Functions

As required by regulations or industry standards, audible and/or visual warnings must be provided on all remote control equipment, and these warning devices must meet all government requirements. In system integration, there is a top-priority safety restriction: the direct output of this product must not be directly connected to critical maintenance functions requiring dual-state safety assurance, including but not limited to magnets, vacuum pumps, pumps, or emergency equipment. For such high-risk loads, a mechanically locked intermediate relay system with independent power supply considerations must be provided. This provision addresses the most common failure mode of electromagnetic relays—relay sticking or jamming. By using mechanically locked relays, it can be ensured that in the event of control signal loss or internal relay jamming, the external circuit can still physically disconnect the power supply to the critical load, thereby achieving a highly reliable failsafe state and avoiding serious accidents caused by accidental relay conduction.

2.2. Risk Control and LOTO Procedures During Maintenance

Strict risk control procedures must be followed before performing any maintenance, installation, or handling of any remotely controlled equipment.

- 1. Comply with LOTO procedures: Before maintaining or installing any remote control equipment, the local Lockout Tagout (LOTO) procedure must be strictly followed.
- 2. Removal and marking of power: All power should always be removed from cranes, hoists, lifting devices, or similar equipment before any installation procedure. Before handling any equipment, all residual power should be consumed and marked.
- 3. Prohibition of self-repair and reporting system: Operators must not repair any radio controller themselves. If any abnormality is found in the product's performance or safety, the equipment must be stopped immediately and reported to the supervisor. If the remote control is damaged or inoperable, it should be returned to the manufacturer for inspection and repair immediately. Repair by non-professionals is strictly prohibited. This is to maintain the integrity of the remote control as a safety control component and ensure that any repairs are professionally tested and certified.

2.3. Battery Operation and Disposal Warnings

Proper battery operation, charging, and disposal procedures are crucial. Failure to follow these procedures may result in explosion or other serious damage. Furthermore, when the transmitter's low battery indicator light illuminates, the operator must immediately stop operation and must not continue using the radio control equipment.

Chapter 3 Receiver Technical Configuration and System Diagnostics

3.1. Receiver Electrical Connections and Configuration

Before installing the receiver, it is essential to check that the voltage settings match the field power supply voltage. The receiver is compatible with a variety of AC and DC voltage configurations, including 110V-220VAV, 24-72VAC, and 24-72VDC transformer configurations.

3.1.1. Relay Output Types

The receiver supports single-speed and dual-speed relay outputs. Single-speed output is the standard mode. When switching to dual-speed, the system is designed so that speed 1 relay engages and speed 2 relay engages (speed 2 relays have independent outputs), corresponding to up, down, left, right, south, and north directional control.

3.1.2. Receiver Input Voltage and Fuse Configuration Table

Fuse configuration is the core of the system's electrical safety protection, used to protect equipment in overcurrent conditions. The following table details the fuse specifications for the main circuit (F3~F10) and control circuit (F1~F2) under different voltage configurations.

Receiver Input Voltage and Fuse Configuration Table		
Applicable voltage range	Main circuit fuses (F3~F10)	Control circuit fuses (F1~F2)
110~120VAC	5.0A	2.0A
220~240VAC	5.0A	2.0A
380~400VAC	5.0A	2.0A
410~460VAC	5.0A	2.0AA
24VAC / 42 & 48VAC / 9~36VDC	5.0A	2.0A

3.2. System Status and Fault Diagnosis Indicator Explanation

Accurately understanding system status indicators is crucial for quickly identifying system operating status, communication status, and internal faults, and is the first step for maintenance personnel in troubleshooting.

3.2.1. Receiver Status Indicator (STATUS)

The receiver's STATUS indicator provides core diagnostic information, especially early warnings of internal faults. Receiver Status Indicator (STATUS)

Status Indicator	Light Status Display	System Diagnostic Fault Description
1	Green Light Flashing Fast	Decoding in progress (receiving and processing commands)
2	Green Light Flashing Slowly	Pending Decoding (Standby or Waiting to Receive)
3	Red Light Flashing 2 Times	Receiver Main Relay Stuck or Faulty (Safety Critical Fault) All critical faults
4	The red light flashes three times	Decoder malfunction (internal processing logic failure) Obstacles)
5	Blue Light Flashing	Network Pairing (Performing Wireless Pairing Operation)

The two fault modes indicated by the red light (relay jam, decoder failure) are both inherent safety issues within the system. Maintenance personnel are required to be able to quickly distinguish between physical component failures (relays) and logic control failures (decoders) based on the number of flashes, in order to efficiently take LOTO measures and perform repairs.

3.2.2. Receiver Power and Relay Board Indicator Lights

The POWER indicator light shows whether the receiver has power: lit indicates power, off indicates no power. The COM indicator light shows the power status of the relay board: lit indicates the relay board has power, off indicates the relay board has no power.

3.2.3. Transmitter Status Light Indicator

Transmitter status lights are mainly used to indicate operating status and battery health.

Transmitter Status Light Indicator	
Status Indicator	status display
1	A light is on
2	B light is on
3	Lights A and B are on.
4	The electric bell light is on
5	The battery light is on

Chapter Four: Operator Qualifications, Training, and Code of Conduct

Wireless-controlled equipment is large and typically operates at high speeds. Operators must remain focused, cautious, and vigilant at all times. The authorization, training, and behavioral requirements for operators are extremely stringent.

4.1. Qualifications and Health Standards for Authorized Operators

Only properly trained personnel designated by management are permitted to operate the control equipment. Specific restrictions apply to the health and cognitive abilities of operators:

- 1. Cognitive Ability: Operation should not be performed by anyone unable to read or understand equipment markings, notices, and operating instructions.
- 2. Physical Condition: Operation should not be performed by anyone with visual or hearing impairments, or any medical conditions that may cause impairment.
- 3. Mental State: Personnel who have consumed alcoholic beverages or taken medication, and whose mental state may be impaired, potentially leading to damage or danger to the equipment, are strictly prohibited from operating the equipment.

4.2. Mandatory Training Content and Skill Requirements

All operators must receive complete training covering the following core knowledge and skills:

- Hazard Awareness and Rules: Operators should clearly understand the hazards of operating the equipment and possess relevant knowledge and safety rules regarding wireless remote controls.
- Pre-Operation Preparation: Operators should understand the pre-operation testing procedures and have received training on wireless transmitter operation.
- Judgment and Monitoring: Operators must be able to judge the distance to moving objects; continuously monitor and track the status of the lifting load; and know how to maintain distance between operators and other personnel and the suspended load, avoiding "potentially hazardous" points.
- Warnings and Alarms: Operators should have knowledge of the use of warning lights and alarm devices.
- Procedure Compliance: Operators should understand and comply with cable and hook inspection procedures; understand and comply with all applicable operation and maintenance manuals, safety procedures, management requirements, and industry standards and specifications.
- Maintenance Compliance: When servicing radio-controlled equipment, operators should understand and comply with local safety lock and safety tag procedures.
- Anomaly Handling and Reporting: Capable of identifying and immediately reporting abnormal and unsafe operating conditions.
- Equipment Management: Possesses proper storage knowledge for idle wireless control transmitters and training on transmitter handover procedures.
- Operational Testing: Tests the transmitter's emergency stop and all warning devices before operation; a no-load test should be conducted before each shift change.

4.3. Strict Prohibited Behaviors for Operators

Operators must strictly adhere to the following prohibited behaviors to prevent operational errors and violations of safety protocols:

1. Lifting or moving objects beyond their rated load.
2. Operating material handling equipment in a direction inconsistent with the instructions on the controller.
3. Using cranes, hoists, or lifting equipment to suspend or transport personnel.
4. Suspending or carrying any items directly above personnel.
5. During operation, operators and related personnel fail to maintain distance from potential hazards.
6. Operating a crane, hoist, or lifting device when the equipment is not centered above the suspended load.
7. Operating with chains or cables not properly secured to gears, rollers, or winches.
8. Operating any damaged or malfunctioning crane or other equipment.
9. Changing settings or controls without authorization and proper training.
10. Removing or hiding any warnings or safety signs or labels.
11. Leaving the equipment unattended during hoisting operations.
12. Failing to disconnect power to the radio control equipment when it is not in operation.
13. Operating with any damaged or unsafe controller.
14. Using power other than that specified in the operating manual.
15. Continuing to operate the radio control equipment when the low battery indicator is on.
16. Repairing any radio controller without authorization.
17. Leaving the transmitter powered on and stored in a secure, dedicated storage area when not in use to prevent unauthorized use.

Chapter 5 Operating Procedures, Power Management, and Testing Requirements

5.1. Mandatory Pre-Operation Test Procedures

Operators must perform the following pre-operation test procedures at the start of each shift change, or when a new operator takes control of the crane:

1. Test all alarm devices.
2. Test all direction and speed controls.
3. Test the transmitter's emergency stop button.

It must be emphasized that these tests, especially the emergency stop and all warning device tests, should be performed under no-load conditions before each shift change to confirm that all safety functions are in good working order before actual operation begins.

5.2. Transmitter Power Management and Standby Mode (Sleep Mode) Setting

This remote control has a power management mechanism that allows setting the time for the transmitter to enter sleep mode when no buttons are pressed. This function is closely related to equipment safety: when the transmitter enters sleep mode, the receiver's main relay will release (i.e., automatically disconnect the control circuit power). This automatic relay release mechanism is an important safety feature, ensuring that connected machinery will automatically enter a passive safety state if the operator forgets to turn off the device or leaves the remote control unattended. The transmitter standby time is set via a DIP switch, and the setting determines the time the device enters sleep mode when there is no operation.

Transmitter standby time (sleep mode) DIP setting quick reference table			
Set Number	Dial setting (last three digits)	standby time	Receiver main relay status (After entering sleep)
1	000	1 minute	release
2	001	20 seconds	release
3	010	3 minutes	release
4	011	5 minutes	release
5	100	10 minutes	release
6	101	30 minutes	release
7	110	60 minutes	release
8	111	Do not enter sleep mode	Maintain suction

5.3. Battery Replacement Procedure

The transmitter uses two AA alkaline batteries. The battery replacement procedure must ensure that the equipment's protection rating is not affected:

1. Use a coin to unscrew the battery cover screw counterclockwise.
2. Open the battery cover to replace the transmitter battery.
3. When replacing the battery, it is necessary to confirm whether the polarity of the battery installation is correct (positive pole (+) connected to positive pole (+), negative pole (-) connected to negative pole (-)).
4. After installation, the screws on the battery cover must be tightened clockwise to ensure that the IP66 waterproof rating is maintained, preventing water, moisture, dust, grease, or other liquids from penetrating and protecting the internal circuit.

Conclusion and Professional Advice

Wireless remote control uses dual advanced microprocessors, CRC Hamming code, and frequency-hopping bidirectional transmission technology to ensure high-speed, accurate, and interference-resistant industrial control. Its IP66 protection rating and highly durable button design make it suitable for harsh industrial operating environments. However, the security of devices depends not only on the product itself, but also on the compliance of system integration and operational processes. This report highlights the following key security compliance requirements:

1. Mandatory System Redundancy: Mainline contactors and brakes must be installed on connected devices to provide physical redundancy for stopping mechanism
2. Safety isolation priority: It is strictly prohibited for the remote control to directly drive any safety critical maintenance functions. A mechanical locking intermediate relay system with independent power supply must be used for isolation, which is a key engineering measure to ensure the Fail safe state.
3. Personnel qualifications and training: Only authorized and professionally trained personnel are allowed to operate, and the training content covers risk assessment, safe distance maintenance, LOTO procedure compliance, and immediate fault reporting.
4. Operation testing and power management: The non load emergency stop test before each shift change is a non-negotiable mandatory operation. The mechanism of automatic release of the receiver main relay in the transmitter sleep mode provides important secondary safety protection for unmanned operation.

Operations management and the HSE (Health, Safety and Environment) department must incorporate the list of warnings and prohibitions in this manual into their Standardized Operating Procedures (SOPs) and ongoing training programs to ensure a zero-accident risk target for on-site operations. Any violation of operating, maintenance, or repair regulations will directly result in legal compliance risks and potential personal injury.