

Alpha 4000 Series

Industrial Radio Remote Control System

Operation & Parts Manual

Fomotech International Corp.

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2. INSTRUCTION

The Alpha 4000 series are highly durable, reliable and safe industrial radio remote control systems. The versatile features of the Alpha 4000 series permit their use in many different remote control applications. The systems can be used to control factory cranes, monorail systems, multiple hoists, trolleys, mining equipment, building construction equipment, automatic control systems, and many others.

The system incorporates numerous safety circuits that guaranty maximum security and ensure the system is resistant to outside interference. The major features of the Alpha 4000 series are as follow:

1. Alpha 4000 systems have the automatic shut-off function, when encountering strong radio interference, and when the transmitter/operator is out of receiving range. The receiver will start the automatic shutdown function in 0.55 seconds.
2. The system is equipped with highly evolved software that has error checking and correcting capabilities to ensure 100% error-free transmission, decoding, and control of all output relays. This highly evolved software includes CRC (Cyclical Redundancy Check) and Hamming Codes (Error Recovery) programming.
3. The transmitter encoder and receiver decoder both utilize advanced microprocessor control. The availability of 65,536 sets of unique ID codes will ensure that only commands from the matching control transmitter can be carried out without any interference from other radio systems.
4. The system also utilizes advanced microprocessor control (watch dog) for data comparison and crosschecking between the two decoding microprocessors. When fault are detected via this central microprocessor, for maximum safety, the entire system will be shutdown immediately to avoid possibility of any accidents occurring.
5. The Alpha 4000 series is equipped with numerous self-diagnosing functions:
 - MODE 1 (safe mode): Transmitter continuous sending signal to receiver for a period of time. (Transmitting time options: 40 seconds, 1 minutes, 3 minutes, 5 minutes, 10 minutes, 15 minutes, 30 minutes, 60 minutes or lasting) When set transmitter continuous transmitting time at 40 seconds, if user has not depressed the transmitter buttons in 40 seconds, the transmitter will be automatic “off”. When the transmitter power is turned off, the receiver MAIN is also deactivated (open).
 - MODE 0 (power-saving mode): Only when depressing transmitter buttons, transmitter send signal to receiver.

Alpha 4000 series includes one receiver, transmitter and battery charger. The major features as follows:

1. The transmitter casings are molded using industrial strength composite materials which are impervious to dust, water, oil, acids, alkaline, heat and sunlight as well as being resistant to deformation due to long term use in harsh environments. The pushbuttons are also constructed from industrial strength composite materials with minimum of up to one million press cycles.

2. Sensor-type battery charging. Metal and open type contact of battery charger provides waterproof and strong construction of transmitter that fits every kind of environment. It also enables transmitter to charge simply by putting it on battery charger.
3. The receiver manufactured by metal material to avoid strong radio interference and protect the internal circuits.
4. Receiver internal circuits and modules are replaceable, such as RX modules card, decoder card, output relay card and power supply card.
5. The system utilizes PLL synthesized RF transmission. It allows the user to select from 63 sets of frequency channels best suited for the environment. The frequency channel is selected via simple dip-switch settings inside the transmitter and receiver unit.
6. The transmitter and receiver both can be designed function at chip card.
7. Base on the system type selected, you may create all kinds of combination with the software to fit different working environment.

3. SAFETY INSTRUCTION

The following instructions should be strictly followed:

1. Make a daily check of the transmitter casing, pushbuttons and pushbutton rubber boot. Should it appear that anything could inhibit the proper operation of the transmitter unit, it should be immediately removed from service.
2. Do not heat the battery or throw it into the fire. Do not touch the gold marking, for instance, chip card, relay board, RX module and decoder board socket.
3. The transmitter voltage should be checked on a daily basis. If the voltage is low, the battery pack should be recharged or replaced.
4. The emergency stop button (EMS) should be checked at the beginning of each shift to ensure they are in the proper working order.
5. In the event of an emergency, push down the emergency stop button immediately to deactivate the receiver main relay. Then turned the power “off” from the main power source of the equipment.
6. The transmitter power key should be pulled “off” after each use and should never leave the transmitter in the power “on” position when the unit is unattended.
7. Never operate a crane or equipment with two (2) transmitter units at the same time with the same frequency channel and ID code.
8. Do not use the same frequency channel and ID code as any other unit in use at the same facility or within distance of 300 meters.
9. Ensure the waist belt and the shoulder strap is worn at all time during operation to avoid accidental damages to the transmitter box.
10. Should the transmitters and receivers need to be repaired or adjusted, please refer all the services to the qualified service personnel. (Do not change parts like transistors, quartz... by yourselves.)

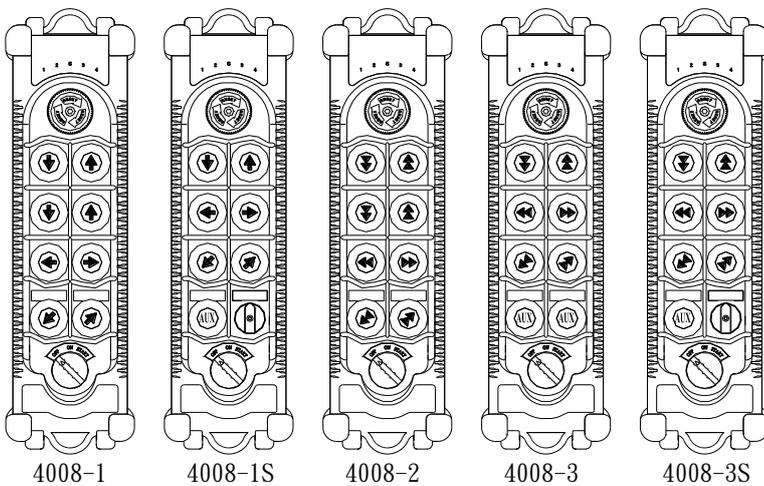
4. INTRODUCTIONS

4.1 System Types

4.1.1 8-pushbutton types :

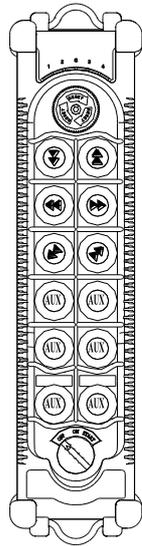
- (1) 4008-2 : 8 double speed pushbuttons
- (2) 4008-3 : 6 double speed pushbuttons + 2 single speed pushbuttons
- (3) 4008-3S : 6 double speed pushbuttons + 1 single speed pushbutton + 1 selector switch*

(* Selector switch: 2-stage or 3-stage selector switch)

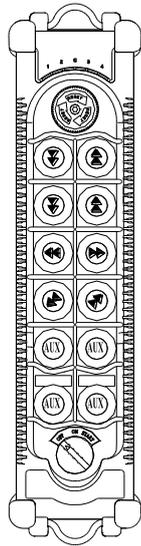


4.1.2 12-pushbutton types :

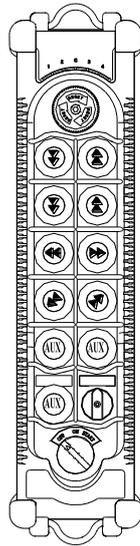
- (1) 4012-2 : 6 double speed pushbuttons + 6 single speed pushbuttons
 - (2) 4012-3 : 8 double speed pushbuttons + 4 single speed pushbuttons
 - (3) 4012-3S : 8 double speed pushbuttons + 3 single speed pushbuttons + 1 selector switch*
- (* Selector switch: 2-stage or 3-stage selector switch)



4012-2



4012-3



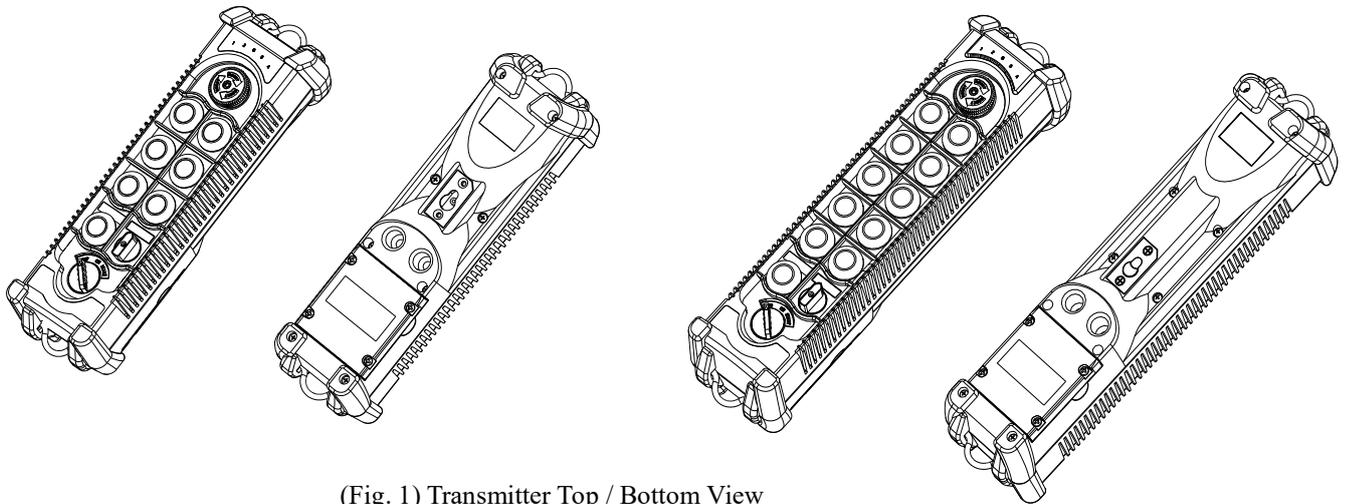
4012-3S

4.2 Transmitter Outline

4.2.1 Transmitter Outline

8 pushbuttons: 231mm × 65mm × 52mm

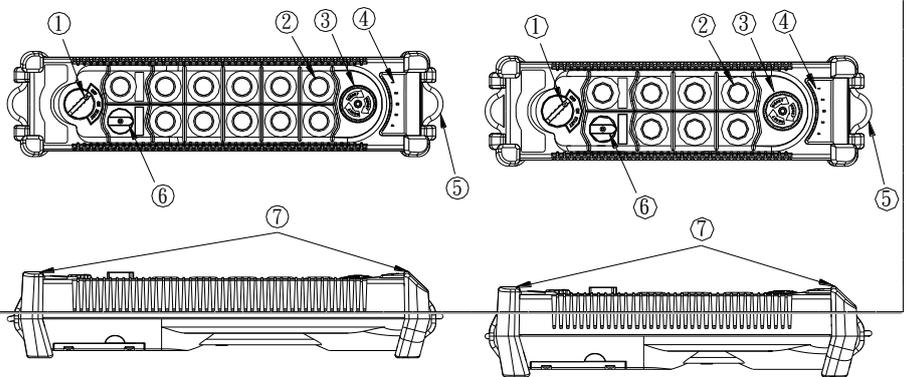
12 pushbuttons: 272mm × 65mm × 52mm



(Fig. 1) Transmitter Top / Bottom View

4.2.2 Transmitter External Descriptions

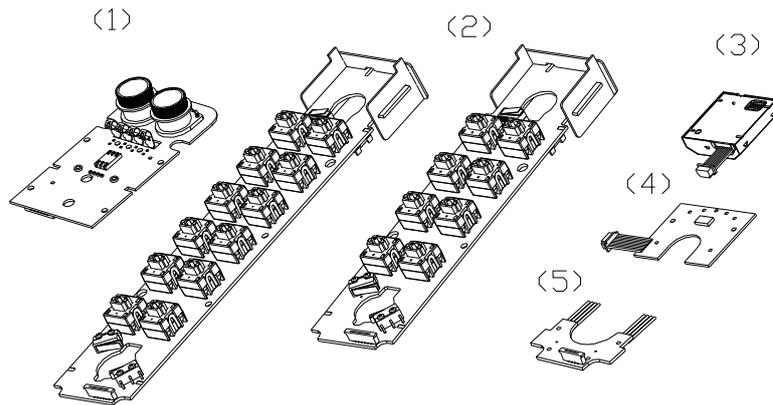
1. On / Off switch
2. Function key
3. Emergency stop button (EMS)
4. Status LED display



- 5. Shoulder strap holder
- 6. Selector switch
- 7. Anti-hit rubber
- 8. Lithium battery
- 9. Battery charging slot
- 10. Battery charging fixed position
- 11. System information

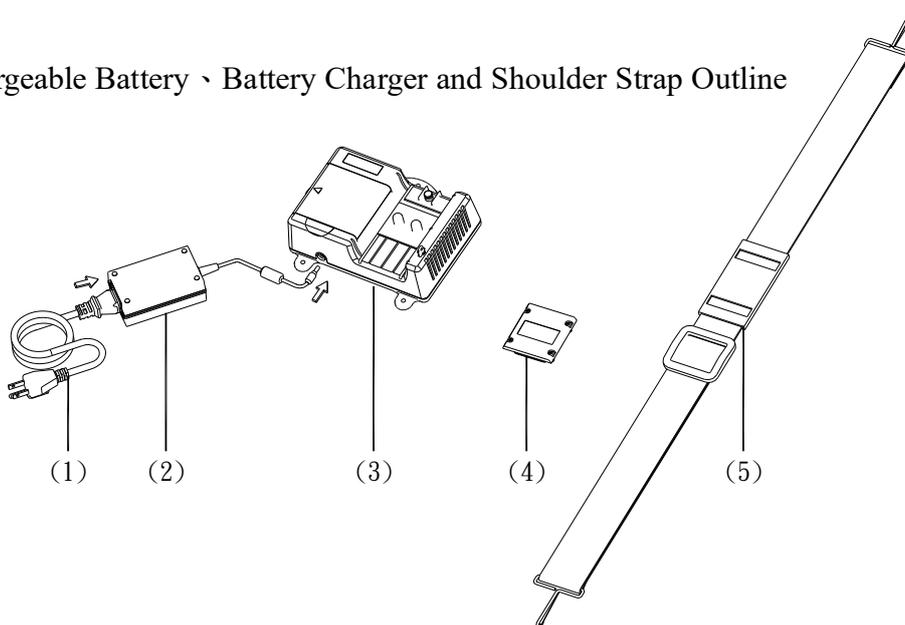
(Fig. 2) Transmitter External Views

4.2.3 Transmitter Interior Descriptions

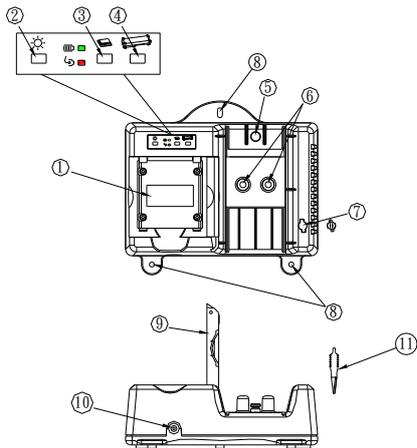


(Fig. 3) (1) Recharging chip card (2) Encoder Board (3) TX module (4) LED card (5) 3-stage select switch board

4.2.4 Rechargeable Battery , Battery Charger and Shoulder Strap Outline



4.2.5 Battery Charger External Descriptions



- (1) Charging compartment
- (2) Power LED
- (3) Battery pack charging LED
- (4) Transmitter charging LED
- (5) Charging fixing pole
- (6) Induction charging poles
- (7) Slot for cleaning tool
- (8) Charger mounting holes
- (9) Charger cover for battery pack
- (10) Power socket
- (11) Cleaning tool for transmitter charging slot

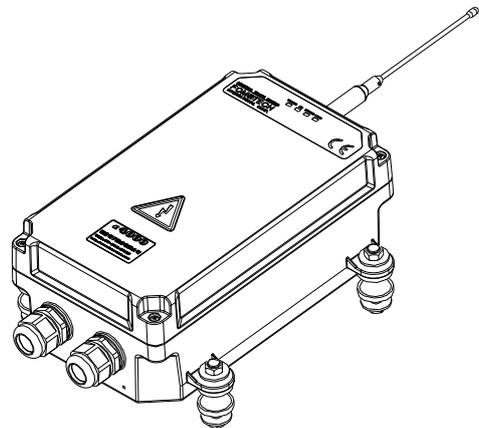
(Fig.5) Battery Charger External Descriptions

4.3 Receiver Introduction

4.3.1 Receiver Outline

300mm × 171mm × 115mm

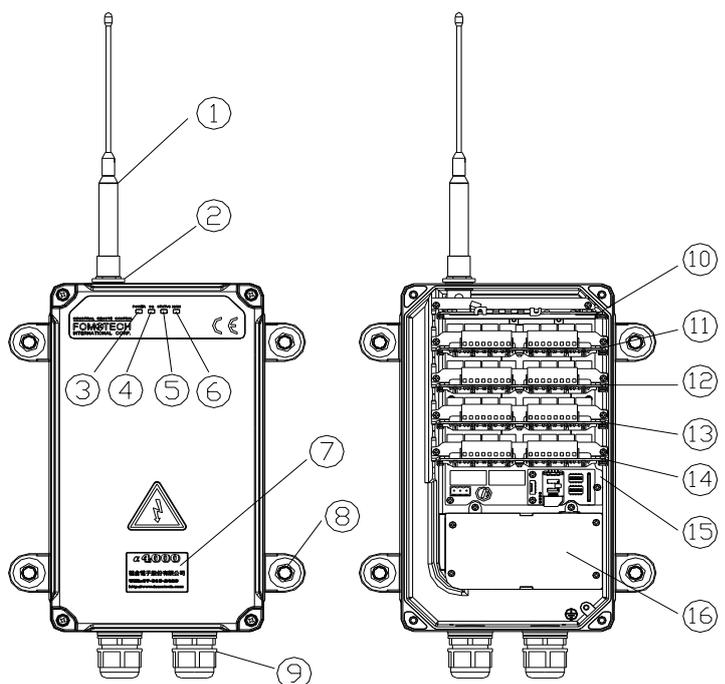
(Antenna and plug-in socket excluded)



(Fig. 6) Receiver Outline

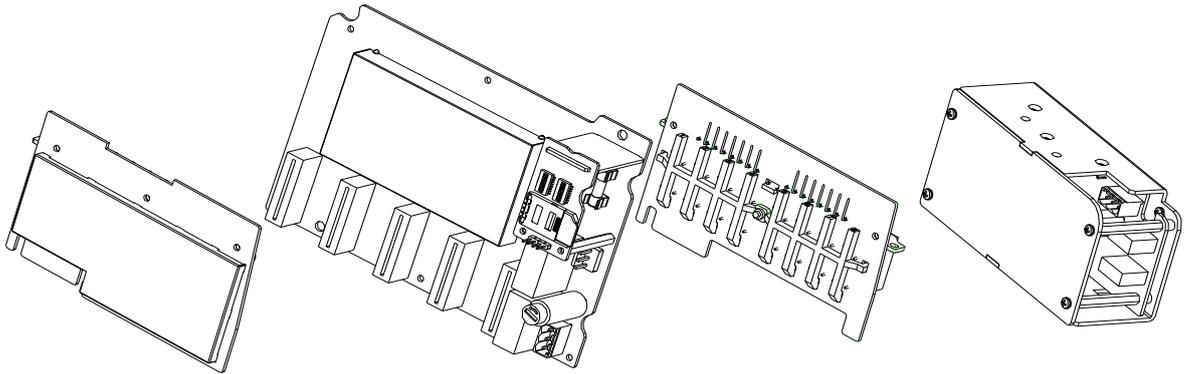
4.3.2 Receiver External Descriptions

1. Antenna
2. Antenna port
3. AC power display
4. SQ Status Display
5. Status display
6. Main relay display
7. System information plate
8. Shock absorber*4
9. Cable gland*2
10. RX module card
11. Output relay card I
12. Output relay card II
13. Output relay card III
14. Output relay card IV
15. Decoder card
16. Power supply card



(Fig.7) Receiver External View

4.3.3 (1) RX Module Card (2) Decoder Card (3) Output Relay Card (4) Power Supply Card



5. SYSTEM CONFIGURATIONS

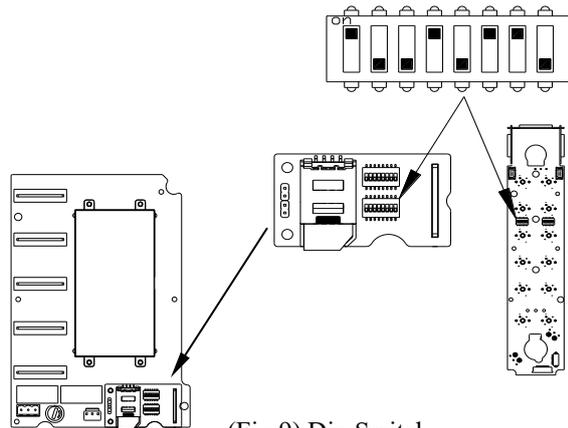
5.1 Security ID Code Settings

Transmitter ID code can be readjusted via an 8-position dip-switch located on the encoder board. Receiver ID code also can be readjusted via an 8-position dip-switch located on the chip card of the decoder card. (Refer to Fig.9)

Example: ID code → 10010110

Top slot: "1"

Bottom slot: "0"



(Fig.9) Dip Switch

5.2 Frequency (RF) Channel Settings

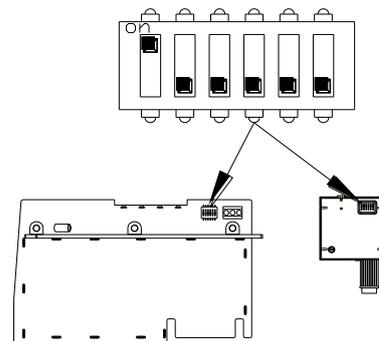
Both transmitter and receiver frequency channel can be readjusted via a 6-position frequency dip-switch located on the TX module and RX module. (Refer to Fig.10).

When the frequency dip-switch ID is not pre-set, (000000) the channel has to be set by SIM card. If the dip-switch is set as below drawing, i.e. channel 01 (100000) / 433.075MHz, then the SIM card setting will be replaced by frequency dip-switch setting.

Example: Channel 01 (100000) / Frequency 433.075MHZ

Top slot: "1"

Bottom slot: "0"



(Fig. 10) Frequency Dip Switch

5.3 Frequency (RF) Channel Table

FREQUENCY	DIP-SWITCH SETTING	CHANNEL
433.075 MHz	100000	01
433.100 MHz	010000	02
433.125 MHz	110000	03
433.150 MHz	001000	04
433.175 MHz	101000	05
433.200 MHz	011000	06
433.225 MHz	111000	07
433.250 MHz	000100	08
433.275 MHz	100100	09
433.300 MHz	010100	10
433.325 MHz	110100	11
433.350 MHz	001100	12
433.375 MHz	101100	13
433.400 MHz	011100	14
433.425 MHz	111100	15
433.450 MHz	000010	16
433.475 MHz	100010	17
433.500 MHz	010010	18
433.525 MHz	110010	19
433.550 MHz	001010	20
433.575 MHz	101010	21

434.100 MHz	011010	22
434.125 MHz	111010	23
434.150 MHz	000110	24
434.175 MHz	100110	25
434.200 MHz	010110	26
434.225 MHz	110110	27
434.250 MHz	001110	28
434.275 MHz	101110	29
434.300 MHz	011110	30
434.325 MHz	111110	31
434.350 MHz	000001	32
434.375 MHz	100001	33
434.400 MHz	010001	34
434.425 MHz	110001	35
434.450 MHz	001001	36

FREQUENCY	DIP-SWITCH SETTING	CHANNEL
434.475 MHz	101001	37
434.500 MHz	011001	38
434.525 MHz	111001	39
434.550 MHz	000101	40
434.575 MHz	100101	41
434.600 MHz	010101	42
434.625 MHz	110101	43
434.650 MHz	001101	44
434.675 MHz	101101	45
434.700 MHz	011101	46
434.725 MHz	111101	47
434.750 MHz	000011	48
434.775 MHz	100011	49
433.325 MHz	010011	50
433.350 MHz	110011	51
433.375 MHz	001011	52
433.400 MHz	101011	53
433.425 MHz	011011	54
433.450 MHz	111011	55
433.475 MHz	000111	56
433.500 MHz	100111	57
433.525 MHz	010111	58
433.550 MHz	110111	59
433.575 MHz	001111	60
433.600 MHz	101111	61
433.625 MHz	011111	62
433.650 MHz	111111	63

6. TRANSMITTER OPERATION

6.1 Transmitter Operation

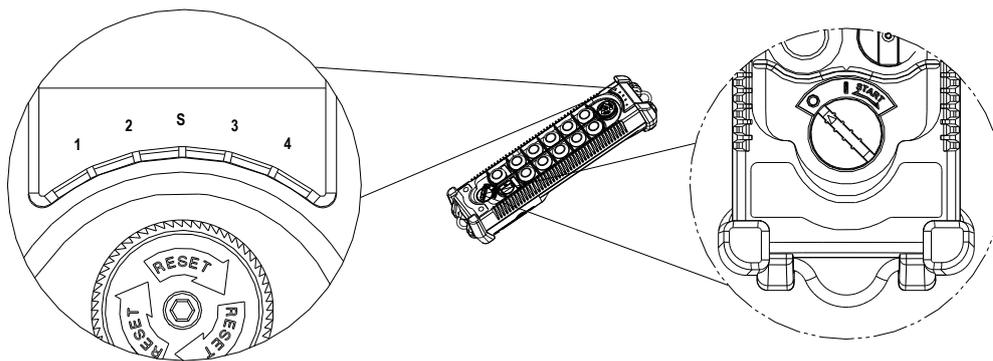
1. Make sure that the red emergency stop button (EMS) is twist elevated before the transmitter power is turned on.
2. To turn on the transmitter, rotate the power switch (O) → (I) → (Start) without pressing any pushbutton. (refer to “Transmitter Status LED Display” as below)
3. The transmitter can be operated after the “power on” LED status display is off. After operation is finished, rotate the power switch to “0” position to switch off the transmitter.
4. In case of any emergency, press emergency stop button immediately to unlatch MAIN relay.



In case of any emergency, please press the emergency stop button first and then switch off the transmitter power.

6.2 Transmitter LED Display

1. Transmitter LED Display



(Fig.11) Transmitter LED display

2. Transmitter Status LED Display:

LED STATUS DISPLAY	REASON
Green S (on) → 0.1 sec; (off) → 0.9 sec	Standby
0.2 sec. per step: Red (S) → (2+S+3) → (1+2+S+3+4) → Green (S) → (2+S+3) → (1+2+S+3+4) → off	Transmitter power “on”
Green S (on) → 0.1 sec; (off) → 0.1 sec	Transmitter active
Refer to Battery Power LED Display	Charging
8 blinks: Red (on) → 0.1 sec. (off) → 0.3 sec.	CPU I/O error

2 blinks: Red (on) → 0.1 sec. (off) → 0.3 sec.	Low battery voltage or out of battery
7 blinks: Red (on) → 0.1 sec. (off) → 0.3 sec.	EEPORM error
5 blinks: Red (on) → 0.1 sec. (off) → 0.3 sec.	No Chip card is inserted

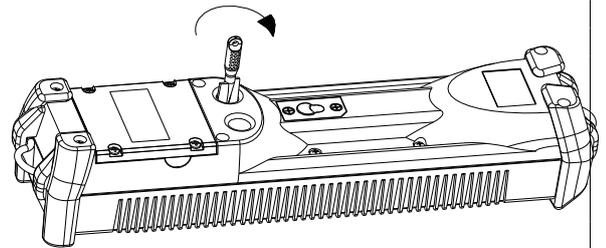
LED STATUS DISPLAY	REASON
6 blinks: Red (on) → 0.1 sec. (off) → 0.3 sec.	Chip card data error
4 blinks: Red (on) → 0.1 sec. (off) → 0.3 sec.	TX module defective
3 blinks: Red (on) → 0.1 sec. (off) → 0.3 sec.	Jammed or defective pushbutton
Red (on) → 0.1 second (off) → 0.1 second	Emergency stop or POS function started (refer to note)
	Emergency stop with pressing pushbutton or pushbuttons jammed
Red (on) → 0.1 second (off) → 0.9 second	Transmitter low-voltage warning
0.5 sec. per step: Green (1) → (1+2) → (1+2+S) → (1+2+S+3) → (1+2+S+3+4)	Update the chip card
0.5 sec. per step: Green (4) → (3+4) → (S+3+4) → (2+S+3+4) → (1+2+S+3+4)	Copy CPU data to chip card

Note: POS = Power Off Stop: When the power switch is rotated to (Off) position, transmitter will send “Stop” codes.

6.3 Transmitter Maintenance

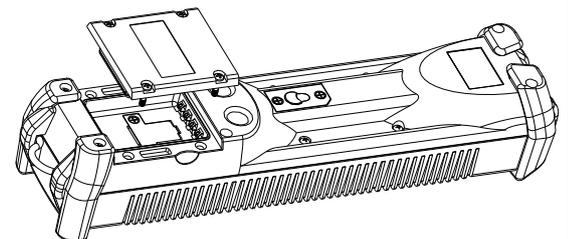
Check transmitter appearance:

- A. Check the transmitter enclosure, pushbutton rubber boot and transmitter anti-hit rubber.
In case of breakage, please replace as soon as possible.
- B. Always keep the induction charging holes clean prior to charging. In case of any dirt, please use the cleaning tool to clean.
- C. To check if the battery is running out, rotate the
- D. transmitter power switch to “On” position and see if the LED displays “S” blinking green.



4. Loading the battery:

Remove the battery cover screws on the back of transmitter and load the battery.



(Fig.12) Lithium battery loading/removing

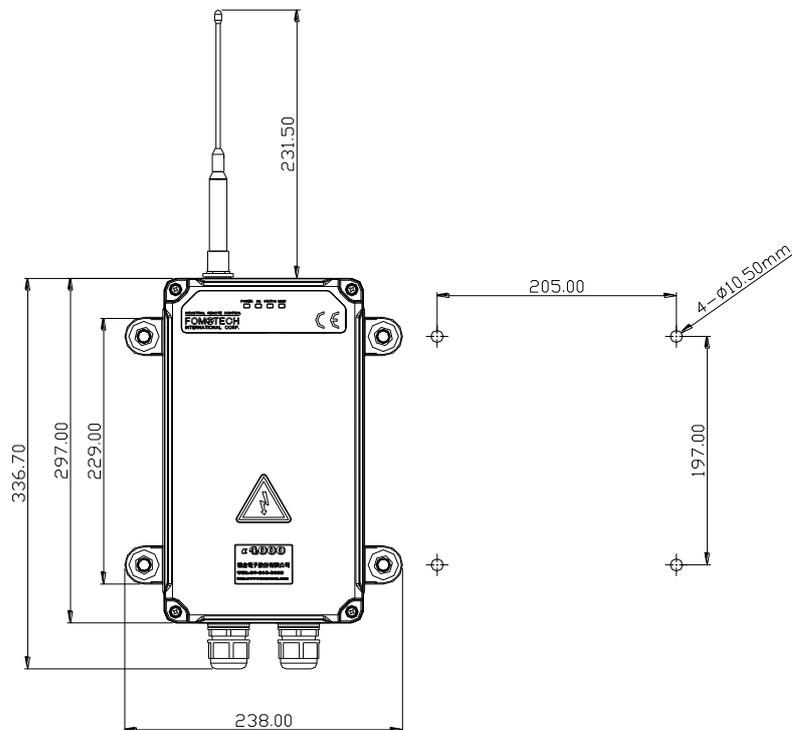
7. RECEIVER INSTALLATION

7.1 Preparation for Installation

1. Required Tools:

- | | |
|------------------------------------|--|
| (1) Flat Head Screwdriver (-) | (6) Power Drill with $\phi 10.5$ mm ~ $\phi 11$ mm Drill-Bit |
| (2) 5mm Wrench X 6 | (7) Long nose pliers |
| (3) Multi-Meters | (8) Cutter pliers |
| (4) Box end wrench or 14 mm Wrench | (9) Output Cables ($\phi 13$ mm~ $\phi 18$ mm) and wiring materials |
| (5) Power Drill | |

2. Receiver Mounting Dimension

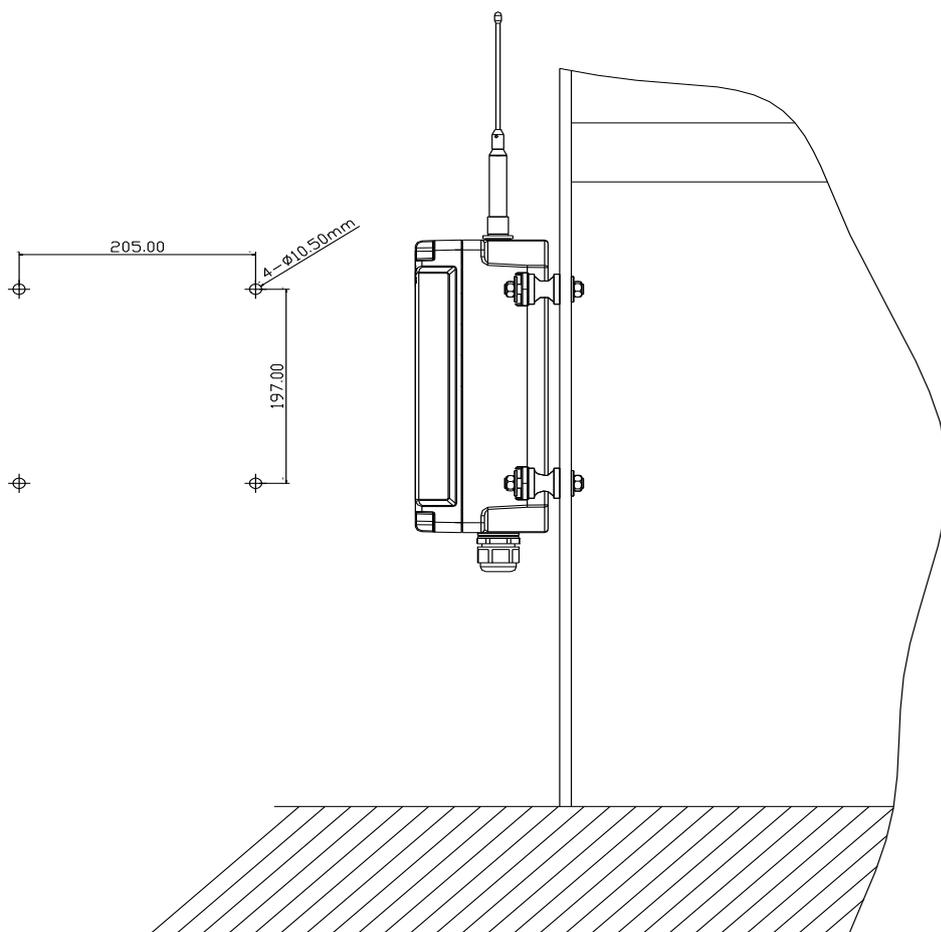


(Fig.13) Receiver Mounting Dimension

3. Ensure receiver is not set to the same frequency channel and ID code as any other units in use at the same facility or within distance of 300 meters.
4. Prior to installation, make sure that the crane or equipment itself is working properly.
5. Use the multi-meter to check the voltage source available and ensure the receiver voltage setting matches your power source. Prior to installation, switch off the main power source to the crane or equipment.

7.2 Step-by-Step Receiver Installation

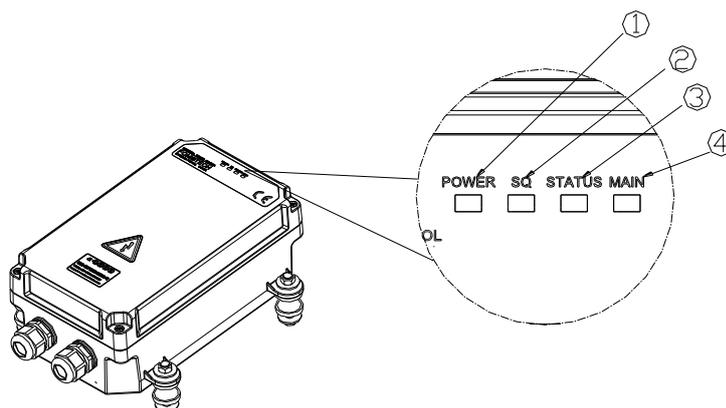
1. Select a suitable location to mount the receiver.
2. As much as possible, the location selected should be has the antenna visible from all areas where the transmitter is to be used.
3. The location selected should not be exposed to high levels of electric noise.
4. Ensure the selected location has adequate space to accommodate the receiver enclosure.
5. The distance between the antenna and the control panel should be as far as possible.
6. Drill four holes on the control panel (10.50mm)
7. Tighten all screws provided.
8. Ensure AC ground is connected to the power input terminal block otherwise chassis ground should be connected to the chassis ground connection hole on the receiver enclosure.
9. Ensure all wiring is correct and safely secured and all screws are fastened.



(Fig. 14) Receiver mounting position

7.3 Receiver Status LED Displays

1. Receiver Status LED Display



(Fig 15) Receiver Status LED Display

- | | |
|-------------------------------|--------------------------------|
| 1. Receiver Power Display | 3. Receiver Status Display |
| 2. Receiver SQ Status Display | 4. Receiver MAIN Relay Display |

2. Receiver Central CPU Status LED Display

LED INDICATION	REASON
Constant (Green)	Transmitted signals detected and received
Fast Blinks (Green 0.1 sec/ Red 0.1 sec)	Transmitter power (on) step incorrect
Blinks (Green)→ 0.1 sec.	Transmitted signal decoded.
Green (On)→ 0.1 sec. (Off)→ 0.8 sec.	Decoder on standby (No transmitted signals detected)
Green (On)→ 0.3 sec. (Off)→ 0.1 sec.	Calibration function for smart frequency is active
2 Fast Blinks (Red)	Incorrect transmitted ID code
3 Fast Blinks (Red)	Main contact relays jammed or defective
4 Fast Blinks (Red)	RX module defective
5 Fast Blinks (Red)	Chip card defective
6 Fast Blinks (Red)	Chip card data error
7 Fast Blinks (Red)	EEPORM error
8 Fast Blinks (Red)	System faulty
POWER LED DISPLAY	STATUS
No light display	Low voltage (voltage < 10.5V)
Blinks (Red) → 0.1 sec.	Over voltage (voltage > 16V)

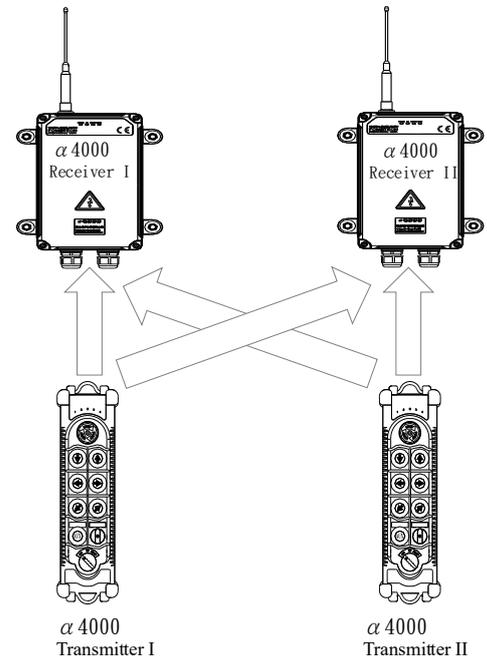
Remark:

When the receiver detects one MAIN relay abnormally locked, the MAIN relay contact will be quickly On/Off and check automatically for 3 seconds. After 3 seconds, the MAIN relay contact will be slowly On/Off. After abnormally lock is cleared, MAIN relay contact will be off. (P.S.: The remote control cannot be operated when the MAIN relay contact is On/Off repeatedly. There will be no relay output either.)

8. TRANSMITTER SPECIAL FEATURES

8.1 Tandem feature

1. Please see below for two α 4000 operation modes:
 - (1) Transmitter I operates Receiver I or Receiver II independently; Or Transmitter II operates Receiver I or Receiver II independently.
 - (2) Transmitter I controls Receiver I and Receiver II at the same time; or Transmitter II controls Receiver I and Receiver II at the same time.



* The transmitter that first controls the receiver takes the priority.

2. Software setting for transmitter tandem mode

Special request for the 8-pushbutton type:

The 7th pushbutton has to be “single-speed”, or either the 7th or 8th position has to be “selector switch”.

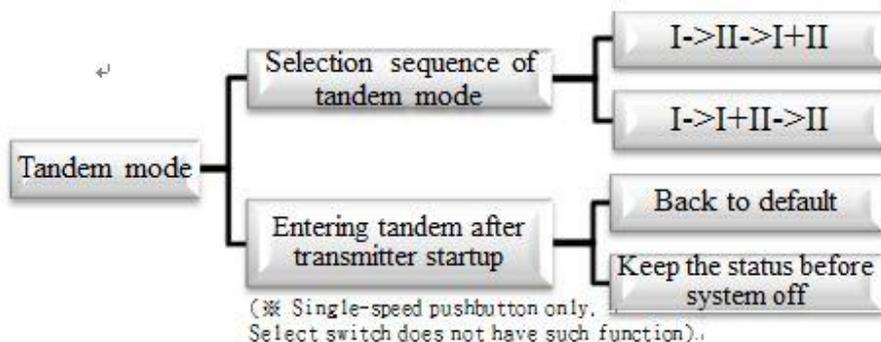
Special request for the 12-pushbutton type:

The 11th pushbutton has to be “single-speed”, or either the 11th or 12th position has to be “selector switch”.



Note: Either the pushbutton or selector switch for tandem feature cannot be on the same transmitter with +2 auxiliary pushbuttons.

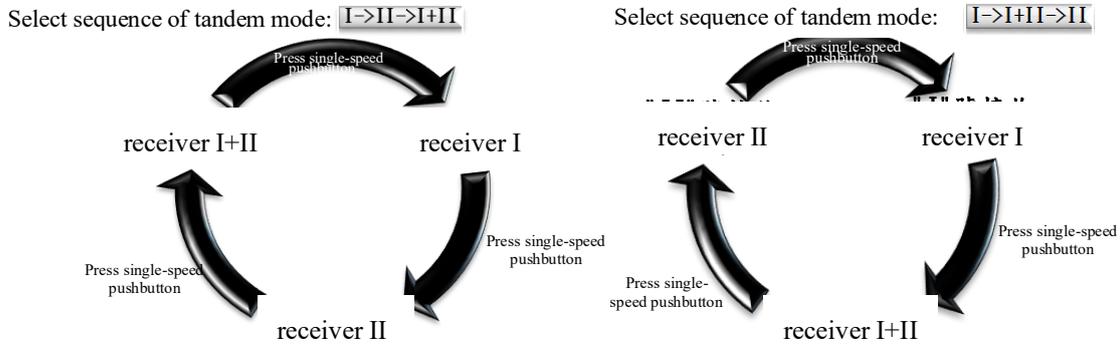
- (1) With Alpha 4000 software, be sure to select “tandem mode” under special function of **Status Selection** for the “single-speed pushbutton” or “select switch”.
- (2) Tree diagram of software operation for Tandem mode :



3. Transmitter operation steps for tandem mode:

3.1 **Single-speed pushbutton** for Tandem Mode :

- (1) Rotate the power key to START position, and press the single-speed pushbutton for tandem mode by the sequence of I -> II -> I+II or I -> I+II -> II. Then refer to the transmitter status light 1 & 2 to control the receiver by the transmitter. (see 6.2 for transmitter LED display)
- (2) Drawing for selecting sequence of transmitter tandem mode :



- (3) After the function of the selected receiver is completed, release the single-speed pushbutton for

Receiver	Transmitter status light 1	Transmitter status light 2
I	Red	Green
II	Green	Red
I+II	Red	Red

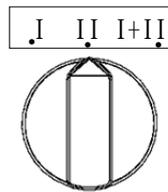
tandem mode first and then rotate the power switch from “START”

to “I”.

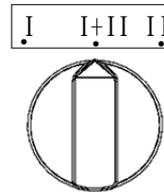
- (4) By following the below “4. Receiver STARTUP selection table” and select the way of starting the receiver.

3.2 **Select switch** for Tandem Mode :

- (1) When the transmitter is On or Off, select the receiver needed base the label on the transmitter by following the tandem selection sequence I -> II -> I+II or I -> I+II -> II. When the transmitter is On, please follow the position of transmitter status light 1 & 2. (see 6.2 for transmitter LED display)
- (2) Switch label for transmitter tandem mode :
(Be sure that the select sequence is the same as selected on the software.)



Select sequence 1



Select sequence 2

Change of switch selection	Receiver	Transmitter status light 1	Transmitter status light 2
I	I	Red	Green
II	II	Green	Red
I+II	I+II	Red	Red

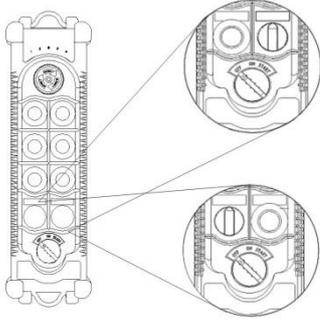
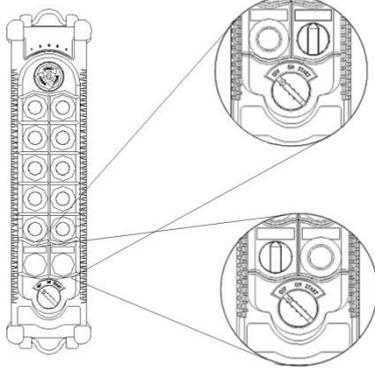
- (3) After the function of the selected receiver is completed, be

sure that the power switch is rotated to “I”. Then select the way of starting the receiver by following the below “4. Receiver STARTUP selection table”.

4. Receiver STARTUP selection table:

Selection of Receiver Startup	Transmitter Operation
START switch (continuous 3 sec.) / (continuous 5 sec.) / (immediately)	Release all pushbuttons then rotate power switch to “START” position and hold for: (Continuous 3 sec.): Receiver receives “START” command for continuous 3 seconds. (Continuous 5 sec.): Receiver receives “START” command for continuous 5 seconds. (Immediately): Receiver receives “START” command immediately. Transmitter can be operated normally only after the receiver MAIN relay is activated. Then rotate the start switch back to “I”.
Power switch	Rotate the power switch clockwise, the receiver MAIN relay has to be activated immediately to operate normally.
Any switch/pushbutton (select switch excluded)	Press any pushbutton (select switch excluded), or rotate the power switch to “START” and then back to “I” position, the receiver MAIN relay will be activated immediately to operate normally.
Infrared start	Release all pushbuttons and rotate the power switch to “START” position. Then point the infrared LED sensor located on the front top of the transmitter towards the infrared receiving module to activate the MAIN relay and operate normally. Finally, rotate the power switch back to “I” position.

5. System types available for tandem mode

System types available for tandem mode		Pushbutton position for tandem mode	Pushbutton for tandem mode
8-pushbutton type	ALPHA 4008-1 ALPHA 4008-1S ALPHA 4008-3 ALPHA 4008-3S ALPHA 4008-4S ALPHA 4008-5S ALPHA 4008-6S		<p>➤ 7th pushbutton : (as right pushbutton on the left drawing) “single-speed pushbutton” Or “select switch”</p> <p>➤ 8th pushbutton : (as left pushbutton on the left drawing) “select switch” only.</p>
12-pushbutton type	ALPHA 4012-1 ALPHA 4012-1S ALPHA 4012-2 ALPHA 4012-2S ALPHA 4012-3 ALPHA 4012-3S ALPHA 4012-4 ALPHA 4012-4S ALPHA 4012-5S ALPHA 4012-6S ALPHA 4012-7S		<p>➤ 11th pushbutton : (as right pushbutton on the left drawing) “single-speed pushbutton” Or “select switch”</p> <p>➤ 12th pushbutton : (as left pushbutton on the left drawing) “select switch” only.</p>
Not available for tandem mode		Reason	
8-pushbutton type	ALPHA 4008-2	<ol style="list-style-type: none"> 8-pushbutton type: The 7th & 8th buttons are double-speed type, not available for tandem mode. 12-pushbutton type: The 11th & 12th pushbuttons are double-speed type, not available for tandem. 	
12-pushbutton type	ALPHA 4012-5		

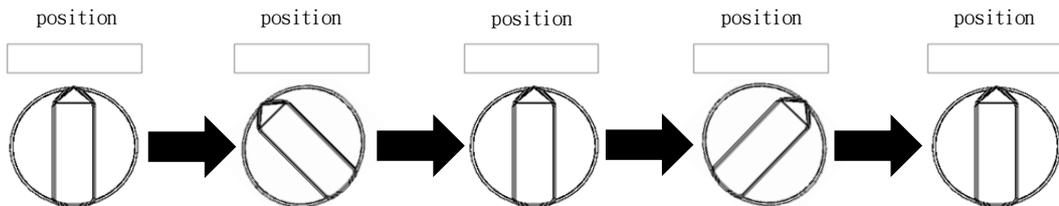
8.2 Transmitter Automatic Channel Change

1. Hardware and software request:

- (1) Hardware: Transmitter with “select switch” available.
- (2) Software: Select “Special Function” under “Status Selection”, then click “Transmitter Channel Automatic Change” and select channel range “Start” / “End”.

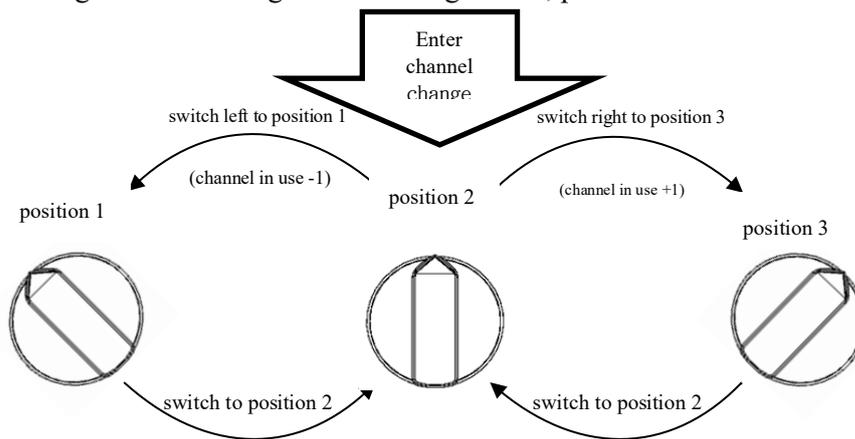
2. Channel change steps:

- (1) Enter channel change mode: Keep all pushbuttons released and rotate select switch as below within 1 second.



After the above step completed, transmitter stop sending signals and the start light on. (see 6.2 line 2 for transmitter LED display) After the start light is off, transmitter enters automatic channel change mode.

- (2) Channel change: After entering channel change mode, please refer to below for the changes.



Channel in use plus 1: When the select switch is switched from position 2 to 3, channel in use plus 1.

Example: When channel 5 is in use, if the channel is changed by following above drawing, the first time, the channel will be changed to 6, the second time, channel will be changed to 7....etc.

Channel in use minus 1: When the select switch is switched from position 2 to 1, channel in use minus 1.

Example: When channel 5 is in use, if the channel is changed by following above drawing, the first time, channel will be changed to 4, the second time, channel will be changed to 3....etc.

The End channel number plus 1 will be back to Start channel.

Example: When the channel in use is set as 20, then the Start channel is 01, End channel is 20. If the channel number in use plus 1, the channel in use will be changed to 01.

The End channel number minus 1 will be back to End channel.

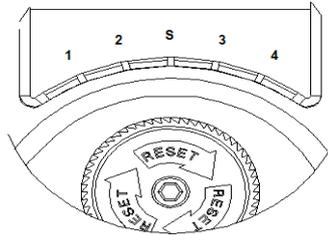
Example: When the channel in use is set as 01, then the Start channel is 01, End channel is 20. If the channel number in use minus 1, the channel in use will be changed to 20.

- (3) Exit Automatic Channel Change Mode: To exit the automatic channel mode, turn off the transmitter power. To operate the transmitter again, turn on the transmitter power.

3. Channel change mode LED display:

Under channel change mode, LED displays the channel in use synchronously, including the channel in use has been changed.

See LED display 1, 2, 3 & 4 as right



Please see below for the definition of red / green LED display and LED position 1, 2, 3 & 4. Red LED is for tens and green LED is for ones. If the channel number is over 10, then red and green LED status light will be displayed alternately.

- Example: Channel 1: Transmitter green LED 1 On.
- Channel 8: Transmitter green LED 1, 3 & 4 On.
- Channel 14: Transmitter red LED 1 and green LED 4 On alternately.
- Channel 20: Transmitter red LED 2 flashes.
- Channel 33: Transmitter red and green LED 3 on alternately.

Red LED					Green LED				
TENS	1	2	3	4	ONES	1	2	3	4
10	flash				1	steady on / flash			
20		flash			2		steady on / flash		
30			flash		3			steady on / flash	
40				flash	4				steady on / flash
50	flash			flash	5	steady on / flash			steady on / flash
60		flash		flash	6		steady on / flash		steady on / flash
70			flash	flash	7			steady on / flash	steady on / flash
80	flash		flash	flash	8	V		steady on / flash	steady on / flash
90		flash	flash	flash	9		steady on / flash	steady on / flash	steady on / flash

9. BATTERYCHARGING & LED DISPLAY

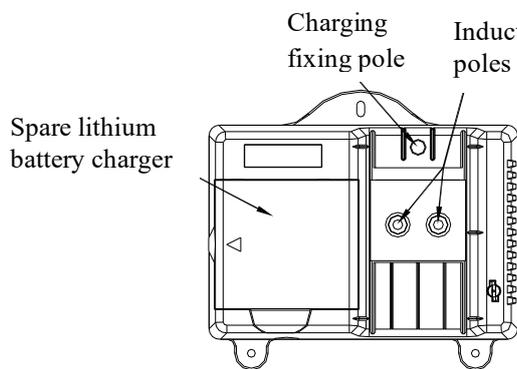
9.1 Battery Charging

1. For home power supply, connect the charger power adaptor input to AC100-240V.
2. For vehicle power supply, plug the power cord to charger power socket. Power socket specification ϕ 5.5mm \ominus \oplus ϕ 2.5mm, DC12-24V 2A. (Please purchase power cable separately.)
3. Insert spare battery pack to the charging compartment of the charger. (As Fig.18) Please refer to 9.2 for LED status display of battery charger.
4. Rotate the transmitter power key to 0 (off position). Then place the transmitter charging holes to the induction charging poles of the charger and pull the transmitter downward to the bottom (As Fig. 19) to charging position for charging. Please refer to 9.2 for LED status display of battery charger.
5. To remove the transmitter from the charger, please push the transmitter upward to top.

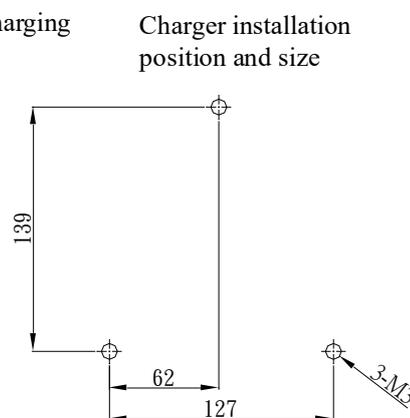


Note 1: The lithium battery has to be recharged to green LED on within 3 months after the manufacturing date.

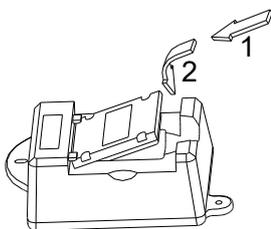
Note 2: Change the charging voltage of the spare lithium battery for A4KICDMV1 charger to "storage voltage" to prolong the storage life of the lithium battery. The operating hours of the fully charged spare battery will be a bit shorter than the complete transmitter charged directly on the charger.



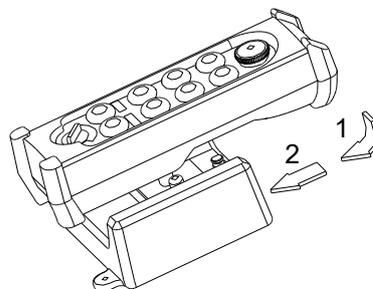
(Fig.16) Charger



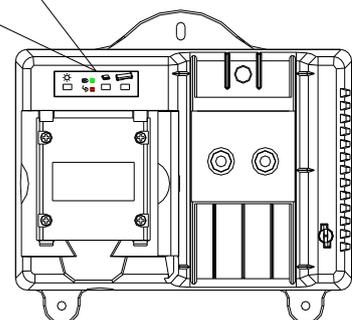
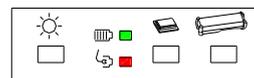
(Fig.17) Charger installation holes and size



(Fig.18) Insert the battery pack



(Fig.19) Transmitter to the charging position



(Fig.20) Transmitter

9.2 Battery Status LED Display

		LED Status Display	Reason
Power LED 	1	Green (on)	Normal voltage
	2	No LED display	Under voltage
	3	Green blinks → 0.1 second	Over voltage
Battery charger LED 	1	No LED display	Standby
	2	Red (on)	Charging
	3	Red (on)→ 0.1 sec., (off)→ 0.3 sec. every 2 sec.	Battery warm up over time
	4	Red (on)→ 1.9 sec., (off)→ 0.1 sec.	Battery warm up
	5	No LED display	Under voltage
	6	Green (on)	Charging completed
Transmitter charger LED 	1	No LED display	Under voltage
	2		Standby
	3	Red (on)→ 1.9 sec., (off)→ 0.1 sec.	Battery warm up
	4	Red (on)	Charging
	5	Green (on)	Charging completed
	6	Red (on)→ 0.1 sec., (off)→ 0.3 sec. every 2 sec.	High induction circuit temperature.
	7	Red (on)→ 0.1 sec. every 2 sec.	Overtime charging
	8	Red (on)→ 0.1 sec., (off)→ 0.3 sec. every 2 sec.	Boost circuit defective
	9	Red (on)→ 0.1 sec., (off)→ 0.3 sec. Blink 4 times	Remove battery before charging is completed
	10	Red (on)→ blink 0.5 sec. (no lit)	Induction charging with low activated current / pulled down induction charging pole. The transmitter is not at The charging position

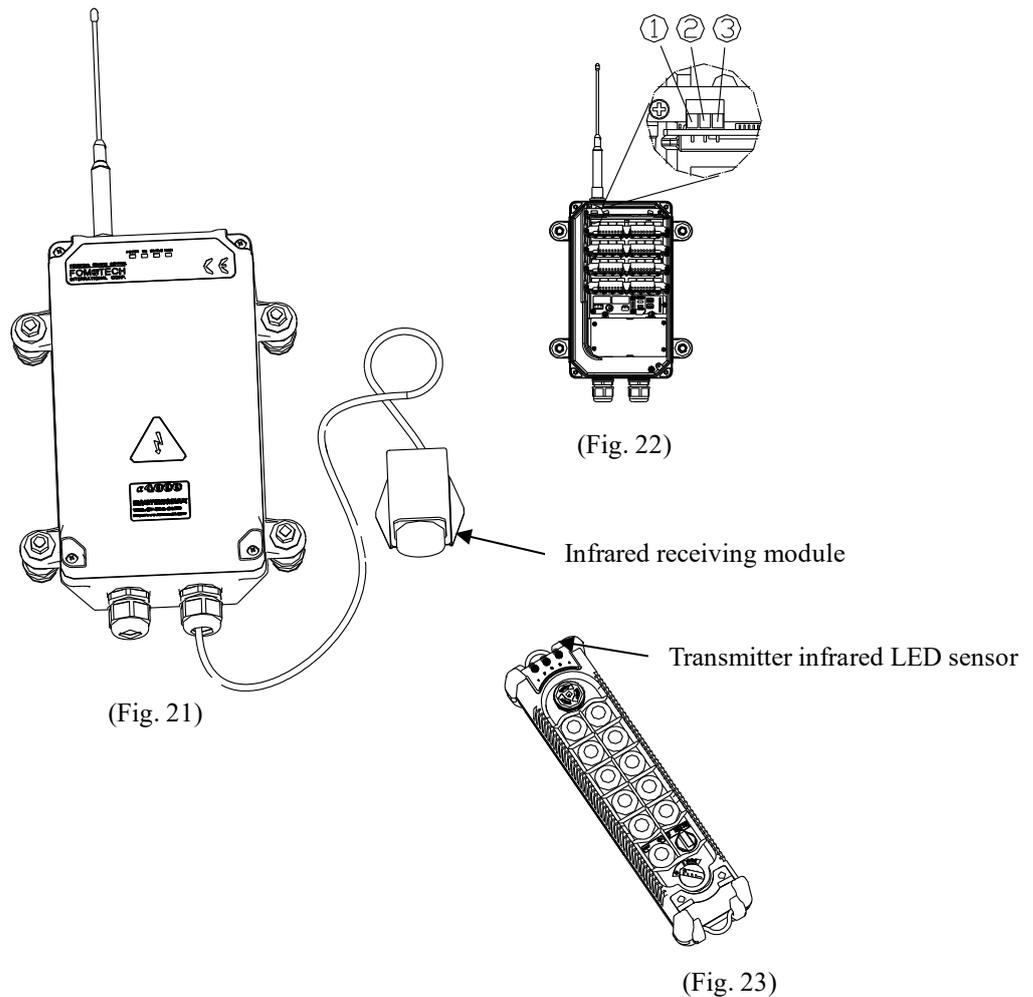
10. TROUBLE SHOOTING

Should the operator find the equipment not operating normally, please check the chart below for simple trouble shooting tip.

POSSIBLE REASON	PROBLEM	SOLUTION
Crane malfunctioned	Try to operate the crane with pendent but not working.	Repair the crane.
1. Transmitter power is not On. 2. Transmitter battery low voltage.	1. Battery and status LEDs are not On. 2. Turn on the transmitter power and red status light blink twice.	1. Turn on the power. 2. Charge or replace the battery.
Pushbutton jammed	Turn on the transmitter power and press any pushbutton at the same time.	Turn off the transmitter and turn it on again without pressing any pushbutton at the same time.
Chip card data error	Whenever the transmitter power is turned on, red status light blinks 6 times constantly.	Chip card setting error. Please correct the setting per different system types.
All transmitter green LEDs On and pushbuttons are not functioning.	Whenever transmitter power is on, green status LED 1~4 On and pushbuttons are not functioning.	(Refer to 12.2.) Remove “□” type short pin from the position as shown on Fig. 26.
No chip card	Whenever transmitter power is On, red status LED blinks 5 times constantly.	Insert chip card.
Other radios interference	When the transmitter power is Off, receiver SQ status light On very often. When the transmitter is operated normally, receiver sometimes works slowly or not functioning.	Change to other channel.
No power to the receiver.	Blown fuse or no input power connection.	Ensure the power is input to the receiver unit.
Blown fuse.	Check if the receiver fuse is burnt.	Replace the fuse.

POWER SUPPLY MODULE	FUSE
AC100~240V	3A fast acting glass tube fuse
AC380~460V	3A tube fuse (with terminal/fast acting type)
AC28~48V	5A fast acting glass tube fuse
DC12~24V	5A fast acting glass tube fuse

11. OPTIONAL FEATURE: INFRARED STARTUP



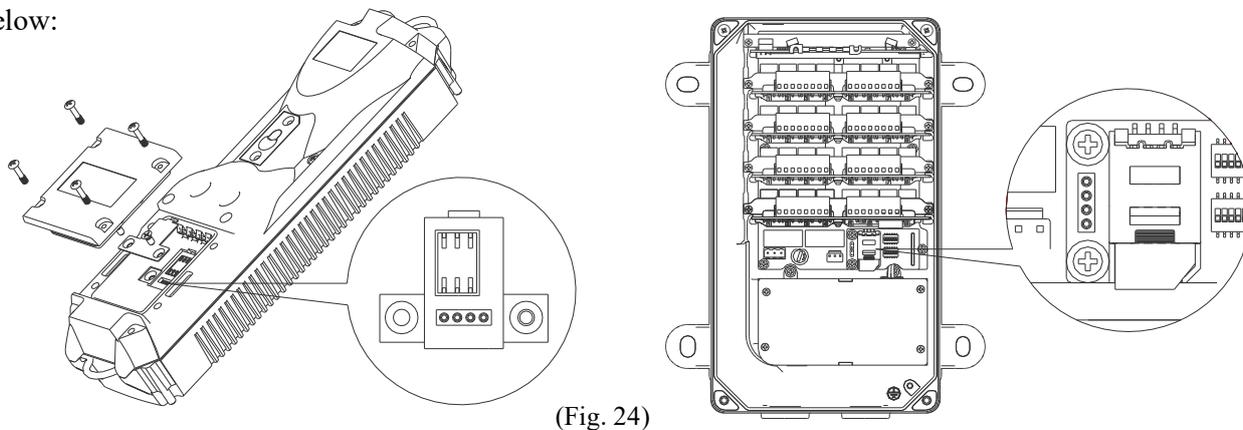
➤ Infrared Startup Accessories:

1. Transmitter infrared LED sensor (refer to Fig.21)
2. Infrared receiving module (refer to Fig.22)
3. Infrared receiving module input connector (refer to Fig.23):
(1) GND (2) DC+8V (3) Infrared receiving module

- Set “Infrared Startup” of chip card (refer to chapter 5.7 of software function setting manual).
- If the ID code of the transmitter unit is altered via 8-pin dip-switch setting inside the transmitter , you must then also change the ID code in the receiver.
- If the system is equipped with an “Infrared Startup” function, the operator then can only activate the receiver MAIN relay within 100-meter linear distance from the location of the receiver or the receiving infrared module. Point the infrared LED sensor located on the front of the transmitter towards the infrared receiving module.
- How to cancel “ Infrared Start” function
 1. Insert pin both into (1) GND and (3) Infrared receiving module
 2. Or remove Infrared receiving module input connector (refer to Fig.20)
 3. Or reset chip card without “Infrared start” function.

12. CHIP CARD JUMPER SETTINGS

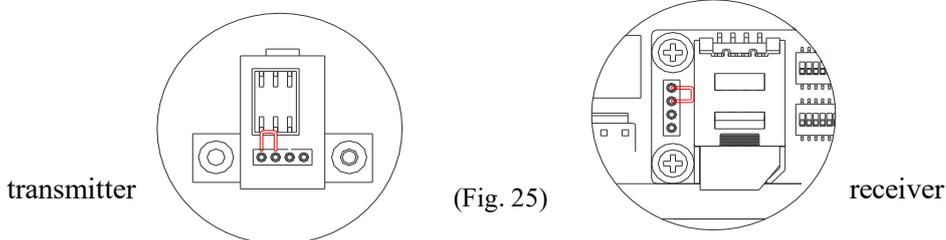
One 4-pin socket is under the chip card holder of each transmitter and beside the chip card holder of each receiver. The “⌐”type jumper attached can be removed to change the short circuit position. Please refer to the description as below:



(Fig. 24)

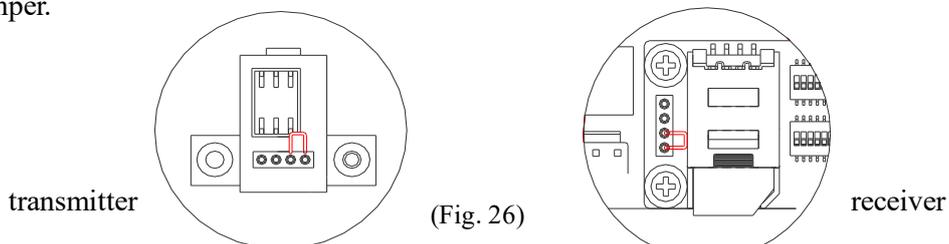
12.1 Chip card not in use: Insert the “⌐”type jumper into the position as shown on Fig.25 and do not remove it. Even if the chip card is still in the chip card holder, when the “Chip card not in use” function is enabled, the system will bypass the chip card installed (or no chip card is inserted) and adopts the data from the CPU.

- * If either transmitter or receiver status light red flashes 5 or 6 times. It means the chip card is defective. Using this function will avoid reading the chip card and can operate normally.



(Fig. 25)

12.2 Copy Transmitter/Receiver Function to Chip Card: Please refer to Fig. 26 for the insert position of the “⌐”type jumper.

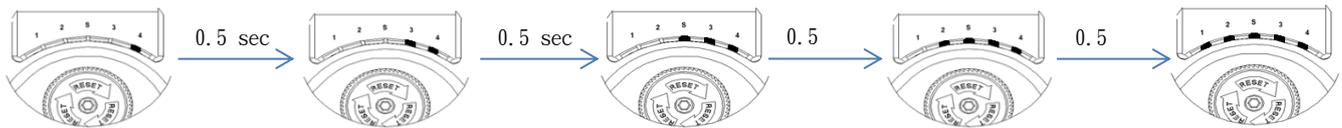


(Fig. 26)

The chip card is supplied by FOMOTECH International Corp.

Transmitter: Insert the “⌐”type jumper into the position as shown on Fig.26 when transmitter power is off. Then put the chip card into the chip card holder, screw in the battery to the transmitter bottom casing tightly and rotate the power switch to ON position.

Transmitter status light will display as: Each step 0.5 seconds from green light (4)→(3+4)→(S+3+4) →(2+S+3+4) →(1+2+S+3+4), chip card update is completed.

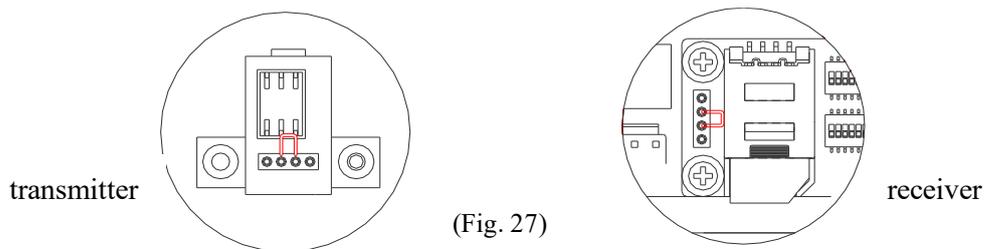


Receiver: Insert the “ Γ ”type jumper into the position as shown on Fig.26 when the power is off. Then put the chip card into the chip card holder and turn the receiver power on.

Receiver without status light display: It’s completed 3 minutes after power is on.

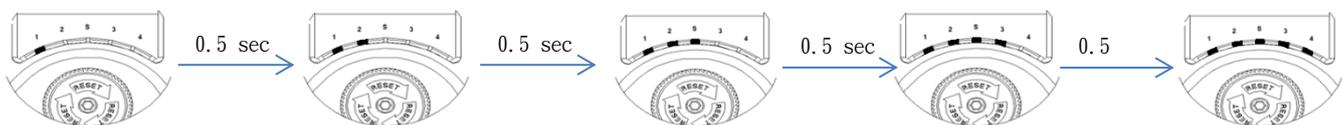
After chip card write-in is completed, please remove the “ Γ ”type jumper from the position as shown on Fig.26 and put the “ Γ ”type jumper back to the position as shown on Fig. 25, “Chip card not in use”. Then the receiver may back to normal operation after this function is disabled.

12.3 Use the chip card: Insert the “ Γ ”type jumper into the position as shown on Fig.27.



* When using the Alpha 4000 software to change the chip card setting, the transmitter / receiver function setting can only be updated after “Use the chip card” is enabled.

Under this status, transmitter and receiver power have to be on and then the CPU may read the data from the chip card and check if it is the same as the data saved in the CPU. If the data setting is different, the data saved in the CPU will be updated to the same as that in the chip card. When data update is proceeding, the transmitter status light will display as: Each step every 0.5 second from green light (1)→ (1+2)→ (1+2+S) →(1+2+S+3) →(1+2+S+3+4), then data update setting is completed.



Receiver without status light display: It’s completed when the STATUS green light flashes.

The data set in chip card will be written into the CPU. After update is completed then the system can be operated normally.

* Suggestion: After chip card write-in is completed, please remove the “ Γ ”type jumper and insert it to the “Chip card not in use” position as shown on Fig.25. By doing this, error caused by chip card contact or chip card holder contact oxidation can be avoided.

13. SYSTEM SPECIFICATION

13.1 Transmitter Unit

Frequency Range	:	PLL 433MHz
Transmitting Range	:	70 Meters
Hamming Distance	:	$D \geq 6$
Channel Spacing	:	25 KHz
Frequency Control	:	Quartz Crystals (PLL)
Frequency Drift	:	$< 5\text{ppm @ } -10^{\circ}\text{C} \sim 70^{\circ}\text{C}$
Frequency Deviation	:	$< 1\text{ppm @ } 25^{\circ}\text{C}$
Spurious Emission	:	$> 50\text{dBc}$
Transmitting Power	:	$\sim 1\text{ mW}$
Emission	:	F1D
Antenna Impedance	:	$50\ \Omega$
Enclosure Rating	:	IP-66
Source Voltage	:	4.2VDC lithium / 1800mA
Current Drain	:	$\sim 20\text{mA @ } 3.7\text{V}$
Operating Temperature	:	$-10^{\circ}\text{C} \sim 70^{\circ}\text{C}$
Dimension	:	273 mm x 65 mm x 52 mm (12 pushbuttons) 228 mm x 65 mm x 5 2mm (8 pushbuttons)
Weight	:	Alpha 4008: 530g (with 1800mA lithium battery) Alpha 4012: 600g (with 1800mA lithium battery)

13.2 Receiver Unit

Frequency Range	:	PLL 433 MHz
Channel Spacing	:	25KHz
Hamming Distance	:	$D \geq 6$
Frequency Control	:	RX module card or synthesizer (PLL)
Frequency Drift	:	$< 5\text{ppm @ } -10^{\circ}\text{C} \sim 70^{\circ}\text{C}$
Frequency Deviation	:	$< 1\text{ ppm @ } 25^{\circ}\text{C}$
Sensitivity	:	$< -125\text{dBm}$
Antenna Impedance	:	$50\ \Omega$
Data Decoder Reference	:	Quartz Crystals (PLL)
Responding Time	:	50 ~ 150 ms
Enclosure Rating	:	IP-66
Source Voltage	:	100 ~ 240VAC @ 50/60 Hz.
Power Consumption	:	MAX 32W@240VAC 50Hz
Operating Temperature	:	$-10^{\circ}\text{C} \sim +70^{\circ}\text{C}$
MAIN Contact Rating	:	250V @ 5A
Output Contact Rating	:	250V @ 10A
Main Output Contact Rating	:	250V @ 5A
Dimension	:	300 mm x 171 mm x 115 mm
Weight	:	4,500g

13.3 Charger Unit

Frequency Range	:	PLL 433 MHz
Power Consumption	:	DC12 ~ 24V 24W or AC100 ~ 240V 50/60Hz 30W
Operating Temperature/ Humidity	:	$-20^{\circ}\text{C} \sim +40^{\circ}\text{C} / 95\%$
Charging time	:	Battery: 3.6 hrs (500mA), Transmitter: 2.4 hrs
Heating time (-20°C)	:	To Max. 20 minutes
Dimension	:	175 mm x 122 mm x 55 mm
Weight	:	500g

14. PARTS LIST

14.1 Transmitter Unit

1.	A4008 Transmitter	BT4008
	A4012 Transmitter	BT4012
2.	A4008 Encoder Board	EN4008
	A4012 Encoder Board	EN4012
3.	A4000 433MHz Transmitting RF Board	TX4000
4.	Transmitter chip card holder	CH4000
5.	1-speed pushbutton	PB4001
	2-speed pushbutton	PB4002
6.	2-stage selector switch	SW-2T
	3-stage selector switch	SW-3T
	2-stage selector switch (momentary)	SW-3TM
7.	Alpha 4008 transmitter upper casing	BCTT4008
	Alpha 4008 transmitter bottom casing	BCTB4008
	Alpha 4012 transmitter upper casing	BCTT4012
	Alpha 4012 transmitter bottom casing	BCTB4012
	Alpha 4008 transmitter casing	TC4008
	Alpha 4012 transmitter casing	TC4012
8.	Pushbutton rubber boot	RB4000
9.	Emergency stop button	EMS500
10.	Emergency stop red cap	EMS04
11.	Chip Card	CHIP
12.	Lithium battery	BAT4000
13.	Shoulder strap	SS5000
14.	Transmitter key + strap (all models)	TK4000
15.	Transmitter anti-vibration bumper (upper right/bottom right/upper left/bottom left)	SB4000

14.2 Receiver Unit

16.	A4008 receiver	R4008
	A4012 receiver	R4012
17.	PLL RX Module (All Modules)	RX4000
18.	Relay board (8R)	RY4000
19.	Regular Relay 12VDC	RR12V
	Safety Relay 12VDC	SR12V
20.	433/419/447MHz Receiver Antenna	ANT433
21.	A4000 Receiver Upper Enclosure	REU4000
	A4000 Receiver Bottom Enclosure	REB4000
	A4000 Receiver Enclosure (complete)	RE4000
22.	Shock Absorber	SA4000
23.	Decoder board	DE4000
	Decoder board (Infrared)	DE4000IR
24.	Power supply card	PS4000
	(available ones: DC12-24V, AC28-48V, AC100-240V & AC380-460V)	

14.3 Battery Charger

25.	Charger (AC100-240V)	BCH4000
26.	Charging hole cleaner	CLEAN4K