

TABLE OF CONTENTS

	Page
1. INTRODUCTION	3
2. SAFETY INSTRUCTIONS	5
3. SYSTEM DESCRIPTIONS	6
3.1 TRANSMITTER OUTLINE	
3.1.1 TRANSMITTER EXTERNAL DESCRIPTIONS.....	6
3.1.2 TRANSMITTER INTERNAL DESCRIPTIONS.....	7
3.1.3 RECHARGEABLE BATTERY, BATTERY CHARGER AND SHOULDER BELT VIEWS	7
3.2 RECEIVER OUTLINE	
3.2.1 RECEIVER EXTERNAL DESCRIPTIONS	8
3.2.2 RECEIVER INTERNAL DESCRIPTIONS	8
3.2.3 RECEIVER MOUNTING DIMENSION.....	9
3.2.4 CARDS INSIDE RECEIVER	9
4. SYSTEM FUNCTIONS	
4.1 TRANSMITTER JOYSTICK DESCRIPTIONS	13
4.2 JOYSTICK CONFIGURATIONS AND SETTINGS	24
4.3 TRANSMITTER PUSHBUTTON DESCRIPTIONS	25
4.3.1 PUSHBUTTON TYPES	25
4.3.2 FUNCTION SETTINGS	27
4.3.2.1 TRANSMITTER FUNCTION SETTINGS.....	28
4.3.2.2 RECEIVER FUNCTION SETTINGS.....	30
4.4 SPECIAL TYPES	34
4.5 CUSTOMIZED TYPES.....	36
4.6 FREQUENCY TABLE.....	37
5. SYSTEM SETTINGS	
5.1 TRANSMITTER LCD FUNCTION SETTINGS.....	39
5.2 LCD DISPLAY DESCRIPTIONS.....	39
6. RECEIVER STATUS LIGHT AND INSTALLATION	
6.1 RECEIVER STATUS LIGHT.....	44
6.2 RECEIVER LED STATUS.....	44
6.3 PREPARATION.....	46
6.4 STEPS-BY-STEPS INSTALLATION.....	46
6.5 WIRING DIAGRAM	47
6.6 SYSTEM TESTING.....	47

7. TRANSMITTER OPERATING INSTRUCTION	
7.1 POWER “ON” THE SYSTEM	47
7.2 TRANSMITTER SYSTEM STATUS DISPLAY	48
7.2.1 TRANSMITTER LED DISPLAY	48
7.2.2 TRANSMITTER LED STATUS TABLE	48
7.3 JOYSTICK CORRECTION	
7.3.1 REASONS FOR JOYSTICK CORRECTION.....	49
7.3.2 ENTER JOYSTICK CORRECTION MODE.....	49
7.3.3 JOYSTICK CORRECTION STEPS.....	50
7.3.4 EXIT	50
7.3.5 FUNCTION CHANGE SETTINGS.....	51
8. BATTERY CHARGING	53
9. TROUBLE SHOOTING	54
10. SYSTEM SPECIFICATION	55
11. PARTS LIST	57

1. INTRODUCTION

The Alpha 6000 is a highly sophisticated industrial radio remote control system. The versatile features of Alpha 6000 permits its usage in a wide range of industrial applications. The system can be used to control all types of industrial cranes, tower cranes, building construction equipment, automatic control systems, mining equipment, and many others.

The Alpha 6000 incorporates numerous advanced safety features and software programming that will ensure maximum security and safety in the workplace. The major features of Alpha 6000 industrial radio remote control system are as follow:

- * The system is equipped with highly evolved software that has redundant 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. The responding time from system error to receiver auto-shutdown is maximum 1 second.
- * The encoding system utilizes advanced microprocessor control for 100% error-free data transmission. The availability of 65,536 sets of unique security ID codes + 68 distinct RF channels will ensure that only commands from a matching control transmitter can be carried out without any interference from other radio systems.
- * The decoding system utilizes dual-microprocessor control, which will ensure 100% error-free calculating, bit checking and correcting of all incoming data.
- * The system also utilizes an additional central microprocessor for data comparison and crosschecking between the two decoding microprocessors. When faults are detected via this central microprocessor, for maximum safety, the entire system will be shutdown immediately to avoid possibility of any accidents occurring.
- * The system utilizes PLL synthesized RF transmission. It allows the user to select from 68 sets of frequency channels best suited for the environment. The frequency channel for transmitter and receiver is selected via programming software. The receiver also has the ability to auto-scan from these 68 sets of frequency channels. The receiver will search and locked on to the intended matching control transmitter.
- * For added safety the receiver also utilizes dual Safety Relays for the receiver MAIN relay circuit. If the receiver MAIN relay is defective (example: fails to open or close during operation or not respond to a "Stop" command) a fault will be detected and the system will be shut down immediately to avoid possibility of any accidents occurring.
- * The Alpha 6000 is equipped with numerous self-diagnosing functions, which include transmitter low-voltage detection/warning, faulty pushbutton/joystick detection, faulty safety MAIN relays detection, faulty relay boards detection, faulty EEPROM detection, faulty RX module detection, incorrect ID code detection, and receiver MAIN auto-deactivation when transmitter low-voltage is detected, when encountering strong radio interference, and when the transmitter/operator is out of receiving range.
- * The transmitter is equipped with power auto shutdown function: After 5 minutes of inactivity, that is 5 minutes after the last pushbutton is released, the transmitter power will shut off

automatically. (0-120 minutes or no auto shutdown is selectable)

- * The transmitter casing is composed of special engineering plastic and pushbutton waterproof layer. The engineering plastic is featured with wearable, oil-proof, acid-proof, alkaline-proof, high temperature resistance, anti-UV, water-proof and dust-proof. With the self-developed no contact cross type and single axis joystick, there is no disadvantage of friction and non-durability as the operation of direct contact. The operation life and reliability is for a minimum of 1 million operating cycles.
- * The receiver enclosure is composed of 100% aluminum alloy. It may eliminate the static completely and avoid interference from radio radiation.
- * Relay and proportional joystick output via RS485 interface (optional). It is also applicable on internet type control.
- * Receiver internal circuit is completely modularized. Including: receiving RF module, decoding module, relay module, proportional output module, LCD display module and power module. It is easy for the users to replace and extend.
- * LCD display module shows the current receiver status, including individual relay output, proportional output, receiving signal strength, error messages...etc.
- * Maximum number of joysticks and pushbuttons on each transmitter:
 1. 2 double axes joysticks plus 16 single speed pushbuttons
 2. 8 single axis joysticks plus 12 single speed pushbuttons
 3. If there is no joystick on the transmitter, maximum 32 single speed pushbuttons can be installed on each transmitter.
- * Relay and proportional output:
 1. Maximum 32 relays. 8pcs relays on each relay interface card, maximum 4 relay interface cards.
 2. Proportional output interface cards available:
 - Standard: By voltage/current: 0~+5V, 0~+10V, 0~±5V, 0~±10V, 4~20mA, 0~20mA & 0~24mA
 - Customized: Customized proportional output interface card (optional).
- * All Alpha 6000 function setting and selection can be done via Alpha 6000 software.

2. SAFETY INSTRUCTIONS

The Alpha 6000 system is relatively simple to use. However, it is very important to observe the proper safety procedures before, during, and after operation. When using properly the Alpha 6000 systems will enhance productivity and efficiency in the workplace.

The following instructions should be strictly followed:

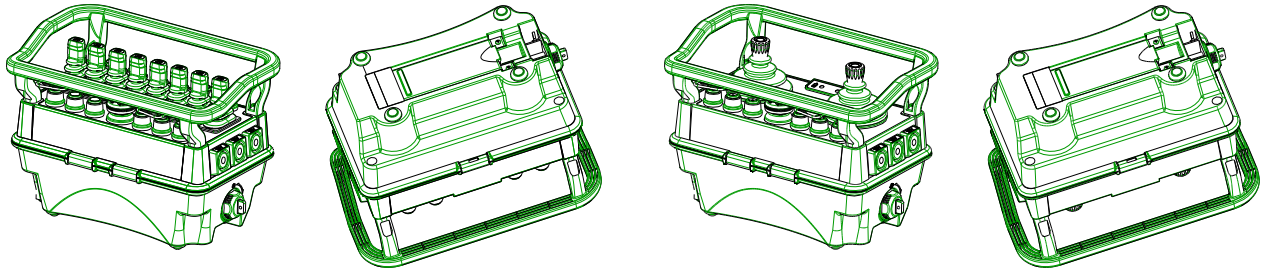
1. Make a daily check of the transmitter casing, joysticks and pushbuttons. Should it appear that anything could inhibit the proper operation of the transmitter unit, it should be immediately removed from service.
2. The transmitter voltage should be checked on a daily basis. If the voltage is low, the battery pack should be recharged or replaced (refer to page 45 for battery power status LED display).
3. The emergency stop button (EMS) should be checked at the beginning of each shift to ensure they are in the proper working order.
4. In the event of an emergency, activate the emergency stop button immediately by pressing the red EMS button down. This will immediately disconnect the transmitter power and receiver MAIN relays. Then turn the power “off” from the main power source of the equipment.
5. The transmitter power key, which is located on the right side of the transmitter box, should be turned “off” after each use and should never leave the power key in “on” position when the unit is unattended.
6. 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 to avoid interference.
7. Ensure the waist belt and the shoulder strap is worn at all time during operation to avoid accidental damages to the transmitter box.
8. Never operate a crane or equipment with two (2) transmitter units at the same time with same frequency channel and ID code.

3. SYSTEM DESCRIPTIONS

3.1 Transmitter Outline

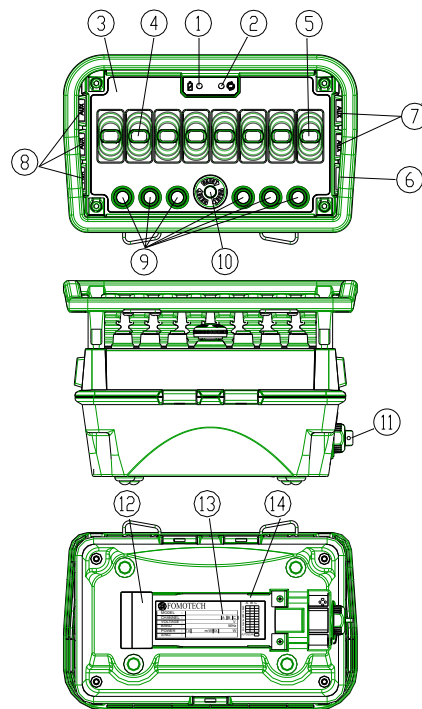
3.1.1 Transmitter External Descriptions

268mm × 162mm × 178.5mm



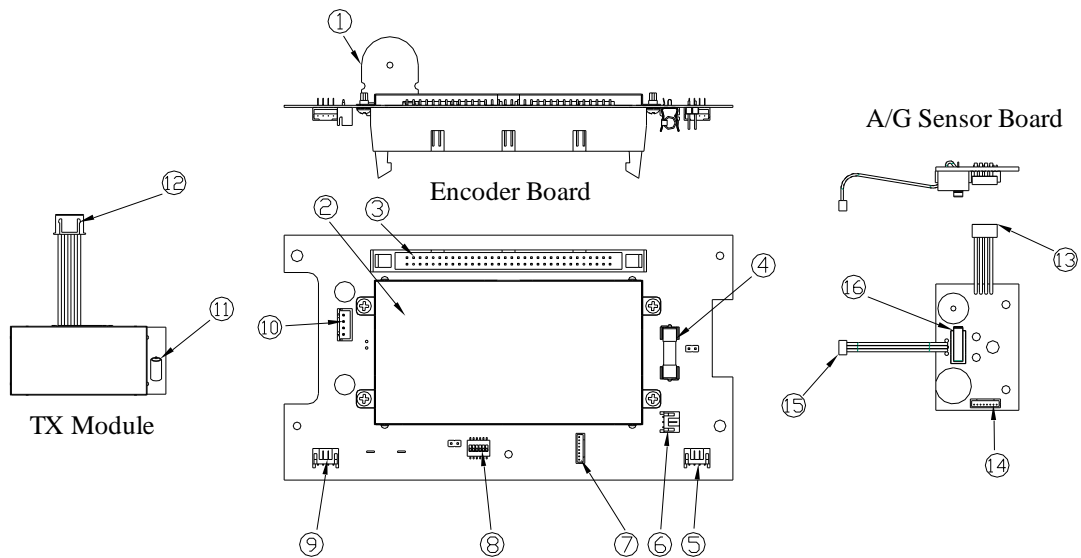
(Fig. 1) Transmitter Top & Bottom View

1. Battery Power LED Display
2. Status LED Display
3. Information Top Plate (engraved)
4. Joystick Rubber Boot
5. Joystick Rubber Boot
6. START Pushbutton
7. AUX/RES Pushbutton (side panel)
8. AUX/RES Pushbutton (side panel)
9. AUX/RES Pushbutton (top panel)
10. Emergency Stop Button (EMS)
11. Power Key (detachable)
12. Battery Contact (gold-plated)
13. System Information
14. Battery Slot



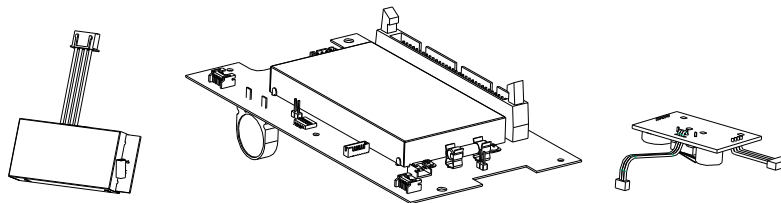
(Fig. 2) Transmitter Exterior Views

3.1.2 Transmitter Internal Descriptions



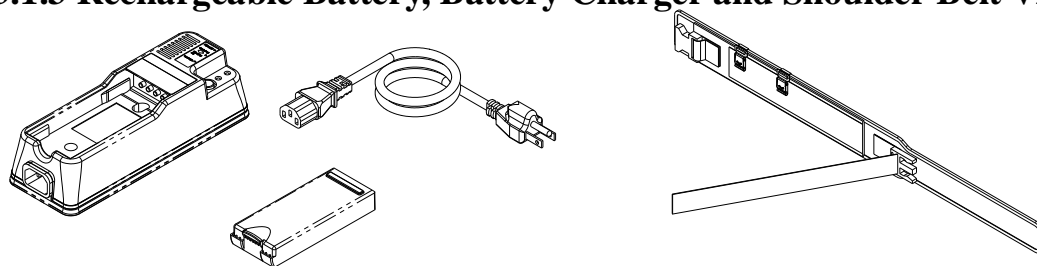
(Fig. 3) RF Module, Encoder Board and Power Switch Views

- | | |
|--|--|
| 1. Buzzer | 9. TX Module Connector Dip-Switch |
| 2. Encoder Anti-Magnetic Shielding Plate | 10. Power Input Connector Port |
| 3. Ribbon Type Connector Port | 11. Antenna Port |
| 4. Power Fuse (0.5A) | 12. TX module Connector |
| 5. A/G Sensor Ribbon Type Connector Port | 13. A/G Sensor Ribbon Type Connector |
| 6. Power Key Switch Connector Port | 14. External Programming Port |
| 7. External Programming Port | 15. Power Key Switch Ribbon Type Connector |
| 8. Function Setting Dip-Switch (incl. joystick correction) | 16. Power Key Switch |



(Fig. 4) Encoder Board, TX Module and A/G Sensor Views

3.1.3 Rechargeable Battery, Battery Charger and Shoulder Belt Views



(Fig. 5) Rechargeable battery、Battery Charger、Shoulder Belt Views

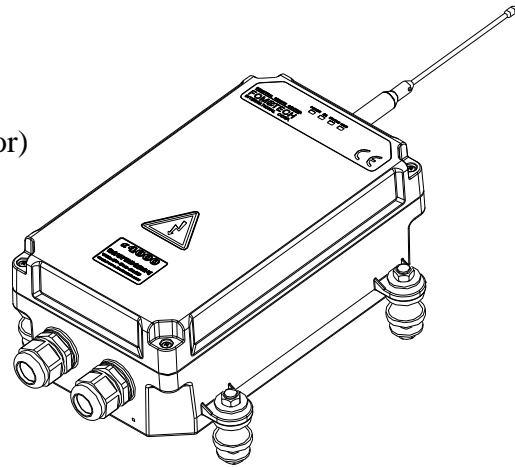
5 RECEIVER OUTLINE

3.2 Receiver Outline

3.2.1 Receiver External Descriptions

300mm×171mm×115mm

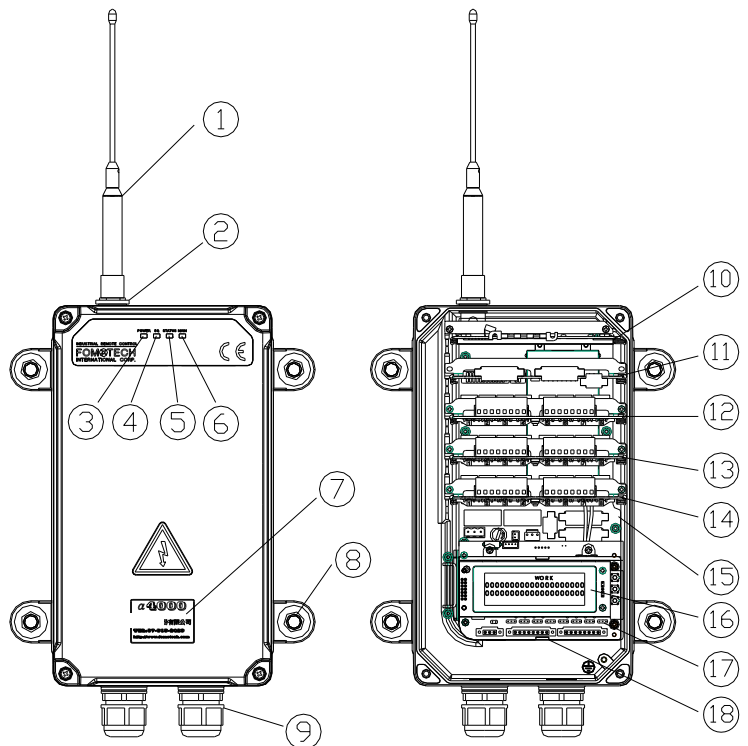
(excluding antenna and plug-in connector)



(Fig. 6) Receiver External Descriptions

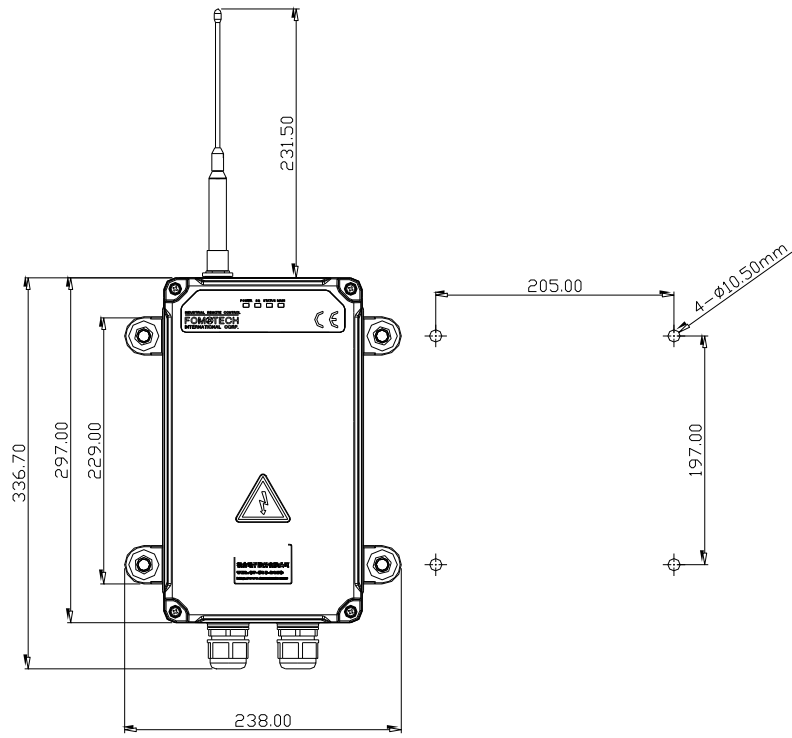
3.2.2 Receiver Internal Descriptions

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 Module Card
16. LCD Display
17. Proportional Output Module Card
18. Power Module Card



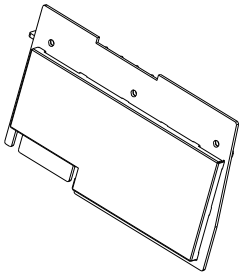
(Fig. 7) Receiver External/Internal Descriptions

3.2.3 Receiver Mounting Dimension

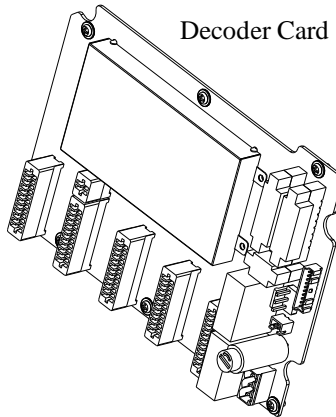


3.2.4 Cards inside Receiver

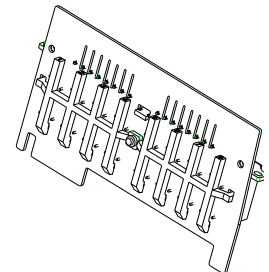
RX Module Card



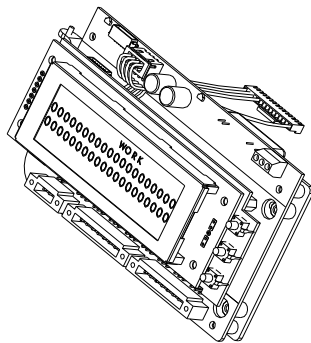
Decoder Card



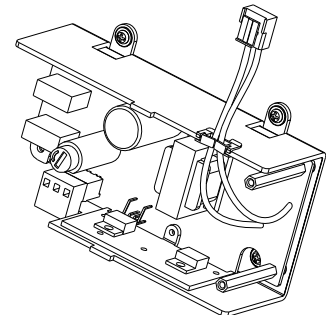
Relay Module Card



LCD Display Card

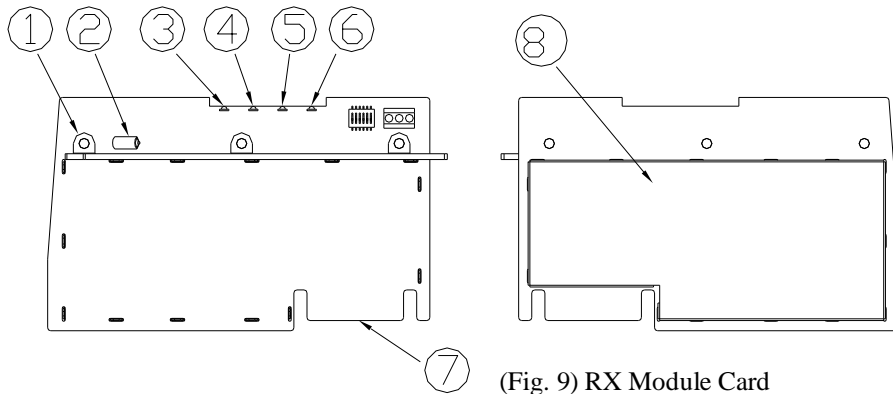


100~240VAC Power Module



(Fig. 8) Cards inside Receiver

(1) RX Module Card

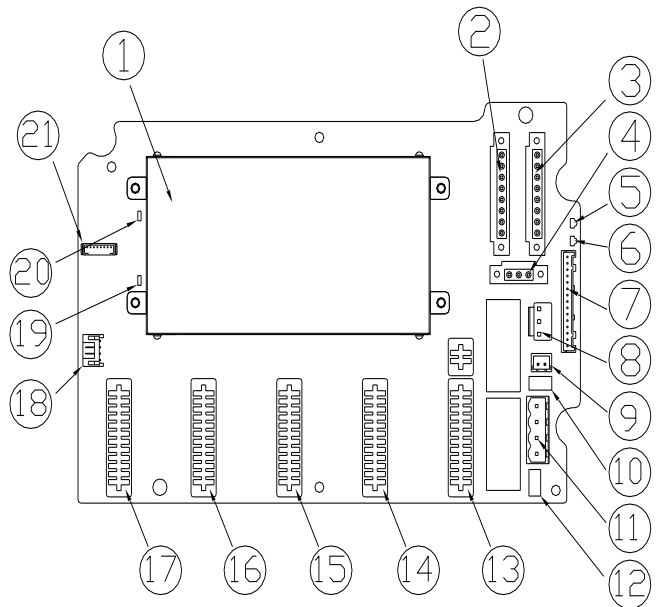


(Fig. 9) RX Module Card

- | | |
|-----------------------------------|---------------------------------|
| 1. RX Module Card Release Clip | 6. Receiver Power LED Display |
| 2. RX-1 Antenna Port | 7. RX Module Golden Finger Slot |
| 3 Receiver MAIN Relay LED Display | 8. RX Module Anti-Magnetic |
| 4. Receiver Status LED Display | |
| 5. Receiver SQ Status LED Display | |

(2) Decoder Card

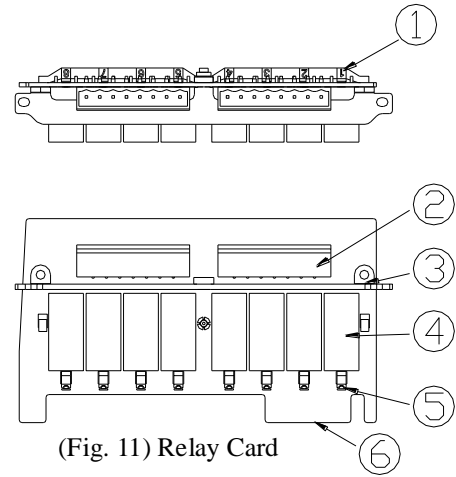
1. Decoder Card Anti-magnetic Shielding Plate
2. SICK LASER Input Contact CN13
3. SICK LASER Input Contact CN14
4. SICK LASER Contact Power
5. Relay Power(COM) LED Display
6. MAIN Relay Status LED Display
7. "Proportional Output Module" Connecting Port
8. DC12V Power Input
9. Spare DC12V Power Output
10. MAIN Relay 1 Fuse F3 250V/5A
11. MAIN Relay Contact
12. MAIN Relay 2 Fuse F5 250V/5A
13. Relay Module Card Golden Finger Slot IV(K25~K32)
14. Relay Module Card Golden Finger Slot III(K17~K24)
15. Relay Module Card Golden Finger Slot II(K09~K16)
16. Relay Module Card Golden Finger Slot I (K01~K08)
17. RX Module Golden Finger Slot
18. External Extension Contact
19. Decoder Card Power LED Display
20. Status LED Display
21. Programming Port



(Fig. 10) Decoder Card

(3) Relay Card

1. Relay LED Display Pole
2. Relay Output Contact Connector Port
3. Relay Fixing Frame
4. Relay
5. Relay LED Display
6. Relay Card Golden Finger Slot

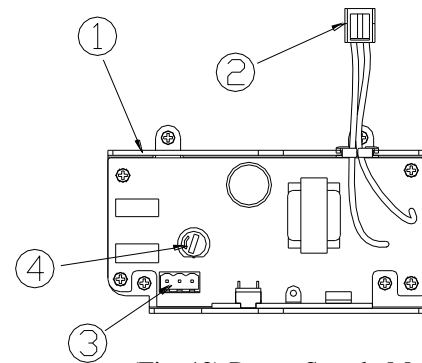


(Fig. 11) Relay Card

(4) Power Supply Module

1. Aluminum Base for Power Supply Card
2. Power DC12V/2A Output Connector
3. Power Input Connector
4. Fuse Holder
5. Input Fuse: 3A (100-240VAC)
5A (48VAC)

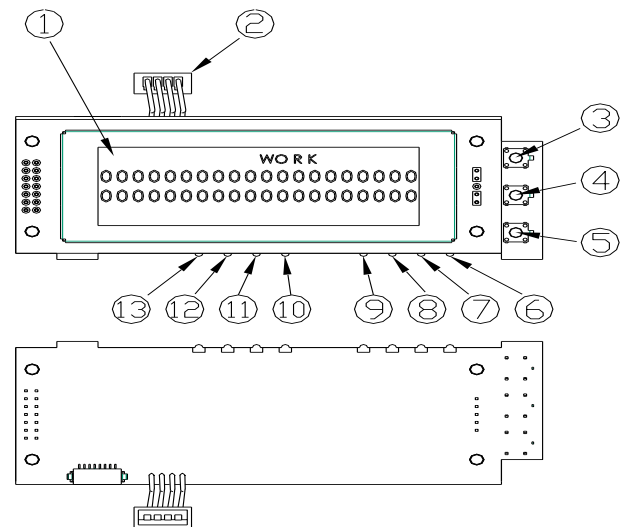
Power supply module	Fuse
AC100~240V	3A fast acting glass tube fuse
AC380~460V	3A tube fuse (with terminal/fast acting type)
AC28~48V	5A fast acting glass tube fuse
DC12~24V	5A fast acting glass tube fuse



(Fig. 12) Power Supply Module

(5) LCD Display

1. LCD Screen
2. Input / Output connecting Port
3. Pushbutton 1
4. Pushbutton 2
5. Pushbutton 3
6. Joystick 8/VR8 Output Status LED
7. Joystick 7/VR7 Output Status LED
8. Joystick 6/VR6 Output Status LED
9. Joystick 5/VR5 Output Status LED
10. Joystick 4/VR4 Output Status LED
11. Joystick 3/VR3 Output Status LED
12. Joystick 2/VR2 Output Status LED
13. Joystick 1/VR1 Output Status LED

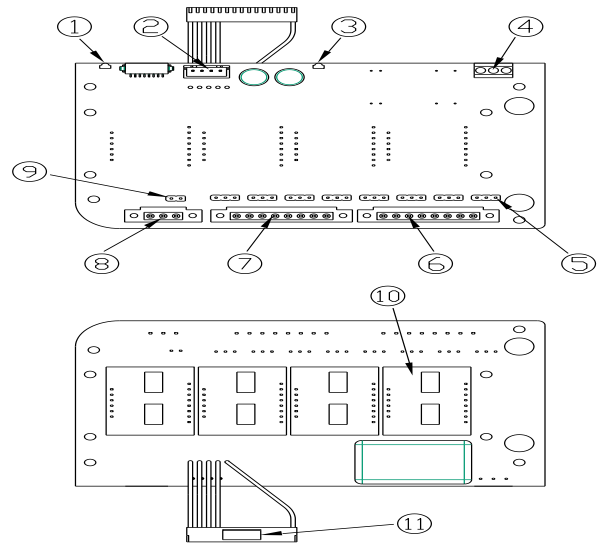


(Fig. 13) LCD Display

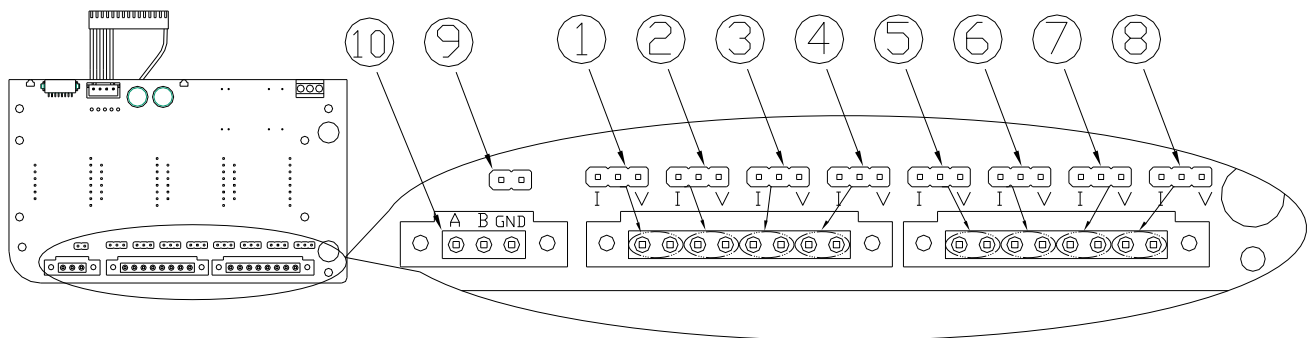
Joystick 1/VR1 ~ joystick 8/VR8 output status LED: Each joystick/VR is equipped with one red/green dual color output status LED. Both red and green status LED will not ON when there is no output from joystick. When the joystick output does not reach to the highest point, green status LED blinks. The lower the joystick output, the slower the green LED blinks. The higher the joystick output, the faster the green LED blinks. When the output reaches to the highest point, green LED OFF and red LED steady ON.

(6) Voltage/Current Proportional Output Module

1. Status LED
2. " LCD Display" Connector
3. RESET Status LED
4. External Power Input
5. Joystick/VR Output Voltage & Current Setting JUMPER
6. Joystick 5/VR5 ~ Joystick 8/VR8 Voltage & Current Output
7. Joystick 1/VR1 ~ Joystick 4/VR4 Voltage & Current output
8. RS485 Output Interface (optional)
9. RS485 Terminal Resistance Setting JUMPER
10. Proportional Output Module Card
11. Output Module to Decoder Card Connecting Port



(Fig. 14) Voltage/current proportional output module



① ~ ⑧ Corresponding joystick 1/VR1 ~ joystick 8/VR8

* Plug short pin into the 3-pin JUMPER left ("I" mark): Select "current" output and plug short pin into the 3-pin JUMPER right ("V" mark): Select "voltage" output ◦

Current output: Software setting(0~20mA、0~24mA & 4~20mA available) and plug the short pin into the 3-pin JUMPER left.("I" mark)

Voltage output: Software setting (0~+5V、0~+10V、0~±5V & 0~±10V available) and plug the short pin into the 3-pin JUMPER right.("V" mark)

* Each joystick/VR corresponds to the 2-pin output terminal. Left terminal is for voltage/current output and right terminal is for GND.

⑨ RS485 output terminal with 150Ω resistance. Plug in short pin: Use terminal resistance; not using short pin: Not using terminal resistance.

⑩ RS485 output

4. SYSTEM FUNCTIONS

4.1 Transmitter Joystick Descriptions

Joystick types can be customized by the demand per different customer. The available ones are described as below:

JOYSTICK TYPE	DESCRIPTION
<p>Proportional joystick</p>	<p>Double axes joystick Neutral angle range $0^{\circ} \pm 5^{\circ}$, max. motion angle $\pm 40^{\circ}$ Joystick Up/Left axis $+6^{\circ} \sim +40^{\circ}$ for $0 \sim +\text{MAX}$ proportional output. (127 steps resolution) Joystick Down/Right axis $-6^{\circ} \sim -40^{\circ}$ for $0 \sim +\text{MAX}$ or $0 \sim -\text{MAX}$ proportional output. (127 steps resolution)</p> <p>Single axis joystick Neutral angle range $0^{\circ} \pm 3^{\circ}$, max. motion angle $\pm 35^{\circ}$ Joystick Up axis $+4^{\circ} \sim +35^{\circ}$ for $0 \sim +\text{MAX}$ proportional output. (127 steps resolution) Joystick Down axis $-4^{\circ} \sim -35^{\circ}$ for $0 \sim +\text{MAX}$ or $0 \sim -\text{MAX}$ proportional output. (127 steps resolution)</p> <p>* Move joystick to any angle and release, joystick will auto return to neutral position. * Back to zero checking after transmitter joystick startup.</p>
<p>Single-side type VR(#)</p>	<p>* 0° on the start position of the rotary switch left. Rotating clock-wisely $0^{\circ} \sim 240^{\circ}$ for $0 \sim +\text{MAX}$ proportional output (255 steps resolution) * Rotate switch to any angle and release, rotary switch will remain at that angle and will not auto return to 0°. * Pre-set transmitter startup as not having back to zero check. * Proportional output available: Interface card with voltage/current proportional output: $0 \sim +5\text{V} / 0 \sim +10\text{V} / 4 \sim 20\text{mA} / 0 \sim 20\text{mA} / 0 \sim 24\text{mA}$ (not-selectable: $0 \sim \pm 5\text{VDC} / 0 \sim \pm 10\text{VDC}$)</p>

Neutral type VR	<p>* 0° as the rotating central position. Clockwise 0°~+120°, counterclockwise 0°~-120°.</p> <p>* 0°~+120°, rotating range for 0~+MAX proportional output. (127 steps resolution)</p> <p>* 0°~-120°, rotating range for 0~+MAX or 0~-MAX proportional output. (127 steps resolution)</p> <p>* Rotate switch to any angle and release, rotary switch will remain at that angle and will not auto return to 0°.</p> <p>* Pre-set transmitter startup as not having back to zero check.</p> <p>* Proportional output available: By voltage/current: 0~+5V, 0~+10V, 0~±5V, 0~±10V, 4~20mA, 0~20mA & 0~24mA.</p> <p>* To use output not within 0~±5VDC / 0~±10VDC, axis relay 2pcs is needed.</p> <ol style="list-style-type: none"> When VR is at 0°, 2 axis relays are OFF. When VR is at 0°, rotate it clockwise. Upper axis relay is ON; Lower axis relay is OFF. When VR is at 0°, rotate it counter-clockwise. Upper axis relay is OFF; Lower axis relay is ON. 																																				
1-speed joystick	<p>* Joystick back to zero check after transmitter startup</p> <table border="1" data-bbox="438 786 1114 1025"> <thead> <tr> <th></th> <th>Neutral relay (optional)</th> <th>Up 1-speed relay</th> <th>Down 1-speed relay</th> </tr> </thead> <tbody> <tr> <td>Joystick neutral</td> <td>ON</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>Joystick Up 1-speed</td> <td>OFF</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>Joystick Down 1-speed</td> <td>OFF</td> <td>OFF</td> <td>ON</td> </tr> </tbody> </table>		Neutral relay (optional)	Up 1-speed relay	Down 1-speed relay	Joystick neutral	ON	OFF	OFF	Joystick Up 1-speed	OFF	ON	OFF	Joystick Down 1-speed	OFF	OFF	ON																				
	Neutral relay (optional)	Up 1-speed relay	Down 1-speed relay																																		
Joystick neutral	ON	OFF	OFF																																		
Joystick Up 1-speed	OFF	ON	OFF																																		
Joystick Down 1-speed	OFF	OFF	ON																																		
1-speed joystick (Not share the 2nd speed relay)	<p>* Joystick back to zero check after transmitter startup</p> <table border="1" data-bbox="438 1077 1342 1400"> <thead> <tr> <th></th> <th>Neutral relay (optional)</th> <th>Up 1-speed relay</th> <th>Up 2-speed relay</th> <th>Down 1-speed relay</th> <th>Down 2-speed relay</th> </tr> </thead> <tbody> <tr> <td>Joystick neutral</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>Joystick Up 1-speed</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>Joystick Up 2-speed</td> <td>OFF</td> <td>ON</td> <td>ON</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>Joystick Down 1-speed</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>Joystick Down 2-speed</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>ON</td> </tr> </tbody> </table>		Neutral relay (optional)	Up 1-speed relay	Up 2-speed relay	Down 1-speed relay	Down 2-speed relay	Joystick neutral	ON	OFF	OFF	OFF	OFF	Joystick Up 1-speed	OFF	ON	OFF	OFF	OFF	Joystick Up 2-speed	OFF	ON	ON	OFF	OFF	Joystick Down 1-speed	OFF	OFF	OFF	ON	OFF	Joystick Down 2-speed	OFF	OFF	OFF	ON	ON
	Neutral relay (optional)	Up 1-speed relay	Up 2-speed relay	Down 1-speed relay	Down 2-speed relay																																
Joystick neutral	ON	OFF	OFF	OFF	OFF																																
Joystick Up 1-speed	OFF	ON	OFF	OFF	OFF																																
Joystick Up 2-speed	OFF	ON	ON	OFF	OFF																																
Joystick Down 1-speed	OFF	OFF	OFF	ON	OFF																																
Joystick Down 2-speed	OFF	OFF	OFF	ON	ON																																
2-speed joystick (Not share the 2nd speed relay. 1st & 2nd speed relays do not activate at the same time)	<p>* Joystick back to zero check after transmitter startup</p> <table border="1" data-bbox="438 1451 1326 1774"> <thead> <tr> <th></th> <th>Neutral relay (optional)</th> <th>Up 1-speed relay</th> <th>Up 2-speed relay</th> <th>Down 1-speed relay</th> <th>Down 2-speed relay</th> </tr> </thead> <tbody> <tr> <td>Joystick neutral</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>Joystick Up 1-speed</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>Joystick Up 2-speed</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>Joystick Down 1-speed</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>Joystick Down 2-speed</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> </tr> </tbody> </table>		Neutral relay (optional)	Up 1-speed relay	Up 2-speed relay	Down 1-speed relay	Down 2-speed relay	Joystick neutral	ON	OFF	OFF	OFF	OFF	Joystick Up 1-speed	OFF	ON	OFF	OFF	OFF	Joystick Up 2-speed	OFF	OFF	ON	OFF	OFF	Joystick Down 1-speed	OFF	OFF	OFF	ON	OFF	Joystick Down 2-speed	OFF	OFF	OFF	OFF	ON
	Neutral relay (optional)	Up 1-speed relay	Up 2-speed relay	Down 1-speed relay	Down 2-speed relay																																
Joystick neutral	ON	OFF	OFF	OFF	OFF																																
Joystick Up 1-speed	OFF	ON	OFF	OFF	OFF																																
Joystick Up 2-speed	OFF	OFF	ON	OFF	OFF																																
Joystick Down 1-speed	OFF	OFF	OFF	ON	OFF																																
Joystick Down 2-speed	OFF	OFF	OFF	OFF	ON																																
3-speed joystick (2nd & 3rd speed share the same relay)	<p>* Joystick back to zero check after transmitter startup</p> <table border="1" data-bbox="438 1825 1334 2045"> <thead> <tr> <th></th> <th>Neutral relay (optional)</th> <th>Up relay</th> <th>Down relay</th> <th>2-speed relay</th> <th>3-speed relay</th> </tr> </thead> <tbody> <tr> <td>Joystick neutral</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>Joystick Up 1-speed</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>Joystick Up 2-speed</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>ON</td> <td>OFF</td> </tr> </tbody> </table>		Neutral relay (optional)	Up relay	Down relay	2-speed relay	3-speed relay	Joystick neutral	ON	OFF	OFF	OFF	OFF	Joystick Up 1-speed	OFF	ON	OFF	OFF	OFF	Joystick Up 2-speed	OFF	ON	OFF	ON	OFF												
	Neutral relay (optional)	Up relay	Down relay	2-speed relay	3-speed relay																																
Joystick neutral	ON	OFF	OFF	OFF	OFF																																
Joystick Up 1-speed	OFF	ON	OFF	OFF	OFF																																
Joystick Up 2-speed	OFF	ON	OFF	ON	OFF																																

	Joystick Up 3-speed	OFF	ON	OFF	ON	ON		
	Joystick Down 1-speed	OFF	OFF	ON	OFF	OFF		
	Joystick Down 2-speed	OFF	OFF	ON	ON	OFF		
	Joystick Down 3-speed	OFF	OFF	ON	ON	ON		
4-speed joystick (2nd, 3rd & 4th speed share the same relay)	* Joystick back to zero check after transmitter startup							
		Neutral relay (optional)	Up relay	Down relay	2-speed relay	3-speed relay	4-speed relay	
	Joystick neutral	ON	OFF	OFF	OFF	OFF	OFF	
	Joystick Up 1-speed	OFF	ON	OFF	OFF	OFF	OFF	
	Joystick Up 2-speed	OFF	ON	OFF	ON	OFF	OFF	
	Joystick Up 3-speed	OFF	ON	OFF	ON	ON	OFF	
	Joystick Up 4-speed	OFF	ON	OFF	ON	ON	ON	
	Joystick Down 1-speed	OFF	OFF	ON	OFF	OFF	OFF	
	Joystick Down 2-speed	OFF	OFF	ON	ON	OFF	OFF	
	Joystick Down 3-speed	OFF	OFF	ON	ON	ON	OFF	
	Joystick Down 4-speed	OFF	OFF	ON	ON	ON	ON	
5-speed joystick (2nd, 3rd, 4th & 5th speed share the same relay)	* Joystick back to zero check after transmitter startup							
		Neutral relay (optional)	Upper relay	Lower relay	2-speed relay	3-speed relay	4-speed relay	5-speed relay
	Joystick neutral	ON	OFF	OFF	OFF	OFF	OFF	OFF
	Joystick Up 1-speed	OFF	ON	OFF	OFF	OFF	OFF	OFF
	Joystick Up 2-speed	OFF	ON	OFF	ON	OFF	OFF	OFF
	Joystick Up 3-speed	OFF	ON	OFF	ON	ON	OFF	OFF
	Joystick Up 4-speed	OFF	ON	OFF	ON	ON	ON	OFF
	Joystick Up 5-speed	OFF	ON	OFF	ON	ON	ON	ON
	Joystick Down 1-speed	OFF	OFF	ON	OFF	OFF	OFF	OFF
	Joystick Down 2-speed	OFF	OFF	ON	ON	OFF	OFF	OFF
	Joystick Down 3-speed	OFF	OFF	ON	ON	ON	OFF	OFF
	Joystick Down 4-speed	OFF	OFF	ON	ON	ON	ON	OFF
Joystick Down 5-speed	OFF	OFF	ON	ON	ON	ON	ON	

Outer extension, 1-speed joystick	Not included in the receiver 32pcs relays. The maximum number of outer extensive relay is 32. Same function as 1-speed joystick.
Outer extension, 2-speed joystick (Not to share the 2nd speed relay)	Not included in the receiver 32pcs relays. The maximum number of outer extensive relay is 32. Same function as 2-speed joystick. (not share the 2nd speed relay)
Outer extension, 2-speed joystick (Not to share the 2nd speed relay. 1st & 2nd speed relays do not activate at the same time)	Not included in the receiver 32pcs relays. The maximum number of outer extensive relay is 32. Same function as 2-speed joystick. (Not share the 2nd speed relay. 1st & 2nd speed relays do not activate at the same time)
Outer extension, 3-speed joystick (2nd & 3rd speed share the same relay)	Not included in the receiver 32pcs relays. The maximum number of outer extensive relay is 32. Same function as 3-speed joystick. (2nd & 3rd speed share the same relay)
Outer extension, 4-speed joystick (2nd, 3rd & 4th speed share the same relay)	Not included in the receiver 32pcs relays. The maximum number of outer extensive relay is 32. Same function as 4-speed joystick. (2nd, 3rd & 4th speed share the same relay)
Outer extension, 5-speed joystick (2nd, 3rd, 4th & 5th speed share the same relay)	Not included in the receiver 32pcs relays. The maximum number of outer extensive relay is 32. Same function as 5-speed joystick. (2nd, 3rd, 4th & 5th speed share the same relay)

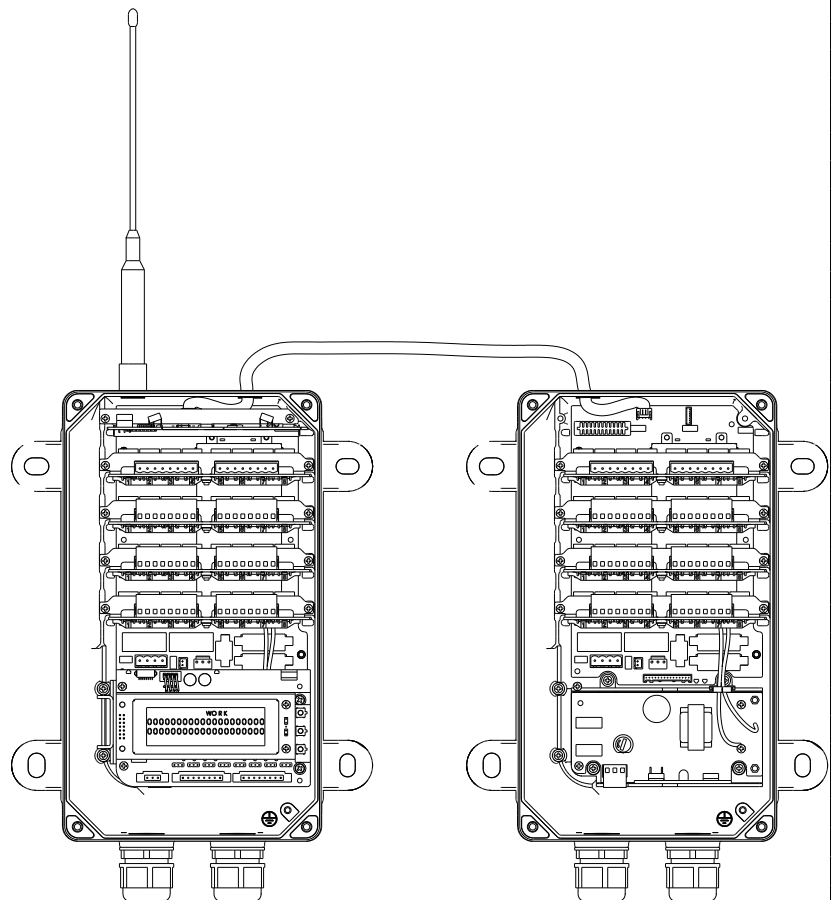
(#) VR = Variable Resistor

By using a 4-cord cable, you may connect the main receiver (left) and the extension one (right) as shown on below figure.

Please refer to “18. External Extension Contact” of figure 10 on page 33 for the position of connecting port.

Maximum number of relay for extension receiver is 32pcs.

Please note that the extension receiver is only for external extension only, not for main receiver.



JOYSTICK FUNCTION	REQUEST	DESCRIPTION
<p>0~±10V 0~±5V</p>	<p>* Installation: Interface card for voltage/current proportional output. Please make sure the JUMPER in front of the output PORT is plugged in the V mark position.</p> <p>* Only for: Proportional joystick and neutral type VR</p>	<p>Double axes proportional joystick:</p> <ul style="list-style-type: none"> * Neutral position as 0°, output 0V. * Joystick Upper/Left axis 0° ~ +40° for 0 ~ +10V / 0~+5V proportional output. (127 steps resolution) * Joystick Lower/Right axis 0° ~ -40° for 0 ~ -10V / 0~-5V proportional output. (127 steps resolution) <p>Single axis proportional joystick:</p> <ul style="list-style-type: none"> * Neutral position as 0°, output 0V. * Joystick Upper axis 0° ~ +35° for 0 ~ +10V / 0 ~ +5V proportional output. (127 steps resolution) * Joystick Lower axis 0° ~ -35° for 0 ~ -10V / 0 ~ -5V proportional output. (127 steps resolution) <p>Neutral type VR:</p> <ul style="list-style-type: none"> * 0° as rotating central position. Output 0V. * Clockwise 0° ~ +120° for 0~+10V / 0~+5V proportional output. (127 steps resolution) * Counterclockwise 0° ~ -120° for 0~-10V / 0~-5V proportional output. (127 steps resolution)
<p>0~+10V 0~+5V</p>	<p>* Installation: Interface card for voltage/current proportional output. Please make sure the JUMPER in front of the output PORT is plugged in the V mark position.</p> <p>* Availability: All are available except for the digital joystick.</p>	<p>Double axes proportional joystick:</p> <ul style="list-style-type: none"> * Neutral position, output 0V. Upper and Lower axis relays are OFF. * Joystick Upper/Left axis 0° ~ +40° for 0~+10V / 0~+5V proportional output. (127 steps resolution) Upper axis relay is ON, Lower axis relay is OFF. * Joystick Lower/Right axis 0° ~ -40° for 0~+10V / 0~+5V proportional output. (127 steps resolution) Upper axis relay is OFF, Lower axis relay is ON. <p>Single axis proportional joystick:</p> <ul style="list-style-type: none"> * Neutral position, output 0V. Upper and Lower axis relays are OFF. * Joystick Upper axis 0° ~ +35° for 0~+10V / 0~+5V proportional output. (127 steps resolution) Upper axis relay is ON, Lower axis relay is OFF. * Joystick Lower axis 0° ~ -35° for 0~+10V / 0~+5V proportional output. (127 steps resolution) Upper axis relay is OFF, Lower axis relay is ON. <p>Neutral type VR:</p> <ul style="list-style-type: none"> * 0° as rotating central position, output 0V. Upper and Lower axis relays are OFF. * Clockwise 0° ~ +120° for 0~+10V / 0~+5V proportional output. (127 steps resolution)

		<p>Upper axis relay is ON, Lower axis relay is OFF.</p> <p>* Counterclockwise 0° ~ -120° for 0~-10V / 0~-5V proportional output. (127 steps resolution)</p> <p>Upper axis relay is OFF, Lower axis relay is ON.</p> <p>Single type VR:</p> <p>* 0° as rotating central position, output 0V.</p> <p>* Clockwise 0° ~ +240° for 0~+10V / 0~+5V proportional output. (255 steps resolution)</p>
<p>0~20mA 0~24mA</p>	<p>* Installation: Interface card for voltage/current proportional output. Please make sure the JUMPER in front of the output PORT is plugged in the I mark position.</p> <p>* Availability: All are available except for the digital joystick.</p>	<p>Double axes proportional joystick:</p> <p>* Neutral position, output 0mA. Upper and Lower axis relays are OFF.</p> <p>* Joystick Upper/Left axis 0° ~ +40° for 0~20mA / 0~24mA proportional output. (127 steps resolution) Upper axis relay is ON, Lower axis relay is OFF.</p> <p>* Joystick Lower/Right axis 0° ~ -40° for 0~20mA / 0~24mA proportional output. (127 steps resolution) Upper axis relay is OFF, Lower axis relay is ON.</p> <p>Single axis proportional joystick:</p> <p>* Neutral position, output 0mA. Upper and Lower axis relays are OFF.</p> <p>* Joystick Upper axis 0° ~ +35° for 0~20mA / 0~24mA proportional output. (127 steps resolution) Upper axis relay is ON, Lower axis relay is OFF.</p> <p>* Joystick Lower axis 0° ~ -35° for 0~20mA / 0~24mA proportional output. (127 steps resolution) Upper axis relay is OFF, Lower axis relay is ON.</p> <p>Neutral type VR:</p> <p>* 0° as rotating central position, output 0mA. Upper and Lower axis relays are OFF.</p> <p>* Clockwise 0° ~ +120° for 0~20mA / 0~24mA proportional output. (127 steps resolution) Upper axis relay is ON, Lower axis relay is OFF.</p> <p>* Counterclockwise 0° ~ -120° for 0~20mA / 0~-5V proportional output. (127 steps resolution) Upper axis relay is OFF, Lower axis relay is ON.</p> <p>Single type VR:</p> <p>* 0° in the left start position within rotating range. Output 0mA.</p> <p>* Clockwise 0° ~ +240° for 0~20mA / 0~24mA proportional output. (255 steps resolution)</p>
<p>4~20mA</p>	<p>* Installation: Interface card for voltage/current proportional output. Please</p>	<p>Double axes proportional joystick:</p> <p>* Neutral position, output 4mA. Upper and Lower axis relays are OFF.</p> <p>* Joystick Upper/Left axis 0° ~ +40° for 4~20mA proportional</p>

	<p>make sure the JUMPER in front of the output PORT is plugged in the I mark position.</p> <p>* Availability: All are available except for the digital joystick.</p>	<p>output. (127 steps resolution) Upper axis relay is ON, Lower axis relay is OFF.</p> <p>* Joystick Lower/Right axis 0° ~ -40° for 4~20mA proportional output. (127 steps resolution) Upper axis relay is OFF, Lower axis relay is ON.</p> <p>Single axis proportional joystick:</p> <p>* Neutral position, output 4mA. Upper and Lower axis relays are OFF.</p> <p>* Joystick Upper axis 0° ~ +35° for 4~20mA proportional output. (127 steps resolution) Upper axis relay is ON, Lower axis relay is OFF.</p> <p>* Joystick Lower axis 0° ~ -35° for 4~20mA proportional output. (127 steps resolution) Upper axis relay is OFF, Lower axis relay is ON.</p> <p>Neutral type VR:</p> <p>* 0° as rotating central position, output 4mA. Upper and Lower axis relays are OFF.</p> <p>* Clockwise 0° ~ +120° for 4~20mA proportional output. (127 steps resolution) Upper axis relay is ON, Lower axis relay is OFF.</p> <p>* Counterclockwise 0° ~ -120° for 4~20mA proportional output. (127 steps resolution) Upper axis relay is OFF, Lower axis relay is ON.</p> <p>Single type VR:</p> <p>* 0° as the left start position within rotating range, output 4mA.</p> <p>* Clockwise 0° ~ +240° for 4~20mA proportional output. (255 steps resolution)</p>
Customized (OPTION) proportional output card	* Base on customers' requests	Base on customers' requests
Neutral check	* Digital / Proportional is compelled to have neutral check * Selectable at VR	When transmitter is ON, the joystick / VR has to be checked if it is at 0° position, then transmitter can be started. If not, the error status light will display as "pushbutton jammed / joystick is not at neutral position" (Please refer to encoder status table.) and the transmitter will not be started.
Plus/Minus (+/-)voltage exchange	* Only for proportional joystick or neutral type * Select 0~±5V or 0~±10V	Plus / Minus output reverse Example: Original => -5V(Lower axis)~ 0V(Neutral) ~(Upper axis)+5V Select this function => +5V(Lower axis)~0V(Neutral)~(Upper axis) -5V
Axis relay	* Not selectable: single-side type	* There are 2pcs of relay for Axis relay. One is Upper/Left axis, the other is Lower/Right axis.

	VR and digital joystick (digital joystick is available with axis relay)	<ul style="list-style-type: none"> * Joystick is at neutral position or when neutral type VR is at 0° position, 2-axis relays are OFF. * Joystick Upper/Left axis or neutral VR operates clockwise: Upper/Left axis relay is ON, Lower/Right axis relay is OFF. * Joystick Lower/Right axis or neutral VR operates counter-clockwise: Upper/Left axis relay is OFF, Lower/Right axis relay is ON. * The proportional output voltage/current can be wired to Upper/Lower axis relay at the same time. When the joystick is moving, the proportional output voltage/current will output via the corresponding axis.
Accelerating output slowly	<ul style="list-style-type: none"> * Both joystick and VR are selectable * Every joystick or VR can be selected respectively or not to select 	<ul style="list-style-type: none"> * Example: Proportional joystick at 0~5V output, slowly output time 3 seconds. Operate joystick from neutral to top position swiftly and stop, the output increases linearly from 0V, then gradually to 5V at the 3rd second and stops at 5V.
Accelerating output slowly time 1.5sec ~ 5sec	<ul style="list-style-type: none"> * Joystick activates and accelerates slowly * All joysticks and VR with activated accelerating output slowly share this setting time 	<ul style="list-style-type: none"> * Time needed from the lowest output to the highest output.
Accelerating output slowly: immediately/slowly	<ul style="list-style-type: none"> * Joystick with activated accelerating output slowly is needed 	<ul style="list-style-type: none"> * Joystick/VR spring return: Decelerating immediately-- Output corresponds to the current joystick/VR angle immediately. Decelerating slowly-- Base on the time selected for accelerating output slowly, output decreases proportionally from previous setting to current joystick/VR angle.
Joystick neutral relay	<ul style="list-style-type: none"> * Joystick/VR are selectable 	<ul style="list-style-type: none"> * Joystick in the neutral position, neutral relay ON; Joystick is not in the center position, neutral relay OFF. * Neutral type VR: Within center position of rotating range, neutral relay ON; Out of center position of rotating range, neutral relay OFF. * Single type VR: VR in the left START position, neutral relay ON; VR is not in the left START position, proportional output activated and neutral relay OFF.
Joystick neutral relay output reversely	<ul style="list-style-type: none"> * After joystick neutral relay is activated 	<ul style="list-style-type: none"> * Neutral relay reverse
Joystick direction Up/Down or	<ul style="list-style-type: none"> * For digital and proportional 	<ul style="list-style-type: none"> * Joystick Up axis is changed to Down axis and Down axis is changed to Up axis.




Left/Right exchange	joystick only	<p>Not to select:</p> <ol style="list-style-type: none"> 1. Left cross axis: Up/Down axis 2. Left cross axis: Left/Right axis 3. Right cross axis: Left/Right axis 4. Small single axis <p>To select:</p> <p>Right cross axis: Up/Down axis</p>
Joystick share the same accelerator relay	* Joystick/VR are selectable	<p>* The selected joystick or VR share the same relay.</p> <p>* Either the selected joystick or VR is not in the center/0° position (with output), the relay with joystick share the same accelerator is ON.</p> <p>* The selected joystick or VR is back to the center/0° position, the relay with joystick share the same accelerator is OFF.</p>
Opposite side protection of joystick spring return	<p>* For digital and proportional joysticks only.</p> <p>* For cross type joystick, not for small single axis joystick.</p>	* When the joystick is back to neutral position, if the spring inertia is too strong, then the joystick will spring back to the opposite position. But the opposite relay output will be inhibited.
Assign the 8th axis as the output that share the same accelerator	<p>* Digital joystick without this function</p> <p>* All the activated joysticks/VR with the same style</p> <p>* Not to use the 8th joystick/VR (reserved for sharing the same accelerator output)</p>	<p>* The 8th joystick/VR are reserved for sharing the same accelerator output. Not to use for general joystick.</p> <p>* Joystick/VR share the same accelerator output is the same as the selected joystick or VR as highest output “absolute value”. (output always with plus voltage).</p> <p>* The selected joystick or VR is back to neutral /0° position, joystick/VR share the same accelerator analog output back to neutral/0° position output.</p>
8 joysticks allow only one function at the same time	* Either cross type joystick restriction or this function can be selected	<p>* When “joystick/VR share the same accelerator analog output” is not considered, only 1 out of 8 with output.</p> <p>* 1~8 joysticks/VR, detect from joystick/VR 1 to 2,3~8. At last, the joystick function first with output (joystick or VR not on neutral/0° position), the rest without output. When “all joystick/VR (including the one without function)” back to neutral/0° position, output back to neutral/0° position and start again.</p>
Cross type joystick restriction	<p>* Joystick only</p> <p>* Only 1 out of 8 single axis joysticks is allowed to function independently.</p> <p>* Restriction for each two</p>	<p>* Take 1-2 cross type joystick restriction as an example:</p> <p>Joystick 1&2 without neutral but with output and another joystick output is not allowed (1&2 joystick without neutral at the same time, joystick 1 has the priority). When joystick 1&2 back to neutral, output back to neutral position and start again.</p>

	joysticks 1-2, 3-4, 5-6 & 7-8.	
SICK LASER	* Single side VR is not selectable	<p>* SICK LASER “NORTH” is restricted to Up axis. The purpose is for the very north positioning.</p> <p>* SICK LASER “SOUTH” is restricted to Down axis. The purpose is for the very south positioning.</p> <p>* Joystick 1 is to the detecting point of CN13 1N(Up axis)/1S(Down) input.</p> <p>* Joystick 2 is to the detecting point of CN13 2N(Up axis)/2S(Down) input.</p> <p>* Joystick 3 is to the detecting point of CN13 3N(Up axis)/3S(Down) input.</p> <p>* Joystick 4 is to the detecting point of CN13 4N(Up axis)/4S(Down) input.</p> <p>* Joystick 5 is to the detecting point of CN14 5N(Up axis)/5S(Down) input.</p> <p>* Joystick 6 is to the detecting point of CN14 6N(Up axis)/6S(Down) input.</p> <p>* Joystick 7 is to the detecting point of CN14 7N(Up axis)/7S(Down) input.</p> <p>* Joystick 8 is to the detecting point of CN14 8N(Up axis)/8S(Down) input.</p> <p>* CN2 +0V supplies trigger purpose power level.</p> <p>Example:</p> <p>0~±10V output, SENSORS are equipped on the North/South end of crane rail.</p> <p>When the crane does not reach the North SENSOR, the input detecting point that is sent from SENSOR to CN13 1N will not be triggered;</p> <p>When the crane reaches the North SENSOR, the SENSOR will send detecting point 0V to CN13 1N input;</p> <p>When the crane does not reach the South SENSOR, the input detecting point that is sent from SENSOR to CN13 1S will not be triggered;</p> <p>When the crane reaches the South SENSOR, the SENSOR will send detecting point 0V to CN13 1S input.</p> <p>When joystick is operated to the Up axis position, the crane will go to North. Before joystick reaches the North SENSOR, the detecting point of CN13 1N input will not be triggered. The output will depend on joystick Up axis angle 0~+10V. Crane will go to North position continuously.</p> <p>When crane reaches the North SENSOR, the detecting point of CN13 1N input will be 0V. The decoding firmware will be restricted as the North output. That is, when joystick is operated to Up axis position, the output will be 0V. Then crane cannot go to North position anymore.</p> <p>When joystick is operated to the Down axis position, the crane will go to South. Before crane reaches the South SENSOR, the detecting point of CN13 1S input will not be triggered. The output will depend on the angle 0~ -10V of joystick Down axis. Crane will go to South position continuously.</p>

		When crane reaches the North SENSOR, the detecting point of CN13 1S input will be 0V. The decoding firmware will be restricted as South output. That is, when joystick is operated to Down axis position, the output will be 0V. Then crane cannot go to South anymore.
Selection of linear output curve: linear	* For proportional joystick and VR only	* The tilt percentage for input and output is fixed. Output from neutral to maximum value is a straight line. * Joystick/VR angle output corresponds to the tilt percentage of this straight line.
Selection of linear output curve: curve	* For proportional joystick and VR only	* Forward/reverse parabola curves may be changed by dragging mouse. * Joystick/VR angle output corresponds to this curve.
Selection of linear output curve: logic	* For proportional joystick and VR only	* Output status is only available with neutral and highest level, no in between one. * Joystick moves/VR rotates to "certain angle", the output from neutral immediately to highest point of the axis. * Certain angle: changeable by dragging the mouse.
Non-symmetry	* For proportional joystick and neutral VR only * Select "curve" or "logic"	* Up/Down axis setting is independent.

4.2 Joystick Configurations and Settings

JOYSTICK	SETTING							
	Joystick1	Joystick2	Joystick3	Joystick4	Joystick5	Joystick6	Joystick7	Joystick8
	Left double axis type Up/Down axis	Left double axis type Left/Right axis			Right double axis type Up/Down axis	Right double axis type Left/Right axis		
	Left double axis type Up/Down axis	Left double axis type Left/Right axis	(Left) small single axis	(Right) small single axis	Right double axis type Up/Down axis	Right double axis type Left/Right axis		
	(A) small single axis	(B) small single axis	(C) small single axis	(D) small single axis	Right double axis type Up/Down axis	Right double axis type Left/Right axis		
	small single axis							
	small single axis							
					small single axis			
	(A) small single axis	(B) small single axis						
	(A) small single axis				(B) small single axis			
					(A) small single axis	(B) small single axis		
	(A) small single axis	(B) small single axis	(C) small single axis					
	(A) small single axis	(B) small single axis			(C) small single axis			
					(A) small single axis	(B) small single axis	(C) small single axis	
	(A) small single axis	(B) small single axis			(C) small single axis	(D) small single axis		
	(A) small single axis	(B) small single axis	(C) small single axis		(D) small single axis	(E) small single axis		

	(A) small single axis	(B) small single axis	(C) small single axis		(D) small single axis	(E) small single axis	(F) small single axis	
	(A) small single axis	(B) small single axis	(C) small single axis	(D) small single axis	(E) small single axis	(F) small single axis	(G) small single axis	
	(A) small single axis	(B) small single axis	(C) small single axis	(D) small single axis	(E) small single axis	(F) small single axis	(G) small single axis	(H) small single axis

When right cross type joystick is applied, the software setting for Joystick5 should be: Joystick direction [Up/Down] or [Left/Right] has to be exchanged.

4.3 Transmitter Pushbutton Descriptions

4.3.1 Pushbutton Types:

Pushbutton Type	Not control by EMS button	Pushbutton share the same accelerator relay	Transmitter start without checking if pushbutton is locked	Function																																																															
Single speed	Software selectable	Software selectable	Software selectable	* Without pressing pushbutton, relay OFF Press pushbutton, relay ON																																																															
Double speed	“Press EMS and compel double speed relay open” is not selectable	Software selectable	Software selectable	* Without pressing pushbutton: 1-speed relay OFF , 2-speed relay OFF * Press pushbutton 1-speed: 1-speed relay ON , 2-speed relay OFF * Press pushbutton 2-speed: 1-speed relay ON , 2-speed relay ON																																																															
Single speed in pairs, interlocked	Software selectable	Software selectable	Software selectable	* Two single-speed pushbuttons, each pushbutton has one relay. Two interlocked relays are not ON at the same time.																																																															
Double speed in pairs, interlocked	“Press EMS and compel double speed relay open” is not selectable	Software selectable	Software selectable	<table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="2">PB 1</th> <th colspan="2">PB 2</th> </tr> <tr> <th>1-spд relay</th> <th>2-spд relay</th> <th>1-spд relay</th> <th>2-spд relay</th> </tr> </thead> <tbody> <tr> <th rowspan="2">PB 2</th> <th>PB 1</th> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>OFF</td> <td>1-spд</td> <td>ON</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>OFF</td> <td>2-spд</td> <td>ON</td> <td>ON</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>1-spд</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>2-spд</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>ON</td> </tr> <tr> <td>1-spд</td> <td>1-spд</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>2-spд</td> <td>1-spд</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>1-spд</td> <td>2-spд</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>2-spд</td> <td>2-spд</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> </tbody> </table>			PB 1		PB 2		1-spд relay	2-spд relay	1-spд relay	2-spд relay	PB 2	PB 1	OFF	OFF	OFF	OFF	OFF	1-spд	ON	OFF	OFF	OFF	2-spд	ON	ON	OFF	OFF	1-spд	OFF	OFF	OFF	ON	OFF	2-spд	OFF	OFF	OFF	ON	ON	1-spд	1-spд	OFF	OFF	OFF	OFF	2-spд	1-spд	OFF	OFF	OFF	OFF	1-spд	2-spд	OFF	OFF	OFF	OFF	2-spд	2-spд	OFF	OFF	OFF	OFF
		PB 1		PB 2																																																															
		1-spд relay	2-spд relay	1-spд relay	2-spд relay																																																														
PB 2	PB 1	OFF	OFF	OFF	OFF																																																														
	OFF	1-spд	ON	OFF	OFF																																																														
OFF	2-spд	ON	ON	OFF	OFF																																																														
1-spд	OFF	OFF	OFF	ON	OFF																																																														
2-spд	OFF	OFF	OFF	ON	ON																																																														
1-spд	1-spд	OFF	OFF	OFF	OFF																																																														
2-spд	1-spд	OFF	OFF	OFF	OFF																																																														
1-spд	2-spд	OFF	OFF	OFF	OFF																																																														
2-spд	2-spд	OFF	OFF	OFF	OFF																																																														
Double speed in pairs, inter-locked, 2-speed separate	“Press EMS and compel double speed relay open” is not selectable	Software selectable	Software selectable	<table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="2">PB 1</th> <th colspan="2">PB 2</th> </tr> <tr> <th>1-spд relay</th> <th>2-spд relay</th> <th>1-spд relay</th> <th>2-spд relay</th> </tr> </thead> <tbody> <tr> <th rowspan="2">PB2</th> <th>PB1</th> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>OFF</td> <td>1-spд</td> <td>ON</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>OFF</td> <td>2-spд</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>1-spд</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>2-spд</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>1-spд</td> <td>1-spд</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>2-spд</td> <td>1-spд</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>1-spд</td> <td>2-spд</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>2-spд</td> <td>2-spд</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> </tbody> </table>			PB 1		PB 2		1-spд relay	2-spд relay	1-spд relay	2-spд relay	PB2	PB1	OFF	OFF	OFF	OFF	OFF	1-spд	ON	OFF	OFF	OFF	2-spд	OFF	ON	OFF	OFF	1-spд	OFF	OFF	OFF	ON	OFF	2-spд	OFF	OFF	OFF	OFF	ON	1-spд	1-spд	OFF	OFF	OFF	OFF	2-spд	1-spд	OFF	OFF	OFF	OFF	1-spд	2-spд	OFF	OFF	OFF	OFF	2-spд	2-spд	OFF	OFF	OFF	OFF
		PB 1		PB 2																																																															
		1-spд relay	2-spд relay	1-spд relay	2-spд relay																																																														
PB2	PB1	OFF	OFF	OFF	OFF																																																														
	OFF	1-spд	ON	OFF	OFF																																																														
OFF	2-spд	OFF	ON	OFF	OFF																																																														
1-spд	OFF	OFF	OFF	ON	OFF																																																														
2-spд	OFF	OFF	OFF	OFF	ON																																																														
1-spд	1-spд	OFF	OFF	OFF	OFF																																																														
2-spд	1-spд	OFF	OFF	OFF	OFF																																																														
1-spд	2-spд	OFF	OFF	OFF	OFF																																																														
2-spд	2-spд	OFF	OFF	OFF	OFF																																																														
ON/OFF in pairs	Software selectable	“No function” is not selectable	Software selectable	<table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="2">ON PB</th> <th>ON PB relay</th> <th>OFF PB relay</th> </tr> <tr> <th>OFF PB</th> <th>ON PB</th> <td></td> <td></td> </tr> </thead> <tbody> <tr> <td>Never press</td> <td>Never press</td> <td>OFF</td> <td>ON</td> <td></td> <td></td> </tr> <tr> <td>Not press</td> <td>Press</td> <td>ON</td> <td>OFF</td> <td></td> <td></td> </tr> <tr> <td>Press</td> <td>Not press</td> <td>OFF</td> <td>ON</td> <td></td> <td></td> </tr> <tr> <td>Press</td> <td>Press simultaneously</td> <td>OFF</td> <td>ON</td> <td></td> <td></td> </tr> </tbody> </table>			ON PB		ON PB relay	OFF PB relay	OFF PB	ON PB			Never press	Never press	OFF	ON			Not press	Press	ON	OFF			Press	Not press	OFF	ON			Press	Press simultaneously	OFF	ON																															
		ON PB		ON PB relay			OFF PB relay																																																												
		OFF PB	ON PB																																																																
Never press	Never press	OFF	ON																																																																
Not press	Press	ON	OFF																																																																
Press	Not press	OFF	ON																																																																
Press	Press simultaneously	OFF	ON																																																																

				simultaneously			
ON/safe OFF in pairs	“EMS not to deactivate” is not selectable	“No function” is not selectable	Software selectable				
						ON PB relay	OFF PB relay
					Receiver power on (Before receiving signal from transmitter)	OFF	ON
					Not to press OFF PB , press ON PB	ON	OFF
					1. Not to press OFF & ON PB 2. Not to press ON PB and depress OFF PB 3. Depress OFF PB and press ON PB	OFF	ON
					Press OFF & ON PB at the same time	Same status	Same status
					Press EMS button or receiver receives no signal from transmitter	Same status	Same status
Toggle switch. Press EMS button and MAIN relay remains activate	“EMS not to deactivate” is not selectable	“No function” is not selectable	Software selectable				
					* Press button and relay become OFF to ON or ON to OFF. * Press EMS button or receiver receives no signal from transmitter, relay remains latched.		
Toggle switch. Press EMS button and MAIN relay deactivates	“Press EMS and compel toggle switch relay open” is not selectable	“No function” is not selectable	Software selectable				
					* Press button and relay become OFF to ON or ON to OFF. * Press EMS button or receiver receives no signal from transmitter, relay off.		
2 nd EMS button	Software is not selectable	“No function” is not selectable	“Compulsory check” is not selectable				
					* Receiver power ON, if no signal is received, 2 nd EMS relay will be OFF. * After transmitter is ON (no to press dual EMS button), relay ON. * Press dual EMS button relay OFF. * Not to press dual EMS button but press START button, relay ON.		
Standard selector switch. Press EMS button and standard selector switch relay close	“EMS not to deactivate” is not selectable	“No function” is not selectable	Pre-set as “No check” is selectable				
					* Switch ON, relay ON; switch OFF, relay OFF. * Press EMS button or receiver receives no signal from transmitter, standard selector switch relay off.		
Standard selector switch. Press EMS and standard selector switch relay open	“Press EMS and compel standard selector switch relay open” is not selectable	“No function” is not selectable	Pre-set as “No check” is selectable				
					* Switch ON, relay ON; switch OFF, relay OFF * Press EMS button or receiver receives no signal from transmitter, relay off.		
Speed limit switch	“No function” is not selectable	“No function” is not selectable	“No check compelled” is not selectable				
					* Switch types selectable: 3-position or 3-stage rotary selector switch. * The joystick/VR output can be changed by the 3-stage limit switch * 1 st stage output 25%, 2 nd stage output 50% & 3 rd stage output 100%.		
Mix mode selector switch	“No function” is not selectable	“No function” is not selectable	* 1 wire to 1 switch: software non-selectable, compel to check * 3 wires encoding type: software is not selectable, compel not to check				
					* Each stage of 2~8 stage selector switch may change function for CHANNEL, LID & EID. * Switch condition- 1 wire to 1 switch: 2-stage rotary selector switch to 2 wires, 3-stage to 3 wires..., 8-stage to 8 wires. * Switch condition- 3-wire encoding type, 8-stage: 3 wires to 8-stage rotary selector switch. Non-changeable. * Switch condition – change directly: The stage of rotary selector switch is changed, transmitter is set to the CHANNEL/LID/EID of that stage. * Switch condition- Re-start the power to change: The setting position of rotary selector switch is used after transmitter power is ON. No other stage of rotary selector switch can be used only after next time transmitter power is ON. * Switch condition- Press START to change: Press START and use the current CHANNEL/LID/EID setting on rotary selector switch. * Use channel selection to assign channel on each stage. * Select EID ENABLE then to either assign EID on each stage or set EID on pushbutton. * Select LID ENABLE then to either assign LID on each stage or set LID on pushbutton.		
Group mode selection switch	“No function” is not selectable	“No function” is not selectable	“Compulsory check” is not selectable				
					* Stage available: 2~8-stage rotary selector switch (wiring: 1 wire to 1 stage) * Select relay of each stage from relay 1~8. * Different stage may assign the same relay repeatedly.		

EID switch	"No function" is not selectable	"No function" is not selectable	"No check compelled" is not selectable	* Change transmitter EID b0~b3 * Switch ON, EID bit=1; switch OFF, EID bit=0. * Either mix mode selector switch or EID ENALE is selectable * Receiver with AUTOSCAN function select EID bit match or bit or function
LID switch	"No function" is not selectable	"No function" is not selectable	"No check compelled" is not selectable	* Change transmitter LID b0~b3 * Switch ON, LID bit=1; switch OFF, LID bit=0. * Only 1 out of 2 LID ENALE function is selectable for mix mode selector switch
Digital joystick 2~5 speeds activating button	"No function" is not selectable	"No function" is not selectable	"Pre-checking" is selectable	* Select the pushbutton so that the pushbutton may control the digital joystick. * When the pushbutton is not depressed, only 1-speed is activated even if the joystick is operated to 2~5 speeds. * Joystick 2~5 speeds only activated with relay output when the pushbutton is depressed without releasing. * Maximum 4pcs pushbuttons. * Pushbutton or auto-return toggle switch is acceptable. No corresponding relay output. * If the digital joystick is not controlled by this pushbutton, then the 2~5 speeds is not limited at 1 speed.

* EMS button: In case of an emergency, press down the red emergency stop button (EMS) will immediately deactivates the transmitter and receiver MAIN relay. This is the rotary return type.

After the emergency stop button is elevated, please refer to "Transmitter startup condition" on Page 28 to restart.

EN ISO 13849-1 type: Press emergency stop button and switch off the transmitter power immediately, then the transmitter will stop sending commands. After the receiver is not receiving any signal for 1 second, MAIN relay will be off.

Regular type: Press emergency stop button and the transmitter will be sending emergency stop command. As soon as the receiver receives stop command, the MAIN relay will be off. When the emergency stop button is pressed for more than 1.5 seconds, the transmitter power will be switched off automatically.

* START button: Press to start the system and activate the receiver MAIN relay at the same time

* KEY: Power switch

4.3.2 Function Settings:

* ID: Range 00000~FFFF (hex), length 20bit. Total 1,048,576 sets of unique ID codes. Each Alpha 6000 system with unique manufacturing ID setting. This will ensure that only commands from the matching control transmitter can be carried out without any interference from other radio systems.

Remark 1: ID with 4 lower digit b[3:0] is called LID

Remark 2: Transmitter with function "mix mode selector switch-LID function" or "LID switch" will replace the original LID.

Remark 3: Receiver with function "LID bit match" or "LID bit" from AUTOSCAN will replace the original LID.

* Channel: The channel in use assigned

Remark 1: transmitter with function "mix mode selector switch-channel in use function" or "intelligent channel change" will replace the original channel in use.

Remark 2: Receiver with channel assigned from AUTOSCAN will replace the original channel in use.

* Service number: Alpha 6000 manufacturing serial number, for after service purpose.

* Manufacturing date: manufacturing date

* Customer remark: 16 alphabets or numbers recordable

4.3.2.1 Transmitter Function Settings

* Transmitter startup condition:

- ⊙ Power key startup: Rotate the power key clockwise to “ON” position to turn on the transmitter power.
- ⊙ START button/press START to activate MAIN relay: Rotate the power key clockwise to “ON” position, then press START to turn on the transmitter power.

* Transmitter power on, EMS button press / release function compel to check

- ⊙ Not enable:
- ⊙ Enable: After transmitter power is turned on and before EMS button is not depressed, the status LED is displayed as: green LED ON_0.1sec, OFF_0.9sec blink. Depress EMS button and elevate it to re-start the transmitter. This is to ensure no function error on EMS button before operation.

Remark: After transmitter power is turned on, the status LED is displayed as “green LED ON_0.1sec,OFF_0.9sec blink”. It means transmitter power is turned on and EMS button press/release function is checked.

* Transmitter inactivity overtime and then enter sleep mode:

- ⊙ Immediate : No press down pushbutton and joystick back to neutral, the transmitter will enter sleep mode immediately.
- ⊙ 1~120mins : No press down pushbutton and joystick back to neutral, after 1~120mins (selectable)/ 5 minutes manufacture setting, the transmitter will enter sleep mode immediately.
- ⊙ No auto shutdown/never shutdown: Transmitter without sleeping mode.

Remark : Transmitter enter sleep mode- Status LED OFF, power green LED ON, RF module and A/G sensor module OFF, then enter power saving mode.

* After transmitter enter sleep mode, re-awakening condition:

- ⊙ Re-start: Power key -> OFF -> ON
- ⊙ Joystick /any pushbutton: Pushbutton is pressed or joystick/VR is operated/rotated or power key -> OFF -> ON
- ⊙ START button: Joystick is back to neutral position and release pushbutton. Press START button to awaken transmitter. (Press START button when joystick is not in neutral position or pushbutton is pressed, red status LED on and transmitter cannot be awakened)

* Abnormal buss from transmitter:

- ⊙ Not enable: Buzz from transmitter START/LV/joystick correction no need to enable.
- ⊙ Enable: Buzzer sound when transmitter error status LED is flash.

* Transmitting power

- ⊙ -2~+20 dbm: Default setting is based on the transmitting power where the area/country is regulated. For any changes, please note if the setting meet the requirement of area/country.

* Transmitter drop protection:

- ⊙ Not enable:
- ⊙ Enable: If transmitter drops during operation, transmitter will send emergency stop signal to receiver and MAIN relay will be OFF. (Transmitter should equip with A/G SENSOR module)
- ⊙ Sensitivity -3 ~ +3 : Range of sensitivity adjustment for dropping detection. The sensitivity is pre-set as standard one.

- ◎ Shutoff transmitter power: When transmitter drops over the range of detective sensitivity, signal transmission from transmitter to receiver will be shutoff. Buzzer and error status LED display will continue to warn the operator. MAIN relay will be deactivated after the receiver receives no signal from the transmitter.

Re-start the transmitter:

1. Rotate the power switch to 'OFF' position and then 'ON' and start the transmitter again.
2. Press the emergency stop button, elevate it again and then start the transmitter again.

- ◎ Inhibit the joystick and button functions:

When transmitter drops to the sensor sensitivity limit, control actively to all the joysticks in use to become neutral output status. VR output remains on the point where transmitter is dropped. Pushbutton types that control automatically: single speed / single speed interlock / double speed / double speed interlock pushbuttons are all released. Other pushbuttons or switches output remains locking on the status of transmitter dropping. The transmitter buzzer and error status light will be ON continuously to warn the operator.

To release joystick and pushbutton function:

- a. To release joystick and pushbutton function, when joysticks are neutral (*) and pushbuttons / switches are released, press START button to release "Inhibit the joystick and button functions". (* VR output remains on the point where transmitter is dropped and cannot be changed until START button is pressed, transmitter is switched off or EMS is pressed)
- b. Press EMS button and release, then start the system again by following the "Transmitter boot condition".

* Transmitter tilt protection:

- ◎ Not enable:
- ◎ $> \pm 30^{\circ} \sim \pm 50^{\circ}$:

Transmitter in operation, when the tilt angle is bigger than default setting, the transmitter will send emergency stop signal to the receiver and MAIN relay will be OFF. (Transmitter should equip with an A/G SENSOR module) The initial press angle of the transmitter power / START button is defined as 0° .

- ◎ Switch off transmitter power:

When the transmitter tilt angle is bigger than the default setting, the signal transmission from transmitter to receiver will be disabled automatically. The transmitter buzzer and error status LED will be ON continuously to warn the operator that the receiver cannot receive any signal from the transmitter and the MAIN relay will be deactivated. To restart the transmitter, rotate the power switch to OFF and then to ON position. Then start the system again by following the "Transmitter boot condition".

- ◎ Inhibit the joystick and pushbutton function:

When the transmitter tilt angle is bigger than the default setting, all the joysticks will be inhibited as neutral output status automatically. VR output remains at the point where transmitter is dropped. Pushbutton types that control automatically: single speed / single speed interlock / double speed /

double speed interlock pushbuttons are all released. The transmitter buzzer and error status light will be ON continuously to warn the operator. To release the inhibited joystick and pushbuttons function by the error status light:

1. To release “Inhibit the joystick and pushbutton function“, press START button when the joystick position is neutral (unrelated to VR) and pushbutton is released. The transmitter buzzer and error status light will be OFF then back to normal operation.
2. After the emergency stop button is elevated, start the system again by following the “Transmitter boot condition”.

Note: Transmitter drop and tilt protection are sharing the same method.

* Transmitter transmission intermittently

- Not enable: Transmitter sends signal 10 times every second.
- Enable: Transmitter sends signal 4 times every second.

* Transmitter battery replacement, auto-recovery

- Not enable:
- Enable: The batteries can be replaced during transmitter operation. (without pressing EMS button or turning off the power) After the batteries are replaced, the transmitter can be operated normally. Transmitter START button startup and EMS button press/release check will be omitted.

Remark: This function is only for the transmitter. When the battery is removed from the transmitter, there will be no signal on the receiver and MAIN relay will be deactivated.

- A. If “receiver MAIN activate term: ID matches” is selected: Signal will be sent as soon as transmitter battery is inserted. When ID matches and receiver receives signal from the transmitter, MAIN relay will be activated.
- B. If “receiver MAIN activate term: START button” is selected: Signal will be sent as soon as transmitter battery is inserted. When ID matches and receiver receives signal from the transmitter, MAIN relay will not be activated until START button is pressed.

* Transmitter power ON, emergency stop button press/release check

- Not enable:
- Enable: After the transmitter power key is rotated to ON position and before the emergency stop button is pressed, the LED status: green LED blinks ON_0.1sec, OFF_0.9sec. Press and release emergency stop button, then transmitter will be started. This is to ensure the emergency stop button function without problem before transmitter operation.

4.3.2.2 Receiver Function Settings

* Receiver MAIN relay activate condition

- ID match: Transmitter and receiver ID is identical
- START button: Make sure transmitter and receiver ID is identical, then press START button on the transmitter.

* Receiver MAIN relay dynamic check

- Not enable:
- Enable: Before MAIN relay is ON, first proceed with dynamic check. If pass, then MAIN relay is

ON; if NG, then error status “MAIN relay lock” appear.

- ⊙ Receiver power ON: Proceed with dynamic check when receiver power is ON. If pass, then start the system; if NG, then error status “MAIN relay lock” appear.
- ⊙ START and receiver power ON: Dynamic check for both operation and power ON conditions.

Remark 1: When MAIN relay is on dynamic check status, MAIN1 relay close and MAIN2 relay open. After MAIN1 relay feedback normally, MAIN2 relay close and MAIN1 relay open, then check MAIN2 relay feedback.

* Receiver channel auto-scan

- ⊙ Not enable: Receiver receives channel regularly
- ⊙ Enable and transmitter power ON enables intelligent channel change: “receiver auto-scan channels” and “transmitter power ON intelligent channel change” activate at the same time.

Transmitter power On intelligent frequency change:

1. When the software setting is started, there will have 8 channels available automatically. The 8 channels are used for receiver auto scanning and the transmitter can also select the best communication channel from them.
2. It takes 1~3 seconds for every channel selection when transmitter is started. Time for receiver channel auto scanning is 1~6 seconds. (pre-set as master / slave channel exchange scanning mode)
3. Transmitter encoder version has to be V02.08 (incl.) or above and setting software has to be V03.05 (incl.) or above.

⊙ Enable **Channel stage selection:**

2~16 stages are available. Each stage may assign receiving channel, LID & EID.

Delay time for entering auto-scan channel:

0~3 seconds are available. Before entering channel auto-scan, the search will stay for 0~3 seconds at the original channel (optional). If transmitter signal is received and matches the frequency auto-scan lock condition, then the system enters operation status again. If delay time over 0~3 seconds, the system will enter frequency auto-scan status again.

Master/slave channel auto-scan exchange mode:

Master channel is the previous channel in use; the rest 1~16 channels are slave channels.

Master/salve channel auto-scan exchange sequence: Master channel ->1st setting channel -> Master channel -> 2nd setting channel Master channel -> Last setting channel

↑ _____ |

Non-master/slave channel auto-scan exchange sequence: 1st setting channel ->2nd setting channel Last setting channel

↑ _____ |

- ⊙ Auto-scan lock, LV relay ON for 3 seconds: Enable LV relay first to select. The function is the same as ALARM relay.

⊙ Auto-scan master channel lock condition

ID match_It is used only for master channel under auto-scan condition which transmitter ID matches receiver one.

START button_It is used only for master channel under auto-scan condition which transmitter ID matches receiver one. The transmitter START button has to be pressed down at the same time.

⊙ Auto-scan slave channel lock condition

ID match: It is used only for slave channel under auto-scan condition which transmitter ID matches receiver one.

START button: It is used only for slave channel under auto-scan condition which transmitter ID matches receiver one. The transmitter START button has to be pressed down at the same time.

⊙ Slave channel lock time: 0~3 seconds. (optional) Only when auto-scan slave channel is locked for 0~3 seconds, then it is confirmed to be locked. (MAIN RELAY ON)

⊙ LID

Disable: Not in use

Bit match: The LID setting within 1~16 stages will replace the original LID of ID and become new 20bit ID. The 20bit ID has to be identical to the ID received.

Bit or: The LID setting within 1~16 stages will replace the original LID of ID. Please refer to below for the “bit or” comparison table. ”√” means accept.

<i>LID received</i> AUTOSCAN <i>LID setting</i>	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0001		√		√		√		√		√		√		√		√
0010			√	√			√	√			√	√			√	√
0100					√	√	√	√					√	√	√	√
1000									√	√	√	√	√	√	√	√

⊙ EID

Disable: Not in use

Bit match: In addition to 20bit ID, all the 1~16 EID setting and the EID received have to match.

Bit or: In addition to 20bit ID, all the 1~16 EID setting and the EID received, the “EID bit or” also has to match. Please refer to below for the “EID bit or” comparison table. ”√” means accept.

<i>EID received</i> AUTOSCAN <i>EID setting</i>	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0001		√		√		√		√		√		√		√		√
0010			√	√			√	√			√	√			√	√
0100					√	√	√	√					√	√	√	√
1000									√	√	√	√	√	√	√	√

* The assigned pushbutton enter AUTOSCAN function: When MAIN relay is ON, the transmitter will pass its

operation priority to the other one.

Setting request: Transmitter 1 is set as channel 1 and transmitter 2 is set as channel 2. AUTOSCAN enable is set as 2 stages. 1st stage is set as the channel for transmitter 1 and 2nd stage is set as the channel for transmitter 2. Select one single speed pushbutton and set as "assigned pushbutton enter AUTOSCAN function". Except for different channels, setting for transmitter 1 & 2 has to be completely identical.

Enable method: When the original transmitter in operation, receiver MAIN relay is ON, joystick or neutral VR back to neutral position and single side VR back to 0° position, press down the assigned pushbutton, then the receiver enters AUTOSCAN status and searches for the other transmitter. The other transmitter has to START and standby, but no assigned pushbutton is pressed. After receiver successfully catches the other transmitter, the AUTOSCAN function will stop and the operation priority is transferred.

* Receiver relay setting

◎ LV relay: Transmitter low voltage relay or AUTOSCAN channel lock instruction

Function { **ON:** Transmitter low voltage, LV relay ON
ON 2sec & OFF 2sec repeatedly: Transmitter low voltage, LV relay ON 2sec & OFF 2sec repeatedly
ON 1sec & OFF 1sec repeatedly: Transmitter low voltage, LV relay ON 2sec & OFF 2sec repeatedly

Shutoff { **Transmitter battery change or transmitter shutoff:** Transmitter shutoff or change fully charged battery.
(Not suitable for receiver channel AUTOSCAN enable)
Transmitter battery change: Transmitter should change the fully charged battery.

◎ STOP relay: **Emergency stop relay**
RELAY ON: Press emergency stop button when MAIN relay is ON. Or, receiver is started but transmitter emergency stop button is pressed.
RELAY OFF: To activate emergency relay, transmitter non-emergency code has to be received and receiver startup request has also to be met, that is, MAIN relay is activated.

◎ ID relay: Identical to MAIN relay ON/OFF.

◎ START relay: Press START button on transmitter, START relay ON; release START button then START relay OFF

◎ ALARM relay { MAIN relay ON { Not in use.
ON 1~3sec: When MAIN relay ON, ALARM relay ON 1~3sec
MAIN relay OFF { Not in use.
ON 1~3sec: When MAIN RELAY OFF, ALARM relay ON 1~3sec

* RELAY K1~K32 output position exchange: Corresponding function for relay K1~K32 is exchangeable at will.

Case 1: Each relay module is available with DC output relay up to 8pcs. (The change of AC output relay is

available upon request) That is each DC voltage output module is available with 8pcs of DC voltage relay output. Whenever two types of voltage output, including relay and DC voltage output, are mix distributed, relay K1~K32 may be applied to exchange output position. Arranging relay output to relay module and DC voltage output voltage to AC voltage output module.

For example: 14-relay output and 7 DC voltage output are needed.

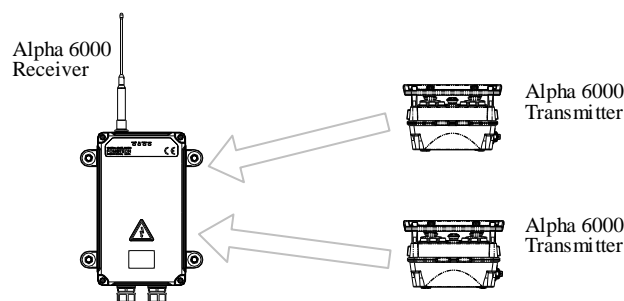
If you apply relay K1~K32 output position to exchange functions, the 14 relays will be arranged from K1 to K14. Each receiver relay module, including slot I and II, with one relay module. Keep K15 & K16 empty and then arrange 7 DC voltage output from K17 to K23. Insert DC voltage output module to receiver relay module slot III.

Case 2: After the wiring for receiver relay output is completed, if more or less function is needed, relay number and sequence will have to be changed and the re-wiring is needed. Relay K1~K32 output can be applied to exchange function. For increasing relay numbers, the new wiring sequence can be re-arranged manually to match the original wiring arrangement. Then move the increasing relays to the last position in sequence, so that only the increased relay contacts need to be wired, the original wiring will remain unchanged. For decreasing relay numbers, the new wiring sequence can be re-arranged manually to match the original wiring arrangement. Then keep the decreasing relay positions empty, so the original wiring will remain unchanged.

4.4 Special Types:

* “Pitch and Catch” Feature/Assigned button AUTOSCAN as below:

- (1) Two transmitters (or more) take turn to control one receiver.
- (2) Move the transmitter joystick and VR in operation back to neutral position and depress assigned pushbutton for 0~3 seconds (by following “enter auto-scan channel delay time”).
- (3) After the assigned pushbutton signal is received by the receiver, the receiver will look for the transmitter which is going to take turn by AUTOSCAN.
- (4) Press START button on the transmitter that catches the signal for 0~3 seconds (No assigned pushbutton is pressed. Please follow “time for salve channel lock” setting).
- (5) After the receiver has scanned and caught the transmitter that takes over, the AUTOSCAN control will also be taken over by the transmitter that takes over.
- (6) Please turn off the original transmitter in operation.

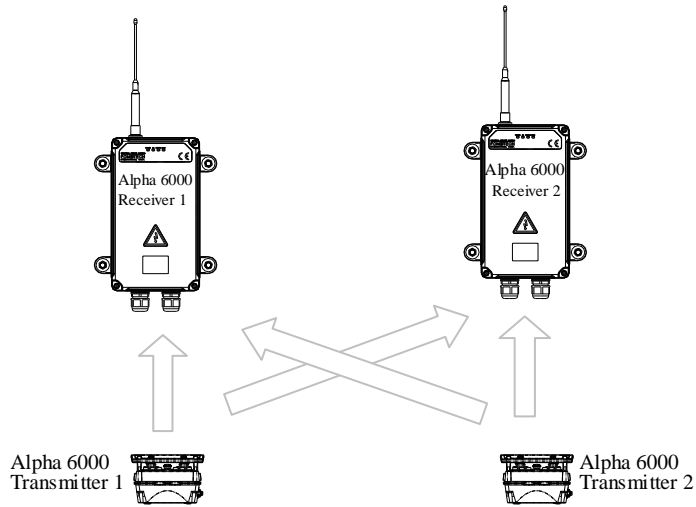


* One Transmitter to Two Receivers Feature (Tandem Mode): two operation types

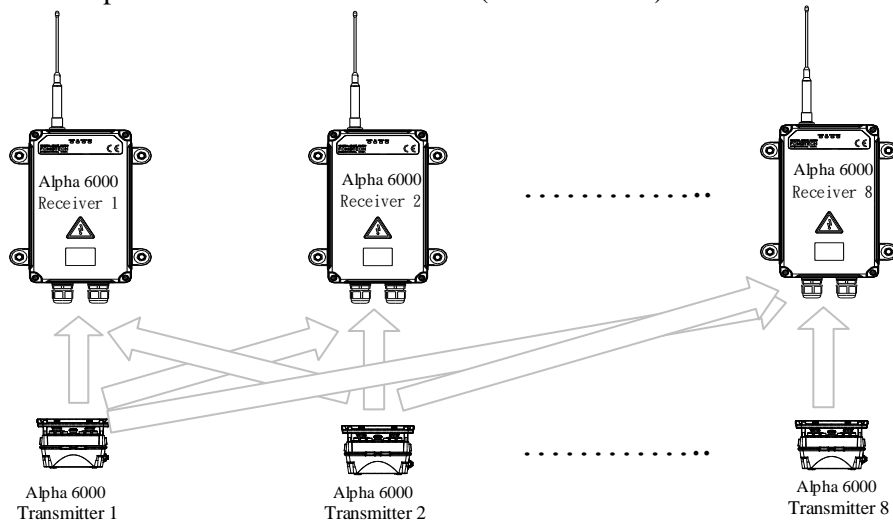
- (1) Transmitter 1 operates receiver 1 or receiver 2 independently; transmitter 2 operates receiver 1 or receiver 2 independently.

(2) Transmitter 1 operates receiver 1 & 2 at the same time, or transmitter 2 operates receiver 1 & 2 at the same time.

* The transmitter that controls the receiver gets the control priority.



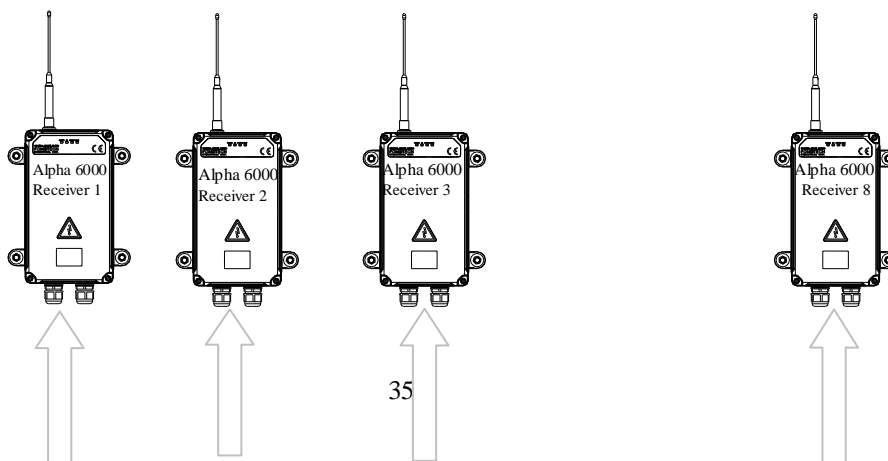
(3) Maximum up to 1 transmitter to 8 receivers (Tandem mode)



*** Random Access Feature:**

- (1) This feature allows for up to 8 operators randomly accessing up to 8 crane systems.
- (2) 8 receivers with respective channels.
- (3) The channel changes can be done via a multi-position selector switch on each transmitter.

* Do not control one receiver with two or more than two transmitters at the same time.





Alpha 6000
Transmitter 1



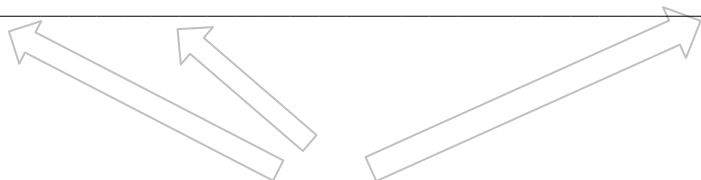
Alpha 6000
Transmitter 2



Alpha 6000
Transmitter 3



Alpha 6000
Transmitter 8



4.5 Customized Types

There are many types of customized system available with the combination of single-axis joystick, double-axis joystick, pushbuttons and switches for the Alpha 6000. Please talk to the manufacturer for more information.

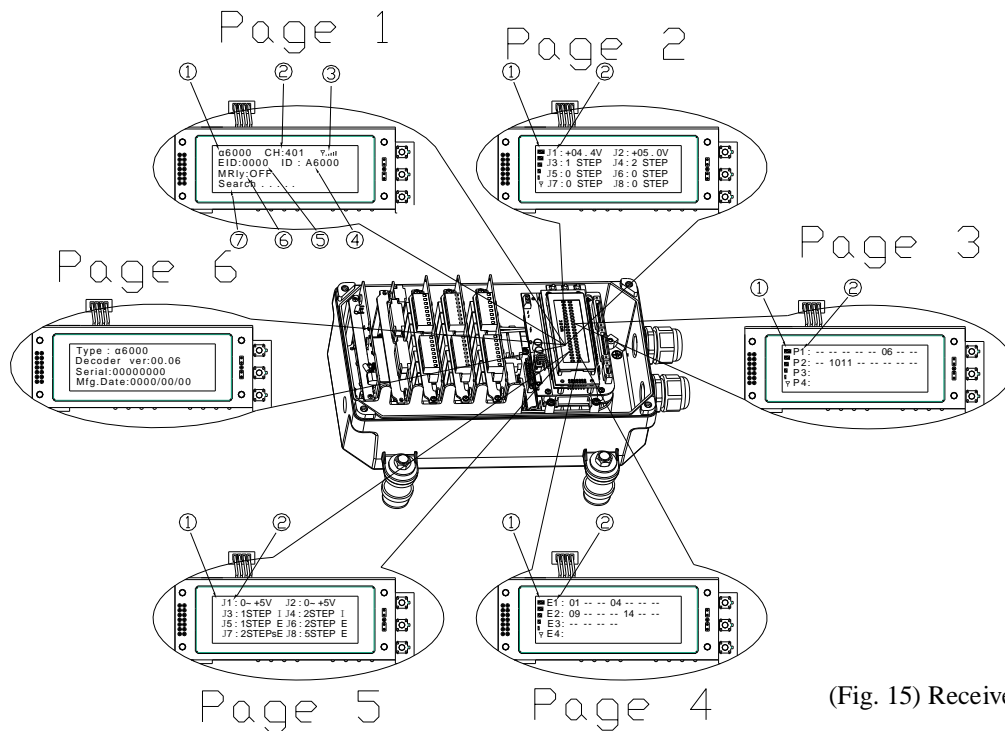
4.6 Frequency Table

CHANNEL	433MHz/25k	CHANNEL	447MHz/12.5k
401	433.0750 MHz	701	447.8750 MHz
402	433.1000 MHz	702	447.8875 MHz
403	433.1250 MHz	703	447.9000 MHz
404	433.1500 MHz	704	447.9125 MHz
405	433.1750 MHz	705	447.9250 MHz
406	433.2000 MHz	706	447.9375 MHz
407	433.2250 MHz	707	447.9500 MHz
408	433.2500 MHz	708	447.9625 MHz
409	433.2750 MHz	709	447.9750 MHz
410	433.3000 MHz	710	447.9875 MHz
411	433.8250 MHz	711	448.0000 MHz
412	433.8500 MHz	712	448.0125 MHz
413	433.8750 MHz	713	448.0250 MHz
414	433.9000 MHz	714	448.0375 MHz
415	433.9250 MHz	715	448.0500 MHz
416	433.9500 MHz	716	448.0625 MHz
417	433.9750 MHz	717	448.0750 MHz
418	434.0000 MHz	718	448.0875 MHz
419	434.0250 MHz	719	448.1000 MHz
420	434.0500 MHz	720	448.1125 MHz
421	434.0750 MHz	721	448.1250 MHz
422	434.1000 MHz	722	448.1375 MHz
423	434.1250 MHz	723	448.1500 MHz
424	434.1500 MHz	724	448.1625 MHz
425	434.1750 MHz	725	448.1750 MHz
426	434.2000 MHz	726	448.1875 MHz
427	434.2250 MHz	727	448.2000 MHz
428	434.2500 MHz	728	448.2125 MHz
429	434.2750 MHz	729	448.2250 MHz
430	434.3000 MHz	730	448.2375 MHz
431	434.3250 MHz	731	448.2500 MHz
432	434.3500 MHz	732	448.2625 MHz
433	434.3750 MHz	733	448.2750 MHz
434	434.4000 MHz	734	448.2875 MHz
435	434.4250 MHz	735	448.3000 MHz
436	434.4500 MHz	736	448.3125 MHz
437	434.4750 MHz	737	448.3250 MHz
438	434.5000 MHz	738	448.3375 MHz
439	434.5250 MHz	739	448.3500 MHz

440	434.5500 MHz		740	448.3625 MHz
441	434.5750 MHz		741	448.3750 MHz
442	434.6000 MHz		742	448.3875 MHz
443	434.6250 MHz		743	448.4000 MHz
444	434.6500 MHz		744	448.4125 MHz
445	434.6750 MHz		745	448.4250 MHz
446	434.7000 MHz		746	448.4375 MHz
447	434.7250 MHz		747	448.4500 MHz
448	434.7500 MHz		748	448.4625 MHz
449	434.7750 MHz		749	448.4750 MHz
450	433.3250 MHz		750	448.4875 MHz
451	433.3500 MHz		751	448.5000 MHz
452	433.3750 MHz		752	448.5125 MHz
453	433.4000 MHz		753	448.5250 MHz
454	433.4250 MHz		754	448.5375 MHz
455	433.4500 MHz		755	448.5500 MHz
456	433.4750 MHz		756	448.5625 MHz
457	433.5000 MHz		757	448.5750 MHz
458	433.5250 MHz		758	448.5875 MHz
459	433.5500 MHz		759	448.6000 MHz
460	433.5750 MHz		760	448.6125 MHz
461	433.6000 MHz		761	448.6250 MHz
462	433.6250 MHz		762	448.6375 MHz
463	433.6500 MHz		763	448.6500 MHz
464	433.6750 MHz		764	448.6625 MHz
465	433.7000 MHz		765	448.6750 MHz
466	433.7250 MHz		766	448.6875 MHz
467	433.7500 MHz		767	448.7000 MHz
468	433.7750 MHz		768	448.7125 MHz

5. SYSTEM SETTINGS

5.1 Receiver LCD Function Settings



(Fig. 15) Receiver LCD Displays

5.2 LCD Display Descriptions:

Pushbutton 1 page change: Page 1 → Page 2 → Page 3 → Page 4 → Page 5 → Page 6 → Page 1 →

Pushbutton 2 page change: Page 1 → Page 6 → Page 5 → Page 4 → Page 3 → Page 2 → Page 1 →


Pushbutton 3: Reserved.

- 1) When the receiver power is ON, the initial display on LCD is “α6000 decoder loading.....”.
- 2) When internal interface is connected correctly, the first LCD display would be “page1”.

Line 1:

- ① α6000 → System Type
- ② CH: 401 → 1st code is frequency band code, the 2nd and 3rd is for channel 01~68.

BAND CODE	FREQUENCY BAND
4	433 MHz
7	447 MHz

- ③  Signal strength, 5 sections in total. Full 5-section is for the strongest signal and empty 5-section is for the weakest signal.

Line 2:

- ④ EID:0000 → 4 bits (4 bits/binary), after AUTOSCAN EID function enable.
For receiver ID comparison.
- ⑤ ID:12345 → ID for receiver comparison, 5 bits (20 bits/ Hexadecimal)

Line 3:

- ⑥ MRly OFF → MAIN relay deactivated
MRly ON → MAIN relay activated

Line 4: Message

- ⑦ Search..... → Searching transmitter ID
Scan>>>>>>> → AUTO channel searching
Work>>>>>>> → Functioning

Error Message	Description
Error:Eeprom ack	Decoder EEPROM read-out/write-in error
Error:Eeprom id	Decoder EEPROM ID setting error
Error:Eeprom crc	Decoder EEPROM data CRC error
Error:Relay > 32pcs	Decoder relay setting over 32pcs
Error:Rf usart	Decoder to RX module interface faulty
Error:Rf module	RX module faulty
Error:Com or 2803	Decoder relay power faulty
Error:Main relay	Decoder MAIN relay faulty
Error:V&I card	Error on the voltage/current proportional output of interface card
Error:PWM card	Error on PWM proportional output interface card
Error:Watchdog	Faulty on watch-dog layout of decoder externals
Receiver voltage low	Decoder voltage is too low <10VDC
ID not match	Receiver with un-identical ID
Emergency Stop	Decoder receives stop command
Error:Main1 LOOP OUT	Main relay 1 control module faulty, LOOP OUT
Error:Main2 LOOP OUT	Main relay 2 control module faulty, LOOP OUT
Error:Main1 CAN LOSS	Main relay 1 control module faulty, CANBUS LOSS
Error:Main2 CAN LOSS	Main relay 2 control module faulty, CANBUS LOSS
Error:Main1 RF LOSS	Main relay 1 control module faulty, receiving RF module misses the signal
Error:Main2 RF LOSS	Main relay 2 control module faulty, receiving RF module misses the signal
Error:Main1 STOP	Main relay 1 control module faulty, STOP
Error:Main2 STOP	Main relay 2 control module faulty, STOP
Error:Main1 pre-on	Main relay 1 control module faulty, Pre-START overtime
Error:Main2 pre-on	Main relay 2 control module faulty, Pre-START overtime

Line 4: P4: 25 - - - - - 32

P4 is to relay module card IV. P4: In sequence to relay K25 ~ K32

“25” is K25 RELAY ON, “--” is K25 RELAY OFF, “ ”(empty) is K25 RELAY not in use.

⋮ ⋮ ⋮

“32” is K32 RELAY ON , “--” is K32 RELAY OFF, “ ”(empty) is K32 RELAY not in use.

5) Page 4: External extension relay function display

① Signal strength, 5 sections in total. Full 5-section is for the strongest signal and empty 5-section is for the weakest signal.

② External extension relay output

Line 1: E1: 01 02 03 - - - - - 08

E1 is in the CN7 slot of external extension system, relay module card I.

E1: In sequence to external relay K01 ~ K08

“01” is external K01 RELAY ON , “--” is external K01 RELAY OFF, ” “ (empty) is external K01 RELAY not in use

⋮ ⋮ ⋮

“08” is external K08 RELAY ON , “--” is external K08 RELAY OFF, ” “ (empty) is external K08 RELAY not in use

Line 2: E2: 09 - - - - - 16

E2 is in the CN8 slot of external extension system, relay module card II.

E2: In sequence to external relay K09 ~ K16

“09” is external K09 RELAY ON , “--” is external K09 RELAY OFF, ” “ (empty) is external K09 RELAY not in use

⋮ ⋮ ⋮

“16” is external K16 RELAY ON , “--” is external K16 RELAY OFF, ” “ (empty) is external K16 RELAY not in use

Line 3: E3: 17 - - - - - 24

E3 is in the CN9 slot of external extension system, relay module card III.

E3: In sequence to external relay K17 ~ K24

“17” is external K17 RELAY ON , “--” is external K17 RELAY OFF, ” “ (empty) is external K17 RELAY not in use

⋮ ⋮ ⋮

2STEP E	External extension double-speed joystick, not to share the 2-speed relay
2STEPs E	External extension double-speed joystick, not to share the 2-speed relay. 1 & 2-speed relay do not activate at the same time.
3STEP E	External extension three-speed joystick, share the 2-speed and above relay..
4STEP E	External extension four-speed joystick, share the 2-speed and above relay..
5STEP E	External extension five-speed joystick, share the 2-speed and above relay.

7) Page 6: Message

Line 1: Type:α6000

Line 2: Decoder ver:00.06

Decoder MCU firmware version

Line 3: Serial:00000001

Serial number

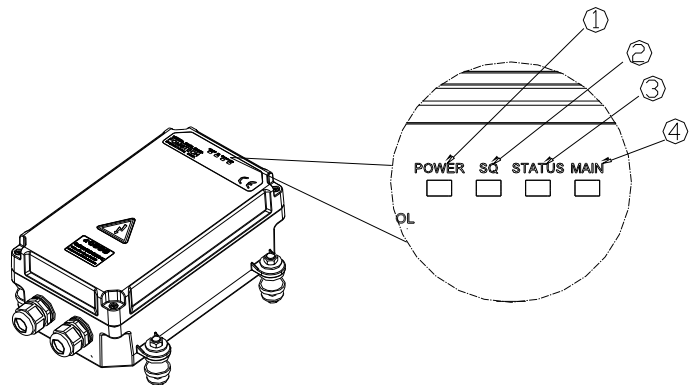
Line 4: Mfg.Date:2013/1/23

Manufacturing date

6. RECEIVER STATUS LIGHT AND INSTALLATION

6.1 Receiver Status Light

1. Power LED Display
2. Signal LED Display
3. Status LED Display
4. MAIN relay LED Display



6.2 Receiver LED Status

(Fig. 16) Receiver Status Light

ITEM	CONDITION	REASON	STATUS LED DISPLAY	REMARK
1	Power ON, voltage abnormal	Voltage > 15V or voltage < 10.5	Red LED ON_0.1/OFF_0.1	All output off
2	High Voltage	Voltage > 16V	Red LED ON, green LED ON	
3	System START error display	External watchdog abnormal	Red LED ON_0.1/OFF_0.3sec with 8 blinks, OFF_0.8sec	All output off
4	Low Voltage	Voltage <10V	Red LED OFF, green LED OFF	All output off
5	EEPROM invalid	EEPROM data write-in failed or data error. (ID, CRC, ...)	Red LED ON_0.1/OFF_0.3sec with 7 blinks, OFF_0.8sec	All output off

6	RELAY setting error	Internal RELAY > 32PCS	Red LED ON_0.1/OFF_0.3sec with 5 blinks, OFF_0.8sec	All output off
7	START system display error	COM or 2803 feedback check abnormal	Red LED ON_0.1/OFF_0.3sec with 8 blinks, OFF_0.8sec	All output off
8	RX module invalid	TX module faulty is detected by decoder	Red LED ON_0.1/OFF_0.3sec with 4 blinks, OFF_0.8sec	All output off
9	MAIN RELAY jammed	MAIN relay check NG	Red LED ON_0.1/OFF_0.3sec with 3 blinks, OFF_0.8sec	All output off
10	Faulty on interface connection	Faulty on voltage, current, proportional output interface card, PWM proportional output interface card or outer extension relay module	Red LED ON_0.1/OFF_0.3sec with 6 blinks, OFF_0.8sec	All output off
11	ID error	ID error	Red LED ON_0.1/OFF_0.3sec with 2 blinks, OFF_0.8sec	Standby status
12	Delay on AUTOSCAN slave channel locking	AUTOSCAN slave CH lock delay	Green LED ON	Standby status
13	Abnormal STARTUP status	MAIN RELAY is not activated. START and emergency stop commands are sending at the same time.	Red LED ON_0.1sec, green LED ON_0.1sec blink	Standby status
14	Function normally	MAIN RELAY is activated, ID is correct & SQ light has to be ON	Whenever correct transmitter ID code is received, Green LED ON_0.05sec	Standby status
15	STANDBY (working but without receiving signal)	DATA shown as noise or DC	Green LED ON_0.1sec, OFF_0.8sec blink	Standby status

MAIN Relay module board

ITEM	CONDITION	REASON	GREEN STATUS LED DISPLAY
1	Connection failure	CAN BUS receiving error	No light displayed
2	Decoder board status error	Decoder status error	Green LED continuous ON
3	Normal operation	Normal operation	ON_0.1sec, OFF_0.1sec blink

6.3 Preparation

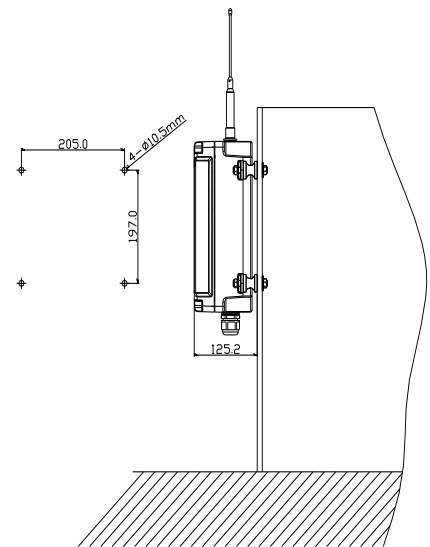
1. Required Tools:

- | | |
|--|---|
| (1) Flat Head Screwdriver (-) | (6) Self Drill $\phi 10.5$ mm ~ $\phi 11$ mm |
| (2) 5 mm Wrench | (7) Needle-nose pliers |
| (3) Multi-Meters | (8) Diagonal pliers |
| (4) 14 mm Box Wrench or Socket Wrench | (9) Wiring Cable(cord between 14 mm ~18 mm) and |
| (5) Power Drill with 10.5~11mm Drill-Bit | Materials |

2. 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.
3. Prior to installation, make sure that the crane system itself is working properly.
4. Use the multi-meter to check the voltage source available and ensure receiver voltage setting is correct for this voltage.
5. Prior to installation, switch off the main power source to the equipment.

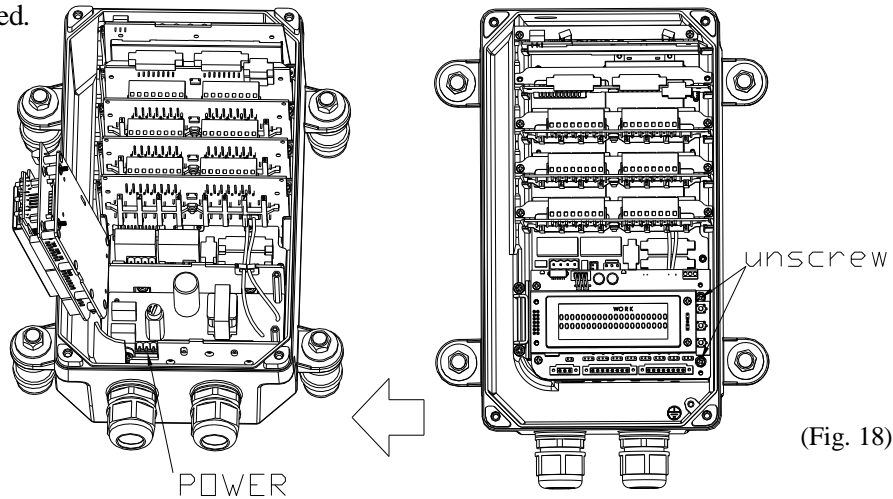
6.4 Steps-By-Steps Installation

1. Be sure to put a stopper in the cable gland not in use after wiring is completed.
2. Select a suitable location that is far from high voltage wiring or equipment, such as motor, relay...etc., to mount the receiver.
3. As much as possible, the location selected should have the antenna visible from all areas where the transmitter is to be used.
4. The location selected should not be exposed to high levels of electrical noise.
5. Ensure the selected location has adequate space to accommodate the receiver enclosure.
6. The distance between the antenna and the control panel should be as far apart as possible.
7. The use of an external axial cable to move the receiving antenna to the position for better signal receipt where it is necessary.
8. Drill four holes on the control panel (11mm).
9. Tightened all screws provided.
10. For system wiring, please refer to the wiring diagram located on the last page of this manual and on the backside of the receiver cover plate.
11. Ensure all wiring is correct and safely secured and all screws are fastened.
12. The power cable has to be connected to the AC position of power terminal block; the ground wire has to be connected to the GND position (crane metal frame) or to the screw fixing hole of ground wire on the receiver.



(Fig. 17) Receiver Installation

13. Please refer to below figures. To open the metal cover, unscrew the power module cover as positioned.



(Fig. 18)

6.5 Wiring Diagram

Please refer to the wiring diagram located on the last page of this manual and on the backside of the receiver cover plate.

6.6 System Testing

1. Connect the power source to the receiver and test the operation of each function to ensure it operates in the same manner as the pendant controller.
2. Ensure the MAIN contact relay can be properly controlled by the remote control.
3. Ensure the limit switches on the crane that limit all travels are working properly.
4. Ensure the pendant controller is located in a safe location where it would not interfere with remote operation.

7. OPERATING INSTRUCTION

7.1 Power “ON” the System

1. Insert the transmitter power key into the key-switch slot located on the right side of the transmitter belly box.
2. Push the transmitter power key inward and then rotate it clockwise to “1” position.
“1” → “ON” “0” → “OFF”
3. To activate the system, first turn the EMS button clockwise so that the red button pops up. To activate the function “When transmitter power is turned on, emergency stop button is compelled to press & release check”: Press emergency stop button and release.
4. Press the START pushbutton to activate MAIN relay and the transmitter starts to send signals.
5. After 5 minutes of inactivity, that is 5 minutes after the last pushbutton is released, the green light

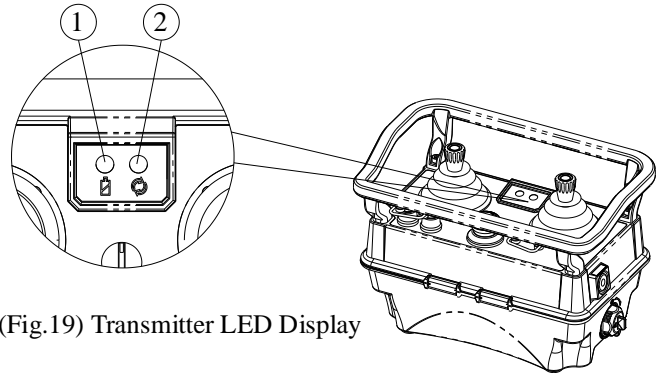
will disappear thus temporarily deactivating the transmitter power and the receiver MAIN.

Pressing START pushbutton thereafter will close the receiver MAIN and start the timing sequence over again.

6. If any function, such as the frequency channel of the transmitter unit is altered via simple dip-switch setting inside the transmitter (refer to page 13), you must then also change the frequency RF channel in the receiver (refer to page 15~16). If the “auto-scanning feature” on the receiver is activated, you must then press and hold the START pushbutton after turning “on” the transmitter power in order for the auto-scanning receiver to identify the newly selected channel and then you may release the START pushbutton to operate.

7.2 Transmitter System Status Displays

7.2.1 Transmitter LED Display



(Fig.19) Transmitter LED Display

(1) Battery Power LED Display : High power → green LED on; Low power → red LED on.

(2) Transmitter Status LED Display: Normal status → green LED on; Abnormal status → red LED on.

7.2.2 Transmitter LED Status Table

Encoder-Power Status LED Display (dual colors)

ITEM	STATUS	CONDITION	LED STATUS
1	Low voltage power on	Full current, power < 6.0V	Red LED steady ON
2	Low voltage during operation (3)	Power < 5.1V	Red LED constant ON
3	Low voltage during operation (2)	Power > 5.1V < 5.5V	Red LED ON_0.1.OFF_0.1sec until power_off
4	Low voltage during operation (1)	Power > 5.5V < 6.0V	Red LED ON_0.1.OFF_0.9sec until power off
5	Joystick correction mode	Enter joystick correction	Orange LED ON (red and green LED steady ON)
6	Emergency stop button is not pressed	Checking the press & release function of emergency stop button when emergency stop button is not pressed.	Green ON_0.1sec, OFF_0.9sec blink
7	Normal operation	Power > 6.0V	Green LED ON

Encoder-Status LED Display (dual colors)

ITEM	STATUS	CONDITION	LED STATUS
1	Low mid-voltage	Power < 6.0V	All LED status lights off
2	System error	Failed on external Watchdog wiring check or ADC reference voltage error	Red LED ON_0.1/OFF_0.3sec with 8 blinks, OFF_0.8sec
3	Check pushbuttons, increase resistance value	Pushbutton and increase resistance value error	Red LED ON_0.1/OFF_0.3sec with 6 blinks, OFF_0.8sec
4	EEPROM error	EEPROM data read out / write in error or data error (ID, CRC, ...)	Red LED ON_0.1/OFF_0.3sec with 7 blinks, OFF_0.8sec
5	Pushbutton jammed or joystick is not in the neutral position	Power ON when some of the pushbuttons are activated	Red LED ON_0.1/OFF_0.3sec with 2 blinks, OFF_0.8sec
6	Joystick correction has never been proceeded	Joystick correction has to be done to those joysticks with settings	Red LED ON_0.1/OFF_0.3sec with 3 blinks, OFF_0.8sec
7	Joystick correction error	Joystick correction over time or step incorrect.	Red LED ON_0.1/OFF_0.3sec with 5 blinks, OFF_0.8sec
8	Joystick correction completed	Enter joystick correction completed	Orange (red + green) LED ON_0.5sec/OFF_0.5sec blink
9	TX module invalid	TX module error is detected by the encoder	Red LED ON_0.1/OFF_0.3sec with 4 blinks, OFF_0.8sec
10	Drop or tilt protection	Protection to the transmitter which is dropped or tilt.	Red LED ON_0.2/OFF_0.2sec blink
11	Re-awake status after sleep mode: pushbutton jammed or joystick is not in the neutral position	Re-awake after sleep mode: depress START button, joystick is not in the neutral position or pushbutton jammed	Red LED ON_0.05/OFF_0.05sec blink
12	STOP button is not pressed	During e-stop button press / release check, e-stop button is not pressed	All status lights off
13	Enter STOP	Press emergency stop button	All status LEDs are OFF
14	Normal power_on	Normal voltage and some of the pushbuttons are not pressed	Green LED ON 2sec and OFF
15	Transmitter in operation	TX board signal intermittent or continue to send signals	Green LED ON_0.1sec, OFF_0.1sec blink
16	Transmitter standby	Without stopping or continue to send signals	Green LED ON_0.1sec, OFF_0.9sec blink

7.3 Joystick Correction

7.3.1 Reasons for Joystick Correction

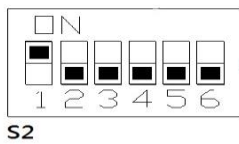
The assembly / change of new joystick, increasing deviation after long-term operation or joystick output non-proportional. (Not caused by settings)

7.3.2 Enter Joystick Correction Mode

Before joystick correction is proceeding, please first rotate transmitter power key to OFF position.

Dip-switch S2 on transmitter has to be set as 100000. (see below figure) After the setting of joystick correction is done, rotate the power key to ON position. The power LED will display in orange (red and

green lights are ON at the same time), and the status LED will display in green quick blinks then the transmitter enters joystick correction mode.



7.3.3 Joystick Correction Steps

Proportional joystick:

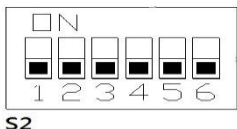
1. Select either joystick and operate it slowly. Then the buzzer will beep once briefly which means the joystick axis direction catches the start position.
2. Continue to operate the joystick swiftly to the end and hold. Then the buzzer will beep twice briefly which means the joystick axis direction catches the end position. The directional axis correction is now completed and joystick may back to neutral position.
3. Repeat step 1 & 2 to correct the reverse directional axis of the joystick.
4. Repeat step 1~3 to complete all joysticks correction. After the joystick correction is completed, the buzzer will have a long beep once and then the joystick status LED blinks in orange slowly.
5. When status LED display becomes orange blinking slowly, then setting is completed. Please refer to 8.3.4 for exiting from correction mode.

Digital joystick 1~5 speeds:

1. Select either joystick, operate it to the 1st speed position and hold. Then press START button and the buzzer will beep once briefly. Release START button and the joystick axis direction catches the 1st speed position.
2. Locate the 2nd ~5th speeds directional axis by following step 1. Then operate the joystick back to the neutral position after the correction is completed.
3. Repeat step 1 & 2 to correct the reverse directional axis of the joystick.
4. Repeat step 1~3 to complete all joysticks correction. After the joystick correction is completed, the buzzer will have a long beep once and then the joystick status LED blinks in orange slowly.
5. When status LED display becomes orange blinking slowly, then setting is completed. Please refer to 8.3.4 for exiting from correction mode.

7.3.4 Exit

After all joystick correction is completed, rotate the transmitter power switch to OFF position and set dip-switch S2 as 000000 as shown on below figure, then all joysticks exit the correction mode and back to normal operation.



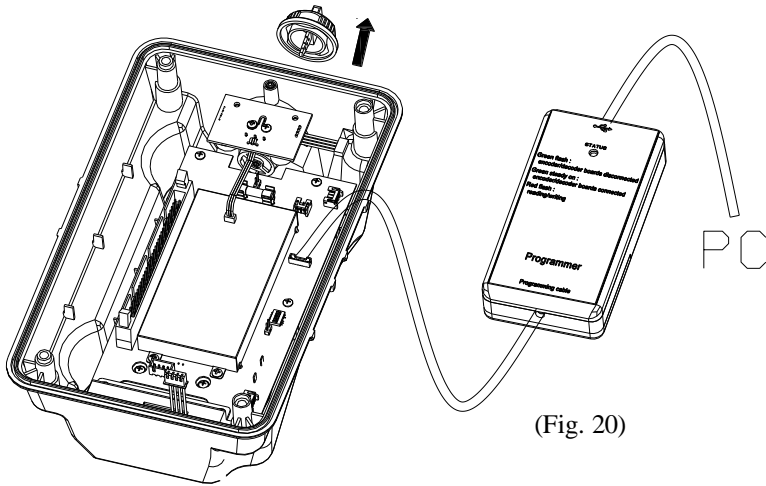
S2

Note:

- (1) Please do not proceed with joystick correction when voltage is low. When voltage is low, please rotate power key switch to OFF position and replace battery.
- (2) Joystick correction has to be proceeded by following joystick axis sequence, otherwise joystick correction cannot be continued and status LED display will also show as orange fast blinking light. If transmitter is available with both digital and proportional joysticks, please correct the joysticks by following correction steps for digital and proportional joystick respectively.
- (3) Under “Correction Standby” condition, if no joystick is operated for more than 30 seconds, buzzer for joystick correction overtime will have one long beep for warning. Status LED display will also show as red LED ON_0.1sec/OFF_0.3sec with 5 blinks and OFF_0.8sec, then correction will be discontinued. There is no sequence request for joystick correction. After long as correction for all joysticks is completed, the status LED will continue to blink slowly in orange.
- (4) Under “Correction” condition, if the joystick axis is not changed for more than 30 seconds or if the joystick is back to neutral position, buzzer for joystick correction overtime will have one long beep for warning. Status LED display will also show as red LED ON_0.1sec/OFF_0.3sec with 5 blinks and OFF_0.8sec, then correction will be discontinued. During joystick correction, if status LED blinks in red for 5 times (please refer to “Encoder status LED display”) and there will have long beep on the buzzer, then the correction is failed. In this case, please shutoff the power and start the correction again.
- (5) Under “2nd step Correction” condition, only the maximum joystick axis value will be recorded. No timing will be over 30 seconds. During the 2nd step correction, please operate the joystick forward smoothly. Do not shake the joystick or operate the joystick backward, otherwise the joystick correction cannot be completed. Under “Correction Mode condition”, the power status LED displays in orange and the correction has to be completed in 3 minutes. If not, the status LED blinks in red for 5 times (please refer to “Encoder status LED display”) and there will have long beep on the buzzer, then the correction is failed. In this case, please shutoff the power and start the correction again.
- (6) Under “Correction Standby” condition, if the joystick axis buzzer has three beeps, that means the joystick has been operated forward over half way. Please keep on operating the joystick forward to the axis end for correction.

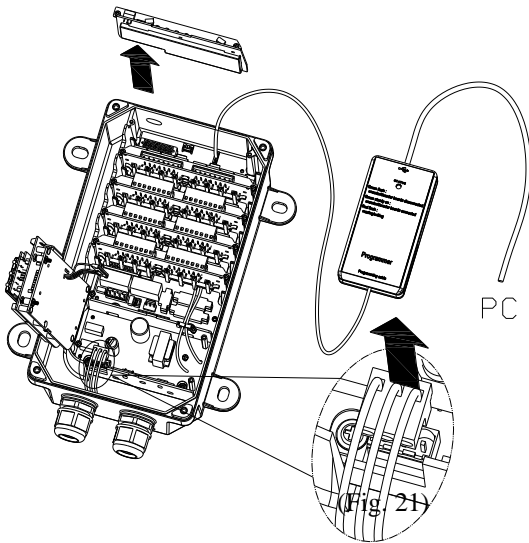
7.3.5 Function Change Settings

1. One end of the Alpha 6000 USB programming cable connects to computer, the other end connects to encoder board inside transmitter as shown below. (Remove the Power Key first)



(Fig. 20)

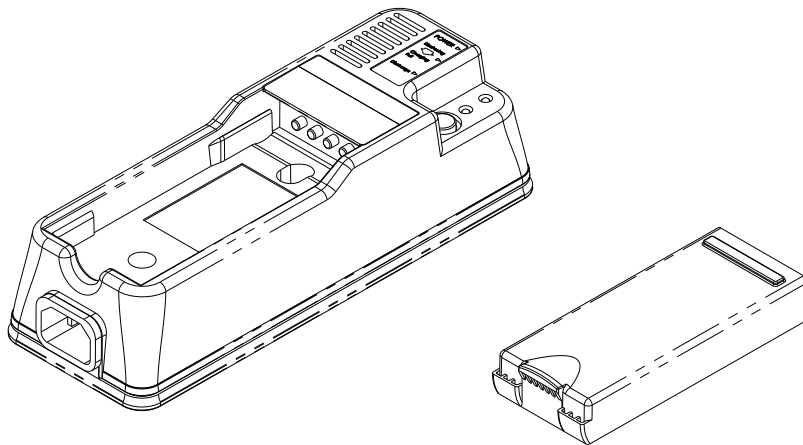
2. Install Alpha 6000 software and click open. (Alpha6K.exe for windows XP /Alpha6K_W64.exe for windows 7).
3. Select "Read Memory".
4. After memory data is read successfully, then enter function change setting display.
5. After function setting is completed, change the display to the last page to continue setting. Select "Write-in Memory (ROM)" to download the setting data to the transmitter.
6. After transmitter setting data is downloaded completely, remove Alpha 6000 programmer USB plug from encoder board and then plug it into decoder board as shown below. (The system has to be first shutoff.)



7. Click "Write-in Memory (ROM)", then the setting data will be downloaded to receiver and the setting is completed.

8. BATTERY CHARGING

1. Plug in the power cord and the power indicator will light up.
2. When a battery pack is inserted, the green charging light will blink to indicate charging is taking place at the current moment.
3. If discharging of battery pack is desired, press the “DISCHARGE” button. At discharging mode, the green blinking light will now turned into a constant red light indicating that the battery pack is now being discharged. If you want to cancel the discharge, just press “DISCHARGE” button again
4. When discharging is completed, the charger will automatically switch to the charging mode where the green blinking light will reappear again
5. The charging time is approximately 3 ~ 6 hours.
6. When charging is completed, a constant green light will appear to indicate that the battery pack is fully charged.
7. When the battery pack is at 90% charged state, trickle charging will take over to ensure the longevity of the battery pack and as well as to ensure the battery pack is 100% charged
8. When the battery pack’s temperature exceeds 50°C, the charger will go into protective mode and charging will be discontinued
9. To prolong the life of the battery pack, it is recommended that the battery pack be fully discharged prior to every re-charging.



9. TROUBLE SHOOTING

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

POSSIBLE REASON	PROBLEM JUDGEMENT	SOLUTION
Crane malfunctioned	Try to operate the crane by a pendent. If it is working, then the problem is on the crane itself.	Repair the crane
1. Transmitter power is not on. 2. Transmitter battery voltage is low.	1. Both battery and status LED not lit. 2. Turn "on" the transmitter with EMS elevated. Battery status LED red light constantly on.	1. Turn on the power 2. Replace the rechargeable battery.
No power to the receiver (AC power indicator on the receiver unit not lit).	Check if the power indicator (AC) is lighted	Ensure power input to the receiver unit is correct.
Blown fuse	Check if the fuse has blown	Replace the Fuse.
Transmitter startup, pushbutton/joystick jammed	<p>Under pushbutton jammed condition: First check which pushbutton/joystick is jammed.</p> <p>[Status LED] Red fast blinks: Without jammed Red blinks twice: Jammed</p> <p>Description: Under pushbutton jammed condition: [Status LED] two red blinks. After all pushbuttons and joysticks are released, move joystick 1. If [Status LED] red blinks quickly, it means joystick 1 is not jammed. If red LED blinks twice, it means joystick 1 is jammed.</p> <p>Please check all joysticks by following above descriptions.</p> <p>* Enable pushbutton [power startup without checking pushbutton jammed] checking bypass. * [Standard selector switch] [Mixed mode selector switch][Speed limit switch] [EID/LID switch] checking bypass.</p>	Replace/repair, pushbutton/joystick

10. SYSTEM SPECIFICATION

Transmitter Unit

Frequency Range	:	PLL 433 ~ 434 MHz / 447 ~ 448 MHz
Transmitting Range:	:	over 100 Meters
Continuous Operating Time	:	28+ Hours (2000mAh)
Operating Current	:	approx. 70mA
Sleep Mode Current	:	approx. 10mA
Charging Current	:	approx. 400mA
Security ID Code	:	1,048,576 sets (20 bit)
Shortest Pushbutton Recognizing Time	:	5mS
Channel Spacing	:	25KHz / 12.5KHz
Frequency Control	:	VTCXO + Synthesizer (PLL)
Frequency Drift	:	< 3ppm @ -10°C ~ 70°C
Frequency Deviation	:	< 1ppm @ 25°C
Spurious Emission	:	> 60dBc
Transmitting Power	:	1.0mW
Emission	:	F1D
Antenna Impedance	:	50 ohms
Encoding Reference	:	2FSK
Encoding Depth	:	+/-2.5KHZ
Enclosure Rating	:	IP-65
Source Voltage	:	7.2 V (2000mAH NiMH battery pack)
Operating Temperature	:	-10°C ~ +50°C
Shock Resistant	:	50G
Dimension	:	268mm X 162mm X 178.5mm
Weight	:	1,600g (with 2000mAh battery pack)

Receiver Unit

Frequency Range	:	PLL 433 ~ 434 MHz / 447 ~ 448 MHz
Channel Spacing	:	25KHz / 12.5KHz
Hamming Distance	:	≥ 6
Frequency Control	:	VTCXO + Synthesizer (PLL)
Frequency Drift	:	< 3ppm @ -10°C ~ 70°C
Frequency Deviation	:	< 1ppm @ 25°C
Sensitivity	:	$\leq -120\text{dBm}$
Decoding Reference	:	2FSK
Intermediate Frequency	:	21.4MHZ and 455MHZ
Antenna Impedance	:	50 ohms
Data Decoder Reference	:	Quartz Crystals
Radiation Leakage	:	< -75dBm
Proportional Voltage Output Impedance :		$\geq 1\text{k}\Omega$
Proportional Current Output Impedance :		$\geq 250\Omega$
Responding Time (pushbutton / EMS / joystick)	:	45mS ~ 150mS
MAIN off Time after RF Signal Interruption :		Approx. 1 second
Enclosure Rating	:	IP-65
Source Voltage	:	100-240VAC @ 50/60 Hz.
Power Consumption	:	32W
Operating Temperature	:	-10°C ~ +60°C
Shock Resistant	:	40G
Output Contact Rating	:	250V @ 6A
Dimension	:	300mm X 171mm X 115mm
Weight	:	4,500g (include the cable gland)

Note: Other types of source voltages are available upon request.

11. PARTS LIST

1. TX module	TX6000
2. RX module card	RX6000
3. Proportional output module	POM6000
4. Wiring loom	WL6000
5. Encoder board	EN6000
6. Decoder card	DE6000
Decoder card (infrared)	DEIR6000
7. LCD display card	LCD6000
8. Relay card (8R)	RL6008
9. A/G sensor board	AG6000
10. Power supply module (100 ~ 240VAC)	PS6000
Power supply module (380~460VAC)	PS6001
Power supply module (12 ~ 24VDC)	PS6002
11. Small single axis joystick unit (complete)	
proportional	JOY-600
1/2 speeds / steps (digital)	JOY-602
3 speeds / steps (digital)	JOY-603
4 speeds / steps (digital)	JOY-604
5 speeds / steps (digital/proportional)	JOY-605
12. Single axis joystick unit (complete)	
proportional	JOY-610
1/2 speeds / steps (digital)	JOY-612
3 speeds / steps (digital)	JOY-613
4 speeds / steps (digital)	JOY-614
5 speeds / steps (digital/proportional)	JOY-615
13. Double axis joystick unit (complete)	
proportional	JOY-620
1/2 speeds / steps (digital)	JOY-622
3 speeds / steps (digital)	JOY-623
4 speeds / steps (digital)	JOY-624
5 speeds / steps (digital/proportional)	JOY-625
14. Joystick rubber boot	JOYRB5000
15. Joystick head	JOYH5000
16. 1-step pushbutton (side panel)	PB-1S
17. 1-step pushbutton (top panel)	PB-1T
18. 2-stage selector switch	SW-2T
19. 3-stage selector switch	SW-3T
20. 2-stage toggle switch	TW-2T
21. 3-stage toggle switch	TW-3T
22. Emergency stop button	EM5000

23. Transmitter casing (complete)	TC6000
24. Transmitter protective guardrail + hardware	PG5000
25. Transmitter power key	PW5000
26. 2000mAh NiMH battery pack	BAT2000
27. Receiver antenna (419/433/447 MHz)	ANT433
28. Receiver upper enclosure	RCU6000
Receiver bottom enclosure	RCB6000
Receiver enclosure (complete)	RC6000
29. Regular relay 12VDC	RR6000_12VDC
30. Safety relay 12VDC	SR6000_12VDC
31. Receiver shock absorber (4pcs/set)	SA4000
32. Intelligent charger (please specify voltage)	CH5000
33. Waist belt	WB5000
34. Shoulder strap	SS5000
35. Cable gland	CG4000
36. Labels for top pushbuttons	TPBL5000
37. Labels for side pushbuttons	SPBL5000
38. Joystick gates	GA5000