FLEXEPH

Instruction Manual

ARC
ADVANCED RADIOTECH CORPORATION

Service Information

Your New Radio Remote Control System

Thank you for your purchase of ARC Flex EPH radio remote control system. Without a doubt, our Flex EPH system is the ultimate solution for providing precise, undeterred, and safe control of your material.

If your product ever needs modification or service, please contact our representative in your country or at the following location:

World Headquarter:

Advanced Radiotech Corporation
No.3, South 1st Road, Chien Chen District
Kaohsiung, Taiwan

Telephone:

+886 7 812 8112

Fax Number:

+886 7 812 8119

Website:

www.advanced-radiotech.com

E-mails:

info@advanced-radiotech.com

sales@advanced-radiotech.com

PRODUCT MANUAL SAFETY INFORMATION

Advanced Radiotech Corporation (ARC) offers a broad range of radio remote control product for material handling applications. This manual has been prepared by ARC to provide information and recommendations for the installation, use, operation and service of ARC's material handling products and systems (ARC Products). Anyone who uses, operates, maintains, services, installs or owns ARC Products should know, understand, and follow the instructions and safety recommendations in this manual for ARC Products.

The recommendations in this manual do not take precedence over any of the following requirements relating to cranes, hoists lifting devices or other material handling equipment which use or include ARC Products:

- Instructions, manuals, and safety warnings of the manufacturers of the equipment where the radio system is used.
- Plant safety rules and procedures of the employers and the owners of facilities where the ARC Products are being used.
- Safety standards and practices for the industries in which ARC Products are used.

This manual does not include or address the specific instructions and safety warnings of these manufacturers or any of the other requirements listed above. It is the responsibility of the owners, users and operators of the ARC Products to know, understand and follow all of these requirements. It is the responsibility of the employer to make its employees aware of all of the above listed requirements and to make certain that all operators are properly trained. **No one should use ARC Products prior to becoming familiar with and being trained in these requirements and the instructions and safety recommendations in this manual**.

WARRANTY INFORMATION

For information on ARC's product warranties, please contact ARC representative nearest to you or visit www.advanced-radiotech.com.

FCC WARNINGS and CAUTIONS

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference; and
(2) this device must accept any interference received, including interference that may cause undesired operation.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

- This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

- Any changes or modifications not expressly approved by the party responsible for compliance could void the authority to operate equipment.
- This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.
- End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

FCC MPE：This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment for body-worn configuration in direct contact to the phantom.

IC WARNINGS

RSS-Gen Issue 4 8.4
According to RSS-Gen Issue 4 section 8.4, User manuals for license-exempt radio apparatus shall contain the following text, or an equivalent notice that shall be displayed in a conspicuous location, either in the user manual or on the device, or both:

(English)
This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

(1) This device may not cause interference; and
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

(French)
Le présent appareil est conforme aux CNR d'Industrie Canada applicables auxappareils radio exempts de licence.L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage adioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Industry Canada ICES-003 Compliance Label:
CAN ICES-3 (B)/NMB-3(B)

IC MPE: This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Cet équipement est conforme aux limites d'exposition au rayonnement ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à une distance minimale de 20 cm entre le radiateur et votre corps

Table of Contents

1. Introduction

The **Flex EPH** radio remote control system is designed for control of industrial hydraulic equipment with PWM and Current outputs.

Each **Flex EPH** system consists of a transmitter handset and a receiver unit. Other standard-equipped accessories include transmitter waist belt, vinyl pouch, pushbutton labels, output cable and instruction manual CD.

List of notable features include:

* **Advanced Controls** – the system utilizes dual advanced microprocessor controls with 32bit CRC and Hamming Code, providing ultra fast, safe, precise, and error-free encoding and decoding.
* **Frequency Hopping RF Transceiver** – the system automatically search-and-lock onto a free and uninterrupted channel at every system startup or during operation when encountering radio interference. The system is also capable of two-way communication between the transmitter and receiver and as well as receiver to receiver with system status and relay output feedbacks.
* **Programmable Transmitter Access Card (TAC)** – the optional transmitter access card feature (TAC) further guard against any unauthorized personnel from operating the transmitter. The TAC can also be individually programmed unlocking any specific function or functions on the transmitter allowing a more experienced or qualified user to operate.
* **Zero-G Sensor Imbedded** – the transmitter is embedded with a Zero-G sensor to guard against any unintended control of the crane or equipment when transmitter is thrown or dropped.
* **Wireless Remote Pairing Function** – system information can be transferred wirelessly between two transmitters or between a transmitter and a receiver without the hassle of resetting the spares.
* **Reliable Pushbuttons** – the inductive-type proportional stepless pushbuttons provide precise and interference-free stepless controls. The pushbuttons are extremely reliable and durable for more than five million press cycles.
* **Low Power Consumption** – requires only two “AA” alkaline batteries for more than 100 hours of uninterrupted operation between replacements.
* **Durable Nylon and Fiberglass Composite Enclosures** – highly resistance to breakage and deformation even in the most abusive environments. The receiver enclosures and output cables are UL94-V0 rated. The transmitter and receiver enclosures are IP66 rated.
* **Full Compliance** – all systems are fully complied with the FCC Part-15 Rules, IC and European Safety Standards.
* **Other Optional Accessories and Features** – transmitter magnet mount, transmitter belt clip, transmitter lanyard, transmitter rubber guard, transmitter padded casing, transmitter shoulder strap, 2 and 3 positions rotary switches, miniature indicator light, charging station, plugin charger, external antenna kit, removable mounting bracket, and many others.

2. Radio Controlled Safety

WARNINGS and CAUTIONS

Throughout this document WARNING and CAUTION statements have been deliberately placed to highlight items critical to the protection of personnel and equipment.

WARNING – A warning highlights an essential operating or maintenance procedure, practice, etc. which if not strictly observed, could result in injury or death of personnel, or long term physical hazards. Warnings are highlighted as shown below:

CAUTION – A caution highlights an essential operating or maintenance procedure, practice, etc. which if not strictly observed, could result in damage to, or destruction of equipment, or loss of functional effectiveness. Cautions are highlighted as shown below:

WARNINGS and CAUTIONS SHOULD NEVER BE DISREGARDED.

The safety rules in this section are not intended to replace any rules or regulations of any applicable local, state, or federal governing organizations. Always follow your local lockout and tagout procedure when maintaining any radio equipment. The following information is intended to be used in conjunction with other rules or regulations already in existence. It is important to read all of the safety information contained in this section before installing or operating the Radio Control System.

2.1 CRITICAL INSTALLATION CONSIDERATIONS

WARNING

PRIOR TO INSTALLATION AND OPERATION OF THIS EQUIPMENT, READ AND DEVELOP AN UNDERSTANDING OF THE CONTENTS OF THIS MANUAL AND THE OPERATION MANUAL OF THE EQUIPMENT OR DEVICE TO WHICH THIS EQUIPMENT WILL BE INTERFACED. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

ALL EQUIPMENT MUST HAVE A MAINLINE CONTACTOR INSTALLED AND ALL TRACKED CRANES, HOISTS, LIFTING DEVICES AND SIMILAR EQUIPMENT MUST HAVE A BRAKE INSTALLED. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

AN AUDIBLE AND/OR VISUAL WARNING MEANS MUST BE PROVIDED ON ALL REMOTE-CONTROLLED EQUIPMENT AS REQUIRED BY CODE, REGULATION, OR INDUSTRY STANDARD. THESE AUDIBLE AND/OR VISUAL WARNING DEVICES MUST MEET ALL GOVERNMENTAL REQUIREMENTS. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

FOLLOW YOUR LOCAL LOCKOUT TAGOUT PROCEDURE BEFORE MAINTAINING ANY REMOTE-CONTROLLED EQUIPMENT. ALWAYS REMOVE ALL ELECTRICAL POWER FROM THE CRANE, HOIST, LIFTING DEVICE OR SIMILAR EQUIPMENT BEFORE ATTEMPTING ANY INSTALLATION PROCEDURES. DE-ENERGIZE AND TAGOUT ALL SOURCES OF ELECTRICAL POWER BEFORE TOUCH-TESTING ANY EQUIPMENT. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

THE DIRECT OUTPUTS OF THIS PRODUCT ARE NOT DESIGNED TO INTERFACE DIRECTLY TO TWO STATE SAFETY CRITICAL MAINTAINED FUNCTIONS, I.E., MAGNETS, VACUUM LIFTS, PUMPS, EMERGENCY EQUIPMENT, ETC. A MECHANICALLY LOCKING INTERMEDIATE RELAY SYSTEM WITH SEPARATE POWER CONSIDERATIONS MUST BE PROVIDED. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH OR DAMAGE TO EQUIPMENT.

2.2 GENERAL

Radio controlled material handling equipment operates in several directions. Cranes, hoists, lifting devices and other material handling equipment can be large, and operate at high speeds. Quite frequently, the equipment is operated in areas where people are working in close proximity to the material handling equipment. **The operator must exercise extreme caution at all times**. Workers must constantly be alert to avoid accidents. The following recommendations have been included to indicate how careful and thoughtful actions may prevent injuries, damage to equipment, or even save a life.

2.3 PERSONS AUTHORIZED TO OPERATE RADIO CONTROLLED CRANES

Only properly trained persons designated by management should be permitted to operate radio controlled equipment.

Radio controlled cranes, hoists, lifting devices and other material handling equipment should not be operated by any person who cannot read or understand signs, notices and operating instructions that pertain to the equipment.

Radio controlled equipment should not be operated by any person with insufficient eyesight or hearing or by any person who may be suffering from a disorder or illness, is taking any medication that may cause loss of equipment control, or is under the influence of alcohol or drugs.

2.4 SAFETY INFORMATION AND RECOMMENDED TRAINING FOR RADIO CONTROLLED EQUIPMENT OPERATORS

Anyone being trained to operate radio controlled equipment should possess as a minimum the following knowledge and skills before using the radio-controlled equipment.

The operator should:

- have knowledge of hazards pertaining to equipment operation
- have knowledge of safety rules for radio-controlled equipment
- have the ability to judge distance of moving objects
- know how to properly test prior to operation
- be trained in the safe operation of the radio transmitter as it pertains to the crane, hoist, lifting device or other material handling equipment being operated
- have knowledge of the use of equipment warning lights and alarms
- have knowledge of the proper storage space for a radio control transmitter when not in use
- be trained in transferring a radio control transmitter to another person
- be trained how and when to report unsafe or unusual operating conditions
- test the transmitter emergency stop and all warning devices prior to operation; testing should be done on each shift, without a load
- be thoroughly trained and knowledgeable in proper and safe operation of the crane, hoist, lifting device, or other material handling equipment that utilizes the radio control
- know how to keep the operator and other people clear of lifted loads and to avoid “pinch” points
- continuously watch and monitor status of lifted loads
- know and follow cable and hook inspection procedures
- know and follow the local lockout and tagout procedures when servicing radio-controlled equipment
- know and follow all applicable operating and maintenance manuals, safety procedures, regulatory requirements, and industry standards and codes

The operator shall not:

- lift or move more than the rated load
- operate the material handling equipment if the direction of travel or function engaged does not agree with what is indicated on the controller
- use the crane, hoist or lifting device to lift, support or transport people
- lift or carry any loads over people
- operate the crane, hoist or lifting device unless all persons, including the operator, are and remain clear of the supported load and any potential pinch points
- operate a crane, hoist or lifting device when the device is not centered over the load
- operate a crane, hoist or lifting device if the chain or wire rope is not seated properly in the sprockets, drum or sheave
- operate any damaged or malfunctioning crane, hoist, lifting device or other material handling equipment

- change any settings or controls without authorization and proper training
- remove or obscure any warning or safety labels or tags
- leave any load unattended while lifted
- leave power on the radio-controlled equipment when the equipment is not in operation
- operate any material handling equipment using a damaged controller because the unit may be unsafe
- operate manual motions with other than manual power
- operate radio-controlled equipment when low battery indicator is on

WARNING

THE OPERATOR SHOULD NOT ATTEMPT TO REPAIR ANY RADIO CONTROLLER. IF ANY PRODUCT PERFORMANCE OR SAFETY CONCERNS ARE OBSERVED, THE EQUIPMENT SHOULD IMMEDIATELY BE TAKEN OUT OF SERVICE AND BE REPORTED TO THE SUPERVISOR. DAMAGED AND INOPERABLE RADIO CONTROLLER EQUIPMENT SHOULD BE RETURNED TO ARC FOR EVALUATION AND REPAIR. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

2.5 TRANSMITTER UNIT

Transmitter switches should never be mechanically blocked ON or OFF. When not in use, the operator should turn the transmitter OFF. A secure storage space should be provided for the transmitter unit, and the transmitter unit should always be placed there when not in use. This precaution will help prevent unauthorized people from operating the material handling equipment.

Spare transmitters should be stored in a secure storage space and only removed from the storage space after the current transmitter in use has been turned OFF, taken out of the service area and secured.

2.6 PRE-OPERATION TEST

At the start of each work shift, or when a new operator takes control of the crane, operators should do, as a minimum, the following steps before making lifts with any crane or hoist:

Test all warning devices.

Test all direction and speed controls.

Test the transmitter emergency stop.

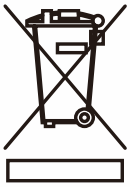
2.7 BATTERIES

WARNING

KNOW AND FOLLOW PROPER BATTERY HANDLING, CHARGING AND DISPOSAL PROCEDURES. IMPROPER BATTERY PROCEDURES CAN CAUSE BATTERIES TO EXPLODE OR DO OTHER SERIOUS DAMAGE. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

2.8 USED SYMBOL DESCRIPTION

Danger electric shock risk



Equipment Recycling: The production and operation of this equipment requires the recycling and utilization of natural resources. There are substances that are harmful to the environment or human health. To avoid the release of such substances into the environment and to reduce the use of natural resources, it is recommended that you recycle this product through a suitable system to ensure that most of the materials are properly recycled or reused.

Earth; ground protection against electric shock in case of a fault, or the terminal of a protective earth (ground) electrode.

2.9 METHOD CLEANING PRODUCTS

Wipe the dust, smudges and stains on the surface of the product with a damp, lint-free cloth.

2.10 PRODUCT MAINTENANCE

Do not drop or damage the controller. Drop controllers can cause delicate electronic parts to loosen and affect the use of functions.

2.11 POWER SUPPLY

The POWER front end must be equipped with circuit breaker as the way to power off the product.

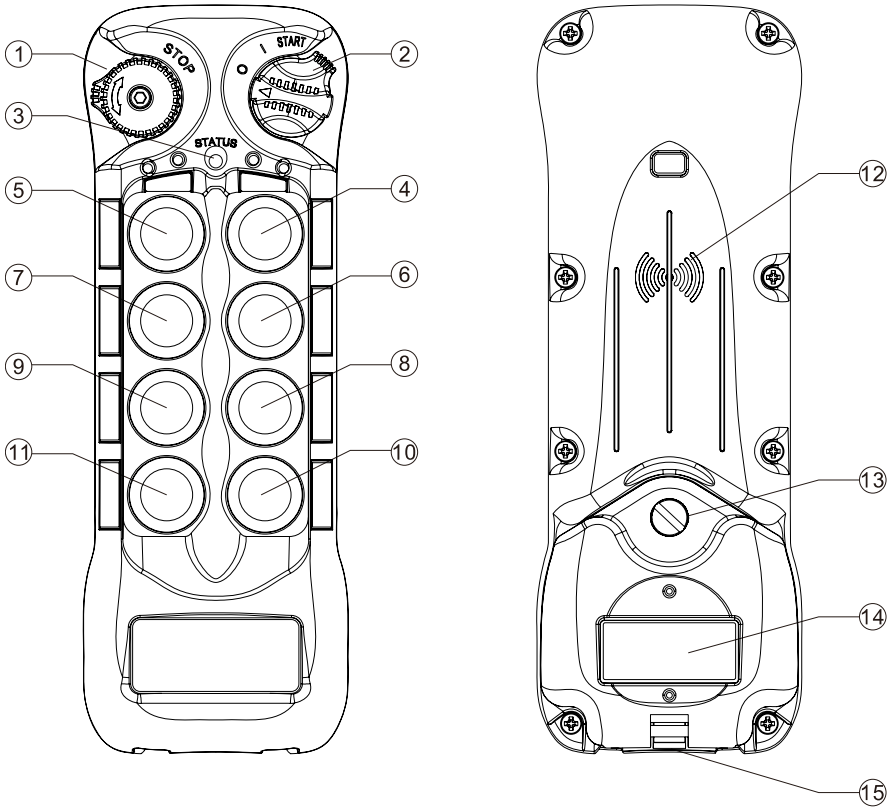
2.12 ENVIRONMENT CONDITION

- Outdoor use.
- Altitude up to 2000 Meters (6500 feet).
- Maximum Relative Humidity 90%.
- MAINS supply voltage fluctuations up to ±10%.
- OVERVOLTAGE CATEGORY II.
- WET LOCATION, applicable.
- Applicable POLLUTION DEGREE 2 of the intended environment (in most cases).

3. General System Information

3.1 Transmitter

3.1.1 8EPH External Illustration

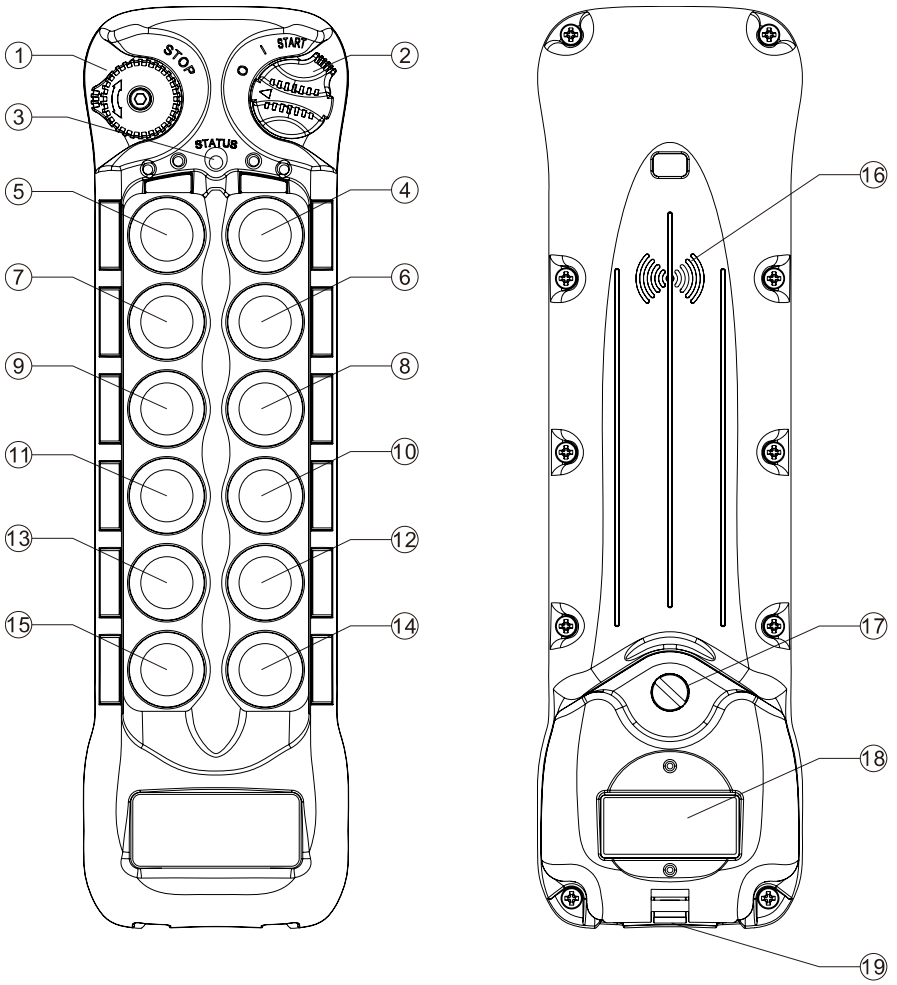


1. STOP Button
2. Power Key Switch
3. Status LED Indicator
4. Pushbutton 1 (PB1)
5. Pushbutton 2 (PB2)
6. Pushbutton 3 (PB3)
7. Pushbutton 4 (PB4)
8. Pushbutton 5 (PB5)
9. Pushbutton 6 (PB6)
10. Pushbutton 7 (PB7)
11. Pushbutton 8 (PB8)
12. TAC* and Wireless Charging Slot
13. Battery Cover Screw
14. System Information
15. Lanyard and Waist Belt Attachment Slot

** Transmitter Access Card*

Note: *Flex 8EPH-AB model is with A/B/A+B rotary switch on PB8 slot.*

3.1.2 12EPH External Illustration

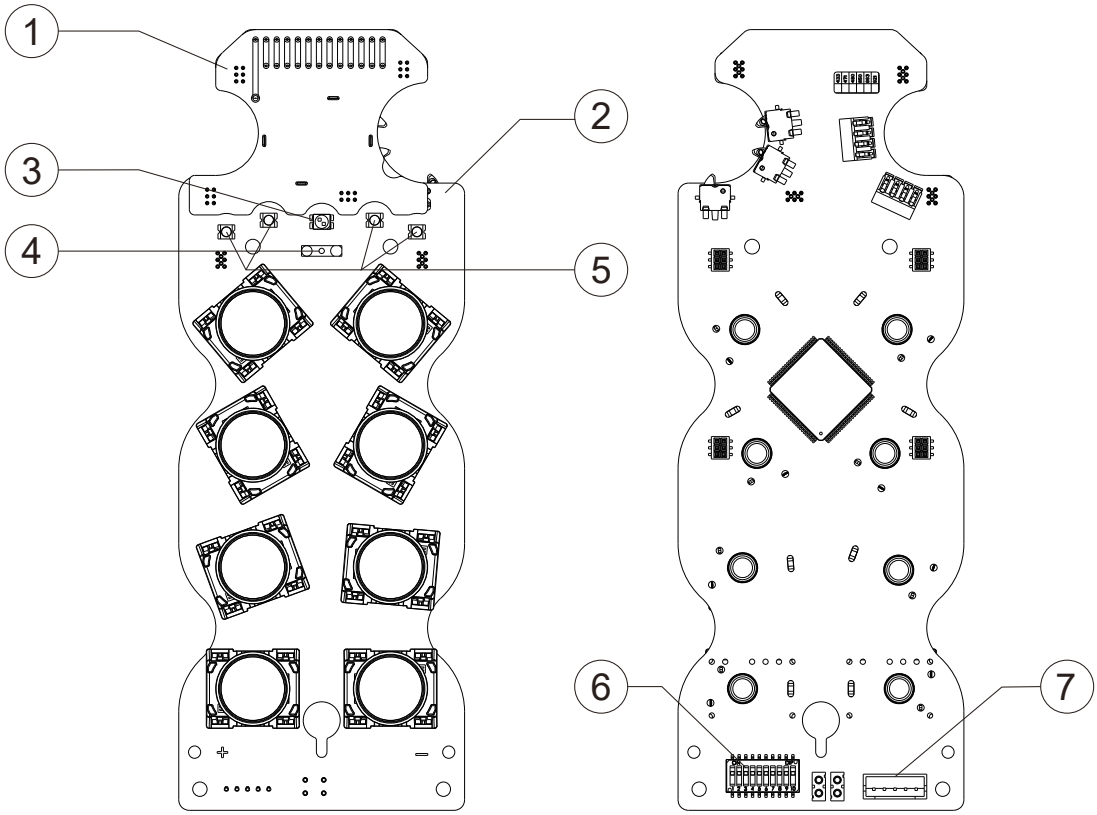


1. STOP Button
2. Power Key Switch
3. Status LED Indicator
4. Pushbutton 1 (PB1)
5. Pushbutton 2 (PB2)
6. Pushbutton 3 (PB3)
7. Pushbutton 4 (PB4)
8. Pushbutton 5 (PB5)
9. Pushbutton 6 (PB6)
10. Pushbutton 7 (PB7)
11. Pushbutton 8 (PB8)
12. Pushbutton 9 (PB9)
13. Pushbutton 10 (PB10)
14. Pushbutton 11 (PB11)
15. Pushbutton 12 (PB12)
16. TAC* and Wireless Charging Slot
17. Battery Cover Screw
18. System Information
19. Lanyard and Waist Belt Attachment Slot

** Transmitter Access Card*

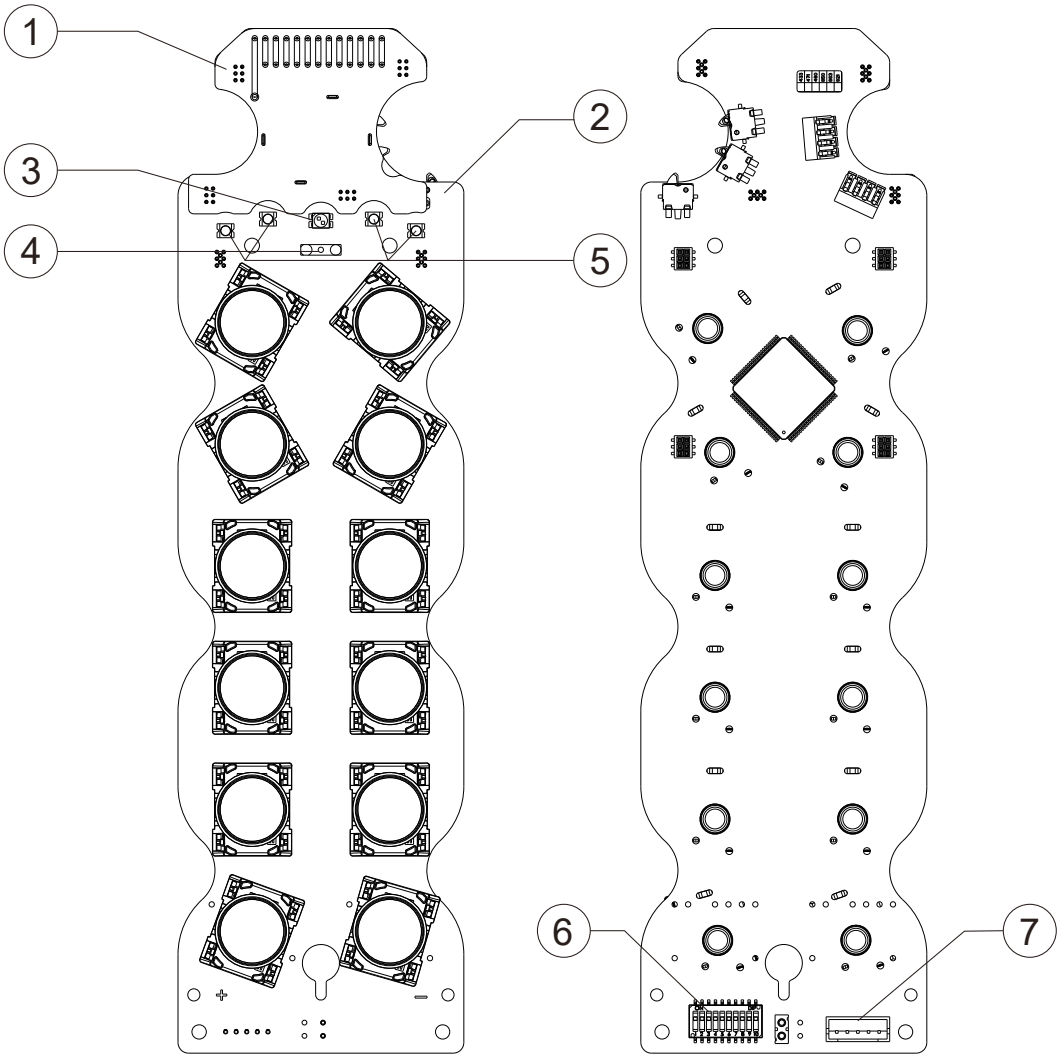
Note: *Flex 12EPH-AB model is with A/B/A+B rotary switch on PB12 slot.*

3.1.3 8EPV Internal Illustration



1. RF Transceiver Board
2. Encoder Board
3. Status LED Indicator
4. Infrared Sensors
5. 25/50/75/100% LED Indicators
6. Function Dipswitch
7. Programming Port

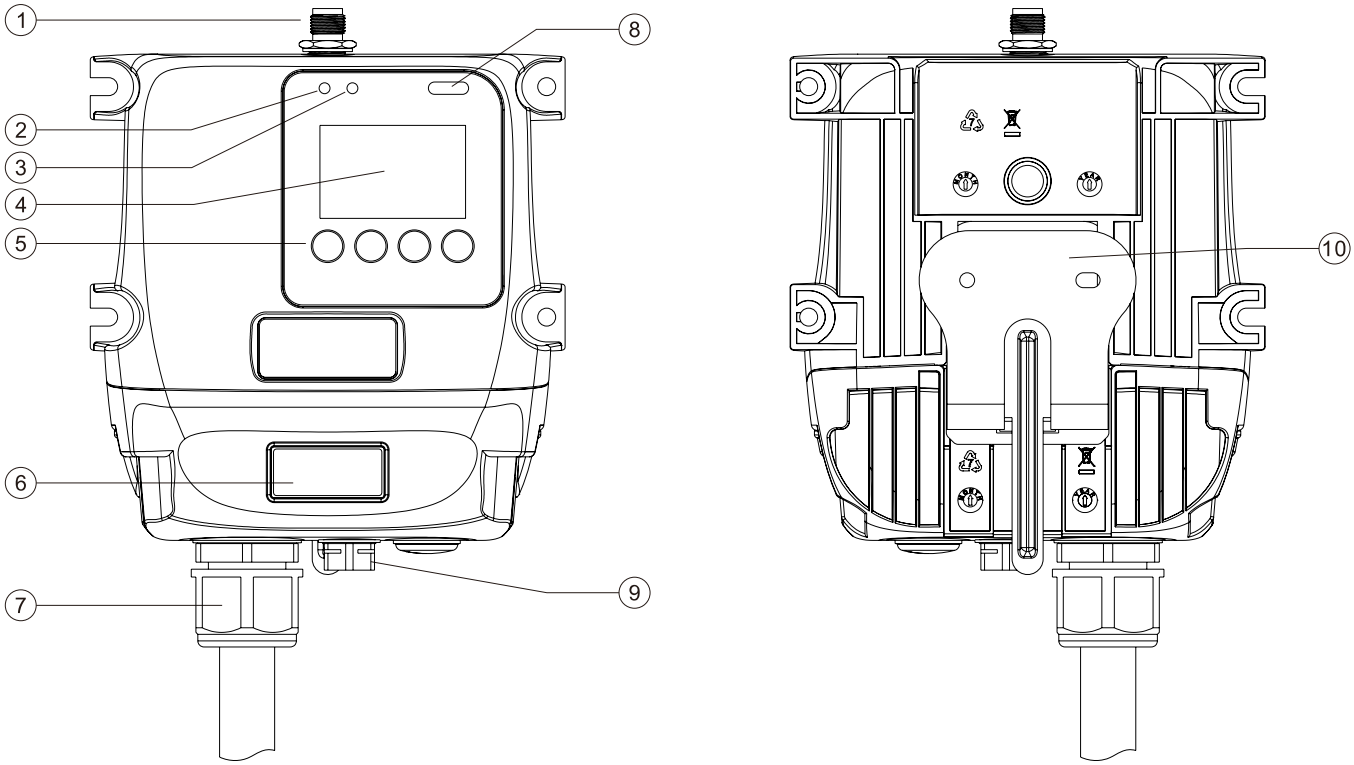
3.1.4 12EPV Internal Illustration



1. RF Transceiver Board
2. Encoder Board
3. Status LED Indicator
4. Infrared Sensors
5. 25/50/75/100% LED Indicators
6. Function Dipswitch
7. Programming Port

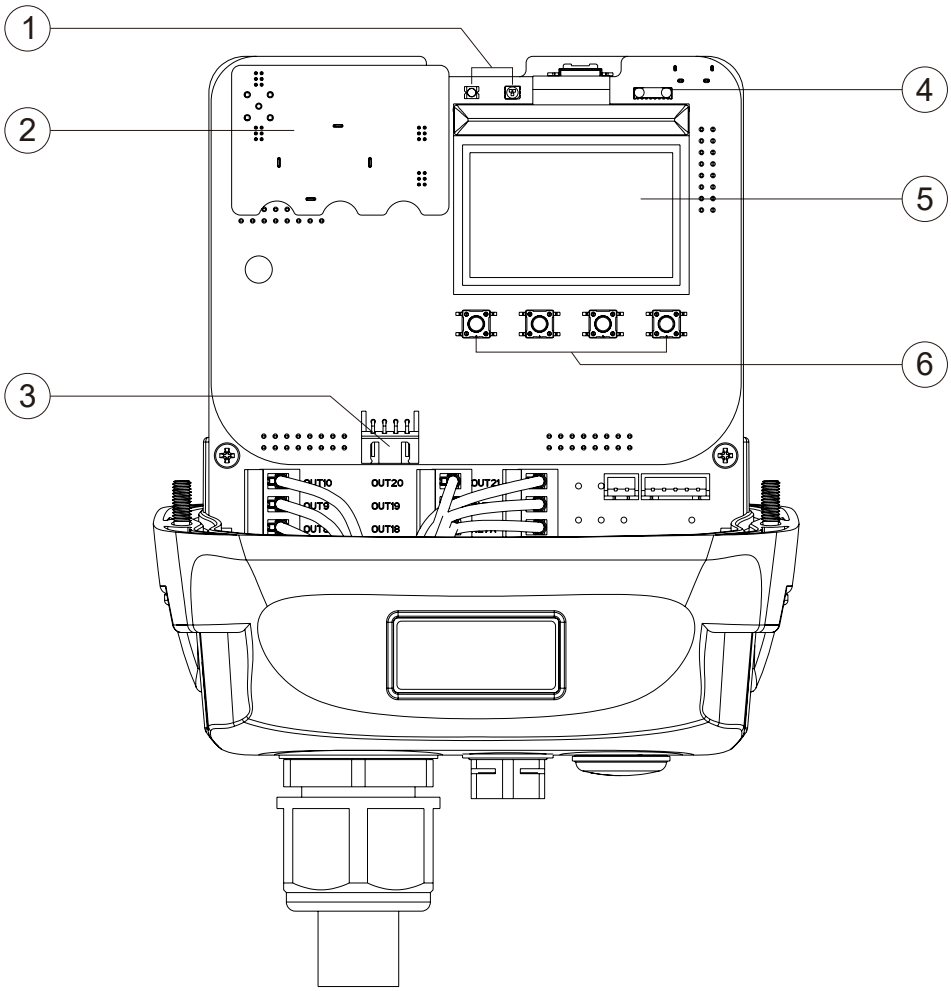
3.2 Receiver

3.2.1 8EPV and 12EPV External Illustration



1. External Antenna Port (optional)
2. Power LED Indicator
3. Status LED Indicator
4. LCD Screen
5. Remote Pairing and Programming Buttons
6. System Information
7. Cord Grip
8. Infrared Sensors
9. Gore-Tex Vent
10. Mounting Bracket (optional)

3.2.2 8EPV and 12EPV Internal Illustration

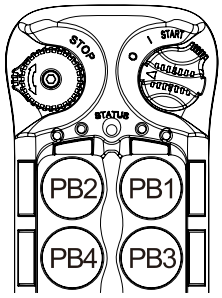


1. Power and Status LED Indicators
2. RF Transceiver Board
3. CAN Bus Connector
4. Infrared Sensors
5. LCD Screen
6. Remote Pairing and Programming Buttons

4. Function Settings

4.1 Transmitter

4.1.1 Transmitter Firmware Version

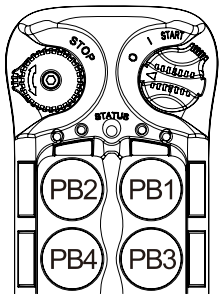


1) Rotate the power switch key to OFF (0) position.
2) With the STOP button elevated, press and hold PB1 and PB3 at the same time.
3) Rotate the power switch key to ON (I) position.
4) Let go PB1 and PB3 at the same time. The Status LED displays firmware version with red, green and orange blinks.
5) Exit Firmware Version mode by rotate the power switch key to OFF (0) position.

4.1.2 Transmitter Channel Settings

A. Unassigned Channel Scheme (no preset system channel)

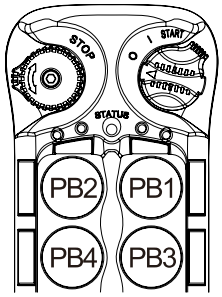
When both transmitter and receiver is set to unassigned channel scheme (no preset channel) the system automatically search and lock onto a free and uninterrupted channel at every transmitter startup. ***Pitch & Catch configuration "cannot" set to unassigned channel scheme.***



1) Rotate the power switch key to OFF (0) position.
2) With the STOP button elevated, press and hold PB1 and PB2 at the same time.
3) Rotate the power switch key to ON (I) position.
4) Let go PB1 and PB2 at the same time (entered Channel Setting mode). The Status LED displays current channel setting with red and green blinks. A green blink represents the tens (+10) and a red blink represents the units (+1). For example, 1 green blink followed by 5 red blinks is channel 15. Channel unassigned is represented by constant orange on the Status LED.
5) Change transmitter channel to "channel unassigned" by pressing PB4 one time (Status LED displays constant orange). Make sure constant orange is shown on the Status LED before proceeding to the next step below.
6) Transfer "channel unassigned" setting to the receiver by rotate and hold the power switch key at START position until the Status LED turns to constant green (transfer complete). Turn off the transmitter power if constant green is not shown on the Status LED after more than 10 seconds (transfer incomplete); the transmitter will revert back to its previous channel setting. Make sure the receiver power is turned on and within the operating distance during the entire process. When transmitter is set to "channel unassigned" the receiver must also set to "channel unassigned" in order for the entire system to work.
7) Exit Channel Setting mode by rotate the power switch key to OFF (0) position.

B. Assigned Channel Scheme (preset system channel)

Both transmitter and receiver is assigned with a matching preset channel (channel 01~62). ***Pitch & Catch configuration "must" set to assigned channel scheme*.**



1) Rotate the power switch key to OFF (0) position.
2) With the STOP button elevated, press and hold PB1 and PB2 at the same time.
3) Rotate the power switch key to ON (I) position.
4) Let go PB1 and PB2 at the same time (entered Channel Setting mode). The Status LED displays current channel setting with red and green blinks. A green blink represents the tens (+10) and a red blink represents the units (+1). For example, 1 green blink followed by 5 red blinks is channel 15. Channel unassigned is represented by constant orange on the Status LED.
5) Change transmitter channel by pressing PB1 to increment the units (+1) and PB2 to increment the tens (+10). For example, press PB2 two times and then PB1 four times is channel 24 (Status LED blinks 2 greens and 4 reds). Make sure the newly selected channel is shown on the Status LED before proceeding to the next step below.
6) Transfer the newly selected channel to the receiver by rotate and hold the power switch key at START position until the Status LED turns to constant green (transfer complete). Turn off the transmitter power if constant green is not shown on the Status LED after more than 10 seconds (transfer incomplete); the transmitter will revert back to its previous channel setting. Make sure the receiver power is turned on and within the operating distance during the entire process. **Skip step 6 if changing receiver channel is not required.**
7) Exit Channel Setting mode by rotate the power switch key to OFF (0) position.

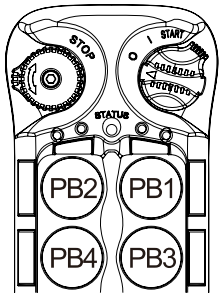
Note: *When selecting a new channel, make sure each button press does not exceed 3 seconds.*

Important Note:

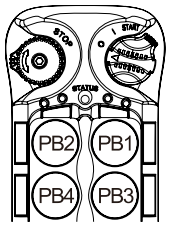
Step 6 illustrated above is strictly required if you are intending to change the entire system channel (both transmitter and receiver). The entire system no longer works if step 6 is skipped because the transmitter and receiver channels are now different (new vs. old). In this case you would have to redo step 1~4 and step 6 to transfer the newly selected transmitter channel to the receiver.

4.1.3 Remote Pairing

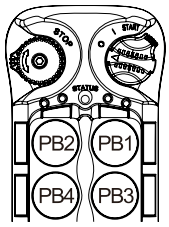
A. Transmitter-to-Transmitter Pairing:



1) Rotate the power switch key to OFF (0) position.
2) With the STOP button elevated, press and hold PB1 and PB3 at the same time.
3) Rotate the power switch key to ON (I) position.
4) Let go PB1 and PB3 at the same time (entered Remote Pairing mode). The Status LED displays firmware version with red, green and orange blinks.
5) Output data (original transmitter) by press and hold PB2 (Status LED off).
6) Receive data (new transmitter) by press and hold PB1 (Status LED blinks green).
7) When the Status LED (receiving data end) turns to constant green while both pushbuttons are still pressed down the pairing is completed.
8) Exit Remote Pairing mode by rotate the power switch key to OFF (0) position.



Output data – original transmitter
(press and hold PB2)

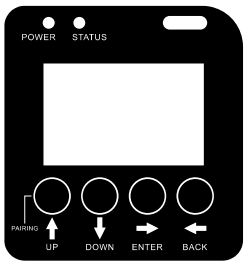


Receive data – new transmitter
(press and hold PB1)

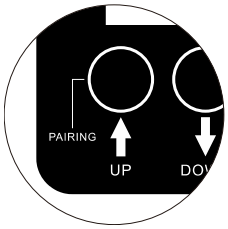
Note: *During remote pairing make sure the distance between the two transmitters is within 1 meter.*

B. Receiver-to-Transmitter Pairing:

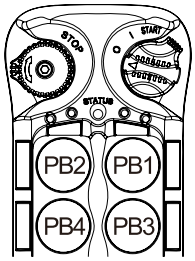
JP8 Open Method: After the transmitter enters the Remote Pairing mode, output receiver data by press and hold the PAIRING button located on the receiver cover and receive data by press and hold PB3 on the transmitter, both at the same time. When the transmitter Status LED turns to constant green while both pushbuttons are still pressed down the pairing is completed. Refer to section 4.2.3 and section 4.2.5.28 JP8 description and programming. During pairing process, the receiver MAIN relays must be deactivated (relay open).



Set JP8 to “Open”



Output data – receiver
(press and hold the Pairing button)



Receiving data – transmitter
(press and hold PB3)

JP8 Short Method (press Pairing button not required): After the transmitter enters the Remote Pairing mode, press and hold PB3 on the transmitter until the Status LED turns to constant green the pairing is completed. Make sure the pairing process is executed within distance of 10 meters from one another and no other active receivers nearby. During pairing process, the receiver MAIN relays must be deactivated (relay open).

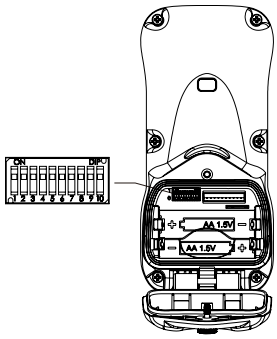
C. Transmitter-to-Receiver Pairing:

JP8 Open Method: After the transmitter enters the Remote Pairing mode, output transmitter data by press and hold PB4 on the transmitter and receive data by press and hold the PAIRING button on the receiver cover, both at the same time. When the transmitter Status LED turns to constant green while both pushbuttons are still pressed down the pairing is completed. Refer to section 4.2.3 and section 4.2.5.28 JP8 descriptions and programming. During pairing process, the receiver MAIN relays must be deactivated (relay open).

4.1.4 Transmitter Start Function Settings

When transmitter goes into sleep mode the system is temporarily deactivated (MAIN relays opened). Execute the START command or press any pushbutton to wake up the system (MAIN relays closed).

	Dipswitch Settings	Function
1	xxxxxxxxx**0**	START Reactivation
2	xxxxxxxxx**1**	Any Button Reactivation



4.1.5 Transmitter Inactivity Timer Settings

Set how long the system enters the sleep mode when the transmitter is not in use (pushbutton not pressed). When transmitter goes into sleep mode the receiver MAIN relays are deactivated.

	Dipswitch Settings	Time		Dipswitch Settings	Time
1	xxx**000**xxxx	1 minute	**5**	xxx**100**xxxx	10 minutes
2	xxx**001**xxxx	20 seconds	**6**	xxx**101**xxxx	30 minutes
3	xxx**010**xxxx	3 minutes	**7**	xxx**110**xxxx	60 minutes
4	xxx**011**xxxx	5 minutes	**8**	xxx**111**xxxx	Constant On (sleep mode disabled)

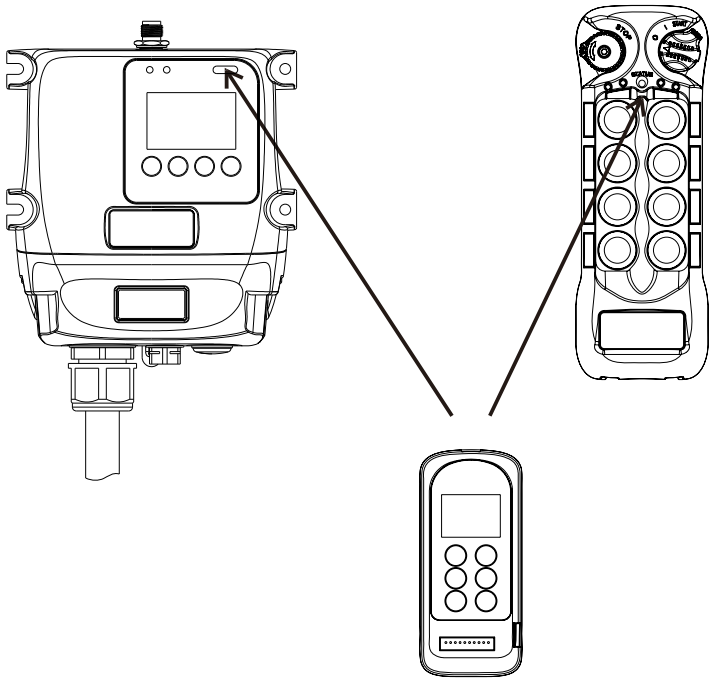
4.1.6 Transmitter Output Power Settings

1mW offers the shortest operating range with lowest battery consumption while 10mW offers the longest operating range with highest battery consumption (manufacture preset at 2mW).

	Dipswitch Settings	Output Power		Dipswitch Settings	Output Power
1	**000**xxxxxxx	1mW	**5**	**100**xxxxxxx	5mW
2	**001**xxxxxxx	2mW	**6**	**101**xxxxxxx	6mW
3	**010**xxxxxxx	3mW	**7**	**110**xxxxxxx	8mW
4	**011**xxxxxxx	4mW	**8**	**111**xxxxxxx	10mW

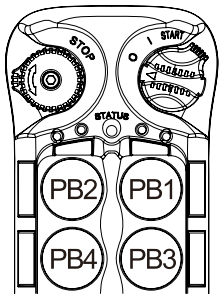
4.1.7 Infrared Programming

Other custom functions and settings not listed in this manual can be programmed via the infrared IR programmer unit, such as the system serial number, frequency range, TAC, new and updated functions, and many others. Please contact ARC representative for more details.

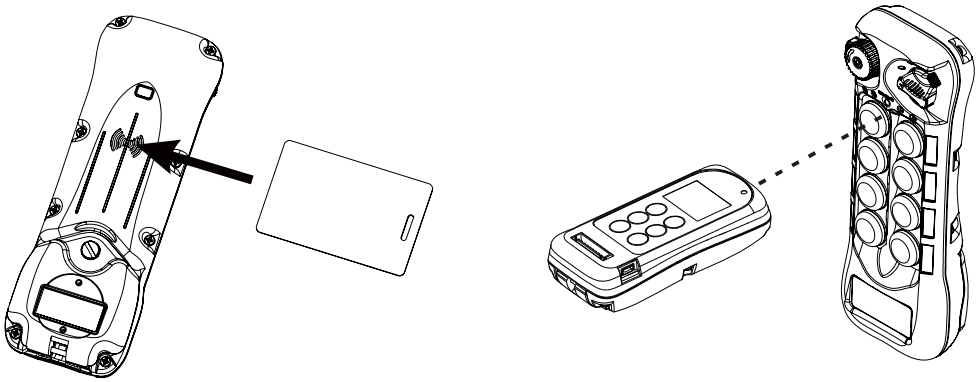


4.1.8 Transmitter Access Card (TAC) Settings

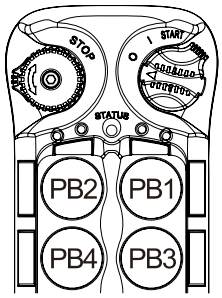
Follow the instruction below on how to program the TAC into the transmitter. The infrared IR programmer unit is required to complete the programming. Please contact ARC representative for more details.



1) Rotate the power switch key to OFF (0) position.
2) With the STOP button elevated, press and hold PB1, PB2, PB3 and PB4 at the same time.
3) Rotate the power switch key to ON (I) position.
4) Let go PB1, PB2, PB3 and PB4 at the same time, the Status LED displays orange fast blinks (entered TAC mode).
5) Placed the access card over the RFID marking located on the backside of the transmitter.
6) Status LED with 1 second green means the access card is being programmed into the transmitter.
7) Status LED with 1 second orange means the access card is already programmed into the transmitter.
8) Status LED with 1 second red means unable to store any more access cards. Each transmitter can only store up to 16 access cards.
9) Use the infrared IR programmer unit to extract all access card information stored inside the transmitter for further programming. Other than restricting any unauthorized personnel from using the transmitter, it can also be individually programmed unlocking any specific function or functions on the transmitter allowing a more experienced or qualified user to operate, such as the magnet lift, tandem operation, entering restricted areas, etc…
10) Exit TAC mode by rotate the power switch key to OFF (0) position.



4.1.9 Display Frequency Band



1) Rotate the power switch key to OFF (0) position.
2) With the STOP button elevated, press and hold PB2 and PB4 at the same time.
3) Rotate the power switch key to ON (I) position.
4) Let go PB2 and PB4 at the same time (entered Frequency Band Display mode).
5) The Status LED displays the preset transmitter frequency band with orange, green and red blinks. An orange blink represents the hundreds (+**1**00), a green blink represents the tens (+0**1**0) and a red blink represents the units (+00**1**). For example, **8** orange blinks followed by **6** green blinks and **3** red blinks is **8**6**3**MHz.
6) Exit Frequency Band Display mode by rotate the power switch key to OFF (0) position.

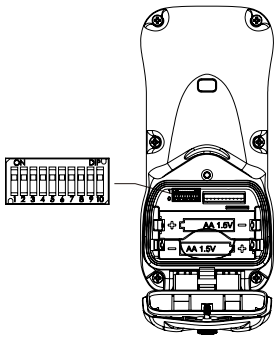
4.1.10 Infrared Function Settings

The transmitter is embedded with infrared sensors for infrared start function. These settings require using the infrared IR programmer unit. Please contact ARC representative for more details.

4.1.11 Zero-G Sensor Settings

The transmitter is embedded with a Zero-G sensor to guard against any unintended control of the crane or equipment when transmitter is thrown or dropped. When triggered, the receiver MAIN relays are deactivated with the exception of the horn function that can be assigned to any of the Function outputs (Function-1 ~ Function-3). This horn output setting requires the infrared IR programmer unit. Please contact ARC representative for more details.

	Dipswitch Settings	Function
1	xxxxxxxx**0**x	Sensor Disabled
2	xxxxxxxx**1**x	Sensor Enabled

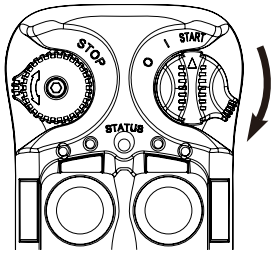


4.2 Receiver

4.2.1 Output Descriptions

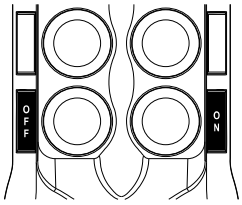
4.2.1.1 START + AUX Function

After executing the START command at transmitter startup, the same START position becomes an auxiliary function with momentary contact connected through Function-1 output (wire #10). There are other types of auxiliary functions made available for Function 1 output. Refer to section 4.2.4 and section 4.2.5.6 ~ 4.2.5.8 Function outputs descriptions and programming. Please contact ARC representative if your application requires other types of auxiliary function connected to these Function output relays.



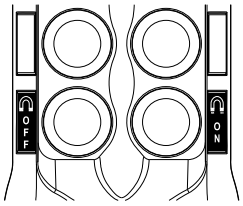
4.2.1.2 ON/OFF Pushbutton Function

The user can set any of the two adjacent pushbuttons on the transmitter to behave like a mechanical ON & OFF rocker or toggle switch. ON output relay closes when ON pushbutton is pressed (OFF output relay opens) and OFF output relay closes when OFF pushbutton is pressed (ON output relay opens). Refer to section 4.2.2.1 and section 4.2.5.9 ~ 4.2.5.14 output relay descriptions and programming.



4.2.1.3 Magnet ON/OFF Pushbutton Function

The user can set any of the two adjacent pushbuttons on the transmitter to control industrial magnet lift. Activate the magnet by pressing the Magnet ON pushbutton. Deactivate the magnet by first press and hold the Magnet ON pushbutton and then press the Magnet OFF pushbutton. Pressing the Magnet OFF pushbutton alone is unable to deactivate the magnet. Refer to section 4.2.2.1 and section 4.2.5.9 ~ 4.2.5.14 output relay descriptions and programming.



4.2.1.4 External Warning Function

The user can install an external warning device (rotating lights, horn, etc…) to the Function-2 output (wire #11). The user can choose which pushbutton pair (or pairs) triggers the external warning device when pressed. Refer to section 4.2.2.1 and section 4.2.5.9 ~ 4.2.5.14 output relay descriptions and programming.

4.2.1.5 Momentary Contact

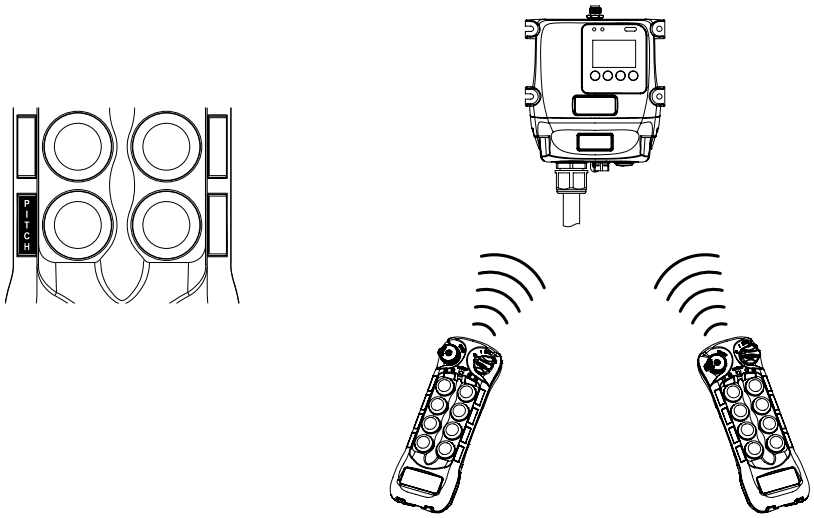
When pushbutton is released the corresponding output relay will open or deactivate. This type of relay action usually applies to external applications such as horn and buzzer. Refer to section 4.2.2.2 and section 4.2.5.9 ~ 4.2.5.14 output relay descriptions and programming.

4.2.1.6 Toggled Contact

When pushbutton is released the corresponding output relay will maintain contact or closure until next time the user presses the same pushbutton again. This type of relay action usually applies to external application such as lights. Refer to section 4.2.2.2 and section 4.2.5.9 ~ 4.2.5.14 output relay descriptions and programming.

4.2.1.7 Pitch & Catch Function

This function allows two operators controlling from opposite ends of a crane or equipment. When set to “Pitch & Catch” make sure the 2nd transmitter is set to the next upper channel (channel X+1). For example, if the system is set to channel 01 then the newly added 2nd transmitter must be set to channel 02 with identical serial number. Furthermore, the receiver auto-scanning function must set to 2-channel scanning (scans channel 01 and 02). Refer to section 4.2.2.2 and section 4.2.5.9 ~ 4.2.5.14 output relay descriptions and programming. Pitch & Catch function must set to assigned channel scheme (refer to section 4.1.2 part B).



4.2.2 Output Programming

4.2.2.1 Interlocking Digital Outputs

Interlocking means any pushbutton pair cannot be pressed simultaneously as it will cancel each other out. Refer to section 4.2.1 and section 4.2.5.9 ~ 4.2.5.14 output descriptions and programming.

Function #	Function Descriptions (left button / right button)
00000000	Interlocking single speed
00001100	OFF / ON
00010010	On + Start/Off + Start - For added safety, you must first rotate and hold the power switch key at START position and then press the On or Off pushbutton to activate the output relay.
00001110	Magnet Lift On & Off
00010000	OFF / ON (EMS)**
00010100	Toggled / Toggled
00010110	Toggled / Toggled (EMS)**
00011000	None-interlocked single speed
00100000	Interlocking single speed + External warning*
00111000	None-interlocked single speed + External warning*

* *External warning function requires installing an external warning device such as horn and lights to wire #11 Function-2 output.*

** *EMS: Output opens when STOP button is pressed down.*

4.2.2.2 Non-interlocking Digital Outputs

Non-interlocking setting allows the pushbutton pair be pressed simultaneously. It usually applies to equipment's auxiliary functions such as lights, horn or buzzer. Refer to section 4.2.1 and section 4.2.5.9 ~ 4.2.5.14 output descriptions and programming.

Function #	Function Descriptions (left button / right button)
10000000	Normal / Normal
10000010	Normal / Toggled
10000110	Normal / Toggled (EMS)**
10001000	Normal / Normal + Start*
10001100	Normal / Pitch & Catch
10010000	Toggled / Normal
10010010	Toggled / Toggled
10010110	Toggled / Toggled (EMS)**
10011000	Toggled / Normal + Start*
10011100	Toggled / Pitch & Catch
10110000	Toggled (EMS)** / Normal
10110010	Toggled (EMS)** / Toggled
10110110	Toggled (EMS)** / Toggled (EMS)**
10111000	Toggled (EMS)** / Normal + Start*
10111100	Toggled (EMS)** / Pitch & Catch
11000000	Normal + Start* / Normal
11000010	Normal + Start* / Toggled
11000110	Normal + Start* / Toggled (EMS)**
11001000	Normal + Start* / Normal + Start*
11001100	Normal + Start* / Pitch & Catch
11100000	Pitch & Catch / Normal
11100010	Pitch & Catch / Toggled
11100110	Pitch & Catch / Toggled (EMS)**
11101000	Pitch & Catch / Normal + Start*

** Normal + Start: For added safety, must first rotate and hold the power switch key at the START position and then press the intended pushbutton to activate the output.*

*** EMS: Output opens when STOP button is pressed down.*

4.2.3 Jumper Functions

Refer to section 4.2.5.28 jumper function programming.

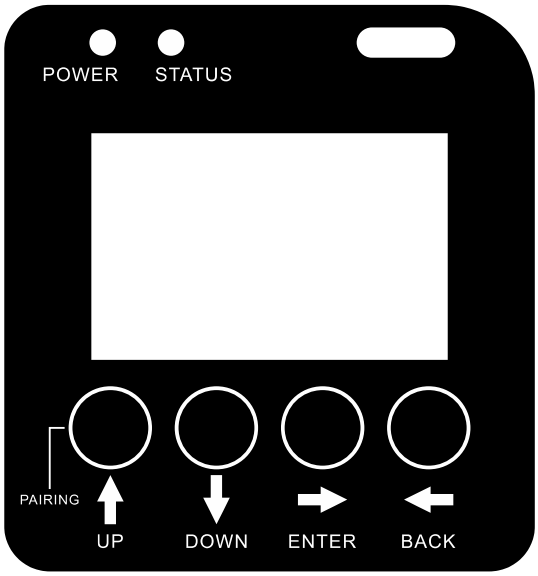
Jumper Settings	Function
JP7 (Short)	For system testing only (receiver MAIN-A relay disabled)
JP8 (Open)	Receiver-to-transmitter remote pairing (pressing the Pairing button required)
JP8 (Short)	Receiver-to-transmitter remote pairing (pressing the Pairing button not required)

4.2.4 Function Outputs

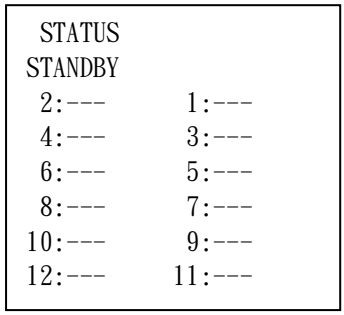
Listed below are other types of functions that can be outputted through the three Function outputs (wire #10, wire #11 and CN8). Refer to section 4.2.5.6 ~ 4.2.5.8 function relay programming.

---	:	START function only.
LV	:	Function output closes when receiver voltage is low.
ID	:	Function output works simultaneously with all motion commands.
NORMAL	:	START function + AUX with normal momentary output.
TOGGLE	:	START function + AUX with toggled/latching output.
TOG&E	:	START function + AUX with toggled/latching output. Output opens when STOP button is pressed down and transmitter power off.
S/P	:	FUNCTION output closes when START command is executed and opens only when transmitter power is turned off.
EXT	:	FUNCTION output works simultaneously with the receiver MAIN relays.
TDM A+B	:	FUNCTION output closes when selector switch is rotated to the A+B
HORN	:	FUNCTION output closes for up to 3 seconds when START command is initiated at transmitter power on and then becomes normal momentary outputs thereafter.
G SENSOR	:	FUNCTION output closes when Zero-G sensor is triggered (receiver MAIN relays deactivated) and opens when receiver MAIN relays are reactivated.
RESET	:	FUNCTION output closes when rotate to START position and opens when let go. Works during initial transmitter startup and inactivity timer START reset.
SW8 ABC	:	FUNCTION output closes at C position (for pushbutton and rotary select ABC function).
SW12 ABC	:	FUNCTION output closes at C position (for pushbutton and rotary select ABC function).

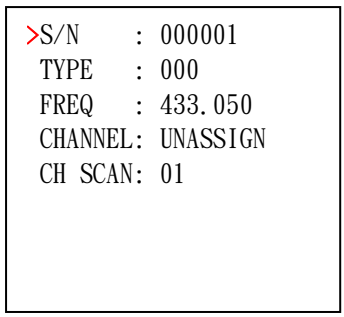
4.2.5 Programming



1) Turn on the receiver power (receiver in standby mode).



2) Press and hold both ENTER and BACK buttons for up to 3 seconds to enter system programming. The LCD screen will exit system programming after 5 minutes of inactivity.



3) Press the UP/DOWN buttons to scroll through all available settings.

4.2.5.1 System Serial Number (S/N)

For safety measure, system serial number can only be changed via the IR programmer unit. Please contact ARC representative for more details. Press the UP/DOWN buttons to scroll through other system settings

```
>S/N     : 000001
 TYPE    : 000
 FREQ    : 433.050
 CHANNEL: UNASSIGN
 CH SCAN: 01
```

4.2.5.2 System Type Programming (TYPE)

System type number is associated with functions such as the dual-crane tandem operation, multiple-receiver operation, and random-access operation. Please contact ARC representative for more details.

```
 S/N     : 000001
>TYPE    : 000
 FREQ    : 433.050
 CHANNEL: UNASSIGN
 CH SCAN: 01
```

1) Press the ENTER button to enter System Type Programming (cursor shown next to the 3-digit type value).
2) Press the UP/DOWN buttons to scroll and select type value as a whole (000~512) or press the ENTER button again to change the 3-digit type value individually (cursor shown under the first digit to the far left). Press the UP/DOWN buttons to scroll and select, and then the ENTER button to go to the next digit to the right. Press the ENTER button repeatedly to cycle through the 3-digit type value. Press the UP/DOWN buttons to change value.
3) Press the BACK button to return to step 1. Press it again to go back to System Type Programming (cursor shown next to TYPE).
4) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.3 System Frequency Programming (FREQ)

For safety measure, system frequency range can only be changed via the IR programmer unit. Please contact ARC representative for more details. Press the UP/ DOWN buttons to scroll through other system settings

```
 S/N     : 000001
 TYPE    : 000
>FREQ    : 433.050
 CHANNEL: UNASSIGN
 CH SCAN: 01
```

4.2.5.4 System Channel Programming (CHANNEL)

```
 S/N     : 000001
 TYPE    : 000
 FREQ    : 433.050
>CHANNEL: UNASSIGN
 CH SCAN: 01
```

1) Press the ENTER button to enter System Channel Programming (cursor shown next to UNASSIGN* or the 2-digit channel value**).
2) Press the UP/DOWN buttons to scroll and select UNASSIGN or channel value as a whole (channel 1~62).
3) Or press the ENTER button again to change the 2-digit channel value individually (cursor shown under the first digit to the left). Press the UP/DOWN buttons to scroll and select, and then the ENTER button to go to the next digit to the right. Press the ENTER button repeatedly to cycle through the 2-digit channel value. Press the UP/DOWN buttons to change value.
4) Press the BACK button to return to step 1. Press it again to go back to System Channel Programming (cursor shown next to CHANNEL).
5) Press the UP/DOWN buttons to scroll through other system settings.

** Make sure the transmitter is also set to Unassigned Channel Scheme.*

*** Make sure the transmitter channel is identical to the receiver channel.*

**** Pitch & Catch configuration "cannot" set to unassigned channel.*

4.2.5.5 Auto-Scanning Programming (CH SCAN)

System Channel Programming on section 4.2.5.4 must set to Assigned Channel when auto-scanning is programmed to two or more channels

+

```
 S/N     : 000001
 TYPE    : 000
 FREQ    : 433.050
 CHANNEL: UNASSIGN
>CH SCAN: 01
```

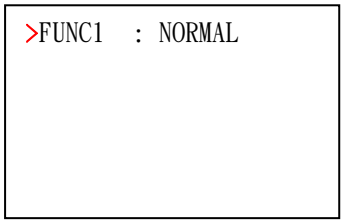
1) Press the ENTER button to enter Auto-Scanning Programming (cursor shown next to the 2-digit channel scanning value).
2) Press the UP/DOWN buttons to scroll and select the number of channels to be scanned when the receiver is in standby mode (maximum 12 channels).
3) Press the BACK button to go back to Auto-Scanning Programming (cursor shown next to CH SCAN).
4) Press the UP/DOWN buttons to scroll through other system settings.

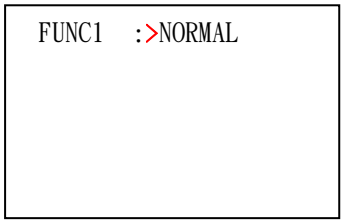
** When set to 2-channel scanning, the receiver will scan the channel set in the receiver (channel X) and the next channel up (channel X+1). When set to 3-channel scanning, the receiver will scan the channel set in the receiver (channel X) and the next 2 channels up (channel X+1 and X+2).*

** Pitch & Catch operations requires 2-channel scanning.*

4.2.5.6 Function-1 Programming (OUT 5 / wire #10)

Please refer to section 4.2.4 for various types of function outputs available.

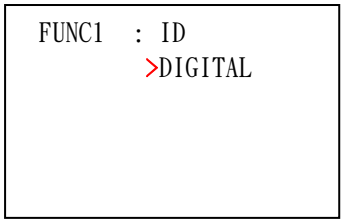




1) Press the ENTER button to enter Function-1 Programming (cursor shown next to NORMAL or other setting previously programmed).
2) Press the ENTER button again to change setting.
3) Press the UP/DOWN buttons to scroll and select.
4) When “ID” is selected, press the BACK button and then the DOWN button to select DIGITAL, CURRENT and PWM outputs.
5) Press the ENTER button and then the UP/DOWN buttons to scroll and select.

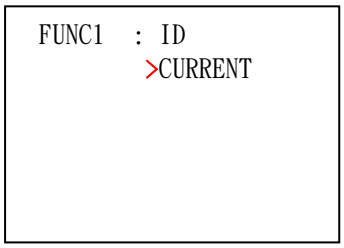
Digital Output

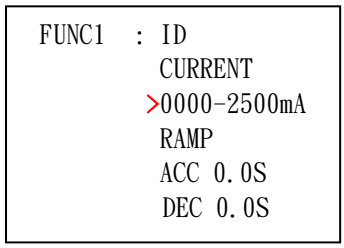
1) Select DIGITAL for digital output.



Current Output

1) Select CURRENT for current output.

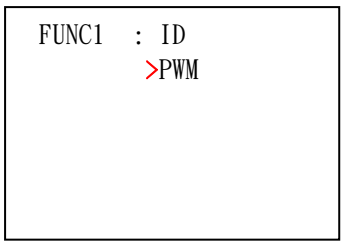


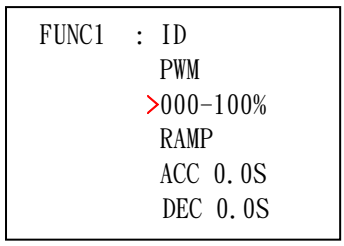


2) Press the UP/DOWN buttons to select the mA value.
3) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 3.
4) Press the BACK button and then UP/DOWN buttons to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
5) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 5.
6) Press the BACK button to go back to Function-1 Programming (cursor shown next to FUNC1).
7) Press the UP/DOWN buttons to scroll through other system settings.

PWM Output

1) Select PWM for PWM output.

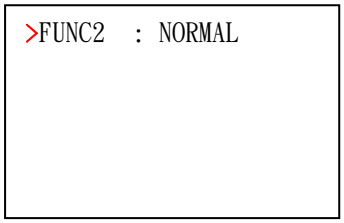


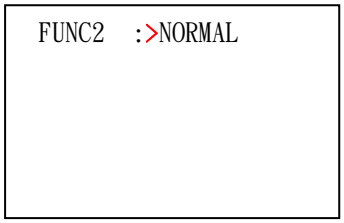


2) Press the UP/DOWN buttons to select the PWM % value.
3) Press the ENTER button and then the UP/DOWN buttons to change % value on the far left. Press the ENTER button to go the next digit to the right and repeat step 3.
4) Press the BACK button and then UP/DOWN buttons to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
5) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 5.
6) Press the BACK button to go back to Function-1 Programming (cursor shown next to FUNC1).
7) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.7 Function-2 Programming (OUT 6 / wire #11)

Please refer to section 4.2.4 for various types of function outputs available.

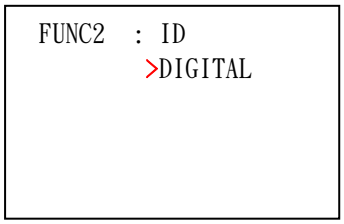




1) Press the ENTER button to enter Function-2 Programming (cursor shown next to NORMAL or other setting previously programmed).
2) Press the ENTER button again to change setting.
3) Press the UP/DOWN buttons to scroll and select.
4) When “ID” is selected, press the BACK button and then the DOWN button to select DIGITAL, CURRENT and PWM outputs.
5) Press the ENTER button and then the UP/DOWN buttons to scroll and select.

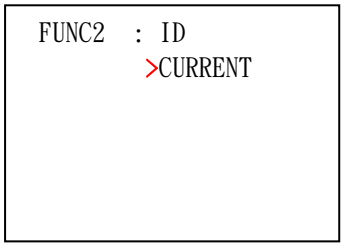
Digital Output

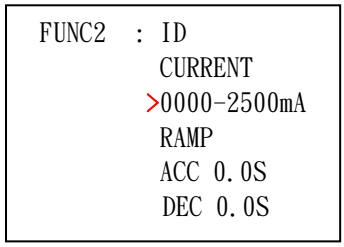
1) Select DIGITAL for digital output.



Current Output

1) Select CURRENT for current output.

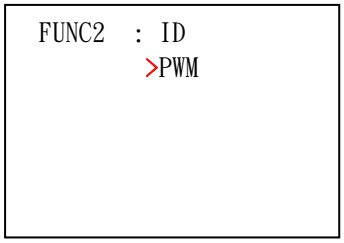


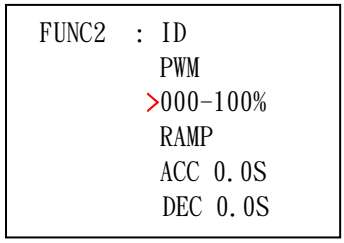


2) Press the UP/DOWN buttons to select the mA value.
3) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 3.
4) Press the BACK button and then UP/DOWN buttons to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
5) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 5.
6) Press the BACK button to go back to Function-2 Programming (cursor shown next to FUNC2).
7) Press the UP/DOWN buttons to scroll through other system settings.

PWM Output

1) Select PWM for PWM output.

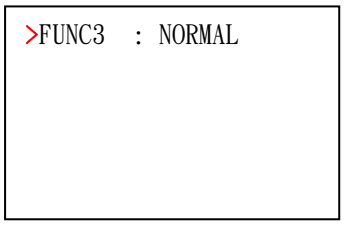


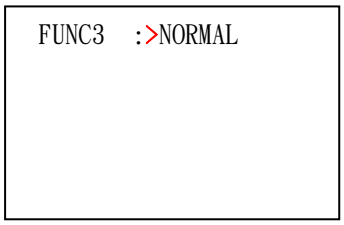


2) Press the UP/DOWN buttons to select the PWM % value.
3) Press the ENTER button and then the UP/DOWN buttons to change % value on the far left. Press the ENTER button to go the next digit to the right and repeat step 3.
4) Press the BACK button and then UP/DOWN buttons to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
5) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 5.
6) Press the BACK button to go back to Function-2 Programming (cursor shown next to FUNC2).
7) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.8 Function-3 Programming (CN8)

Please refer to section 4.2.4 for various types of function outputs available.



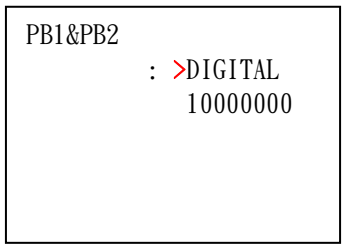


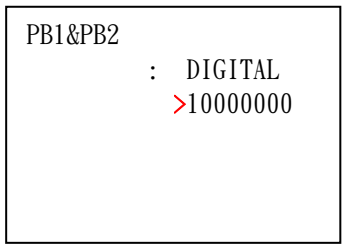
1) Press the ENTER button to enter Function-3 Programming (cursor shown next to NORMAL or other setting previously programmed).
2) Press the ENTER button again to change setting.
3) Press the UP/DOWN buttons to scroll and select.
4) Press the BACK button to go back to Function-3 Programming (cursor shown next to FUNC3).
5) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.9 PB1 & PB2 Programming

Digital Output

Please refer to section 4.2.2.1 and 4.2.2.2 Interlocked and Non-interlocked digital output variants and function number (8 digits).

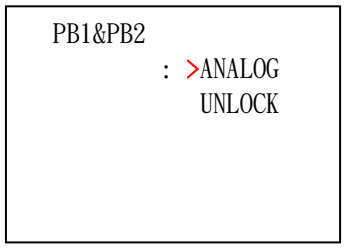


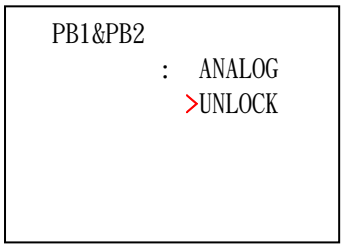


1) Press the ENTER button to enter PB1 & PB2 Programming (cursor shown next to DIGITAL or ANALOG).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select DIGITAL.
3) Press the BACK button and then the DOWN button to change value (cursor shown next to XXXXXXXX).
4) Press the ENTER button and then the UP/DOWN buttons to select “0” or “1” value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button to go back to step 4.
6) Press the BACK button again to go back to PB1 & PB2 Programming (cursor shown next to PB1&PB2).
7) Press the UP/DOWN buttons to scroll through other system settings.

Analog Output

Proceed to section 4.2.5.15 for further analog output programming if PB1 & PB2 are set to ANALOG.



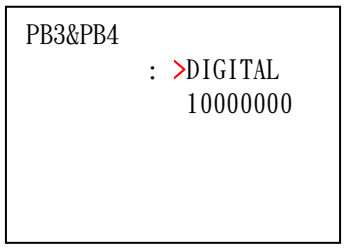


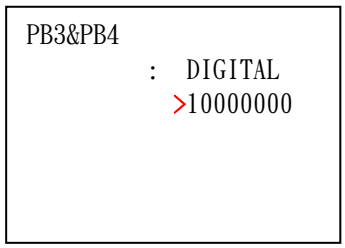
1) Press the ENTER button to enter PB1 & PB2 Programming (cursor shown next to DIGITAL or ANALOG).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select ANALOG.
3) Press the BACK button and then the DOWN button to select LOCK (PB1 & PB2 interlocked) or UNLOCK (PB1 & PB2 none-interlocked).
4) Press the ENTER button and then the UP/DOWN buttons to scroll and select.
5) Press the BACK button to go back to step 4.
6) Press the BACK button again to go back to PB1 & PB2 Programming (cursor shown next to PB1&PB2).
7) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.10 PB3 & PB4 Programming

Digital Output

Please refer to section 4.2.2.1 and 4.2.2.2 Interlocked and Non-interlocked digital output variants and function number (8 digits).

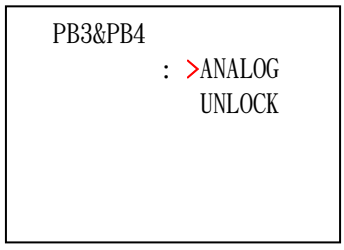


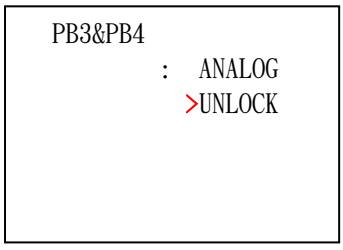


1) Press the ENTER button to enter PB3 & PB4 Programming (cursor shown next to DIGITAL or ANALOG).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select DIGITAL.
3) Press the BACK button and then the DOWN button to change value (cursor shown next to XXXXXXXX).
4) Press the ENTER button and then the UP/DOWN buttons to select “0” or “1” value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button to go back to step 4.
6) Press the BACK button again to go back to PB3 & PB4 Programming (cursor shown next to PB3&PB4).
7) Press the UP/DOWN buttons to scroll through other system settings.

Analog Output

Proceed to section 4.2.5.16 for further analog output programming if PB3 & PB4 are set to ANALOG.



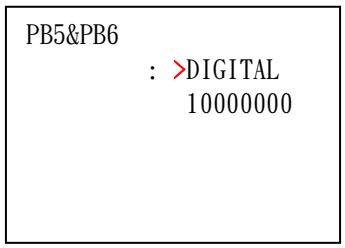


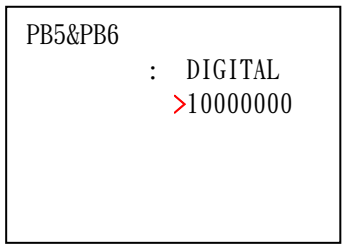
1) Press the ENTER button to enter PB3 & PB4 Programming (cursor shown next to DIGITAL or ANALOG).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select ANALOG.
3) Press the BACK button and then the DOWN button to select LOCK (PB3 & PB4 interlocked) or UNLOCK (PB3 & PB4 none-interlocked).
4) Press the ENTER button and then the UP/DOWN buttons to scroll and select.
5) Press the BACK button to go back to step 4.
6) Press the BACK button again to go back to PB3 & PB4 Programming (cursor shown next to PB3&PB4).
7) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.11 PB5 & PB6 Programming

Digital Output

Please refer to section 4.2.2.1 and 4.2.2.2 Interlocked and Non-interlocked digital output variants and function number (8 digits).

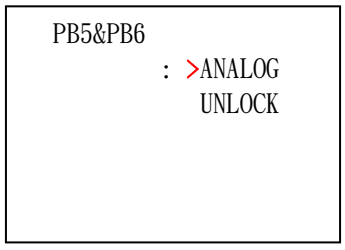


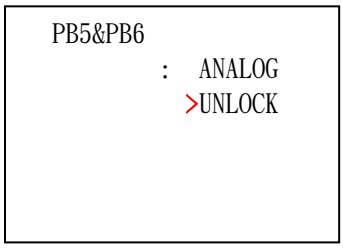


1) Press the ENTER button to enter PB5 & PB6 Programming (cursor shown next to DIGITAL or ANALOG).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select DIGITAL.
3) Press the BACK button and then the DOWN button to change value (cursor shown next to XXXXXXXX).
4) Press the ENTER button and then the UP/DOWN buttons to select “0” or “1” value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button to go back to step 4.
6) Press the BACK button again to go back to PB5 & PB6 Programming (cursor shown next to PB5&PB6).
7) Press the UP/DOWN buttons to scroll through other system settings.

Analog Output

Proceed to section 4.2.5.17 for further analog output programming if PB5 & PB6 are set to ANALOG.



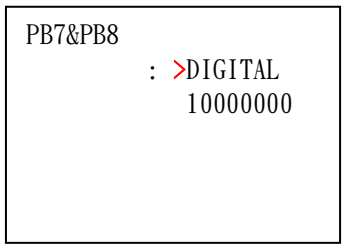


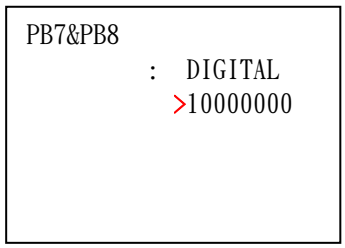
1) Press the ENTER button to enter PB5 & PB6 Programming (cursor shown next to DIGITAL or ANALOG).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select ANALOG.
3) Press the BACK button and then the DOWN button to select LOCK (PB5 & PB6 interlocked) or UNLOCK (PB5 & PB6 none-interlocked).
4) Press the ENTER button and then the UP/DOWN buttons to scroll and select.
5) Press the BACK button to go back to step 4.
6) Press the BACK button again to go back to PB5 & PB6 Programming (cursor shown next to PB5&PB6).
7) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.12 PB7 & PB8 Programming

Digital Output

Please refer to section 4.2.2.1 and 4.2.2.2 Interlocked and Non-interlocked digital output variants and function number (8 digits).

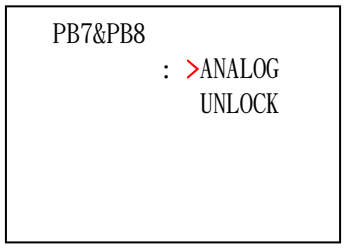


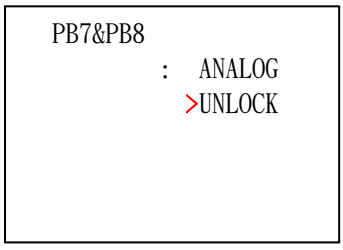


1) Press the ENTER button to enter PB7 & PB8 Programming (cursor shown next to DIGITAL or ANALOG).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select DIGITAL.
3) Press the BACK button and then the DOWN button to change value (cursor shown next to XXXXXXXX).
4) Press the ENTER button and then the UP/DOWN buttons to select “0” or “1” value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button to go back to step 4.
6) Press the BACK button again to go back to PB7 & PB8 Programming (cursor shown next to PB7&PB8).
7) Press the UP/DOWN buttons to scroll through other system settings.

Analog Output

Proceed to section 4.2.5.18 for further analog output programming if PB7 & PB8 are set to ANALOG.



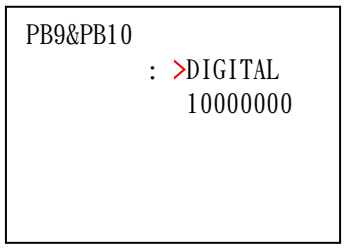


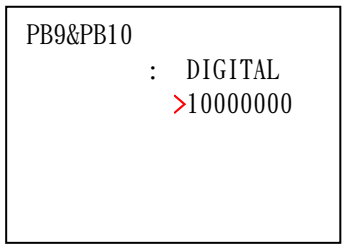
1) Press the ENTER button to enter PB7 & PB8 Programming (cursor shown next to DIGITAL or ANALOG).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select ANALOG.
3) Press the BACK button and then the DOWN button to select LOCK (PB7 & PB8 interlocked) or UNLOCK (PB7 & PB8 none-interlocked).
4) Press the ENTER button and then the UP/DOWN buttons to scroll and select.
5) Press the BACK button to go back to step 4.
6) Press the BACK button again to go back to PB7 & PB8 Programming (cursor shown next to PB7&PB8).
7) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.13 PB9 & PB10 Programming

Digital Output

Please refer to section 4.2.2.1 and 4.2.2.2 Interlocked and Non-interlocked digital output variants and function number (8 digits).

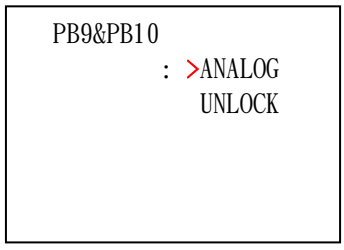


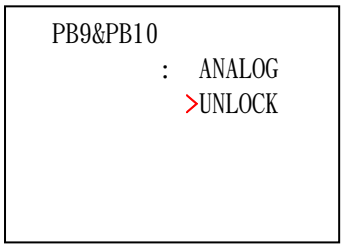


1) Press the ENTER button to enter PB9 & PB10 Programming (cursor shown next to DIGITAL or ANALOG).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select DIGITAL.
3) Press the BACK button and then the DOWN button to change value (cursor shown next to XXXXXXXX).
4) Press the ENTER button and then the UP/DOWN buttons to select “0” or “1” value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button to go back to step 4.
6) Press the BACK button again to go back to PB9 & PB10 Programming (cursor shown next to PB9&PB10).
7) Press the UP/DOWN buttons to scroll through other system settings.

Analog Output

Proceed to section 4.2.5.19 for further analog output programming if PB9 & PB10 are set to ANALOG.



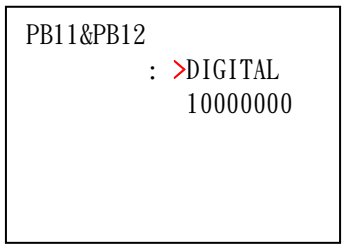


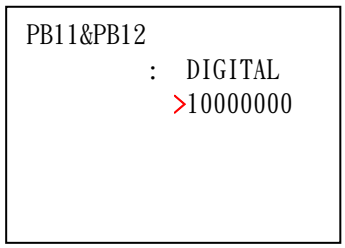
1) Press the ENTER button to enter PB9 & PB10 Programming (cursor shown next to DIGITAL or ANALOG).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select ANALOG.
3) Press the BACK button and then the DOWN button to select LOCK (PB9 & PB10 interlocked) or UNLOCK (PB9 & PB10 none-interlocked).
4) Press the ENTER button and then the UP/DOWN buttons to scroll and select.
5) Press the BACK button to go back to step 4.
6) Press the BACK button again to go back to PB9 & PB10 Programming (cursor shown next to PB9&PB10).
7) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.14 PB11 & PB12 Programming

Digital Output

Please refer to section 4.2.2.1 and 4.2.2.2 Interlocked and Non-interlocked digital output variants and function number (8 digits).

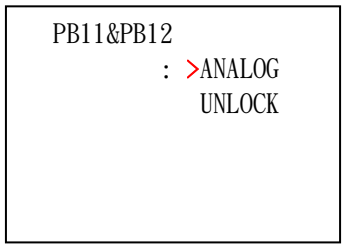


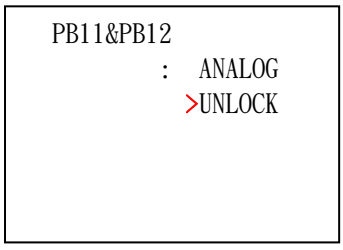


1) Press the ENTER button to enter PB11 & PB12 Programming (cursor shown next to DIGITAL or ANALOG).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select DIGITAL.
3) Press the BACK button and then the DOWN button to change value (cursor shown next to XXXXXXXX).
4) Press the ENTER button and then the UP/DOWN buttons to select “0” or “1” value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button to go back to step 4.
6) Press the BACK button again to go back to PB11 & PB12 Programming (cursor shown next to PB11&PB12).
7) Press the UP/DOWN buttons to scroll through other system settings.

Analog Output

Proceed to section 4.2.5.20 for further analog output programming if PB11 & PB12 are set to ANALOG.



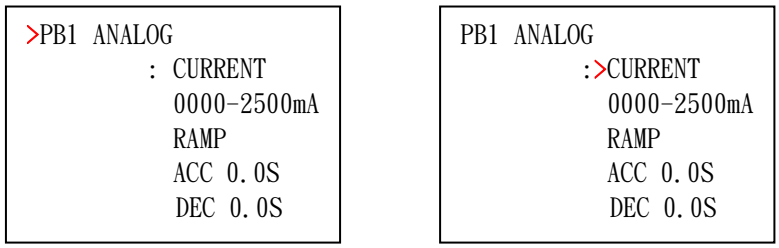


1) Press the ENTER button to enter PB11 & PB12 Programming (cursor shown next to DIGITAL or ANALOG).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select ANALOG.
3) Press the BACK button and then the DOWN button to select LOCK (PB11 & PB12 interlocked) or UNLOCK (PB11 & PB12 none-interlocked).
4) Press the ENTER button and then the UP/DOWN buttons to scroll and select.
5) Press the BACK button to go back to step 4.
6) Press the BACK button again to go back to PB11 & PB12 Programming (cursor shown next to PB11&PB12).
7) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.15 PB1 Analog Output Programming

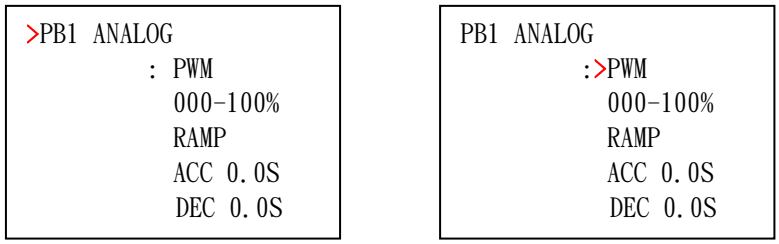
Program this section if PB1 & PB2 Programming on section 4.2.5.9 is set to ANALOG. This section will not show if section 4.2.5.9 is set to set to DIGITAL.

Current Output



1) Press the ENTER button to enter PB1 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select CURRENT.
3) Press the BACK button and then the DOWN button to select the mA value.
4) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB1 Analog Output Programming (cursor shown next to PB1 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

PWM Output

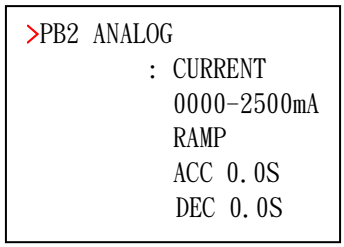


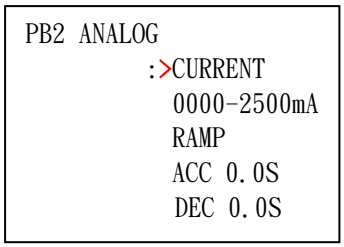
1) Press the ENTER button to enter PB1 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select PWM.
3) Press the BACK button and then the DOWN button to select PWM % value.
4) Press the ENTER button and then the UP/DOWN buttons to change% value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB1 Analog Output Programming (cursor shown next to PB1 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.16 PB2 Analog Output Programming

Program this section if PB1 & PB2 Programming on section 4.2.5.9 is set to ANALOG. This section will not show if section 4.2.5.9 is set to set to DIGITAL.

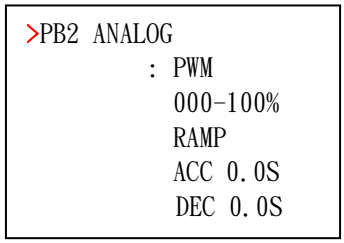
Current Output

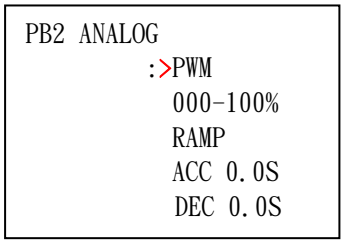




1) Press the ENTER button to enter PB2 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select CURRENT.
3) Press the BACK button and then the DOWN button to select the mA value.
4) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB2 Analog Output Programming (cursor shown next to PB2 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

PWM Output



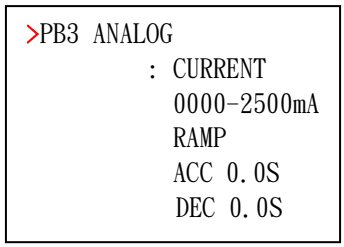


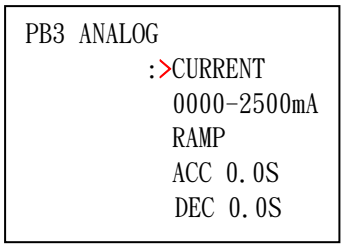
1) Press the ENTER button to enter PB2 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select PWM.
3) Press the BACK button and then the DOWN button to select PWM % value.
4) Press the ENTER button and then the UP/DOWN buttons to change% value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB2 Analog Output Programming (cursor shown next to PB2 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.17 PB3 Analog Output Programming

Program this section if PB3 & PB4 Programming on section 4.2.5.10 is set to ANALOG. This section will not show if section 4.2.5.10 is set to set to DIGITAL.

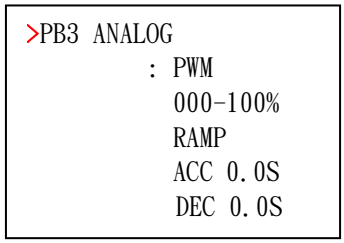
Current Output

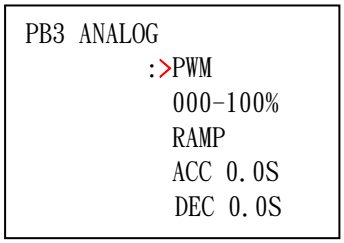




1) Press the ENTER button to enter PB3 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select CURRENT.
3) Press the BACK button and then the DOWN button to select the mA value.
4) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB3 Analog Output Programming (cursor shown next to PB3 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

PWM Output



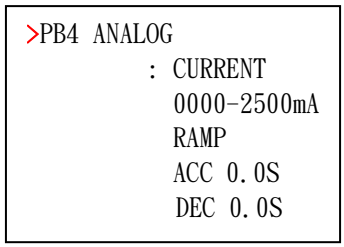


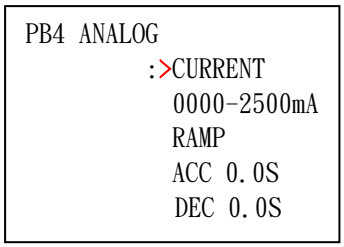
1) Press the ENTER button to enter PB3 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select PWM.
3) Press the BACK button and then the DOWN button to select PWM % value.
4) Press the ENTER button and then the UP/DOWN buttons to change% value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB3 Analog Output Programming (cursor shown next to PB3 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.18 PB4 Analog Output Programming

Program this section if PB3 & PB4 Programming on section 4.2.5.10 is set to ANALOG. This section will not show if section 4.2.5.10 is set to set to DIGITAL.

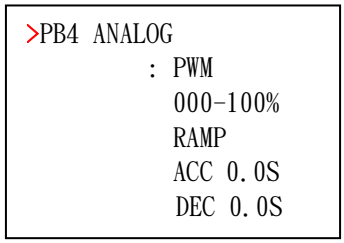
Current Output

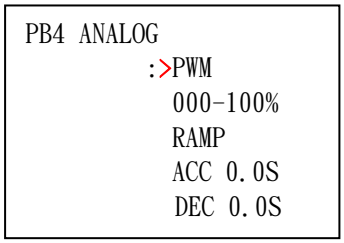




1) Press the ENTER button to enter PB4 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select CURRENT.
3) Press the BACK button and then the DOWN button to select the mA value.
4) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB4 Analog Output Programming (cursor shown next to PB4 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

PWM Output



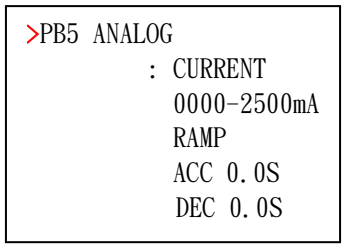


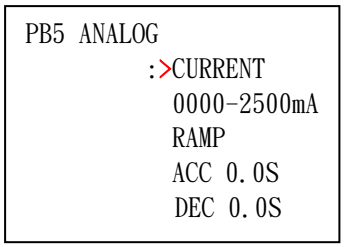
1) Press the ENTER button to enter PB4 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select PWM.
3) Press the BACK button and then the DOWN button to select PWM % value.
4) Press the ENTER button and then the UP/DOWN buttons to change% value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB4 Analog Output Programming (cursor shown next to PB4 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.19 PB5 Analog Output Programming

Program this section if PB5 & PB6 Programming on section 4.2.5.11 is set to ANALOG. This section will not show if section 4.2.5.11 is set to set to DIGITAL.

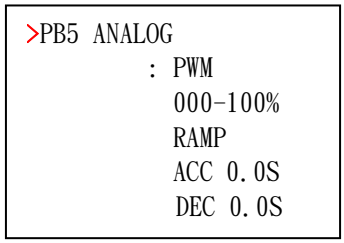
Current Output

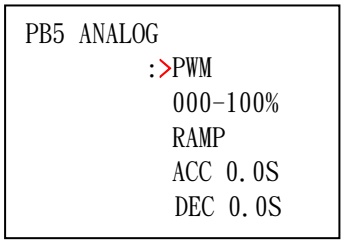




1) Press the ENTER button to enter PB5 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select CURRENT.
3) Press the BACK button and then the DOWN button to select the mA value.
4) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB5 Analog Output Programming (cursor shown next to PB5 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

PWM Output



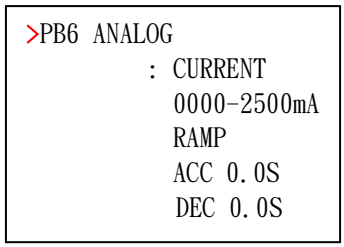


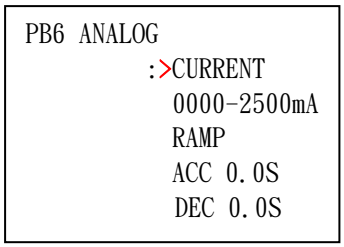
1) Press the ENTER button to enter PB5 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select PWM.
3) Press the BACK button and then the DOWN button to select PWM % value.
4) Press the ENTER button and then the UP/DOWN buttons to change% value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB5 Analog Output Programming (cursor shown next to PB5 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.20 PB6 Analog Output Programming

Program this section if PB5 & PB6 Programming on section 4.2.5.11 is set to ANALOG. This section will not show if section 4.2.5.11 is set to set to DIGITAL.

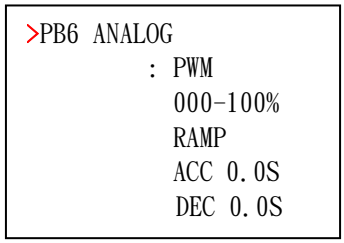
Current Output

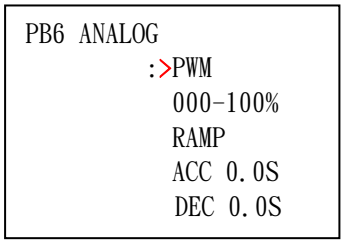




1) Press the ENTER button to enter PB6 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select CURRENT.
3) Press the BACK button and then the DOWN button to select the mA value.
4) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB6 Analog Output Programming (cursor shown next to PB6 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

PWM Output



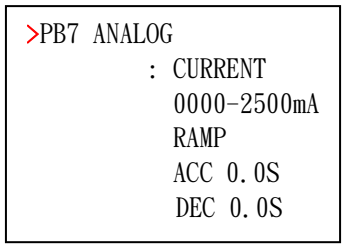


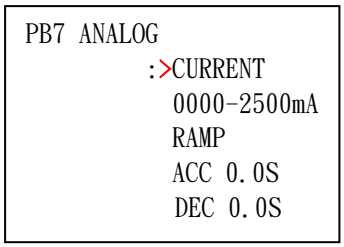
1) Press the ENTER button to enter PB6 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select PWM.
3) Press the BACK button and then the DOWN button to select PWM % value.
4) Press the ENTER button and then the UP/DOWN buttons to change% value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB6 Analog Output Programming (cursor shown next to PB6 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.21 PB7 Analog Output Programming

Program this section if PB7 & PB8 Programming on section 4.2.5.12 is set to ANALOG. This section will not show if section 4.2.5.12 is set to set to DIGITAL.

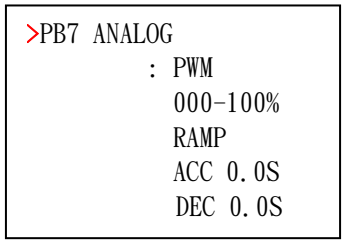
Current Output

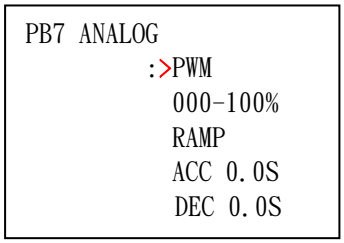




1) Press the ENTER button to enter PB7 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select CURRENT.
3) Press the BACK button and then the DOWN button to select the mA value.
4) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB7 Analog Output Programming (cursor shown next to PB7 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

PWM Output



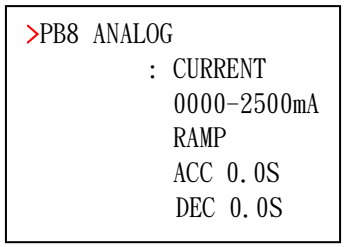


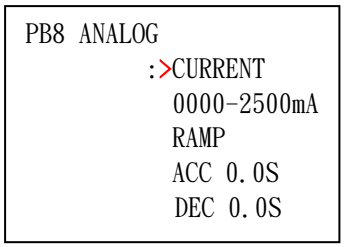
1) Press the ENTER button to enter PB7 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select PWM.
3) Press the BACK button and then the DOWN button to select PWM % value.
4) Press the ENTER button and then the UP/DOWN buttons to change% value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB7 Analog Output Programming (cursor shown next to PB7 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.22 PB8 Analog Output Programming

Program this section if PB7 & PB8 Programming on section 4.2.5.12 is set to ANALOG. This section will not show if section 4.2.5.12 is set to set to DIGITAL.

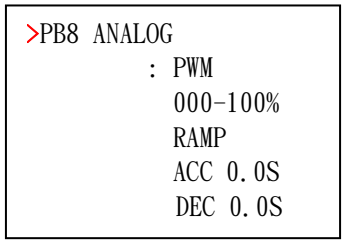
Current Output

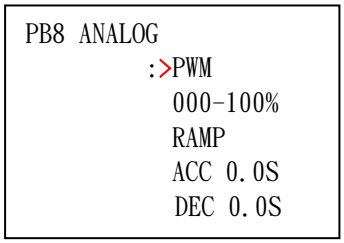




1) Press the ENTER button to enter PB8 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select CURRENT.
3) Press the BACK button and then the DOWN button to select the mA value.
4) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB8 Analog Output Programming (cursor shown next to PB8 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

PWM Output



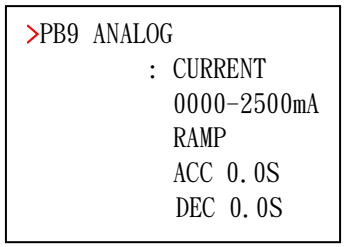


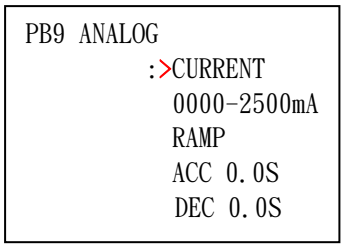
1) Press the ENTER button to enter PB8 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select PWM.
3) Press the BACK button and then the DOWN button to select PWM % value.
4) Press the ENTER button and then the UP/DOWN buttons to change% value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB8 Analog Output Programming (cursor shown next to PB8 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.23 PB9 Analog Output Programming

Program this section if PB9 & PB10 Programming on section 4.2.5.13 is set to ANALOG. This section will not show if section 4.2.5.13 is set to set to DIGITAL.

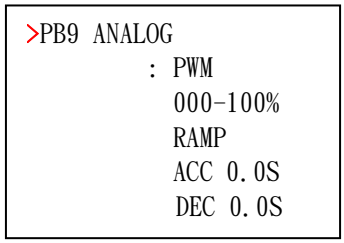
Current Output

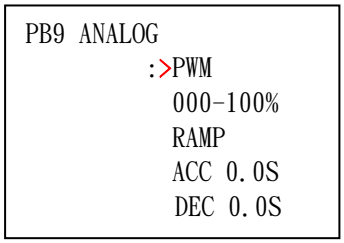




1) Press the ENTER button to enter PB9 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select CURRENT.
3) Press the BACK button and then the DOWN button to select the mA value.
4) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB9 Analog Output Programming (cursor shown next to PB9 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

PWM Output



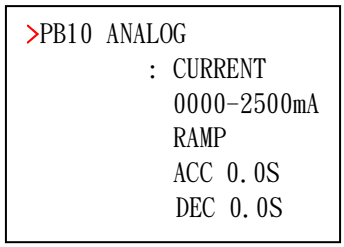


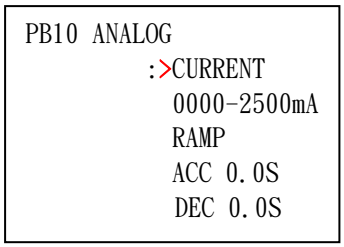
1) Press the ENTER button to enter PB9 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select PWM.
3) Press the BACK button and then the DOWN button to select PWM % value.
4) Press the ENTER button and then the UP/DOWN buttons to change% value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB9 Analog Output Programming (cursor shown next to PB9 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.24 PB10 Analog Output Programming

Program this section if PB9 & PB10 Programming on section 4.2.5.13 is set to ANALOG. This section will not show if section 4.2.5.13 is set to set to DIGITAL.

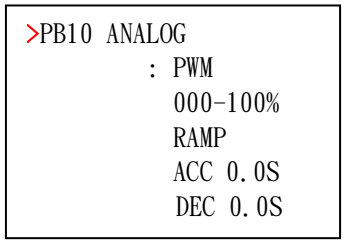
Current Output

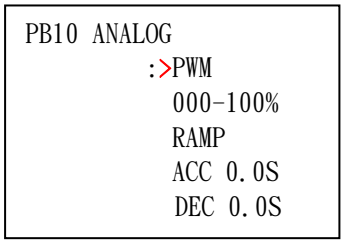




1) Press the ENTER button to enter PB10 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select CURRENT.
3) Press the BACK button and then the DOWN button to select the mA value.
4) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB10 Analog Output Programming (cursor shown next to PB10 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

PWM Output



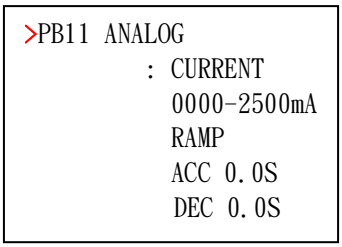


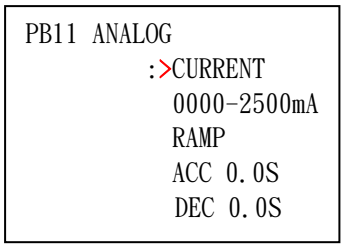
1) Press the ENTER button to enter PB10 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select PWM.
3) Press the BACK button and then the DOWN button to select PWM % value.
4) Press the ENTER button and then the UP/DOWN buttons to change% value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB10 Analog Output Programming (cursor shown next to PB10 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.25 PB11 Analog Output Programming

Program this section if PB11 & PB12 Programming on section 4.2.5.14 is set to ANALOG. This section will not show if section 4.2.5.14 is set to set to DIGITAL.

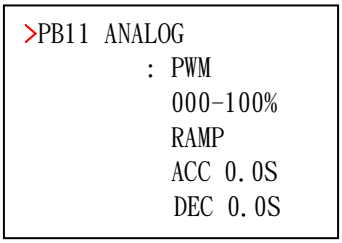
Current Output

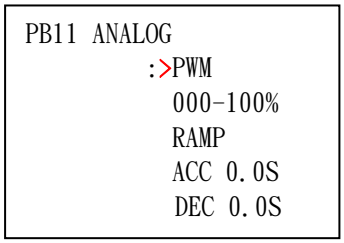




1) Press the ENTER button to enter PB11 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select CURRENT.
3) Press the BACK button and then the DOWN button to select the mA value.
4) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB11 Analog Output Programming (cursor shown next to PB11 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

PWM Output



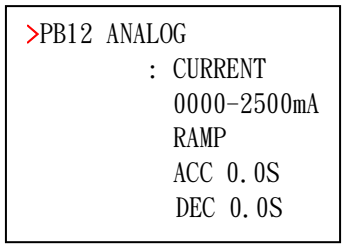


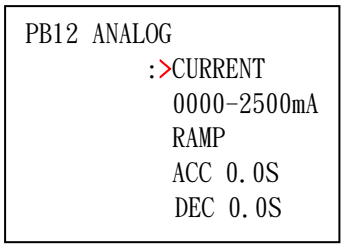
1) Press the ENTER button to enter PB11 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select PWM.
3) Press the BACK button and then the DOWN button to select PWM % value.
4) Press the ENTER button and then the UP/DOWN buttons to change% value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB11 Analog Output Programming (cursor shown next to PB11 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.26 PB12 Analog Output Programming

Program this section if PB11 & PB12 Programming on section 4.2.5.14 is set to ANALOG. This section will not show if section 4.2.5.14 is set to set to DIGITAL.

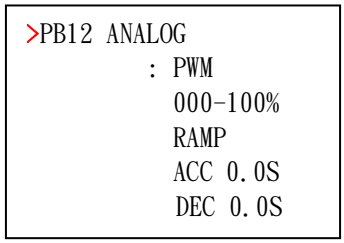
Current Output

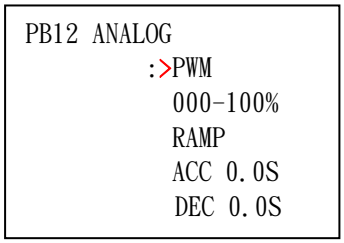




1) Press the ENTER button to enter PB12 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select CURRENT.
3) Press the BACK button and then the DOWN button to select the mA value.
4) Press the ENTER button and then the UP/DOWN buttons to change mA value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB12 Analog Output Programming (cursor shown next to PB12 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

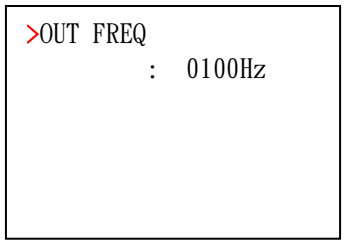
PWM Output

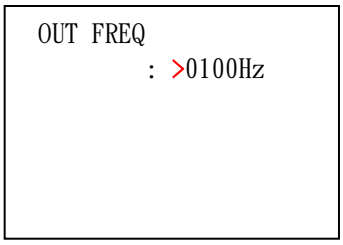




1) Press the ENTER button to enter PB12 Analog Output Programming (cursor shown next to CURRENT or PWM).
2) Press the ENTER button and then the UP/DOWN buttons to scroll and select PWM.
3) Press the BACK button and then the DOWN button to select PWM % value.
4) Press the ENTER button and then the UP/DOWN buttons to change% value on the far left. Press the ENTER button to go the next digit to the right and repeat step 4.
5) Press the BACK button and then the DOWN button to select RAMP ACC (acceleration delay) and RAMP DEC (deceleration delay) settings.
6) Press the ENTER button and then UP/DOWN buttons to change ACC or DEC value on the far left. Press the ENTER button to go the next digit to the right and repeat step 6.
7) Press the BACK button to go back to ACC or DEC setting, press it again to go back to PB12 Analog Output Programming (cursor shown next to PB12 ANALOG).
8) Press the UP/DOWN buttons to scroll through other system settings.

4.2.5.27 Output Frequency Programming

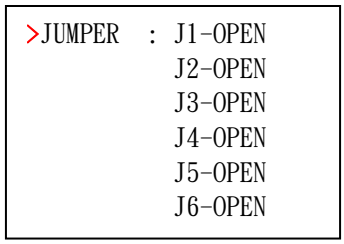




1) Press the ENTER button to enter Output Frequency Programming (cursor shown next to 0100Hz or other setting previously programmed).
2) Press the UP/DOWN buttons to scroll and select the required value (50Hz~1,000Hz).
3) Press the BACK button to go back to Output Frequency Programming (cursor shown next to OUT FREQ).
4) Press the UP/DOWN buttons to scroll through other system settings.

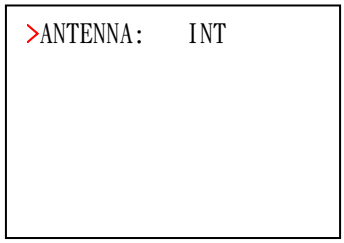
4.2.5.28 Jumper Function Programming

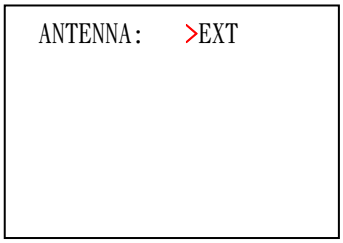
Please refer to section 4.2.3 for various types of jumper settings available.



1) Press the ENTER button to enter Jumper Function Programming (cursor shown next to JP1-OPEN or other setting previously programmed).
2) Press the UP/DOWN buttons and then the ENTER button to scroll and select which Jumper to program (cursor shown next to OPEN or SHORT)
3) Press the UP/DOWN buttons to select OPEN or SHORT.
4) Press the BACK button to go back to step 2. Press it again to go back to Jumper Function Programming (cursor shown next to JUMPER)
5) Press the UP/DOWN buttons to scroll through other system settings.

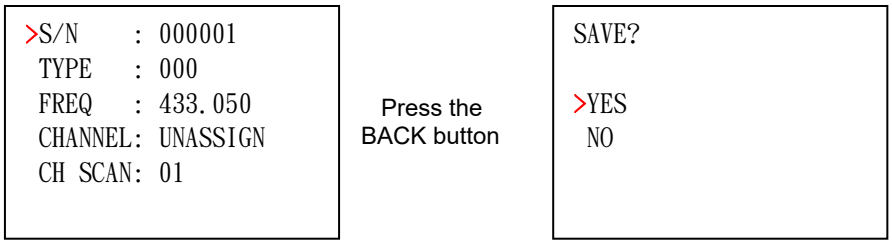
4.2.5.29 Antenna Setting





1) Press the ENTER button to enter Antenna Setting (cursor shown next to INT (internal antenna connection) or EXT (external antenna connection).
2) Press the UP/DOWN buttons to scroll and select.
3) Press the BACK button to go back to Antenna Setting (cursor shown next to ANTENNA).
4) Press the UP/DOWN buttons to scroll through other system settings.

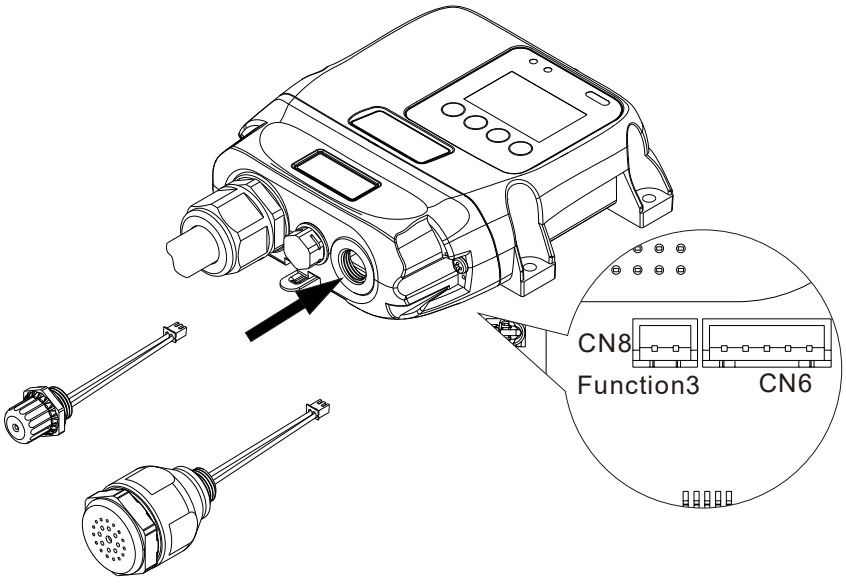
4.2.5.30 Save Programming



1) Press the BACK button on the main system programming screen to enter Save Programming (cursor shown next to YES).
2) Press the UP/DOWN buttons to select Yes or No.
3) Press the ENTER button to execute.
4) Programming completed with LCD returned to the main screen.

4.2.6 Indicator Light and Buzzer Installation

The miniature indicator light and buzzer can be easily fitted onto the receiver enclosure. The indicator light or the buzzer works simultaneously with the receiver MAIN relays (manufacture preset). When receiver MAIN relays are activated the indicator light or the buzzer is also activated, or vice versa. Make sure the indicator light or the buzzer is connected to the Function-3 CN8 port inside the receiver. Please contact ARC representative if you would like the indicator light or the buzzer work differently than described above. Refer to section 4.2.4 and section 4.2.5.6 ~ 4.2.5.8 Function relay descriptions and programming



4.2.7 System Channels Table

433~439MHz:

Channel	Primary/Secondary Frequency	Channel	Primary/Secondary Frequency
01	433.050/436.550	32	434.600/438.100
02	433.100/436.600	33	434.650/438.150
03	433.150/436.650	34	434.700/438.200
04	433.200/436.700	35	434.750/438.250
05	433.250/436.750	36	434.800/438.300
06	433.300/436.800	37	434.850/438.350
07	433.350/436.850	38	434.900/438.400
08	433.400/436.900	39	434.950/438.450
09	433.450/436.950	40	435.000/438.500
10	433.500/437.000	41	435.050/438.550
11	433.550/437.050	42	435.100/438.600
12	433.600/437.100	43	435.150/438.650
13	433.650/437.150	44	435.200/438.700
14	433.700/437.200	45	435.250/438.750
15	433.750/437.250	46	435.300/438.800
16	433.800/437.300	47	435.350/438.850
17	433.850/437.350	48	435.400/438.900
18	433.900/437.400	49	435.450/438.950
19	433.950/437.450	50	435.500/439.000
20	434.000/437.500	51	435.550/439.050
21	434.050/437.550	52	435.600/439.100
22	434.100/437.600	53	435.650/439.150
23	434.150/437.650	54	435.700/439.200
24	434.200/437.700	55	435.750/439.250
25	434.250/437.750	56	435.800/439.300
26	434.300/437.800	57	435.850/439.350
27	434.350/437.850	58	435.900/439.400
28	434.400/437.900	59	435.950/439.450
29	434.450/437.950	60	436.000/439.500
30	434.500/438.000	61	436.050/439.550
31	434.550/438.050	62	436.100/439.600

863~869MHz:

Channel	Primary/Secondary Frequency	Channel	Primary/Secondary Frequency
01	863.050/866.550	32	864.600/868.100
02	863.100/866.600	33	864.650/868.150
03	863.150/866.650	34	864.700/868.200
04	863.200/866.700	35	864.750/868.250
05	863.250/866.750	36	864.800/868.300
06	863.300/866.800	37	864.850/868.350
07	863.350/866.850	38	864.900/868.400
08	863.400/866.900	39	864.950/868.450
09	863.450/866.950	40	865.000/868.500
10	863.500/867.000	41	865.050/868.550
11	863.550/867.050	42	865.100/868.600
12	863.600/867.100	43	865.150/868.650
13	863.650/867.150	44	865.200/868.700
14	863.700/867.200	45	865.250/868.750
15	863.750/867.250	46	865.300/868.800
16	863.800/867.300	47	865.350/868.850
17	863.850/867.350	48	865.400/868.900
18	863.900/867.400	49	865.450/868.950
19	863.950/867.450	50	865.500/869.000
20	864.000/867.500	51	865.550/869.050
21	864.050/867.550	52	865.600/869.100
22	864.100/867.600	53	865.650/869.150
23	864.150/867.650	54	865.700/869.200
24	864.200/867.700	55	865.750/869.250
25	864.250/867.750	56	865.800/869.300
26	864.300/867.800	57	865.850/869.350
27	864.350/867.850	58	865.900/869.400
28	864.400/867.900	59	865.950/869.450
29	864.450/867.950	60	866.000/869.500
30	864.500/868.000	61	866.050/869.550
31	864.550/868.050	62	866.100/869.600

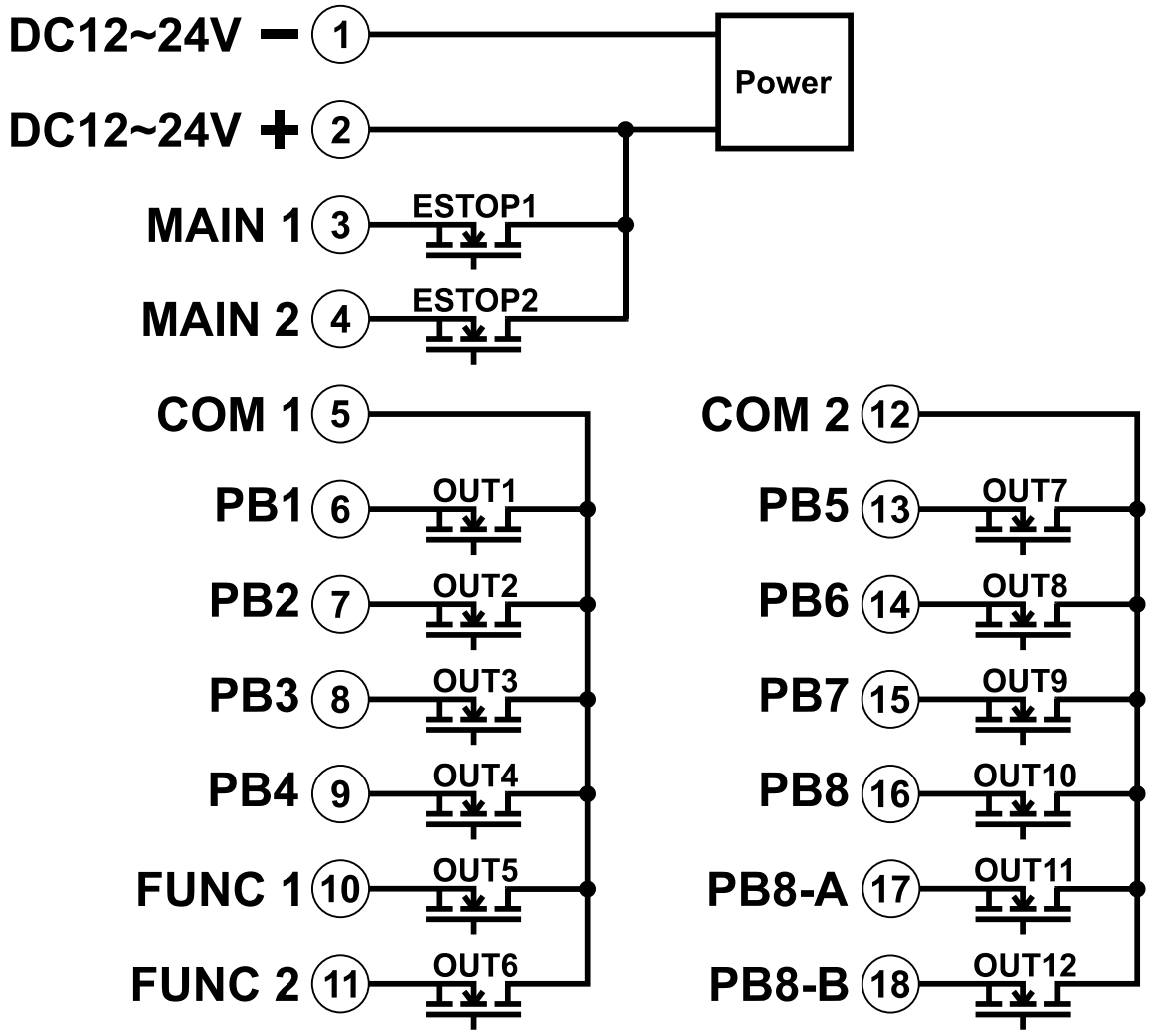
921~927MHz:

Channel	Primary/Secondary Frequency	Channel	Primary/Secondary Frequency
01	921.000/924.500	32	922.550/926.050
02	921.050/924.550	33	922.600/926.100
03	921.100/924.600	34	922.650/926.150
04	921.150/924.650	35	922.700/926.200
05	921.200/924.700	36	922.750/926.250
06	921.250/924.750	37	922.800/926.300
07	921.300/924.800	38	922.850/926.350
08	921.350/924.850	39	922.900/926.400
09	921.400/924.900	40	922.950/926.450
10	921.450/924.950	41	923.000/926.500
11	921.500/925.000	42	923.050/926.550
12	921.550/925.050	43	923.100/926.600
13	921.600/925.100	44	923.150/926.650
14	921.650/925.150	45	923.200/926.700
15	921.700/925.200	46	923.250/926.750
16	921.750/925.250	47	923.300/926.800
17	921.800/925.300	48	923.350/926.850
18	921.850/925.350	49	923.400/926.900
19	921.900/925.400	50	923.450/926.950
20	921.950/925.450	51	923.500/927.000
21	922.000/925.500	52	923.550/927.050
22	922.050/925.550	53	923.600/927.100
23	922.100/925.600	54	923.650/927.150
24	922.150/925.650	55	923.700/927.200
25	922.200/925.700	56	923.750/927.250
26	922.250/925.750	57	923.800/927.300
27	922.300/925.800	58	923.850/927.350
28	922.350/925.850	59	923.900/927.400
29	922.400/925.900	60	923.950/927.450
30	922.450/925.950	61	924.000/927.500
31	922.500/926.000	62	924.050/927.550

5. Receiver Installation

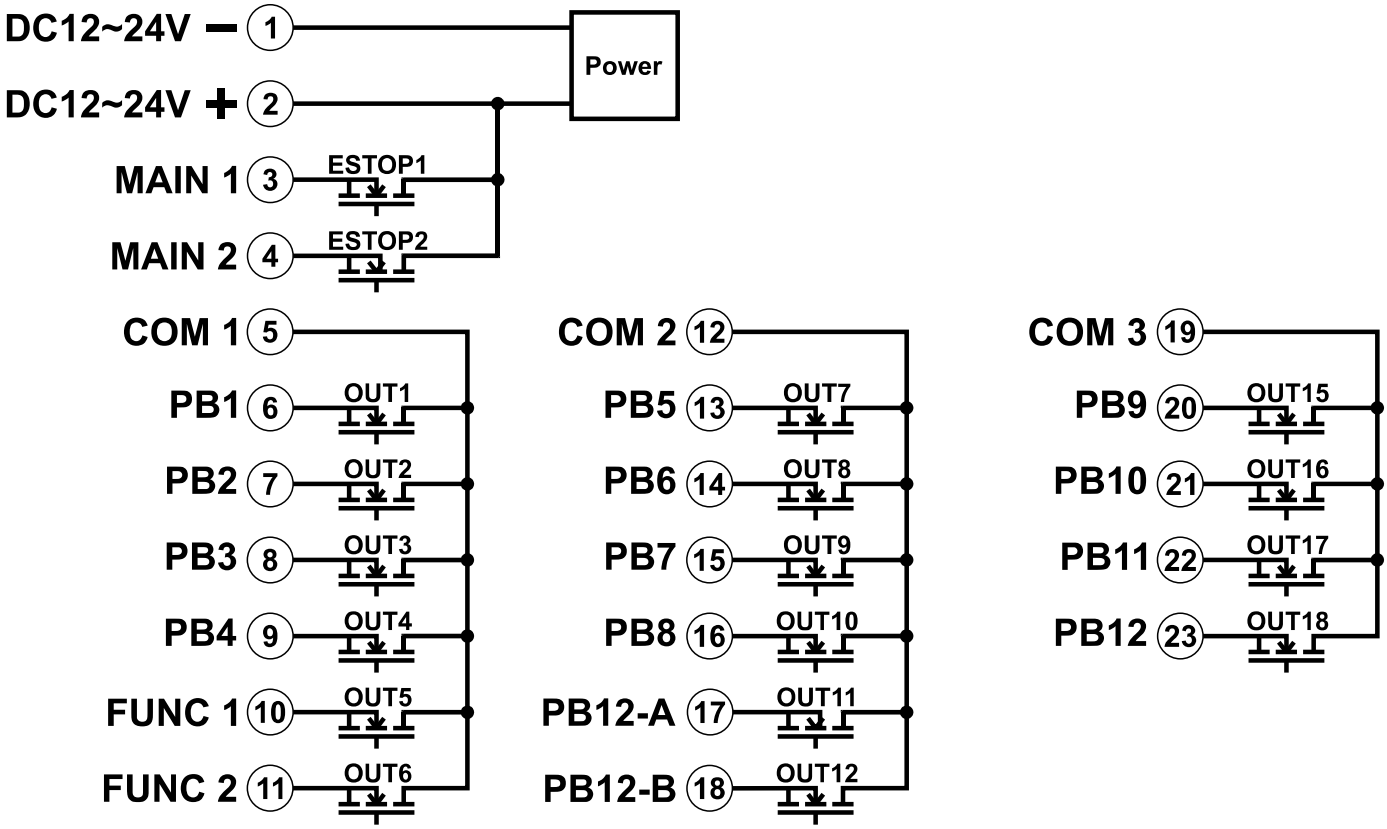
5.1 Wiring Diagram

Flex 8EPH Model



* *Transmitter equipped with A/B/A+B rotary switch on PB8 position: Connect A output to wire #17 and B output to wire #18.*

Flex 12EPH Model

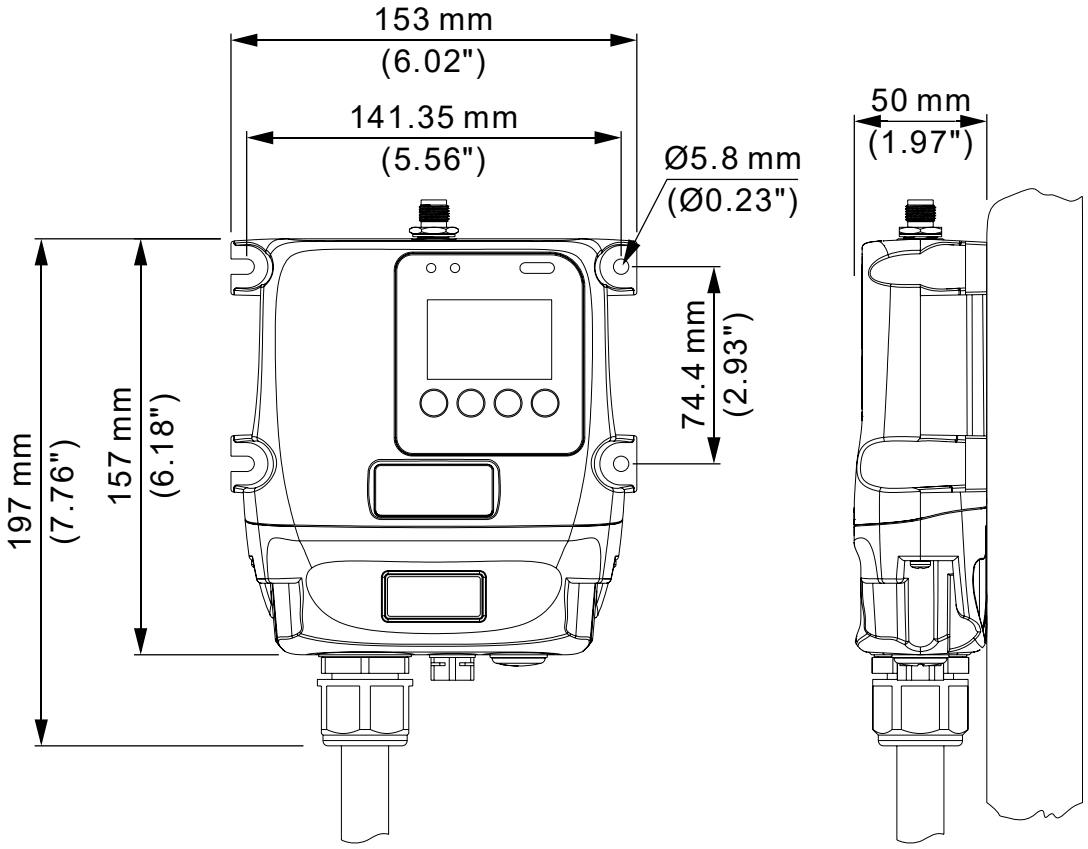


* *Transmitter equipped with A/B/A+B rotary switch on PB12 position: Connect A output to wire #17 and B output to wire #18.*

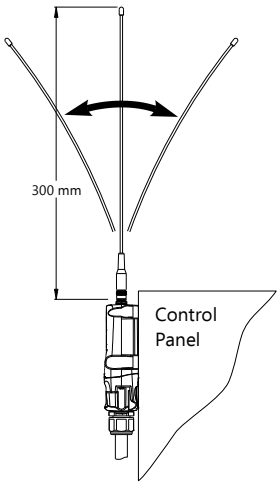
5.2 Pre-installation Precautions

1. Make sure the transmitter and receiver are with identical serial number and channel.
2. Make sure the receiver is not set to the same channel as any other systems in use in the surrounding area.
3. Make sure the equipment is working properly prior to installation.
4. Make sure the power source to the receiver is set correctly.
5. Switch off the main power source to the equipment prior to installation.

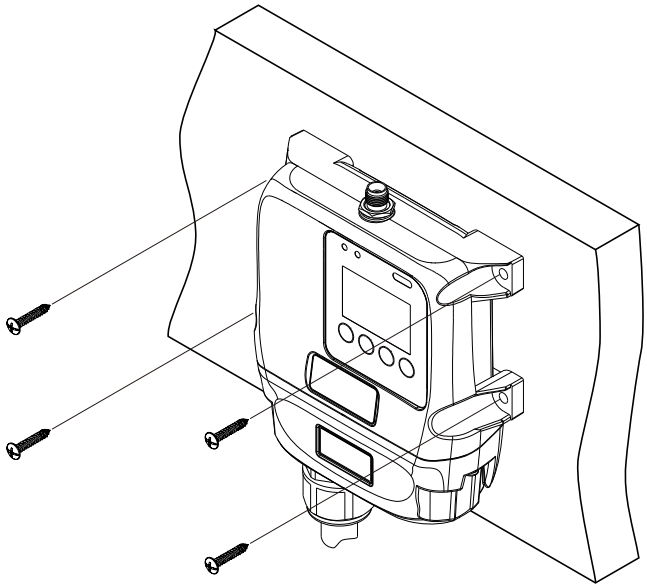
5.3 Step-By-Step Installation



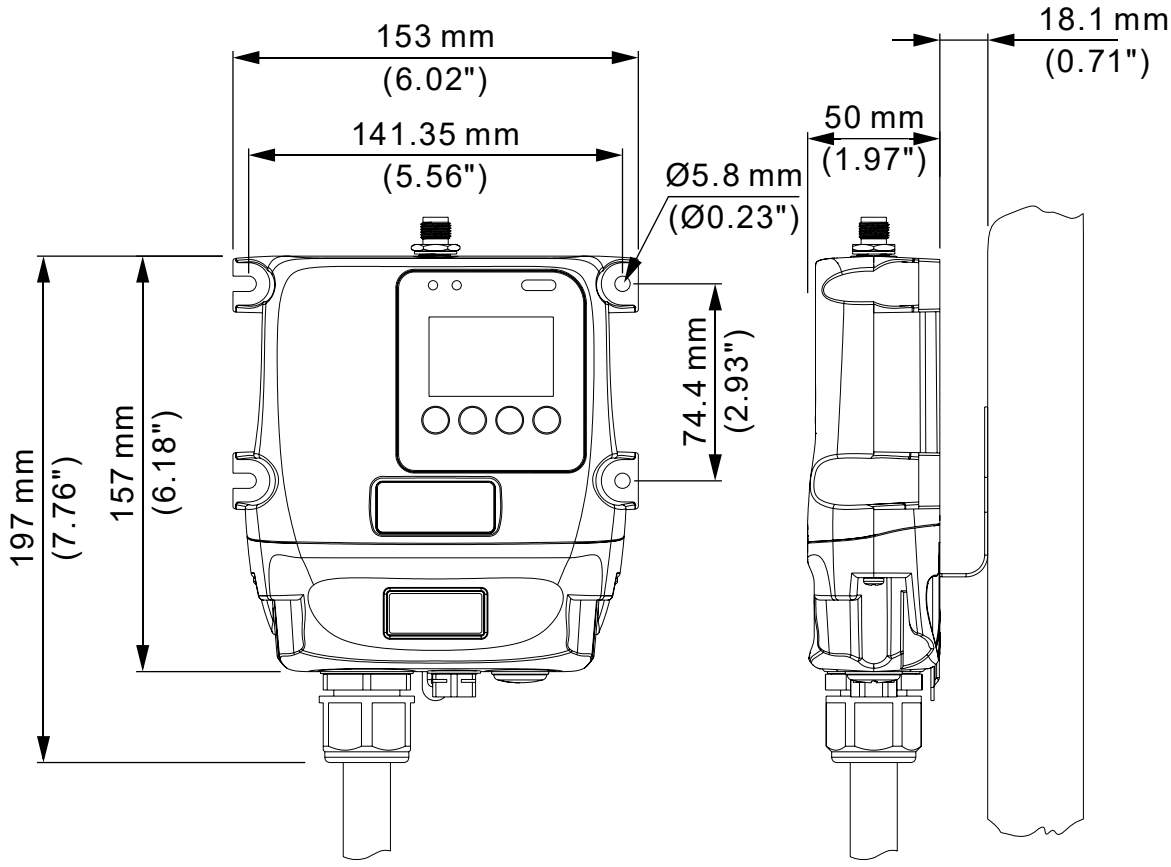
1. For best reception the location of the receiver should be visible to the operator at all time.
2. The location selected should not be exposed to high levels of electric noise. Mounting the receiver next to an unshielded variable frequency drive may cause radio interference. Always locate the receiver as far away from variable frequency drive and electric motor as possible.
3. Ensure the selected location has adequate space to accommodate the receiver. If an external antenna is used, to avoid the possibility of antenna damage always locate the receiver where the antenna is free from any obstacles.



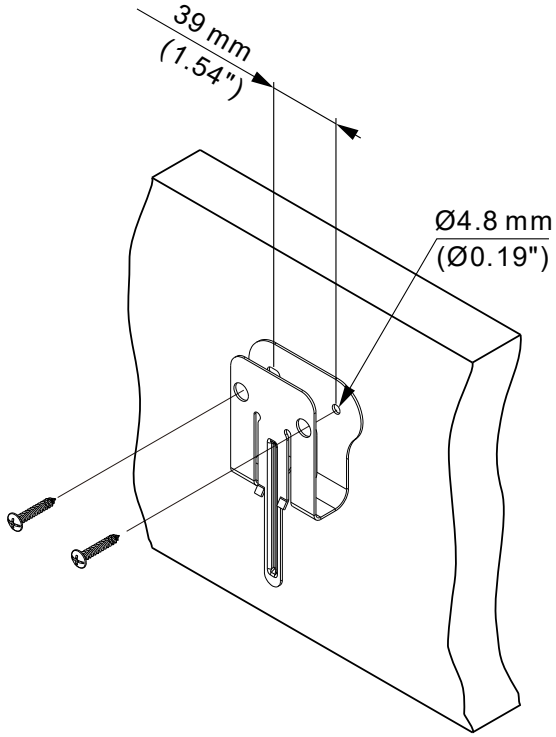
4. When installing an external antenna, make sure the MCX jack located on the decoder board inside the receiver is connected and antenna setting set to EXT (refer to section 4.2.5.29).
5. For better reception, make sure the receiver is in an upright position.
6. Drill four holes on the control panel, wall or location where the receiver is to be installed.



Optional Removable Mounting Bracket

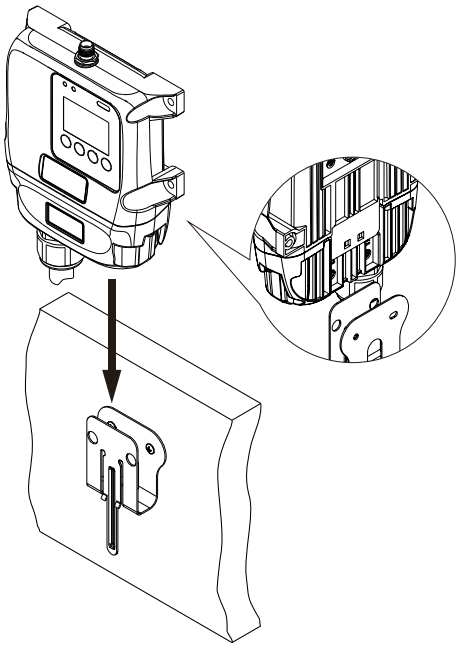


1. Drill two holes on the control panel, wall or location where the receiver is to be installed.

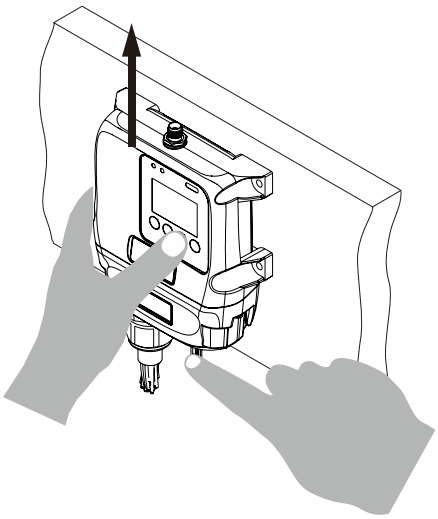


2. Slide down the receiver along the guided track to secure the receiver to the mounting bracket.
3. Remove the receiver by pressing down the bracket release and pull the receiver upward until it clears the guided track.

Install



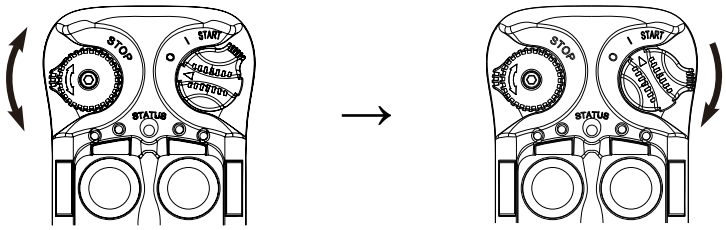
Remove



6. Operating Procedures

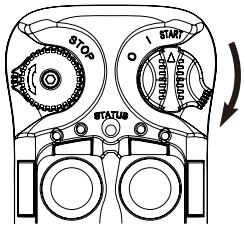
6.1 General Operation

a. Reset the STOP button located on the top left-hand corner of the transmitter by rotating it clockwise or counter clockwise, the button will pop up. Turn on the transmitter power by inserting the power switch key and rotate to ON (I) position.



b. After turning on the transmitter power, check the Status LED on the transmitter for any sign of system irregularities (refer to section 6.7.1 Transmitter Status Indications). If the transmitter is in good working order, the Status LED will display constant green for up to 2 seconds at power on (no faults detected).

c. Rotate the power switch key further to the START position and hold it there for up to 2 seconds (Status LED constant green). When the receiver MAIN relays are activated, the Status LED will change from constant green to constant orange (system on). The power switch key will retract back to the ON (I) position when let go (Status LED blinks green). The same START position becomes an auxiliary function thereafter (refer to section 4.2.1.1 START + AUX Function). Then press any pushbutton on the transmitter to begin operation. Pressing any pushbutton prior to executing the START command at system startup will result in no signals transmitted (Status LED blinks orange).



d. Now press any pushbutton on the transmitter to begin operation. During transmitter inactivity (pushbuttons not pressed), the transmitter will automatically switch to standby mode, with an orange blink on the Status LED every 4-second interval. Always turn off the transmitter power when not in use to save battery power.

e. In case of an emergency, press down the STOP button to disconnect the receiver MAIN relays (Status LED blinks 3 reds and then shuts off). To resume operation, rotate the STOP button clockwise or counter clockwise, the button will pop up. Then

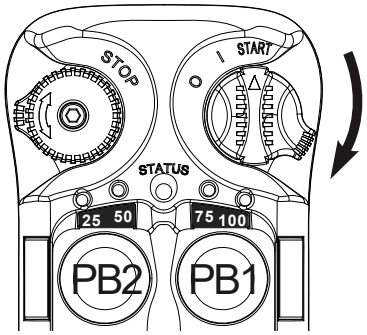
execute the START command to reconnect the receiver MAIN relays. For safety, executing the START command is strictly required every time when the transmitter is turned on or after every STOP button reset.

f. After 5 or 30 minutes of inactivity (pushbutton not pressed), the receiver MAIN relays are temporarily disconnected (refer to section 4.1.5 Inactivity Timer Settings). The Status LED blinks 3 reds and then shuts off. Press any pushbutton or execute the START command to resume operation (refer to section 4.1.4 Start Function Settings).

g. Turn off the transmitter power by rotating the power switch key counter clockwise to Off (0) position; it will disconnect the transmitter power and the receiver MAIN relays altogether. Turn it further counter clockwise to release the key.

6.2 Pushbutton Output Resolution Adjustments

Rotate and hold the power switch key at the START position then press PB1 to increase or PB2 to decrease pushbutton output resolution (25%, 50%, 75% and 100%).



25% Pushbutton Resolution: Maximum output at 25% when pushbutton is fully pressed down.

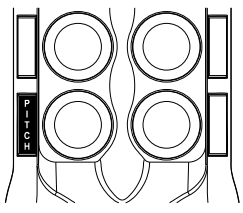
50% Pushbutton Resolution: Maximum output at 50% when pushbutton is fully pressed down.

75% Pushbutton Resolution: Maximum output at 75% when pushbutton is fully pressed down.

100% Pushbutton Resolution: Maximum output at 100% when pushbutton is fully pressed down.

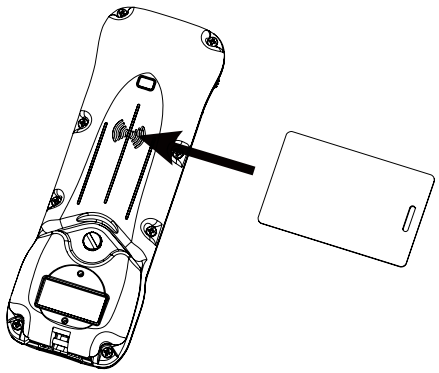
6.3 Pitch & Catch Operation

Press the “PITCH” pushbutton for up to 2 seconds to release control of the receiver. After 2-second grace period, rotate the power switch key to START position for up to 2 seconds to gain control of the receiver. The 2nd operator is unable to take control of the receiver unless the 1st operator presses the “PITCH” pushbutton. Refer to section 4.2.1.7, section 4.2.2.2 and section 4.2.5.9 ~ 4.2.5.14 pitch and catch descriptions and programming.



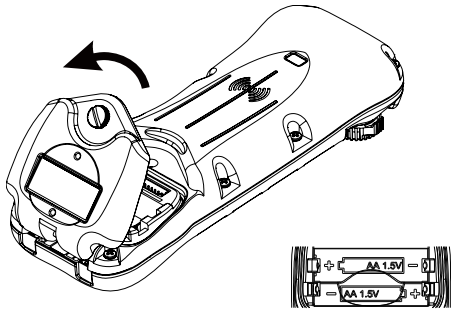
6.4 Transmitter Access Card (TAC) Operation

After turning on the transmitter power, place the TAC directly over the RFID marking located on the backside of the transmitter. A 2-second green on the Status LED represents access card accepted. Status LED with red blinks represents invalid access card. Then rotate the power switch key to the START position for up to 2 seconds to begin operation. TAC is not required after every transmitter inactivity restart, only during initial transmitter power on.



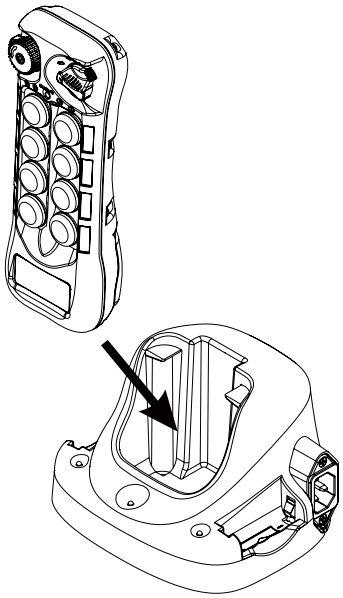
6.5 Changing Batteries

Changing transmitter batteries (“AA” alkaline battery x 2) by unscrewing the battery cover located on the backside of the transmitter. During battery installation make sure the batteries are installed correctly, with “+” to “+” charge and “–” to “–” charge. Also make sure the screw is tightened after battery installation to avoid water, moisture, dirt, grease, and other liquid penetration.



6.6 Battery Charging

The transmitter is designed to accept any off-the-shelf Ni-MH rechargeable batteries. When charging both transmitter and individual batteries at the same time the priority always goes to the transmitter charging. The individual battery charging begins only after the transmitter charging is completed. Depending on the battery capacity the average charging time is approximately 3 hours from completely drained to fully charged. Constant red on the LED represents charging in progress, constant green represents batteries fully charged, and LED off represents no batteries detected. Please do not use any rechargeable lithium-ion batteries as it will damage both the transmitter and the charging station. Please refer to the charging station instruction manual for other useful features such as the rubber safety belt, removable mounting bracket and external light indication.



6.7 System Status Indications

6.7.1 Transmitter Status LED Indications

Type	Display Type	Indication
1	Constant red	Voltage below 1.8V at initial power on or during operation
2	Constant red → off	Voltage below 1.75V during operation (receiver MAIN relays shut off)
3	1 red blink followed by a 2-second pause	Voltage below 1.85V during operation (change batteries suggested)
4A	2 red blinks followed by a 2-second pause	Defective or jammed pushbutton detected at initial power on
4B	No light displayed	When defective pushbutton condition occurs (2 red blinks, type 4A above), find out which pushbutton is defective by pressing all of them one at a time. If the pushbutton is in good working order when pressed, the Status LED is off. If the Status LED maintained 2 red blinks, then the pushbutton is defective.
5	4 red blinks followed by a 2-second pause	Transmitter is unable to lock onto the assigned channel
6	Constant green for up to 2 seconds	Transmitter power on with no faults detected
7	Blinking green	Transmission in progress
8	Blinking orange	Pressing any pushbutton prior to executing the START command at power on
9	3 slow red blinks → off	STOP button pressed down
10	4 orange blinks	Transmitter on standby
11	2 orange blinks followed by a 2-second pause	Receiver MAIN relays jammed or defective
12	3 orange blinks followed by a 2-second pause	Decoding processors defective
13	3 red blinks followed by a 2-second pause	Encoding processor defective
14	Constant orange when the power switch key is rotated and hold at the START position at initial system startup	Receiver MAIN relays activated

6.7.2 Receiver Status LED Indications

Type	Display Type (Green & Red)	Indication
1	Fast green blinks	Decoding in process
2	Slow green blinks	Decoding on standby
3	2 red blinks	Receiver MAIN relays jammed or defective
4	3 red blinks	Decoding processors defective
5	4 red blinks	Receiving RF board defective
6	Fast red blinks	Incorrect transmitter serial number
7	Constant red	Receiver low voltage
8	No light displayed	Decoding processors defective
9	3 slow red blinks followed by slow green blinks	STOP button pressed down

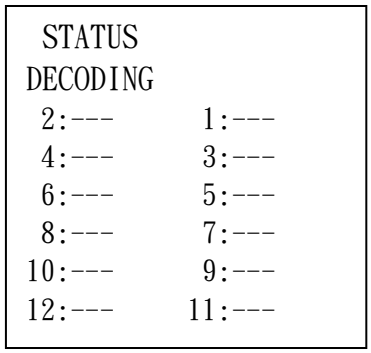
6.7.3 Receiver Power LED Indications

Type	Display Type (Red)	Indication
1	On	Power to receiver
2	Off	No power to receiver

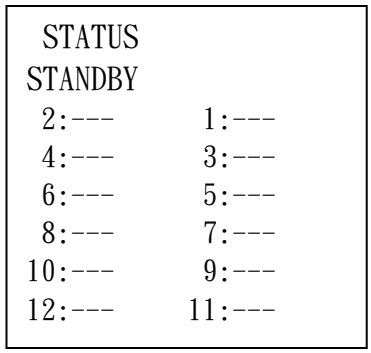
6.7.4 Receiver COM LED Indications

Type	Display Type (Red)	Indication
1	On	Power to relay Board
2	Off	No power to relay board

6.7.5 Receiver Status LCD Indications



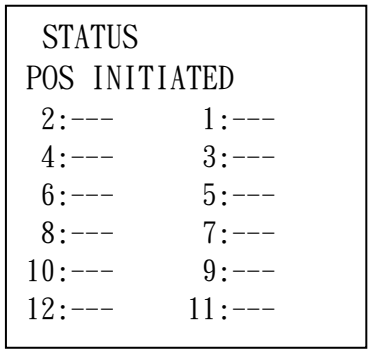
Decoding in progress



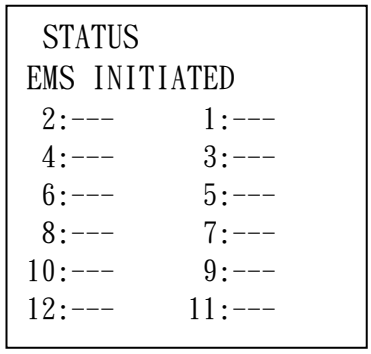
Decoding on standby

Transmitter timeout

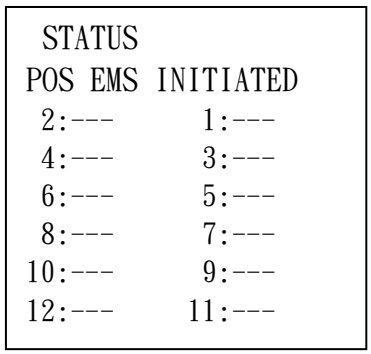
Stop button pressed down



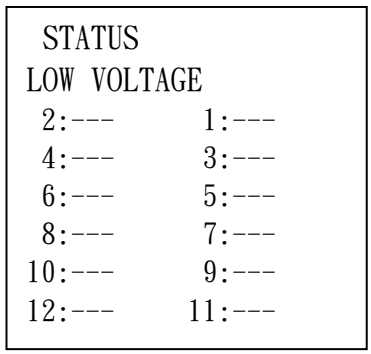
Transmitter power off



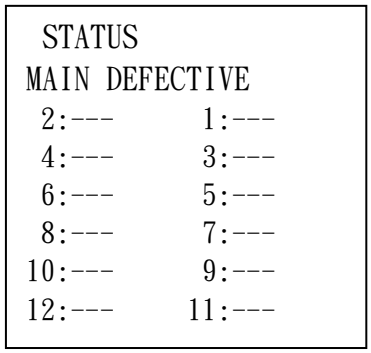
Stop button pressed down



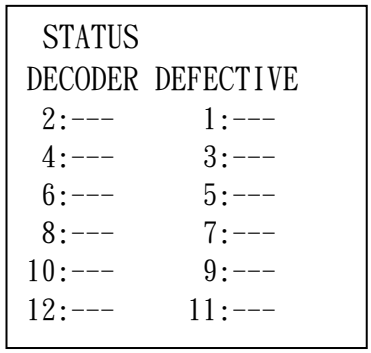
Transmitter power off + stop button pressed down



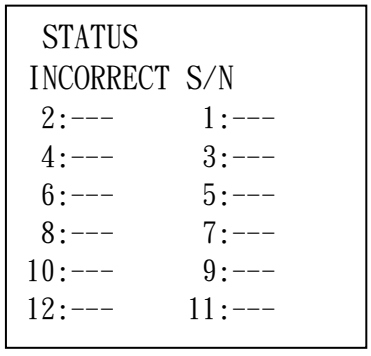
Receiver low voltage



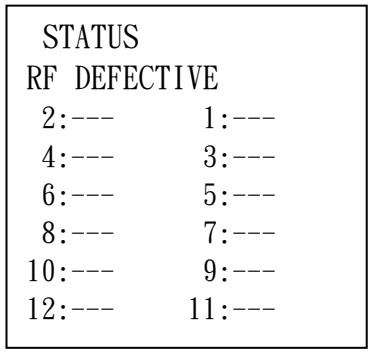
Main relay defective



Decoder board defective



Incorrect TX serial number



RF board defective

7. General Specifications

Frequency Range	:	433.050MHz ~ 439.600MHz 863.050MHz ~ 869.600MHz 921.000MHz ~ 927.550MHz
Number of Channels	:	62 channels
Channel Spacing	:	50 KHz
Modulation	:	Digital Frequency Modulation based on Manchester Code, 20bit address, 32bit CRC and Hamming Code.
Encoder & Decoder	:	Microprocessor-controlled
Transmitting Range	:	＞100 Meters (300 feet)
Hamming Distance	:	＞6
Frequency Control	:	Synthesized PLL
Receiver Type	:	Frequency Auto Scanning
Receiver Sensitivity	:	-116dBm
Spurious Emission	:	-50dB
Antenna Impedance	:	50 ohms
Responding Time	:	40mS (average)
Transmitting Power	:	2.0mW
Enclosure Type	:	NEMA4
Enclosure Rating	:	IP66
Output Contact Rating	:	12~24VDC @ 1 Amp
Transmitter Operating Voltage	:	3.0VDC
Receiver Power Consumption	:	2.4W (max)
Receiver Voltages	:	9~36VDC
Operating Temperature	:	-25°C ~ 75°C / -13°F ~ 167°F
Transmitter Dimension (8EPH)	:	198mm (L) x 70mm (W) x 44mm (H)
Transmitter Dimension (12EPH)	:	244mm (L) x 70mm (W) x 44mm (H)
Receiver Dimension (8EPH & 12EPH)	:	197mm (L) x 153mm (W) x 50mm (H)
Transmitter Weight (8EPH)	:	292g / 10.3oz (include batteries)
Transmitter Weight (12EPH)	:	341g / 12.0oz (include batteries)
Receiver Weight (8EPH & 12EPH)	:	1.36kg / 3.0lb (include output cable)

CE EU Declaration of Conformity CE
(RED, LVD & Machinery)

For the following equipment:

Product	:	Flex EPH Series Radio Remote Control System
Multiple Listee Model No.	:	Flex 8EPH and 12EPH
Manufacturer's Name	:	Advanced Radiotech Corporation
Manufacturer's Address	:	No.3, South 1st Road, Chien Chen District, Kaohsiung, Taiwan

We hereby declare, that all major safety requirements, concerning the CE Mark Machinery Directive 2006/42/EC, Low Voltage Directive 2014/35/EU (LVD) and Radio Equipment Directive of 2014/53/EU (RED) are fulfilled, as laid out in the guideline set down by the member states of the EEC Commission.

The standards relevant for the evaluation of the electrical safety requirements are as follow:

RED (EMC)	:	EN 301 489-17 V2.2.1 + EN 301 489-3 V1.6.1
RED (RF)	:	EN 300 220-1 V2.4.1 + EN 300 220-2 V2.4.1
LVD	:	EN 60950:2006+A1+A11+A12
MACHINERY	:	EN 60204-32:2008, EN ISO 13849-1:2015 (PLd) EN 13557:2003+A2:2008
OTHERS	:	EN 60529 (IP66), EN 62479, EN 55032 + EN 55024

Test reports issued by:

RED (EMC)	:	SGS
RED (RF)	:	SGS
LVD	:	SGS
MACHINERY	:	SGS
OTHERS	:	SGS

Person responsible for making this declaration:

Tom Jou / President

Name and signature of authorized person