FLEXMiniM

Instruction Manual

ARC
ADVANCED RADIOTECH CORPORATION

Service Information

Your New Radio System

Thank you for your purchase of ARC Flex Mini-M radio remote control system. Without a doubt, our Flex Mini-M 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:

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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.

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1. 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.

1.1 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.

1.2 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.

1.3 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.

1.4 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.

1.5 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.

1.6 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.

1.7 BATTERIES

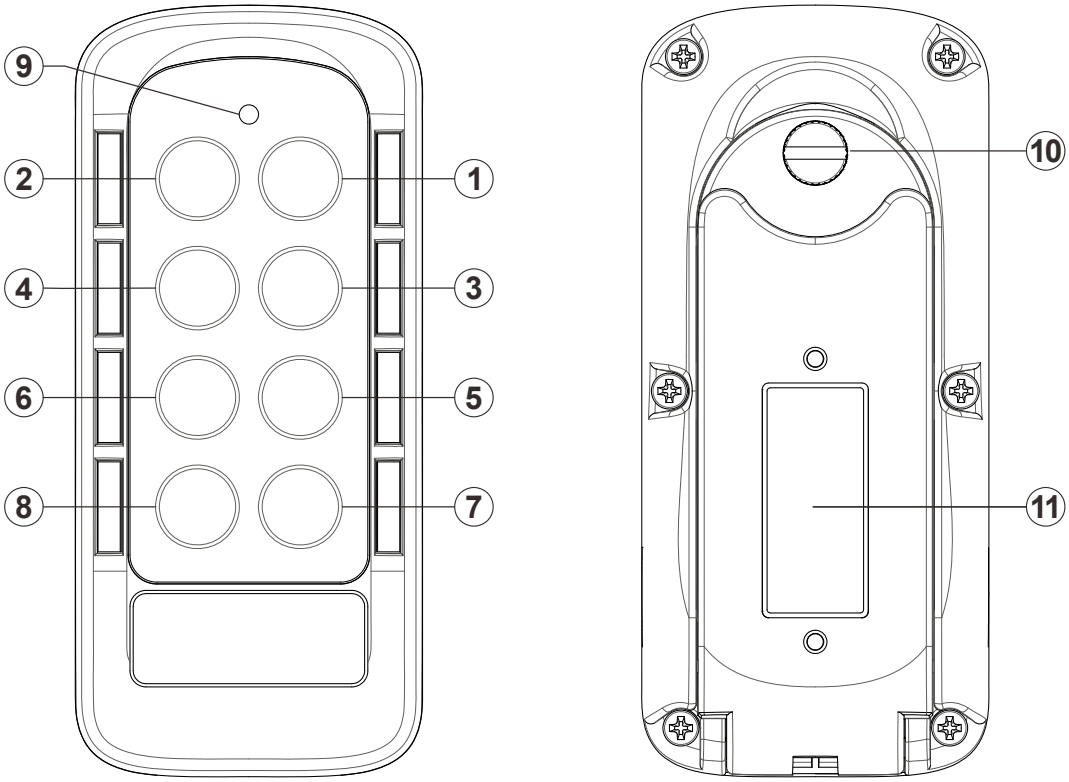
WARNING

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. General System Information

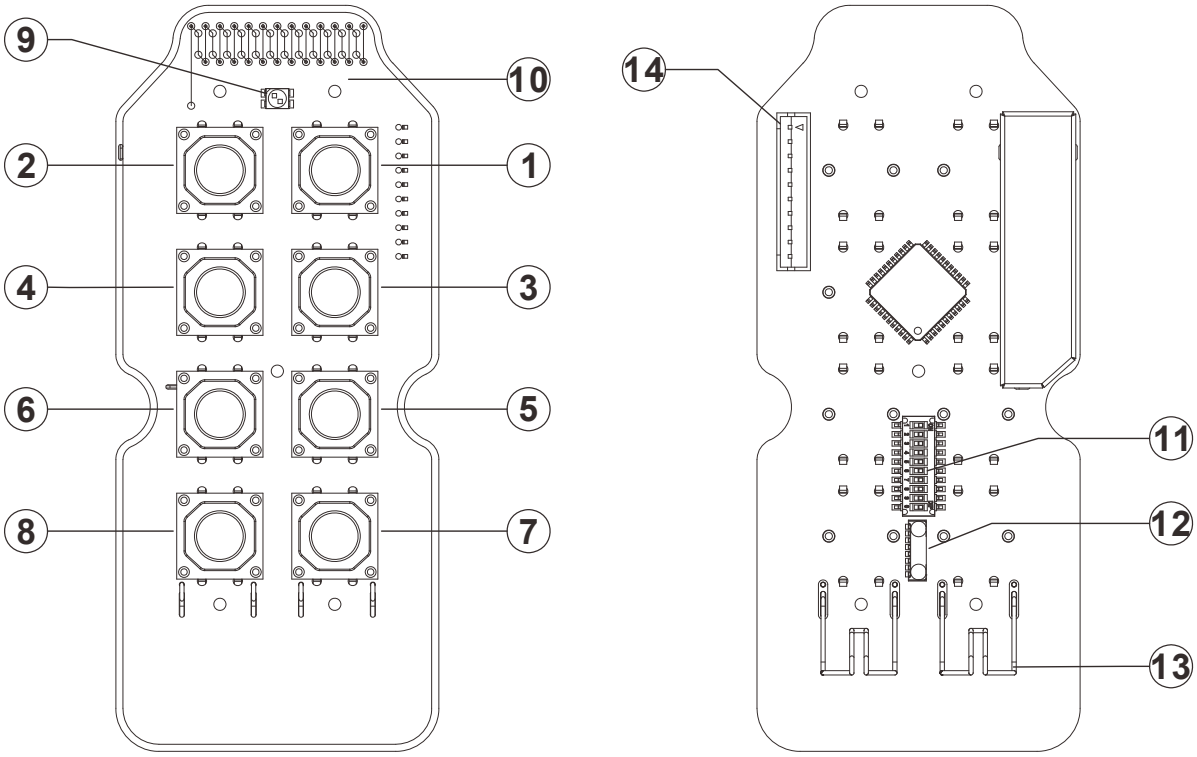
2.1 Transmitter

2.1.1 External Illustration



1. Pushbutton 1 (PB1)
2. Pushbutton 2 (PB2)
3. Pushbutton 3 (PB3)
4. Pushbutton 4 (PB4)
5. Pushbutton 5 (PB5)
6. Pushbutton 6 (PB6)
7. Pushbutton 7 (PB7)
8. Pushbutton 8 (PB8)
9. Status LED Indicator
10. Battery Cover Screw
11. System Information

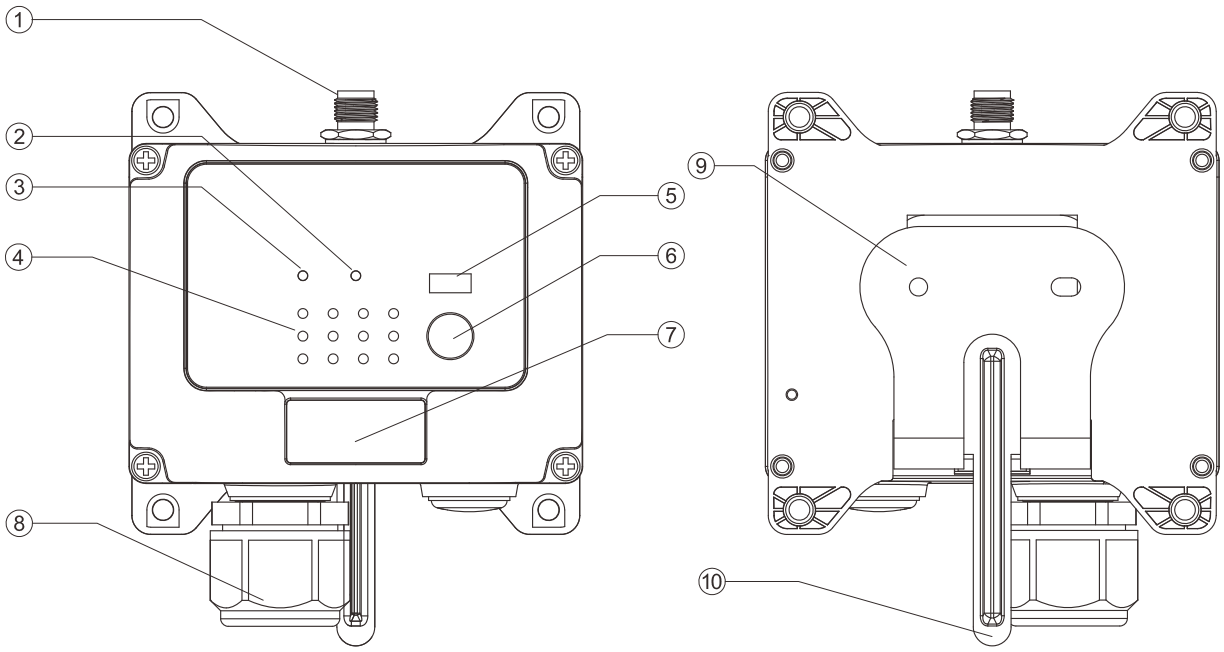
2.1.2 Internal Illustration



1. Pushbutton 1 (PB1)
2. Pushbutton 2 (PB2)
3. Pushbutton 3 (PB3)
4. Pushbutton 4 (PB4)
5. Pushbutton 5 (PB5)
6. Pushbutton 6 (PB6)
7. Pushbutton 7 (PB7)
8. Pushbutton 8 (PB8)
9. Status LED Indicator
10. RF/Encoder Board
11. Function Dipswitch
12. Infrared Sensors
13. Battery Contacts
14. Programming Port

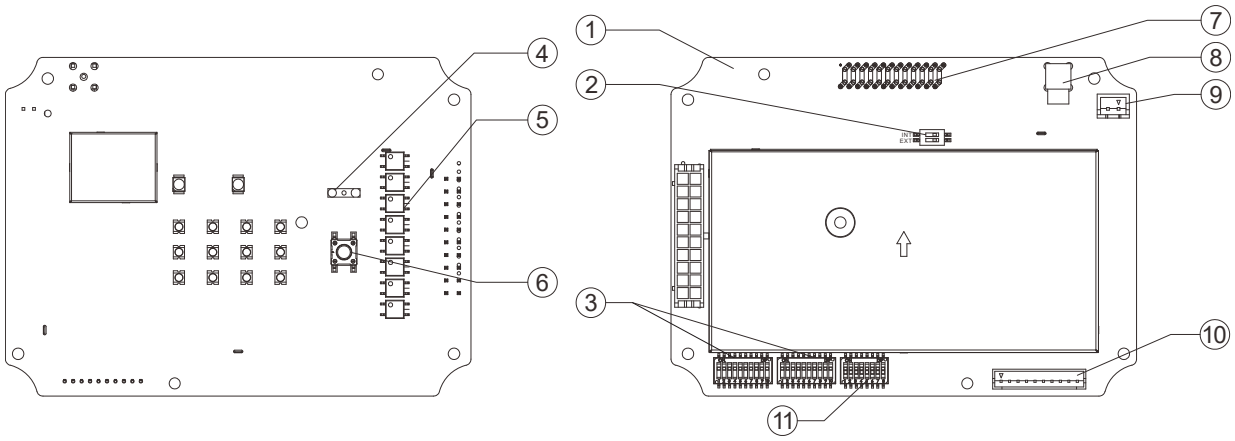
2.2 Receiver

2.2.1 External Illustration



1. External Antenna Port (optional)
2. Status LED Indicator
3. Power LED Indicator
4. Output LED Indicators
5. Infrared Sensors
6. Remote Pairing Button
7. System Information
8. Cord Grip
9. Mounting Bracket (optional)
10. Mounting Bracket Release

2.2.2 Internal Illustration



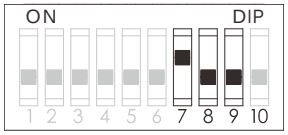
1. RF/Decoder Board
2. INT/EXT Antenna Dipswitch
3. Function Dipswitches
4. Infrared Sensors
5. 12~24VDC Photo FET Outputs
6. Remote Pairing Button
7. Internal Antenna
8. MCX External Antenna Connector
9. CN6 Function Output Connector
10. Programming Port
11. Channel Dipswitch

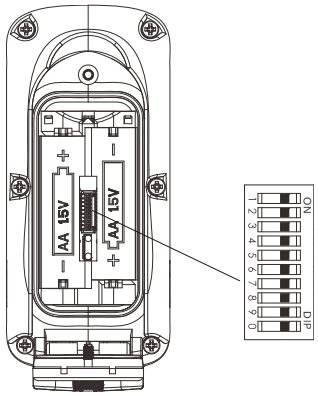
3. Function Settings

3.1 Transmitter

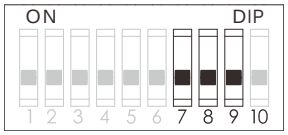
3.1.1 Transmitter Firmware Version

1. Set dipswitch position 7~9 to “100”.



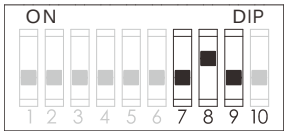


2. Reinsert batteries and press any pushbutton to display the transmitter firmware version with red, green and orange blinks.
3. Exit firmware version mode by reset dipswitch position 7~9 to “000”.

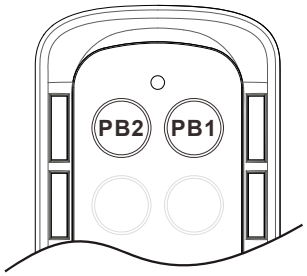


3.1.2 Transmitter Channel Settings

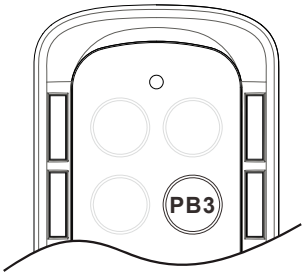
1. Set dipswitch position 7~9 to “010”.



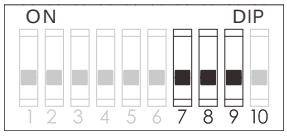
2. Reinsert batteries and press any pushbutton to proceed.
3. The Status LED displays current channel setting with red and green blinks. A green blink represents the tens (+10) and a red blink represents the units (+1). For example, 1 green blink followed by 5 red blinks is channel 15.
4. Change transmitter 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.



5. Transfer the newly selected channel to the receiver by press and hold PB3 pushbutton until the Status LED turns to constant green (transfer complete). 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.**



6. Exit transmitter channel settings by reset dipswitch position 7~9 to “000”.



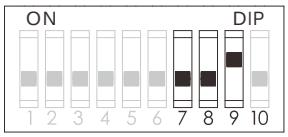
Note: When selecting a new channel, make sure each button press does not exceed 3 seconds.

Important Note:

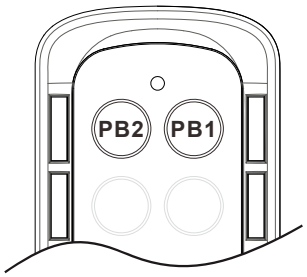
Step 5 illustrated above is strictly required if you are intending to change the entire system channel (both transmitter and receiver). The entire system no longer works if step 5 is skipped because the transmitter and receiver channels are now different (new vs. old). In this case you would have to redo step 1~3 and step 5 to transfer the newly selected transmitter channel to the receiver.

3.1.3 Transmitter Keypad Settings

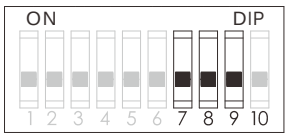
1. Set dipswitch position 7~9 to “001”.



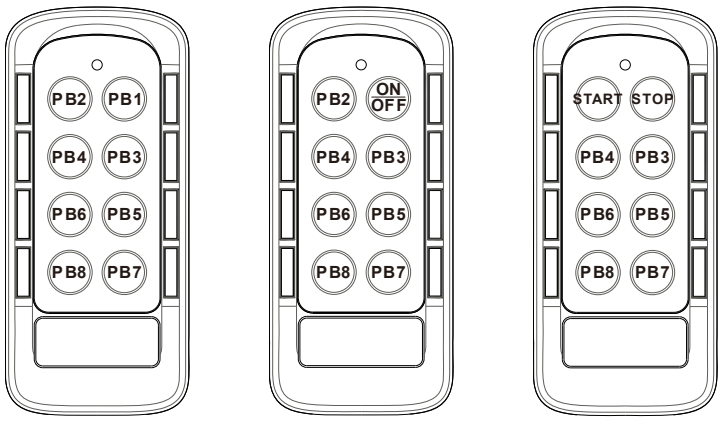
2. Reinsert batteries and press any pushbutton to proceed.
3. The Status LED displays current keypad type with red and green blinks. A green blink represents the tens (+10) and a red blink represents the units (+1).
4. Change keypad type by pressing PB1 to increment the units (+1) and PB2 to increment the tens (+10). For example, press PB1 two times is keypad type 2 (Status LED blinks 2 reds).



5. Exit transmitter keypad settings by reset dipswitch position 7~9 to “000”



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

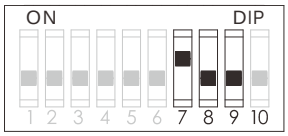


Type 1 **Type 2** **Type 3**

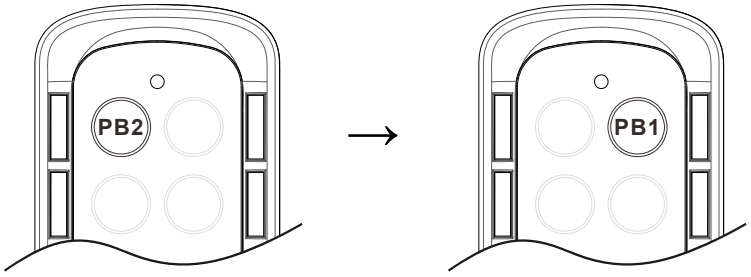
3.1.4 Remote Pairing

A. Transmitter-to-Transmitter Pairing:

1. Set dipswitch position 7~9 to “100”.



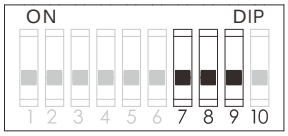
2. Reinsert batteries and press any pushbutton to proceed.
3. Status LED displays firmware version with red, green and orange blinks.
4. Output data (original transmitter) by press and hold PB2.
5. Receive data (new transmitter) by press and hold PB1 (Status LED blinks green).
6. When the Status LED (receiving data end) turns to constant green while both pushbuttons are still pressed down the pairing is completed.



Output data – original transmitter
(press and hold PB2)

Receive data – new transmitter
(press and hold PB1)

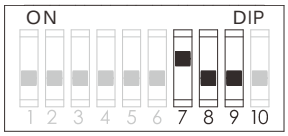
7. Exit transmitter-to-transmitter remote pairing mode by reset dipswitch position 7~9 to “000”.



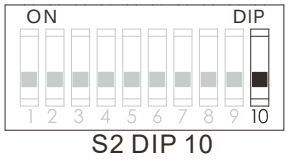
Note: During remote pairing make sure the distance between the two transmitters is within 1 meter.

B. Receiver-to-Transmitter Pairing (Manual Mode):

1. Set transmitter dipswitch position 7~9 on transmitter to “100”.

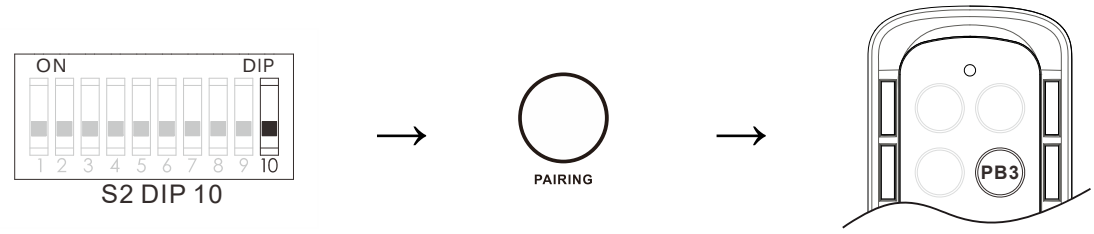


2. Reinsert batteries and press any pushbutton to proceed.
3. Status LED displays firmware version with red, green and orange blinks.
4. Set receiver S2 dipswitch position 10 to “0” for manual remote pairing mode.



S2 DIP 10

5. Output data (receiver) by press and hold the PAIRING button on receiver.
6. Receive data (transmitter) by press and hold PB3 (Status LED blinks green).
7. When the transmitter Status LED turns to constant green while both PB3 and the PAIRING button are still pressed down the pairing is completed.

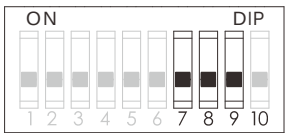


S2 dipswitch position 10 set to “0”

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

Receive data – transmitter
(press and hold PB3)

8. Exit receiver-to-transmitter manual remote pairing mode by reset transmitter dipswitch position 7~9 to “000”.

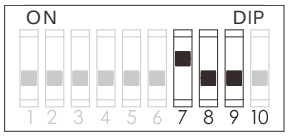


Important Note:

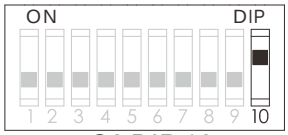
Make sure the pairing process is executed within distance of 10 meters from one another and no other active receivers nearby. During pairing process, the receiver MAIN outputs must be deactivated.

C. Receiver-to-Transmitter Pairing (Auto Mode):

1. Set transmitter dipswitch position 7~9 on transmitter to “100”.

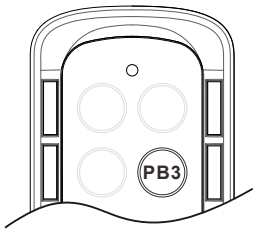


2. Reinsert batteries and press any pushbutton to proceed.
3. Status LED displays firmware version with red, green and orange blinks.
4. Set receiver S2 dipswitch position 10 to “1” for auto remote pairing mode.

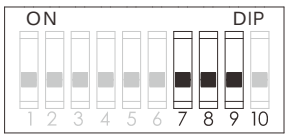


S2 DIP 10

5. Receive data (transmitter) by press and hold PB3 (Status LED blinks green).
6. When the transmitter Status LED turns to constant green while PB3 is still pressed down the pairing is completed.



7. Exit receiver-to-transmitter auto remote pairing mode by reset transmitter dipswitch position 7~9 to “000”.

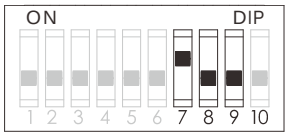


Important Note:

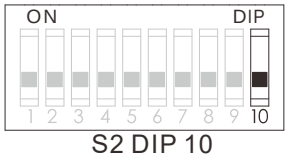
Make sure the pairing process is executed within distance of 10 meters from one another and no other active receivers nearby. During pairing process, the receiver MAIN outputs must be deactivated.

D. Transmitter-to-Receiver Pairing (Manual Mode):

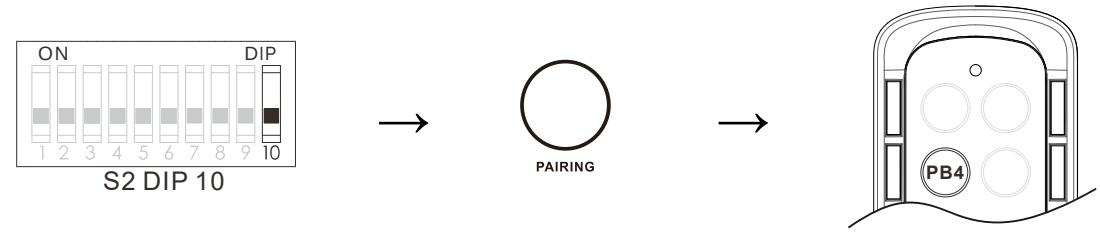
1. Set transmitter dipswitch position 7~9 on transmitter to “100”.



2. Reinsert batteries and press any pushbutton to proceed.
3. Status LED displays firmware version with red, green and orange blinks.
4. Set receiver S2 dipswitch position 10 to “0” for manual remote pairing mode.



5. Output data (transmitter) by press and hold PB4 (Status LED blinks green).
6. Receive data (receiver) by press and hold the PAIRING button on receiver.
7. When the transmitter Status LED turns to constant green while both PB4 and the PAIRING button are still pressed down the pairing is completed.

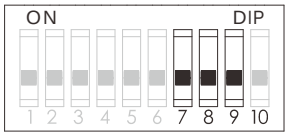


S2 dipswitch position 10 set to “0”

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

Output data – transmitter
(press and hold PB4)

8. Exit transmitter-to-receiver manual remote pairing mode by reset transmitter dipswitch position 7~9 to “000”.



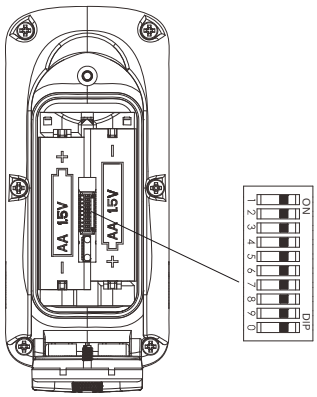
Important Note:

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 outputs must be deactivated.

3.1.5 Transmitter START & ON/OFF Function Settings

When transmitter goes into sleep mode the system is temporarily deactivated (MAIN outputs deactivated). Press the START, ON/OFF or ANY pushbuttons to wake up the system (MAIN outputs reactivated).

	Dipswitch Settings	Function
1	xxxxxxxxx**0**	START or ON/OFF Reactivation
2	xxxxxxxxx**1**	ANY Pushbutton Reactivation



* for keypad Type-2 and Type-3 with START and ON/OFF pushbutton.

* keypad Type-1 set to ANY pushbutton reactivation.

3.1.6 Transmitter Inactivity Timer Settings

Set how long the transmitter enters the sleep mode when not in use (pushbutton not pressed). When transmitter goes into sleep mode the receiver MAIN outputs 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)

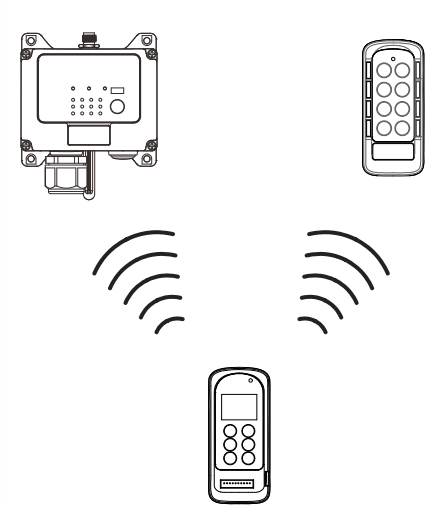
3.1.7 Transmitter Output Power Settings

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

3.1.8 Infrared Programming

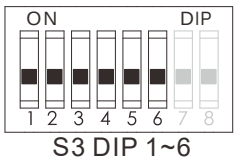
Other customized functions and settings not listed in this manual can be programmed via the infrared IR programmer unit, such as the system serial number, frequency range, new and updated functions and many others. Please contact ARC representative for more details.



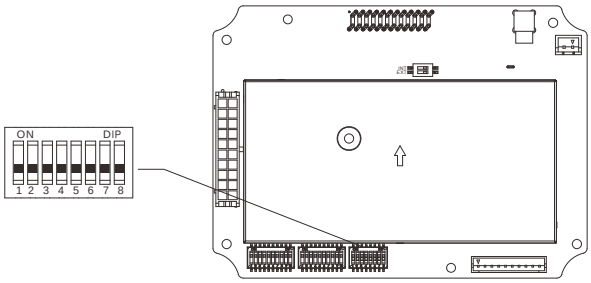
3.2 Receiver

3.2.1 Receiver Channel Settings

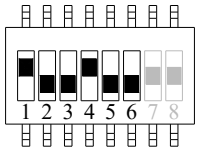
Set the receiver channel by configuring the S3 channel dipswitch located on the RF/decoder board, only the first 6 dipswitch positions are used for channel programming. The system channels table on section 3.2.7 illustrates which dipswitch setting corresponds to which channel. Once the receiver channel is altered do make sure to change the transmitter channel as well. The channel on both transmitter and receiver must be identical in order for the system to work (refer to section 3.1.2 Transmitter Channel Settings).



S3 DIP 1~6



Example:

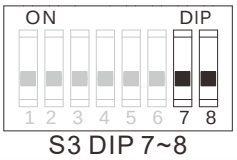


Top position → “1”

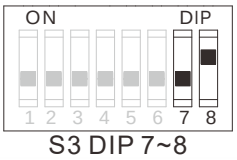
Bottom position → “0”

The above dipswitch setting **“1 0 0 1 0 0”** corresponds to “channel 36” in the system channels table on section 3.2.7.

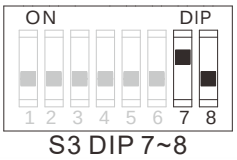
3.2.2 Receiver Channel Scanning Function

(1) 

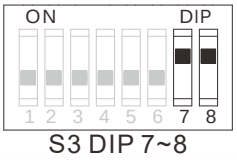
→ “00” manufacture preset (channel X)

(2) 

→ “01” scans 2 channels (channel X and channel X+1)

(3) 

→ “10” scans 3 channels (channel X… channel X+2)

(4) 

→ “11” scans 4 channels (channel X… channel X+3)

* Channel X → Channel set on the Channel dipswitch.

** Please contact ARC representative if your application requires scanning more than 4 channels.

Example: If the first 6 dipswitch positions are set to channel 01 (000001), when set to 2-channel scanning (type-2 above) the receiver will only scan channel 01 and 02.

3.2.3 Receiver Output Types

3.2.3.1 START + AUX Output

After executing the START function at transmitter startup the same START pushbutton becomes an auxiliary function with momentary contact connected through OUT-9 Function-1 output. There are other types of auxiliary functions made available for OUT-9 Function-1 output (refer to section 3.2.4.4). Please contact ARC representative if your application requires other types of auxiliary function connected to the Function outputs.

4.2.3.2 ON & OFF Pushbutton Outputs

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 activates when ON pushbutton is pressed (OFF output deactivates) and OFF output activates when OFF pushbutton is pressed (ON output deactivates). Refer to section 3.2.4.1 on how to set to this function.

4.2.3.3 Momentary Output

When pushbutton is released, the corresponding output is deactivated. This type of out usually applies to external applications such as horn or buzzer. Refer to section 3.2.4.1 and 3.2.4.2 on how to set to this function.

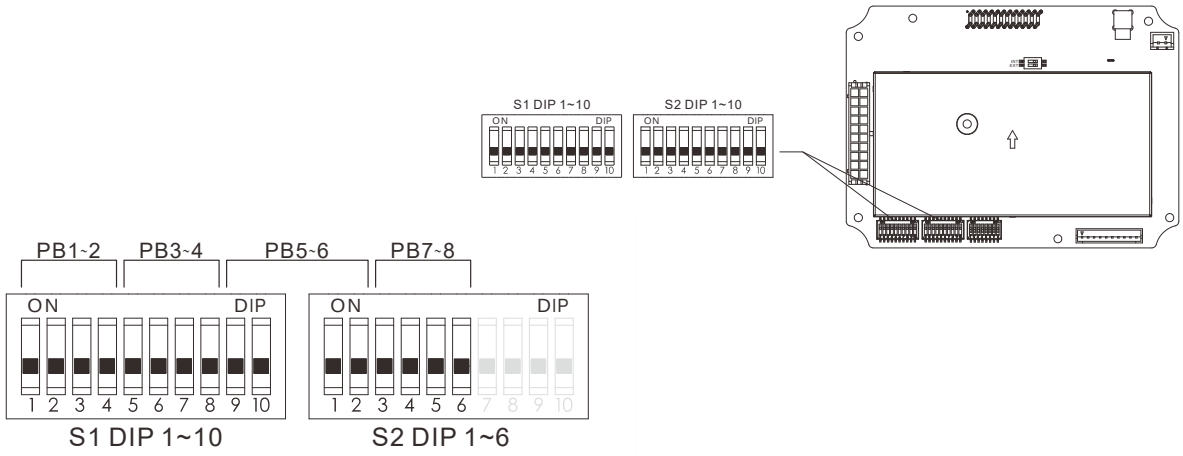
4.2.3.4 Toggled Output

When pushbutton is released, the corresponding output remain activated until next time the user presses the same pushbutton again. This type of output usually applies to external application such as lights. Refer to section 3.2.4.1 and 4.2.4.2 on how to set to this function.

3.2.4 Dipswitch Settings

3.2.4.1 Interlocked Pushbutton Pair

Interlocked means any pushbutton pair cannot be pressed simultaneously at the same time as it will cancel each other out. Four dipswitch positions correspond to a pushbutton pair.

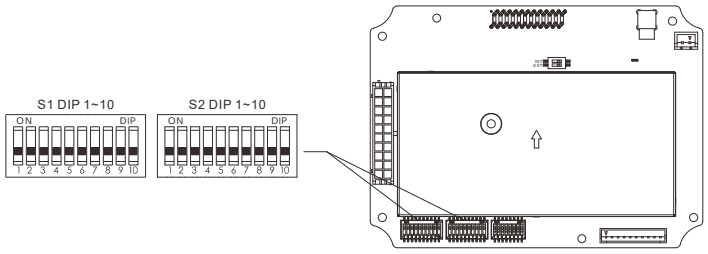


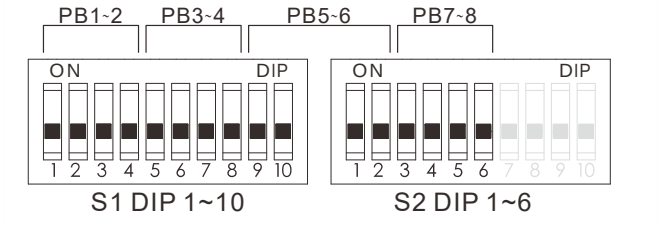
Dipswitch Settings	Function
0000	Normal / Normal
0001	On (right button) & Off (left button)
0010	Toggled / Toggled (EMS)
0011	Normal / Normal + OUT-10 output (0 second delay)
0100	Normal / Normal + OUT-10 output (0.5 second delay)
0101	Normal / Normal + OUT-10 output (1.0 second delay)
0110	Normal / Normal + OUT-10 output (1.5 seconds delay)
0111	Normal / Normal + OUT-10 output (2.0 seconds delay)

** EMS → Output deactivates when STOP or ON/OFF pushbutton is pressed (keypad Type 2 and 3) or when transmitter enters the sleep mode (keypad Type-1).*

3.2.4.2 None-Interlocked Pushbutton Pair

Non-interlocked setting allows the pushbutton pair be pressed simultaneously at the same time. Four dipswitch positions correspond to a pushbutton pair.



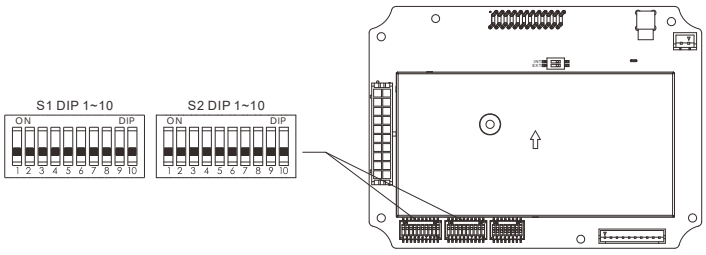


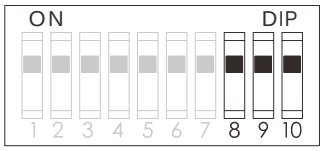
Dipswitch Settings	Left Pushbutton	Right Pushbutton
1000	Normal	Normal
1001	Toggle	Normal
1010	Normal	Toggle
1011	Toggle	Toggle
1100	Toggle (EMS)	Normal
1101	Normal	Toggle (EMS)
1110	Toggle (EMS)	Toggle (EMS)

** EMS → Output deactivates when STOP or ON/OFF pushbutton is pressed (keypad Type 2 and 3) or when transmitter enters the sleep mode (keypad Type-1).*

3.2.4.3 Other Dipswitch Settings

Settings include the firmware version indication, system testing and manual/auto remote pairing.





S2 DIP 8~10

S2 Dipswitch Position 8	Function
Dipswitch set to “0” or down	Normal
Dipswitch set to “1” or up	Display receiver firmware version
S2 Dipswitch Position 9	**Function**
Dipswitch set to “0” or down	Normal
Dipswitch set to “1” or up	System testing (receiver MAIN-B output disabled)
S2 Dipswitch Position 10	**Function**
Dipswitch set to “0” or down	Receiver-to-transmitter remote pairing (pressing the PAIRING button required)
Dipswitch set to “1” or up	Receiver-to-transmitter remote pairing (pressing the PAIRING button not required)

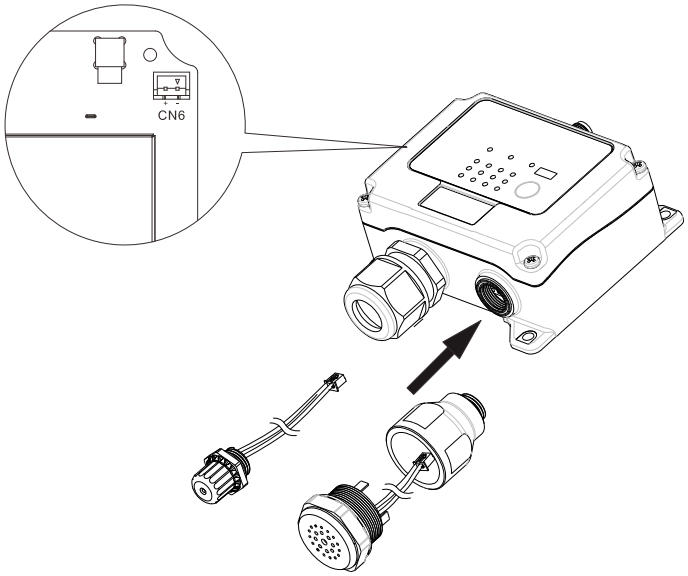
3.2.4.4 Function Output Settings

Listed below are various type of functions that can be outputted through the OUT-9, OUT-10 and CN6 outputs via the infrared IR programmer unit. Please contact ARC representative for more details

----	:	According to dipswitch setting.
LV	:	Function output activates receiver voltage is low.
ID	:	Function output works simultaneously with all motion commands.
NORMAL	:	START function + AUX with normal momentary output. Works the 2nd time the START pushbutton is pressed (keypad Type-3 only).
TOGGLE	:	START function + AUX with toggled/latching output (keypad Type-3 only).
TOG&E	:	START function + AUX with toggled/latching output affected by the STOP command (Function output deactivates when STOP button is pressed down) (keypad Type-3 only).
EXT	:	Function output works simultaneously with the receiver MAIN outputs.
HORN	:	Function output activates for up to 3 seconds when START command is initiated at transmitter power on and then becomes a normal momentary output thereafter (keypad Type-3 only).
RESET	:	Function output activates when START command is initiated and deactivates when let go. Works during initial transmitter startup and inactivity timer START reset (keypad Type-3 only).

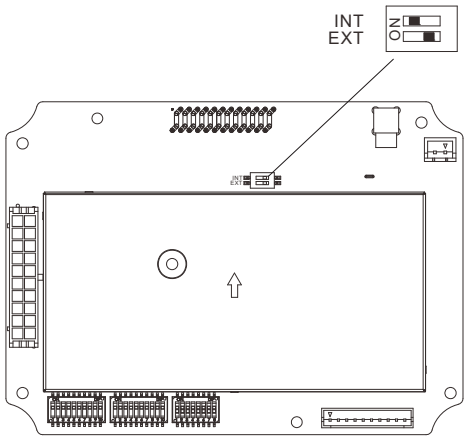
3.2.5 Indicator Light and Buzzer Installation

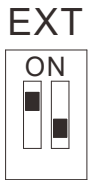
The indicator light or buzzer can be easily fitted onto the receiver enclosure. The indicator light or buzzer works simultaneously with the receiver MAIN outputs (refer to section 3.2.4.4 EXT setting). When receiver MAIN outputs are activated, the indicator light or buzzer is also activated. The indicator light or buzzer is connected to the CN6 port located inside the receiver. Please contact ARC representative if you would like this indicator light or buzzer work differently than described above.



3.2.6 External Antenna Connection

Make sure to set the jumper to “EXT” when external antenna is connected.





External antenna setting

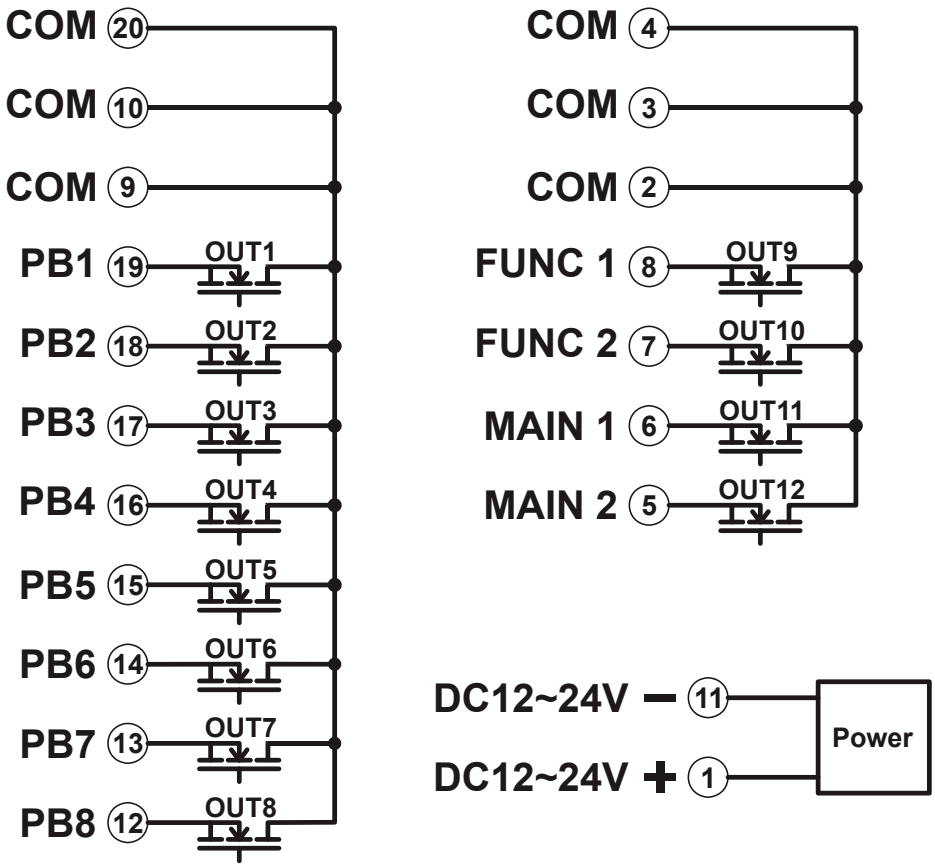
Internal antenna setting

3.2.7 System Channels Table

Channel	Dipswitch Setting	Channel	Dipswitch Setting
01	000001	**32**	100000
02	000010	**33**	100001
03	000011	**34**	100010
04	000100	**35**	100011
05	000101	**36**	100100
06	000110	**37**	100101
07	000111	**38**	100110
08	001000	**39**	100111
09	001001	**40**	101000
10	001010	**41**	101001
11	001011	**42**	101010
12	001100	**43**	101011
13	001101	**44**	101100
14	001110	**45**	101101
15	001111	**46**	101110
16	010000	**47**	101111
17	010001	**48**	110000
18	010010	**49**	110001
19	010011	**50**	110010
20	010100	**51**	110011
21	010101	**52**	110100
22	010110	**53**	110101
23	010111	**54**	110110
24	011000	**55**	110111
25	011001	**56**	111000
26	011010	**57**	111001
27	011011	**58**	111010
28	011100	**59**	111011
29	011101	**60**	111100
30	011110	**61**	111101
31	011111	**62**	111110

4. Receiver Installation

4.1 Output Diagram



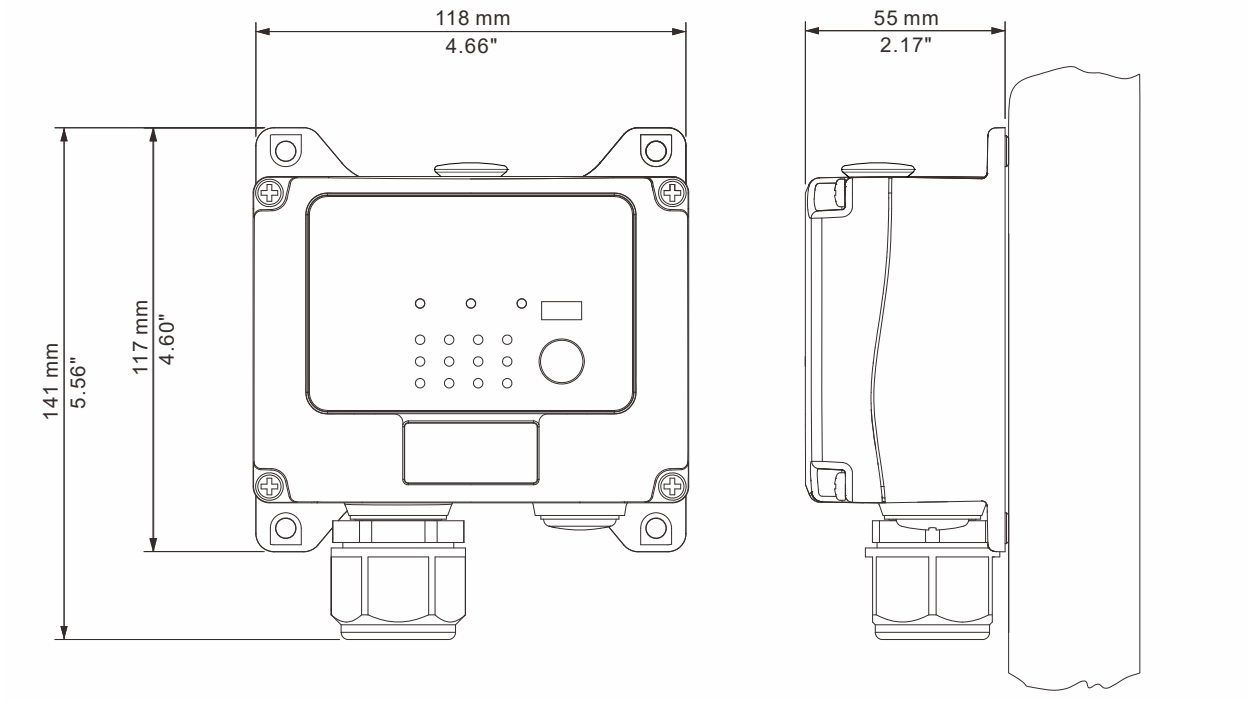
Important Note:

Total current for any single output is limited to 3 Amps. Make sure you connect all 3 COM wires (wire #9, #10 and #20) if your application requires pressing more than one pushbutton at the same time.

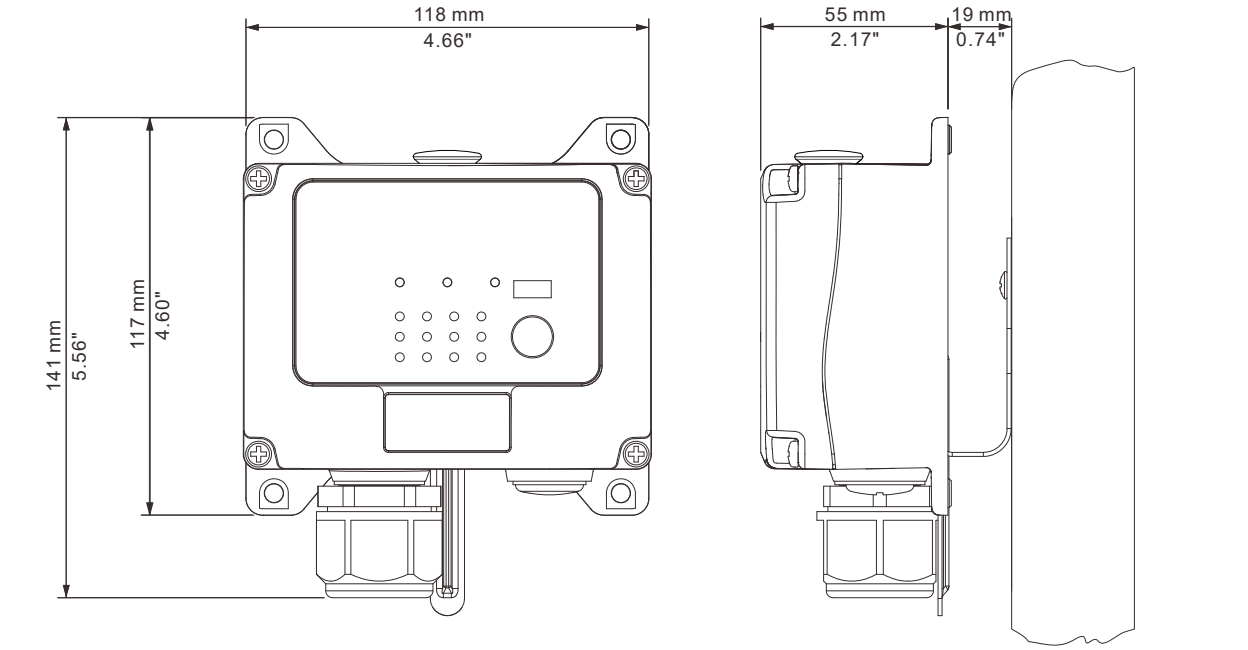
4.2 Pre-installation Precautions

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 crane or 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 crane or equipment prior to installation.

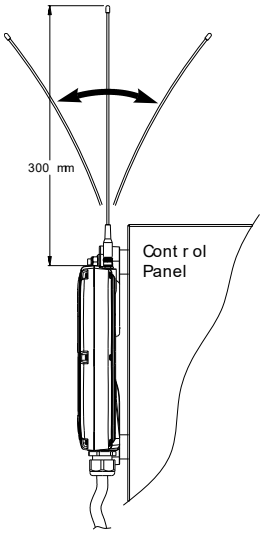
4.3 Step-By-Step Installation



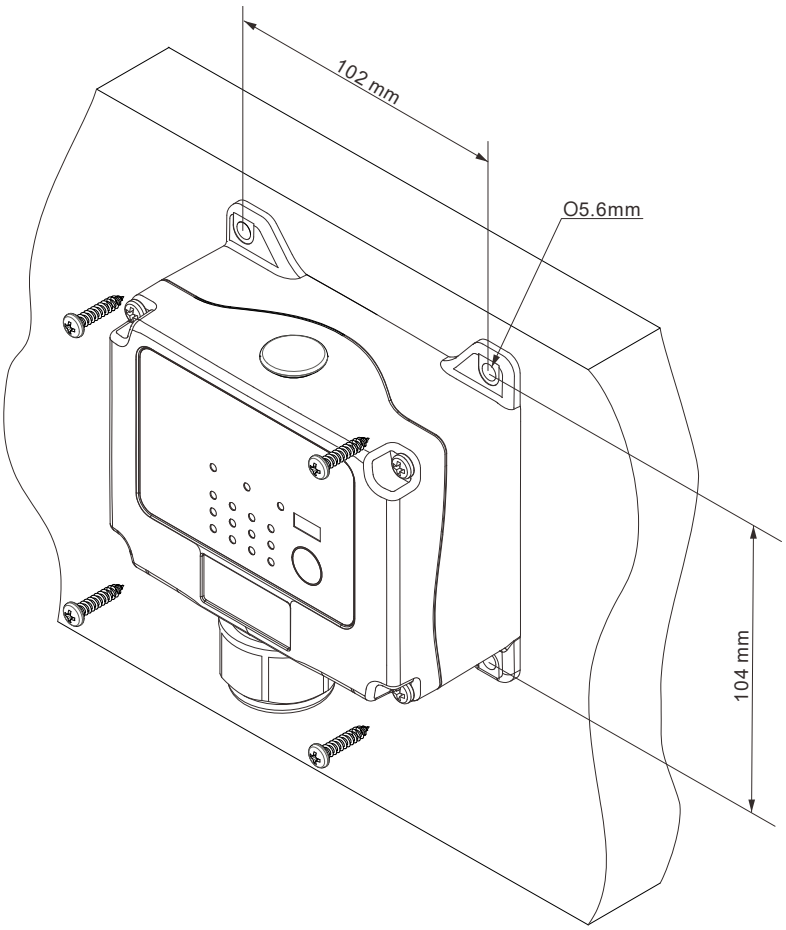
With Optional Removable Mounting Bracket



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 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 RF/decoder board inside the receiver is connected and dipswitch set to EXT position.

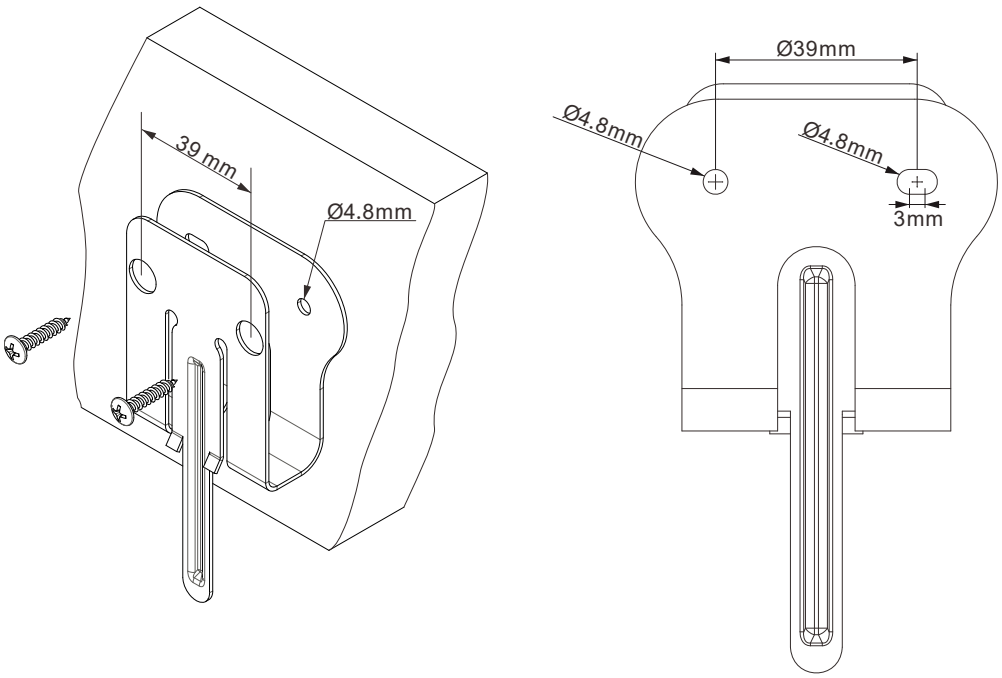


5. For better reception, make sure the receiver is in an upright position.
6. Drill four holes on the control panel, wall or location where the receiver is to be installed.
7. Make sure the screws are tightened after installation (not provided with the system).



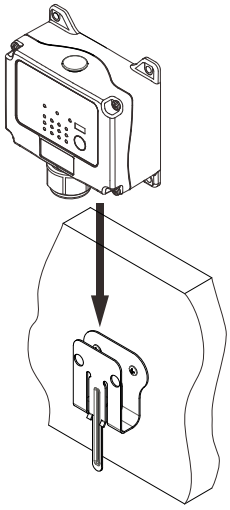
With Optional Removable Mounting Bracket

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

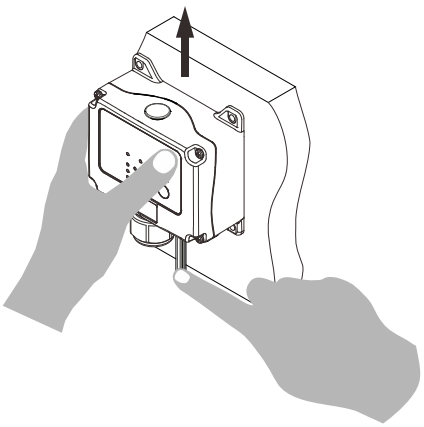


2. Slide down the receiver along the guided track to secure the receiver to the mounting bracket.
3. Remove the receiver by pressing down the bracket release and pull the receiver upward until it clears the guided track.

Install



Remove

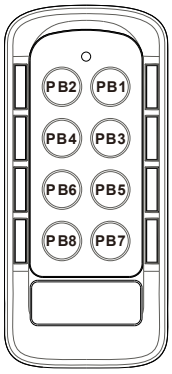


5. Operating Procedure

General Operating Procedure

Keypad Type-1:

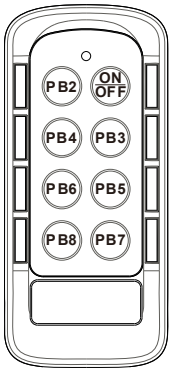
The transmitter is powered on and operated by pressing any pushbutton on the keypad for up to 1 second (green on Status LED); the receiver MAIN outputs are also activated (orange on Status LED). The Status LED blinks green when pushbuttons are pressed thereafter. The transmitter goes into sleep mode with receiver MAIN outputs deactivated after 5 minutes of inactivity (refer to section 3.1.6 Transmitter Inactivity Timer Settings). Press any pushbutton for up to 1 second to wake up the transmitter (green on Status LED) and reactivate the receiver MAIN outputs (orange on Status LED).



Type 1

Keypad Type-2:

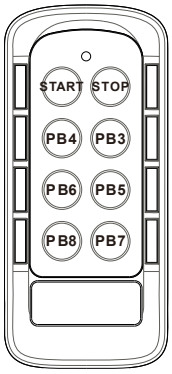
The transmitter is powered on by pressing the ON/OFF pushbutton for up to 1 second (green on Status LED); the receiver MAIN outputs are also activated (orange on Status LED). The Status LED blinks green when pushbuttons are pressed thereafter. The transmitter goes into sleep mode with receiver MAIN outputs deactivated after 5 minutes of inactivity (refer to section 3.1.6 Transmitter Inactivity Timer Settings). Press the ON/OFF pushbutton (orange on Status LED) or any pushbuttons (green on Status LED) to wake up the transmitter and reactivate the receiver MAIN outputs (refer to section 3.1.5 Transmitter START & ON/OFF Function Settings). Turn off the transmitter power by pressing the ON/OFF pushbutton for up to 1 second (red on Status LED and then off); the receiver MAIN outputs are also deactivated. The system will not work when pressing any pushbuttons prior to executing the ON/OFF command (Status LED blinks 2 red).



Type 2

Keypad Type-3:

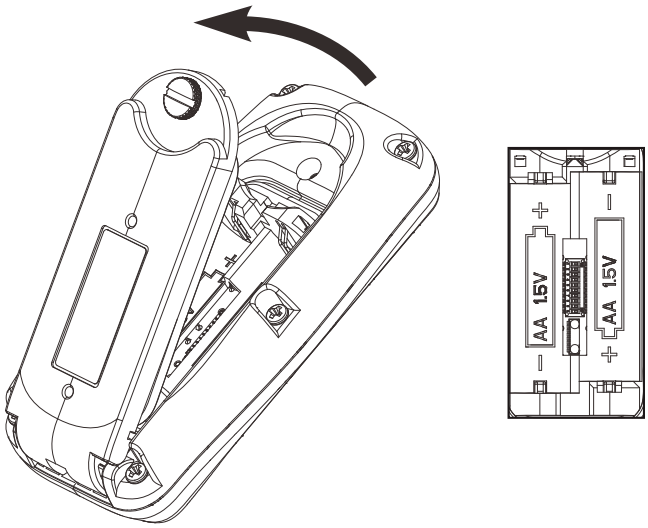
The transmitter is powered on by pressing the START pushbutton for up to 1 second (green on Status LED); the receiver MAIN outputs are also activated (orange on Status LED). The same START pushbutton becomes an auxiliary function thereafter (refer to section 3.2.3.1 and 3.2.4.4 START + AUX Normal Function). The Status LED blinks green when pushbuttons are pressed thereafter. The transmitter goes into sleep mode with receiver MAIN outputs deactivated after 5 minutes of inactivity (refer to section 3.1.6 Transmitter Inactivity Timer Settings). Press the START pushbutton (orange on Status LED) or any pushbuttons (green on Status LED) to wake up the transmitter and reactivate the receiver MAIN outputs (refer to section 3.1.5 Transmitter START & ON/OFF Function Settings). Turn off the transmitter power by pressing the STOP pushbutton for up to 1 second (red on Status LED and then off); the receiver MAIN outputs are also deactivated. The system will not work when pressing any pushbuttons prior to executing the START command (Status LED blinks 2 red).



Type 3

Changing Transmitter Batteries

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



6. Status & Warnings

6.1 Transmitter Status Indications

Type	Display Type	Indication
1	Constant red	Voltage below 1.9V at initial power on
2	2 red blinks	Voltage below 1.75V during operation (receiver MAIN outputs deactivated)
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	Press pushbutton prior to transmitter power on (keypad type-2 and type-3)
4B	2 red blinks followed by a 2-second pause	Defective pushbutton detected at initial power on (keypad type-2 and type-3)
5	No light displayed	When defective pushbutton condition occurs (type 4B 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 maintain 2 red blinks, then the pushbutton is defective.
6	4 red blinks followed by a 2-second pause	Transmitter is unable to lock onto the assigned channel
7	Constant green for up to 2 seconds	Transmitter power on with no faults detected
8	Slow green blinks	Transmission in progress
9	2 orange blinks followed by a 2-second pause	Receiver MAIN outputs defective
10	3 orange blinks followed by a 2-second pause	Decoding processors defective
11	Constant orange when any pushbutton (keypad type-1), On/Off pushbutton (keypad type-2), and START pushbutton (keypad type-3) is pressed at initial system startup.	Receiver MAIN outputs activated

6.2 Receiver Status 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 outputs defective
4	3 red blinks	Decoding processors defective
5	4 red blinks	RF decoder board defective
6	Fast red blinks	Incorrect transmitter serial number
7	Constant red	Receiver low voltage
8	No light displayed	Decoding processors defective
9	slow red blinks followed by slow green blinks	STOP or ON/OFF pushbutton pressed down (keypad Type-2 and Type-3)

6.3 Receiver Power Indications

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

7. System Specifications

Frequency Range	:	433.050MHz ~ 434.575MHz
Number of Channels	:	62 channels
Channel Spacing	:	25 KHz
Modulation	:	Digital Frequency Modulation based on Manchester Code, 20bit address, 32bit CRC and Hamming Code.
Encoding & Decoding	:	Microprocessor-controlled
Operating Range	:	＞100 Meters (300 feet)
Frequency Control	:	Synthesized PLL
Receiver Sensitivity	:	-118dBm
Antenna Impedance	:	50ohms
Responding Time	:	40mS (average)
Transmitting Power	:	2mW
Enclosure Type	:	NEMA4
Enclosure Rating	:	IP66
Output Contact Rating	:	12~24VDC @ 3A
Transmitter Operating Voltage	:	3.0VDC
Transmitter Power Consumption	:	20mA (average)
Receiver Power Consumption	:	20mA (max)
Receiver Voltages	:	9~36VDC
Operating Temperature	:	-25°C ~ 75°C / -13°F ~ 167°F
Transmitter Dimension	:	120mm (L) x 54mm (W) x 28mm (H)
Receiver Dimension	:	120mm (L) x 90mm (W) x 55mm (H)
Transmitter Weight	:	160g / 5.6oz (include batteries)
Receiver Weight	:	543g / 1.2lb (include output cable)

CE EU Declaration of Conformity CE

(RED, LVD & Machinery)

For the following equipment:

Product	:	Flex Mini Series Radio Remote Control System
Multiple Listee Model No.	:	Flex Mini
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 301 489-1 V2.2.0 + EN 301 489-3 V2.1.1
RED (RF)	:	EN 300 220-1 V3.1.1 + EN 300 220-2 V3.1.1
LVD	:	EN 60950-1+A1+A11+A12
OTHERS	:	EN 60529 (IP66)

Test reports issued by:

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

Person responsible for making this declaration:

Tom Jou / President

Name and signature of authorized person