

Industrial radio remote control system

***FLEX12HRX***

***FLEX8HRX***

**Instruction Manual**

# Service Information

## Your New Radio Remote Control System

Thank you for your purchase of ARC Flex 12HRX/8HRX radio remote control system. Without a doubt, our Flex 12HRX/8HRX 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](http://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 of the device.

**(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.
- For product available in the USA/Canada market, only channel 1~141 can be operated. Selection of other channels is not possible

### **Industry Canada ICES-003 Compliance Label:**

CAN ICES-3 (B)/NMB-3(B)

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# 1. Introduction

The **Flex** HRX radio remote control systems are designed for control of industrial equipment and machinery such as overhead traveling cranes, jib cranes, gantry cranes, tower cranes, electric hoists, winches, monorails, conveyor belts, mining equipment, and all other material handling equipment where wireless control is preferred.

Each **Flex** 12HRX/8HRX system consists of a transmitter handset and a receiver unit. Other standard-equipped accessories include transmitter waist belt, vinyl pouch, pushbutton labels, LED 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 input 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 pushbuttons have gold plated contacts and are rated for more than two million press cycles. The defined snap-action steps provide positive tactile feedback even wearing gloves.
- \* **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 and European Safety Standards.
- \* **Other Optional Accessories and Features** – transmitter magnet mount, transmitter belt clip, transmitter lanyard, transmitter rubber guard, miniature indicator light and buzzer, TAC, contact and contactless (inductive) charging stations, Ni-MH rechargeable batteries, tandem function, random access function, 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 MAGNETEK 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



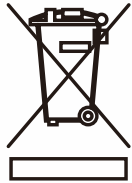
## WARNING

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.

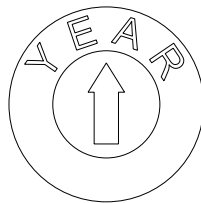
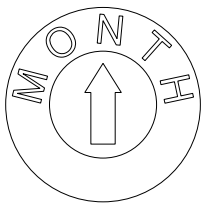
## 2.8. Used symbol description



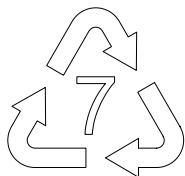
danger electric shock risk



Equipment Recycling: The production and operation of this equipment requires the recycling and utilization of natural resources. If the product is not processed properly when it is scrapped, this device may contain 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.



Mold factory month / year



Other plastics, such as acrylic, nylon, polycarbonate, and polylactic acid (a bioplastic also known as PLA), and multilayer combinations of different plastics

## 2.9. Method cleaning products

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

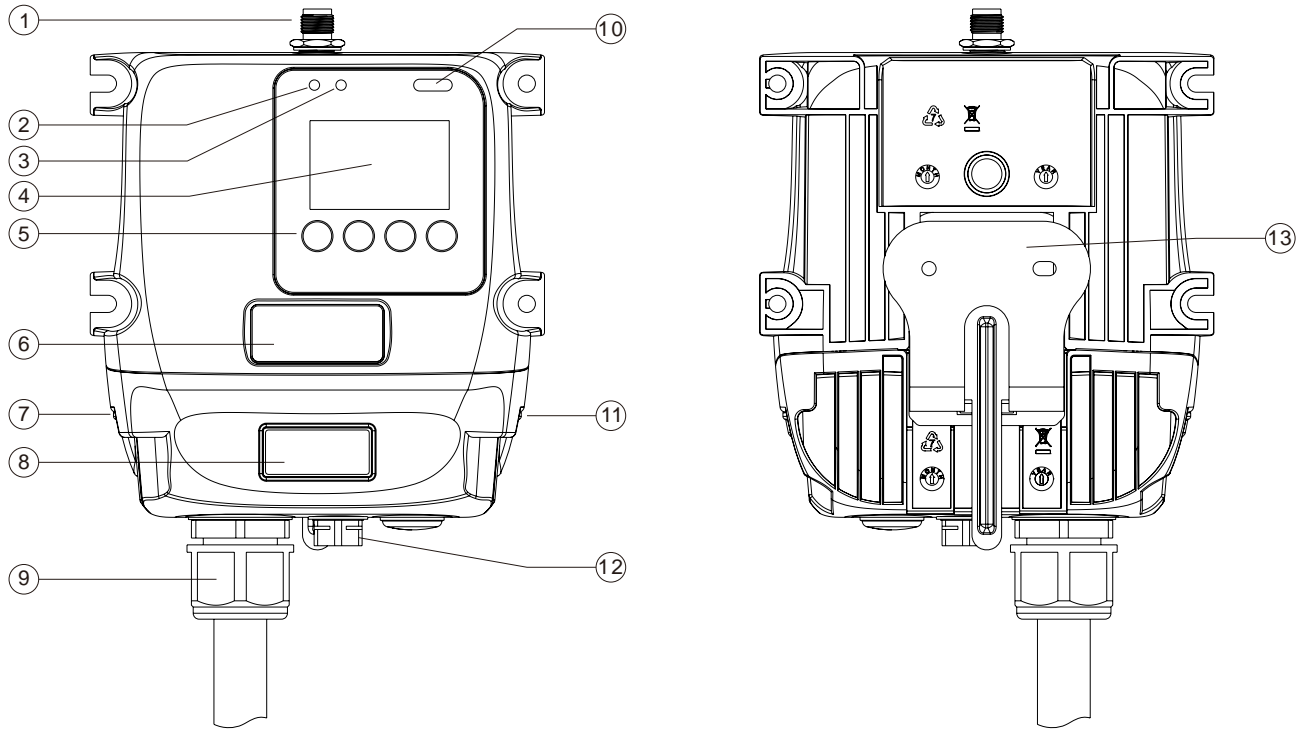
## 2.10. Product Maintenance

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

# 3. General System Information

## 3.1. Receiver

### 3.1.1. External Illustration



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

# 4. Function Settings

## 4.1. Receiver

### 4.1.1. Output Configurations

#### 4.1.1.1. Output Types

1. **1 output per motion**  
Current Compensated Outputs, PWM Output, and Digital IO.

#### 4.1.1.2. START + AUX Function

After executing the START command at transmitter startup the same START position becomes an auxiliary function with momentary contact connected through OUT5 Function output. There are other types of auxiliary functions made available for OUT5, OUT6, CN8 Function output (refer to section 4.2.7). Please contact ARC representative if your application requires other types of auxiliary function connected to these Function output.

#### 4.1.1.3. 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 closes when ON pushbutton is pressed (OFF output opens) and OFF output closes when OFF pushbutton is pressed (ON output opens). Refer to section 4.2.3.1 on how to set to this function.

#### 4.1.1.4. 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 4.2.3.1 on how to set to this function.

#### 4.1.1.5. External Warning Function

The user can install an external warning device (rotating lights, horn, etc...) to the K26 Function output located inside the receiver. The user can choose which pushbutton pair (or pairs) triggers the external warning device when pressed. Refer to section 4.2.3.1 on how to set to this function.

#### 4.1.1.6. Momentary Contact

When pushbutton is released the corresponding output will open or deactivate. This type of action usually applies to external applications such as horn and buzzer. Refer to section 4.2.3.2 on how to set to this function.

#### 4.1.1.7. Toggled Contact

When pushbutton is released the corresponding output will maintain contact or closure until next time the user presses the same pushbutton again. This type of action usually applies to external application such as lights. Refer to section 4.2.3.2 on how to set to this function.

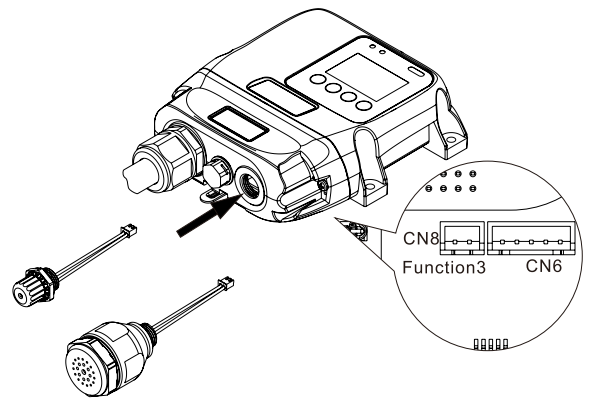
#### 4.1.2. Voltage Settings

Prior to installation always check the voltage setting is correct for your application.

12-24VDC

#### 4.1.3. 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 output (manufacture preset). When receiver MAIN output 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 Function3 output CN8 port located on the IO board inside the receiver. Please contact ARC representative if you would like the indicator light or the buzzer work differently than described above.



#### 4.1.4. Other Function Output Settings

Listed below are other types of functions that can be outputted through the three Function output (OUT5, OUT6, CN8) via the infrared IR programmer unit. Please contact ARC representative for more details.

**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. The 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 output.

**TDM A+B** → Function output closes when selector switch is rotated to the A+B position and opens when rotate to A or B positions (tandem monitoring output).

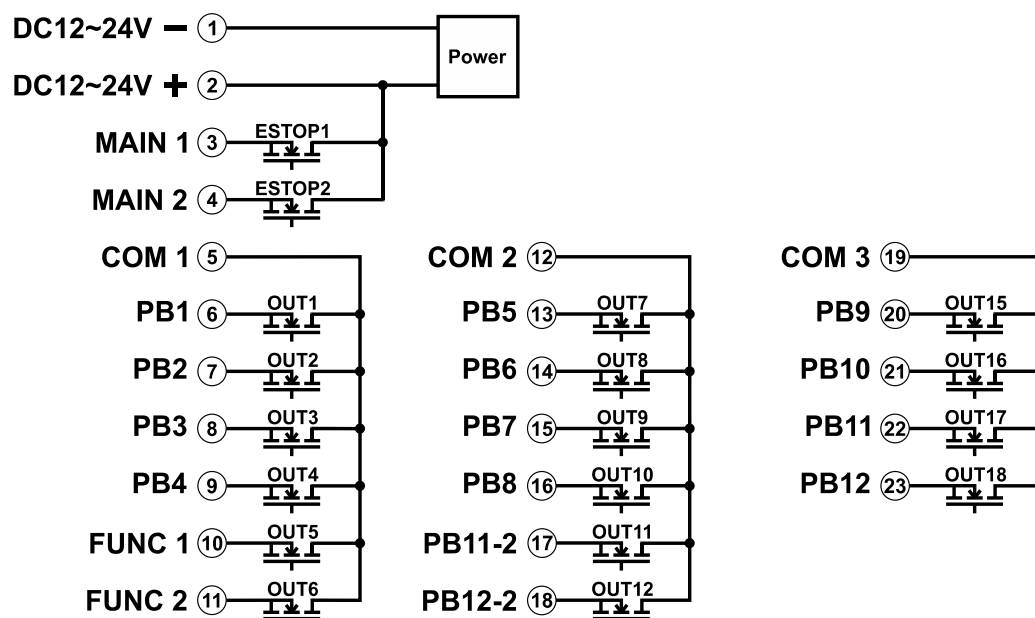
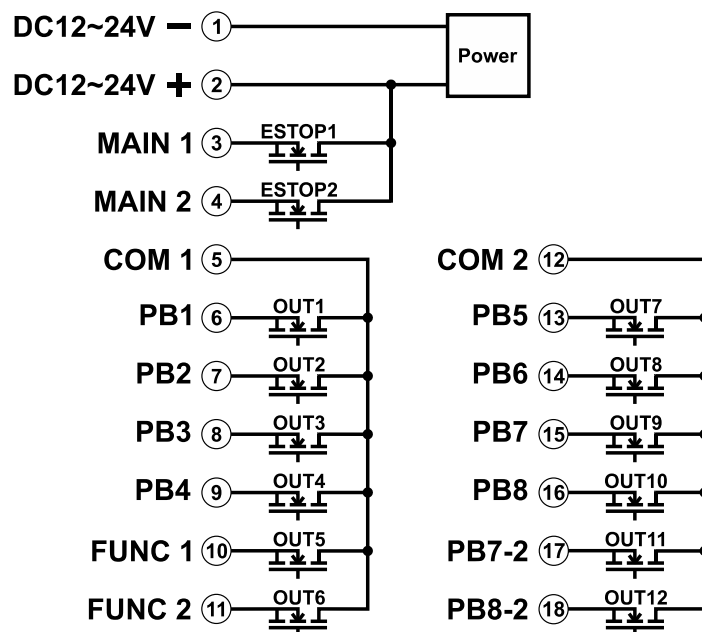
**HORN** → Function output closes for up to 3 seconds when START command is executed at transmitter power on and then becomes a normal momentary output thereafter.

**G SENSOR** → Function output closes when Zero-G sensor is triggered (receiver MAIN output deactivated) and opens when receiver MAIN output are reactivated.

# 5. Receiver Installation

## 5.1. Output IO Contact Diagrams

### Flex 12HRX/8HRX

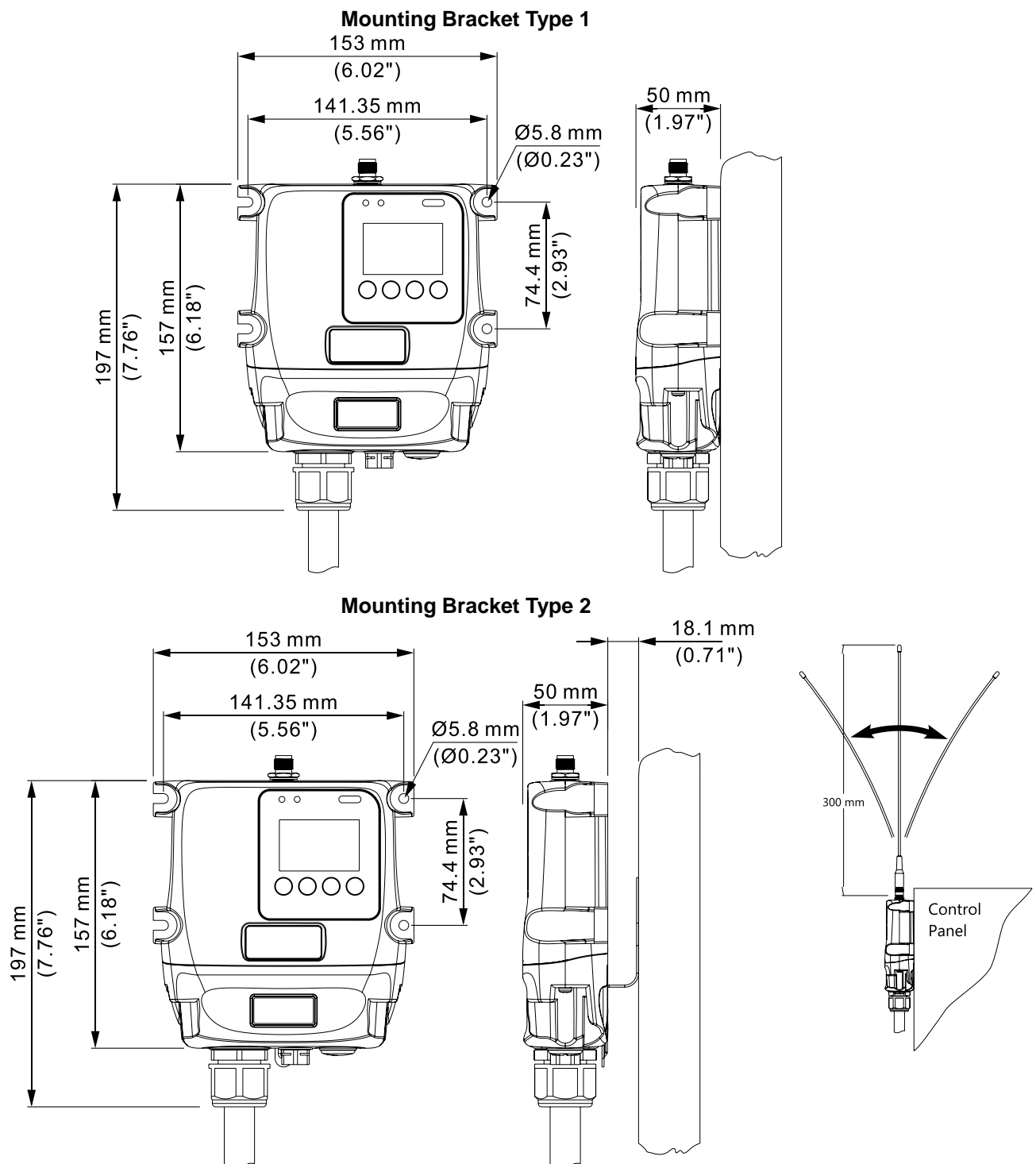


\* If PB12 is set to A/B pushbutton select or A/B rotary switch select function (AB models), connect output A to OUT18 and output B to OUT12.

## 5.2. Pre-installation Precautions

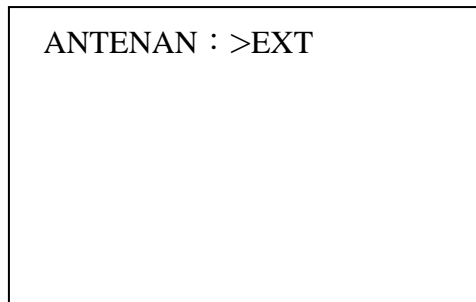
1. Make sure the transmitter and receiver are with identical serial number and channel.
2. Make sure the receiver is not set to the same channel as any other systems in use in the surrounding area.
3. Make sure the crane or equipment is working properly prior to installation.
4. Make sure the power source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

## 5.3. Step-By-Step Installation



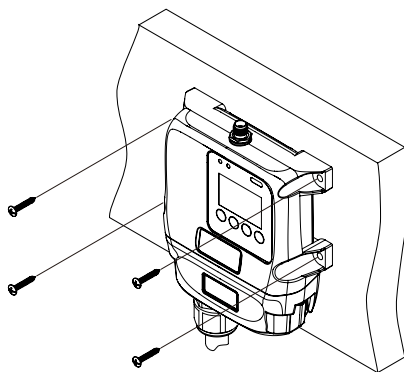


1. For best reception the location of the receiver should be visible to the operator at all time.
2. The location selected should not be exposed to high levels of electric noise. Mounting the receiver next to an unshielded variable frequency drive may cause radio interference. Always locate the receiver 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 receiver's internal settings are adjusted to EXT.

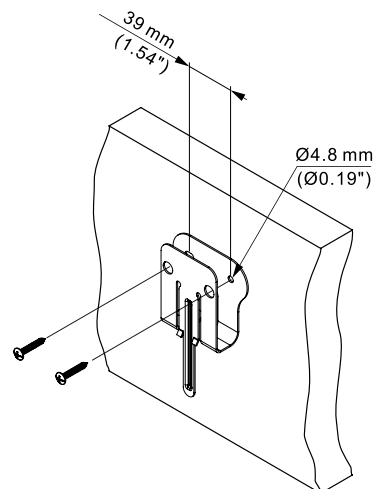


5. For better reception, make sure the receiver is in an upright position.
6. Drill four holes for mounting bracket type 1 and two holes for mounting bracket type 2 on the control panel, wall or location where the receiver is to be installed.
7. Make sure the screws, bolts or shock absorbers are tightened after installation (not provided with the system).

**Mounting Bracket Type 1**



**Mounting Bracket Type 2**

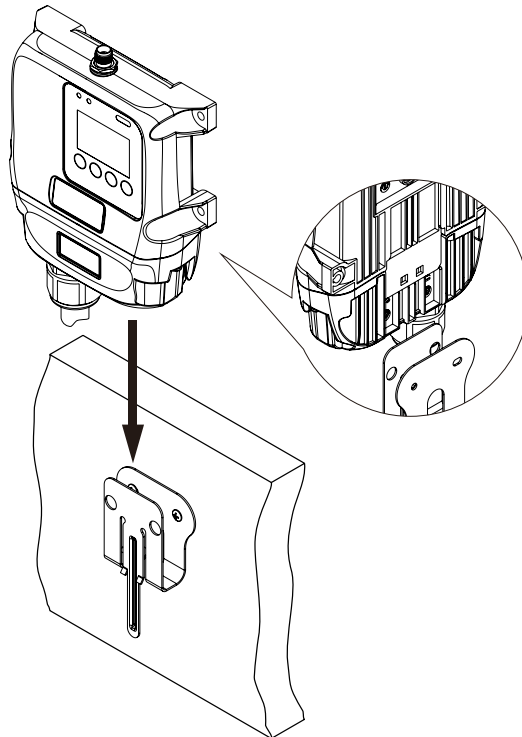


8. Slide down the receiver along the guided track to secure the receiver to the mounting bracket.
9. Remove the receiver by pressing down the bracket release and pull the receiver upward until it clears the guided track.

## Install

Mounting Bracket Type 1

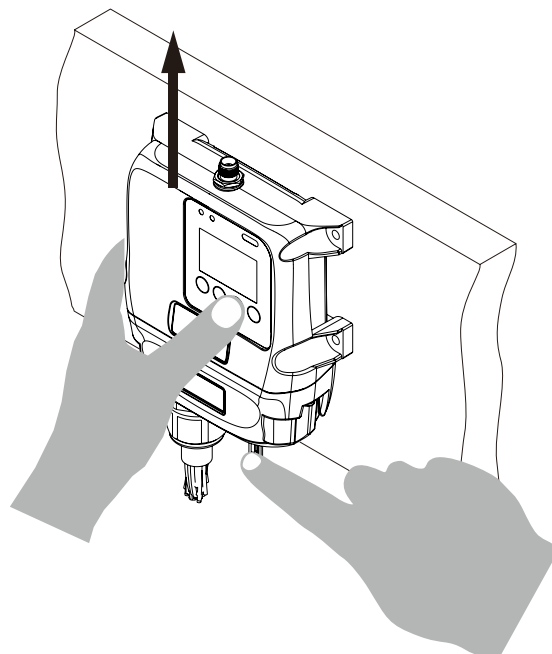
Mounting Bracket Type 2



## Remove

Mounting Bracket Type 1

Mounting Bracket Type 2



## 6. Operating Procedures

### 6.1.1. 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 output 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	2 orange blinks followed by a 1-second pause	Temp out of range
10	3 orange blinks followed by a 1-second pause	Angle below range

### 6.1.2. Receiver Power Indications

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

## 7. General Specifications

Frequency Range	:	433MHz ~ 440MHz (FCC) 863MHz ~ 870MHz (CE)
Number of Channels	:	141 channels(FCC)/62 channels(CE)
Channel Spacing	:	50K(FCC)/100 KHz(CE)
Modulation	:	Digital Frequency Modulation based on Manchester Code, 20bit address, 32bit CRC and Hamming Code.
Encoder & Decoder	:	Microprocessor-controlled
Receiver Type	:	Frequency Auto Scanning
Receiver Sensitivity	:	-116dBm
Spurious Emission	:	-50dB
Antenna Impedance	:	50 ohms
Enclosure Type	:	NEMA4
Enclosure Rating	:	IP66
Output Contact Rating	:	12~24VDC , 1A
Receiver Power Consumption	:	2.4W (max)
Available Receiver Voltages	:	12~24VDC , 2A
Operating Temperature	:	-25°C ~ 50°C / -13°F ~ 167°F
Receiver Dimension	:	197mm (L) x 153mm (W) x 50mm (H)
Receiver Weight	:	1.36kg / 2.99lb (include output cable)

### Environment Condition

- a) outdoor use
- b) altitude up to 2000 Meters (6500 feet)
- c) Maximum Relative Humidity 90%
- f) WET LOCATION, applicable
- g) applicable POLLUTION DEGREE of the intended environment  
( POLLUTION DEGREE 2 IN MOST CASES)