



Flex EX2 Receiver Select Systems

Radio Control Equipment Instruction Manual



MAGNETEK

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SERVICE INFORMATION

Your New Radio Remote Control System

Thank you for your purchase of Magnetek's Flex EX2 Radio Remote Equipment Control. Magnetek has set a whole new standard in radio remote performance, dependability, and value with this unique new line of handheld transmitters.

If your product ever needs modification or service, please contact one of our representatives at the following locations:

U.S. Service Information

For questions regarding service or technical information contact:

1-866-MAG-SERV

(1-866-624-7378)

International Service

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PRODUCT MANUAL SAFETY INFORMATION

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

The recommendations in this manual do not take precedence over any of the following requirements relating to cranes, hoists and lifting devices:

- 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 Magnetek Products are being used,
- Regulations issued by the Occupational Health and Safety Administration (OSHA),
- Applicable local, state or federal codes, ordinances, standards and requirements, or
- Safety standards and practices for the overhead material handling industry.

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 Magnetek Products to know, understand and follow all of these requirements. It is the responsibility of the owner of the Magnetek Products 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 Magnetek Products prior to becoming familiar with and being trained in these requirements.**

WARRANTY INFORMATION

FOR INFORMATION ON MAGNETEK'S PRODUCT WARRANTIES BY PRODUCT TYPE, PLEASE VISIT WWW.MAGNETEK.COM.

1 Introduction

The **Flex EX2** 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 other material handling equipment where wireless control is preferred.

Each **Flex EX2** system consists of a transmitter handset and receiver unit. Other standard-equipped accessories include transmitter waist belt, spare transmitter power key, vinyl pouch, “AA” alkaline batteries, pushbutton labels, output cable, and instruction manual CD.

List of notable features includes:

- **Advanced Controls** – the system utilizes dual advanced microprocessor controls with 32-bit CRC and Hamming Code, providing ultra-fast, safe, precise, and error-free encoding and decoding.
- **Frequency Hopping RF Transceiver** – the system automatically searches and locks 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 as well as receiver-to-receiver with system status and relay output feedbacks.
- **Zero-G Sensor Embedded** – 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 2 million press cycles. The defined snap-action steps provide positive tactile feedback even through 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 resistant 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 fully comply 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, charging station, tandem function, random access function, multiple receivers 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

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTE: A NOTE statement is used to notify people of installation, operation, programming, or maintenance information that is important, but not hazard-related.

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



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. The equipment is often 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, prevent 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 that may cause them to lose control of the equipment, 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 perform, at 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



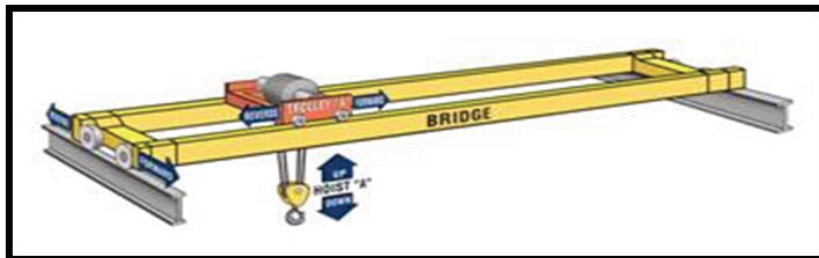
WARNING

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.

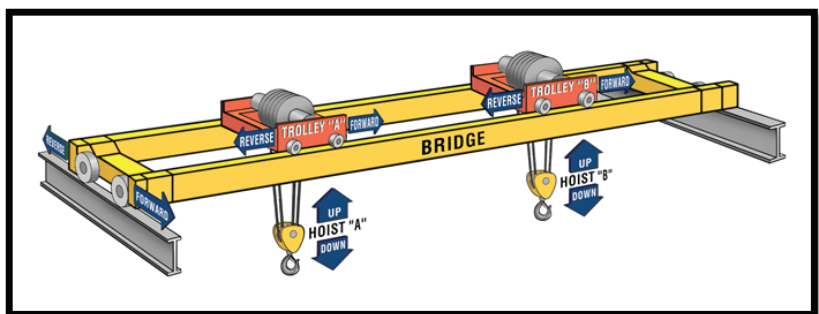
3 General System Information

3.1 RS System Types

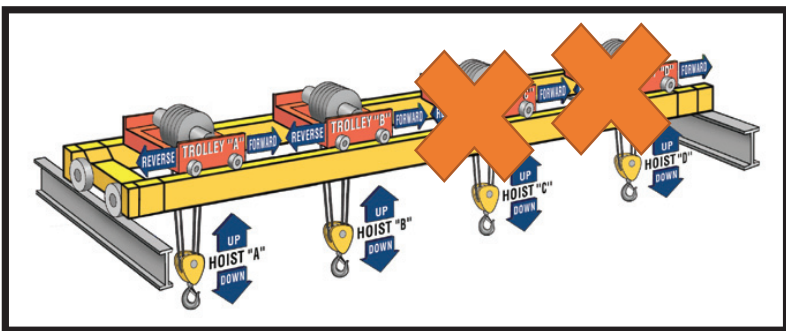
FLEX-8EX2-2RS-3M



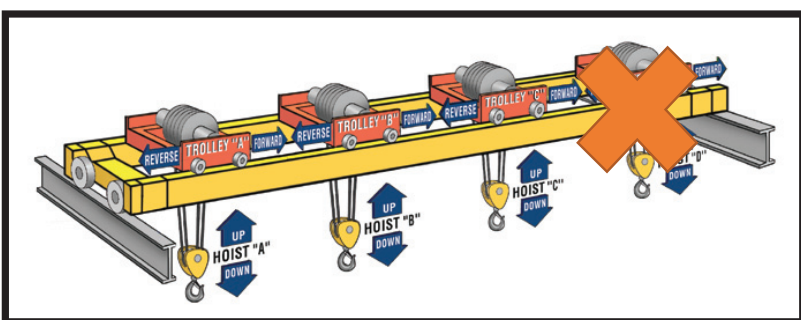
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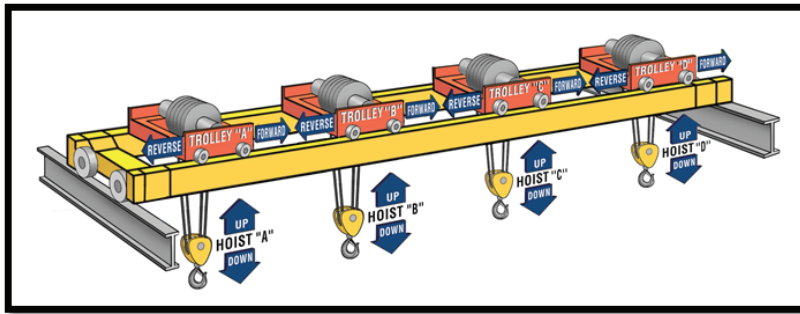
FLEX-8EX2-2RS-4M



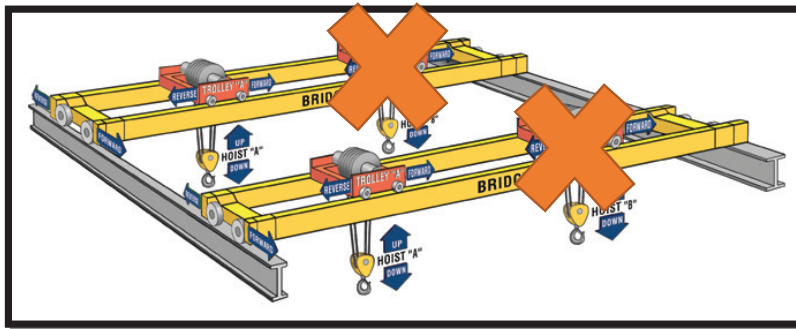
FLEX-8EX2-3RS-6M



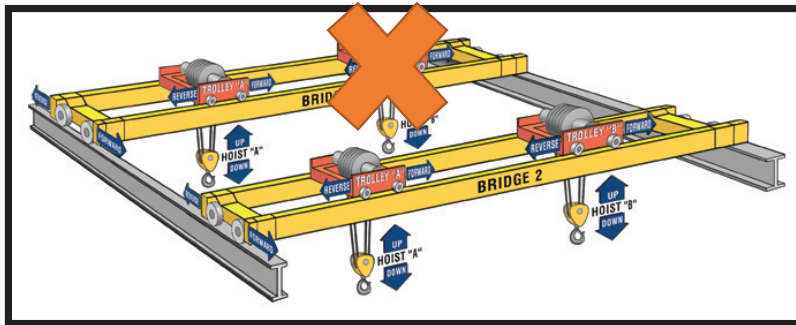
FLEX-8EX2-4RS-8M



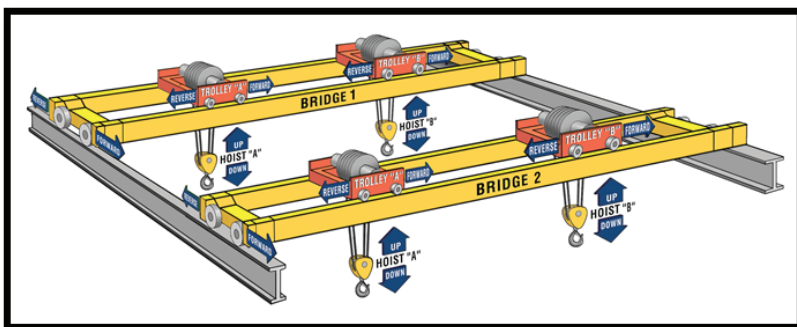
FLEX-12EX2-4RS-6M



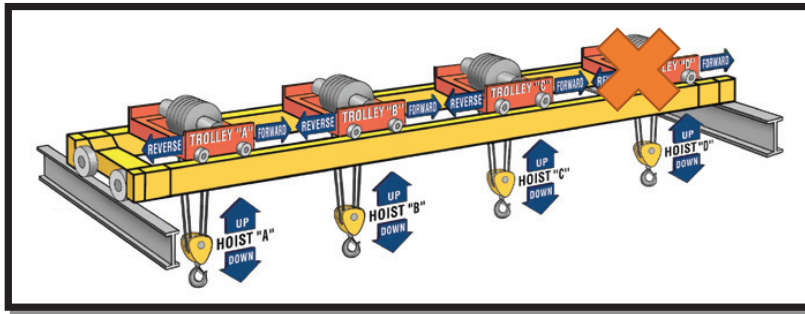
FLEX-12EX2-5RS-8M



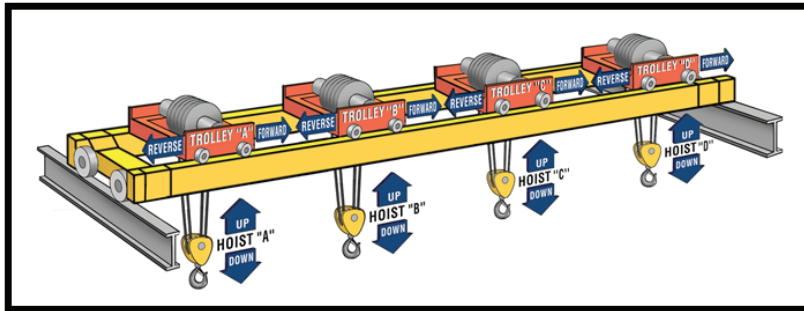
FLEX-12EX2-6RS-10M



FLEX-12EX2-4RS-7M

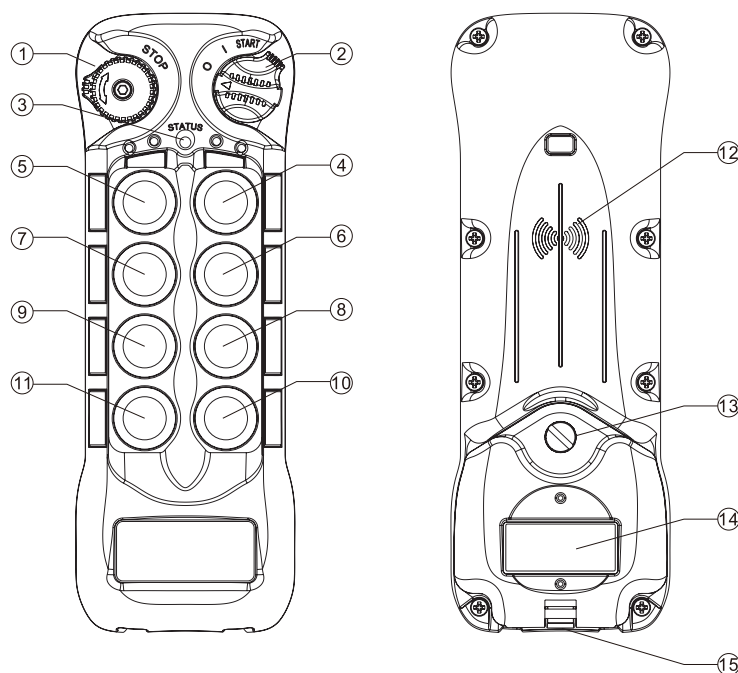


FLEX-12EX2-5RS-9M



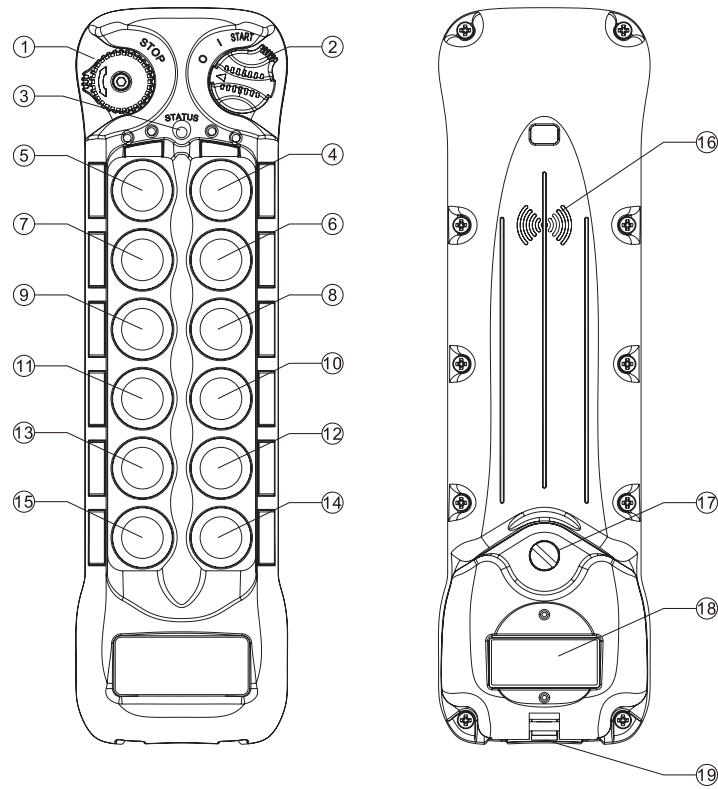
3.2 Transmitter

3.2.1 External Illustration (8EX2)



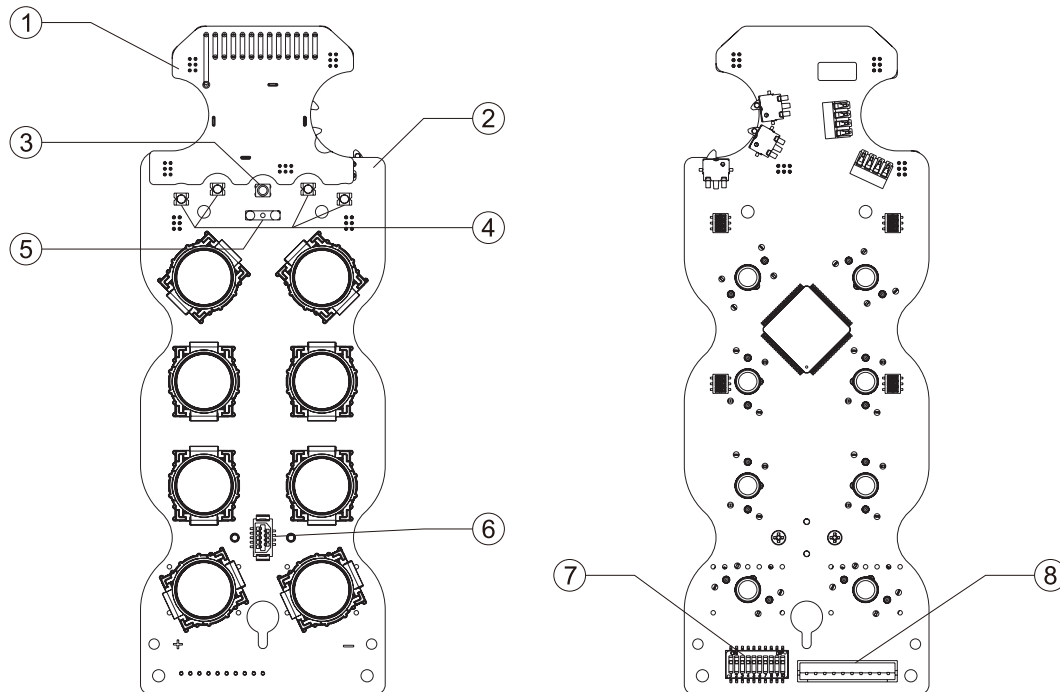
- | | | | |
|----|----------------------|-----|--|
| 1. | STOP Button | 9. | Pushbutton 6 (PB6) |
| 2. | Power Key Switch | 10. | Pushbutton 7 (PB7) |
| 3. | Status LED Indicator | 11. | Pushbutton 8 (PB8) |
| 4. | Pushbutton 1 (PB1) | 12. | Future Feature |
| 5. | Pushbutton 2 (PB2) | 13. | Battery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

3.2.2 External Illustration (12EX2)



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

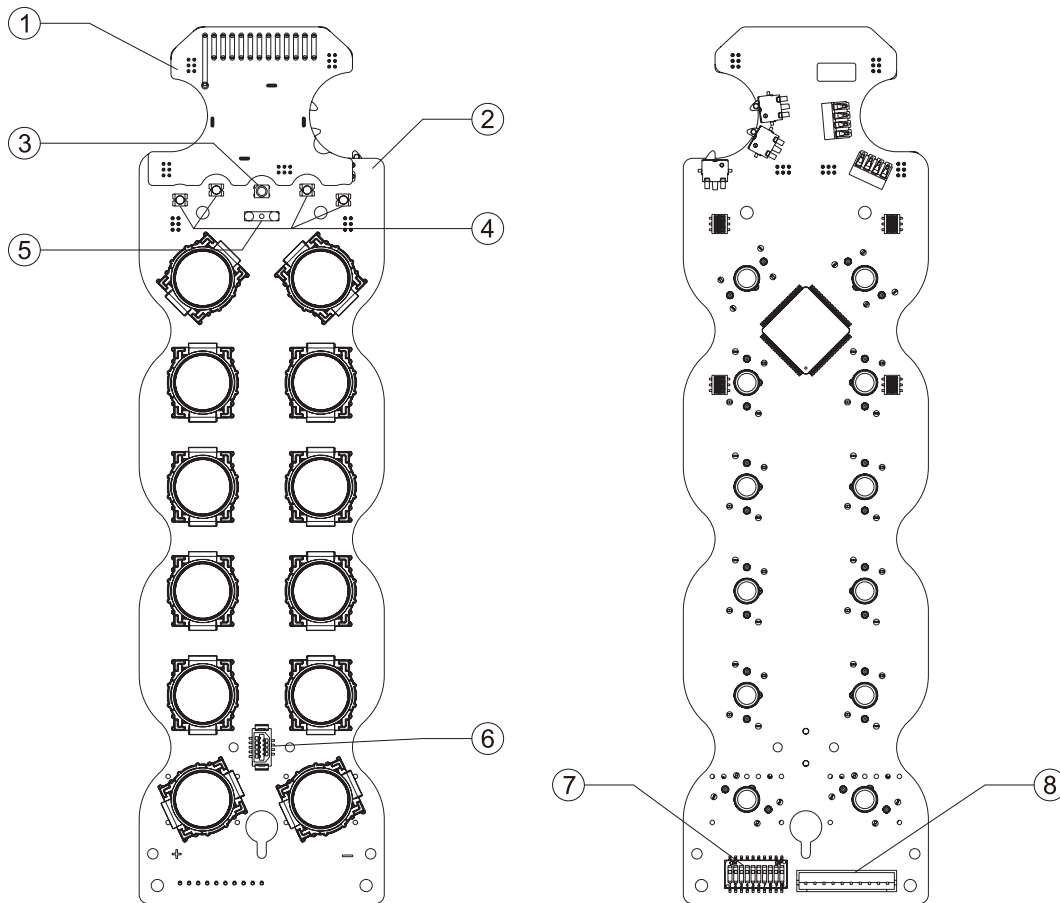
3.2.3 Internal Illustration (8EX2)



- | | | | |
|----|------------------------|----|--------------------|
| 1. | RF Transceiver Board | 5. | Infrared Sensors |
| 2. | Encoder Board | 6. | I-Chip Slot |
| 3. | Status LED Indicator | 7. | Function Dipswitch |
| 4. | A/B/C/D LED Indicators | 8. | Programming Port* |

** The programming port is only used for updating the transmitter firmware. It is not used with the IR Programmer. For more information, contact Magnetek field service.*

3.2.4 Internal Illustration (12EX2)

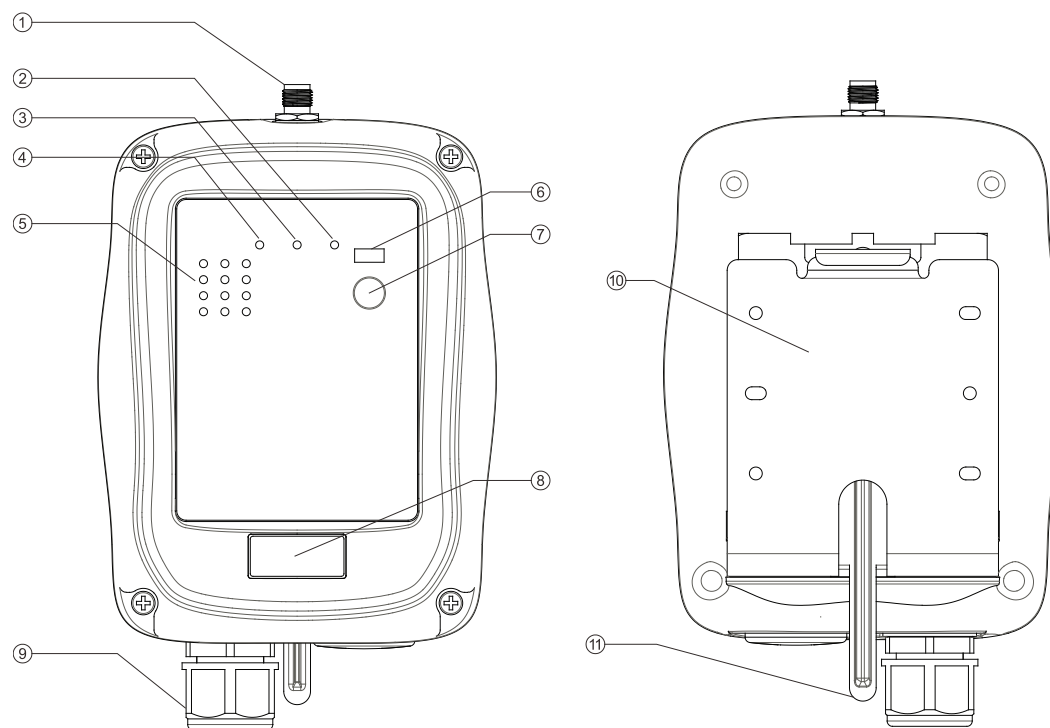


- | | |
|---------------------------|-----------------------|
| 1. RF Transceiver Board | 5. Infrared Sensors |
| 2. Encoder Board | 6. I-Chip Slot |
| 3. Status LED Indicator | 7. Function Dipswitch |
| 4. A/B/C/D LED Indicators | 8. Programming Port* |

** The programming port is only used for updating the transmitter firmware. It is not used with the IR Programmer. For more information, contact Magnetek field service.*

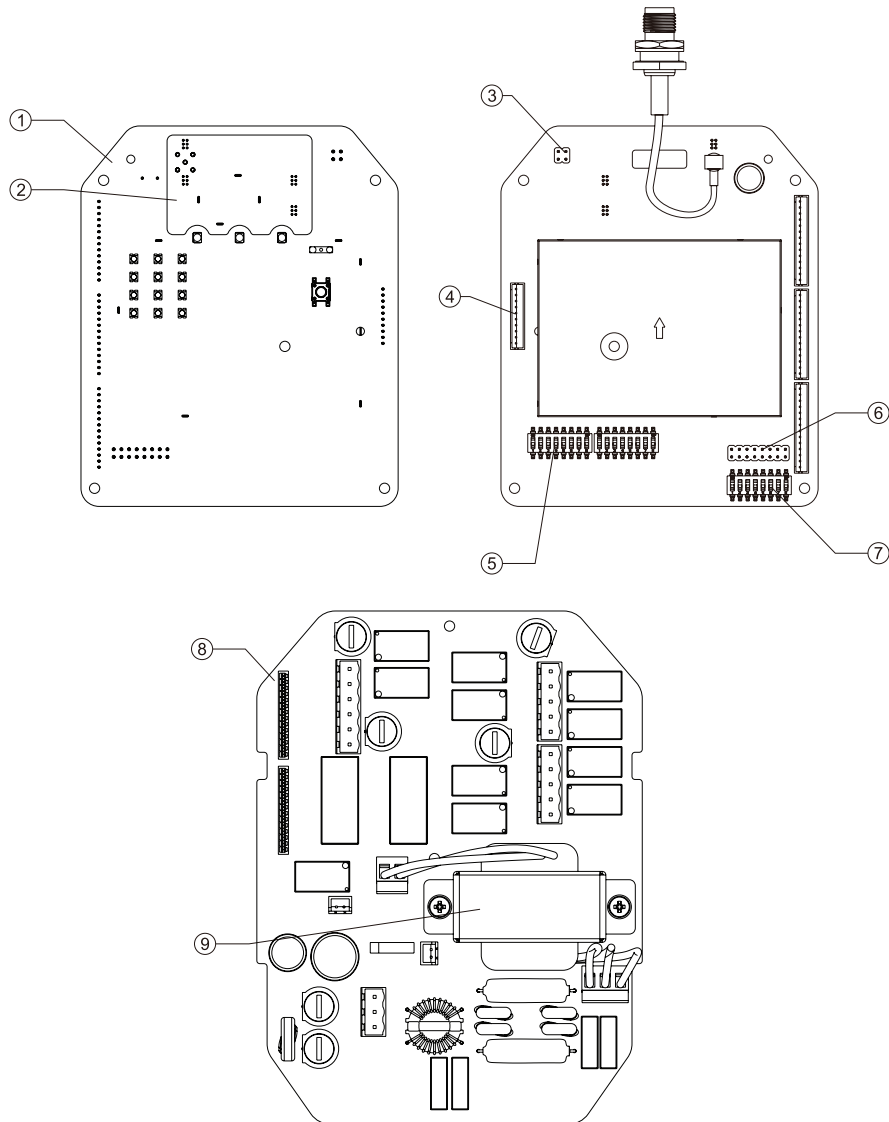
3.3 Receiver

3.3.1 External Illustration



- | | |
|---------------------------------|------------------------------|
| 1. External RP-TNC Antenna Port | 7. Remote Pairing Button |
| 2. COM LED Indicator | 8. System Information |
| 3. Status LED Indicator | 9. Cord Grip |
| 4. Power LED Indicator | 10. Mounting Bracket |
| 5. Output Relay LED Indicators | 11. Mounting Bracket Release |
| 6. Infrared Sensors | |

3.3.2 Internal Illustration



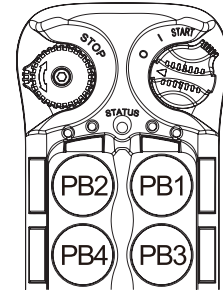
- | | | | |
|----|-------------------------|----|----------------------------|
| 1. | Decoder Board | 6. | Function Jumpers |
| 2. | RF Transceiver Board | 7. | Channel Dipswitch |
| 3. | INT/EXT Antenna Jumpers | 8. | AC Line Filter/Relay Board |
| 4. | Programming Port | 9. | Power Transformer |
| 5. | Function Dipswitches | | |

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 (1) position.
4. Release 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 rotating the power switch key to OFF (0) position.



4.1.2 Display Frequency Band

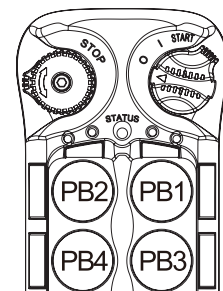
1. Rotate the power switch key to OFF (0) position.
2. With the STOP button elevated, press and hold PB2 and PB4 simultaneously.
3. Rotate the power switch key to ON (1) position.
4. Release PB2 and PB4 simultaneously (entered Frequency Band Display mode).
5. The Status LED displays the preset transmitter frequency band with orange, green and red blinks. An orange blink represents the hundreds (+100), a green blink represents the tens (+010) and a red blink represents the units (+001). For example, 4 orange blinks followed by 3 green blinks and 3 red blinks is 433 MHz.
6. Exit Frequency Band Display mode by rotating the power switch key to OFF (0) position.

4.1.3 Transmitter Channel Settings – Assigned Channel Scheme (preset system channel)

Both transmitter and receiver are assigned to a matching preset channel (**see Section 4.2.7 on page 30** for the system channels table).

NOTE: Receiver select configurations *MUST* be 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 simultaneously.
3. Rotate the power switch key to ON (1) position.
4. Release PB1 and PB2 simultaneously (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 solid 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, pressing PB2 two times and then PB1 four times is channel 24 (Status LED blinks 2 greens and 4 reds).
6. Transfer the newly selected channel to the receiver by rotating and holding the power switch key at START position until the Status LED turns to solid green (transfer complete). Turn off the transmitter power if solid 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 rotating the power switch key to OFF (0) position.

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

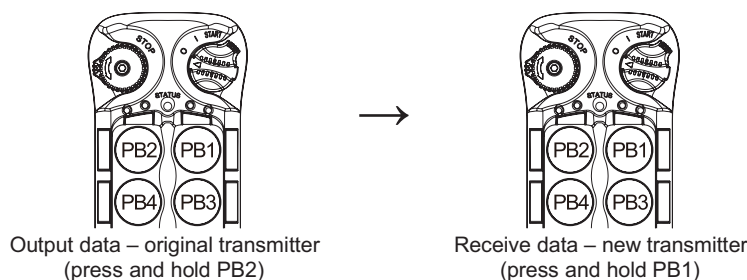
Important Note:

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 steps 1-4 and step 6 to transfer the newly selected transmitter channel to the receiver.

4.1.4 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 simultaneously.
3. Rotate the power switch key to ON (I) position.
4. Release PB1 and PB3 simultaneously. The Status LED will now display the firmware version with red, green and orange blinks. The transmitter is now in Remote Pairing mode.
5. Output data (original transmitter) by pressing and holding PB2 (Status LED off).
6. Receive data (new transmitter) by pressing and holding PB1 (Status LED blinks green).
7. When the Status LED (receiving data end) turns to solid green while both pushbuttons are still pressed down, the pairing is completed.
8. Exit Remote Pairing mode by rotating the power switch key to OFF (0) position.

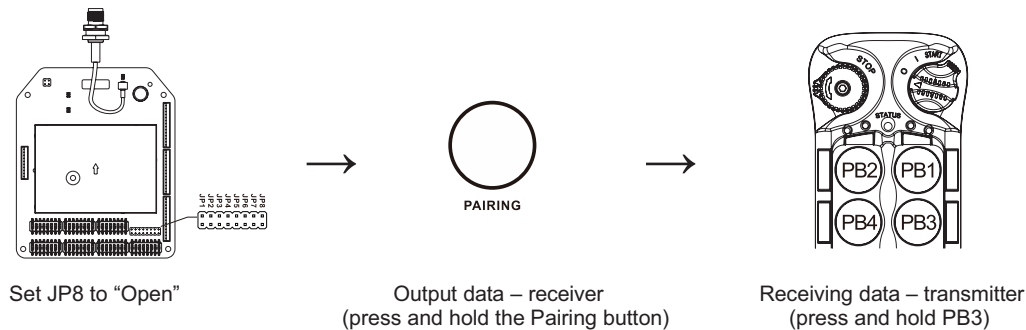


NOTE: During remote pairing make sure the distance between the two transmitters is no more than 1 meter.

B. Receiver-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 simultaneously.
- 3. Rotate the power key switch to ON (I) position.
- 4. Release PB1 and PB3 simultaneously. The Status LED will now display the firmware version with red, green and orange blinks. The transmitter is now in Remote Pairing mode.
- 5. Press Pairing button on receiver and PB3 on transmitter until Status LED on Transmitter turns solid green.

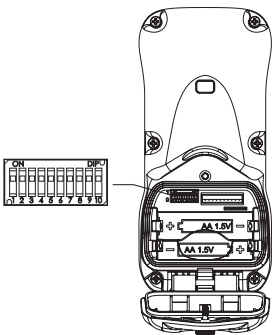
NOTE: If you have completed the above procedure and it does not work, cycle power on the receiver and try the above procedure again.



4.1.5 Transmitter Output Power Settings

The transmitter is set to 1mW by default as that is the maximum allowed due to FCC regulations. If a different output power is required, please contact Magnetek field service.

	Dipswitch Settings	Output Power
1	000xxxxxxx	1mW



4.1.6 Transmitter Inactivity Timer Settings

After 5 minutes (default) of the transmitter pushbuttons not being pressed, the system will go into Sleep mode and the receiver MAIN relays will be deactivated.

	Dipswitch Settings	Time		Dipswitch Settings	Time
1	xxx000xxxx	1 minute	5	xxx100xxxx	10 minutes
2	xxx001xxxx	20 seconds	6	xxx101xxxx	30 minutes
3	xxx010xxxx	3 minutes	7	xxx110xxxx	60 minutes
4	xxx011xxxx	5 minutes	8	xxx111xxxx	Constant On (Sleep mode disabled)

4.1.7 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 the transmitter is dropped. By default, the sensor is disabled. When the sensor is enabled and a drop is detected, the receiver MAIN relays are deactivated. Please contact Magnetek field service for more details.

	Dipswitch Settings	Function
1	xxxxxxx0x	Sensor Disabled
2	xxxxxxx1x	Sensor Enabled

4.1.8 Transmitter Start Function Settings

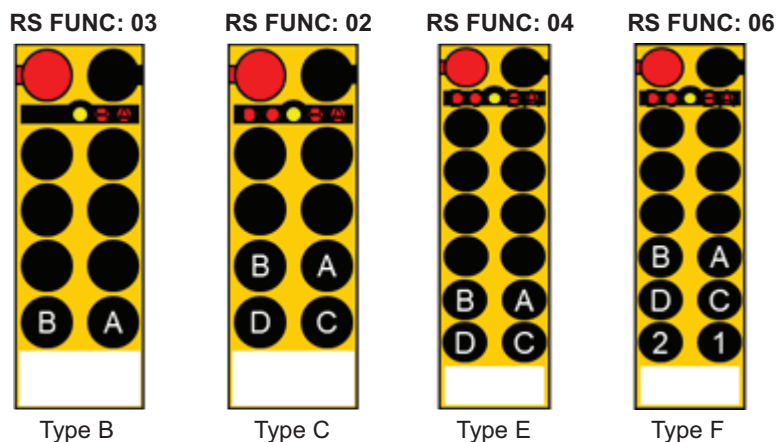
When the transmitter goes into Sleep mode and the receiver MAIN relays are deactivated, execute the START command (default) or press any pushbutton to reactivate the MAIN relays.

	Dipswitch Settings	Output Power
1	xxxxxxx0	START Reactivation
2	xxxxxxx1	Any Button Reactivation

4.1.9 Infrared Transmitter Settings

The IR programmer unit can be used to set the system serial number, channel, type setting, RS function setting, and many others. Please refer to the Flex IR Programmer Manual or contact Magnetek field service for more details.

- All transmitters in a system are set to the same serial number and assigned channel.
- All RS transmitters (regardless of their configuration) come preset to Type 00.
- The RS Function settings for each transmitter configuration come preset as follows:



4.1.10 I-Chip

A Flex EX2 transmitter will enter a Legacy mode and become backwards compatible with Flex EX receivers once an I-Chip is inserted. The serial number, channel, and type setting are transferred through the I-Chip. The dipswitch is NOT used to change the channel. If the channel needs to be changed, please refer to the Channel Change via Pushbuttons procedure in a GEN 1 Flex EX manual. The first 8 positions on the transmitter dipswitch (positions 9 and 10 are not used) will operate the same as the function dipswitch on the Flex EX transmitter.

NOTE 1: All settings in this manual are no longer applicable once an I-Chip is inserted into a Flex EX2 transmitter. Please refer to the appropriate GEN 1 Flex EX manual instead.

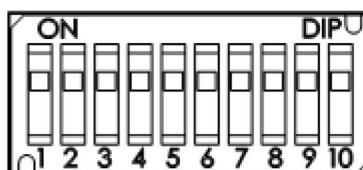
NOTE 2: A Flex EX transmitter will NOT work with a Flex EX2 receiver.

I-Chip Settings:

Serial number = match receiver/s

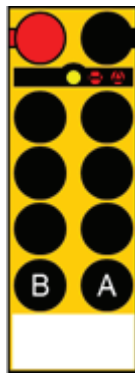
Channel = match receiver/s

Type = 00



Transmitter Dipswitch Settings											
Transmitter Type		1	2	3	4	5	6	7	8	9	10
B	Non-Interlocked	Off	On	Off	Off	Off	Off	Off	Off	X	X
	Interlocked	Off	On	Off	Off	Off	Off	On	Off	X	X
C	Non-Interlocked	Off	Off	On	Off	Off	Off	Off	Off	X	X
	Interlocked	Off	Off	On	Off	Off	Off	On	Off	X	X
D	Non-Interlocked	Off	Off	Off	On	Off	Off	Off	Off	X	X
	Interlocked	Off	Off	Off	On	Off	Off	On	Off	X	X
E	Non-Interlocked	Off	Off	Off	Off	On	Off	Off	Off	X	X
	Interlocked	Off	Off	Off	Off	On	Off	On	Off	X	X
F	Non-Interlocked	Off	Off	Off	Off	Off	On	Off	Off	X	X
	Interlocked	Off	Off	Off	Off	Off	On	On	Off	X	X

X = Not used



Type B



Type C



Type D



Type E

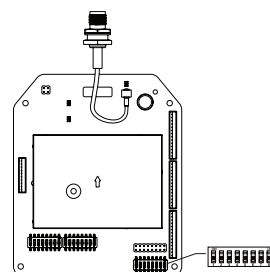


Type F

4.2 Receiver

4.2.1 Receiver Channel Settings

Set the receiver channel by configuring the channel dipswitch located on the decoder board. Only the first 6 dip positions are used for channel programming. The system channels table in Section 4.2.7 illustrates which dipswitch setting corresponds to which channel. Once the receiver channel is altered, make sure to change the transmitter channel as well. The channel on both the transmitter and receiver must be identical in order for the system to work (**see Section 4.1.3 on page 21**).



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 in **Section 4.2.7 on page 30**.

4.2.2 Receiver Channel Scanning Function

Receiver channel scanning function is applicable only when a preset channel is assigned to the system (**see Section 4.1.3 on page 21**).

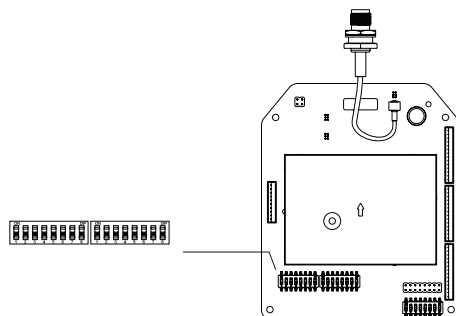
- | | | |
|-----|--|--|
| (1) | | → "00" manufacturer preset (channel X)* |
| (2) | | → "01" scans 2 channels (channel X and channel X+1) |
| (3) | | → "10" scans 3 channels (channel X... channel X+2) |
| (4) | | → "11" scans 4 channels (channel X... channel X+3)** |

* Channel X → channel set on the channel dipswitch.

** Contact Magnetek field service 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 scan only channel 01 and 02.

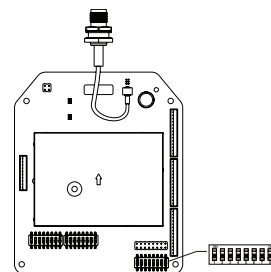
4.2.3 Dipswitch Settings



Dip Settings	Function Descriptions	# of Relays Used
00000010	4 output relays Closed/Closed relay action at 2nd speed (separate 2nd speed output relays)	4
00000100	3 output relays Closed/Closed relay action at 2nd speed (shared 2nd speed output relay)	3

4.2.4 Jumper Settings

Jumper setting applies to functions such as the receiver settings, firmware version, system testing and remote pairing methods.



Default

Jumper Settings		Function
JP4 (Inserted)	JP5 (Open)	Setting for Bridge Receivers (selectable and non-selectable)
JP4 (Open)	JP5 (Open)	Setting for Trolley/Hoist Receivers (all letters)
JP6 (Inserted)		Display system firmware version
JP7 (Inserted)		For system testing only (receiver MAIN relays disabled)
JP8 (Opened)		Receiver-to-transmitter remote pairing (pressing the Pairing button required)
JP8 (Inserted)		Receiver-to-transmitter remote pairing (pressing the Pairing button not required)

4.2.5 Infrared Receiver Settings

The IR programmer unit can be used to set the system serial number, channel, type setting, function relay settings, and many others. Refer to the Flex IR Programmer Manual or contact Magnetek field service for more details.

Presets:

- All receivers in a system are set to the same serial number and assigned channel
- Receiver A - Type 01
- Receiver B - Type 02
- Receiver C - Type 04
- Receiver D - Type 08
- Bridge receiver (non-selectable) - Type 00
- Bridge receiver 1 - Type 16
- Bridge receiver 2 - Type 32
- FUNC RLY1 - Normal
- FUNC RLY2 - RS



4.2.6 Fuse Ratings

FUSE #	110 - 120VAC	220 - 240VAC	380 - 400VAC	410 - 460VAC	24VAC	42 & 48VAC	9 - 36VDC
F3 - F10	5.0A	5.0A	5.0A	5.0A	5.0A	5.0A	5.0A
F1 - F2	0.5A	0.5A	0.5A	0.5A	1.0A	1.0A	3.0A

4.2.7 System Channels Table

The following dipswitch settings only apply to setting the channel in the receiver when using the assigned channel scheme (see **Section 4.1.3 on page 21**).

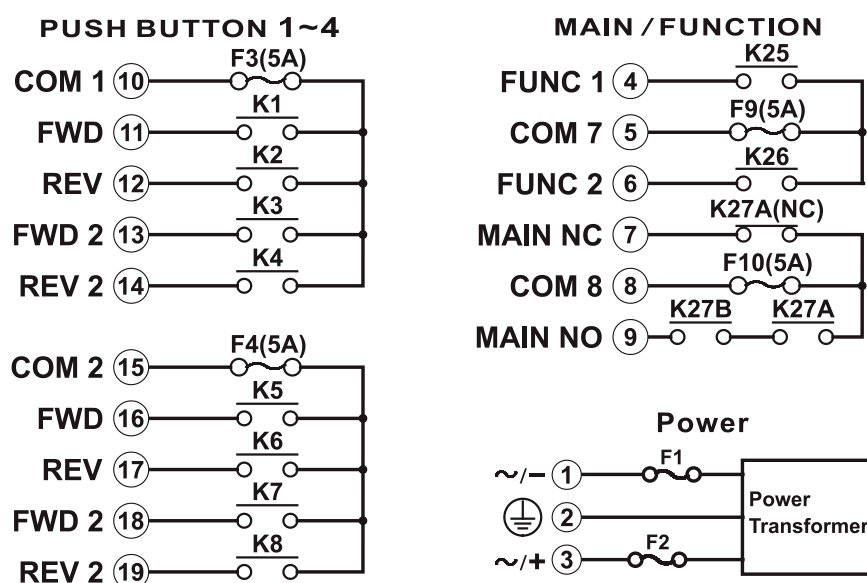
Ch.	Dipswitch Setting	Primary Channel Frequency (MHz)	Secondary Channel Frequency (MHz)	Ch.	Dipswitch Setting	Primary Channel Frequency (MHz)	Secondary Channel Frequency (MHz)
01	000001	433.050	436.550	32	100000	434.600	438.100
02	000010	433.100	436.600	33	100001	434.650	438.150
03	000011	433.150	436.650	34	100010	434.700	438.200
04	000100	433.200	436.700	35	100011	434.750	438.250
05	000101	433.250	436.750	36	100100	434.800	438.300
06	000110	433.300	436.800	37	100101	434.850	438.350
07	000111	433.350	436.850	38	100110	434.900	438.400
08	001000	433.400	436.900	39	100111	434.950	438.450
09	001001	433.450	436.950	40	101000	435.000	438.500
10	001010	433.500	437.000	41	101001	435.050	438.550
11	001011	433.550	437.050	42	101010	435.100	438.600
12	001100	433.600	437.100	43	101011	435.150	438.650
13	001101	433.650	437.150	44	101100	435.200	438.700
14	001110	433.700	437.200	45	101101	435.250	438.750
15	001111	433.750	437.250	46	101110	435.300	438.800
16	010000	433.800	437.300	47	101111	435.350	438.850
17	010001	433.850	437.350	48	110000	435.400	438.900
18	010010	433.900	437.400	49	110001	435.450	438.950
19	010011	433.950	437.450	50	110010	435.500	439.000
20	010100	434.000	437.500	51	110011	435.550	439.050
21	010101	434.050	437.550	52	110100	435.600	439.100
22	010110	434.100	437.600	53	110101	435.650	439.150
23	010111	434.150	437.650	54	110110	435.700	439.200
24	011000	434.200	437.700	55	110111	435.750	439.250
25	011001	434.250	437.750	56	111000	435.800	439.300
26	011010	434.300	437.800	57	111001	435.850	439.350
27	011011	434.350	437.850	58	111010	435.900	439.400
28	011100	434.400	437.900	59	111011	435.950	439.450
29	011101	434.450	437.950	60	111100	436.000	439.500
30	011110	434.500	438.000	61	111101	436.050	439.550
31	011111	434.550	438.050	62	111110	436.100	439.600

NOTE: Channel unassigned is represented by "000000" dipswitch setting. This setting is not compatible with Receiver Select systems.

5 Receiver Installation

5.1 Output Relay Contact Diagrams

5.1.1 Flex 4EX2



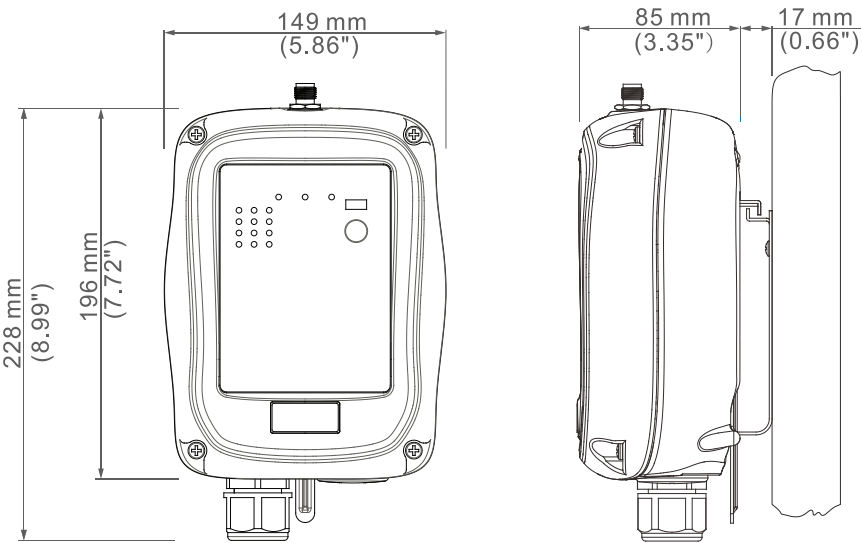
- For 9-36VDC power supply, wire #1 corresponds to the negative charge (-) and wire #3 corresponds to the positive charge (+). Wire #2 is for GROUND.
- Due to the possibility of voltage spikes on the contactors, suppressors are required on contactors being driven by Flex relays.
- FUNC1 (K25) is set to Normal by default. It will become a normal momentary output after the initial START command.
- FUNC 2 (K26) is set to RS by default. It will become a latched output on any and all receivers that are selected by the transmitter.

5.2 Pre-installation Precautions

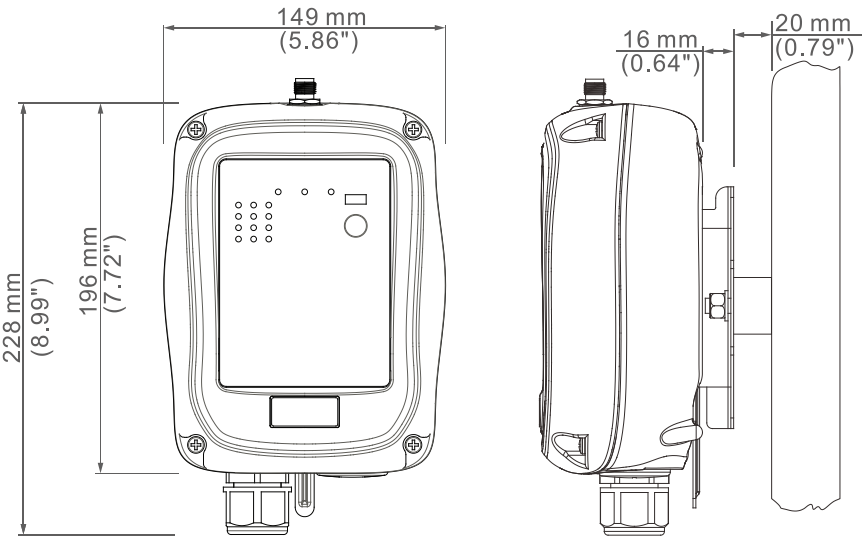
1. Make sure the transmitter and receiver have the same serial numbers and are set to the same channel.
2. Make sure the receiver is not set to the same channel as any other systems in use in the surrounding area.
3. Make sure the crane or equipment is working properly prior to installation.
4. Make 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

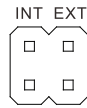
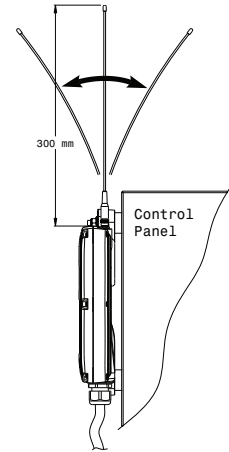
Mounting Bracket Type 1



Mounting Bracket Type 2

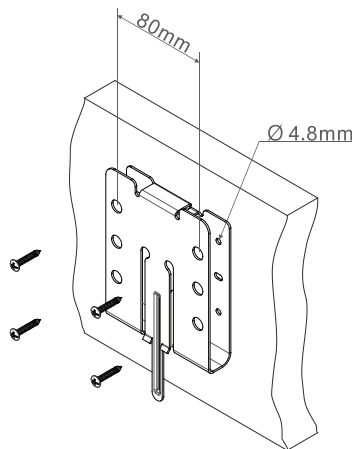


1. For best reception the location of the receiver should be visible to the operator at all times.
2. The location selected should not be exposed to high levels of electric noise. Mounting the receiver next to an unshielded variable-frequency drive may cause radio interference. Always locate the receiver 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 jumper set to "EXT" position.

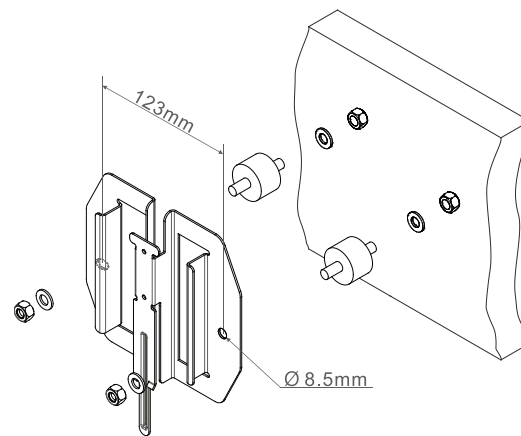


5. For better reception, make sure the receiver is in an upright position.
6. Drill four holes for mounting bracket type 1 and two holes for mounting bracket type 2 on the control panel, wall or location where the receiver is to be installed.
7. Make sure the screws, bolts or shock absorbers are tightened after installation (not provided with the system).
8. Install suppressor on all contactors being driven by Flex relays. This is due to the possibility of voltage spike on the contractors.

Mounting Bracket Type 1



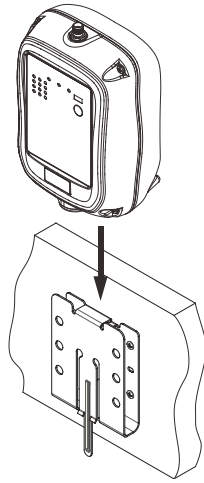
Mounting Bracket Type 2



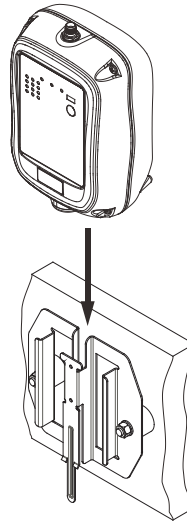
9. Slide down the receiver along the guided track to secure the receiver to the mounting bracket.
10. Remove the receiver by pressing down the bracket release and pulling the receiver upward until it clears the guided track.

Install

Mounting Bracket Type 1

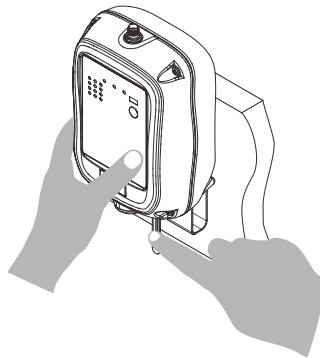


Mounting Bracket Type 2

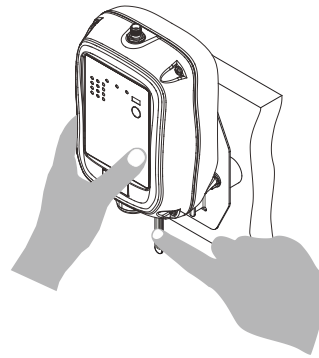


Remove

Mounting Bracket Type 1



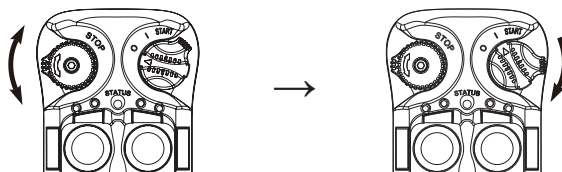
Mounting Bracket Type 2



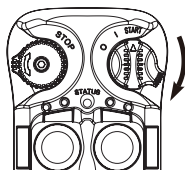
6 Operating Procedures

6.1 General Operation

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



2. After turning on the transmitter power, check the Status LED on the transmitter for any sign of system irregularities (*see Section 6.4.1 Transmitter Status Indications on page 37*). If the transmitter is in good working order the Status LED will display solid green for up to 2 seconds at power on (no faults detected).
3. Rotate the power switch key further to the START position and hold it there for up to 2 seconds (Status LED solid green). When the receiver MAIN relays are activated the Status LED will change from solid green to solid orange (system on). The power switch key will retract back to the ON (I) position when released. The same START position becomes an auxiliary function thereafter. Pressing any pushbutton prior to executing the START command at system startup will result in no signals transmitted (Status LED blinks orange).

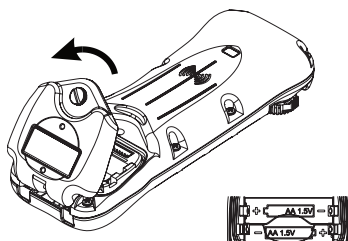


4. Press any pushbutton on the transmitter to begin operation. During transmitter inactivity (pushbuttons not pressed), the transmitter will automatically switch to Standby mode, with an orange blink on the Status LED at every 4-second interval. Always turn off the transmitter power when not in use to save battery power.
5. 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 counterclockwise. The button will pop up. Then execute the START command to reconnect the receiver MAIN relays. For safety, executing the START command is required every time the transmitter is turned on or after every STOP button reset.
6. After 5 minutes of inactivity (pushbutton not pressed) the receiver MAIN relays are temporarily disconnected (*see Section 4.1.5 on page 23*). The Status LED blinks 3 reds and then shuts off. Press any pushbutton or execute the START command to resume operation (*see Section 4.1.4 on page 22*).

7. Turn off the transmitter power by rotating the power switch key counterclockwise to OFF (0) position. It will disconnect the transmitter power and the receiver MAIN relays altogether. Turn it further counterclockwise to release the key.

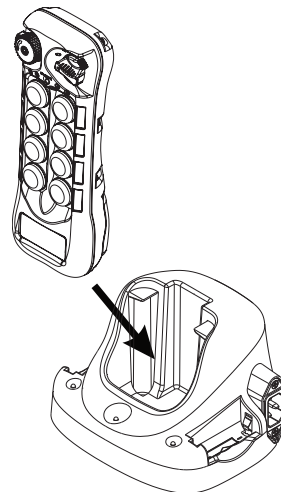
6.2 Changing Batteries

Change 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.



6.3 Battery Charging

The transmitter is designed to accept any off-the-shelf NiMH 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. Solid red on the LED represents charging in progress, solid green represents batteries fully charged, and LED off represents no batteries detected. Do not use any rechargeable lithium ion batteries as they will damage both the transmitter and the charging station.



6.4 System Status Light Indications

6.4.1 Transmitter Status Indications

Type	Display Type	Indication
1	Solid red	Voltage below 1.8V at initial power on or during operation
2	3 red blinks and then 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 (changing 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 maintains 2 red blinks, the pushbutton is defective.
5	4 red blinks followed by a 2-second pause	Transmitter is unable to lock onto the assigned channel
6	Solid 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	2 orange blinks followed by a 2-second pause	Receiver MAIN relays jammed or defective
10	3 orange blinks followed by a 2-second pause	Decoding processors defective
11	3 slow red blinks	STOP button pressed down
12	Solid orange when the power switch key is rotated and held at the START position at initial system startup	Receiver MAIN relays activated

6.4.2 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 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	Solid 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

6.4.3 Receiver Power Indications

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

6.4.4 Receiver COM Indications

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

7 General Specifications

Frequency Range:	433.050 MHz - 439.600 MHz
Number of Channels:	62 channels
Channel Spacing:	50 KHz
Modulation:	Digital Frequency Modulation based on Manchester Code, 20-bit address, 32-bit 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:	-116 dBm
Spurious Emission:	-50 dB
Antenna Impedance:	50 ohms
Responding Time:	40 mS (average)
Transmitting Power:	1.0 mW
Enclosure Type:	NEMA4
Enclosure Rating:	IP66
Output Contact Rating:	250V @ 8 Amps
Transmitter Operating Voltage:	3.0VDC
Receiver Power Consumption:	8VA (max)
Available Receiver Voltages:	9 - 36VDC 24VAC 42VAC 48VAC 110 - 120VAC 220 - 240VAC 380 - 400VAC 410 - 460VAC
Operating Temperature:	-25°C - 75°C / -13°F - 167°F
Transmitter Dimension:	8EX2: 198 mm (L) x 70 mm (W) x 44 mm (H) 12EX2: 244 mm (L) x 70 mm (W) x 44 mm (H)
Receiver Dimension:	196 mm (L) x 149 mm (W) x 85 mm (H)
Transmitter Weight:	8EX2: 292 g / 10.3 oz (including batteries) 12EX2: 341 g / 12.0 oz (including batteries)
Receiver Weight:	1.76 kg / 3.8 lb (including output cable)