Flex Duo™ System
Radio Control Equipment
Operator Manual

MAGNETEK

Part Number: 191-32000-M002EN
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PRODUCT SAFETY INFORMATION

Magnetek, Inc. (Magnetek) offers a broad range of radio remote control products, control products, adjustable frequency drives, and industrial braking systems for numerous industries including overhead lifting and mobile hydraulics. 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
- Applicable local and national codes / laws, ordinances, standards and requirements such as OSHA and CE

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.columbusmckinnon.com/magnetek.

1 Introduction

The Flex Duo™ radio remote control systems are designed for control of industrial equipment and machinery such as electric hoists, winches, monorails, conveyor belts, mining equipment, hydraulic valves controlled by electric solenoids, and all other material handling equipment where wireless control is preferred.

Each Flex Duo system consists of a transmitter handset and a receiver unit. Other standard-equipped accessories include transmitter lanyard, vinyl pouch, pushbutton labels, output cable, and quick start guide.

This manual covers both FCC/IC and CE versions of the Flex Duo. All settings and functions listed within this manual are the same between the two versions except where noted inside specific sections where the two versions perform differently.

The list of notable features includes:

- **62 User-programmable Channels** – advanced synthesized radio frequency (RF) controls with 62 built-in programmable channels set via pushbuttons (transmitter) and dipswitches (receiver).
- **Wireless Remote Pairing Function** – system pairing and cloning can be done easily and wirelessly.
- **Over One Million Unique Address Codes** – each and every Flex Duo system has its own address code and serial number, never repeats.
- **Advanced Controls** – the Flex Duo system utilizes dual advanced microprocessor controls with 32-bit CRC and Hamming Code, which provide ultrafast, safe, precise, and error-free encoding and decoding.
- **Two-way Transmission** – transmitter and receiver communicate with one another for safe, precise and uninterrupted operation (for example, receiver status feedbacks).
- **Reliable Pushbuttons** – the pushbuttons are rated for more than one million press cycles.
- **Low Power Consumption** – requires only two “AA” alkaline batteries for more than 150 hours of uninterrupted operation between replacements.
- **Durable Nylon and Fiberglass Composite Enclosures** – high resistance to breakage and deformation even in the most abusive environments. The receiver enclosures and output cables are UL94-V0 rated.
- **Fully Sealed Enclosures** – the transmitter and receiver enclosures are IP66 rated.
- **Full Compliance** – all systems are compliant with FCC, IC and CE.
- **Other Optional Accessories and Features** – transmitter magnet mount, transmitter belt clip, transmitter waist belt, ring hook, transmitter rubber guards, charging station, external antenna kit, removable mounting bracket, and many others.

2 Radio-Controlled Safety

WARNING, CAUTION and NOTE Statements

Read and understand this manual before installing, operating or servicing this product. Install the product according to this manual and local codes.

The following conventions indicate safety messages in this manual. Failure to heed these messages could cause fatal injury or damage products and related equipment and systems.

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

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, such as magnets, vacuum lifts, pumps, and emergency equipment. 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 mobile hydraulic 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 Equipment

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

Radio-controlled cranes, hoists, lifting devices and other mobile hydraulic 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 mobile hydraulic 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 machine 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 mobile hydraulic 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 mobile hydraulic equipment to support or transport people
- lift or carry any loads over people
- operate the crane, hoist or mobile hydraulic equipment unless all persons, including the operator, are and remain clear of the supported load and any potential pinch points
- operate a crane, hoist or lifting device when the device is not centered over the load
- operate a crane, hoist or lifting device if the chain or wire rope is not seated properly in the sprockets, drum or sheave
- operate any damaged or malfunctioning crane, hoist, lifting device or other material handling equipment
- change any settings or controls without authorization and proper training
- remove or obscure any warning or safety labels or tags
- leave any load unattended while lifted
- leave power on the radio-controlled equipment when the equipment is not in operation

- operate any material handling equipment using a damaged controller because the unit may be unsafe
- operate manual motions with other than manual power
- operate radio-controlled equipment when low battery indicator is on

WARNING

The operator should not attempt to repair any radio controller. If any product performance or safety concerns are observed, the equipment should immediately be taken out of service and be reported to the supervisor. Damaged and inoperable radio-controller equipment should be returned to arc for evaluation and repair. Failure to follow this warning could result in serious injury or death and damage to equipment.

2.5 Transmitter Unit

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

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

2.6 Pre-Operation Test

At the start of each work shift, or when a new operator takes control of the equipment, 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 machine stop function.

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 Changing Batteries

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

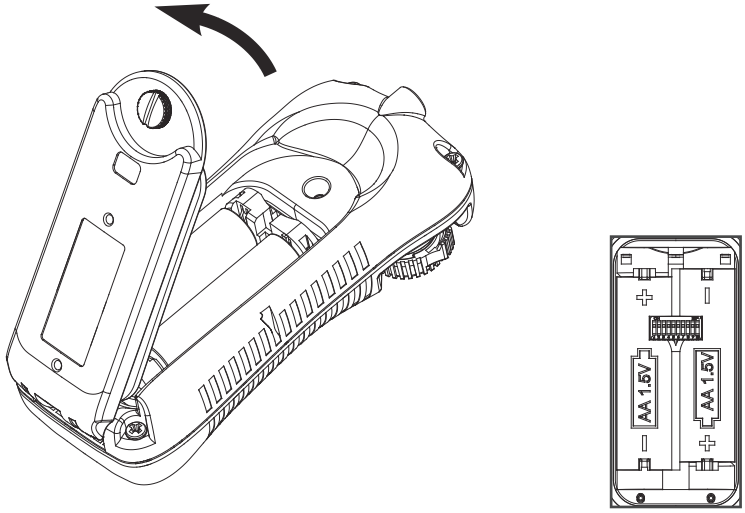

Figure 2-1

2.9 Battery Charger (Optional)

WARNING

Do not attempt to charge non-rechargeable battery packs in the charger.

Do not use rechargeable lithium ion batteries, as they will damage both the transmitter and the charging station.

Avoid charging partially discharged rechargeable batteries to help prolong battery life cycle.

Do not charge batteries in a hazardous environment.

Do not attempt to charge a damaged battery.

Do not attempt to use a battery that is leaking, swollen or corroded.

Do not short the charger.

The Flex Duo charger does <u>not</u> come standard with Flex Duo systems or spare transmitters.

2.9.1 Charging Cradle Top View

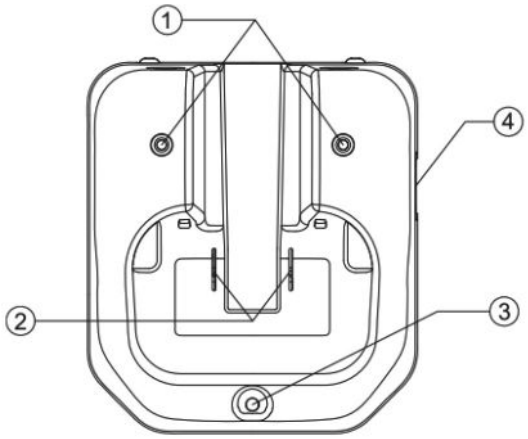

Figure 2-2

1. Rubber Safety Belt Attachment Slot
2. Charging Contacts
3. Charging Status LED
4. Power USB Input

2.9.2 Power Supply

The Flex Duo charging cradle uses any off-the-shelf Micro USB-to-USB cable and USB power adapter with 5V at 2A output (optional).

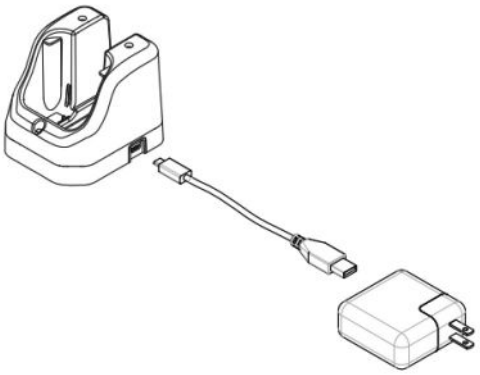

Figure 2-3

2.9.3 Charging

1. The Flex Duo transmitters are designed to accept any off-the-shelf Ni-MH rechargeable batteries.
2. Depending on the battery capacity, the average charging time is approximately 1.5 hours from completely drained to fully charged.
3. Solid red on the LED represents charging in progress, solid green represents batteries fully charged, and LED off represents no batteries detected.

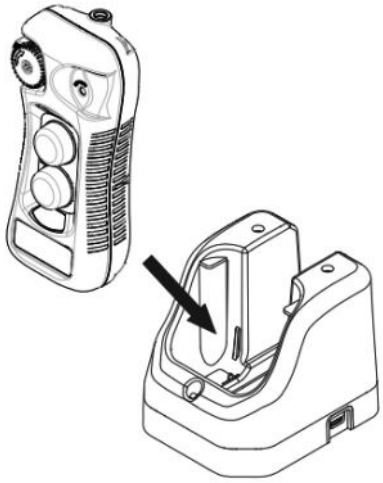

Figure 2-4

WARNING

Do not use rechargeable lithium ion batteries, as they will damage both the transmitter and the charging station.

2.9.4 Retaining Belt

For mobile applications, the retaining belt can be used to prevent the transmitter from becoming loose in the cradle or falling out when the equipment moves through rough terrain.

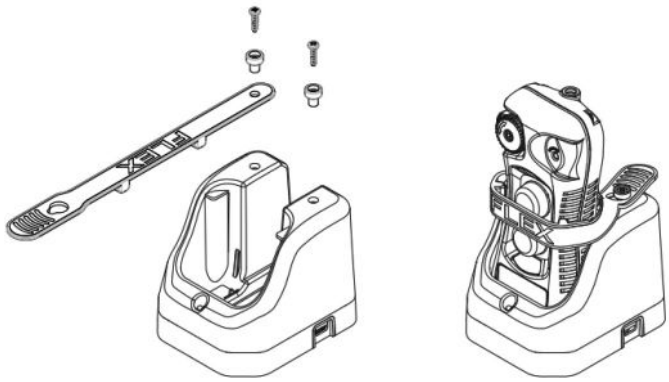

Figure 2-5

2.9.5 Wall Mounting the Charger

The Flex Duo charging cradle has two holes located in the back, vertical face of the unit. These holes allow the cradle to be mounted on a wall by sliding the cradle over the two screws and then sliding down to secure the cradle onto the screw heads.

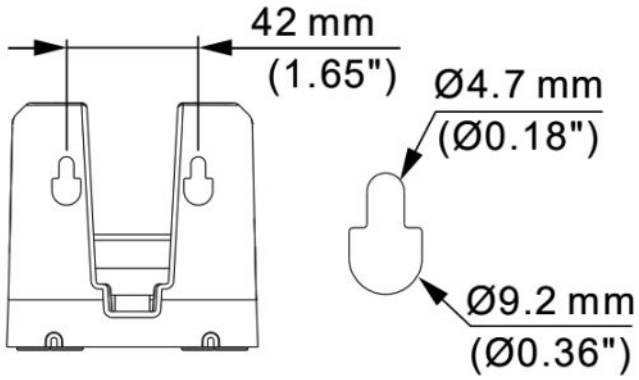

Figure 2-6

3 General System Information

3.1 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. The transmitter powers on when the STOP button elevates.
2. After turning on the transmitter power, check the Status LED on the transmitter for any sign of system irregularities. ***See Section 4.1 on page 18.*** 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. Press and hold both PB1 and PB2 at the same time for 1 second to activate the receiver MAIN relays (Status LED solid green). When the receiver MAIN relays are activated, the Status LED will change from solid green to solid orange (system on). Then press any pushbutton on the transmitter to begin operation. Pressing any pushbutton prior to executing the START command at start-up will result in no signals transmitted (Status LED blinks orange).

   NOTE: *If the Status LED does not change from green to orange, confirm that the serial number and channel match between the transmitter and receiver.*
4. In case of an emergency, press down the STOP button to disconnect the receiver MAIN relays and the transmitter power (Status LED blinks 3 reds and then shuts off). To resume operation after confirming safe conditions are present, rotate the STOP button clockwise or counterclockwise; the button will pop up. Then press and hold both PB1 and PB2 pushbuttons at the same time for 1 second to reconnect the receiver MAIN relays.
5. After 5 minutes of inactivity (pushbutton not pressed) the receiver MAIN relays temporarily disconnect. The Status LED blinks 3 reds and then shuts off. Press and hold both PB1 and PB2 to resume operation.
6. Turn off the transmitter power by pressing down the STOP button. It will disconnect the transmitter power and the receiver MAIN relays altogether (Status LED blinks 3 reds and then shuts off).

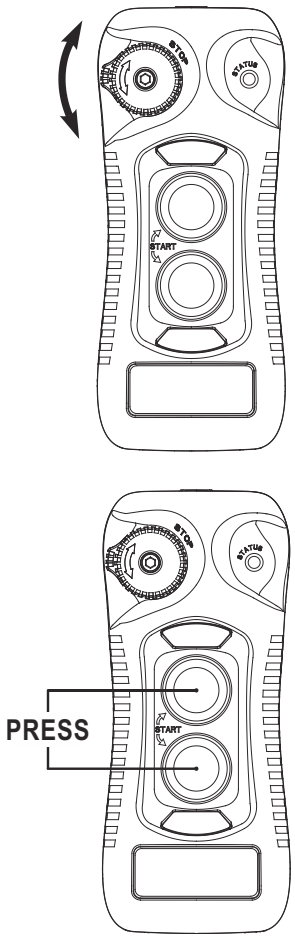

Figure 3-1

3.2 Transmitter

3.2.1 External Illustration

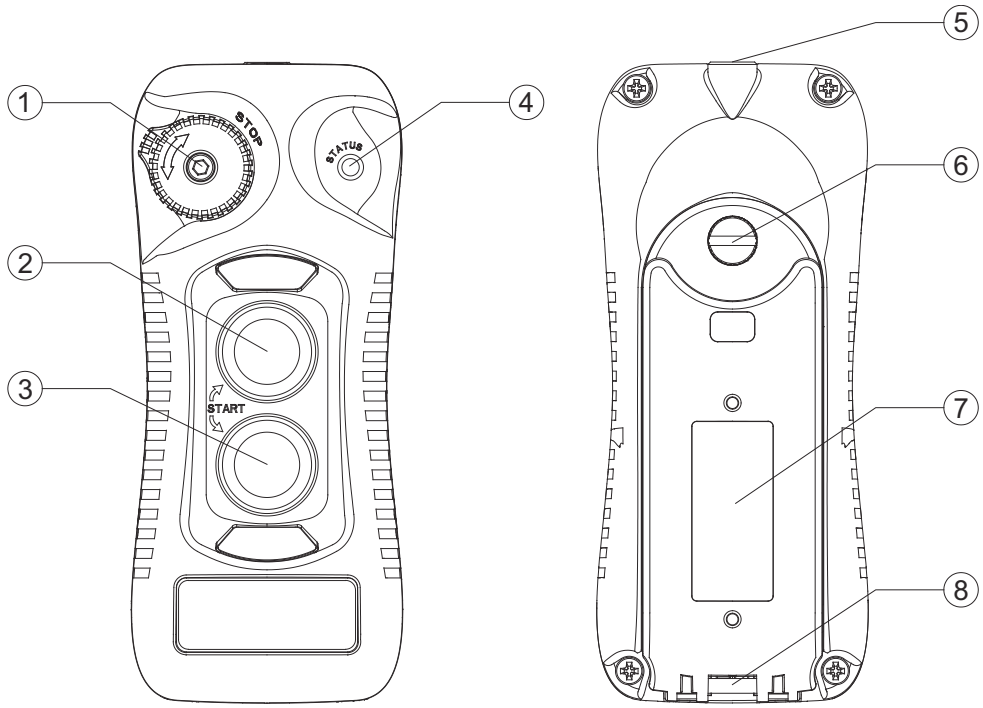

Figure 3-2

1. STOP Button
2. Pushbutton 1 (PB1)
3. Pushbutton 2 (PB2)
4. Status LED Indicator
5. Ring Hook Attachment Slot
6. Battery Cover Screw
7. System Information
8. Lanyard and Waist Belt Attachment Slot

3.3 Receiver

3.3.1 External Illustration

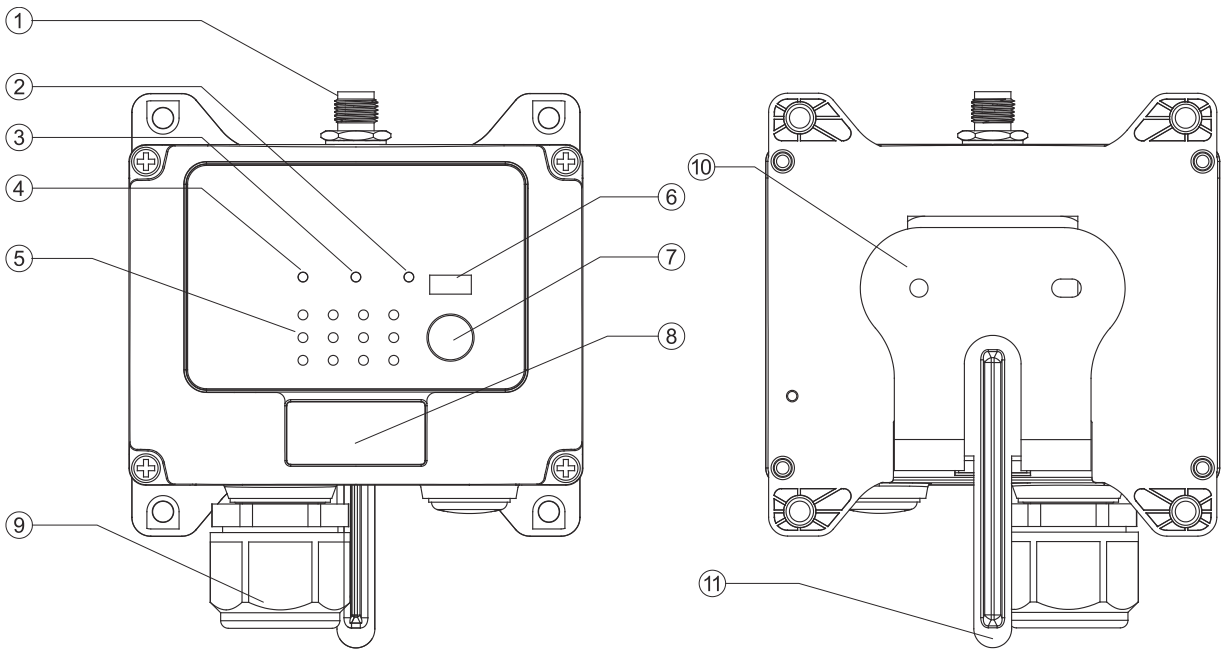

Figure 3-3

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

3.3.2 Output Relay Contact Diagrams

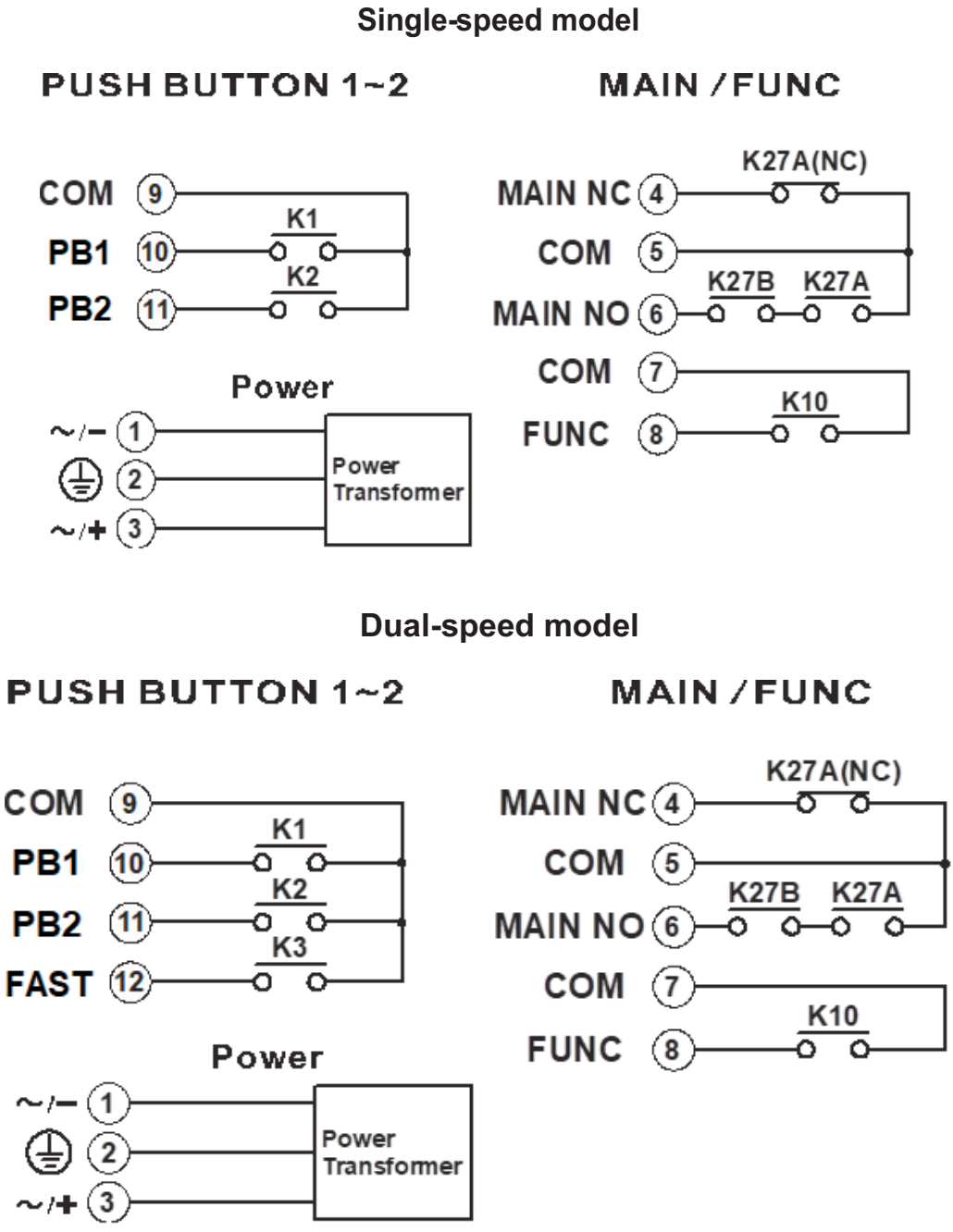

Figure 3-4

- The default operation of the Flex Duo system will have the two pushbuttons configured as a pair to perform as an interlocked motion control with the corresponding output relays set up for momentary contact closure.
- For 9-36VDC power supply, wire #1 corresponds to the negative charge (-), wire #3 corresponds to the positive charge (+), and wire #2 is for GROUND.
- The circled numbers in the output diagrams above correspond to the wire numbers in the harness.
- Suppressors are recommended on contactor, capacitive loads or inductive loads being driven by Flex relays due to the possibility of voltage spikes.

4 System Status Light Indications

4.1 Transmitter Status Indications

Type	Display Type	Indication
1	Solid red	Voltage below 1.8V at initial power on or during operation
2 (FCC)	Solid red → 3 red blinks → off	Voltage below 1.75V during operation (receiver MAIN relays shut off)
2 (CE)	Solid red → off	Voltage below 1.75V during operation (receiver MAIN relays shut off)
3	1 red blink followed by a 2-second pause	Voltage below 1.85V during operation (change batteries suggested)
4A	2 red blinks followed by a 2-second pause	Defective or jammed pushbutton detected at initial power on
4B	No light displayed	When defective pushbutton condition occurs (2 red blinks, type 4A above), find out which pushbutton is defective by pressing all of them one at a time. If the pushbutton is in good working order when pressed, the Status LED is off. If the Status LED maintained 2 red blinks, then the pushbutton is defective.
5	4 red blinks followed by a 2-second pause	Transmitter is unable to lock onto the assigned channel
6	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 (FCC)	3 slow red blinks → off	STOP button pressed down
10	2 orange blinks followed by a 2-second pause	Receiver MAIN relays jammed or defective
11	3 orange blinks followed by a 2-second pause	Decoding processors defective
12	Solid orange when the START button is pressed and held at initial system start-up	Receiver MAIN relays activated

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 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

4.3 Receiver Power Indications

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

4.4 Receiver COM Indications

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

5 General Specifications

Frequency Range:	433.050 MHz - 434.575 MHz
Number of Channels:	62 channels
Channel Spacing:	25 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:	NEMA 4
Enclosure Rating:	IP66
Output Contact Rating:	250VAC/28VDC @ 6 Amps
Transmitter Operating Voltage:	3.0VDC
Receiver Power Consumption:	7VA (max)
Available Receiver Voltages:	9 - 36VDC
	24 - 48VAC
	48 - 240VAC
Operating Temperature:	-25°C - 75°C / -13°F - 167°F
Transmitter Dimension:	130 mm (L) x 55 mm (W) x 40 mm (H) 5.12 in. (L) x 2.17 in. (W) x 1.57 in. (H)
Receiver Dimension:	120 mm (L) x 90 mm (W) x 55 mm (H) 4.72 in. (L) x 3.54 in. (W) x 2.17 in. (H)
Transmitter Weight:	183 g / 6.4 oz (including batteries)
Receiver Weight:	900 g / 2.0 lb (including output cable)

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