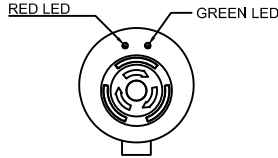


SALES KIT, WIRELESS E-STOP, STICK INCLUDING:

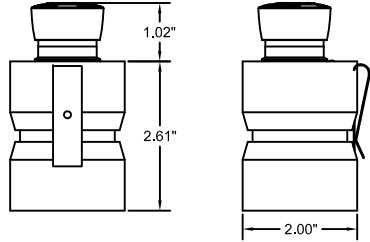
1 TRANSMITTER
1 RECEIVER

Micro USB charger port.
Check orientation before inserting Micro USB charger plug. Do not insert with more than 5 lb. of force. Use approved Kar-Tech chargers.

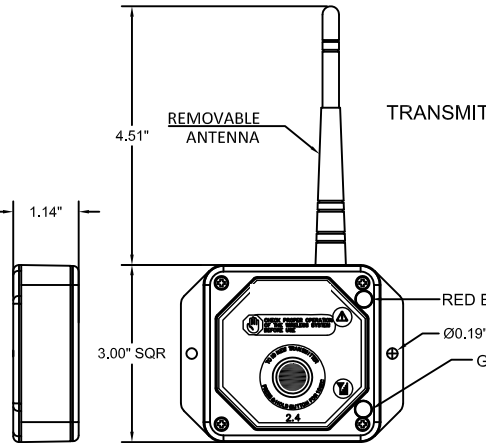


BOTTOM VIEW

Only use approved chargers
WALL CHARGER/ 110-240VAC (B20172A)
CAR CHARGER/ 12-24VDC (B20173B)

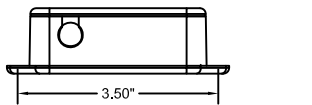


TRANSMITTER, WIRELESS E-STOP STICK, 2.4 GHZ



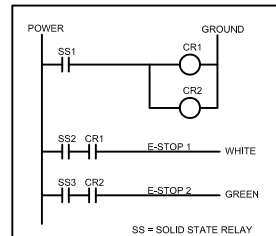
COLOR	DESCRIPTION
RED	POWER (9-30 VDC)
BLACK	GROUND
WHITE	E-STOP OUTPUT 1
GREEN	E-STOP OUTPUT 2

RECEIVER, WIRELESS E-STOP, 2.4 GHZ



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. Changes or modifications not expressly approved by Kar-Tech will void the user's authority to operate the equipment.

CE0700



RECEIVER INTERNAL DIAGRAM

OPERATION:

Up to 10 modules (transmitters or receivers) can communicate with each other simultaneously. For example, there could be 5 transmitters and 5 receivers communicating with each other simultaneously, 9 transmitters and 1 receiver, 9 receivers and 1 transmitter, 2 transmitters and 8 receivers, 2 transmitters and 2 receivers, or more combinations. Under normal conditions, the receiver outputs are ON (shorted to power). When any transmitter's E-Stop is pressed or a transmitter or a vital receiver loses communication, both outputs will turn OFF.

The receiver is designed with three solid-state outputs that control two relays. Two output/relays are for the outputs. The third output provides redundancy, where two outputs or relays need to fail in the ON state in order to have false outputs. Output one turns on when all transmitters have their E-Stop switches released and all vital modules (followers) are normally communicating with the leader. Output two turns on after power is cycled to the receiver and all transmitters' E-Stop switches are released and all vital modules (followers) are normally communicating with the leader. Output two is less permissive than output one. When properly installed, output two is used for additional safety to ensure the equipment will not turn on without cycling power at the receiver.

Note: If multiple transmitters or receivers are taught to the leader, and any transmitter or vital receiver is not present, the receiver will be in an E-Stop condition. If a transmitter or receiver is lost, misplaced or damaged, and you intend to safely operate with fewer transmitters or receivers, you must re-teach the remaining transmitters or receivers to the receiver to normally operate.

For additional redundancy, the transmitter's E-stop switch includes two normally closed contacts, along with the additional output redundancies on the receiver side.

TRANSMITTER SLEEP MODE:

- Transmitter ON time is 7 seconds when not talking to the leader
- In the first 15 minutes the sleep duration is 5 seconds and 7 seconds ON time if E-STOP is released
- Between 15 and 60 minutes the sleep duration is 10 seconds and 7 seconds ON time if E-STOP is released
- After 60 minutes the sleep duration is 20 seconds and 7 seconds ON time if E-STOP is released

Vital vs Non-Vital: The 3A548 RF E-Stop system architecture can have up to 10 "vital" modules. A vital module is any module linked into the system that must be on and communicating for the others to run in normal mode and not go into E-Stop mode. If any "vital" module is turned off, loses power, or goes out of range, all the modules will go into E-Stop mode. All transmitters linked in the system are considered vital, so they all must be on and communicating for the system to be in E-stop mode. Receivers can be set up as either vital or non-vital when they are added to the system. A non-vital receiver will go into E-Stop mode when the others do, or when it loses communication with the others. However, if a non-vital receiver is turned off, loses power, or goes out of range, the other units in the system will keep going with or without it. If a receiver is set up as vital, if it turns off, loses power, or goes out of range, all the other units will go into E-Stop mode. Note that non-vital receivers do not affect the communication, so there is no limit to how many non-vital receivers can be added to the system.

Use case for non-vital receivers: Consider a lab with up to 15 robots, with 6 KILL switches spread around the room, where some but not all robots will be used at any one time. In this situation, each receiver would be made non-vital.

Use case for vital receivers: In a plant with 4 machines and 4 leader kill switches, where the machines must all be functional or there will be backups or other problems (like sequential conveyor belts), the receivers would be made vital so if one machine loses power, the other machines go into e-stop mode.

Leader: The final novel feature of the 3A548 is the ability to have either the standard system that uses one receiver as the Leader, or to be able to assign one transmitter to be the Leader. The leader module is the unit that controls the communication and makes the E-Stop mode decisions. The standard is to use a receiver for it. This is because the leader does more work and uses more energy. If a transmitter is used, it will need charging or battery replacement more often. Typically, receivers don't have this limitation. The key thing to remember when deciding which module will be the leader, is that the leader must be in RF range of all other modules in the system. If a leader transmitter is worn on a belt clip and the operator moves behind a large metal machine, if even one other vital unit's signal gets blocked, the system will go into e-stop mode and everything shuts down. If you have a 1 transmitter to 1 receiver system, they are both needed, so it doesn't matter who is the leader. Note that all the different ways to set up the 3A548 are changeable. If one configuration does not work ideally, you can always try a different one.

LED INDICATORS (LIGHTS):

TRANSMITTER:

- Green blinking fast - normal condition.
- Green blinking slow - the transmitter is not talking to the leader or the leader is not talking to all the transmitters and vital receivers that were synced to it.
- Green off - E-stop pressed and transmitter is off or battery is discharged.
- Red blinking - Low battery.
- Red solid - E-stop pressed on another transmitter or loss of communication

RECEIVER:

- Green blinking fast - normal condition.
- 2 times per second - non-vital receiver is talking to the leader
- 4 times per second - leader receiver is talking to a transmitter or vital receiver that was synced to it
- 8 times per second - vital receiver is talking to the leader
- Green off - the receiver is not talking to the leader or the leader is not talking to all the transmitters and vital receivers that were synced to it.
- Red blinking
 - Solid - E-stop is pressed on the transmitter (assuming synchronized) or loss of communication
 - 1 time - No communication with leader or not synced after ID changed.
 - 2 times and a pause: E-stop pressed at least once on a transmitter or loss of communication
 - 3 times and a pause: Low voltage at the receiver.

SYNCHRONIZING TRANSMITTER(S) AND RECEIVER(S):

Transmitter(s) and receiver(s) are synchronized together at the factory. Total of 10 modules (transmitters or receivers) can be synced together. If a new transmitter or receiver is needed, synchronizing is required. Use the following procedure for each transmitter(s) or receiver(s) synchronization:

- Apply power to a receiver and make sure transmitter battery is not low and E-stop switch is pressed. All other E-stop transmitters (E-stop switch pressed) and receivers must be off.
- Press and hold receiver's push button switch for more than 10 seconds then release (this is the teacher receiver). Both red and green LEDs will start flashing. If syncing any receiver(s) continue if syncing just transmitter(s) go to step 9.
- If the receiver being synced should be vital, press the teacher receiver's push button a second time and hold during ALL the steps below. Otherwise continue without pressing the push button to have receiver be non-vital.
- Apply power to the receiver that is to be synchronized
- Wait until the green and red LEDs stop flashing together on the receiver that is being synchronized. If this does not occur, start over from the beginning and go slow.
- If more than one receiver is to be synchronized, apply power to each receiver one at a time, wait 5 seconds between each receiver making sure to hold the teacher receiver's push button if it should be a vital receiver.
- If only syncing receivers then go to step 12 otherwise continue
- Stop holding the push button on the teacher receiver if it was being held. The LEDs should still be flashing together on the teacher receiver.
- Twist and release transmitter's E-stop switch.
- Wait until the green and red LEDs stop flashing together on the transmitter. If this does not occur, start over from the beginning and go slow.
- If more than one transmitter is to be synchronized, twist and release transmitter's E-stop switch one at a time, wait 5 seconds between each transmitter.
- Teach complete
- Cycle power off to each receiver before normal operation.

NOTE: receiver used to be the teacher in steps 4-11 will be the leader receiver unless the transmitter is made one in steps below. The leader receiver's green LED will blink at different rate, see LED Indicators above. It is recommended that the transmitter only be the leader if there is one total transmitter in the system.

If the transmitter should be the leader follow steps below carefully;

- Follow steps 1-11 above to sync all the wanted receiver(s) and follow transmitter(s) in the system first
- Press and hold the push button on the teacher receiver that has the LEDs flashing together
- Power up the transmitter that should be the leader.
- Wait until the the green and red LEDs stop flashing on the transmitter and the receiver's LEDs start to toggle
- If the teacher receiver should be vital, keep holding the push button on the receiver for the next 10 seconds until the LEDs stop toggling. If the teacher receiver should be non-vital, release the push button and wait till the LEDs stop toggling.
- Teach complete
- Cycle power off to each receiver before normal operation.

SPECIFICATIONS:

RF: 2.4 GHZ - 100 mW
Output Rating: 5A maximum each (sourcing) 20A system maximum
Battery Life between each charge: 16 hours of normal operation
80 hours with E-stop switch released and receiver is off
Receiver Supply: 9-30 VDC, ≈15 mA standby, ≈45 mA Active.
Environmental: Transmitter: -20C to +60C Receiver: -40C to +85C Vibration: 3G to 200Hz