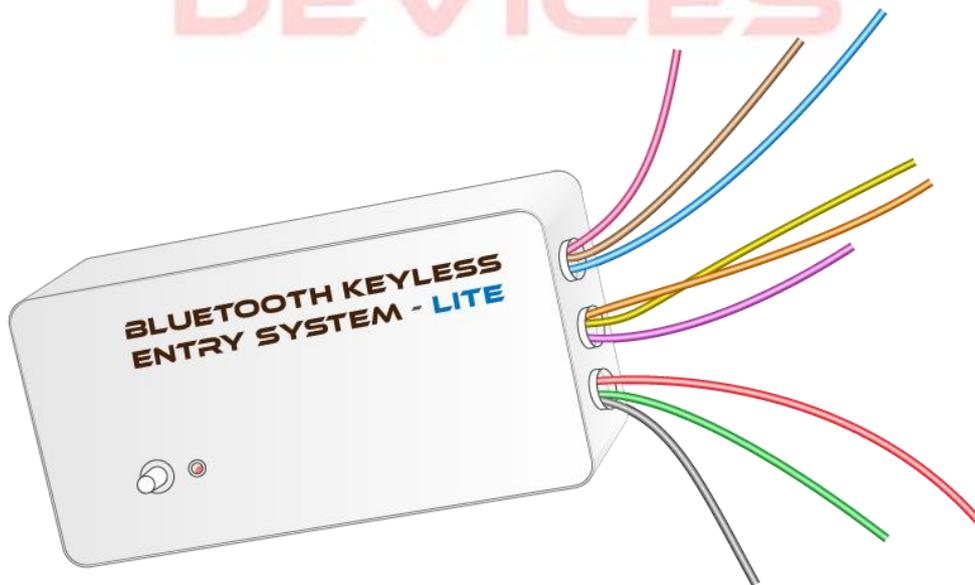


Bluetooth Keyless Entry System - Lite

Installation and operation manual



DISCLAIMER: To aid users during the installation process, WE STRONGLY RECOMMEND THAT THIS MANUAL IS READ FIRST before beginning the product's installation. This manual is designed for individuals that have previous automotive and electrical understanding and feel able to test and connect wires for proper installation and operation. This product is meant to be professionally installed into a vehicle in which all systems and necessary components are in perfect working condition. Warranty will not cover DAMAGE resulting from improper installation or failure to follow supplied guidelines. In case such DAMAGE does occur, repair or replacement charges will apply. Instructions are provided as a GENERAL GUIDELINE as vehicles' electrical systems differ and the information provided here may not entirely apply. **[SM]Devices** and its vendors cannot be held liable for any accident resulting from the use of this product. If after reading these instructions you do not feel sufficiently skilled to install this product safely, we suggest you have it installed by a professional instead.

1. INTRODUCTION.

The **Bluetooth Keyless Entry System – Lite (BKES-L)** has been designed to function in any vehicle, regardless of its fuel type, manufacturer, model, manual or automatic transmission. This is a complete product, no additional aftermarket components required. Before starting the installation you should take into consideration the followings:

- It requires basic knowledge on how electric components work and how they communicate each other.
- Minimum experience on how to identify wires with their scope, and how to connect/solder between them.
- Additional wire diagrams related with locking system that your vehicle has, comes in hand but they are not mandatory.
- Determine a suitable location where **BKES-L** will be placed.
- Tools like multimeter (voltmeter and ohmmeter) can help you identify wires and connections, and can perform partial tests on **BKES-L** functionalities.
- Make sure your vehicle is in good condition, meaning no engine warnings, weaken battery or damaged electrical system.

2. OPERATION.

BKES-L is meant to work with any Bluetooth enabled device, like phones, tablets, laptops, notebooks, PDAs, headsets, ear headsets etc. Once registered with **BKES-L**, the device works as keyless entry system. Meaning, the vehicle will unlock when device is in range and lock when device goes out of range. Or simply sitting next to your vehicle, by enabling or disabling Bluetooth on the registered portable device. **BKES-L** can work with only one Bluetooth device at a time. The typical lock/unlock range is about 20m (65ft), but may depend on your device Bluetooth's signal strength. We have seen 5m (16ft) range but we also have seen 70m (230ft). There are two ways for **registering** your Bluetooth device with **BKES-L**:

- By pressing search button.
- By performing the search pattern using the ignition key.

The **BKES-L** knows when ignition key is inserted. Switching the key between neutral and IGN (ACC 2) five times in a period shorter than 5 seconds will trigger the register mechanism. This is useful when the **BKES-L** is installed in a less accessible place and you are unable to press its search button. For instance, the most common place for **BKES-L** installation is inside driver's door.

Once the search action is invoked, the **BKES-L** starts searching for any nearby Bluetooth device. The LED will blink green and you'll hear a beep each second that passes for the entire search period. The search period lasts about 48 seconds. During this time, make sure your mobile device has Bluetooth ON and it's visible/discoverable (very important!). When your device is being found, the **BKES-L** will stop the search phase, LED will turn solid green and you'll hear two short beeps. At this point, your mobile device is registered with **BKES-L**. In the case where your device has not been found, the LED will turn solid red and you'll hear a long beep (two seconds). Check your mobile device for Bluetooth configuration (enabled and visible) and try again by re-invoking the register method. If you still have problems, check the section **5. Troubleshoot**.

Note: the **BKES-L** does NOT make any pair to your device. Its Bluetooth will not be seen in your near Bluetooth devices list using a smartphone, for instance. For safety reasons, it's permanently undiscoverable.

Table 2-1. States of **BKES-L**

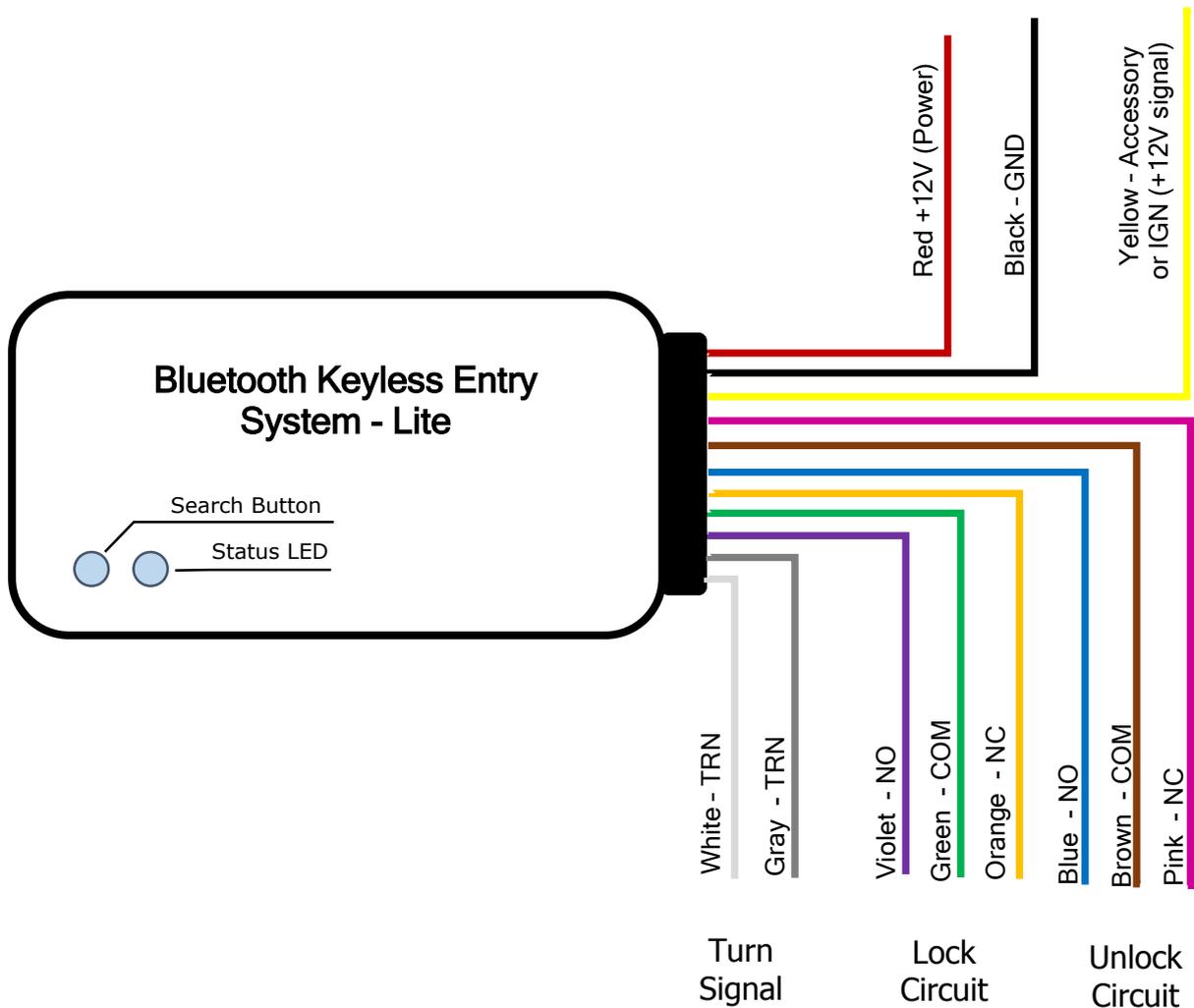
Behavior	State
LED blink red.	BKES-L is initializing.
LED solid red.	No Bluetooth device registered.
LED blink green, beeps every second.	BKES-L is in searching phase.
LED solid green.	Bluetooth device registered.

3. PRODUCT DESCRIPTION AND SPECIFICATIONS.

3.1. Harness.

BKES-L uses two standard relays in order to trigger locking or unlocking mechanism of your vehicle, using its central locking system. Depending on the vehicle, different wiring setup is being used. This product is not meant to be wired to the actual locking motors or any other high current (high amperage) circuits. All modern cars have a central locking system which takes logical inputs (low current) to trigger locking or unlocking mechanism.

BKES-L does not replace your current locking system and does not conflict with any existing vehicle alarm system. Correctly installed, this device will work as an additional locking/unlocking system.



3.2. Physical and electrical properties.

The table below specifies physical and electrical properties for the device. Make sure you don't exceed electrical parameters, specially the relay switching power.

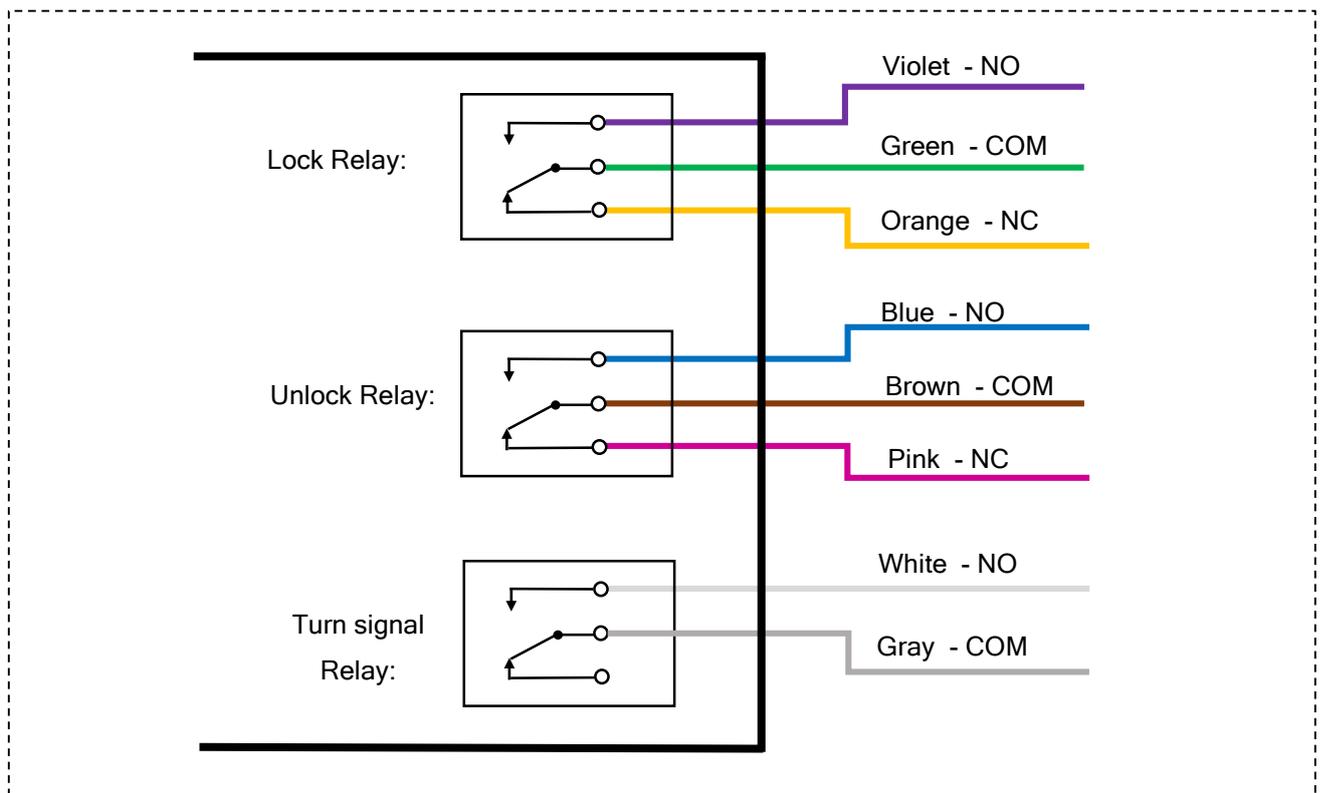
Table 3-1. **BKES-L** physical and electrical properties.

Name and Description	Parameter Range
Typical power consumption	22mA @12V
Operational Voltage	6 – 38V
Working temperature	-20°C - 85°C
Max relay switch voltage	24V
Max wire amperage	6A
All relays max switch power	25A
Lock/unlock pulse duration	700ms
Dimensions in millimeters (width, height, depth)	80x20x40
Typical Bluetooth range	20m (65ft)

3.3. Relay wire connectivity.

In order to cover a wide range of vehicle locking system types, two standard relays are being used. One for lock and one for unlock. In idle, the COM wire is connected to the NC wire. When the relay is activated, COM is being disconnected from NC and gets connected to the NO wire. After 700ms, the relay returns to idle, by disconnecting COM from NO and reconnecting it to NC.

Additionally, the turn signal relay can be used to notify the driver (through turn signal lights) when the car gets locked or unlocked.



The function of turn signal wires (gray and white) can be reversed and used as needed. Note that there is one single relay/circuit to handle all turn signal lights. If the vehicle has two different circuits for Left and Right, you can connect them to this relay but make sure there are used in conjunction with two high power diodes.

4. INTERFACE WITH PLUG AND PLAY HARNESS INSTALLATION GUIDE.

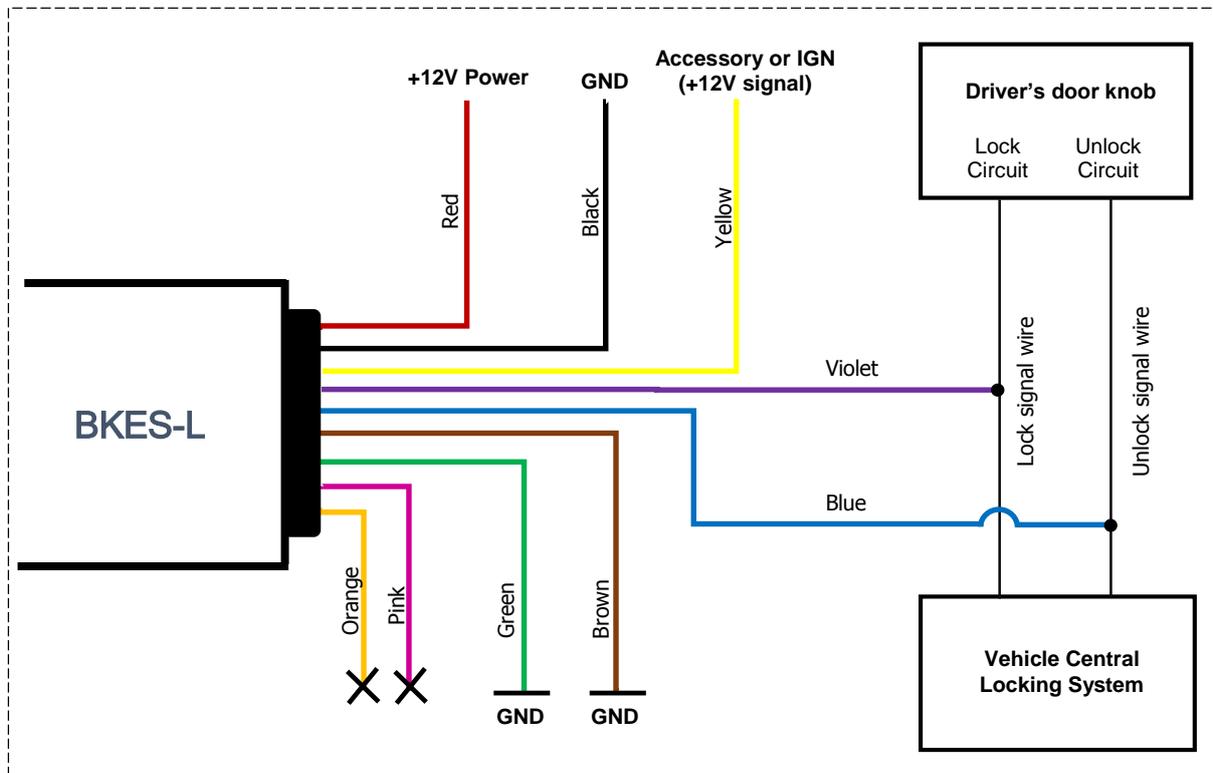
Before connecting any wires you must determine the type of locking system your vehicle has. Incorrect connection can result in damage to the **BKES-L** and/or vehicle locking system. Typical locking systems are described below:

- **Ground (negative) Trigger.** Locking Systems are driven using a ground pulse that comes from door or wireless key module. Initially the input is neutral (not connected) and when an action is invoked, a short GND signal is sent on corresponding lock or unlock circuit.
- **+12V Positive Trigger.** Similar with Ground Triggers, but uses a +12V pulse instead of ground pulse.
- **Polarity Switch.** Locking Systems are driven by switching polarity from GND to +12V (or other way around) on the corresponding lock or unlock circuit.
- **Vacuum System.** There is a selector valve in the driver's door which routes vacuum to one circuit and simultaneously vents the other circuit to the atmosphere. The atmospheric pressure entering the vented circuit acts against a diaphragm and moves the actuator to the selected position. A vacuum reservoir is provided to allow several lock/unlock cycles while the vacuum pump is not in operation.
- **Data Bus.** Data messages are sent over an internal network, usually CAN or IEBus (AVCLan). In order to have a functional system with **BKES-L**, additional components are required in order to interface the regular relays with data bus endpoints.
- **Voltage Level.** On the same wire, different levels of voltage, one for lock and another one for unlock.

NOTE: do NOT connect **BKES-L relays to high current wires that controls or powers the lock/unlock motors (actuators or solenoids). If you need to control high power motors you need additional relays that will resist high amperage requirements. These high power relays can be controlled directly by the **BKES-L** signal relays.**

4.1. Ground (negative) Trigger.

This is the most common type of locking system. The door knob sends a short pulse, low current, in one of two different circuits, one for lock and the another one for unlock.



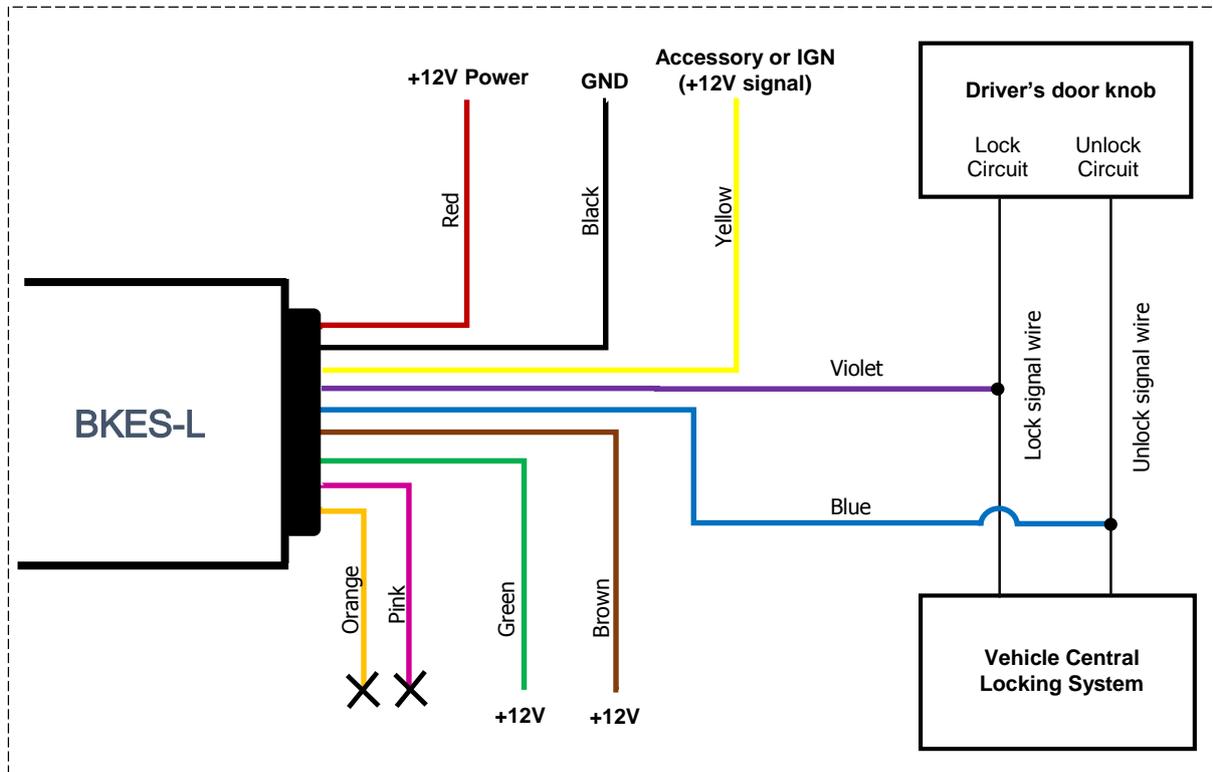
The device must be attached to the lock and unlock wires that comes from the driver's door knob. The central locking system usually is placed under driver's dashboard, but it can be located as well under the glove box or even inside the driver's door. You must identify those two wires (circuits) that connects the door knob and the Vehicle Central Locking System.

Using provided T-Taps connectors you must connect **Violet** wire to the Locking circuit and the **Blue** wire to the Unlocking circuit. If a soldering station is available, the wires can be soldered directly, but make sure you have a perfect electrical insulation. No wires requires to be cut.

Note: most vehicles have in their Central Locking Systems a reserved connector made especially for external (aftermarket) devices, like **BKES-L** or Vehicle Alarms Systems. In this case, you can connect **BKES-L** wires directly to it, without attaching to driver's knob wires.

4.2. Positive (+12V) Trigger.

This locking system is similar with Ground Trigger, but instead of GND signal, this version uses +12V signal. The door knob sends a short pulse, low current, in one of two different circuits, one for lock and the another one for unlock.



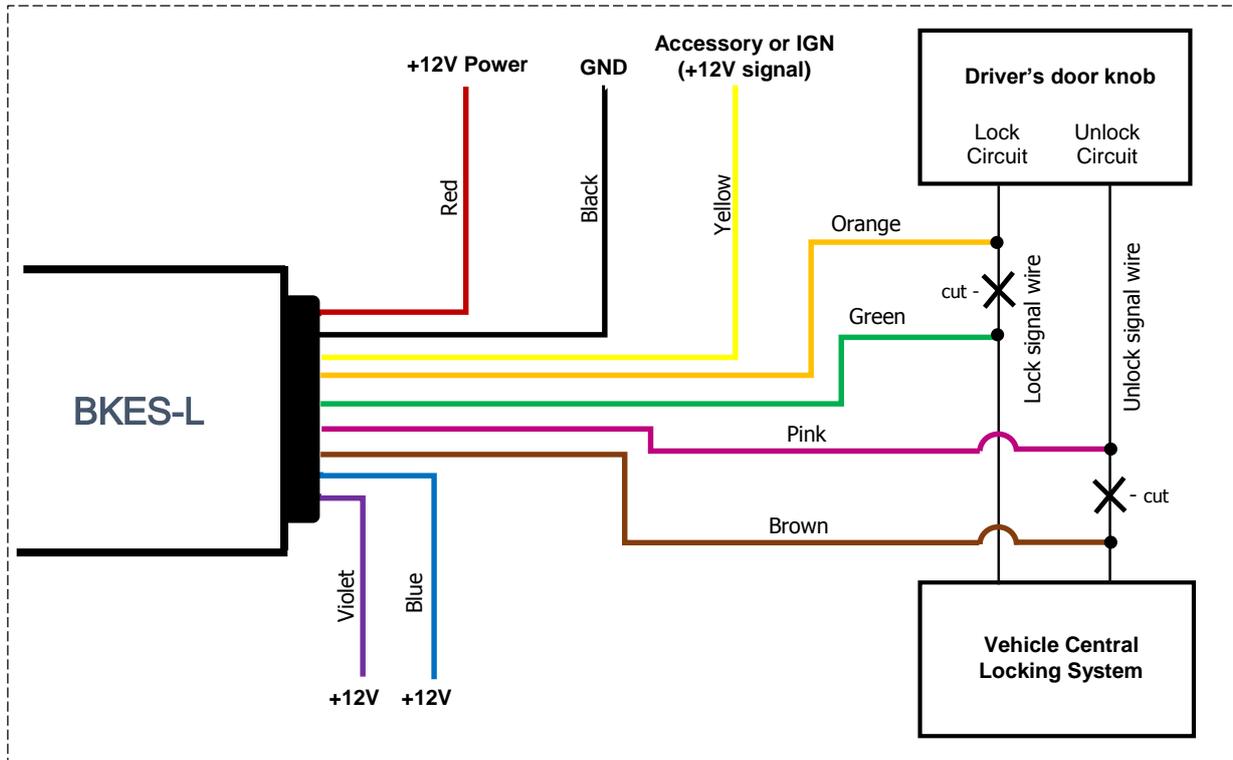
The device must be attached to the lock and unlock wires that comes from the driver's door knob. The central locking system usually is placed under driver's dashboard, but it can be located as well under the glove box or even inside the driver's door. You must identify those two wires (circuits) that connects the door knob and the Vehicle Central Locking System.

Using provided T-Taps connectors you must connect **Violet** wire to the Locking circuit and the **Blue** wire to the Unlocking circuit. If a soldering station is available, the wires can be soldered directly, but make sure you have a perfect electrical insulation. No wires requires to be cut.

Note: most vehicles have in their Central Locking Systems a reserved connector made especially for external (aftermarket) devices, like **BKES-L** or Vehicle Alarms Systems. In this case, you can connect **BKES-L** wires directly to it, without attaching to driver's knob wires.

4.3. Polarity Switch.

For this type of locking system, two wires requires to be cut. This will not affect the original vehicle locking mechanism. This will simply run as parallel locking/unlocking device.

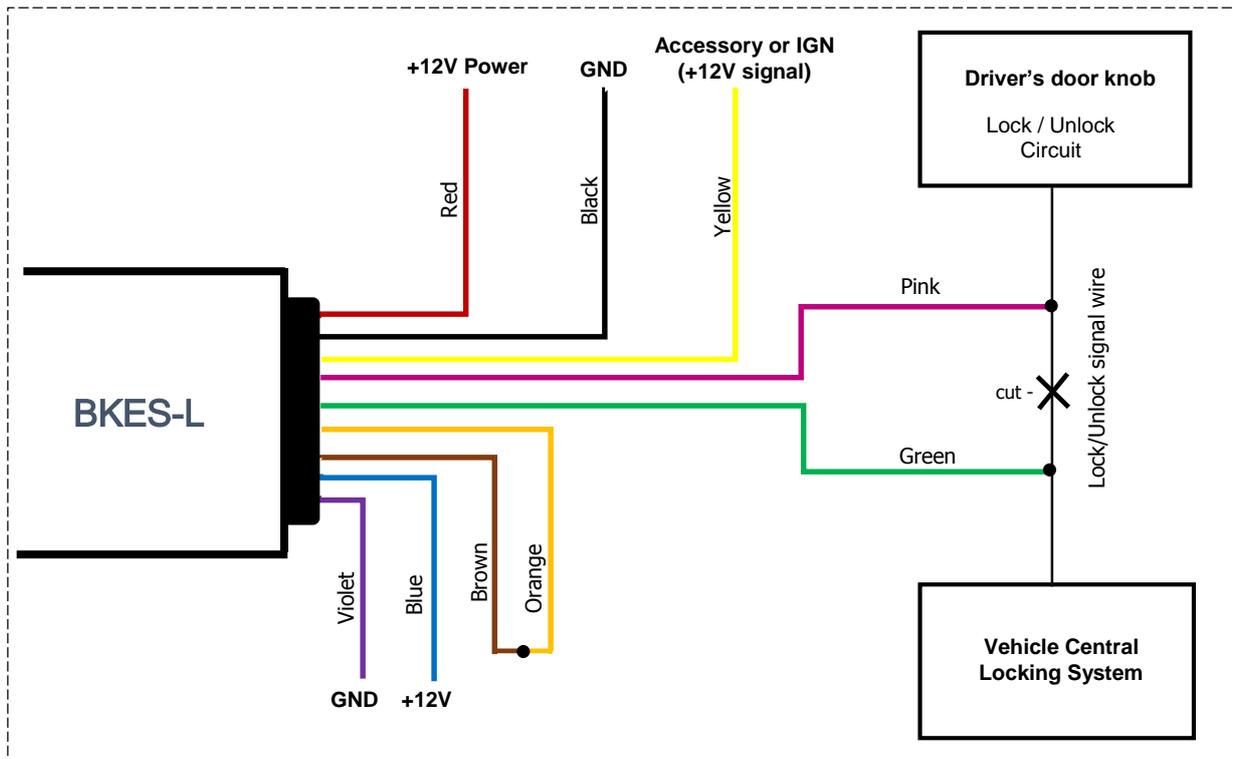


The device must be attached to the lock and unlock wires that comes from the driver's door knob. The central locking system usually is placed under driver's dashboard, but it can be located as well under the glove box or even inside the driver's door. You must identify those two wires (circuits) that connects the door knob and the Vehicle Central Locking System.

Note: do NOT connect BKES-L relays to high current wires that controls or powers the lock/unlock motors (actuators or solenoids). If you need to control high power motors you need additional relays that will resist high amperage requirements. These high power relays can be controlled directly by the BKES-L signal relays.

4.4. Vacuum System.

This is rather rare type of locking system that uses vacuum pumps in order to lock or unlock the vehicle. Even though, this mechanism can be controlled through a command electric wire.



The device must be attached to the lock and unlock wires that comes from the driver's door knob. The central locking system usually is placed under driver's dashboard, but it can be located as well under the glove box or even inside the driver's door. You must identify the wire (circuit) that connects the door knob and the Vehicle Central Locking System.

Note: do NOT connect BKES-L relays to high current wires that controls or powers the lock/unlock motors (actuators or solenoids). If you need to control high power motors you need additional relays that will resist high amperage requirements. These high power relays can be controlled directly by the BKES-L signal relays.

5. TROUBLESHOOT.

1. I'm using a smartphone and I'm unable to find the BKES-L's Bluetooth on my nearby Bluetooth devices list.

The **BKES-L**'s Bluetooth is not visible to any other Bluetooth enabled device. It only searches for others. Its visibility will always be off.

2. The device is not working, the LED is off and it makes no sound.

Makes sure you have the correct wires and voltage available for the device. Use a voltmeter to verify that you have a proper +12V power supply and a solid ground. Connect the device with minimum required harness: Red wire on +12V and Black wire to GND. The LED should blink red for a few seconds, then it should turn solid green or solid red, depending on whether you have a synced mobile device (green) or no device has been synced (red).

3. I'm pressing the search button, but nothing happens.

Sometimes it takes a couple seconds in order to trigger the command. Be patient and the device should enter in search mode in a few seconds, by blinking LED green and making repetitive sound pulses. If this is not working, try to trigger the search command using the key pattern method. This is done by switching ignition key between neutral and IGN (ACC 2) five times in a period shorter than 5 seconds. If you don't have the Yellow wire connected to IGN, you can simulate the same behavior by manually connect and disconnect the wire from the +12V. This should trigger the search command.

4. I'm pressing the search button, the device starts the search procedure, but after approx. 1 min the LED turns solid red, makes a long beep and no device is synced.

It means that **BKES-L** is unable to find your Bluetooth enabled device. Make sure your device has Bluetooth enabled and it MUST be in discoverable (visible) mode. You can check this with a second Bluetooth device (like a smartphone) if your first device has a visible Bluetooth or not. Now, press **BKES-L**'s search button (or perform the accessory key pattern). The **BKES-L** should enter in search mode and should find and sync with your device. Note that no actual pairing is being made. For instance, you won't see the **BKES-L** on your smartphone. After the sync is done (the LED turns solid green), you can close the visibility of your device, and the **BKES-L** will still work (which is also recommended).

5. I'm pressing the search button, the BKES-L finds my device, but I'm unable to lock or unlock my vehicle.

This is because there are multiple Bluetooth enabled devices in the area and the **BKES-L** gets synced with other than yours. Make sure your device is the only one near the **BKES-L**. Avoid parking your car near other vehicles, some of them may already have Bluetooth for different kind of applications. You can use a smartphone to search any nearby unwanted devices. If you can find any, drive your vehicle elsewhere, far from any other unwanted Bluetooth device.

6. I have synced my device with BKES-L, I can hear two beeps when I'm enabling or disabling Bluetooth from my mobile device, but no vehicle locking or unlocking is actual triggered.

Make sure you have correctly wired **BKES-L's** harness, accordingly with your central locking system (i.e.: not wiring as Polarity Switch instead of Ground Trigger). You may try to trigger the locks and unlocks using only vehicle's harness, by making temporary direct connections between wires. If this works then you can proceed connecting the wires to the **BKES-L** relays, as described in section "3.3. Relay wire connectivity."

Note that the device doesn't lock or unlock while the engine is ON, or if the ignition key is in ACC II. If the IGN wire (Yellow) is detecting permanent +12V it will prevent any lock or unlock. This is a safety measure in order to avoid locking or unlocking while driving. Turn the engine OFF and remove the ignition key. Verify if the device works properly. If the behavior is still the same, it means that the IGN wire has been wired incorrectly. Disconnect the IGN wire and let it open. This should fix the problem. You can let the IGN wire unconnected but it will remove the protection while driving and you will not be able to trigger the search phase using ignition key pattern (remains only the physical search button from the **BKES-L**).

7. I'm driving along and some time to time I'm hearing two beeps from BKES-L.

It means that the **BKES-L** is losing signal from your device. Either the battery from your device is low, or your device has a power saving mechanism where it controls the power of your Bluetooth. Since the **BKES-L** doesn't make any actual pairing, some devices closes the Bluetooth after a period of inactivity. Try to configure your device not to use power saving methods that cuts the Bluetooth.

Another possible reason is the placement of **BKES-L** inside your vehicle. If is placed in a metal shielded environment, this will affect Bluetooth signal quality. Using longer harness, try to move the **BKES-L** in a Bluetooth (radio) friendly place.

8. I'm using iPhone and the Bluetooth goes off (and locks the vehicle) when my phone enters sleep.

Most iPhone devices shuts down the Bluetooth if no pairing has been previously made. Since the **BKES-L** doesn't make any pairing, the iPhone feels free to close its Bluetooth in order to preserve power. The solution is to pair your iPhone with any other Bluetooth device (like another iPhone, headset, iPad etc.). Once the pair is available, even if the paired device is no longer present, your iPhone Bluetooth will remain powered through sleep period as well.

9. The BKES-L worked for a period of time, but now is unable to detect the presence of my device.

The **BKES-L** does not forget your device Bluetooth identification. When is unable to detect your device in its range, is usually due to a change in the device name string. Since the **BKES-L** verifies both Bluetooth MAC and synced device name, this will fail to recognize it. In order to fix this, you must re-sync it using **BKES-L** search method.

10. How can I avoid any hacks on my BKES-L device?

Once your device is synced, the **BKES-L** searches the presence of it by checking its unique Bluetooth MAC address AND the device name altogether. If any of these two don't match, the vehicle will never get unlocked. Make sure your device is having the Bluetooth visibility turned off. Meaning no other bad-intentioned device should be able to find the presence of your own device. Once synced, **BKES-L** is able to identify your device even if it's hidden. The **BKES-L's** Bluetooth is permanently hidden (undiscoverable) as well, therefore it's impossible to find its presence. If you have the feeling that your device Bluetooth identification (MAC and device name) has been compromised, you can change the device name with any other name and re-sync with **BKES-L**. After that, make sure you turn off the Bluetooth visibility. In this manner, your device identification is safe.

11. If I remove the battery from the vehicle, does my device get forgotten?

No. The **BKES-L's** stores your Bluetooth device identification in a non-volatile memory.