

Solidremote

402U Wireless Receiver

Installation Manual

Edition_A1

Thank you for purchasing Solidremote 402U standalone receiver with *SolidAdvantage*.

Familiarise yourself with the following instructions prior to commencing setup. Store this information in a safe place for future reference.

Part of 4th generation 40X receiver family, 402U is by far the best 2Ch wireless receiver made by us. It is our first receiver built with *STEP concept* from the ground up to easily provide optimum security and performance for tons of applications.

Brand new TrioAES 433 code plus frequency dual hopping technology is implemented as a solid RF platform, with advanced features loaded such as remote learning, X mode, smart alert, smart range, flexible expansion port and built-in beeper.

The best part is, you can control the whole system

in a breeze, by straightforward LED segment display and DIP switches.

This makes our receiver perfect for controlling a variety of home automation devices such as garage door openers, motorized gates, lifts, lights, alarms plus much more where security matters.

At a Glance

402U wireless receiver has two relays on board which provide normally open (NO) dry contact for controlling virtually any electronic device. Both independent relays can be programmed to any of three modes - pulse, hold or latching.

Two additional external relays can be expanded for advanced users (see [6X Expansion Ports](#) section).

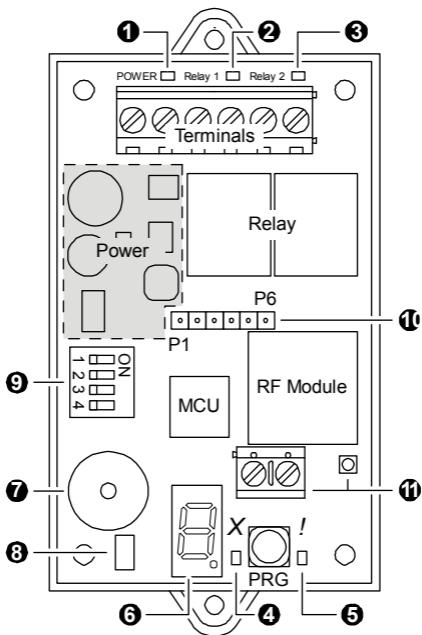
Compatible Transmitters

402U Rev. A receiver works with all Solidremote **TrioAES 433** mainstream transmitters and **TrioAES 433-X** transmitters with eXtended range.

With Solidremote's TrioAES technology, traditional code grabbers are blocked outside because our RF code and frequency change continuously in transmission. In addition, with over 87 duodecillion (8.7×10^{40}) codes, the chances of ever repeating a code are virtually non-existent.

Furthermore, every transmission is protected by AES encryption algorithm, which is adopted by the U.S. government and used worldwide due to its high security.

Receiver PCB Feature Map



Remove top cover of the receiver to access DIP switches, beeper on/off jumper and antenna ports.

Part #	Description
① Power	ON - Receiver is up and running
② Relay 1	ON - Relay 1 activated
③ Relay 2	ON - Relay 2 activated
④ X <i>eXtended</i>	Steady ON - Receiver is in X mode Flashing - X transmitter working
⑤ ! <i>Smart Alert</i>	Flashing - Receiver has detected and blocked a RF replay attack, it's likely someone nearby is hacking using code grabber if this has happened multiple times. Alert will only turn off when receiver is powered off or reset.

<p>⑥</p> <p>7-Segment Display</p>	<p>ON - Entered programming, erasing or reporting # mode</p> <p>† In following pages, <i>LED</i> refers to <i>7-segment LED display</i> unless otherwise specified.</p>
<p>⑦</p> <p>Beeper</p>	<p>Serving as audio aids, beeper will usually sound when LED changes. It can be particularly useful when receiver is placed out of sight.</p> <p>Open ⑧ <u><i>Beeper SW jumper</i></u> if you would like to disable it, keep jumper in a safe place for future use.</p>

⑨ DIP switches for mode and function control

⑩ 0.1" pitch, refer to *6X Expansion Ports* section

⑪ Antenna connectors, terminal block and u.FL

Setting Relay Operating Modes

Pulse Mode – Relay contact is active whilst transmitter button is pressed, min. active period is 0.5 seconds, also known as *momentary / M*

Hold Mode – Relay changes state at each press of transmitter button. Hold, Release, Hold etc. (like an on/off switch), also known as *toggle / T*

Latching Mode – Relay maintains its state after being activated by corresponding transmitter button, until transmitter's next command is received.

It looks like two relays interact with each other on 402U receiver, relay 1 on then relay 2 off, relay 2 on then relay 1 off.

An ~300ms delay is implemented by design to ease relay off to on transition in latching mode.

Advanced working modes such as timed output and sequenced output are possible via ODM order.

DIP # 1	ON	ON	OFF	OFF
DIP # 2	ON	OFF	ON	OFF



Relay 1	Pulse	Hold	Latching	Pulse
Relay 2	Hold	Hold	Latching	Pulse

† Relay 1&2 are two onboard relays, while relay 3&4 are virtual relays which follow relay 1&2's operating mode respectively ($3 \rightarrow 1$ / $4 \rightarrow 2$), except for latching mode, where any transmitter button controlling relay # >2 will turn off both relays 1&2. *For example, if you assign transmitter button C to virtual relay 3, since $3 > 2$ so button C will turn off both relays 1&2 in latching mode.*

Storing, Erasing & Reporting Remotes

Press and release **PRG button** on receiver board to cycle through programming, erasing and reporting modes, LED segment display will change to indicate the current working mode.

After every mode change, LED's dot will flash around 10 seconds. If no valid transmitter button is pressed during this period, receiver will exit to normal working mode, followed by LED turned off immediately.

Solidremote's *Smart Range* feature automatically limit receiver's range during programming & erasing (except in remote learning), this is to avoid interference from unwanted transmitters far away.

Storing / Programming Mode

LED	Usage
1	Number on left side indicates which relay you would like to program into.
2	<i>1&2 are for two onboard relays, while 3&4 are for virtual relay ports, see <u>6X Expansion Ports</u> section for usage on latter</i>
3	
4	
	<ol style="list-style-type: none">1. Press the transmitter button you would like to use to control the device channel until LED dot flashes quickly, indicating that the button has been stored.2. Release transmitter button.3. If you would like to program another button to same relay #,

repeat the above steps 1-2.

4. Wait 10 seconds until receiver LED turned off, you can press the transmitter button to test operation.

A

A (ALL) is for whole transmitter learning instead of button by button, storing procedure is same as above steps 1-4, except for that press any transmitter button will memorize the whole transmitter, then button will control respective relay A→1 B→2 C→3 D→4 automatically.

It's preferred method if you would like to store many transmitters efficiently.

Make sure antenna installed before programming

Erasing Mode



Press any button on transmitter will erase all memorized buttons on that transmitter.

LED dot flashes quickly indicates that all codes associated with that transmitter are now erased.

Reporting # Mode



No transmitter is required under this working mode

Wait 10 seconds while LED dot flashes, then it will show how many memory slots are occupied by now.

For example, 12 slots used will

display as 1 .. 2 .. LED OFF

Code Learning Behaviour

1. Receiver will only learn the code of a particular transmitter button once, also one relay can only be controlled by one transmitter button on a particular remote (strictly one to one relationship). If you try to code new transmitter button in a way not following above rules, then receiver will simply discard all previous codes *related*, only keep the latest one.
2. 402U Rev. A has 80 memory slots in total, if you attempt to store new transmitter button when memory is already full, it will be refused by receiver along with LED showing F for 1 second then turn off, you must erase old codes before proceed, refer to [Reporting # Mode](#) to check currently used slots.

Erasing All Stored Transmitter Codes

1. Turn power off to receiver.
2. Press and hold **PRG button**.
3. While **holding PRG button** turn power back on, LED will count down from 5 to zero in 5 seconds. After that LED will show flashing E while erasing in progress, LED will turn off after all receiver memory has been cleared, usually seconds later.
4. Release **PRG button**. All stored transmitter codes should now be erased.

Confirm this by pressing transmitter buttons previously used to operate the receiver, there should be no response.

Remote Learning Procedure


Remote learning makes it easy for you to store new transmitters over-the-air, without touching PRG button on receiver, it is particularly useful if receiver is located somewhere difficult to access.

DIP # 3 must be turned ON to enable remote learning feature, remote learning is disabled by default to provide maximum security.

You will need at least one transmitter that is *already programmed*, serving as *master transmitter*, before proceed to programming steps below.

1. Press ASSOC button on *master transmitter* for one second then release, *ASSOC button is usually A+B pressed together on TrioAES 433 transmitters.*

2. Within 5 seconds, press ASSOC button again for one second then release.

3. LED will turn on to show  with flashing dot.

4. Within 10 seconds, select relay channel for programming by pressing an *already assigned button on master transmitter* for one second then release. LED will show selected channel number.

For example, if button A on master transmitter is assigned to relay 1, then press A here makes all new buttons programmed to relay 1 in step below.


5. Within 10 seconds, press new transmitter button you would like to use for one second then release.

6. Repeat step 5 above if you would like to learn other transmitters.

7. Receiver will exit remote learning mode if no valid transmitter button pressed within 10 seconds.

X Mode Introduction

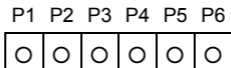
X (eXtended) mode is designed to achieve even better range and stability by fine-tuning receiver to increase sensitivity by 4dBm.

 X mode works with ***TrioAES 433-X*** transmitters only, using it on TrioAES 433 transmitters will result in extremely worse range.

DIP # 4 must be turned ON to enable X mode, only turn on DIP # 4 when you solely use X mode transmitters with receiver, default setting is OFF.

† Switching DIP # 4 will also cause receiver to reset and become unresponsive for approx 1.5 seconds, X LED indicates current X mode on/off status after auto reset completes.

6X Expansion Ports



Port #	Function
P1	+5VDC output, up to 150mA current
P2	Virtual relay (P2→R3 / P3→R4) <i>active low</i> transistor ground output, max 300mA sunk each port
P3	
P4	0V GND
P5	Onboard relay limit switch input (P5→R1 / P6→R2), relay releases when port connected to P4
P6	

† Make sure you know how it works before using, or it may cause unexpected results or damage.

Technical Specifications

Power Supply Voltage: 9-28V AC¹ or 9-40V DC

Standby Current: 21mA at 12VDC / 11mA at 24VDC
/ 9mA at 30VDC

Working Current: +60mA each activated relay at
12VDC / +40mA beeper sound at 12VDC

Frequency: 3 frequencies hopping near 433MHz

Memory Capacity: 80 transmitter button codes

Antenna Connector: 22-14AWG screw terminal or
industry standard u.FL² (50 Ohms imp.)

Output Type: Form C relay³ / 10A at 14VDC or
125VAC

Working Temp: -4°F to 131°F (-20°C to 55°C)

Relative Humidity: 5% to 85% noncondensing

Operating Altitude: up to 6561 ft (2000 m) AMSL

Weight: 0.16 lbs. (0.07 kg)

Physical Size: 3.82"L x 1.98"W x 1.24"H (9.7cmL x 5.04cmW x 3.14cmH)

Power & Relay Terminals: 10A screw terminals / fit 22-12AWG wire with min. 6mm stripped


Beeper: 85dB sound level at 10cm distance⁴

1. If you're using transformer to get AC power, make sure measure the real voltage output of transformer before use, since sometimes a labelled 24VAC transformer can get you 30VAC due to mains voltage fluctuation and transformer error.
2. Never connect antenna to both connectors.
3. Only NO & COM pins of each relay are available via screw terminals.
4. Don't put beeper too close to ear, as >85dB may cause permanent damage to your hearing.


Basic Installation Guidelines

Installation plays an important role in achieving optimum performance, here are some recommendations that may help.

1. Mount the receiver in a location where it is not exposed to weather or moisture, and where it is not surrounded by metal. Metal will block RF signal, resulting in a perhaps significantly reduced range.
2. For best range, pull the antenna wire as *long and straight* as possible. If the receiver receives interference from local RF activity (e.g. airport or military base), the antenna wire can be folded. **DO NOT CUT OR LENGTHEN THE ANTENNA WIRE**
Remote distance can be further improved by using our optional external antenna accessories.

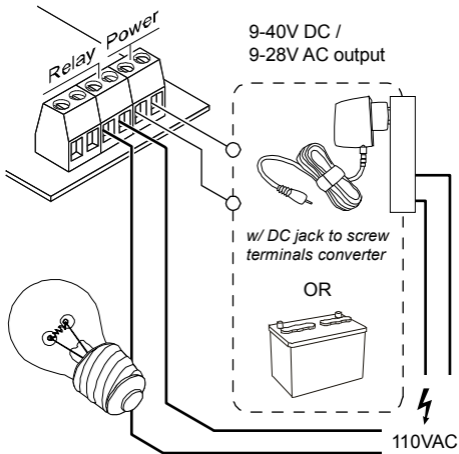
 Motors and other electronic devices may cause radio frequency interference (RFI) and power line noise that could impair the performance of a radio controlled device like 402U. For best results, locate the receiver away from other electronic devices and connect the receiver to a clean power source such as standard 9-24V power supply (AC or DC) or battery pack.

† Motors will likely cause wide spectrum RF interference regardless of receiver frequency, consider using brushless motor instead of brushed ones for improved performance.

 **WARNING! Incorrect installation or improper use of the product can cause damage to persons, animals or things.**

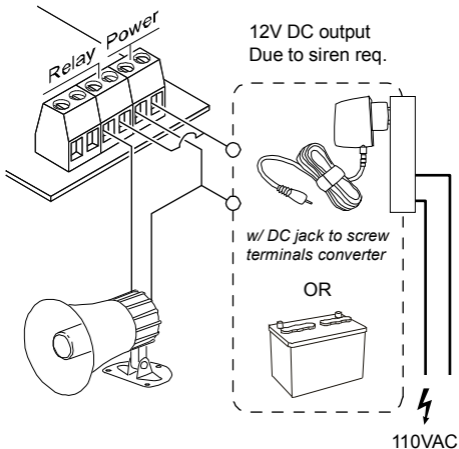
Sample Installation #1

Use 402U receiver to control a 110VAC light bulb, using *independent power sources*.



Sample Installation #2

Use 402U receiver to control a 12VDC electronic siren, using *shared power source*¹



1. Not recommended for motor or other electronics which will introduce noise into power line.

Troubleshooting

When installing 402U wireless receiver, if it is not working properly here is a basic method to troubleshoot the products.

1. When transmitter button is actuated, does the transmitter LED illuminate?

> If yes, proceed to step 2.

> If no, check the battery and make sure battery is connected to the transmitter properly and battery is not flat. If the transmitter continues to fail in showing LED, you may need to repair or replace the transmitter.

2. Does receiver have power (POWER LED illuminate)?

Ensure that correct power (see technical specs above) is supplied to the power terminal of 402U receiver, and the wiring harness is plugged in correctly. Refer to POWER label next to terminals to locate the two power terminals.



It is important to know that the transmitter must have been learned to receiver before proceed to following steps.

3. When transmitter button is actuated, does relay activate / click?

> If yes, the transmitter and receiver are working properly, but there is another issue, proceed to step 5.

> If no, the receiver is not seeing a signal from the transmitter.

4. If receiver is not responding to a signal from transmitter, there are a few additional things to consider.

> Materials such as metal, energy efficient (Low E) glass or other electronic devices may affect the signal. If possible, hold transmitter near receiver and activate it. If receiver sees signal then it is possible that obstructions may be blocking signal from where the transmitter or receiver is normally located, or you may be experiencing signal interference from other RF devices nearby.

> Try activating receiver with a different transmitter. If receiver sees signal from a different transmitter, it is possible that the original transmitter has a problem. If this occurs, contact seller about repairing or replacing the original transmitter.

> Ensure that receiver antenna is exposed from the enclosure box as much as possible.

> If receiver is not responding to any compatible transmitter, regardless of distance, it is possible the receiver may need repair. Try a different receiver if possible, contact seller if receiver needs to be repaired or replaced.

5. Receiver and transmitter are functioning correctly, but target circuit is not working?

Ensure that the output terminal of receiver is connected properly to target circuits or devices.

If you still have questions, please *contact us via Amazon or post on solidremote.help*, our support staff is more than happy to help.

Hardware Revision History

The revision and product identifier of 402U boards are printed at one corner on top side of PCB, in plain text as *nnnn Rcvr Rev. rr* where *nnnn* is the identifier and *rr* is the revision.

Rev. A - Product initial release / 2017

Special Notice

The descriptions and illustrations contained in the present manual are not binding. Solidremote reserves the right to make any alterations deemed appropriate for the technical, manufacturing and commercial improvement of the product, while leaving its essential features unchanged, at any time and without undertaking to update the present publication.

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DOCID: SR-RCS-402U-170124 / Printed In China



Printed on Recycled Paper