Settings

① Select Input Mode - Power up holding the button to enter the input mode menu. When the green light starts blinking let go. Turn the wheel to change modes, tap the button to select and continue to Servo Settings.

INPUT MODES

●x1	**Default -** *Both inputs are normally-open and not interruptible* In this mode either input can be triggered to start its animation. If an input is kept on, that scene will loop. If both inputs are kept on, input 1 takes priority so only input 1 will loop.
●x2	**Input 2 Interruptible -** *Only input 2 is interruptible* In this mode Input 1 can be triggered to interrupt input 2's scene. This can be used when you need one input to cancel another. You can also use this mode to loop an ambient animation by programming it into input 2. Then jumper it so it loops and put your triggered scene into input 1.
●x3	**Inputs 1 & 2 Interruptible -** *Both inputs are interruptible by the other* In this mode either input will interrupt the other input's scene.
●x4	**Run Once -** *Both inputs can only run once until the other input is pulsed* Use this mode when you need each input's animation to play only once. Input 2 can be connected to a reset button which would reset the cycle. Input 2 can be jumpered so input 1 operates in a single-shot mode where it still runs once per trigger but does not require the reset.
●x5	**Run Once with Reset with IN1 Normally-Closed** Same as above except for use with normally-closed sensors. For example, an escape room where a proximity sensor is used to detect the presence of an object. You may only want the animation to run once and not loop when the object is moved out of its original location.

② Servo Settings - The LED should now be blinking yellow. You can tap the button to exit the setup menu, or rotate the wheel to select a servo to edit.

SERVO SETTINGS

x1	**Select Servo -** *Rotate the wheel to select a servo to edit* ○○○○ **Exit -** Tap the button with none of the lights lit to exit the menu. ○●○○ **Select Servo -** Tap the button to edit the selected servo (Servo 2 shown).
x2	**Output Mode -** *Select the servo sleep or output mode* ●○○○ **Normal -** The servo will sleep after a few seconds of inactivity. (digitals may not sleep) ○●○○ **Sleep Disabled -** The servo will be kept on regardless of activity. ○○●○ **On/Off -** Use this mode to control 5V amplified relays. (Normal 5V relays will NOT work)
●	**Left Limit -** *Select the position you'd like the servo to be in when the wheel is rotated full left* The servo will move to the current left limit position. Rotate the wheel to change this position, or tap the button to leave it unchanged and move on to the next option.
●	**Right Limit -** *Same as above except now for the right limit*
●	**Max Acceleration -** *Select the maximum acceleration for this servo* The servo will start moving between the limits you set, gradually accelerating until it reaches the current acceleration limit for the servo. Rotate the wheel if you'd like to change the current limit. The controller will never let the servo move faster than this setting. Tap the button to return to *Select Servo* above.

Advanced Menu - To enter the advanced menu, power up holding the button for 10 seconds. Let go when the Status light starts blinking red. Select an option below using the wheel, then tap the button to select.

ADVANCED MENU

|	
●x1	**Toggle Write-Protect -** Selecting this option will toggle the write-protect state. With write-protect enabled, the animation is protected from being erased or changed.
●x2	**Set Over-Voltage for 6v Servos -** At powerup, over-voltage will trigger above 6.5 volts.
●x3	**Set Over-Voltage for 7.4v Servos -** At powerup, over-voltage will trigger above 7.9 volts.
●x4	**Factory Reset -** Selecting this option will reset all animation and settings to their factory defaults.

Boot Process
At power up, the Status light will flash the current input mode in green. At the same time, any servos outputs with sleep disabled will have their lights on. Any outputs set to On/Off mode will flash. Following that, the Status light will turn solid red if recording is enabled, or green if it's write-protected. At the same time servo lights 1 & 2 will indicate which scenes have animation.
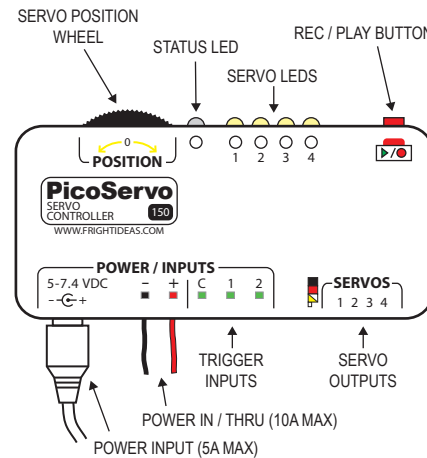

Operating Manual

PicoServo
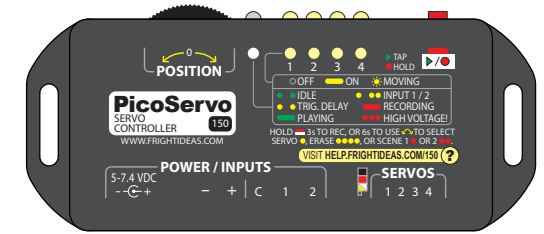
Getting Familiar

Sizing your Power Supply
Your PicoServo does not include a power supply as the voltage and current required will vary depending on which servos you are using and how many there are.

Check your servo's specs to confirm, but generally speaking, most servos are very happy at 6 volts. They will also function at 5 volts, but with a little less torque. If you're using standard sized servos you can budget for about an amp per servo in most conditions. If you are using quarter scale servos then budget for 2 amps each. If your servos are heavily loaded they can draw much more current than this. If the PicoServo seems to reboot as the servos are moving, you probably need a power supply with more current.

Servo Voltage Protection
Your PicoServo contains special circuitry to protect your servos from reverse polarity and high voltage. At power-up, the Status LED will blink red if the voltage is too high. Power will only be passed thru to your servos if the voltage is below a safe threshold. See the Advanced Menu to set the safe voltage level.

CONNECTIONS AND CONTROLS

Servo Position Wheel	This wheel will control the position of the currently selected servo. It's also used in combination with the button to navigate menus.
Rec. / Play Button	Tap this button to play your animation, hold it 3 seconds to start recording, hold it 6 seconds to select the current scene, servo, or erase the current scene's animation.
Power Input Power In / Thru	Your power supply should connect to one of these. The barrel connector is rated for a maximum current of 5 amps. The terminal blocks are internally connected to the barrel.
Trigger Inputs	If you're using triggers to control the PicoServo those will connect here.
Servo Outputs	Your servos will connect here. The black or brown wire should be closest to the top.
Servo LEDs	These show each servo's current state: ○ Sleeping ● On but not moving ☀ On and moving
Status LED	The status LED will blink different patterns to indicate the current status: ● ● Green blink every 2 sec - Idle mode. Ready to record, playback, or be triggered. ● ● Yellow blink every 2 sec - Idle mode, ignoring triggers. Occurs after recording or if playback is interrupted. ▬ Steady green with brief flash - Playback. Number of brief flashes indicates the current scene. ▬ Steady red with brief flash - Recording. Number of brief flashes indicates the current scene. ● ●● One or Two yellow blinks - Trigger Active. Indicates trigger input 1 or 2 became active. ●●● Steady blink - A power supply with a voltage exceeding 6 or 7.4 volts is connected.

Servo Connections
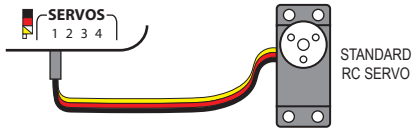
MAKE SURE THE BLACK OR BROWN WIRE IS CLOSEST TO THE TOP OF THE PICOSERVO. ADDITIONAL SERVOS CONNECT TO OUTPUTS 2-4 IN THE SAME FASHION.
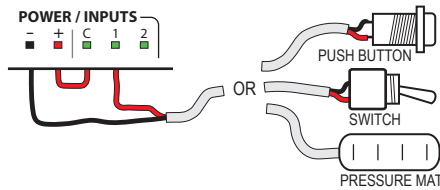
STANDARD RC SERVO
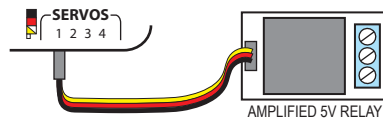
⚠ STANDARD 5V RELAYS WILL NOT WORK AND MAY DAMAGE THE PICOSERVO. USE ONLY RELAYS DESIGNED FOR LOW CURRENT OUTPUTS, SUCH AS POLOLU 2481 OR KEYES KY-019. SEE THE LAST PAGE TO SET THE OUTPUT YOU ARE USING TO ON/OFF MODE. RELAYS DESIGNED FOR SERVO OUTPUTS CAN ALSO BE USED, JUST LEAVE THE OUTPUTS IN SLEEP DISABLED MODE FOR THOSE TYPES.
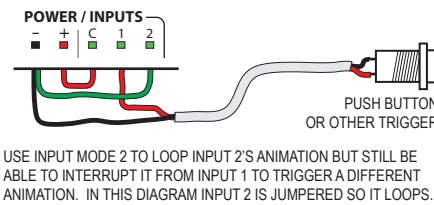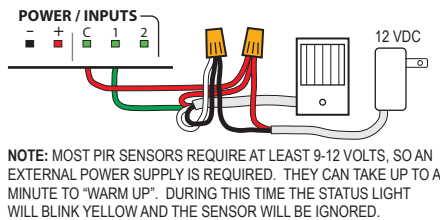
AMPLIFIED 5V RELAY

Trigger Input Wiring

⚠ • Trigger inputs are ignored for a short time after recording, and at startup if a PIR was detected.
• The PicoServo runs on 5 to 7.4 volts DC, which is lower than what most powered sensors can use. For this reason, an external power supply is required for any sensor that requires a higher voltage.
• Most diagrams shown below are connected to input 1. Just connect to 2 instead of 1 for input 2.
• If the device you are using to trigger the PicoServo can output 5-24V, just connect it directly to C and #.

PUSH BUTTON, PRESSURE MAT, SWITCH

USE INPUT MODE 2 TO LOOP INPUT 2'S ANIMATION BUT STILL BE ABLE TO INTERRUPT IT FROM INPUT 1 TO TRIGGER A DIFFERENT ANIMATION. IN THIS DIAGRAM INPUT 2 IS JUMPERED SO IT LOOPS.
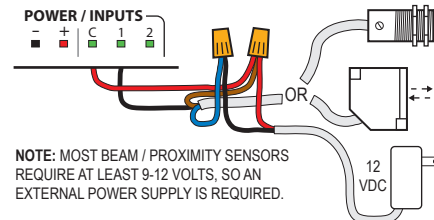
AMBIENT LOOP WITH INTERRUPT

NOTE: MOST PIR SENSORS REQUIRE AT LEAST 9-12 VOLTS, SO AN EXTERNAL POWER SUPPLY IS REQUIRED. THEY CAN TAKE UP TO A MINUTE TO "WARM UP". DURING THIS TIME THE STATUS LIGHT WILL BLINK YELLOW AND THE SENSOR WILL BE IGNORED.
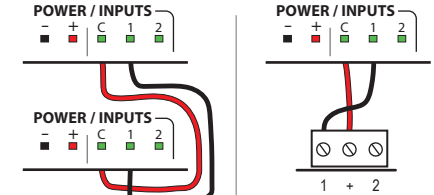
PIR MOTION SENSOR

NOTE: MOST BEAM / PROXIMITY SENSORS REQUIRE AT LEAST 9-12 VOLTS, SO AN EXTERNAL POWER SUPPLY IS REQUIRED.

NPN OUTPUT BEAM OR PROXIMITY SENSOR
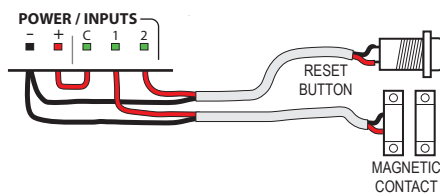
USE INPUT MODE 4 OR 5 TO ALLOW AN ANIMATION TO PLAY ONLY ONCE. USE A BUTTON ON INPUT 2 FOR MANUAL RESET, OR JUMPER IT SO INPUT 1 RUNS ONLY ONCE PER TRIGGER (SINGLE SHOT MODE).

RUN ONCE THEN REQUIRE RESET

CONNECT TRIGGER TO ONLY ONE UNIT, THEN LINK AS SHOWN ABOVE.

TRIGGER FROM THE SOLID-STATE OUTPUT OF ANOTHER CONTROLLER.

ONE TRIGGER FOR MULTIPLE UNITS OR ANOTHER CONTROLLER TRIGGERS THIS ONE
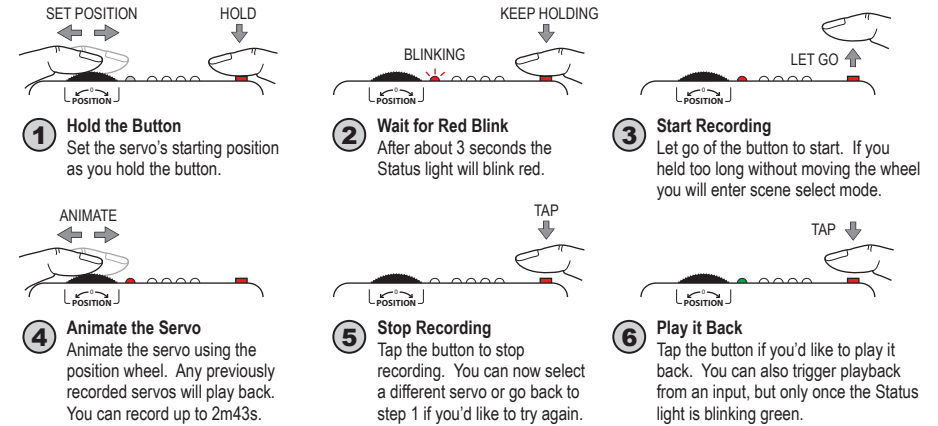
Recording Servo Animation

⚠ For best results, we highly recommend setting your servo limits and maximum acceleration before recording. Read the back page for more information.

Getting Started
Move the position wheel to control the current servo. Once you've gotten a feel for how it moves, you can attempt to record animation. Re-record as necessary until you like the result, then select a different servo and repeat the process. As you animate new servos, any previously recorded servos will play back, allowing you to build upon your existing animation. For this reason it's usually best to animate your longest running movements first.
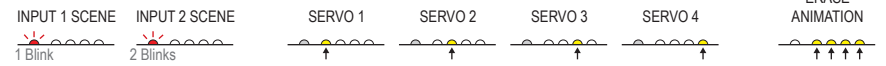
You can record up to 2 minutes and 43 seconds of animation per input scene.

Recording Animation

1 Hold the Button
Set the servo's starting position as you hold the button.

2 Wait for Red Blink
After about 3 seconds the Status light will blink red.

3 Start Recording
Let go of the button to start. If you held too long without moving the wheel you will enter scene select mode.

4 Animate the Servo
Animate the servo using the position wheel. Any previously recorded servos will play back. You can record up to 2m43s.

5 Stop Recording
Tap the button to stop recording. You can now select a different servo or go back to step 1 if you'd like to try again.

6 Play it Back
Tap the button if you'd like to play it back. You can also trigger playback from an input, but only once the Status light is blinking green.

Selecting a Different Servo, Input Scene, or Erasing a Scene's Animation
To select any of the above you have to enter the selection menu. Hold the button for six seconds without moving the wheel. The status light or a servo light will turn on solid. Rotate the Position wheel to select ...

| INPUT 1 SCENE | INPUT 2 SCENE | SERVO 1 | SERVO 2 | SERVO 3 | SERVO 4 | ERASE ANIMATION |
| 1 Blink | 2 Blinks | | | | | |

If you selected a different input scene, you can now play that scene or record animation as described above. If you selected a different servo, the position wheel will now control that servo. You can repeat the recording steps to record animation for this servo. Any previously recorded servos will play back. If you chose to erase the current scene's animation you will start fresh, so only the current servo will move during recording.

Advanced Recording and Triggering

• For best results, try to end your animation with the servos in the position they will start from on the next cycle. If you are only using one input, then this would be the position they are in at the beginning of your animation. If you are using two inputs, this would be the start position of the scene that will most likely play next.

• If a particular servo does not have any animation recorded in a particular scene, it will not change position when that scene is played. This allows you to program some servos in one scene and some servos in another, without having to worry about positioning the unused servos. This is especially useful if a scene is being interrupted and you would like certain servos to stay where they were as the interrupting scene plays.

• It's possible to just record positions and not animation. For example, if you wanted each input to move the servos to a certain position and leave them there. One input would move the servos to one position, the second input would move them to another. To do this just move the servo to the desired position and record for a second or two without moving the wheel.