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For detailed instructions, see the sections below.

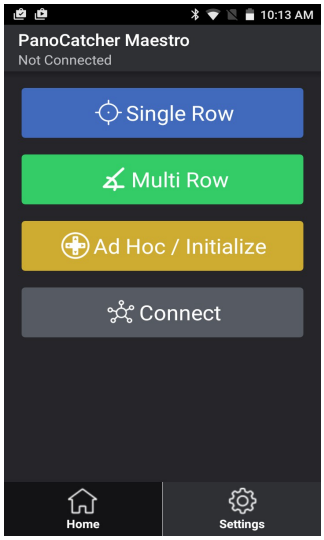
I. How to Install the PanoCatcher Maestro Control App

The Maestro control app requires Android 4.1 or newer.

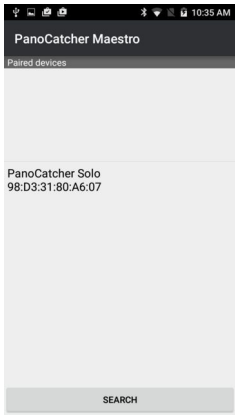
1. Turn on the Maestro Controller
2. Turn on Bluetooth on your smartphone
3. Pair your Phone with the PanoCatcher Maestro, the pin is 1234
4. Install the Maestro app on your smartphone. You may get a warning about installing apps from unknown sources. Change your smartphone's settings temporarily to allow installation of the app. Don't forget to change it back after the app is installed.
5. Lock your phone display to portrait orientation
6. Start the app

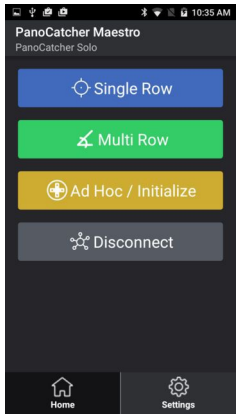
II. How to connect to the PanoCatcher Maestro

When you start the app you'll see the following screen:



Tap the **Connect** button to connect to the PanoCatcher Maestro. You'll be presented with a list of devices. Select the PanoCatcher Maestro. When it has connected, you'll be returned to the main screen. The button label will change to **Disconnect** and you'll see the connected device name under the title of the app at the top of the screen.

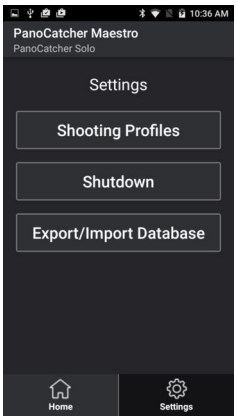


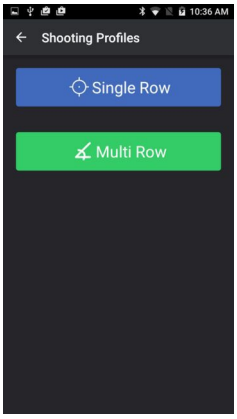


III. How to Create Shooting Profiles

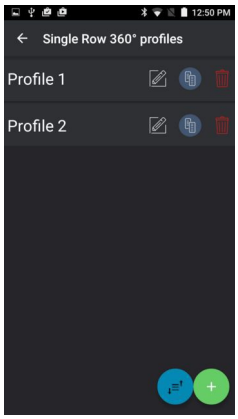
To use the Maestro control app, you must first create your **Shooting Profiles**.
Shooting profiles are sets of parameters that tell the Maestro what type of action to perform.
You can create and save many shooting profiles on your smartphone and when you go to the field you simply select from the list of profiles the one you want the Maestro to execute.

To create your Shooting Profiles, from the main screen tap the **Settings** button and then the **Shooting Profiles Button**. Depending on what type of profile you want to create, tap the appropriate button.





You'll see the following screen:



There are two ways to add a new shooting profile:

- Tap the **green + button** to create a new profile, or
- Tap the **blue icon** next to an existing profile to duplicate it and then rename & edit it

Tap the **blue button** at the bottom of the screen to sort the profiles.
Use the **icons** next to each profile to edit, duplicate or delete it.

When you add a new profile, you'll see a long list of parameters that are available to customize. It may seem tedious, but it's not. Only 2 or 3 parameters are required to create a profile and they are clearly marked as such. The rest can be customized or they will use default values.

Tip: If you would rather use different defaults than the app provides, create a profile and customize its parameters with whatever values you want to use as defaults. When you want to add a new profile, simply duplicate the profile with your preferred default values and then edit it.

IV. Parameters for Single Row Profiles

Important Note:

The Maestro can receive feedback from the camera and adjust some parameters automatically. To do this, you must connect your camera's flash pc-sync port to the Maestro AUX port.

Without such feedback:
- You'll have to specify affected settings manually. This can be a real pain as you'll need to test and manually adjust the affected parameters every time you change things such as shutter speed, ISO, aperture, number of bracketed shots, etc.
- You will not be able to use some features of the Maestro that depend on receiving feedback from the camera.

Features & settings that require camera feedback are marked in this document as:
Camera feedback required.

If your camera does not have a pc-sync port, you can add one through a hotshoe adapter. You can find them in your local photo store or buy them online from Ebay, Amazon, etc. They cost anywhere from 4 to 20 €.

I have tested several such adapters and the ones that worked best for me were the cheapest of all: **Seagull SC-2** & **Viltrox FC-5P,** search for them on Ebay or Amazon. They've also worked for other users with various camera models. I tested more expensive ones and they worked as well or worse. Depending on your camera, you may need to get one specifically made for it.

1. Profile Name
Alphanumeric, use letters, numbers, spaces and dash (-).

2. Panorama Width
The panorama width in degrees.
Default: 360°
Range: 0° to 64000°

3. Number of Shooting Positions
Specifies the number of shooting positions, range: 1 to 64000
Equivalent to the number of click-stops on a manual panoramic head.

4. Tilt Arm Elevation
Specifies the position of the tilt arm in degrees.
-90.0° is nadir, 0.0° is horizontal, 90.0° is zenith

5. Number of Bracketed Shots
Specifies the number of shots to be taken at each shooting position.
Intended to facilitate bracketing.
Must be equal to the number of bracketed shots you have specified in your camera.
Range: 0 to 30

6. Bracketing Style
Determines how the bracketed shots will be taken.
- **Single Shot**: It will take the number of specified shots one at a time. Simulates pressing the shutter one time for each shot to be taken.
- **Continuous Short (Camera feedback required)**: Some cameras have a setting that allows to take all bracketed shots automatically in rapid succession with a single, short press of the shutter button. If your camera supports this setting, you can use it with this parameter.
- **Continuous long (Camera feedback required)**: This mode is supported by most cameras. Set your camera to the desired number of bracketed shots and also set it for continuous shooting. This mode simulates keeping the shutter button pressed until all bracketed shots are taken. Your camera will take the shots in rapid succession.

7. Startup Delay
Specifies the time interval from the moment you tap the start button in the app until the Maestro starts executing the selected profile.
In seconds, range: 0 to 64000.

8. Focus Delay
If you want your camera to autofocus before taking each shot, here you can specify how long to wait until focus is achieved.
In milliseconds, range: 0 to 64000
If 0 is specified, no focus signal will be sent to the camera.

9. Before Shot Delay
Specifies the interval from the time the Maestro stops at a shooting position until it takes the shot. This delay is used to allow micro-vibrations from the movement to settle before taking the shot.
In milliseconds, range: -1 to 64000.
The Maestro has a built-in vibration sensor that can automatically detect when it's safe to take the shot. To use it, set this parameter to: -1

10. After Shot Delay
Specifies the interval from the time a shot has been completed until the Maestro starts executing the next step in the shooting sequence.
In milliseconds, range: -1 to 64000
This is an important parameter. If you set it to a value shorter than the shutter speed, the Maestro will start moving before the shutter has closed.
Fortunately, the Maestro can detect automatically when the shot has been completed (shutter has closed) and it's safe to move on to the next step. To use it, set this parameter to: -1. **(Camera feedback required).** This setting also protects against missed shots when the buffer is full.

11. Speed
Specifies the rotational speed.
In RPM x 1000, range: 1 to 64000
So, if you want the rotational speed to be 15RPM, set this parameter to 15000.
Why the 1000 multiplier? This value has to be an integer. Without the 1000 multiplier, the minimum value would've been 1RPM. With the multiplier, it's possible to set very slow speeds if needed. A good setting for this parameter is from 12000 to 16000 (12-16RPM).

12. Acceleration
Specifies the acceleration setting.
In steps/sec^2. A good value for this parameter is from 2500 to 5000.

13. Direction
Specifies the direction of horizontal rotation.
CW = Clockwise, CCW = Counter-Clockwise

14. Continuous rotation
Enables/Disable continuous rotation mode. If enabled, the Maestro does not stop at each shooting position, it just takes the shot while moving.

15. Continuous Rotation Shutter Release
Specifies how the camera shutter is controlled during continuous rotation.
If you select the option **Controller**, the Maestro will take each shot at its specified position.
If you select **Camera**, you must set your camera to continuous shooting mode. The Maestro will simulate a shutter button press that lasts for as long as it takes for the rotation to complete. In this case, the camera controls the number of shots taken. You will capture more frames but most likely the spacing between frames will not be equidistant. This a useful mode for action or crowd scenes.

16. Number of Panoramas
Specifies the number of panoramas to be taken. Use this parameter to capture multiple panoramas with a single button tap.
Range: 1 to 64000

17. Delay Between Panoramas
Specifies the time delay between panoramas.
In seconds, range 0 to 64000

18. Return to Start
Specifies what the Maestro will do after a shooting sequence has been completed.
If you select **Disable**, the Maestro will not retutn to the starting position after it completes the shooting sequence.
If **Quick** is selected, the Maestro will return to its starting position via the shortest route
If **Backtrack** is selected, the Maestro will return to its starting position doing a complete backtrack. This setting is useful if the Maestro is powered by an adapter connected to an electrical outlet or other stationary devices because it prevents the cables getting wound around the tripod column.

19. Shutter Signal Length.
The length of the signal the Maestro sends to the camera to activate the shutter.
In milliseconds, range: 100 to 1000
Default: 300

20. Focus Signal Length
The length of the signal the Maestro sends to the camera to activate autofocus.
In milliseconds, range: 100 to 1000
Default: 300

21. Camera wakeup
Enables or disables camera wakeup. If enabled, before the Maestro starts executing the selected shooting profile, it will send a wakeup signal to the camera in case it has gone to sleep.

22. Camera Wakeup Signal Length
The length of the wakeup signal the Maestro sends to the camera.
In milliseconds, range: 100 to 1000
Default: 300

23. Camera Wakeup delay
Specifies how long to wait for the camera to wakeup after the wakeup signal is sent.
In milliseconds, range: 100 to 5000.
Default: 1000

23. Max Frame Rate
Specifies the maximum, **sustained** frame rate.
In frames per second, range: 0.0 to 20.0 (accepts decimals).
This is **not** the same as your camera's frame rate. Your camera may have a max frame rate of let's say 6 frames per second but it can only sustain this rate as long as there is available space in the buffer. This parameter can slow down the shooting process to a rate that can be sustained by your camera regardless of the number of shots or your camera's buffer depth and avoids missed frames.
To **disable**, set this parameter to 0.0.

V. Parameters for Multi-Row Profiles

Please read the **Important Note** at the beginning of the previous section. Applies here as well.

Creating a multi-row profile is a 3-step process:
Step 1: Specify Profile Name, Number of Rows and Panorama Width
Step 2: Specify the elevation and number of shooting positions for each row
Step 3: Specify the rest of the parameters.

STEP 1

1. Profile Name
Alphanumeric, use letters, numbers, spaces and dash (-).

2. Number of Rows
The number of rows in your multi-row panorama.
Range: 2-20

3. Panorama Width
The panorama width in degrees.
Range: 1° to 360°

STEP 2

In this step, you'll be presented with a table that has as many rows as the number you specified previously. For each row, you can specify the tilt arm elevation, the number of shooting positions and the direction of horizontal rotation.

Elevation is the angle of the tilt arm.
-90° is nadir, 0° is horizontal, 90° is zenith

Number of Shooting Positions
Specifies the number of shooting positions for each row, range: 1 to 4000
Equivalent to the number of click-stops on a manual panoramic head.

Direction
Specifies the direction of horizontal rotation.
CW = Clockwise, CCW = Counter-Clockwise

STEP 3

4. Number of Bracketed Shots
Specifies the number of shots to be taken at each shooting position.
Intended to facilitate bracketing.
Must be equal to the number of bracketed shots you have specified in your camera.
Range: 0 to 30

5. Bracketing Style
Determines how the bracketed shots will be taken.
- **Single Shot**: It will take the number of specified shots one at a time. Simulates pressing the shutter one time for each shot to be taken. This is the recommended setting.
- **Continuous Short (Camera feedback required)**: Some cameras have a setting that allows to take all bracketed shots automatically in rapid succession with a single, short press of the shutter button. If your camera supports this setting, you can use it with this parameter.
- **Continuous long (Camera feedback required)**: This mode is supported by most cameras. Set your camera to the desired number of bracketed shots and also set it for continuous shooting. This mode simulates keeping the shutter button pressed until all bracketed shots are taken. Your camera will take the shots in rapid succession.

6. Startup Delay
Specifies the time interval from the moment you tap the start button in the app until the Maestro starts executing the selected profile.
In seconds, range: 0 to 64000.

7. Focus Delay
If you want your camera to autofocus before taking each shot, here you can specify how long to wait until focus is achieved.
In milliseconds, range: 0 to 64000
If 0 is specified, no focus signal will be sent to the camera.

8. Before Shot Delay
Specifies the interval from the time the Maestro stops at a shooting position until it takes the shot. This delay is used to allow micro-vibrations from the movement to settle before taking the shot.
In milliseconds, range: -1 to 64000.
The Maestro has a built-in vibration sensor that can automatically detect when it's safe to take the shot. To use it, set this parameter to: -1

9. After Shot Delay
Specifies the interval from the time a shot has been completed until the Maestro starts executing the next step in the shooting sequence.
In milliseconds, range: -1 to 64000
This is an important parameter. If you set it to a value shorter than the shutter speed, the Maestro will start moving before the shutter has closed.
Fortunately, the Maestro can detect automatically when the shot has been completed (shutter has closed) and it's safe to move on to the next step. To use it, set this parameter to: -1. **(Camera feedback required).** This setting also protects against missed shots when the buffer is full.

10. Speed
Specifies the rotational speed.
In RPM x 1000, range: 0 to 64000
So, if you want the rotational speed to be 15RPM, set this parameter to 15000.
Why the 1000 multiplier? This value has to be an integer. Without the 1000 multiplier, the minimum value would've been 1RPM. With the multiplier, it's possible to set very slow speeds if needed. A good setting for this parameter is from 12000 to 16000 (12-16RPM).

11. Acceleration
Specifies the acceleration setting.
In steps/sec^2. A good value for this parameter is from 3000 to 5000.

12. Continuous rotation
Enables/Disable continuous rotation mode. In this mode, the Maestro does not stop at each shooting position, it just takes the shot while moving.

13. Continuous Rotation Shutter Release
Specifies how the camera shutter is controlled during continuous rotation.
If you select the option **Controller**, the Maestro will take each shot at its specified position.
If you select **Camera**, you must set your camera to continuous shooting mode. The Maestro will simulate a shutter button press that lasts for as long as it takes the rotation to complete. In this case, the camera controls the number of shots taken. You will capture more frames but most likely the spacing between frames will not be equidistant. This a useful mode for action or crowd scenes.

14. Number of Panoramas
Specifies the number of panoramas to be taken. Use this parameter to capture multiple panoramas with a single button tap.
Range: 1 to 64000

15. Delay Between Panoramas
Specifies the time delay between panoramas.
In seconds, range 0 to 64000

16. Return to Start
Specifies what the Maestro will do after a shooting sequence has been completed.
If you select **Disable**, the Maestro will not retutn to the starting position after it completes the shooting sequence.
If **Quick** is selected, the Maestro will return to its starting position via the shortest route
If **Backtrack** is selected, the Maestro will return to its starting position doing a complete backtrack. This setting is useful if the Maestro is powered by an adapter connected to an electrical outlet or other stationary devices because it prevents the cables getting wound around the tripod column.

17. Shutter Signal Length.
The length of the signal the Maestro sends to the camera to activate the shutter.
In milliseconds, range: 100 to 1000. Default: 300

18. Focus Signal Length
The length of the signal the Maestro sends to the camera to activate autofocus.
In milliseconds, range: 100 to 1000. Default: 300

19. Camera wakeup
Enables or disables camera wakeup. If enabled, before the Maestro starts executing the selected shooting profile, it will send a wakeup signal to the camera in case it has gone to sleep.

20. Camera Wakeup Signal Length
The length of the wakeup signal the Maestro sends to the camera.
In milliseconds, range: 100 to 1000. Default: 300

21. Camera Wakeup delay
Specifies how long to wait for the camera to wakeup after the wakeup signal is sent.
In milliseconds, range: 100 to 5000. Default: 1000

22. Max Frame Rate
Specifies the maximum, **sustained** frame rate.
In frames per second, range: 0.0 to 20.0 (accepts decimals).
This is **not** the same as your camera's frame rate. Your camera may have a max frame rate of let's say 6 frames per second but it can only sustain this rate as long as there is available space in the buffer. This parameter can slow down the shooting process to a rate that can be sustained by your camera regardless of the number of shots or your camera's buffer depth and avoids missed frames.
To **disable**, set this parameter to 0.0.

VI. Tilt Arm Initialization

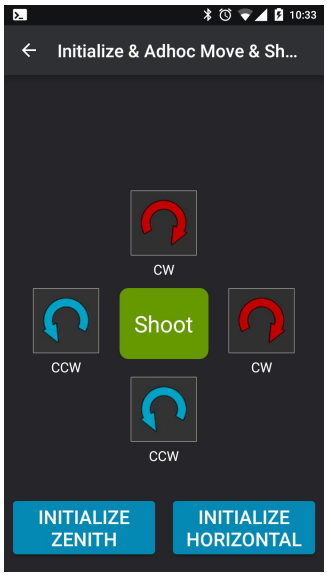
Before you start using the Maestro, the tilt arm position **must be initialized**. This must be done every time you turn the controller on. It provides a necessary reference point.

Auto-Initialization:
When the controller is turned on, it assumes the tilt arm is in the vertical position with the camera facing the zenith (+90°) and it is initialized automatically and you can start using it.

Tip: Before you turn the controller off when you have finished using the Maestro, go to the **Settings** screen and tap the **Shutdown** button. The tilt arm will be moved to the vertical position. Then, turn the controller off. This way, the next time you turn the controller on, the tilt arm will be auto-initialized correctly and you can start using the Maestro with no need for manual initialization.

Manual Initialization:
If the tilt arm is not in the vertical position when you turn the controller on, it must be initialized manually.

From the main screen, tap the **Ad Hoc / Initialize** button. You will be presented with this screen:



There are 2 ways to manually initialize the tilt am:

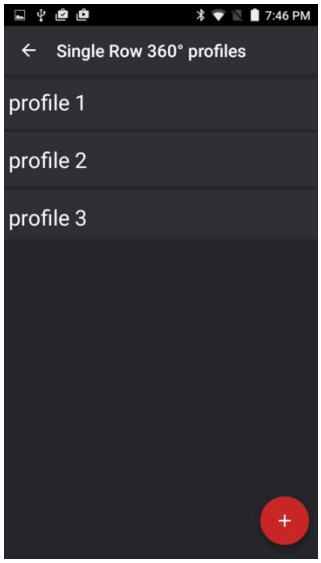
1. Use the manual controls to position the tilt arm at the vertical position with the camera pointed at the **zenith (+90°)** and tap the **Initialize Zenith button**. Or,

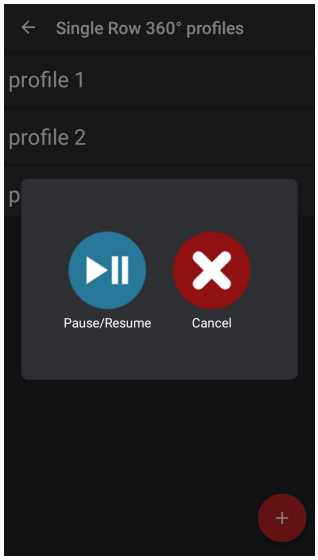
2. Position the tilt arm at the **horizontal (0°) position** and tap the **Initialize Horizontal** button.

The controller has now been initialized and the Maestro is ready to use.

VII. How to execute a Shooting Profile

To execute a shooting profile, from the main screen select the type of profile you want to execute: Single Row or Multi-Row. You will be presented with a screen that lists all shooting profiles of that type that you have created and saved.



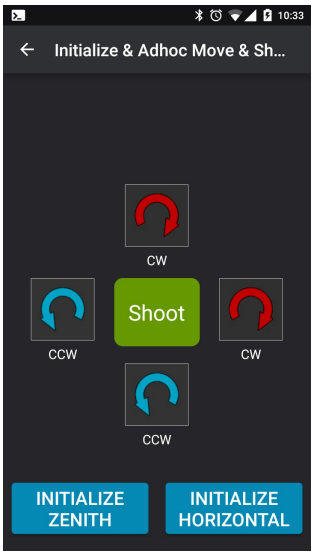


Tap the profile you want to execute and confirm. The Maestro will start executing the profile you selected.

While the Maestro is executing the shooting profile, you can tap the **red + button** to **Pause/Resume** or **Cancel** the shooting sequence.

VIII. Manual camera positioning & shooting

You can use the Maestro to manually position the camera and shoot.
From the main screen, tap the Ad Hoc / Initialize button. You will be presented with the following screen:



Use the controls to position the camera and the **Shoot button** to release the shutter.

IX. Backup and restore

From the main screen, go to Settings and tap the **Export/Import Database** button.
The exported data file is saved under the folder **PanoCatcher** on your phone.
The name of each backup file contains the timestamp of the date & time it was created.

Please note: If you import a data file, it will replace your current data.