Getting Started with PINE II

Thank you for purchasing our newest flagship motion controller - PINE II. This is a short introduction guide to help you get started with the new controller. This guide focuses on the new features like the PRO Mode, OTA Firmware Updates, and the PS4 Game Controller Support. For all other features, please make use of the regular PINE user manual which can be found in the Download section of our website.

Before you start with PINE II, please make sure you have the newest PINE Motion App release from the app store installed on your phone. To get the newest features, you need at least V4.1.0.

Main Features of PINE II

Silent
With newest motor driver technology, you will barely hear the motors moving.

Full Bézier-Curve Support
Create any move you can imagine with our new Pro Mode.

PS4 Controller Support
Control motors and the PINE Motion App conveniently with a PS4 controller.

All in ONE
All application modes you need from Time-Lapse, Video Moves, Gigapixel, 360-Degree, Astro-Tracking, Macro, and 3D-Scanning.

Over-The-Air Firmware Updates
Easiest way to keep your Device up-to-date without the need of a Software-Utility and cables.

Dual Power Supply
Either use the DC Barrel input, or the USB-C input with a USB PD Power Bank. Hot-swap power supplies without interruptions.

Multi-Lapse
Capture up to three Time-Lapses with different movements all at once in Pro Mode.

Powerful Motor-Drivers
Drive Stepper Motors with currents up to 2.5A per channel! This allows you to even drive heavy NEMA23 motors.

Additional Features

- The USB Typ C connector can power the controller (even without a USB PD port). No additional power supply needed for wired firmware updates. Simply connect a USB cable.
- Motor Profiles (which contain information for motor current and gear-ratio), will be saved as XML files. Profiles can now be exported and imported. This allows you to copy your own custom profiles between smartphones.
- Keyframe Presets can be saved as XML files in Pro Mode. The XML files can be exported and imported.
- Ability to link 2 motors together via software (useful for linear rails that are driven by 2 stepper motors e.g. found on XY tables).
- Coming soon:
  - Motor-Stall detection. Detection when a motor is skipping steps.
  - Sensor-less reference moves without the need of mechanical limit-switches.

PRO Mode

PRO Mode is the biggest software change introduced with PINE II. It is an advanced application mode for creating automated real-time movements and time-lapse recordings. It offers advanced keyframing and full Bezier-curve support. You can access the PRO Mode directly from the homescreen of the app.
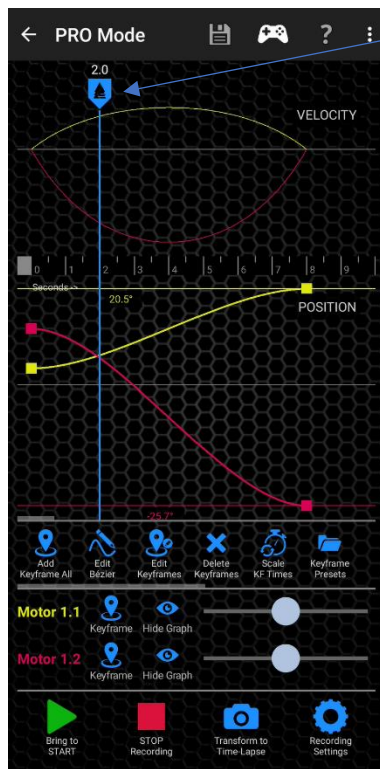
Time Marker
- Draggable by hand to specify the time value when adding new keyframes.
- Scrub function (motors will move to the time marker location while dragging).
- Double tap marker to move time marker to specific location.

Velocity Graph (horizontally scrollable)
- If motor speed is too high, curve will become a dotted line.
- Graph will change in real-time when keyframes/Bezier are modified.

Timeline (horizontally scrollable)
- Scale can be adjusted using the zoom buttons in the toolbox bar.

Position Graph (horizontally scrollable)
- Keyframes shown as squares.
- Current motor positions shown as horizontal lines (updated in real time).
- Show keyframe details (position and time) by pressing a keyframe square.
- Move motors to keyframe by long-pressing a keyframe square.

**Toolbox Bar** (horizontally scrollable)
- Add, edit, scale, delete Keyframes / store and load keyframe presets.
- Move all motors to current time marker location.
- Graph Settings / Zoom in/out buttons / Multi-Lapse Settings.

Motor Control
- Move motors using slide bars.
- Add keyframes for individual motors only / hide & show the graphs.
- Change motor color by tapping the motor name.

Recording Control
- Start / Stop a recording.
- Switch the current move between time-lapse and video move.
- Recording settings:
  - For <u>Video</u>: Loop (Ping-Pong) Mode
  - For <u>Time-Lapse</u>: Interval times (trigger time, delay times, interval time), recording time, total pictures
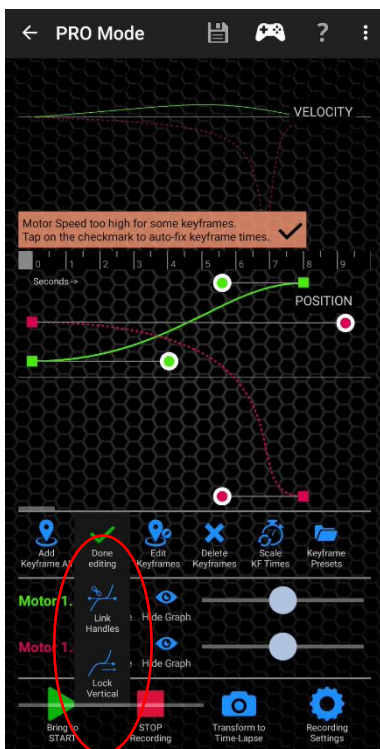
Edit Bezier Curves
- Drag the Bezier control points by hand to change the characteristic of the position graph. The Velocity graph will be updated in real-time.
- Dotted lines means the max motor speed is reached (auto-correct the keyframes with a tap on the checkmark).
- Bezier control points can be locked in the vertical direction (control points can only be moved to the left or right).
- Control points / Handles can be linked (this applies to middle keyframes and the opposite control point will be moved automatically). This guarantees a smooth velocity transition between keyframes.

Edit Keyframes

- Drag the Keyframes squares by hand to change keyframes.
- Keyframes can be locked in position (only time value can be changed when dragging).
- Keyframes can be locked in time (only position value can be changed when dragging).
- When keyframe square is double-tapped, values for position and time can be entered manually (as shown below).
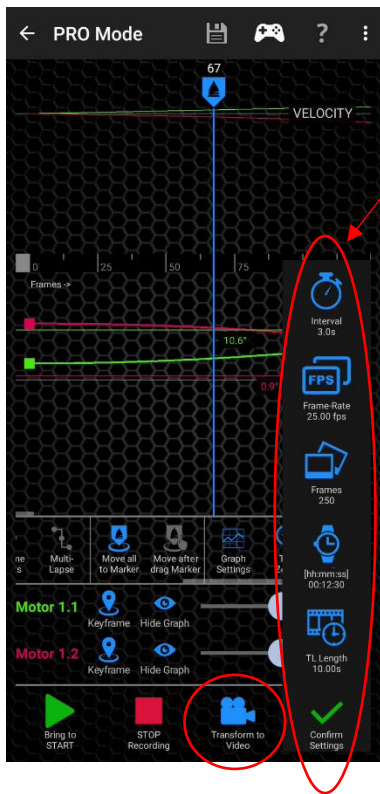

Delete Keyframes

- Tap on the red crosses to delete individual keyframes
- Delete all keyframes of specific motors
- Delete all Keyframes
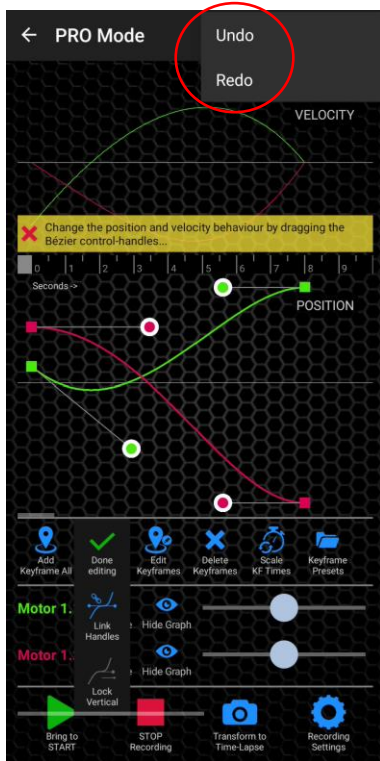
Undo / Redo Feature

- Made a mistake when editing keyframes or bezier curves? Just undo your last change. You can go back (or forward) as many steps as you want to restore any possible previous keyframe state.

Change between Time-Lapse and Video Move

- Just press the "Transform to Timelapse/Video" button to switch modes.
- The recording settings expandable menu will change based on recording mode.

Recording Settings

- When in time-lapse mode, change interval times (includes camera trigger time, delay times, movement times, and wait times). Also change recording time, number of pictures, or time-lapse video length (these settings will linearly scale all keyframes).
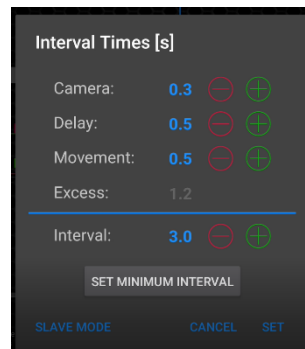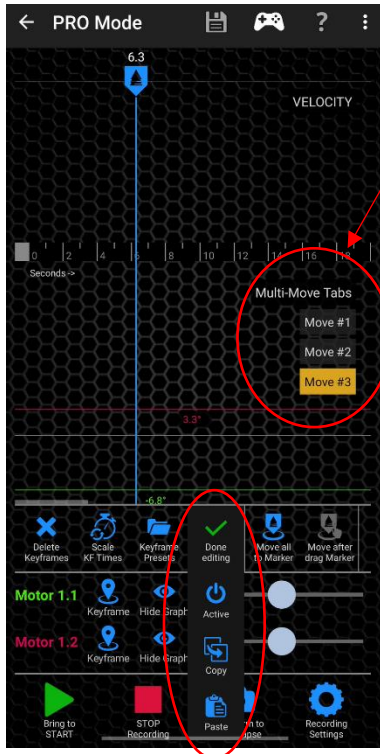
Multi-Move & Multi-Lapse

- With this feature enabled, you will be able to create up to 10 separate recordings (select them by pressing the "Multi-Move Tabs".
- Rename tabs by long-pressing the tab rectangles.
- In Video Mode, you can set-up up to 10 different moves which you can start individually.
- In Time-Lapse Mode, this is a Multi-Lapse feature and will execute up to 10 recordings at once
- Multi-Lapse Process Example with 3 Tabs:
  * Capture frame 1 of Tab 1
  * Capture frame 1 of Tab 2
  * Capture frame 1 of Tab 3
  * Capture frame 2 of Tab 1
  * Capture frame 2 of Tab 2
  * Capture frame 2 of Tab 3
  * Capture frame 3 of Tab 1
  * etc.
- Slave mode (via AUX input) is supported with Multi-Lapse.
- Copy and Paste entire moves between Multi-Move/Lapse Tabs.

How to use a PS4 Controller with PINE II

PINE II is capable of communicating with a PS4 Game Controller completely wirelessly and without the need of an additional USB dongle. Your can control all motors with the PS4 controller and also perform some actions inside the PRO Mode of the app (e.g. add keyframes, move the time-marker, zoom in/out). **All buttons and knobs of the controller can be configured for specific actions.** The settings screen shown on the right is accessible under the "Connections" section on the homescreen, or by pressing the game controller icon on the top right within the PRO Mode.
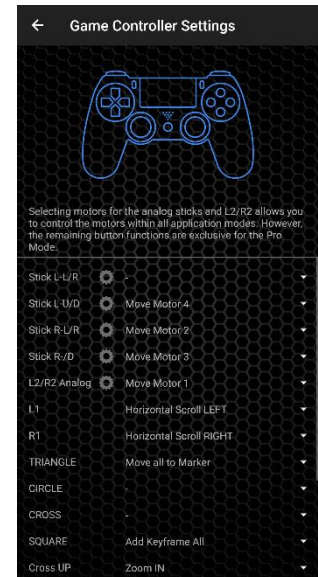
An original PS4 controller is required. Cheap clones from China will most likely not work with PINE II.

In order to use a PS4 controller, the MAC address of the PS4 controller needs to be changed. This process is only necessary once or whenever the controller was previously connected to a PlayStation console. Changing the Mac address can be done with a software called "**SixaxisPair Tool**". It can be downloaded in our Download section of our Website.

The Software is available for Windows PCs only.

Connect your PS4 Controller to your PC using a USB cable. Then start the SixaxisPair Tool.
The **MAC address** needs to be set to: **03:03:03:03:03:03**
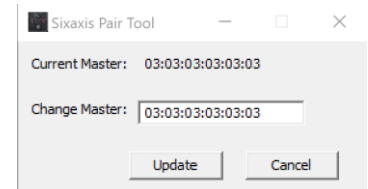
Press the "Update" button. The "Current Master" field should then show the updated MAC address. Now you can disconnect the USB cable from the Controller.

The PS4 Controller can now be connected as soon as the PINE II is powered up and the green status LED on the PINE is flashing green only.
Press the PS button once (button in the middle between the 2 knobs) to connect the game controller to the PINE. The LED of the Controller will flash white while connecting. Once the LED remains solid, the controller is connected to the PINE II.

The LED on the PS4 Controller will change depending on the controller's battery status from green (fully charged) – yellow – orange – red (almost empty).

If the PlayStation controller no longer connects to the PINE (even with the correct Mac address), first try to store another Mac address (e.g. 03:03:03:03:03:02), and then go back to 03:03:03:03:03:03. You might have this issue if you accidently brought the Controller into pair mode by long-pressing the Share + PS Button.

To use the PS4 controller with a game console again later, it can simply be re-connected to the console by long-pressing both Share and PS Button.

OTA Firmware Updates

OTA stands for "Over-The-Air" and means the Firmware of the PINE II can be updated via a WiFi network without the need of a computer and USB cable.

Every time you connect your phone to the PINE with our PINE Motion App, the app will read the current firmware version from your controller. If your phone has an active internet connection and there is a newer firmware available, the app will display a dialog screen right after establishing a connection and tell you that there is a new firmware available.

If you don't want to perform a firmware update, you can simply cancel the dialog (it will reappear the next time you connect to the PINE).

If you want to perform the update via OTA, simply type in the name and password of your WiFi network and press Update.

In order for the Controller to perform the update, the Bluetooth connection between your phone and PINE will automatically be disconnected. PINE is then trying to connect to your WiFi network. If successful, the WiFi LED on the PINE will turn on. If no connection to the network can be established, the PINE Controller will reboot. In that case, restart the App and start a new update attempt. The update process will take roughly 1-2 minutes. The Status LED will flash green and the 4 red motor LEDs will indicate the current progress (each red LED indicates a 25% progress). The update is finished once the WiFi LED turns off and the Status LED starts flashing green again. Then, restart the PINE Motion App to reconnect.

Regular firmware updates via a computer and USB cable are still possible. If you choose this option, please make sure you download the newest Windows Updater Utility from our website. Wired firmware updates for PINE II are only possible with our Windows Updater and are not possible on macOS.

New Update available

Current Firmware: 4.1
Newest Firmware: 4.2

What's NEW:
- Bug fixes when operating with a PS4 Controller. We recommend the firmware update when you want to use a PS4 Controller.

The firmware can be updated via our Windows Utility or using OTA (Over-The Air) technology by connecting PINE to a WiFi network.

If you want to use the OTA Update, enter your WiFi network name and password below and press Update.

WiFi Network Name

WiFi Network Name

WiFi Network Password

WiFi Network Password

CANCEL   UPDATE

Motor Operation Modes (Silent – Dynamic – High Speed)

PINE II allows for near silent stepper motor operations. At low speeds, the motors are completely silent. Please be aware that noise levels can increase as the motor speeds go up (especially on linear slider rails where the carbon rails act as resonance bodies for the vibrations).

We integrated 3 different motor operation modes. You can change modes for each motor under the "Motor Settings" section of the app.

- **Silent**
  Newest stepper motor driver technology allows for near silent motor operations. This makes PINE II the ideal unit for controlling your sliders and pan/tilt heads in audio-critical applications like interviews and wild-life filming.

- **Dynamic**
  This is a standard driver operation mode as it is found on regular motion controllers (as for example in our PINE R Controller). You will hear some audible sound from your motors (typical stepper noise). However, the motors will respond very dynamically and with high a torque output. Use this mode if motor noise is not an issue and you have a heavy payload.

- **High Speed**
  High speed mode is similar to the Dynamic mode in that it results in some audible stepper motor noise. In this mode, we were able to increase the maximum motor speed tremendously (by a factor of almost 7 compared to Dynamic and Silent mode). Use this mode with caution as you will be surprised how fast the motors will move. We recommend decreasing the max. motor speed via the slide bar under the motor settings section and slowly adjust it up to the point where you feel comfortable with the speed.