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MECHA User’s Guide

For firmware version 02314 or newer.

NOTE. Images shown in this guide may not be an exact representation of the current firmware version.

Download the latest version of this guide from

https://www.nodalninja.com/Manuals/mecha.pdf


Support email address: mecha@nodalninja.com

How to use this User’s Guide

Welcome to the MECHA C1 User’s Guide!

If you have never used MECHA before, we recommend that you read the introduction first, to get an overview of how it works and what you can do with it. Then read the MECHA Single Axis part and practice according to the instructions.

Once you are familiar with the MECHA Single Axis, if you are interested in MECHA Dual Axis, you can continue with the second part.

Even if you are an experienced user, please pay attention to the warnings.

If you find the firmware update and other operations difficult, you can receive support and guidance at mecha@nodalninja.com

Let’s get started!
WARNINGS

WARNINGS to Dual Axis MECHA Users

- Test MECHA WITHOUT a camera mounted first!
- Please test for camera clearance before running any program.
- Test any preset supplied or adjusted WITHOUT a camera mounted FIRST, especially when the clearance is not enough.
- CHECK for clearance with shutter cable attached!
- ONLY use a coiled cable for dual axis that can be stretched to about 1m.
- Use short cable with extreme caution.
- The power button, $\text{\textcopyright}$, can always be used as an emergency stop, except for the speed calibration procedure (123123<).
- If the movement is not as expected, or there is any danger for the moving parts to hit something, please press $\text{\textcopyright}$, the power button of MECHA, to stop the movement immediately.
Introduction

What is MECHA?

In short, MECHA is a wireless controlled motor that can rotate and trigger a camera or other devices.

In general, MECHA can rotate anything that can benefit from a controlled rotation, not only cameras directly or mounted on a panoramic or ball-head, but also turn tables holding objects to be photographed or filmed, as well as lights or stands for presentations.

MECHA can be mounted on a tripod and on any other stand that has a mounting screw.

It can rotate along with anything mounted on it, or can rotate only the object mounted on it. The rotations/moves can be pre-programmed and launched using its buttons, or can be wireless launched via its web interface from any device that can run a web browser.

For example, its commands can have equivalent simple QR codes. At an exhibition, scanning a QR code can rotate the featured object at a certain angle without the need to touch the object or the stand. Series of rotations can be pre-programmed and launched wireless by the visitors or by the host.

It also has support for IR remote - just as the camera has its remote, or a TV set has one - and support for wired remote.

The built in battery lasts for one day after a full charge, and can be charged even while it is in use, from a power bank or outlet adapter, thus allowing the non-stop run.

As it uses Wi-Fi for connection, it can be accessed directly with a phone or via a Wi-Fi network, even through Internet, thus the commands can be sent from a few meters away, or from anywhere in the world, with a device connected to the Internet.

This is a short description of MECHA, a long one could be a dozen, if not hundreds of pages.
MECHA allows both simple and complex operations to be performed, even the most complex ones can be reduced to something as simple as pressing one or two buttons. This is due to its feature that allows very complex sequences to be assigned to one button or to a code.

The ways for programming MECHA range from just asking for MECHA to be programmed remotely by manufacturer, to using its web interface, or exchanging programs with other MECHA users. Each way has its own levels of complexity, from very easy to the most powerful. For example, the web interface can be used to download a preset from server and use it directly, or to download, and modify, then use it. To program presets from scratch, support provided by experts or advanced users can make even programming from scratch easy, considering a starting script that can then be extended and made as complex as needed.

In this user guide, we will focus first on using MECHA to automate the movements of a panoramic head on a single axis, like Fanotec R1, or dual axis, like Nodal Ninja 3 and alike, reducing the panorama shooting to a simple press of a button, or two, regardless of its complexity, and to do that without flaws, again and again.

MECHA consists of two parts: a motorized rotator (abbreviated E), and a controller (abbreviated C), and in this guide we are particularly interested in the controller.

**MECHA C1 Presentation**

MECHA C1 controller has six buttons, three ports and a cable connector that connects the controller to a motorized rotator, such as E1.

It also has one LED under the power button, ⚪️, and five LEDs under the battery symbol.
About Buttons

The numerical buttons – 1, 2, and 3 – are used to enter some numeric selections, or to enter specific codes.

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="https://via.placeholder.com/15" alt="Power Button" /></td>
<td>The power button is used to power ON/OFF MECHA, to confirm or cancel some operations, and it is also the equivalent of the number 0 (zero) when power codes are entered.</td>
</tr>
<tr>
<td><img src="https://via.placeholder.com/15" alt="Button 1" /></td>
<td>This button comes pre-programmed with 4 shots around. It can also be used to enter the number 1, or to execute the favorite code 1 by long pressing it.</td>
</tr>
<tr>
<td><img src="https://via.placeholder.com/15" alt="Button 2" /></td>
<td>This button comes pre-programmed with 6 shots around. It can also be used to enter the number 2, or to execute the favorite code 2 by long pressing it.</td>
</tr>
<tr>
<td><img src="https://via.placeholder.com/15" alt="Button 3" /></td>
<td>This button comes pre-programmed with 8 shots around. It can also be used to enter the number 3, or to execute the favorite code 3 by long pressing it.</td>
</tr>
<tr>
<td><img src="https://via.placeholder.com/15" alt="Left Button" /></td>
<td>The left and right buttons are used to rotate the system manually to the left and to the right, respectively, and also to specify the direction when launching a preset using the controller buttons, as terminator for codes (similar to the Enter key).</td>
</tr>
</tbody>
</table>

About UI vs. Codes or Buttons

MECHA can be controlled mainly in two ways: using the web User Interface (abbreviated UI) and using its own buttons.

Always start by powering up MECHA, by pressing and holding the power button, ![Power Button](https://via.placeholder.com/15), for 3 to 5 seconds. A beep will be heard and the LEDs will light up.

Although MECHA can be controlled via its own buttons, sometimes, for more complex tasks, or to assign complex tasks to a single button, the UI can be used.

But, before diving in assigning complex tasks to buttons, it is worth mentioning that MECHA has a unique set of features – zLM, which stands for
zero Learning MECHA – that are specifically designed to allow the use of MECHA without learning something new.

The zLM makes possible this scenario: User calling to or chatting with Support and tell:

U: "I want my MECHA to shoot a panorama 10 shots around, 3 rows, nadir and zenith."

S: "Please press ①, then ②, the right button."

And MECHA will do just that.

This will be explained in more details in the dedicated zLM chapter.

Many tasks, both simple and complex, can be performed either using the UI or the buttons.

**About the User Interface**

To access the UI of MECHA, a device with an Internet browser needs to be used. The simplest and handy, really handy, will be a smartphone.

MECHA uses wireless connection, abbreviated Wi-Fi.

It can be set as AP (Access Point), or STA (Station), or even both: AP+STA, as well as no Wi-Fi, in which case the control is possible only by buttons.

The desired mode can be set as default in MECHA’s Configuration page (more on that later) or by a short press of a button when MECHA expects this, and this is when the LEDs blink alternately: -==-=== (splitting lights).

**Splitting Lights – Set MECHA in AP, STA, AP+STA Mode**

During this period:

- pressing ① will set MECHA in AP mode
- pressing ② will set MECHA in STA mode
- pressing ③ will set MECHA in AP+STA mode
When MECHA is in AP or AP+STA mode, it broadcasts a SSID with a specific name - the default name contains the word "MECHA" in it - to which the smartphone can be connected using a password, which is 12345678 by default.

Once the smartphone is connected to MECHA SSID, the MECHA UI can be accessed in browser at 192.168.8.1

When MECHA is in STA or AP+STA mode, it can also connect to the SSID of a particular network, other than MECHA’s own SSID, and as a result the User Interface of MECHA can also be accessed at the address given in that particular network, like this: 192.168.1.100

As a note, the particular network can be managed by the smartphone itself, if on smartphone a hot-spot is enabled and MECHA can connect to it (more on that later).

If, for any reasons, the address of the MECHA UI cannot be known, MECHA has a way to show the address of the UI, if one of these codes is entered using MECHA’s buttons:

- **321<** will show on LEDs the last part of the UI address, like .100
- **323<** will show on LEDs the full UI address, like 192.168.1.100

Table of Equivalences: LEDs – Characters

The conventions of how the numbers and symbols are shown on LEDs are featured in this table.

![Table of Equivalences: LEDs – Characters](image)
About the Firmware (FW) Update

To benefit from all features implemented in MECHA, it is recommended to update its firmware to the latest version available.

There are a couple of ways to update the firmware, and the easiest is via the Internet.

To check and perform the update, on the UI there is an [Update] button.

If MECHA is not connected to a Wi-Fi with Internet access, it will ask for a SSID name and password, just like a guest in your house will ask if there is a Wi-Fi available, to be able to check something on Internet, a Wi-Fi the guest will connect the phone to. The same way, MECHA will use that Wi-Fi in order to download and perform the update.

MECHA is in the idle status after it is powered up, as long as it doesn’t execute any preset.

If MECHA is OFF, pressing the power button, 📲, for 3 to 5 seconds, will turn it ON and, depending on the configuration, it can take up to 35 seconds until the start sequence ends and MECHA reaches the idle status. This timeframe will be reduced in the future firmware releases.

When MECHA is idle, some codes can be entered to perform specific tasks and tests without using the User Interface. This is useful if you don’t know how to use the User Interface yet, or you don’t want to use the User Interface.

For example, **131>** will perform a test panorama of 6 shots around, 60° apart, in clockwise rotation (CW), while

**131<** will perform a test panorama of 6 shots around, 60° apart, in counter-clockwise rotation (CCW).

These tests can be used for shooting an actual panorama with a fish-eye lens on ring type panorama head, like R1, mounted on MECHA.

**132>** will perform a test panorama of 12 shots around, 30° apart, in clockwise rotation, twice as much as the previous codes, and for counter clockwise rotation, **132<** can be used.

These tests can also be used for shooting a real panorama with a 18-55mm kit lens on a panoramic head, like NN3, mounted on MECHA.

**NOTE.** Whenever you enter codes, press the buttons consecutively, one at a time.
In the case of using only one MECHA, a cylindrical panorama can be shoot automatically, and if the tilting is done manually, even a spherical panorama can be made using the code again for each row, after manual tilting.

When two MECHAs are used, if they are wireless connected in DAC, the entire spherical panorama can be done automatically, without the need for manual tilting, using

\[1313 > 1312 > 1321 >\] for CW, or \[1313 < 1312 < 1321 <\] for CCW.

These codes will shoot a multi-row panorama plus nadir and zenith, the difference being the start position. The most used is \[1313 >\].

These 4-digit codes must be entered on the horizontal MECHA, the lower one, when it is idle, in MECHA DAC.

Often, in this guide, we will use the term **preset**, which means a set of instructions and configurations, that can be saved and used when needed, to perform specific operations much faster. For example, some presets contain all the information that MECHA needs to execute a whole panorama. You can create your own presets or download presets from server.
Part 1

MECHA Single Axis
Before First Use

Before using MECHA, we recommend that you do specific checks and tests.

- First, if you have an R1 or an NN3, mount them on MECHA as shown in the images below:

![Image showing R1 and NN3 mounted on MECHA]

Power On and Test – MECHA Single Axis

https://youtu.be/H5NUuXF1Q14

Power ON and Test - MECHA Single Axis

Power on MECHA by pressing the power button, \( \text{\textsuperscript{1}} \), for 3 to 5 seconds (long press). It may take about 35-45 seconds to start.
The long press of the power button is only necessary at power on/off. In all other cases, use a normal press.

Assuming that MECHA is mounted as shown in the image above, without the camera, let's perform two test rotations.

For a rotation of 90° to the left:

- Press < then quickly press 2.

For a rotation in the opposite direction, to go back to the starting position:

- Press ▶ then quickly press 2.

For a test panorama, press the following buttons:

- 1 3 1 ▶

Power off MECHA by pressing the power button for 3 to 5 seconds.

Now you already know how to power MECHA on and off and perform two simple rotations and a test panorama.

We recommend that you perform the above operations a few more times to familiarize yourself with long and normal button presses, then move on to the next section.

**Check the Battery Level**

- If no LED lights up, or only a red LED lights up, the battery may be discharged, and it is recommended to use a 5V-2A charger to charge it. It may take 3 to 5 hours to charge the battery.

- Otherwise, if the LEDs light up normally, as shown in the **Power ON and Test** video, after 30-40 seconds, you will hear two beeps, and the LEDs below the battery symbol will turn off.
Simple Rotations

Power on MECHA as shown above.

- For 45° rotations:
  - Press < then quickly press 1.
  - Press > then quickly press 1, for the opposite direction.

- For 90° rotations:
  - Press < then quickly press 2.
  - Press > then quickly press 2, for the opposite direction.

- For 180° rotations:
  - Press < then quickly press 3.
  - Press > then quickly press 3, for the opposite direction.

Note that the rotation angle for the above button combinations can be set on the Configuration page.

For continuous rotation press and hold the arrow buttons, one at a time.

For example, for continuous left rotation, press and hold <.

If, for some reasons, you want to reverse the direction of horizontal simple rotations, you can use the 2313< code. After this change, for example, < will rotate the system to the right, and >, to the left. Use the same code to cancel the change.
Note that the above code does not change the rotation of the motor. There is a special code to do that.

Quick Panoramas Using MECHA’s Buttons

- 1< – press the 1 button, which comes pre-programmed with 4 shots around, then the left button, <, to specify the direction of rotation to the left.

- 1> – press the 1 button, then the right button, >, to specify the direction of rotation to the right.

- 2< – press the 2 button, which comes pre-programmed with 6 shots around, then the left button, <, to specify the direction of rotation to the left.

- 2> – press the 2 button, then the right button, >, to specify the direction of rotation to the right.

- 3< – press the 3 button, which comes pre-programmed with 8 shots around, then the left button, <, to specify the direction of rotation to the left.

- 3> – press the 3 button, then the right button, >, to specify the direction of rotation to the right.

These are the default presets assigned to the three numerical buttons of the MECHA. If the results are as expected, it means that they have not been overwritten yet, and you can use them to take panoramas from 4, 6 and 8 shots around with camera mounted. Later in this guide, we will see that these presets can be overwritten.

MECHA's firmware act as the device's complete operating system, performing all control, monitoring and data manipulation functions, and it is important to have the latest version installed.

However, if you prefer not to update at this time, or you are not comfortable with the firmware update procedure, you can skip now to Test using MECHA’s buttons, in the next page.
Firmware Update Using a Hot-spot

This update method is available starting with firmware version 02118.
For this simple method of updating the firmware, we assume that you know how to set up a hot-spot on your 3G, 4G, or 5G smartphone, a smartphone with mobile data enabled and Internet available to it; in other words, you can navigate the Internet using that smartphone alone, without the smartphone being connected to a Wi-Fi.

- First, set up a hot-spot with the name MECHA-UPDATE and (default) password 87654321, in 2.4 GHz band.

- Press the power button, P, for about 3 to 5 seconds to power on MECHA, and wait until the splitting lights end: -=-=-=-=-=, there is no more LED activity and you will hear two beeps. MECHA is now in idle status and can accept commands and codes. If MECHA doesn’t reach this status, then please power it down, by pressing the power button 3 to 5 seconds, and contact us at mecha@nodalninja.com.

- Using MECHA’s buttons, enter the code 312123< by pressing one after another each button. Before pressing the last button, you can wait and look how the LEDs show the entered sequence, just to be sure you entered the correct code. If there is any mistake, short-press the power button and enter the code again, and terminate with < by pressing the left arrow button, <. Now, notice how MECHA starts scanning the existing networks.

Please do not turn off MECHA while updating the firmware!

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● And when it connects to the previously created hot-spot, two beeps are heard. The code 312123< will update the firmware using the MECHA-UPDATE hot-spot you set. The response – displayed on the LEDs – can be: !!!, if Internet is not available for MECHA.

**NOTE.** See the Table of Equivalences: LEDs – Characters.

The update may take up to 5 minutes, but it could take longer in case of slow Internet connection.

---

## Test Using MECHA’s Buttons

After mounting MECHA on a tripod or on any stand that has a mounting screw, you can perform a few tests, first without mounting the camera.

**NOTE.** The following codes are used to tell MECHA what type of rotator is connected to it, if you purchased it separately, or changed the rotator type, or if you want to be sure MECHA has the correct one set:

### Set the Rotator Using MECHA’s Buttons

- 23131< set **E1** as preferred rotator
- 23132< set **E2** as preferred rotator
- 23121< set **P1** as preferred rotator

The code should match with the actual rotator connected to each MECHA, and needs to be entered by pressing the buttons of the MECHA to which the rotator is connected.

However, if you are in doubt about the type of rotator, you can try each code, then launch a 90° rotation – press the left arrow button, 🠝, then quickly the 2 button – and if it is indeed 90°, then the rotator is correctly set.

Alternatively, you can contact your dealer, or mecha@nodalninja.com, for more info or help in identifying the type of rotator you have.
Once the rotator is correctly set, power on MECHA and wait until the LEDs are off and you hear two beeps, then enter the following codes using MECHA’s buttons:

- **131** - to enter this code, press the buttons 1 3 1, which is a hardcoded for a test of 6 shots around, then the right button, ▼, to specify the direction of rotation to the right, or the left button, ◀, to specify the direction of rotation to the left.
- **132** is similar to **131**, but for 12 shots around.
- **3212<** - enter this code to find out the firmware version, which will be displayed on the LEDs.
Panorama with Automatic Shooting Pattern Using only the MECHA’s Buttons – Single Axis

This method requires the firmware version 02118, or newer, and works for rectilinear lens from 10 to 200 mm (FF equiv).

The shooting pattern will be computed by MECHA based on only few presses of a button without using the User Interface, as follows:

- First, position the vertical rail in **level** position.
- Place a sheet of paper in front of MECHA in such way to fill the frame. The frame can be viewed through viewfinder or through the live view. Instead of the sheet of paper, any well defined feature or image on a screen, or other means, can be used. A gray sheet of paper will work best for exposure purposes as well.
- The camera and lens must be set the same as for shooting the actual panorama.
- Enter the code 31< on MECHA, and when the power button starts flashing, MECHA waits for two quick presses of the power button, ✻, as follows:
  - **first** - in order to trigger the camera
  - and the **second** - after the camera was triggered
- After that, MECHA will rotate slowly to the right and wait for another press of the power button, ✻, right after the sheet of paper is out of the camera’s frame.
- Then MECHA will go back to the initial position, and
- the LEDs 1, 2 and 3, under the battery symbol, will start flashing, and MECHA waits (15 seconds) for one of the buttons 1, 2, or 3 to be pressed, to assign the computed preset to that particular button. To cancel the assignment, the power button, ✻, can be pressed instead.
If MECHA is unable to compute a pattern using the feedback received from pressing the power button (mostly caused by too small intervals), the LEDs will show !!!, which indicates that nothing has changed.

To execute the panorama computed by MECHA, make sure the vertical rail is in level position, and press the button to which you have assigned the panorama, then press either the left or right button.

If Single MECHA is used, after first row MECHA pauses and suggests, on LEDs, a manual tilt of the vertical axis to continue to full spherical panorama.

If only cylindrical is needed or no manual tilt is possible, press the power button of MECHA, 🌌.
How to Access the UI

Access the User Interface (UI) with a Smartphone

• Press the power button, , for about 3 to 5 seconds to power on MECHA, and wait until the splitting lights are displayed on LEDs: -=-=-
• To be able to connect your smartphone to MECHA’s network, MECHA must be in AP mode. So, at splitting lights, press either 1, to set MECHA in AP mode, or 3, to set MECHA in AP+STA mode.
• Tap Settings icon on your device. Under Wireless and Networks, make sure Wi-Fi is turned on, then tap Wi-Fi. Tap the network name that contains MECHA in its name, to connect the smartphone to MECHA. The default password for MECHA’s network is 12345678.
• Now MECHA’s User Interface (UI) can be accessed on the smartphone’s browser at: 192.168.8.1 (which is a static IP address).

https://youtu.be/ufIbFlvhHT4

Using a Smartphone to Access the User Interface – MECHA DAC and Single Axis
Access the User Interface (UI) on Your Computer Connected to a Wireless Network

- The first step is to access the User Interface (UI) with your smartphone, as shown above, and preferably **set the AP+STA mode**. After that:

  ![Connect to Wi-Fi button](image)

- Press the *(Connect to Wi-Fi)* button on the Configuration page (there is a similar button on the *Row* page).
- Select the name of the Wi-Fi network you want to connect to and enter the password. Please see **User Interface – Connect to Wi-Fi** for more details.

In this way, MECHA has the connection data to a Wi-Fi network and is able to connect to this network when needed. The above step is required only once for a certain network. If the network changes or you have deleted the connection data, then you need to repeat this step, because MECHA saves only the last accessed network.

- To be able to see MECHA’s UI on your PC, MECHA must be in **STA**, or **AP+STA**, mode.
  - If you set the AP + STA mode, as requested in the previous step, you can proceed to the next step.
  - If, for some reasons, the set mode is AP, power off MECHA, then power it on, pressing the *(P)* button for about 3 to 5 seconds, and wait until splitting lights – -=-=-= – are shown on LEDs. Now press either **2**, to set MECHA in STA mode, or **3**, to set MECHA in AP+STA mode. (You can also make this setting on the *Configuration* page.)

- The next step is to find the IP address, which is dynamic in this case. There are two ways to find it:
  - **1. Using MECHA’s buttons:**
→ **1.1.** enter the code 323< to see on LEDs the full UI address, like 192.168.2.188 (See *Table of Equivalences: LEDs - Characters*),
or
→ **1.2.** Usually, the IP addresses in your local network differ only by the last number of the IP (the part displayed at the end, after the last dot). To display the last part of the IP, enter the code 321<. For the example above, .188 will be displayed.

○ **2. Access the UI with a smartphone,** as shown above (make sure MECHA is in AP+STA mode, started by pressing 3), then access the *Configuration* page, and scroll to the bottom of the page. Note the static IP address (192.168.8.1), and next to it, the dynamic IP address to access the User Interface on a computer. In our example, it is 192.168.2.188.

| IP: 192.168.8.1, 192.168.2.188 SN:255.255.255.0 GW:192.168.2.1 DNS:8.8.8.8 |

**NOTE.** If only the static IP is displayed, it means that MECHA is in AP mode and, as a result, the dynamic IP is not displayed.

- Now you can access the MECHA’s UI on your computer’s browser by entering the IP address you found, like 192.168.2.188, in the browser address bar, at the top of the window.

*https://youtu.be/X-r7_OBMj48*

**Access the User Interface on Your Computer – MECHA DAC and Single Axis**
Test Using the UI

Some tests performed before – using the controller buttons – now, in this chapter, we want to perform them using the User Interface, so please access the User Interface with your smartphone, for example.

Set the Rotator on Configuration Page

At the top of the New page, tap the [Config] button to access the Configuration page (192.168.8.1/config). The user and default password are:

<table>
<thead>
<tr>
<th>User:</th>
<th>admin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password:</td>
<td>Mecha</td>
</tr>
</tbody>
</table>

On this page you can make special settings, as we will see later. For now, enter the name of the rotator you are using: E1, E2, or P1.

Then tap the [Apply] button at the bottom of the Configuration page. This is a one-time setting, and is usually done at the factory.

After that, access the Row page by tapping the [Row] button at the top of the Configuration page.

Tap the [info] button at the top of the Row page whenever you want to find out more details about the functions of the controls available on the User Interface.
At the same time, at the top of the page are displayed a few links to some useful pages: a quick help page, the configuration page and the new page:

When using the User Interface, you can display all or only some of the controls. To see them all, select A3 from the select list next to the [info] button, which is the highest level of complexity for the interface. The other options are: S1, S2, S3, A1, and A2, where S means Simple, and A – Advanced.

UI Test – 131, 132 Codes

If you want to perform the same tests that you did before using the controller buttons, proceed as follows using the UI buttons:

- On the Row page, tap Presets and select TEST 131 from the Presets list, which is the panorama executed before, on chapter Test Using MECHA’s Buttons (6 shots around).

To load the preset, tap the [Load] button, if visible, under Presets list. Otherwise, it means the UI complexity is S (Simple) and some buttons and options are not visible, and the selected preset is already loaded. That means you can go to the next step.
- Tap the [LEFT] button to execute the preset to the left, or [RIGHT] button to execute the preset to the right.

Do the same with the preset TEST 132 (12 shots around).

Note how the settings on the Row page change when a preset is loaded. In other words, the settings we see are, in fact, the loaded preset.

In the Degrees of rotation field, 30° is automatically displayed, not 60° as before. That is because a complete rotation has 360 degrees.
User Interface (UI)

UI Controls

In this chapter, we will explain the functions of the buttons and the options available on the Row page. Ring and Turn pages are quite similar to Row.

Access the User Interface as shown in the chapter How to Access the UI, and tap/click the [Row] button to access to the Row page.

- Tap/click the [info] button, at the top of the Row page, to show the descriptions for all the controls. At the same time, three more buttons are displayed at the top of the page – [HELP], [Config], and [NEW] – for accessing the following pages:
  - Help — Useful information and codes. See the Current Codes List at the end of the guide.
  - What’s new? — The page where you can find information about the current firmware version and the versions published so far.

- Level of complexity — Next to the [info] button there is a list of options to set the level of complexity for the User Interface, from the simplest (S1) to the most complex (A3). Select A3 to show all the controls.

- Firmware version — Under the Row label, note the current firmware version, 02208 in our example (images shown in this guide may not be an exact representation of the current firmware version). Click this tag to access the What's new? page.

- Battery percentage — At the right side of the page, see the battery percentage (84% in our example). If the percentage drops too much and a red LED continuously blinks, it is recommended to recharge the battery, otherwise MECHA switches off. On the Configuration page, we will see that there is a setting for disabling MECHA during charging, to prevent accidents caused by the charger cable, which can twist around the tripod if MECHA is commanded, by mistake, to do a preset during charging.
• **Hand symbol** — Toggles gesture mode. Tap the screen and drag to see how it works. Always make sure there are no objects near the robot, especially in gesture mode.

  ![Status Feedback](image)
  
  **MECHA-Single**
  
  @ 0.5s  E1
  
  0°
  
  1

  **Status Feedback** — In the next area, the **MECHA’s ID**, the **Refresh rate of the motor/controller status** and the **Current lower rotator** are displayed, followed by the **Current angle position** for both rotators, and the **Current status** (shots remaining, position, repeat set). On MECHA DAC, the **Status feedback (SF)** also reflects the tilt angle for the 2nd axis. When scripting is used, yaw is shown on **Status feedback** as well.

  At the right side of this area, note the **Current time**, **Current date or time remaining**, **Current rotation degree interval**, **Seconds remaining in current delay**.

  ![Horizontal Slider](image)

  The horizontal slider allows manual rotation in degrees, relative to the current position. Click/tap on the screen and drag to the left or right.

  The controls shown in the image below, are directly related to the current preset and settings. The values displayed in the fields are the current preset (**sa_7shots**, in our example).

  • **[LEFT]** button — Shoots a 360° panorama counter-clockwise. In our example, the panorama consists of 7 photos, and the first photo is taken in the current position, followed by the second 51.43° apart, and so on.

  • **Shots** — Number of shots around for a 360° row. Select the number of shots from the list, or select **Custom** and enter the desired number of shots, or the focal length of the lens used followed by **mm**. The **mm2** notation is also accepted. For example, **28 mm2** will compute the full spherical panorama for a 28 mm lens, using **Repeat**. If the number of shots is 1, using the **[LEFT]** button, only one photo is taken followed by a rotation of 360° (return to the initial position), if the **Wait** option is selected. Useful when shooting (filming) 360°. If the **Rewind** option is selected, the rotation is 0° (no rotation).

  • **[RIGHT]** button — Shoots a 360° panorama clockwise. It is similar to **[LEFT]** button, but the rotation is to the right.
- **[MAP]** button — Downloads a PTGui file with the current preset. Use this button after all the settings are set as you want.
 MECHA will also offer to download a map.zip file containing three small .png images. The images are the same for any map.
 A high resolution set is also available here, with Mecha as zip password: https://www.nodalninja.com/MECHA-MAP/map-png.zip

- **[Template]** button — Downloads a PTGui file that can be applied to a real set of images. This template also contains the focal length.

- **[Probe]** button — Downloads a probe (a PTGui file) from shooting pattern to study/refine the overlap.

- **[goVM]** button — Downloads a script (a goVM.py file) for the upcoming Virtual MECHA. Until Virtual MECHA will be available, this file can be also used for support and demo purposes.
- **[NPP Shots]** button — Takes two shots for NPP (No-Parallax Point) check
- **[Live NPP]** button — Displays the instructions for determining the NPP along lens axis using camera live view, as follows:
  - Use two vertical reference points with one far behind the other. Turn on live view mode. Position tripod to line them up at image center. Use grid and magnified view for greater accuracy.
  - Scroll left to see the reference points. Slide the lens back or forth to line them up, **being careful not to move the tripod!**
  - Scroll right to see the reference points. Carefully slide the lens back or forth to line them up, if needed.
  - Check if the reference points are still perfectly lined up at image center. Nudge tripod to line them up, if needed.
  - Check if the reference points are lined up to the same extent as in the last step. Carefully adjust to achieve similar alignment.
  - End of Live NPP procedure. Repeat the process to confirm alignment, if needed.


```
<table>
<thead>
<tr>
<th>1 TRG</th>
<th>AF 0.01 sec</th>
<th>W:0 sec</th>
<th>B:0 sec</th>
<th>M:1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E:0.25 sec</td>
<td>A:1 sec</td>
<td>51.43°</td>
<td>x 1</td>
</tr>
<tr>
<td>No Repeat</td>
<td>Single</td>
<td>7 RPM</td>
<td>16+128 uStep</td>
<td></td>
</tr>
<tr>
<td>Medium Load</td>
<td>No Sensor</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

- **TRG** — Number of camera triggerings for each position. Select zero if no triggering is needed. When using automatic exposure bracketing in continuous shooting or self-timer mode, MECHA treats it as 1 triggering. In our example: 1 triggering.

- **AF (Auto-Focus)** — Duration of AF signal time, for example, 0.05. If the value is negative, the AF signal will be ON during the entire image sequence. In order to trigger the camera, for some Sony cameras, you have to set an AF value greater than zero, even if the camera focus is set to manual.

- **W (Wake)** — Duration of the signal for camera wake-up. If the value is negative, the pause will be forced even when the camera is ON, before each sequence begins. Also, it will force a **B (Before)** delay in case of **B: not zero**. A small negative value, under 1 second – for example, **W:-0.9 s**, or **W:-0.1 s** – will trigger the **Wake** signal, which is a focus signal, before every
position instead of only at the beginning of a session. Useful for moving out of the camera’s view.

- When $W$ delay is negative, $B$ delay is referenced to MCU’s clock rather than added delay. For example, in time lapse sessions, for $W$:-0.001 sec and $B$:5 sec, the result will be a shot at every 5 seconds. If movements are executed, the value of $B$ needs to be large enough to cover the time taken by the move.

- Also, when $W$ delay is negative, a log file – /intervals.txt – will be produced, with all the intervals, in ms, between the triggerings of the shutter done by MECHA.

- **$B$ (Before)** — The pause before each bracketing sequence or set of images. If the value is negative, up to 2 seconds will be used for Mirror Lock Up.

- **$M$ (Modifier of Exposure)** — Modifier of the duration of shutter button signal, a list of multipliers, like 1,0.5,2 for normal, half and double exposure time, respectively, in case of 3 TRG, or it can be entered as -0.7EV (for under, normal, over), or 0.7EV (for normal, under, over), in which case it will automatically extend to the number of TRG. If the modifier starts with B, like B-2EV, or B1, or 1,0.5,2, the “Bulb” mode will be assumed.

- **$E$ (Exposure)** — Duration of shutter button signal, for example, 3 or 0.5*3 for progressive half Exposure, or 2*3 for progressive double Exposure in a set. These can be entered as custom values. The values can be entered as 1/100.

  - **E:SHT C.**  
  - **E:SHT C1**

  - $E$: SHT C, $E$: SHT C1 — Fast Shutter Confirmation is automatically used if $E$:SHT C. or $E$:SHT C1 is set in preset. Both options work as a variable pause. In the case of the $E$: SHT C1 option, MECHA sends only One Signal to the camera and waits for TRG confirmations (the [STOP] and [Cancel] buttons in the User Interface can also be used to cancel the wait). This is useful when you have your camera set for bracketing, to press the button one time and the camera to take automatically the whole bracketing set.

Use $E$:SHT C1 or $E$:SHT C. only if the test of shutter confirmation is successful (see 32313<code in Current Codes List), otherwise use the Button Confirmation instead: $E$:BTN > C. or $E$:BTN > CT.
To be able to use the Shutter Confirmation feature, connect the **Mecha 3.5mm to Male PC Sync Cable** (cable for shutter release confirmation, F9981) to the Aux Port of the MECHA C1 or C2 Controller used and to the PC Sync Port of your camera.

If your camera does not have a PC Sync Port, then you need a **Flash Shoe to PC Sync Adapter** (such as F9982, F9983 or F9984).

Shutter release confirmation and IR remote control is possible with a receiver like the one in the image below. In this case, connect the receiver to the Aux Port of the C1 or C2 Controller used and connect the cable for shutter release confirmation (F9981) to the female jack of the receiver.
### E:BTN > C, E:BTN > CT

- **E: BTN > C, E: BTN > C1** — Button confirmation options.
  - **E: BTN > C** — MECHA will wait, after any triggering, for confirmation with the button on the controller or NN IR Remote to continue.
  - **E: BTN > CT** — MECHA will only wait for TRG confirmations with the button on the controller or NN IR Remote, then it will use the learned delay(s) to finish the preset.

- **A (After)** — The delay after each bracketing sequence or individual image. If the value is negative, there will be a delay after each shutter actuation.

- **Degrees of rotation** — The rotation angle between two consecutive positions in a sequence, specified for [N x LEFT] or [N x RIGHT] buttons. The rotation angle is updated automatically, simultaneously with the number of Shots. However, if the rotation angle is changed, the number of Shots does not change. Use this feature when you want to take a certain number of shots, not an entire panorama. Specify this number in the next field (x N), and execute the sequence with the [N x LEFT] or [N x RIGHT] buttons.

- **x N** — The number of moves (N) for [N x LEFT] or [N x RIGHT] buttons.

- **Wait/Rewind** — these options tell MECHA to wait after the last shot, or to rewind to initial position. **Rewind** is useful if there are cables attached, or for partial panorama and time-lapse.

- **Repeat** — Delay in seconds until the shooting sequence will be repeated automatically, for example, 300 for 5 minutes, or 4*300 to repeat 4 times 5 minutes apart, or 0, or no repeat, for no repeat.

- **Single / Dual / Scripted** — Select **Single** for single axis applications. However, you can select **Dual** even if there are no instructions for the second axis. **Scripted** is valid for both types of applications. See **MECHA’s Simple Scripting (MSS)** for details about **Scripted** option.

- **Speed** — Speed denoted by Revolutions Per Minute. Select an option from the list, or enter a value via **Custom**.

---

If the Speed value is too high, the device may stop or move too fast, in which case be prepared to stop it by clicking/tapping the [Stop] button.
- **uStep** — Micro-stepping value, simple or combined; for example, different values for acceleration + constant speed region.

- **Load** — The options for Load are: *Custom, Light, Medium, Heavy, and Ring*. These are optimized motion profiles for a rated load. We encourage you to try them all, to see which one is best for the camera and lens you are using, or for what you want to do. You may prefer the *Heavy* option, even if you use a light camera.

- **[N x LEFT]** button — Shoots & rotates counterclockwise for N positions with the degrees interval specified above, regardless of the number of shots specified in the *Shots* field.
  For example, if you want to take 3 shots 45° apart to the left, set the degrees of rotation to 45°, and the number of positions to 3, as in the image below, and click the **[3 x LEFT]** button.

- **[Shoot]** button — Shoots the number of photos in a set for a single position. In our example, 1 photo is taken (**1 TRG**). Use this feature when you want to take some photos in a certain position, without any rotation.

- **[N x RIGHT]** button — The same as **[N x LEFT]**, but the shooting and rotation are done clockwise.

- **[Cancel]** button — Executes a smooth stop.

- **[PAUSE]** button — Pauses the current running preset. Click/tap again this button to continue.
  - The **21<** code switches MECHA to or off pause mode, the same as clicking the **[Pause]** button on UI, or on IR Remote.
When MECHA is in pause mode, the LEDs blink like (a colon). In idle status, there is a slow blink, and when running presets and paused, there is the regular blink.

When MECHA runs a preset and is paused, you can press on IR Remote, or [PAUSE/NEXT] on UI, to continue to the next position.

If, instead, is pressed on C2 or on IR Remote, MECHA will continue to the next position and switches on/off the step-by-step mode.

The above allows both:

1. Starting a preset in step by step, then switch off step by step when it is not needed, thus the preset will continue automatically.

2. If a preset is paused by remote/UI/script, then pressing will advance and switch on/off the step by step.

A possible application is a spherical panorama with certain areas needing to be done step by step, and which areas depends on the events on the field.

During the pause, pressing on IR Remote, or [SHOOT] on UI, MECHA will trigger the number of shots specified by [TRG] in presets. This can be used for extra shots for a particular position.

- [STOP] — Emergency stop.

- Presets list — This list contains all the presets, both those created and those downloaded from the server.
  - The names of the presets downloaded from the server start with (s), which means they are not saved yet. You can load and save the presets you want to keep.
  - The option More from Server... allows you to download presets from the server.

- [Load] button — Loads the preset selected from the Presets list. In our example, the current preset is sa_7shots.

- [Save] button — Allows you to save the current preset with the same name (overwrite), or with a different name.

- [Rename] button — Allows you to rename the selected preset.
• [Delete] button — Deletes the selected preset.
• [Import] button — Imports a preset and displays it in the Presets list, or multiple presets at once, if all_presets(..).mps file is given when importing.
• [Export] button — Exports the selected preset, or exports all the presets, if Presets is selected.
• [Empty] button — Empties the Presets LIST without deleting the presets.

<table>
<thead>
<tr>
<th>Load 0</th>
<th>Load 1</th>
<th>Load 2</th>
<th>Load 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Save 0</td>
<td>Save 1</td>
<td>Save 2</td>
<td>Save 3</td>
</tr>
</tbody>
</table>

• [Load 0] button — Loads the default preset, the preset saved using the [Save 0] button.
• [Load 1] button — Loads the preset assigned to the 1 button using the [Save 1] button.
• [Load 2] button — Loads the preset assigned to the 2 button using the [Save 2] button.
• [Load 3] button — Loads the preset assigned to the 3 button using the [Save 3] button.
• [Save 0] button — Saves the current preset as default preset that can be loaded with the [Load 0] button.
• [Save 1] button — Saves the current preset and assigns it to the 1 button, and can also be loaded with the [Load 1] button on the User Interface.
• [Save 2] button — Saves the current preset and assigns it to the 2 button, and can also be loaded with the [Load 2] button on the User Interface.
• [Save 3] button — Saves the current preset and assigns it to the 3 button, and can also be loaded with the [Load 3] button on the User Interface.
- **[Reboot]** button — Restarts MECHA, similar to restarting a computer.

- Default page at start — MECHA’s home page, or start page, can be one of the following pages: *Row, Ring, or New* (like in our example). Select the desired option from the list.

- **Volume of Beeps** — A value from 0 to 250, and can be entered via *Custom*, or select another option from the list.

- **Power Saving Mode** — A list of options to set MECHA to shut down automatically after a certain number of minutes of inactivity, or vice versa, to keep it always on. The setting for this field can be done on the *Configuration* page, in which case it has priority over other options, and is displayed on a gray background.

- **[Go to Ring]** button — Accesses the *Ring* page, and alternates with **[Go to Row]**.

- **[Team]** button — Initiates a temporary pairing with a second MECHA, which can be controlled if it joins the team. To confirm joining, enter the code **12<** on the second MECHA using its buttons. The second MECHA will act as a MECHA-V, and the first, as a MECHA-H in Dual Axis Combo. Both MECHAs can be connected to the local wireless network.

- **[Shut Down]** button — Shuts down MECHA in 20 seconds. Press **[Cancel]** or **[Stop]** to cancel.
[Connect to Wi-Fi] button — Initiates the process of connecting to a Wi-Fi network to use MECHA in STA (Station) mode or for firmware update. Available networks are displayed as in the image shown on the right. If you have successfully connected to one of the networks in the list, it is displayed on a gray background and you can connect to it using the stored password instead of typing it.

MECHA will show the connection status on its LEDs when trying to connect to Wi-Fi in STA or AP+STA mode. The process can be stopped by pressing the [Wi-Fi Off] button if you know that the targeted Wi-Fi is not in range.

- [Wi-Fi Off] button — Turns Wi-Fi OFF. It needs power cycling to have it ON again.
- [More or Less...] button — Shows more or less settings.
Configuration Page

The Configuration page can be accessed at 192.168.8.1/config, using the following username and password:

<table>
<thead>
<tr>
<th>User:</th>
<th>admin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password:</td>
<td>Mecha</td>
</tr>
</tbody>
</table>

At the top of the Configuration page, there are links to access Ring page (for single axis applications), Row page (for dual axis applications), and Turn page (for turn table applications – work in progress, at the moment). These pages are quite similar and, as a result, are not presented separately in this user guide. And for single axis applications, you can access either the Ring or Row page.

Default Mode

Default Mode — The possible values for Default Mode are: AP, STA, AP+STA. The default mode set here will be the current mode for MECHA after powering on. However, the default mode can be changed by pressing one of the MECHA’s buttons at splitting lights (----), as follows:

- Press the 3 button for 3 seconds – at splitting lights – to reset the configuration settings to their default values, for example:
  - Fixed Settings: no settings
  - AP Mode SSID: MECHA-ID
  - SSID password: 12345678
  - Password for the Configuration page: Mecha
- Hot-Spot password for firmware update: 87654321
- Default Mode: AP
- STA Mode: no settings
- When Charging: Stay ON

Very useful if you have forgotten the set passwords and cannot access, for example, the Configuration page or the User Interface.

Also, if a hot-spot with the name M-XXXXXX (where XXXXX is the MECHA ID) and the password 12345678 is found, the firmware will be updated using that hot-spot.

[Set Wi-Fi Power] button — Sets the value for Wi-Fi power. The maximum value for Wi-Fi power is 100. In our example (see the image below), it is 25.

**AP Mode SSID** — The name of MECHA’s network. This is how it is displayed in the list of available networks on your device.

**SSID password** — The default SSID password is **12345678**.

**[admin] Password** — The default password for Configuration page is **Mecha**.

**Pairing PIN** — Is a four-digit number that allows you to pair automatically at start more than 2 MECHAs connected to the same network or to the same hot-spot. See **Pairing PIN for more than 2 MECHAs**.

**UI Password** — Allows you to prevent someone from changing the settings on the Configuration page. You may want to allow someone to access your interface, but may not want the settings to be changed.
**Trusted IP(s)** — The IPs added to this field will not be restricted in any way when accessing MECHA. Add the IPs of your personal devices that you use to connect to MECHA.

**Using** — This is the IP of the current device connected to MECHA. In our example, 192.168.2.187.

---

**STA Mode**

**Static IP** — Remember that the IP address to access the MECHA’s User Interface on your computer is dynamic. Therefore, it changes from time to time, and you need to find it by accessing the *Configuration* page with your smartphone, for example. Enter a dynamic, available IP address in the *Static IP* field to make it static.

You can ignore the *Subnet*, *Gateway* and *DNS* fields if you do not know what information to provide.

---

**Fixed Settings**

**Fixed Settings** — Settings that overwrite the corresponding settings on the *Row/Ring/Turn* page. For example, if the *fixed Motor Speed* is 7, the one provided via the preset will be ignored, and MECHA will use 7 RPM as speed.
### Fixed Settings:
If you want a setting to be taken from presets or UI (default) leave its field empty.
The values set here will have priority over those in UI (which will have gray background).

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF:</td>
<td></td>
</tr>
<tr>
<td>W:</td>
<td></td>
</tr>
<tr>
<td>B:</td>
<td></td>
</tr>
<tr>
<td>M:</td>
<td></td>
</tr>
<tr>
<td>E:</td>
<td></td>
</tr>
<tr>
<td>A:</td>
<td></td>
</tr>
<tr>
<td>Motor Speed [RPM]:</td>
<td></td>
</tr>
<tr>
<td>Micro-stepping:</td>
<td>e.g. 16 or 16128</td>
</tr>
<tr>
<td>Motion Profile:</td>
<td></td>
</tr>
<tr>
<td>DAC:</td>
<td></td>
</tr>
<tr>
<td>BEEP:</td>
<td></td>
</tr>
<tr>
<td>Power OFF after:</td>
<td></td>
</tr>
</tbody>
</table>

**Power OFF after** — If this field is not empty, then the value specified here tells MECHA to power off if there is no activity a number of seconds equal to this value.

<table>
<thead>
<tr>
<th>Power OFF after:</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 sec.</td>
<td></td>
</tr>
</tbody>
</table>

1 = No Power OFF

**When Charging: Stay ON** — Means that MECHA does not stop during charging and you can use it as usual. The other possible value is **Turn OFF**, which means that MECHA stops automatically and remains off, except the charging function during charging.
Rotator Settings

Rotator — Set the rotator in use by selecting an option from the list, or using the following codes: 23131< for E1, 23132< for E2, and 23121< for P1.

Inverted — Check this checkbox if, for a particular reason, the rotator needs to have all its movements in the opposite sense of rotation, for example when mounted under a turn table.

Backlash — If the value needs to be entered manually instead of using the automatic procedure, for E1 and E2 rotators it is around 21 (33 in our example), and for P1 rotator the value is 0 (zero). It is recommended to use the automatic procedure for a better result, if the conditions to detect the small movements are met. Please see the code 12321< (Backlash compensation calibration) for more details.

Buzzer PWM and Start Page

Buzzer PWM values — Range from 1 to 255, and do not necessarily refer to the sound loudness. We recommend that you try a few values to find your preferred value.

Start Page — Can be New, Row, or Ring, and can also be set on these pages.

IR Settings and more

Use local CAM and AUX ports only — Check this checkbox if you want to connect camera to the horizontal unit in Dual Axis Combo. This means faster communication between MECHA and camera. Note that the camera cannot be connected to the vertical unit while this setting is active.

Use New Shutter Confirmation
**Use New Shutter Confirmation** — It will be used in both shutter confirmation and test of shutter confirmation (see 32313<code> code in Current Codes List). If the test fails, please perform the test again with this option disabled.

![Shutter Confirmation Time Out (sec.): 30](image)

**Shutter Confirmation Time Out** — This is the maximum time MECHA waits for the shutter confirmation to occur (30 s by default).

**Shutter Confirmation via other MECHA** — If enabled for MECHA-H, the shutter confirmation will work via MECHA-V if the camera and PC-Sync cable are connected to MECHA-V mounted on hot shoe.

**Enable Fast Mode** — Leave this checkbox checked.

**Hide some controls in web UI when a motor is running** — You will notice that some controls are automatically hidden so you can more easily find the important ones – such as [STOP], [PAUSE] – while the motor is running. Enabled by default.

**Use Nodal Ninja IR Remote** — Check this checkbox if you use an NN IR remote control, and connect the receiver to the AUX port.

**Double press the Nodal Ninja IR Remote Power button for power OFF** — Check this checkbox to be able to power off MECHA by pressing the power button on the remote control twice.

**Use Two IR Receivers (DAC ONLY)** — This option allows you to use one receiver on the MECHA-H and one on the MECHA-V. Only one remote control is needed to control the two units:

- the commands sent by using the 🏽 and 🎲 buttons will be interpreted and executed only by the MECHA-H unit,
while the commands sent by using the ▲ and ▼ buttons will be interpreted and executed only by the MECHA-V unit.

Using two receivers improves the performance of DAC (Dual Axis Combo), as the vertical unit receives commands directly from the remote control and not wirelessly, as is the case when a single receiver is used on the horizontal unit.

You may already know that when we mention the Configuration (/config) page, we are referring to the MECHA-H configuration page in DAC. However, the MECHA-V Configuration page can also be accessed after connecting to MECHA-V using your phone, by clicking on a link at the bottom of the page.

If you have enabled the Use Nodal Ninja IR Remote option on the /config page of your MECHA-V, you now need to disable it for the two receivers to work. Use Nodal Ninja IR Remote option should only be enabled on the /config page of MECHA-H, as should the Use Two IR Receivers (DAC ONLY) option.

If you have never accessed the Configuration page of your MECHA-V, most likely the settings are the default ones and no checks or changes are needed.

Use Aux Pulse, if exists — Check this checkbox if you use MECHA in applications requiring the Aux Pulse file. Default is clear and can be ignored.

Custom Protocol on AUX Port — Allows the use of the auxiliary port for equipment that uses a specific protocol. With common remotes, a half-press is detected as 1A, a full press is detected as 1A1S. These are the possibilities for a half-press:

- **045=1A** executes a preset whose name starts with 045 + blank.
- **-045=1A** executes a preset whose name starts with 045 + blank, but in the opposite sense of rotation.
- **HS=1A** – Home Set. A Home Set can also be done by pressing the power button.
- The following uses the inverted rotation for buttons, if it is set:
  - **45.0=1A** rotates MECHA 45.0° from Home position, absolute.
  - **-45.0=1A** rotates MECHA -45.0° from Home position, absolute.
  - **^45.0=1A** rotates MECHA 45.0° from previous position, incremental.
- \(^{-45.0}=1A\) rotates MECHA -45.0° from previous position, incremental.

- H=1A returns MECHA to Home position set by HS or by the power button.

### Reverse Direction of Rotations

Switch the Left - Right rotation when done by MECHA's buttons — Check this checkbox if you want to change the sense of left/right rotation when it is done manually using the <, > buttons. The equivalent of 2313< code. The left button, for example, rotates the camera to the left, and the controller to the right, when this checkbox is checked.

### Camera Settings

**Camera is in Portrait Orientation** — This checkbox is checked by default. You can uncheck it if you want to specify that the camera is in landscape orientation. For example, if the number of shots around is 35mm or 35mm2, via custom, the shooting pattern will be computed considering the camera orientation.

**Preferred MSS pattern** — This is how you want the MSS scripts to be produced automatically. By default it is SL,=,ZZ,NN.

Any MSS script consists of three parts, the first part refers to the starting position (SL – Start Level, in our case), and the third, to the number of
images for zenith and nadir (ZZ, NN – 2 zeniths, 2 nadirs). MECHA will replace the middle part (==) with the computed script.

For example, if you want Start Parked instead of Start Level, and a single Zenith photo instead of two, and a pause before the first row, the Preferred MSS Pattern should be: SP,P==,Z,NN

Usually, the following settings do not need to be changed. If these values are changed, the script on the Row page must be generated again by entering the focal length in the Shots field, via custom, for example: 56mm.

- Default Focal Length — 50.00 (used unless otherwise specified). MECHA supports a focal length from 10 to 1500mm (FF equiv.), with camera in Portrait or Landscape orientation.
- Sensor Height (portrait) — 36.00
- Sensor Width (portrait) — 24.00
- Overlap on Height — 0.25
- Overlap on Width — 0.25

## Arrow Buttons

*Arrow buttons Speed (RPM)* — Rotation speed when a button is held down. If the RPM is zero, pressing MECHA’s directional buttons, the rotator will start slowly and accelerates afterwards, if the button is kept pressed. Useful for precise alignment done with the buttons of the controller or IR remote.

*Arrow buttons Interval Speed (RPM)* — Rotation speed over a certain interval.

<table>
<thead>
<tr>
<th>Arrow buttons Speed [RPM]</th>
<th>3.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrow buttons Interval Speed [RPM]</td>
<td>3.50</td>
</tr>
<tr>
<td>Arrow buttons Interval 1 [deg.]</td>
<td>45.00</td>
</tr>
<tr>
<td>Arrow buttons Interval 2 [deg.]</td>
<td>90.00</td>
</tr>
<tr>
<td>Arrow buttons Interval 3 [deg.]</td>
<td>180.00</td>
</tr>
</tbody>
</table>

*Arrow buttons Interval 1* — Rotation angle for 

*Arrow buttons Interval 2* — Rotation angle for 

*Arrow buttons Interval 3* — Rotation angle for
Safety Interval

Safety interval — If, for some reasons, the vertical unit no longer communicates with the horizontal one, the vertical one stops after a rotation equal to the Safety interval.

Favorite Codes

The above settings allow you to assign three of your favorite codes to the 1, 2, and 3 buttons, respectively, as follow:

- *FavCode 1* to the 1 button
- *FavCode 2* to the 2 button
- *FavCode 3* to the 3 button

These are shortcuts that allow a quick use of codes by long pressing the corresponding button.

More from Server, zLM, Firmware

The following five settings have fairly self-explanatory descriptions, and we just add that the third - *Use “zLM”* - refers to a custom preset, specially created according to the specifications provided by you.
Finally, several technical details are displayed, including the firmware version and the IP addresses at which the User Interface can be accessed:

- the first is the static address for access from smartphones: 192.168.8.1
- and the second, which is displayed only when MECHA is in STA mode, is the dynamic IP for accessing the User Interface on your computer.

Backup and Restore Data
[Backup Data] button — Creates a download archive that contains all of MECHA’s settings and files except the firmware.

[Restore Data] button — Uploads the archive downloaded with the [Backup Data] button.

[Connect to Wi-Fi] button — Initiates the process of connecting to a Wi-Fi network to use MECHA in station mode or for firmware update. Please see User Interface – Connect to Wi-Fi for more details.

[Reboot] button — Restarts MECHA, similar to restarting a computer.

[Apply] button — Applies / saves the current settings.
Other Updating Methods

Firmware Update Using a Smartphone: Method 2

- Press the power button, P, for about 3 to 5 seconds to power on MECHA, and wait until the splitting lights are displayed: -=-=-=

- At splitting lights, press the 1 button to set MECHA in AP mode.
- Tap Settings icon on your device. Under Wireless and Networks, make sure Wi-Fi is turned on, then tap Wi-Fi. Tap the network name that contains MECHA in its name, to connect the smartphone to MECHA. The default password for MECHA’s network is 12345678.

- Now MECHA’s User Interface (UI) can be accessed on the smartphone’s browser at: 192.168.8.1 (which is a static IP address).
- This is the New page. At the top of the page, the current firmware version is displayed. Tap the [Update] button and follow the instructions to update the firmware:
  - Connect to Wi-Fi for Internet access. Enter the Wi-Fi network name that you want to connect to. It can be your home or work Wi-Fi. The name and the password are case sensitive, like MyWiFi and myPassword! It’s not about MECHA’s passwords here, but the Wi-Fi name and password MECHA needs to connect to Wi-Fi.

⚠️ Please do not turn off MECHA while updating the firmware!

- When the update is complete, a few beeps are heard, and the new firmware version is displayed at the top of the page. If it is not displayed in 1-2 minutes, refresh the page or reconnect the smartphone to MECHA, if necessary.
Presets for MECHA Single Axis

You can make your own presets or download presets from server. To download presets from server, on the Row page, select the option More from server from the Presets list and follow the instructions for downloading.

If More from server option is not in the Presets list, then tap the [Connect to Wi-Fi] button, enter the required SSID name and password for a Wi-Fi with Internet access then, after two beeps, re-load the User Interface. If no beeps are heard after the MECHA’s LEDs scan up and down, then please try to connect again and pay attention to the name and password, as they are case sensitive.

If the Wi-Fi network you connect MECHA to is your regular network you want to use for MECHA, any time you start MECHA and press 3 at the splitting lights, MECHA will be accessible both via phone and local network, provided that for the local network the Internet is available. As a benefit, MECHA will also check for any firmware update, if available, and will show a pop-up on UI to read the news and update, if you want.

Downloaded presets are added to the end of the list, and note their names start with (s), which means that they are not saved yet.

The presets for MECHA Single Axis available for download, at the moment, are:

- 4_Shots_Around.mps
- 6_Shots_Around.mps
- 8_Shots_Around.mps
- 10_Shots_Around.mps
- 12_Shots_Around.mps

Let’s analyze the 6_Shots_Around.mps, noting that the description is close enough for all the others.

This preset is suitable for a single row panorama, 6 shots around, and can be used in the S1 (Simple 1) display level.

The level of complexity for the User Interface can be set using the options available in the select list next to the [info] button, at the top of the Row page.
In S1, fewer UI controls are displayed and you don’t need to use any button to load a preset, just select the preset from the list and it loads automatically. To launch (execute) the preset, click/tap either the [RIGHT] or [LEFT] button.

To change some advanced settings of the preset, such as speed, for example, from 6 RPM to 9 RPM, switch to A1 (Advanced 1) display level, as shown in the image below, and select the option 9 RPM from the speed list.

Here you can click/tap the [Save 1] button to save and assign this preset to the 1 button of MECHA, then you can launch this preset, when MECHA is in the idle status, by simply pressing:

- 1 for clockwise rotation, or
- 1 for counter-clockwise rotation.

Also, you can use the [Save] button to save it on MECHA, in the Presets list.

To create a new preset, select any preset from the Presets list, make any changes you want (if you need to), and save it with the [Save] button. If you enter a new name, a new preset will be created, otherwise the current preset will be overwritten.
Please see the chapter **Working with Presets** for more details.
MECHA MSA

MECHA MSA – Manual Second Axis – mode is when a single MECHA executes a dual axis script. For example, the case of NN3 or another panoramic head mounted on a single MECHA unit.

In MECHA MSA, MECHA enters in pause at the end of each row and waits for the 2nd axis to be set/tilt manually. For example, if a row consists of 12 images, after the 12th image you will notice the panning to the initial position, and then MECHA waits for the manual tilt.

The expected manual angle for the 2nd axis is shown both on UI and on LEDs. To understand what is displayed on the LEDs, please see the Table of Equivalences: LEDs - Characters.

After manual tilting, press ▶️, or ⏯️ on NN Remote, or click the [PAUSE] button on UI.
Part 2

MECHA Dual Axis Combo – DAC
Fanotec, the manufacturer of Nodal Ninja Branded Products, has over a decade of experience in building products specifically designed for panoramic and high-resolution photographers. The auto-rotator (E1) with the single axis controller (C1) are precision built with quality motors, components and circuitry.

**MECHA Dual Axis Combo – DAC** – is a compact and affordable dual-axis pan tilt head solution. We use parts from NN3 MK3, together with 2 MECHA E1 Rotators and 2 C1 Controllers which are wireless linked together.

Use as a single-axis horizontal rotator single row shooting for turn table object VR, or use as a dual-axis rotator for both horizontal and vertical movements.

The MECHA E1 and C1 being modular in design, will be compatible with future MECHA rotators and controllers paving the way for future low-cost upgrade paths.

This setup supports a camera/lens up to 1.25kg (2.75 lb) and NPP up to 110mm from the pivot point, making it ideal for mirror-less, compact and lighter DSLR cameras. Shoot 360° panoramas or even high-resolution gigapixel images.

**MECHA Dual Axis Combo – DAC** – is preassembled and packed in a carrying case. If the two MECHA units are not mounted, please see below DAC installation image, or watch the video:

[https://youtu.be/wvAJoXsX6Kw](https://youtu.be/wvAJoXsX6Kw)

*Dual Axis Automated NN3 MK3 with 2 MECHA C1 and E1 Upgrade Instruction*
A term used quite often in the second part of this guide is **pairing**. Pairing MECHAs means preparing two, or more, MECHA units to work as a team.

In general, the MECHA units can be both on your desk when you pair them, or even one in a room and the other in another room, and you can mount them as required after pairing. However, we recommend that you do the mounting first, as shown in the image above.

The pairing of MECHA units is the same, both in case of panoramic photography - dual axis application - and in case you use them for other purposes, for example to rotate a video camera and a subject at the same time and with different speeds.

In this guide, we will present three methods of automatic pairing of MECHA units, automatic meaning that the units remain paired until you unpair them:

1. **zLM2** - pairing using only 2 of MECHA’s 6 buttons, a very quick method, especially for non-technical persons.
2. **zLM** - a method of pairing using a power code, using a few more of MECHA’s buttons.
3. The third method - **pairing using the user interface**, for advanced users.

MECHA has only six buttons, which have various functions, some of them being already mentioned at the beginning of this guide.

As we will see, once paired, usually one MECHA rotates horizontally (MECHA-H), and the other rotates vertically (MECHA-V).

Usually, MECHA-H is mounted on the horizontal rail of the panohead, and MECHA-V is mounted on the vertical rail. However, if necessary, MECHA-H can be mounted on the vertical rail, for example, and MECHA-V on the horizontal rail, depending on what you want to do.
**Power On and Test – MECHA DAC**

![YouTube Video](https://youtu.be/wdovZA3IIOQ)

**Power ON and Test - MECHA Dual Axis Combo**

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**Power on MECHA DAC:**

- First, press the 🌐 button of MECHA-H for 3 to 5 seconds (long press).
- Then, press the 🌐 button of MECHA-V for 3 to 5 seconds (long press).

It may take about 35-45 seconds to start, as in the case of MECHA Single Axis.

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The long press of the power button is only necessary at power on/off. In all other cases, use a normal press.

Assuming that the controllers and rotators are mounted as shown in the installation image above, **without the camera**, let's perform a test panorama consisting of 3 rows, 12 photos per row:

- Press the following buttons on MECHA-H, then wait for the movement to stop: 🌐 312

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**Power off MECHA DAC** the same way you power it on:

- Press the 🌐 button of MECHA-H for 3 to 5 seconds (long press).
- Press the 🌐 button of MECHA-V for 3 to 5 seconds (long press).

The order in which you power off MECHA units is not important.
Simple Rotations – MECHA DAC

Power on MECHA DAC as shown above.

For MECHA-H
- For 45° rotations:
  - Press ⬅️ then quickly press 1.
  - Press ➤️ then quickly press 1, for the opposite direction.
- For 90° rotations:
  - Press ⬅️ then quickly press 2.
  - Press ➤️ then quickly press 2, for the opposite direction.
- For 180° rotations:
  - Press ⬅️ then quickly press 3.
  - Press ➤️ then quickly press 3, for the opposite direction.

On MECHA-V, due to orientation, the left and right buttons look like up and down buttons.
- For 45° rotations:
  - Press ▼️ then quickly press 1.
  - Press ▲️ then quickly press 1, for the opposite direction.
- For 90° rotations:
  - Press ▼️ then quickly press 2.
  - Press ▲️ then quickly press 2, for the opposite direction.

https://youtu.be/owxh7iMnWR4
Simple rotations - MECHA Dual Axis Combo
• For 180° rotations:
  ○ Press ▼ then quickly press 3.
  ○ Press ▲ then quickly press 3, for the opposite direction.

Note that the rotation angle for the above button combinations can be set on the Configuration page.

**For continuous rotation** press and hold the arrow buttons, one at a time.


**Simple rotations 2 - MECHA Dual Axis Combo**

For example, for continuous left rotation, press and hold ⬅.

If, for some reasons, you want to reverse the direction of horizontal and vertical simple rotations, you can use the 2313< and 2323< codes. After this change, for example, the ⬅ button of MECHA-H will rotate the system to the right, and ➡, to the left. Similar for the left and right buttons of MECHA-V. Use the same codes to cancel the change.

Note that the above code does not change the rotation of the motors. There are special codes to do that.
Parked, Level and Raised Positions

The simple rotations mentioned above are very helpful when the upper rail needs to be in a certain position. The basic positions required for presets are shown in the image below, and they are:

1. **Parked** — the most compact position, the upper rail is oriented vertically down.
2. **Level** — the upper rail is in the horizontal position.
3. **Raised** — the opposite of parked, the upper rail is oriented vertically upwards.

For example, if the current position is **parked** and the preset requires **raised**, you can do this with one of the following:

- Press 🡤 (the left button of MECHA-V) then quickly press 2, and do this twice (90°x2=180°).
- Press 🡥 (the left button of MECHA-V) then quickly press 3.
- Press and hold 🡤 (the left button of MECHA-V) until the upper rail reaches the desired position.
Check if Two MECHAs are Paired

How do you know that two MECHA units are already paired?

If two MECHA units are paired, you will notice – few seconds after both units are powered up – one unit has the middle LED turned on (MECHA-H), and the other has the two middle LEDs turned on (MECHA-V).

If a red LED is lit on MECHA-V, as shown above, this indicates that it is not the same firmware version in both units, and it is recommended to update the firmware.

Also, while the MECHA units are on, if you want to check if they are paired, press the button of MECHA-H, then wait for 10 seconds, and the LEDs should light up as mentioned above.

Assuming both MECHAs are mounted as shown in the image above, let’s see how to update the firmware, how to pair MECHA units, if they are not paired, and how paired units work.
DAC Firmware Update Using a Hot-spot

This update method is available starting with firmware version 02118.

For this simple method of updating the firmware, we assume that you know how to set up a hot-spot on your 3G, 4G, or 5G smartphone, a smartphone with mobile data enabled and Internet available to it. We also assume that the MECHA units are already paired.

- First, set up a hot-spot with the name **MECHA-UPDATE** and (default) password **87654321**, in 2.4 GHz band.
- Power on MECHA DAC as shown above.
- Wait until the splitting lights end: -=-=-=-=-=-=-=- and you hear two beeps and, using the buttons of horizontal MECHA, enter the code **312123<**, which will update the firmware of both units.

- The MECHA’s response – displayed on LEDs – can be: !!!, if Internet is not available for MECHA.

If Internet is available for MECHA, the update will be performed in a maximum of 5 minutes. If you encounter problems while updating the firmware, please contact us by e-mail at mecha@nodalninja.com specifying the id of the MECHA you’re using.

In most cases, the problems encountered when updating the firmware are caused by the wrong Wi-Fi password. However, due to the nature of the Internet, sometimes the update server cannot be reached, and this can be investigated once we get in contact by e-mail.

**NOTE.** See the Table of Equivalences: LEDs – Characters.
Pairing Using MECHA’s Buttons

zLM 2 – Automatic Pairing Using Two Buttons

This is a zero learning method – **zero Learning MECHA** – for firmware 02057 or newer.

1. Power off both MECHA units in case they are running.

2. Power on only the horizontal MECHA (hold down the power button, P, for 3 to 5 seconds). When you see the splitting lights ( -=-=-= ), press the 1 button for 3 seconds (until multiple beeps are heard). The unit powered up first **rotates horizontally**, so we name it MECHA-H.

3. Let the horizontal MECHA running, then power on the other MECHA using its power button, P, and when you see the splitting lights ( -=-=-= = ), press the 2 button for 3 seconds (until multiple beeps are heard). The second powered up unit **rotates vertically**, so we name it MECHA-V.

On successful pairing, MECHA-H has the middle LED on, and MECHA-V has the two middle LEDs on, as shown in image on the previous page. Otherwise, power off and on both MECHAs again, preferably power on the MECHA-H first.

Next step is to test the combo using MECHA’s buttons, and see how it works.

Once you get more familiar with MECHA, you can use it in an advanced way, via the UI (User Interface). The zLM pairing method is only given as a quick start, with very little to learn.

 vídeo https://www.youtube.com/watch?v=8kSeOC9NHRg

Automatic pairing - MECHA Dual Axis Combo
For those interested in technical details, see below zLM 2 explained.

First, please read the chapter about the UI.

MECHAs will be automatically paired and will remain paired after power OFF then ON.

This procedure will create MECHA-H-DAC with password 12345678 and MECHA-V-DAC with password 12345678

If in /config of MECHA-H, the SSID name is changed and password is changed, if both MECHAs are ON and paired, the SSID and password will be changed in MECHA-V as well, as long as SSID starts with MECHA-H in the first one.

So after the MECHAs are paired and the SSID and name is changed in config of MECHA-H, say, from MECHA-H-DAC to MECHA-H123 with password 87654321, MECHA-V will receive the name MECHA-V123 and the same password: 87654321.

As a result of these, without using any method of pairing, a MECHA-V999 in STA mode will always try to pair with MECHA-H999 if its SSID is ON, and both have the same password and only the H-V difference in SSID name.

This also opens the way to pair remotely two MECHAs via support, if needed, if they can access the Internet.
DAC Test Using MECHA’s Buttons

After pairing, every time the MECHAs are powered up, you will notice they are connected as DAC (Dual Axis Combo). It is recommended to power on the horizontal unit first, then power on the vertical unit. Wait until all LEDs are off, and perform the following tests without camera mounted.

⚠️ Please note that the power button, 🔌, can always be used as an emergency stop, if necessary, except for the speed calibration procedure (123123<).

Use the MECHA-V left/right buttons (which look like up and down due to the mounting orientation) to position the vertical rail in parked, level, or raised position. You can press ⟩ then, quickly, 2 or 1 then, quickly, 2 to rotate MECHA-V by 90°.

To enter the codes below, use the numerical buttons and left button, 1, to enter <, and right button, 2, to enter >.

DAC Test Without Camera - 1312 Parked Position

With the vertical rail in the parked position, as shown in the image on the right, enter the 1312< or 1312> code on MECHA-H, using the buttons of MECHA-H.
This code tells the Combo to execute a panorama to the left or right, as follows: 12 shots around, 3 rows – at 0° and +/- 45° – plus zenith and nadir, starting from parked position.

### DAC Test Without Camera - 1313 Level Position

With the vertical rail in the level position, as shown in the image on the right, enter the 1313< or 1313> code on MECHA-H, using the buttons of MECHA-H.

This code tells the Combo to execute a panorama to the left or right, as follows: 12 shots around, 3 rows – at 0° and +/- 45° – plus zenith and nadir, starting from level position.

### DAC Test Without Camera - 1321 Raised Position

With the vertical rail in the raised position, as shown in the image on the right, enter the 1321< or 1321> code on MECHA-H, using the buttons of MECHA-H.

This code tells the Combo to execute a panorama to the left or right, as follows: 12 shots around, 3 rows – at 0° and +/- 45° – plus zenith and nadir, starting from raised position.

 ![Image](https://www.youtu.be/9bAnR1HHgp4)

MECHA DAC Tests
Panorama with Camera Mounted

If the above tests are successful, you can repeat each test with a camera mounted.

Mount the camera on the upper rail, using the camera mounting knob shown in the image on the right.

Plug the right shutter cable for the camera in use into the Camera Port (CAM). This allows the triggering of the shutter automatically.

The units being paired, the camera can be connected to any of them.

Use the test codes mentioned above whenever you want to quickly shoot this type of panorama without using the User Interface.

Panorama with Automatic Shooting Pattern Using only the MECHA’s Buttons – DAC

This method requires firmware version 02118, or newer, and works for rectilinear lens from 10 to 200 mm (FF equiv).

The shooting pattern will be computed by MECHA based on only few presses of a button, without using the User Interface, as follows:

● First, position the upper rail in the level position using the left/right buttons of MECHA-V.

● Place a sheet of paper in front of MECHA in such way to fill the frame. The frame can be viewed through viewfinder or through the live view. Instead of the sheet of paper, any well defined feature or image on a
screen, or other means, can be used. A gray sheet of paper will work best for exposure purposes as well.

- The camera and lens must be set the same as for shooting the actual panorama.
- Enter the 31< code. After entering the code, MECHA waits for two quick presses of the power button, $\bigcirc$, as follows:
  - the first – in order to trigger the camera
  - and the second – after the camera was triggered.
- After that, MECHA will rotate slowly to the right and wait for another press of the power button, $\bigcirc$, right after the sheet of paper is out of the camera's frame.
- Then MECHA will go back to the initial position and start to slowly tilt down and, again, wait for another press of the power button, $\bigcirc$, when the sheet of paper is out of the camera's view.
- Then MECHA will go back to the initial position, and
- the LEDs 1, 2 and 3, under the battery symbol, will start flashing, and MECHA waits (15 seconds) for one of the $\bigcirc$, $\bigcirc$, or $\bigcirc$ buttons to be pressed, to assign the computed preset to that particular button. To cancel the assignment, the power button, $\bigcirc$, can be pressed instead.

If MECHA is unable to compute a pattern using the feedback received from pressing the power button (mostly caused by too small intervals), on the display will be shown “!!!”, which indicates that nothing has changed.

To execute the panorama computed by MECHA, make sure the upper rail is in the level position, and press the button to which you have assigned the panorama, then press either the left or right button.

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https://youtu.be/1FMIv1jMa7E

Creating a Panorama Preset Without UI – MECHA DAC
DACTestUsingtheUI

For this test, we assume that the pairing method was zLM 2.
Considering that both MECHA units are powered on and paired, to access the User Interface (UI) using a device, proceed similarly to the MECHA Single Axis (see Access the User Interface (UI) with a smartphone):

- Open your device’s Settings app., turn on Use Wi-Fi, and in Wi-Fi network list of the device tap the network (SSID): MECHA-H-DAC

Please refer to your device manual on how to connect to Wi-Fi. Here is a web page with animated instruction for many smartphones. Here is a generic guide about connecting to a Wi-Fi Network.

- Enter the password: 12345678
- After connecting to the network, you can access the web control interface by typing 192.168.8.1 in the web browser address bar.
- MECHA will show the “What is new?” page.

Tap [Update] if there is a newer firmware than the current one displayed at the top, if you want, and wait until all MECHA status LEDs are off. The update may take several minutes.
In the update process MECHA may ask for a Wi-Fi network with Internet access (like your Wi-Fi at home or office) and the password to be able to download the firmware from the Internet.

⚠️ Please do not turn off MECHA while updating the firmware!

- Tap the [Row] button to go to Row page.
UI Test – 1312, 1313, 1321 Codes

To perform the same tests that you did before using the controller buttons, proceed as follows using the UI buttons:

- On the Row page, tap Presets and select TEST 1312 Parked from the Presets list, which is the panorama executed before, on the chapter DAC test using MECHA’s Buttons (12 shots around, 3 rows – at 0° and +/- 45° – plus zenith and nadir). If necessary, use the left/right buttons of MECHA-V to position the upper rail in the parked position.

To load the preset, tap the [Load] button, if visible, under Presets list. Otherwise, it means the UI complexity is S (Simple) and some buttons and options are not visible, and the selected preset is already loaded. That means you can go to the next step.
• Tap the [LEFT] button to execute the preset to the left, or [RIGHT] button to execute the preset to the right.

Do the same with the presets TEST 1313 Level and TEST 1321 Raised. Use the buttons to position the upper rail in the level or raised position.

How to Change the SSID Password

If your password is 12345678 (automatically created in zLM 2 pairing, or in pairing using the UI), or 01231231 (from our zLM pairing example), now is time to change the SSID password.

• Access the MECHA-H web User Interface (UI) using a device, as we showed on the chapter DAC test using the UI.
• Access the Row page, tap [info] button at the top of the page, then tap [Config] button to access the Configuration page.
• The user and default password are:

<table>
<thead>
<tr>
<th>User:</th>
<th>admin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password:</td>
<td>Mecha</td>
</tr>
</tbody>
</table>

• On Configuration page, scroll to the SSID Password field, delete the current password and enter the new password. You can also change the default password for Configuration page, if you have not changed it yet.
• Scroll to the bottom of the page and tap [Apply] button.

Once the SSID password is changed on MECHA-H, it changes automatically on MECHA-V, because the MECHA units are paired.
Working with Presets

Programming a Preset Using Parameters

A programming method available starting with firmware version 02134.

This method of programming, or creating, a preset consists in connecting to the User Interface (see How to Access the UI) and passing some parameters in the url. This preset is assigned to one of MECHA’s buttons, so it can be executed by pressing that button, and the or buttons.

⚠️ Creating a preset using parameters always overwrites one of the following presets: Button 1, Button 2, or Button 3, depending on the value passed through the b parameter.

Being connected with your smartphone, or computer, to the MECHA’s SSID (MECHA’s Wi-Fi), enter one of the following urls in the browser address bar and tap Access, or press the Enter key (this will overwrite the preset already assigned to the button):

192.168.8.1/preset?b=1&s=12&p=2
192.168.8.1/preset?b=1&f=30&p=2

The page will ask for credentials, which are: admin, Mecha (by default).

Now check that the position for the upper rail is level, or as specified on the Configuration page.

If you press the or buttons:
- MECHA will take 12 shots around (s=12) if you enter
  192.168.8.1/preset?b=1&s=12&f=30&p=2
- or it will start to shoot a full 360° panorama for a 30 mm lens (FF equiv.) (f=30) if you enter 192.168.8.1/preset?b=1&f=30&p=2
In both cases will be a pause of 2 seconds after each shot (p=2).

Let's now explain the above examples and see how you can modify them to create your own preset.

The **parameters passed in the url** are as follows:

- The first parameter is `b` and refers to the button to which the preset will be assigned. Possible values are 1, 2, and 3, because MECHA has three numerical buttons, 1, 2, and 3. They are also used to enter the numbers 1, 2 and 3, respectively. This parameter is required.

- The second parameter – `s` – is the number of shots around; the third parameter can be used instead.

- The third parameter is the focal length – `f` – and it is optional. If you provide this parameter, the panorama will be spherical, otherwise it will be cylindrical.

- The fourth parameter – `p` – is the pause after each shot, and it is optional. The default value is 1 second.

- Starting with firmware version 02134, you can use `h` and `v` parameters to specify, in degrees, the area of a partial panorama. For example:

  ```
  192.168.8.1/preset?b=1&f=80&h=100&v=75
  ```

  Above is the url for a partial panorama for 80 mm lens, 100° wide and 75° tall.

For example, a **url with two parameters** looks like this:

```
192.168.8.1/preset?b=1&s=12
```

Now, all you have to do is replace the values in this example with the desired values. For example, for **6 shots around**:

```
192.168.8.1/preset?b=1&s=6
```

and for a **full spherical panorama** for a 50 mm lens (FF equiv.):

```
192.168.8.1/preset?b=1&f=50
```
In case of Single Axis MECHA, for a panorama made with 50 mm lens, you need to manually tilt the upper rail or camera up or down. MECHA will show you when to do this, and also shows you the value for tilting on the LEDs, and waits until you tilt and confirm the tilting.

To understand what is displayed on the LEDs, please see the Table of Equivalences: LEDs - Characters.

If a Single MECHA is running a DAC preset, when rotation is needed along the second axis, MECHA will pause and show on LEDs the angle for rotation along the second axis.

The value is rounded to the nearest integer and is displayed as follows, for example, for a tilt of 45°: :45 or :-45 if the value is negative.

0 is considered to be the level position (horizontal).

You can use – as tilting up or tilting down, depending on the desired order, upper part first, or lower part first.

When you will add a second MECHA to the single one, thus having a MECHA DAC, the same preset will work automatically without pause, unless you manually add some pauses in script.

As a result of this new feature, the auto generated script, when the focal length is inputted, will not contain any pauses, the pauses will occur automatically if a single MECHA is used.

Please see the User Interface (UI) — Shots for more details about how to use the focal length.
How to Create Your Own Presets Using the UI

Besides the very simple method with buttons only (see Panorama with Automatic Shooting Pattern), and the url with parameters method (see Programming a Preset Using Parameters), the following is the method using the UI.

Access the User Interface (UI) of MECHA-H using a device or computer (see How to Access the UI) and tap/click the [Row] button to access the Row page.

An easy way to create a preset is to load one from the Presets list, and modify it as needed, then save it with a different name.

First, let's analyze some default presets.

Default Presets

Factory (F) presets – cannot be overwritten
- **FE 12mm NZ Level** — for 12mm fisheye lenses, 4 shots around, plus nadir and zenith, starting from **level** position.
- **FE 16mm NZ Level** — for 16mm fisheye lenses, 6 shots around, plus nadir and zenith, starting from **level** position.
- **FE 20mm ZN Level** — for 20mm fisheye lenses, 6 shots around, 2 rows – at -30° and +30° – plus zenith and nadir, starting from **level** position.
- **FE 24mm ZN Level** — for 24mm fisheye lenses, 8 shots around, 2 rows – at -30° and +30° – plus zenith and nadir, starting from **level** position.
- **TEST 1312 Parked** — 12 shots around, 3 rows – at 0° and +/-45° – plus zenith and nadir, starting from **parked** position.
- **TEST 1313 Level** — 12 shots around, 3 rows – at 0° and +/-45° – plus zenith and nadir, starting from **level** position.
- **TEST 1321 Raised** — 12 shots around, 3 rows – at 0° and +/-45° – plus zenith and nadir, starting from **raised** position.
- **TEST 131** — 6 shots around (for single axis applications).
- **TEST 132** — 12 shots around (for single axis applications).
If the fisheye presets are not available in the *Presets* list, you may have a firmware version older than 02202 installed.

To hide all factory presets, uncheck the *Show Factory (F) Presets in the Presets List* option on the *Configuration* page.

**Presets assigned to buttons**

- *Button 1, Button 2, and Button 3* are default presets consisting of 4, 6, and 8 shots, respectively (for single axis applications). These presets can also be executed with the following button combinations:
  - ○ 1▷, 2▷, 3▷ to the right.
  - ○ 1◁, 2◁, 3◁ to the left.

**More from Server**

*More from Server* — This option allows you to get more presets from server. See the chapter *Download More Presets from Server*.

Note that MECHA accessed at 192.168.1.1 is in AP mode, and [More from Server..] is not available.

MECHA controllers work in two network modes: Access Point (AP) and Station (STA). AP mode allows the controller to create its own network and have up to 5 devices to connect to it. STA mode allows it to connect to a Wi-Fi network (for example, one created by your wireless router), acting as a client.

Out of the box, MECHA works in AP mode. Since it does not have a wireless modem, it does not have Internet access. A device connected to it may also lose Internet access. Please refer to *MECHA Controller C1 Manual* on STA mode for more details.

Now we will take a look at preset descriptions above and load the preset most similar to what we want to get.

**Loading a Preset**

Suppose we want *6 shots around, 1 horizontal row, plus zenith and nadir, starting from parked position*. The most appropriate preset seems to be *TEST 1312 Parked*, so we select this preset and load it using the [Load] button.
To find out more about a preset, you can choose a higher level of complexity for the UI from the drop down list next to [info] button, at the top of the page. Select A3, which is the most advanced level.

Now we have the full description of the selected preset and, in addition, clicking/tapping the [info] button will toggle descriptions for all the controls:

- **12 Shots** — 12 shots around for a full 360° panorama. Notice how the rotation angle changes according to the number of photos, so that if we multiply them, the result is 360°. On the other hand, if we change the rotation angle, the number of images does not change.

We will get a similar result for 33mm focal length entered via Custom instead of 12 Shots.
• **1 TRG** — 1 triggering. This is the number of camera triggerings for each position. Select zero if no triggering is needed. When using automatic exposure bracketing in continuous shooting or self-timer mode, MECHA treats it as 1 triggering.

• **AF 0.01 sec** — Auto-focus 0.01 sec. If the value is negative, the AF signal will be ON during the entire image sequence. In order to trigger the camera, for some Sony cameras, you have to set an AF value greater than zero, even if the camera focus is set to manual.

• **W:0 sec** — No pause for camera wake up. If the value is negative, the pause will be forced even when the camera is ON, before each sequence begins. Useful for moving out of the camera’s view.

• **B:0 sec** — No pause before a set of images. If the pause before each bracketing sequence or set of images is negative, up to 2 seconds will be used for Mirror Lock Up.

• **M:1** — Normal modifier of exposure. Modifier of Exposure is the Modifier of the Duration of shutter button signal, a list of multipliers, like 1,0.5,2 for normal, half and double exposure time in case of 3 TRG, or it can be entered as -0.7EV (for under, normal, over) or 0.7EV (for normal, under, over), in which case it will automatically extend to the number of TRG. If the modifier starts with B, like B-2EV, or B1, or 1,0.5,2, the “Bulb” mode will be assumed.

• **E:0.25 sec** — Exposure 0.25 sec. Duration of shutter button signal, for example, 3 or 0.5*3 for progressive half Exposure, or 2*3 for progressive double Exposure in a set. These can be entered as custom values. The values can be entered as 1/100.

• **A:1** — 1 sec. delay after each bracketing sequence or individual image. If the value is negative, there will be a delay after each shutter actuation.

• **30°** — The rotation angle between two consecutive positions in a sequence specified for [N x LEFT] or [N x RIGHT] buttons.

• **x1** — 1 move. The number of moves (N) for [N x LEFT] or [N x RIGHT] buttons.

• **Wait** — Wait after the last shot. The other option is *Rewind*, which means rewind to the initial position. Useful if there are cables attached, or for a partial panorama and time-lapse.

• **No Repeat** — This is the delay in seconds until the shooting sequence will be repeated automatically. Set zero (0) or *No Repeat* for no repeat.

• **SP,0x12,-45x12,45x12,Z,N** — The MSS script that describes our preset: start position is parked, 3 rows of 12 positions, one Zenith and one Nadir (see *MECHA’s Simple Scripting (MSS)* for more details).
● 6 RPM — Speed denoted by Revolutions Per Minute.
● 16+128 uStep — Micro-stepping value, simple or combined; for example, different values for acceleration + constant speed region.
● Medium Load — Means a profile for an average load. The other options are Light, Heavy, and Ring.

⚠️ Most input lists, in both Ring and Row pages, can receive custom values. There is no error check, nor range check for the custom values at the moment, so please use this feature with caution.

Modifying a Preset

To get a preset with 6 Shots and just 1 horizontal row:

1. Instead of 12 Shots select 6 Shots:

   ![Screenshot showing the selection of 6 Shots](image)

2. Remove the second row (-45x12,) and third row (45x12,) from the MSS script as follows:

   \[ SP, 0\times12, Z, N \]

3. Follow the instructions below to save the preset.

Saving a Preset

To save a preset, do one of the following:
1. **Tap/click the [Save]** button to save the preset with a different name, or with the same name if it is a presets that can be overwritten.

   The preset name can be preceded by a power code of maximum 7 digits. This feature also allows you to execute/launch the preset using the remote or MECHA’s buttons. For example, if the preset name is **01 C1 6 shots**:
   - use [P1 >] to execute the preset to the right,
   - use [P1 <] to execute the preset to the left.

2. **Tap/click the [Save 1]** button to overwrite the preset with the name **Button 1**, assigned to the [1] button.

3. **Tap/click the [Save 2]** button to overwrite the preset with the name **Button 2**, assigned to the [2] button.

4. **Tap/click the [Save 3]** button to overwrite the preset with the name **Button 3**, assigned to the [3] button.
Now the new preset is saved and displayed in the Presets list and ready to be used in the future.

https://youtu.be/94oIpK7xwJQ

Using IR Remote Commander and Receiver to Launch Presets – MECHA DAC and Single Axis

https://youtu.be/3F6fFTW3VYc

Assigning a Preset to a MECHA Button in the UI – MECHA DAC
MECHA’s Simple Scripting (MSS)

Starting with firmware version 02116, MECHA’s Simple Scripting (MSS) reached a level of flexibility that allows easy scripting for common shooting patterns, for both single and dual axis applications.

A MSS script looks like the following. No need to fully understand it now, as MECHA will generate it for you in most cases.

Three Row Panorama + Nadir + Zenith (MSS)

Suppose we want to script a panorama starting from parked position, made of 12 shots around, zenith, nadir, one row at 0°, one row at +45° and, finally, one at -45°. The MSS script, in this case, can be:

SP,Z,N,0x12,45x12,-45x12

In the parked position, the camera – mounted on the upper rail – is facing up.

If we want the starting and ending positions to be level, the script will be:

SL,Z,N,0x12,45x12,-45x12

And if we want the starting and ending positions to be raised, the script will be:

SR,Z,N,0x12,45x12,-45x12

If we want a pause before a row, we can add P in script, before that row. For example, this will set a pause just before the row at 0°:

SP,Z,N,P0x12,45x12,-45x12

In the example above, the pause is infinite, and to continue you need to press [RIGHT], the right button of MECHA, or the equivalent UI button.
MSS scripts are row and column oriented and help you photograph a panorama with few clicks or button presses, without the need to understand the script. You only provide the focal length, and MECHA generates the script.

https://youtu.be/jiBYhnGdIMI

UI Preset for Any Focal Length – MECHA DAC

Now let’s have a closer look at scripting using the MSS Language. For dual axis applications, MECHA needs to know its starting position. This can be **parked**, **level**, or **raised**. These conventions are also used in naming the presets available from Server.

The naming conventions for starting and ending positions for MECHA DAC presets available via **More from Server**...

Adjust the position using buttons to match the preset before starting the preset.
Shooting Panorama Made Easy for Dual Axis

Shooting a panorama is made easy by following the steps below.

1. Use the < and > buttons of MECHA-V to position the upper rail in **level** position (see the section Parked, Level, Raised Positions).
   Why **level**? Because this is the default position in Preferred MSS pattern on the Configuration page. If you have changed this setting, then you need to position the upper rail according to your setting.

2. Connect to the MECHA’s User Interface (see the chapter How to Access the UI).

3. On the Row page, select the A1 (or A2, A3) level of complexity for the User Interface. In A1-A3 (Advanced) modes, you will see more controls than in S1-S3 (Simple) modes.

4. We recommend that you load any simple preset, for example the default Button 2 preset. To load this preset, use the [Load 2] button. Now, the current settings are the loaded preset settings.

5. Click/Tap on Shots field, choose the Custom option and enter the desired focal length, for example **29mm**. Confirm by clicking/tapping the OK button.
When you click/tap the OK button, MECHA creates a script for you to shoot a full panorama, according to the focal length provided:

```
SL,0x11,-43.27x10, 43.27x10,ZZ,NN
```

The settings provided by the script have priority over the other settings.

6. To start shooting, press either the [LEFT] or [RIGHT] button.

7. To further simplify this process, we recommend that you save the current settings as a preset. For example, click / tap the [Save 2] button to overwrite the default Button 2 preset, which is assigned to the 2 button by default (see Saving a Presets for more details).

Next time you need to shoot this type of panorama:

- either load the preset using the [Load 2] button, and execute it with the [LEFT] or [RIGHT] button
- or execute the preset directly using the 2> or 2< button combinations of MECHA-H.

Next, we present an example of a MSS script similar to the one above, but with a larger image overlap, resulting in 12 photos per row.

**MSS Script Explained**

Considering the quite popular shooting pattern made with kit lenses around 29mm (FF equiv), that consists in:

1. one row of 12 positions at a tilt of 0° (horizontally)
2. another row of 12 positions at a tilt of +45°
3. another row of 12 positions at a tilt of -45°
4. a single position at a tilt of -90°, known as Nadir
5. a single position at a tilt of 90°, known as Zenith

Considering the **start level** position, as in the image above, this pattern can be programmed with the following **MSS**:

```
SL, 0x12, 45x12, -45x12, N, Z
```

Breaked down, you’ll recognize the description above:

- **SL**: Start Level
- **0x12**: at a tilt of 0°, one row of 12 positions
- **45x12**: at a tilt of 45°, one row of 12 positions
- **-45x12**: at a tilt of -45°, one row of 12 positions
- **N**: the Nadir position
- **Z**: the Zenith position

In MECHA DAC, when the units are paired – which is a requirement for the above script to work – after start, the LEDs settles in showing the status of successful pairing, as shown in this image:

If a **red** LED is lit on the MECHA-V, this indicates that while the pairing is established, the firmware version is different from the one in the MECHA-H, and depending on the differences, some of the recently added features might not work.

To have the full benefit of MSS, it is recommended to launch an update from the MECHA-H, and that should synchronize the firmware by updating both to the latest firmware version, resulting in having both MECHAs with the same firmware, indicated by no **red** LED ON.
Assuming that the angles of rotation are 45°, 90°, and 180°:

- To go from parked to level and back, you can use ▶ 2, then ◀ 2.
- And to go from level to raised in one go, use ▶ 3, then use ◀ 3 to go back to level position.

**NOTE.** On the Configuration page, there is also a checkbox that establishes if the left is left, or the left is right, regarding the movements when the buttons are pressed. You might want to change its status if you prefer a particular behavior over the other.

There are also two codes – 2313< and 2323< – for changing the direction of rotation if it is done using the left/right buttons, without the need to access the Configuration page.

If you notice that instead of a 90° rotation, MECHA seems to rotate more or less, the cause could be a wrong setting regarding the type of the rotators you use. The rotators can be set either on the Configuration page or using special codes.

Considering the script:

```
SL, 0x12, 45x12, -45x12, N, Z
```

let’s see how it can be modified in different situations.
What Needs to be Changed, sometimes, in Real Situations

Instead of a single Zenith, more Zeniths may be needed, say, for flare reasons, in which case Z can be replaced with Zx2, for example, which will produce 2 Zeniths 180° apart (360°/2):

\[
\text{SL, 0x12, 45x12, -45x12, N, Zx2}
\]

For 2 Zeniths 90° apart, the ZZ convention can be used, or ^90, which tells to use 90° interval between Zeniths instead of the computed 360°/2.

\[
\begin{align*}
\text{SL, 0x12, 45x12, -45x12, N, ZZ} \\
\text{SL, 0x12, 45x12, -45x12, N, Zx2^90}
\end{align*}
\]

The same way, for 2 Zeniths 120° apart:

\[
\text{SL, 0x12, 45x12, -45x12, N, Zx2^120}
\]

Now, for Zeniths at a tilt of 80° instead of 90°, which might help in automatic control points, because the Zenith is just like any row, but at a tilt of 90°, 90x1 will do the same as Z, thus 80x1 is what you need for a Zenith at a tilt of 80° instead.

For 2 Zeniths at a tilt of 80° and 180° apart, 80x2, and for 2 Zeniths 90° apart, we can use 80x2^90, thus we will end with this script:

\[
\text{SL, 0x12, 45x12, -45x12, N, 80x2^90}
\]

Suppose that the rows at a tilt of +45° and -45° must have 10 positions instead of 12, then the script can be changed as follows:

\[
\text{SL, 0x12, 45x10, -45x10, N, 80x2^90}
\]

The above apply for Nadirs as well, in which case the N, NN, -90x1, -80x1, -80x2^90 can be used.

The Nadir is like a row at a tilt of -90°.
Using Pause in MSS Script

Let’s take a pause. Sometimes, to the above, we need a pause, say, before the horizontal row, or before Nadir, to be sure we are out of view.

The pause can be added using P, so

0x12 will mean: at a tilt of 0°, a row of 12 positions, while
P0x12 will mean the same, but with a pause before, and
MECHA will wait for the button to be pressed, or for
the UI [PAUSE] button to be pressed, or for the (pause)
button of the NN IR Remote to be pressed, to continue.

That pause can be used to adjust some camera settings, like exposure, aperture, WB, focus, and more.

```
SL, P0x12, 45x10, -45x10, N, ZZ
```

If you want a pause before each row, for focus, for example, then:

```
SL, P0x12, P45x10, P-45x10, N, ZZ
```

or even before Nadir and Zenith:

```
SL, P0x12, P45x10, P-45x10, PN, PZZ
```

To customize it even more, let’s say we want an extra image at the beginning, a kind of clapboard you may want to use, for WB or even for focus; it will be a kind of image you need to take again, without the extra elements in it, and the second one to be used in panorama.

As the horizontal row is scripted by 0x12, for the extra shot we can add another horizontal row, but made from only one position, like 0x1 with pause or not. For example, if starting from level, we may not need a pause, as we can launch the preset after the clapboard preparations are done, and we will have the pause only before the actual row of 12 to start, time to remove, say, the gray card.

```
SL, 0x1, P0x12, 45x10, -45x10, N, ZZ
```
If MECHA is in **parked** position, we need a pause to adjust the camera settings right after MECHA arrives in horizontal orientation for the first horizontal row.

```
SP,P0x1,P0x12,45x10,-45x10,N,ZZ
```

### Let's Take a more Dense Approach with more Photos toward Gigapixel Imagery

Suppose we want a shooting sequence made out of rows at a tilt of 15° – instead of 45°, as we had before:

```
SL,0x36,15x32,30x28,45x24,60x20,-15x32,-30x28,
-45x24,-60x20
```

- **SL**: Start Level
- **0x36**: first row at a tilt of 0° (horizontally) made out of 36 positions
- **15x32**: one row at a tilt of 15° of 32 positions
- **30x28**: one row at a tilt of 30° of 28 positions
- **45x24**: one row at a tilt of 45° of 24 positions
- **60x20**: one row at a tilt of 60° of 20 positions

The same for the negative tilts:

- **-15x32**: one row at a tilt of -15° of 32 positions
- **-30x28**: one row at a tilt of -30° of 28 positions
- **-45x24**: one row at a tilt of -45° of 24 positions
- **-60x20**: one row at a tilt of -60° of 20 positions

Because there are many shots to be taken, it will take a while.

Now, suppose we want only a vertical slice of it, of **45 degrees**, a kind of preview, also to test overlap and to see if the full 360° around can be used in production, or just simply as a partial panorama 45° degrees wide, instead of 360°, with the same camera-lens combo.

To achieve this, we need to add **(45)**, which tells MECHA that only a bit over 45 degrees should be taken.

The resulting MSS script will be:
As in the examples above, it can have pause(s) before row(s), or extra 1 position row for clapboard, so on.

We can also add 1 Nadir and 1 Zenith with pause, and even use that pause to replace the lens with a fish eye, or change the focal lens to the shortest (widest angle) extent.

If the preview slice looks good, we can remove the (45), and make some changes regarding the number of shots per positions (HDR), ending up with the full 360° around and 150° tall panorama:

**Rewind after each ROW**

The *RW* term in the MSS script indicates rewind after each ROW, useful in gigapixel sessions when cables to a power bank are used.

For example, for 50mm (FF equiv.):

**Shooting in Horizontal Zigzag Pattern**

The *HZ* term in MSS script indicates shooting in Horizontal Zigzag pattern. MECHA will change the sense of rotation after each row.

For example, for 50mm (FF equiv.):
Example of partial panorama with explicit intervals for lower rotator (24°) and upper rotator (36°) in Horizontal Zigzag, 4 rows, 8 columns:

\[
\text{SL, } 0x18, -28.03x18, -56.06x14, 28.03x18, 56.06x14, \text{ ZZ, NN, HZ}
\]

**Script for 2 Focal Lengths - MECHA Dual Axis**

Script for shooting a spherical panorama using 50 mm and 24 mm lenses or focal lengths:

\[
\text{SL, } 12x19, -12x19, P-50x10, 50x10, \text{ ZZ, NN}
\]

Select the *Scripted* option from the *Mode* list on the *Row* page and enter the above script in the displayed text box.

For example, use [Save 1] button to assign the preset to the 1 button.

Since the preset is assigned to the 1 button, you can start shooting using the 1 < buttons.

During Pause (P), change the lens or focal length, then press the 1 button to continue.

Please watch the video below for more details.

[https://youtu.be/fKb7Ma3Rddg](https://youtu.be/fKb7Ma3Rddg)
Download more Presets from Server

In short, to download presets from server, make sure MECHA is connected to the Internet, then select the option *More from server* from the *Presets* list on the *Row* page. If the option *More from server* is not displayed in the list, it means that MECHA is not connected to the Internet. In this case, tap/click the [Connect to Wi-Fi] button at the bottom of the page, and after connecting, refresh the page. Please see User Interface – Connect to Wi-Fi for more details.

Step by step:
- On *Row* page, select the option *More from server* from the *Presets* list.
- Provide a keyword if you want to get only certain presets, and click/tap the *[OK]* button. The names of the presets found on the server are added to the *Presets* list.
- The preset name describes what the preset does, and over time you will know which keywords to use. For example, the sequence _P_ in a preset name means that the preset includes a pause.
- *(S)* in a preset name means that the preset is not saved yet on MECHA.
- Save the presets you find useful, as showed in How to Create Your Own Presets using the UI section:
  - Select a preset from the *Presets* list.
  - Tap/click the *[Load]* button to load it (if the button is visible).
  - Modify the preset if necessary.
  - Save the preset with the same name, or with a different name.
Launch a Preset by Scanning a QR Code

A complete list of preset qr codes can be found on this web page:

**MECHA QR Codes**
https://www.fanotec.com/mecha-qr-codes

- To be able to launch a preset by scanning a qr code, your phone needs to be connected to the MECHA’s SSID first (see Access the User Interface (UI) with a Smartphone).
- Click to enlarge, then scan the preset qr code you want to launch.

With MECHA DAC and C1, by scanning a qr code in the table on the page mentioned above, you will launch a preset whose name begins with the numeric code* corresponding to the qr code. For example, the qr code 020 will launch a preset such as 020 mypreset, if this preset exists.

* The numeric code is a preset power code, meaning a code that starts with the digit zero. Remember that certain power codes can be used to launch a preset using the controller buttons. Read Preset Power Code for more details.
How to Set Both MECHA and Smartphone to Have Internet Access

In this chapter, we will explain how to set both MECHA and smartphone to have Internet access, and also how to enable the update and use your device for usual Internet browsing at the same time.

First, set up a hot-spot on your device, in 2.4 GHz band, and name it MECHA-PHONE. Please refer to your device documentation about how to set up a hot-spot.

Suppose the hot-spot is disabled for the moment.

That hot-spot gives 192.168.43.xxx address to its clients.

1. Start paired MECHAs, MECHA-H first.

2. Connect to MECHA-H /config with your device, then set it in STA mode, choosing the STA option from the Default Mode select list.

Scroll to the STA Mode and enter the following values:

- Static IP: 192.168.43.101
- Subnet: 255.255.255.0
3. Scroll to the bottom of the page and tap the [Apply] button.
4. Switch to config of MECHA-V (at the bottom of the page).
5. Set it in STA mode and enter the following values in STA Mode fields:
   - Static IP: 192.168.43.102
   - Subnet: 255.255.255.0
   - Gateway: 192.168.43.1
   - DNS: 8.8.8.8
6. Tap the [Apply] button.
7. Tap the [Connect to Wi-Fi] button at the bottom of the page, then enter MECHA-PHONE and the required password. Please see User Interface – Connect to Wi-Fi for more details.
8. Switch to config of MECHA-H, tapping the button [H MECHA / config], which should be visible at the bottom of the page.
9. Tap the [Connect to Wi-Fi] button at the bottom of the page, then enter MECHA-PHONE and the required password.
10. Start MECHA-PHONE hot-spot.

MECHAs should connect to MECHA-PHONE after a little while.

As a result:
- We have the MECHAs connected to a SSID with Internet access, provided 3g, 4g, so on, is available.
- This enables downloads of presets from server, updates and the use of your phone for Internet browsing as usual.
- MECHA-H-DAC will be accessible always at 192.168.43.101, and
- MECHA-V-DAC will be accessible always at 192.168.43.102

All you have to do is turn MECHA-PHONE hot-spot on when powering up MECHAs, and to maintain it on while using MECHAs, for example disable any automatic turn-OFF of hot-spot on phone/device.

Now your device is connected to the Internet and to MECHAs, and you can download presets from server.
Other Pairing Methods

zLM – Automatic Pairing Using Buttons

This is a zero learning method – zero Learning MECHA – for firmware 02011 or newer.

As you already know, we communicate with MECHA through a web interface or using its own buttons, especially to enter some codes. We use the power button, $\mathcal{U}$, to enter 0 (zero) on the MECHA unit. Therefore, a code that starts with zero, we call it a power code.

In the zLM method of pairing, the first step is to create a code – a power code, and the second, to use this code to pair the MECHA units.

Step 1

Create an 8-digit code followed by the greater-than sign, as follows:

- the first digit must be 0 (zero)
- the next sequence of seven digits must be a combination of the digits 1, 2, and 3, so that two identical digits are not in consecutive positions
- add the greater-than sign (>) at the end

Example:

0 1 2 3 1 2 3 1 >

Please do not use this code, because you will also use it as a password.

When the power code is entered in both MECHAs, these two MECHA units connect automatically and become a Dual Axis Combo (DAC).
Step 2

1. Power off both MECHA units in case they are running. To do that, hold down the power button, 🌌, for 3 to 5 seconds.

2. Power on the horizontal MECHA (hold down the power button, 🌌, for 3 to 5 seconds). Wait until the splitting lights (≡≡≡≡≡) end and all LEDs are off. The unit powered up first rotates horizontally, so we name it MECHA-H.

3. Enter the power code on the MECHA-H using the MECHA-H buttons. After entering the code, MECHA-H gives 5 beeps, if not muted in settings. That means "I'm ready, another unit can pair with me".

4. Power on the other MECHA using its power button, 🌌, and wait until the splitting lights (≡≡≡≡≡) end and all LEDs are off. The second powered up unit rotates vertically, so we name it MECHA-V.

As an alternative to „Wait until splitting lights end”, on steps 2 an 4, you can press the 🕰️ button when the LEDs show ≡≡≡≡≡.

5. Enter the same power code on the MECHA-V using the buttons of MECHA-V. After entering the code, MECHA-V gives 2 beeps, if not muted in settings. That means "I'm done, I'm the pair of MECHA-H".

On successful pairing, MECHA-H has the middle LED on, and MECHA-V has the two middle LEDs on. Otherwise, power off and on both MECHAs again, preferably power on the MECHA-H first.

Next step is to test the combo using MECHA’s buttons, and see how it works.
Pairing PIN for more than 2 MECHAs

This section should be read after you read DAC test using the UI, where we explain how to access the user interface.

The Pairing PIN is an extra option you can use when the pairing method is zLM or zLM 2 to pair automatically at start more than 2 MECHAs connected to the same network or to the same hot-spot.

To set a pairing PIN number:

- Access the MECHA-H web interface, as shown in the chapter DAC test using the UI, and go to /config page.
- Create a four-digit number - the pairing PIN - and enter this number in the field Pairing PIN.
- Then click the [Apply] button at the bottom of the page.

All MECHA units that have the same PIN will be paired together.

All pairing methods and requirements presented in this guide are still valid.

Once paired, if the PIN number is changed on MECHA-H, it will be automatically set the same on MECHA-V.

If you want to break the pairing, please set a different PIN on MECHA-V.

Temporary Pairing

This type of pairing, or team, only lasts until the MECHA units are powered off. To temporary pair two MECHA units:

- Power on both MECHAs.
- Start team building entering the code 1212< on horizontal MECHA. In other words, the unit on which you enter this code, will rotate horizontally.
- Confirm the participation in the team, entering the code 12< on vertical MECHA. This unit will rotate vertically.
Automatic Pairing Using the UI

Power on horizontal MECHA and press 1 when LEDs shows splitting lights (- == ----).

1. Connect to horizontal MECHA with MECHA SSID and password. Refer to MECHA Controller C1 Manual if needed. SSID and password are printed on the supplied QR code label. Record them if the label is not available.

2. Open 192.168.8.1/config

<table>
<thead>
<tr>
<th>User:</th>
<th>admin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password:</td>
<td>Mecha</td>
</tr>
</tbody>
</table>

3. Select Default Mode: [AP+STA]
4. Click the [Apply] button.

5. Power on vertical MECHA and press 1 when LEDs shows splitting lights (- == ----).

6. Connect to vertical MECHA with MECHA SSID and password.

7. Open 192.168.8.1/config

<table>
<thead>
<tr>
<th>User:</th>
<th>admin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password:</td>
<td>Mecha</td>
</tr>
</tbody>
</table>

8. Select Default Mode: [STA]
9. Click the [Apply] button.

10. Click the [Connect to Wi-Fi] button, enter SSID and password for horizontal MECHA.

11. Connect to horizontal MECHA again using MECHA SSID.


   If pairing is successful, UI will show [H] at the upper left corner and [Team .x] near the bottom of page, where x is the last part of the IP in 192.168.8.x. The vertical MECHA can be accessed by selecting the [H] icon or by typing 192.168.8.x on browser address. Vertical MECHA UI will show [V] at the upper left corner and [Team] near the bottom of page. Select [V] to go back to horizontal MECHA. Use 2 Tabs with MECHA IPs in browser to access both MECHAs quickly.
13. To get presets from server, click the [Connect to Wi-Fi] button and enter SSID and password for the Wi-Fi network with Internet access.

14. Select [Presets], load [More from Server] to get some presets to test. You can ask for presets for your specific setup at forum.nodalninja.com

15. Note that MECHA (accessed by 192.168.8.1) is in AP mode. If you use the hot-spot/ Wi-Fi Tethering function on the same device to provide the Internet access, MECHA cannot connect to the Internet and [More from Server] is not available. You can use MECHA’s STA_IP to access it. For example, on Android, STA_IP is 192.168.43.x, where x can be 2-254; on iPhone / iPad, STA_IP is 172.20.10.x, where x can be 2-14. Refer to MECHA Controller C1 Manual on STA mode for details.
How to Unpair MECHAs

Temporary Unpairing

Power on MECHA-V and press MECHA-V button 1 when LEDs show splitting lights (- = - = - = - =). It does not matter whether MECHA-H is on or off at this moment. The units remain unpaired until you power on the system again.

Permanent Unpairing

While the units are temporarily unpaired, access the MECHA-H configuration page, and select the option AP from the Default Mode list, then tap/click the [Apply] button at the bottom of the Configuration page.

Re-Pairing after Unpairing

Power on MECHA-V and press the 2 button of MECHA-V when LEDs show splitting lights (- = - = - = - =). It does not matter whether MECHA-H is on or off at this moment. When both units are powered up, they will pair automatically.

If a pairing PIN is set

If a pairing PIN is set and you want to permanently break the pairing, please set a different PIN on MECHA-V.
MECHA’s Current Codes

MECHA’s buttons allow you to quickly perform some operations, and they can be an alternative to the web interface, in most cases. MECHA has 5 LEDs which show you the result of the performed operation. Please see the Table of Equivalences: LEDS – Characters at the beginning of this guide.

Power on the device by pressing the power button, \( \text{P} \), for a few seconds, and enter the code you need using MECHA’s buttons.

See below the equivalence of buttons and characters:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>&lt;</th>
<th>&gt;</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>&lt;</td>
<td>&gt;</td>
<td>0</td>
</tr>
</tbody>
</table>

For example, to enter the code 1<, use the 1 < buttons. This code executes the Button 1 preset to the left.

All codes end with either the > or < sign, which usually tells MECHA to execute the preset to the right or to the left.

See all standard current codes below.

⚠️ Please note that the power button, \( \text{P} \), can always be used as an emergency stop, if necessary, except for the speed calibration procedure (123123<).
Current Codes List

1< or 1>
Executes the *Button 1* preset to the left or to the right.
By default, the *Button 1* preset consists of 4 shots around, or it is the preset saved with the `[Save1] UI button.

2< or 2>
Executes the *Preset 2* to the left or to the right.
By default, the *Preset 2* consists of 6 shots around, or it is the preset saved with the `[Save2] UI button.

3< or 3>
Executes the *Preset 3* to the left or to the right.
By default, the *Preset 3* consists of 8 shots around, or it is the preset saved with the `[Save3] UI button.

131< or 131>
Executes a panorama of 6 shots around to the left or to the right, for a single MECHA.

132< or 132>
Executes a panorama of 12 shots around to the left or to the right, for a single MECHA.

1312< or 1312>
Executes a panorama of 12 shots around, 3 rows – at 0° and at +/-45° – plus zenith and nadir, to the left or to the right, for MECHA DAC. The code must be entered on MECHA-H, and MECHA-V must be parked, i.e. oriented upward, as for the zenith photo.

1313< or 1313>
The same as 1312, but with MECHA-V in the level position. First time, please test the codes without camera mounted on the panohead.

1321< or 1321>
The same as 1312, but with MECHA-V in the raised position. First time, please test the codes without camera mounted on the panohead.
1212<
Starts an assembly of a team of MECHAs, can be canceled or ended with the power button, \( \text{\textregistered} \), or [Team] button on its UI (user interface). After 1212< code is entered, or after first tap/click the [Team] button in UI, the LEDs will show scanning for any MECHA willing to join the team and be controlled.
The MECHA where Team was started in UI or 1212< code was entered, becomes the main MECHA and will have control over other MECHAs. To join any other MECHA in team, enter the 12< code on that MECHA. The effect of joining by 12< should be instant and echoed by beeps in the main MECHA. However, if nothing happens, the code can be entered again.
To stop the team assembly, either tap/click again on [Team] button in UI or press the power button, \( \text{\textregistered} \), on main MECHA.
Regardless of being in a team or not, each MECHA still have its UI functional, further more, each MECHA can start its own team: for example, with 5 MECHAs in the network, 1 can assemble the 1,2,4 team and, at the same time, 2 can assemble the 2,1,3,4 team, provided the other MECHAs confirm the participation.
For now, the control is limited to dual axis: the main MECHA and the last MECHA joined with 12<, the dual axis control itself will be extended further.
Soon, the control will be extended to as many axis as MECHA team consists of.
As a note, the goal is to assemble and save a team by MECHA IDs, independent of the IP addresses, and that will be achieved at some point.

12<
Confirms the participation in a MECHA team started by another, main MECHA.
After entering the code, the unit will send its IP address to other MECHAs in the same network. On 1st MECHA, there is no need to enter the IP manually, except when you want to use a different 2nd MECHA in the network.
Team build started on one MECHA with [Team] or 1212< code will automatically exit from the team building once a signal from another MECHA is received (after the 12< confirmation on the other MECHA), and the LEDs will light accordingly.

121<
Shows the MECHA’s ID, like “123ABC“.
123<
Shows the entire MAC address, like “123ABC123ABC”.

323<
Shows the full IP address, like “192.168.0.100”. To avoid confusion, the IP address is shown only once, then it automatically exits from IP address display.

321<
Shows the last part of the IP address, starting with a dot, like “.100”. If “AAA” is shown, MECHA is in AP mode, and the IP address is 192.168.8.1. If “!!!” is shown, Wi-Fi is OFF. If either “.0” or “0.0.0.0” is shown, MECHA is not in AP mode, nor does it have an IP assigned. In this case, a restart, then pressing the 1 button for 3 seconds at ———— (splitting lights) will enable the AP mode and allow access to the web interface at 192.168.8.1.

13<
Shows the Battery percentage.

131313<
Reboots MECHA without power cycling it. This is useful when you want MECHA to reboot (say, to enable Wi-Fi, or change the AP-STA mode), without disengaging the motors. Thus, the camera will not move due to gravity or other causes.

21<
Switches MECHA to or off pause mode, the same as clicking the [PAUSE] button on UI, or : on IR Remote.

23<
Disables/Enables the motor. UI [Reboot] command will be ignored if the motor is disabled. While the motor is disabled, the power LED blinks rarely, it blinks also in UI, and "(o)" is shown over it. Disabling the motor is useful to prevent MECHA from turning on by accident while charging, for kids protection, or to simulate the functioning of MECHA for learning purposes, or to save energy, and also the battery can be charged faster. There are other applications, not listed here.
Before disabling the motor of MECHA-V, we recommend that you position MECHA in the **parked** position, using the ▼ button, for example, to avoid a sudden change of position in the case of heavy cameras. Please see the Simple Rotations and Parked, Level and Raised Positions at the beginning of the guide.

### 31<
Code for automatic shooting pattern computed by MECHA, without using the UI. After entering the **31<** code, MECHA waits for two quick presses of the ◀️ button, first is in order to trigger the camera, and the second is after the camera was triggered. Please see Panorama with Automatic Shooting Pattern... for details. After that, MECHA will rotate slowly to the right and wait for another press of the P button, right after the sheet of paper is out of the camera’s frame. Then MECHA will go back in the initial position and wait for one of the 1, 2, or 3 buttons to be pressed, to assign the computed preset to that particular button.

To cancel the assignment, the ◀️ button can be pressed instead. For single axis applications, after the first row, MECHA will enter the pause mode and the vertical axis should be tilted manually to continue to a full spherical panorama. If only a cylindrical is needed, or no manual tilt is possible, press the ◀️ button.

### 32<
Similar with **31<** code, but fish-eye lenses can be used as well. Also, **32<** uses for reference a small feature centered in the frame, say, below the central focus point.

### 231<
Everything OFF, for faster battery charge. First, plug the charger cable, then enter the code.

Press the power button, ◀️, to show/hide battery level on LEDs when charging. If it’s no power on charging cable, the code will be ignored. If the code is executed, the LEDs will show charging, then the cable has to be unplugged and MECHA has to be powered-up again to go back to normal use.
Pressing other buttons than \( \text{Power} \) will have no effect. As an alternative, in UI `/config` page, `When Charging` option should be `Turn OFF`. This reduces the charging time to minimum, and it is also recommended if MECHA is not intended to be used with the charging cable inserted, to prevent accidental rotation of MECHA by UI commands when charging.

232<
Disables/Enables all LEDs, useful during night photography. As the power LED is off, don't forget the device turned on. The LEDs will light however if buttons are pressed for entering a code, to show the result of a code, or for battery check. It enhances the performance of MECHA DAC by using less RAM for communication.

12321<
Backlash compensation calibration. After the code is entered, MECHA will turn slowly to the right, then power LED will start flashing.

After that, you have to press \( \text{Power} \) when you see/feel that MECHA starts moving very slightly to the left. You can use the viewfinder, LIVE view with zoom, or other devices attached, like a laser pointer, and so on, or simply feel by hand when that small movement begins. At the end, the LEDs will show, say, ":24", where 24 is the new calibration factor (it should be around this value). You can enter the code again if you want a better result or you have more precise ways to determine the small movement. You can cancel the procedure with any other button when the power button, \( \text{Power} \), flashes, or press the \( \text{Power} \) button right after it starts to flash to have no compensation at all, or it will time-out in 5 minutes if no buttons are pressed.
TIP: If you have an R1 with camera in portrait mode, with the grip up and no Live view, and you have to look through viewfinder to see when the small movement begins, you can look with your left eye, and there is no need to close the right eye.

If the grip is mounted to the bottom of the camera, you can look with your right eye, and there is no need to close the left one.

This will make the process more bearable.

123123<
Speed calibration.
The procedure takes 1 hour and is silent, the motor is not moving.
Please wait until MECHA turns OFF automatically, and don’t use the web interface during this time.
This is a one-time procedure, which you can omit if you wish, as default factory calibration is good.

It cannot be canceled once started.

Both backlash compensation and speed calibration codes can be used only if they are absolutely necessary for your application. Both procedures save the results automatically.

The speed calibration makes the RPM value set in the interface as close as possible to the same calculated RPM value.

Backlash compensation is to compensate the backlash of the gear assembly, to have a better precision for left-right movements, like rewind to the initial position for cable protection, or in case of partial panoramas and time-lapse.

The procedure can be repeated after a longer period of time, after gear wears.

If you hear or see a slight right-left movement when starting the unit, a compensation is set. Otherwise, the compensation is 0, or is not set.
3212<
Shows the firmware version on the LEDs, then 32123< code can be used to update the firmware, provided MECHA has Internet access, or the Wi-Fi with Internet that MECHA was connected to before is on.

32123<
Updates the firmware, if possible. To update the firmware using the 32123< code, MECHA must be in STA or AP+STA mode and connected to a Wi-Fi with Internet access, before entering the code. Depending on Default Mode, it may be necessary to enable temporarily STA or AP+STA at start via buttons, then enter the 32123< code. MECHA’s LEDs will show "..." if no update was found, or “!!!” if there is no Internet connection.

3212312<
Updates the firmware on both paired MECHAs, if there is a new one.

312123<
Update the firmware using a hot-spot with the name MECHA-UPDATE and the password 87654321, which needs to be created and active before entering the code.

31212<
The code must be entered in the horizontal unit, and it will re-update both MECHAs. If there is no firmware version newer than the current one, then the latest update is performed again.

312<
Like 31212<, but only re-updates the unit where it is entered.

3231<
Code for testing the IR Remote. After the code is entered, MECHA will not execute the commands received from the IR Commander’s buttons. Instead, it will only beep and show on the LEDs the code of the button pressed (after the button is released), and over the battery symbol in UI.
To end the test, press the power button, which flashes during the test.
32313<
Code to test the shutter confirmation.
First, connect a camera to the MECHA’s CAM port using a PC sync cable, then launch the test by entering the code as usual. Trigger the camera a few times, manually, by pressing the camera’s trigger button or using a camera remote (note that if no action is detected, the test ends automatically after 10 seconds).
Now MECHA will count the shutter detections from camera via the AUX port and show on LEDs the number of detections after 10 seconds of idling. For example, if you trigger the camera 4 times, the LEDs should show 4 if the test is successful.
If the above test fails, please perform the test again with the Use New Shutter Confirmation disabled on Configuration (/config) page.
For DAC, if the camera is connected to MECHA-V and the confirmation is via the AUX Port of MECHA-V, the [x] Shutter Confirmation via other MECHA checkbox needs to be enabled in /config of MECHA-H.

3123<
This code will temporarily switch from AP to STA mode and connect MECHA to the last Wi-Fi, if the last Wi-Fi is detected by MECHA.

2313<
Changes the sense of left/right rotation when it is done manually using the ▼, ▲ buttons.

The following three codes should match with the current rotator connected to the controller.

23131<
Sets E1 as preferred rotator.

23132<
Sets E2 as preferred rotator.

23121<
Sets P1 as preferred rotator.

231231<
Resets the configuration settings to their default values, for example: SSID password → 12345678, Password for Configuration page → Mecha,
Hot-Spot password for firmware update → 87654321, Default Mode → AP. This code needs to be entered twice, as follows:
1) enter 231231< and, after the LEDs stop lighting as ' , ', (one green LED at the top, and one red LED at the bottom),
2) enter 231231< again.
When the power LED starts flashing, press the button (short press).

231231231< Factory reset. This code will restore your MECHA to its original factory settings and needs to be entered twice, as follows:
1) enter 231231231< and, after the LEDs stop lighting as ' , ', (one green LED at the top, and one red LED at the bottom),
2) enter 231231231< again.
When the power LED starts flashing, press the button (short press). If three exclamation marks are shown on the LEDs – “!!!“– it means that the factory file is not found, and nothing is done.
Appendix
MECHA’s S (Shots) Language

The S Language requires the firmware 02054 or newer.

In this chapter we will explain how to make a script for your desired pattern of shooting.

The S language is Shots oriented, and it can be used for both Single MECHA and MECHA Dual Axis Combo, abbreviated MECHA DAC.

Access Row page of MECHA-H using the Uset Interface, and select Scripted. As a result, a blank text area is displayed in which you will write the script.

The script starts with the initial position of MECHA, as follows:

\[ S = \{ \text{position in degrees} \} \]

Please note that usually MECHA’s position refers to the position/orientation of the rail/device controlled by MECHA.

In the case of DAC, we commonly have 3 possible start positions: level, parked, and raised. To go from a position to another, please see the Simple Rotations and Parked, Level and Raised Positions sections at the beginning of this guide.
For example, use the ▼ or ▲ buttons to go from raised to parked and back.

There are a couple of conventions in S language, and the most important are the following:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>_</td>
<td>Underscore refers to MECHA-H: 1 LED is ON when paired.</td>
</tr>
<tr>
<td>=</td>
<td>Equal sign refers to MECHA-V: 2 LEDs are ON when paired.</td>
</tr>
<tr>
<td>::</td>
<td>Double colon is the equivalent of the equal sign.</td>
</tr>
<tr>
<td>()</td>
<td>Round brackets indicate a loop.</td>
</tr>
<tr>
<td>^</td>
<td>caret means „relative to the previous position”, and can be used for MECHA-V, as the positions for MECHA-H are always relative to the previous position.</td>
</tr>
</tbody>
</table>
Three Row Panorama + Nadir + Zenith – EXAMPLE 1 (SL)

The MSS example Three Row Panorama + Nadir + Zenith (MSS) can be translated in S-Language as follows:

```
S=90, 1=0_0, =_30, 11=45, 12=-45, 12=-90,
  =90_0, =
```

The S-Language also accepts precise values for the pause, of integer and float type. For example, 2.5: means 2.5 seconds. To cancel a pause, you need to set another pause, of zero seconds: 0:

```
S=90, 1=2.5:0_0, =0:_30, 11=45, 12=-45, 12=-90,
  =90_0, =
```

Three Row Panorama + Nadir + Zenith – EXAMPLE 2 (SL)

In the Script text area, :: will be automatically replaced with = (equal sign), to allow more easy input from phones.

This is an example similar to the previous one. Suppose we want to script a panorama starting, again, from parked position, made of 12 photos around, 3 rows in total, at 0° and at +/- 45°, + zenith and nadir. In this case, we want zenith and nadir to be taken at the end.

This way of scripting is more complex, but allows more flexibility for a particular shooting pattern.

In the parked position, the camera – mounted on the upper rail – is facing up, as in the image on the right, and MECHA has to rotate the upper rail 90° to photograph the first row, as required in our example. So we specify the parked start position for MECHA-V as follows:

```
S=90.
```
If the start position is raised, \( S=-90 \). For the level position, \( S=0 \), or \( S \) (\( S=0 \) is equivalent to \( S= \)).

<table>
<thead>
<tr>
<th>Level</th>
<th>Parked</th>
<th>Raised</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>( S=0 )</td>
<td>( S=90 )</td>
<td>( S=-90 )</td>
<td>( S=45 )</td>
</tr>
</tbody>
</table>

After the start position, we have to specify the details for the first position, as follows:

\[
\{ \text{Number of position until the changes occur} \} \\
= \{ \text{MECHA-V position} \}_\{ \text{MECHA-H position} \} \\
1=0\_0
\]

1  Next 1st position for the change to occur

=0  MECHA-V at a tilt or pitch of 0° (thus MECHA-V does not move)

_0  MECHA-H at yaw of 0° relative to previous (thus MECHA-H does not move)

Assuming parked position, our script becomes:

\[
S=90, \quad 1=0\_0,
\]

Then we have to think about how we want MECHAs to move so that we have 12 photos around, 30° apart.

For the next position, MECHA-H rotation will be 30°, while for MECHA-V the position does not change.

We can write that as \( 1=0\_30 \), but S language also allows this compact form instead: \( =_30 \), by omitting the number 1, and writing the equal sign followed by nothing, meaning no changes for MECHA-V.

So, the script becomes:

\[
S=90, \quad 1=0\_0, \quad =_30,
\]

The movement for the next 10 positions or photos (as we have only one photo in every position) will continue by changing only the rotation of MECHA-H, then at 11th photo something changes, MECHA-V should rotate the upper rail up 45°, so we have to add \( 11=45 \), to our script:
Then 11 positions will continue in the same manner, and at the 12th photo MECHA-V should rotate down 45 (-45)°. So we have to add 12=-45, to our script, and it becomes:

S=90, 1=0_0, =_30, 11=45, 12=-45,

As for the previous row, things goes the same for another 11 photos, and at the 12th photo MECHA-V has to rotate at -90°, which is the position for nadir, so we have to add 12=-90, and the script becomes:

S=90, 1=0_0, =_30, 11=45, 12=-45, 12=-90,

Finally, we only need one position for the zenith photo, at 0° from the nadir, for MECHA-H. So we have to add =90_0, 0 is to tell that the previous position and the next position are 0° apart.

Now the script is:

S=90, 1=0_0, =_30, 11=45, 12=-45, 12=-90,

=90_0,

To complete the script, now we can add an equal sign =, which in other cases can be omitted. And our final script is:

S=90, 1=0_0, =_30, 11=45, 12=-45, 12=-90,

=90_0, =

which you can see in the above image as well.

Just a side note. The script allows to have some pieces of the code in a loop, and much less code to enter, especially in the case of gigapixel panoramas. This feature will be exemplified later.

Before launching the panorama, enter 38 in the number of shots field, via Custom option, then click/tap either the [RIGHT] or [LEFT] button.

We will explain in another example how to tell MECHA to wait or take extra shots in a particular orientation, so on.
Panorama Using Loop in Script – EXAMPLE 3 (SL)

\[ S=90, \; 1=0_0, \; =10 (^3_{-30}, \; =^3), \; =10 (^{-3}_{-30}, \; =^{-3}) \]

\[ S=90, \; \text{— Start from } \text{parked} \text{ position.} \]
\[ 1=0_0, \; \text{— The first position is at } 0_0 \]
\[ =10 (^{3}_{-30}), \; \text{— From the next position, we will start a loop (round brackets) 10 times that sets horizontal rotations of 30° from the previous position,} \]
\[ =^{^3}, \; \text{— and MECHA-V tilts 3° from the previous position (specified by the } ^\text{ sign).} \]

In the loop, we have only the tilting of 3° for MECHA-V, and no changes for the horizontal interval.

The above loop repeats with -3° instead of 3° for MECHA-V:
\[ =10 (^{-3}_{-30}, \; =^{-3}) \]

Panorama with Extra Shots and Pause – EXAMPLE 4 (SL)

A script for 28mm on a full frame camera:

- 2 images 90° apart for both zenith and nadir.
- 2 rows of 10 shots at 45° above & below horizontal,
- and 12 shots around for the horizontal. 36 shots in total.
- Start in parked position (zenith), and end in raised position (nadir).

\[ S=90, \; 1=0_0, \; =_{-30}, \; 11=-45, \; =_{36}, \; 9=45, \; 10=90, \]
\[ =_{-90}, \; =_{-90_0}, \; =_{-90}, \; = \]

\[ S=90, \; \text{— The start position is } \text{parked}. \]
\[ 1=0_0, \; \text{— The first shot is at } 0,0 \text{ (no rotation).} \]
\[ =_{-30}, \; \text{— The next shot is at the same tilt, but 36° apart, and will keep going so.} \]
\[ 11=-45, \; \text{— Then, at the 11th shot from the previous change, the tilt becomes -45 and} \]
\[ =_{36}, \; \text{— the next shot is at the same tilt, but 36° apart, and will keep going so.} \]
9=45, — Then, at the 9th shot from the previous change, the tilt becomes 45°, and

-10=90, — then, at the 10th shot from the previous change, the tilt becomes 90° for zenith, and

=_90, — the next shot is at the same tilt, but 90° apart (the second zenith shot).

=-90.0, — Then, at the next shot, the tilt becomes 90° for nadir, and

=_-90, — the next shot is at the same tilt, but 90° apart (the second nadir shot).

= — End.

To end in the parked position, as it started, in order to repeat it again and again:

S=90, 1=0.0, =_30, 11=-45, =_36, 9=45, 10=90,
=90, =-90.0, =-90, =90

When the camera is facing up, and its buttons and display are not accessible, you can add P to the first shot:

1=P0.0,

MECHA will pause before the first shot, and will continue only after you click the [PAUSE] button on UI or press the button of MECHA-H.
What is New

- **Version 06.3.4 – 2022.01.12:**
  - Added: *Launch a Preset by Scanning a QR Code.*

- **Version 06.3.3 – 2021.12.08:**
  - More details about the shutter confirmation feature added in the **User Interface** chapter.
  - Added in the **Configuration** page:
    - *Hide some controls in web UI when a motor is running.* Enabled by default.
    - *Use Two IR Receivers (DAC ONLY).*
Useful links

https://www.nodalninja.com/Manuals/mecha-card.pdf
MECHA Quick Reference Card

https://www.nodalninja.com/manual
Quick reference guides and complete manuals.

https://www.youtube.com/user/Fanotec
Fanotec Youtube Channel

https://www.youtube.com/user/NodalNinja
Nodal Ninja Youtube Channel

https://forum.nodalninja.com/
Nodal Ninja's Panoramic Photography Forum

https://www.fanotec.com/
Fanotec International Limited official website

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