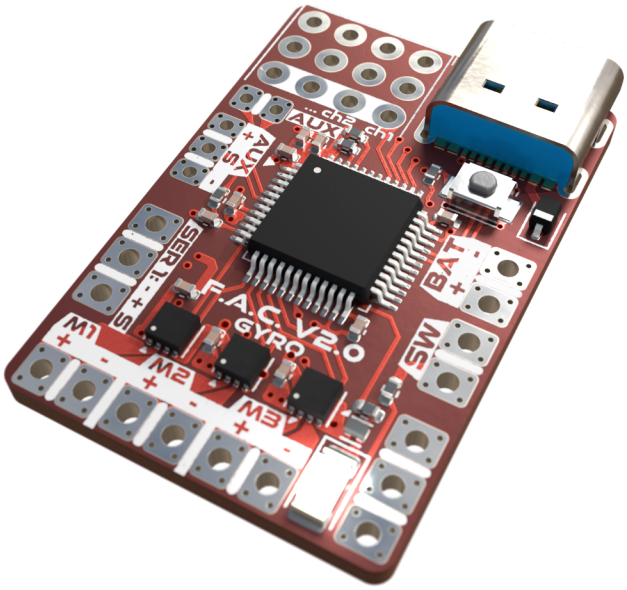
# Floppy Ant Controller

F.A.C. V2 manual

Advanced control board for combat robots




## Introduction

The FAC (Floppy Ant Controller) is a control board for combat robots, intended as a more advanced alternative to the Malenki-nano, while maintaining a competitive cost.

The FAC allows for a very advanced degree of freedom and customization. This allows it to be used as a control board for a wide variety of combat robots.

All settings can be conveniently changed via USB using the dedicated FAC tool, the tool dedicated to FAC settings.

As the firmware releases progress, new features will be added, including the use of the built-in accelerometer/gyroscope. Since it's an open-source project, anyone can modify it.

For the publication of content derived from this project, please consult the conditions established by the LICENSE file.

Last modified 3/1/2026

# Definitions

- **FAC**: Acronym for Floppy Ant Controller, the control board of the project.
- **DC motor**: DC motor, e.g. N20/N10/N30 etc.
- **Servo output**: Typical control signal for servomotors: a pulse between 1 e 2 ms, with a frequency of 50 Hz, which determines the position of the servo.
- **Cut-OFF**: FAC security status.
  When the FAC is in Cut-Off, it is disarmed and cannot be armed remotely. To exit this state, you must turn the FAC off and on again.
- **Connection**: A physical connection of the FAC is a connector on the board, used to connect motors, servos or ESCs via soldered wires.
- **Output:** The output is a value generated by a MIX or a Special Function. This value is associated with a physical connection on the FAC and translates into the movement of a motor or servo.
- **IMU**: Acronym for Inertial Measurement Unit: a sensor that integrates an accelerometer and a gyroscope to measure accelerations and angular velocities.
- **Firmware**: The program loaded into the FAC, which defines its operation and the available functions.

# Specifications

- 3 outputs for DC motors:
  - **1.8A max**
  - **1000 steps per direction (resolution)**
  - **adjustable frequency (100->10,000 Hz)**
- 2 servo outputs:
  - **HV (battery powered)**
  - **1000 steps (resolution)**
  - **adjustable pulse width**
  - **adjustable frequency**
- 2 digital inputs:
  - **3.3V max**
- 1 analog input:
  - **3.3V max**
  - **easy connection for potentiometers**
- Basic version supports 1-2S lipo batteries (limited by DC drivers):
  - **adjustable CUT-OFF threshold**
  - **adjustable CUT-OFF time**
- High brightness status LED
- Compatible with various receivers:
  - **PPM up to 8 channels**
  - **PWM up to 4 channels**
  - **ELRS (not yet implemented)**
- Settings can be easily changed via a dedicated tool https://factool.floppylab.it/ with USB-C cable:
  - **FAC Tool can also be used offline by saving it as an application**
  - **No installation required**
- Compact size and weight:
  - **21mm * 31mm**
  - **2.4g without receiver, 3.6g with FS2A receiver**

# New features

With this new version of the FAC, both the hardware and firmware have been completely redesigned.

This has allowed the introduction of new features, the most significant of which are the integration of an IMU (Inertial Measurement Unit), a sensor that includes a gyroscope and accelerometer, and the possibility of complete configuration in every aspect.

Thanks to these features, it's possible to develop customized algorithms for more advanced robot control. For example, a MIX is already under development that automatically reverses steering control in robots that can move even when upside down.

# Security features

The FAC integrates important safety features, designed to make using robots as safe as possible.

## FAC Activation

The FAC, once powered, does not start the firmware until the receiver generates a valid signal.

FS2A receivers and all model receivers do not generate any signal until the remote control is connected, so this feature has been used to check when the remote control is turned on and connected.

Therefore, the FAC will not activate until the remote control is connected. This makes the robot very safe if it is accidentally turned on without the remote control turned on.

## Arming e FAIL SAFE

Since the FAC does not have direct communication with the receiver chip, it cannot detect if the remote control loses connection.

For this purpose, the receiver's Fail Safe function, when appropriately configured, is used, which puts the FAC into a safe operating state in the event of a connection loss.

If the arming channel is active and assigned to a radio control channel, when the receiver enters Fail Safe the value of this channel must falls below the 80% threshold so that the robot is automatically disarmed.

## Watchdog

The FAC uses the so-called **Watchdog**, a hardware peripheral internal to the microcontroller that verifies that the firmware is running correctly.
If the firmware crashes for more than 500 ms, the Watchdog resets the FAC, preventing the robot from going out of control.

This feature significantly increases safety during combat and reduces the risk of defeat in the event of errors in the firmware execution.

## Battery CUT-OFF

To protect lithium batteries from over-discharging, which could cause them to swell and become dangerous, the FAC monitors the battery voltage.

If the voltage drops below the set threshold for more than the time at the cut-off,The FAC disarms and cannot be remotely rearmed.

It can only be reactivated by turning the FAC off and on again, but if the voltage remains below the threshold it will automatically return to cut-off, preventing damage to the battery.

This feature can be disabled by setting the cut-off threshold to 0V using the FAC Tool, but doing so is not recommended.

# Operating states

The FAC can be found in different operating states. Each is characterized by a flashing pattern of the status LED or a sound effect generated by the connected motors.

Starting from when the FAC is powered, the states it can be found in are the following:

1. Start
2. Unarmed
3. Army
4. Cut-Off

## Start

As soon as power is applied to the FAC, a startup routine is performed that includes several checks. Each check is characterized by different flash patterns based on different situations:

- ➔ Loading settings from EEPROM memory:
  - **3 Quick Flashes**: reading settings already stored
  - **10 Quick Flashes**: writing default settings to memory, empty memory (you should never see this flash, if you do, it means there is a problem with the EEPROM memory)
- ➔ IMU initialization:
  - **1 Long Flash**: accelerometer zero calibration
  - **20 Flashes Medium Speed**: IMU initialization error. The IMU will not be used; the values read will always be 0. (It may be corrupted or there is a temporary error in its initialization. If rebooting the board doesn't fix it, the problem may be permanent.)
- ➔ Waiting for the remote control to turn on:
  - **No light or noise**: waiting for the remote control to be turned on
  - **End of boot ringtone** once the remote control is turned on and connected, the FAC sounds via the connected DC motors. (If the buzzer doesn't sound once the remote control is turned on, check that the remote control is actually connected to the receiver, otherwise the receiver may be damaged.)

If everything is working correctly you should have the following sequence of flashes/sounds:**3 quick flashes ____ 1 long flash ____ end of start-up ringtone**.

## Disarmed

Once the startup sequence is complete, the FAC is disarmed by default.

When the FAC is disarmed, all motors and servo outputs are completely disabled (no signal is generated). In this state, the battery voltage is not monitored, so the Cut-OFF state can never be activated.

- ➔ When the FAC is disarmed the status LED flashes slowly with a 2-second period, and a repeating sound is emitted every second from the connected DC motors.

To arm the FAC (and therefore exit the disarmed state), there are two possibilities dictated by the “arming channel” setting used:

1. **Arming channel active**: a channel is used to remotely arm the FAC, in this case only if the chosen remote control channel rises above 80%, the FAC switches to the ARMED state.
2. **Arming channel disabled**: the FAC automatically arms itself after completing the start-up sequence after a flash and a single sound from the connected DC motors.

## Armed

When the FAC is armed, it means that all the DC motor and servo connections are active and functional, so if the FAC is properly set, you can make the connected motors and servos/ESCs move. This is the active state when using the robot normally during a battle.

- ➔ When the FAC is armed the status LED remains always on and flickers every second (basically, it turns off for a short time and then turns back on). No noise is generated.
- ➔ When the FAC is armed and the battery is low the status LED flashes every second. (Low battery is different from dead battery, which is the cut-off)

When the FAC is armed, it checks the battery voltage to activate the CUT-OFF state if the battery drops below the set threshold for more than the set time, and checks the “arming channel” (if active), and if its value drops below 80%, the FAC returns to the state disarmed.

## CUT-OFF

When the FAC is in CUT-OFF it is as if it were disarmed, that is, all its controls are disabled so the robot cannot move and the weapon is stationary.

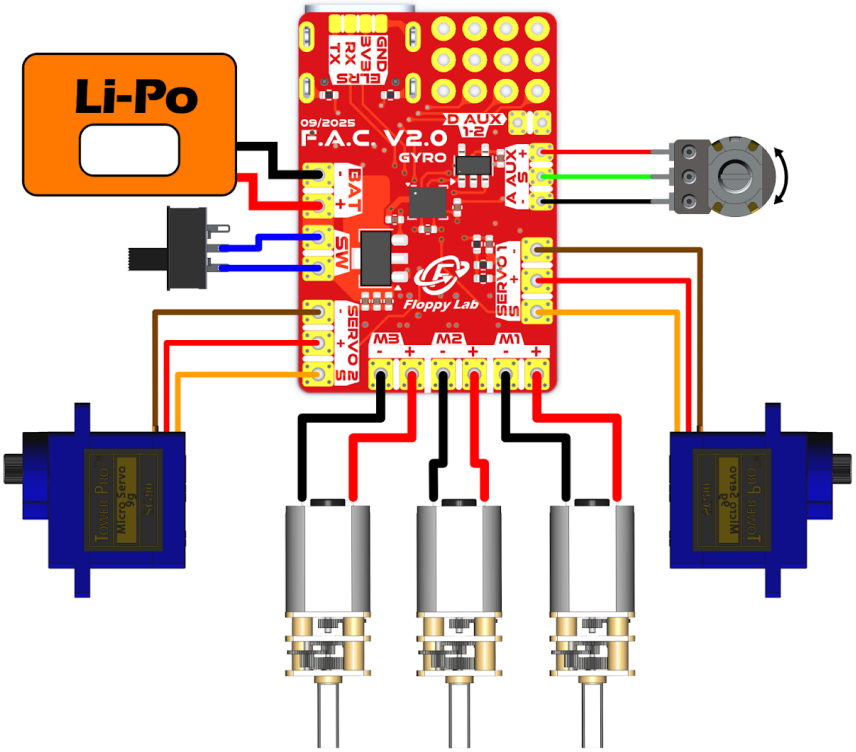
The difference is that once it enters this state, it cannot go back, because it is an emergency state that serves to preserve the battery and prevent it from becoming irreparably damaged.

The only way to restore normal operation of the FAC is to turn it off and on again.

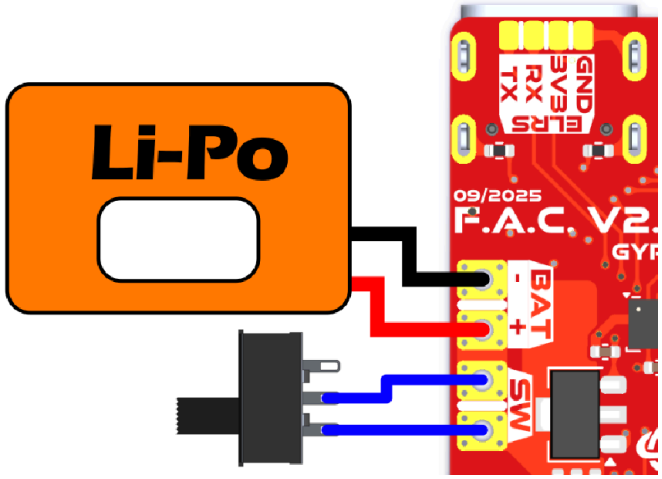
- ➔ When it is in cut-OFF the LED flashes quickly (about every 0.5s) and the connected DC motors beep about every 0.5s.

# Electrical connection

To correctly connect the components (servo motors, ESC, batteries, switches) to the FAC, simply follow the instructions written on it.



# Battery and switch

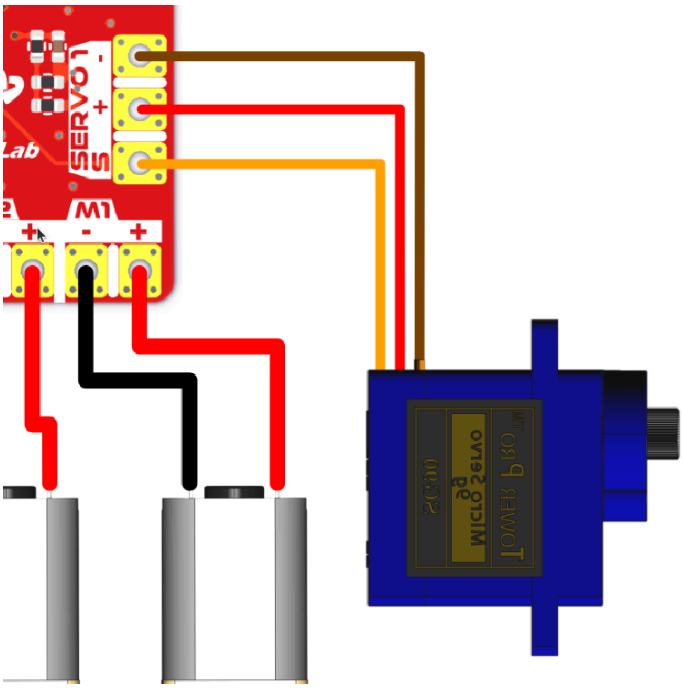



The battery and the switch are connected close to each other.

The battery (BAT) can be a maximum of 2S (7.4V nominal). If larger batteries are used, the FAC and the components connected to it may be permanently damaged.
It is necessary to respect the marked polarity, otherwise the FAC and the connected components may be permanently damaged. The FAC does not have reverse polarity protection, so be very careful.

The switch (SW) has no polarity and is used to disconnect the battery from the board, so if the switch is not closed, or not mounted, the FAC will not turn on. If you do not want to use a switch with the appropriate connections provided, you must short-circuit the two SW connections for the FAC to turn on.

## Servo/ESC



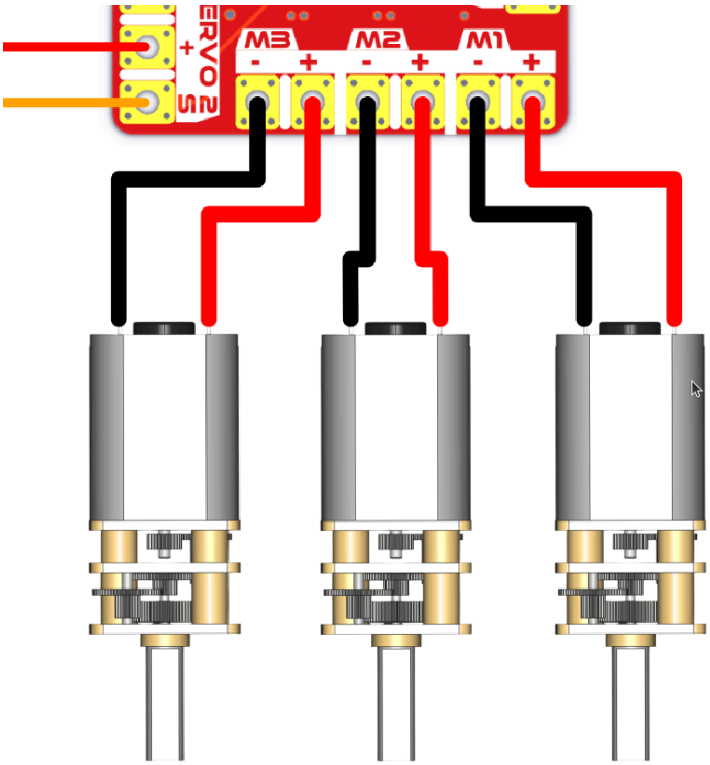

The servomotors must be connected following the graphics shown on the FAC. The servo connections are marked as SERVO 1 and SERVO 2.

The connections marked + and - are the power connections. The + is connected directly to the voltage coming from the battery (downstream of the switch), so be careful to use servos or ESCs that support this voltage.

The connection marked with the letter S is the control signal.

Be very careful not to short-circuit the connections together as this could irreparably damage the FAC and the components connected to it.

## DC motors

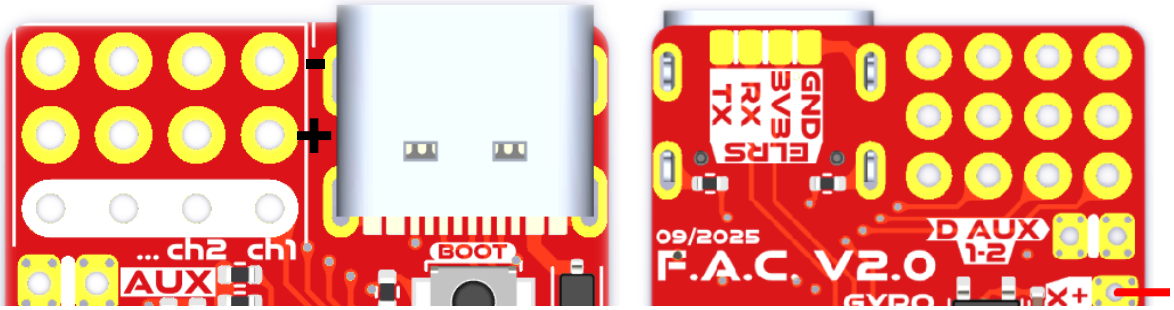


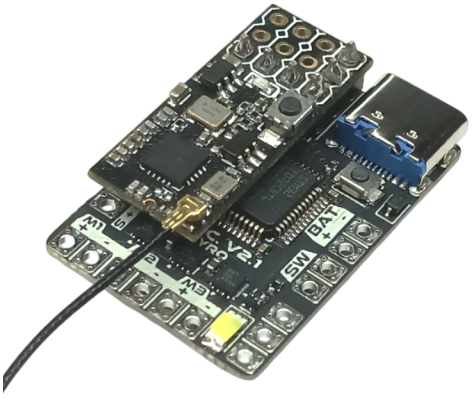

DC motors can be connected to the respective connections marked as M1, M2, M3.

It is recommended to respect the polarity for easier configuration, if they are connected with reverse polarity the direction of rotation is reversed.

Be careful not to short-circuit the connections between them, although they are less critical than the servo connections it is still strongly discouraged to do so.

## Receiver





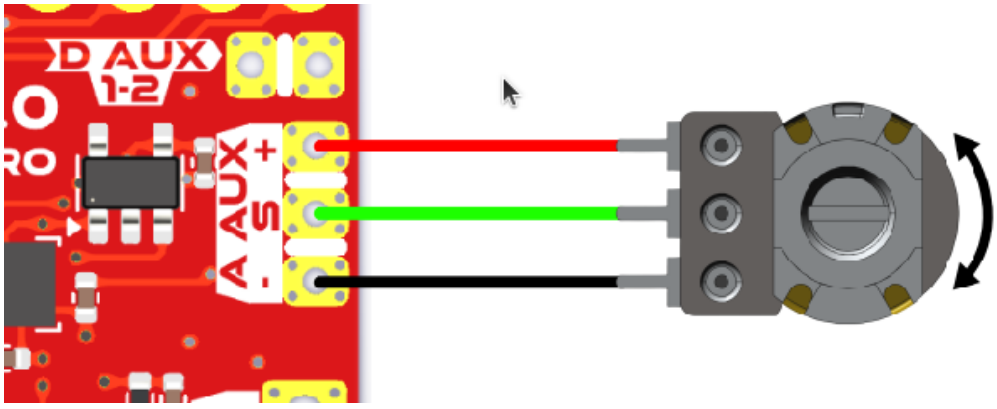

Many types of receivers can be connected to the FAC V2. It is primarily designed to mount an FS2A receiver directly above the connector as shown in the photo. However, other receivers can be connected using wires soldered to the dedicated connections.

You can use **4 channels** with PWM receivers, and up to **8 channels** with PPM receivers connected to channel 1.

The FAC supplies 3.3V (150mA max) of power to the receiver connections. It is extremely important to observe the correct polarity to avoid irreparably damaging the FAC. The first image above shows the polarity provided by the receiver connector.

It is also possible to connect an ELRS receiver, but the protocol management has not yet been implemented in the firmware, so it cannot be used yet.

## Analog and digital auxiliary inputs




The FAC provides one analog input and two auxiliary digital inputs, for additional future or custom functionality.These inputs support signals with a maximum voltage of 3.3V, if this threshold is exceeded it is very likely that the FAC will be irreparably damaged.

The analog input was designed and built to make the use of an external potentiometer quick and easy, in order to have feedback for a possible

servomotor made with DC motors.This feature is already under development, so it will be made available in future firmware releases.

The two digital inputs can also be used for specific functions and automation controls. These have not yet been implemented in the firmware, but may be in future versions.

# FAC TOOL

The FAC tool is a web application that allows you to connect any PC with a Chrome-based browser to the FAC, and change its settings with a convenient graphical interface.

This application can be found at the following link: https://factool.floppylab.it/ and you can download and use it offline by pressing the icon in the top right corner of the browser in the address bar.

This application allows you to modify all FAC settings and preview connections based on the chosen configuration. The preview can be downloaded and/or printed by pressing the printer button in the top right of the preview.

The FAC tool also allows you to activate and deactivate telemetry from the FAC in real time. Telemetry (when active) updates approximately five times per second. In addition to providing the value read from all receiver channels, telemetry provides the battery voltage (total and individual cells, calculated as total/number of cells), the configuration of the connected battery (USB, 1S, 2S, 3S, 4S), and finally the status of the FAC (armed, disarmed, cutoff).On the side you can view the values read by the accelerometer mounted on the FAC by looking at the orientation of the 3D model of the FAC (not yet available).
**NOTE! The FAC V2.x supports batteries up to 2S (7.4V nominal). Connecting a Li-Po/Li-ion battery with more than two cells may cause permanent damage to the FAC.**

# How to connect the FAC V2 to the FAC tool

To connect the FAC V2 to the FAC tool and simply connect the USB-C port on the FAC to a PC with a USB data cable.

When connecting the FAC to a PC to modify its parameters using the FAC tool, it is recommended to also connect the battery to prevent it from being powered exclusively by the PC. The FAC is equipped with a protection diode to prevent current from flowing from the battery to the PC's USB port.

**NOTE! When the FAC V2.x is powered by the PC (i.e. only the USB port is connected, no battery connected to the FAC), the DC motors and servo outputs are also powered by the PC's USB port, so keep in mind that the PC must provide all the current needed to power the motors/servos. It is recommended not to draw too much current from the PC as it could damage it irreparably. Do this at your own risk.**

**When testing new robot settings, always do so safely by blocking any blades or potentially dangerous parts.**

Once the FAC is connected to the computer:

1. open the FAC tool and press the “Connect” button at the top left
2. select the device with the name “FAC_V2” and press connect
3. Please wait for all settings saved in the FAC to load.

Once everything is loaded, the settings you will see on the FAC tool will be the ones active in your FAC, now you can also activate telemetry.

Once you have changed the settings according to your needs you can press the “Test settings” button and once the procedure is finished, the settings have been activated (**but not saved yet**) on the FAC, so you can test them (without disconnecting the FAC from the PC) and verify that they are consistent with your needs.

If you want to return to the settings saved in the FAC memory, simply press the “Read from FAC” button. WARNING! Any changed settings will be permanently lost.

To definitively confirm the settings, you must press the “Save to FAC” button. and wait until the procedure is complete. Once finished, you can press the "Disconnect" button and then disconnect the FAC from the PC. The settings will be retained even when the card is restarted.

# BASIC and ADVANCED settings

In the FAC, some basic settings have been implemented that are commonly found in almost all controllers (such as the Malenki-nano), but it also has other much more advanced features to make the setup of your controller more customizable based on the components used.

The settings have been divided into four categories, present in the FAC tool:

1. General
2. Mapping
3. Mix & Special Functions (Mix & SP. Functions)
4. Servo e Motori (Servos & Motors)

They are explained in more detail below. In the FAC tool, next to each setting, there is a ⓘ symbol containing a description of the individual setting.

An example of a complete robot configuration using the mapper and all other functions can be found under the section Robot configuration example.

# General

The general settings are those that allow the FAC to function correctly, therefore they are the first to be adjusted on a new configuration.

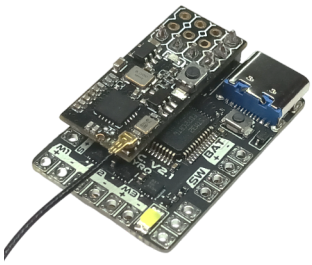
The various settings are listed and explained below. The name of the setting found within the FAC tool is shown in bold.

## Battery (battery)

- ➔ **Low battery voltage**: is the battery voltage at which it is considered flat. (The FAC behavior does not change)
- ➔ **Cut-off voltage**: This is the battery voltage at which it is considered completely flat. (When the cut-off event occurs, the robot is automatically disarmed, and cannot be armed without turning the FAC off and on again.)
- ➔ **Cut-off detection time**: if the battery voltage remains below the CUT-OFF voltage for this time, the FAC goes into CUT-OFF, meaning the robot is automatically disarmed.

## Receiver (receiver)

- ➔ **Receiver type**: allows you to choose the type of receiver you are using. You can choose between several types:
  - PWM, up to 4 channels;
  - PPM, up to 8 channels;
  - ELRS, not yet implemented;
  - NRF24, not yet implemented.



For example, if you are using an FS2A receiver mounted directly above the FAC, with the receiver in PWM mode (the default mode), you should select PWM. The same applies for other modes.

- ➔ **Channels deadzone percentage**: allows you to set a deadzone in the radio system channels to mitigate possible mis-centering of the radio control sticks. The deadzone is expressed as a percentage of the range (2% to 5% should be sufficient).
- ➔ **Arming channel**: You can use a channel read by the receiver to arm and disarm the FAC directly from the remote control. This feature can be disabled. If disabled, the FAC is immediately armed as soon as it is turned on. It disarms automatically when in CUT-OFF. When this setting is active, you must select the channel used for arming. In this case, the FAC arms when the selected channel has a value greater than 80% of its maximum value.

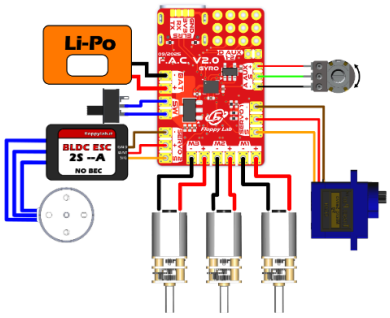
# Mapping

Mapping is used to decide where the outputs generated by the MIX and Special Functions will be used. That is, it allows us to decide whether to use the function/mix on a DC motor or a servo output.

All connections present in the FAC can be mapped as desired using the Mapper present on the right side of the FAC tool. There are **three** DC motor outputs and **two** servo outputs.

Each connection can be mapped to an output generated by a MIX or Special Function. An output can be mapped to multiple FAC connections.

On the FAC tool there is a preview generated based on the configuration chosen with the Mapper. The preview shows the various connections that need to be made on the FAC in order to use it on the robot with the chosen configuration. By pressing the printer icon, you can print the illustration with all the information needed for correct connection. Below the preview, you can choose whether to display a servomotor or an ESC+BLDC in the servo outputs. This option is purely for illustrative purposes and does not change any behavior of the FAC.





# MIX and SPECIAL FUNCTIONS

Depending on the installed firmware, the FAC can create different control signals via MIX and Special Functions.
These signals can command movements, such as the speed and direction of a motor or the position of a servo.

Finally, through the Mapper, it is possible to decide on which physical connectors of the FAC to send these signals.

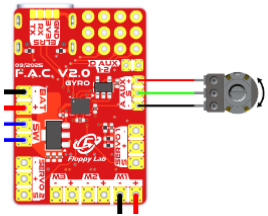
Gradually, further MIXES and Special Functions will be added (if you have specific requests, please send an email to thefloppylab@gmail.com).

## Special Functions

A Special Function generates an output (only one), mappable with the Mapper, that allows you to add behaviors (automated or not) to the physical connections of the FAC.

The following are the Special Functions that can be activated:

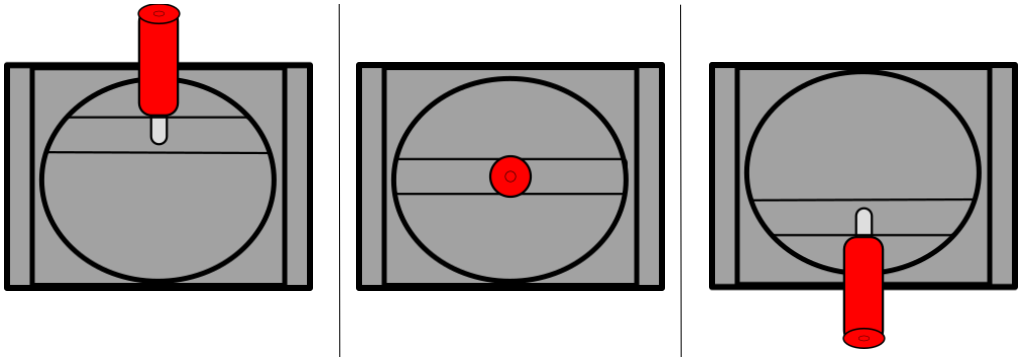
- ➔ **DC Servo:** (not yet implemented) allows you to create a servomotor with a DC motor connected to the M1/M2/M3



outputs, controlling the position via the A.AUX analog input connected to a potentiometer. Control is performed via PID control. The position of the DC servo is set by the selected radio control channel.

➔ **Direct link to channel**: This special function is extremely useful for directly controlling servos and ESCs, as well as DC motors. It takes the signal from the selected channel and generates the output according to the logic shown below, depending on the use case. Up to eight "direct link to channel" functions can be activated.
The logic is slightly different depending on the connection selected on the Mapper:

- **DC motors**: decideDirection and speed are directly proportional to the selected channel value. The central channel value is the engine stopped, up to the maximum and minimum values, which correspond respectively to maximum forward speed and maximum reverse speed.*(motor direction can be reversed in settings Motors & Servos)*



STICK 100% -> DC motor Forward 100% | STICK 50% -> DC motor 0% | STICK 100% -> DC motor Backwards 100%

- **servo**: decide the servo position angle.
- **ESC**: decide the speed of the brushless motor connected to the ESC (also direction with the same logic as the DC motor in case the ESC is bidirectional).

## MIX

MIXES are used to decide the movement logic. They usually generate two or more outputs that can be selected with the Mapper on the physical connections of the FAC.

The following are the currently selectable MIXES:

➔ **None**: no MIX active. Does nothing.

➔ **Simple Tank**: this mix is used to calculate the speed and direction of the motors of a robot that uses only two wheels/squeaks (differential steering), i.e. it follows the movement logic of a tank's tracks. This mix therefore generates two outputs: right motor, left motor [*Left Motor, Right Motor*], which can then be assigned with the Mapper. Once activated, you can decide which radio control channel to associate with steering and throttle. In addition, you can decide whether or not to reverse these two channels, depending on your needs.

# Servos and Motors

These settings are related to modifying the behavior of the DC motor outputs and servo outputs.

The FAC V2 features two servo outputs, where you can connect servos and ESCs (Electronic Speed Controllers) for brushless or brushed motors. There are also three outputs for brushed (DC) motors.

The outputs of DC motors are PWM controlled to vary the speed of the motor.

The servo outputs provide the classic signal accepted by servomotors.

These two categories of outputs enjoy different settings.

## Engines

- ➔ **Motors PWM frequency**: You can choose the control frequency of the DC motors. You can choose a frequency ranging from 100Hz to 10,000Hz. This can be useful for specific calibration based on the motors used. For classic N20s, a frequency of 1000/2000Hz is sufficient.
- ➔ **Reverse**: Each DC output can be inverted by activating the reverse setting. If this is activated, the motor will rotate in the opposite direction to the value calculated by the MIX or Special Functions.
- ➔ **Braking**: Each DC output can be used to activate or deactivate the motor brake. The motor brake allows the motors to be stopped almost instantly once the speed is set to zero. The brake also provides greater control over the motor's rotation speed. If deactivated, the motor will also coast when you want to slow down the speed, thus providing less precise control.

## Servo

- ➔ **Servos PWM frequency**: You can choose the frequency of the generated servo signal. Some servos require (or support) a higher frequency than the classic 50Hz. A higher frequency allows for a greater update of the values. The frequency can be chosen from a minimum value of 20Hz to a maximum of 300Hz.
- ➔ **Reverse**: Each servo output can be reversed by activating the reverse setting. When activated, the servo will reverse its zero position with its maximum position.Pay close attention to this setting if you connect an ESC with a motor to these outputs. The motor may start at full speed, or the ESC may not activate at all and enter the settings if not configured correctly.. It is usually left unchanged if the radio control channels have not been reversed.
- ➔ **Min µs value**: to eachservant withThis setting defines the minimum pulse width of the generated servo signal. Some servo motors (especially the cheaper ones) require a pulse width other than the standard one (1ms -

2ms). This setting defines the minimum pulse width. The value can be set from a minimum of 100µs to a maximum of 1499µs.

➔ **Max µs value**: to every servant withThis setting defines the maximum pulse width of the generated servo signal. Some servo motors (especially the cheaper ones) require a pulse width other than the standard one (1ms to 2ms). This setting defines the maximum pulse width. The value can be set from a minimum of 1501µs to a maximum of 2900µs.

# Robot configuration example

As a practical example, we use the Bretèllator robot, which is equipped with a rotating kinetic weapon and two wheels for a differential movement system.

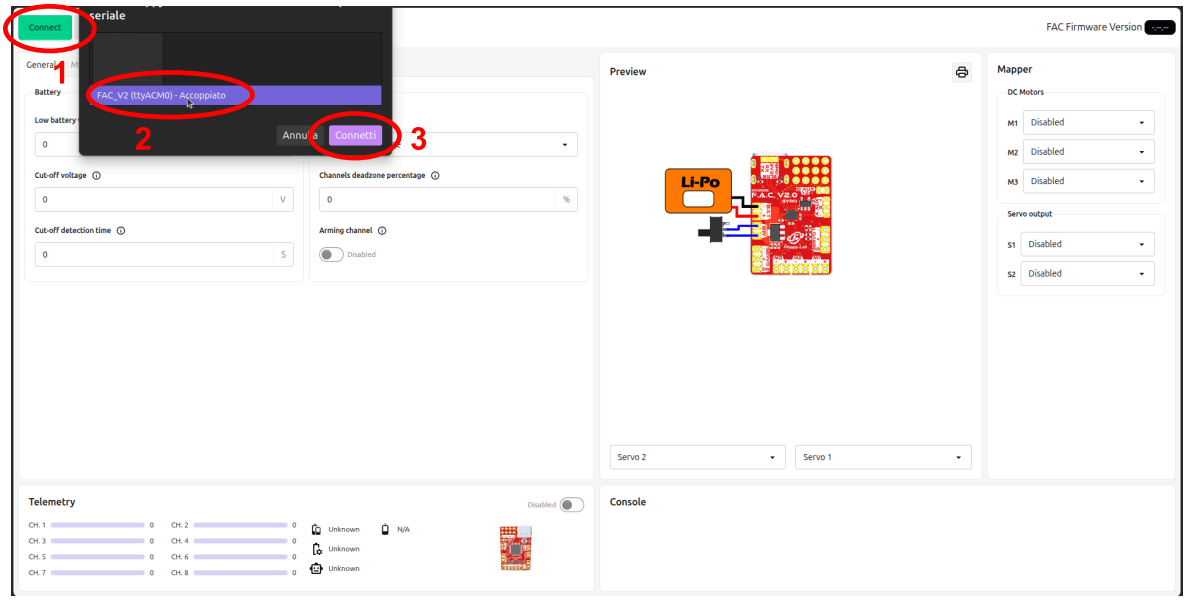
Let's assume we have:

- two side wheels connected to two N20s
- a rotating kinetic weapon connected to a BLDC (brushless) motor controlled by an ESC
- an FS2A receiver in PWM mode (default mode) connected to the FAC (4 channels available).

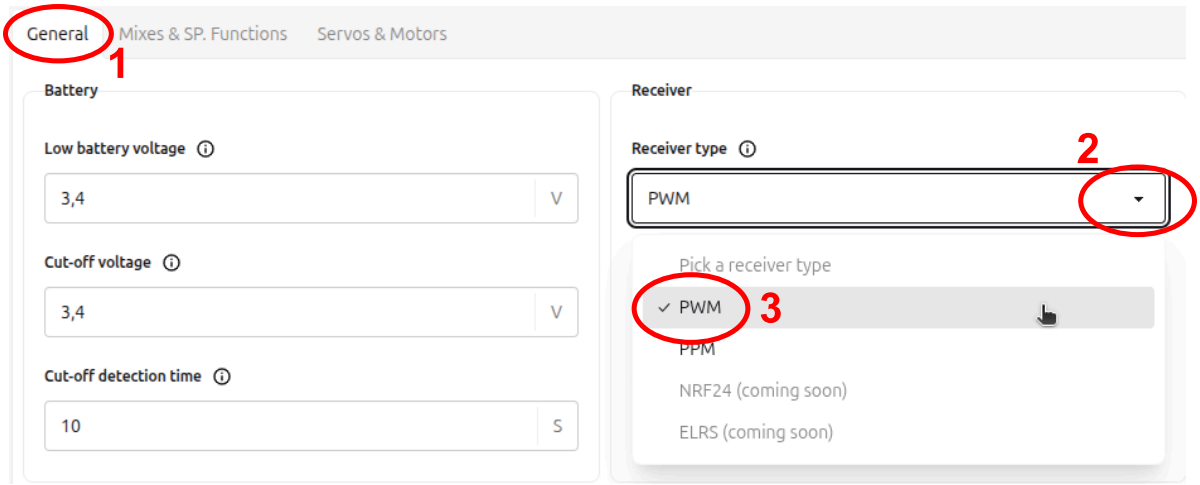
We choose to connect the **right wheel motor on connection M1** and the **left wheel motor on M3 connection**. Finally the **ESC that drives the weapon motor on servo connection 1**.

1. We lock the weapon with the locking device and lift the robot so that it does not touch the wheels.
2. We turn on the radio control and place it in a place where it cannot be bumped and the position of the sticks cannot be changed.
3. Once the FAC is connected to the PC with a USB cable, keeping the battery connected and the switch on, we start the FAC tool.
4. Remember that the FAC will not start until the receiver provides a valid signal, which is when the remote control is turned on and properly connected. When it is turned on, the chime will be played by the connected DC motors.
5. Press "Connect" and select the FAC_V2 device. The FAC tool will now load the FAC settings and allow you to configure everything. In the top

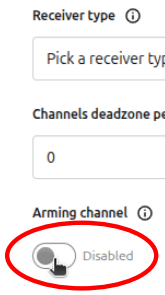
right, you can check the firmware version installed on your FAC.




6. First of all we set the correct type of receiver, so in our case we go to the tab “General” and under the “Receiver” box we select PWM as the type.

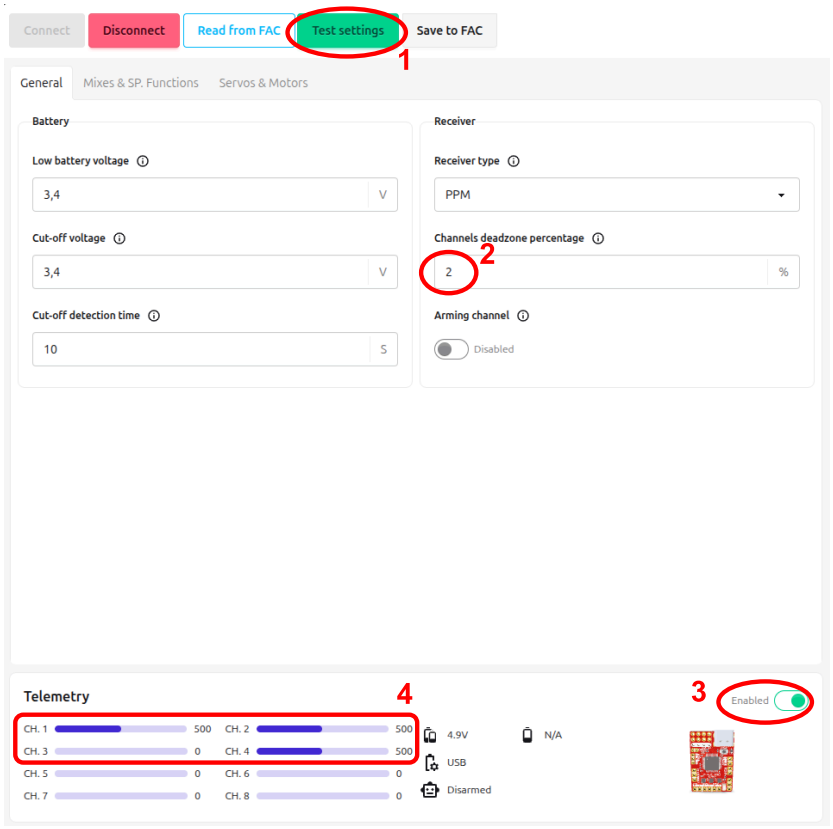



7. Since the FS2A doesn't have many channels in PWM mode (only four), we disable the "Arming channel" option. This will automatically arm the FAC as soon as it's turned on, so we need to be very careful not to accidentally move the radio controls.

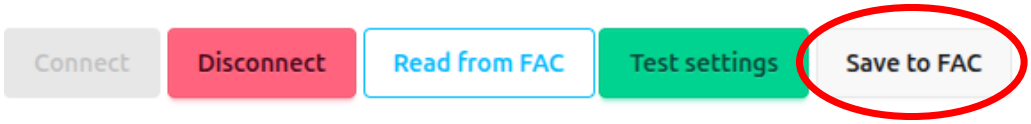



8. Now press the "Test settings" button and activate telemetry. Now we can check that the first four channels (CH.1-4) follow the position of the remote control sticks. If the remote control is already centered

correctly, but when the sticks are at center the displayed value is not 500, or when they are at maximum it is not 999 or 0, we need to increase the deadzone percentage. Do this until the values are acceptable. **There is no need to adjust the deadzone, usually a value between 2% and 5% is sufficient.**

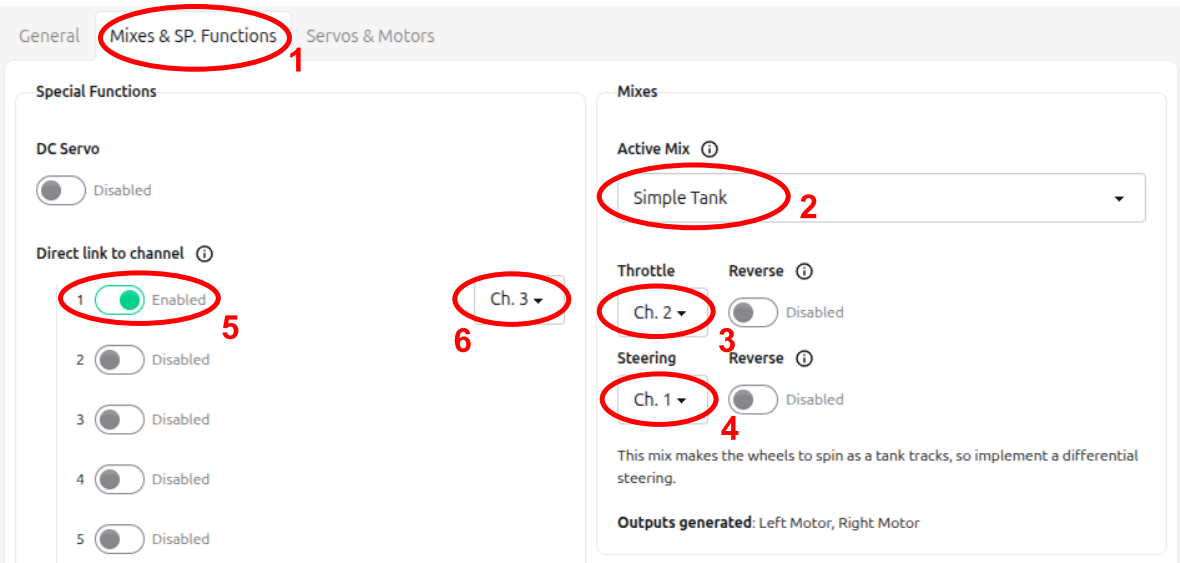



9. If all channels are correct, we can save these settings so they won't be lost if the device is shut down. To save them to the FAC's memory, simply press the “Save to FAC” button and wait for the operation to complete. The time it takes to save and test the settings increases when many settings are changed. However, it's a very short time.

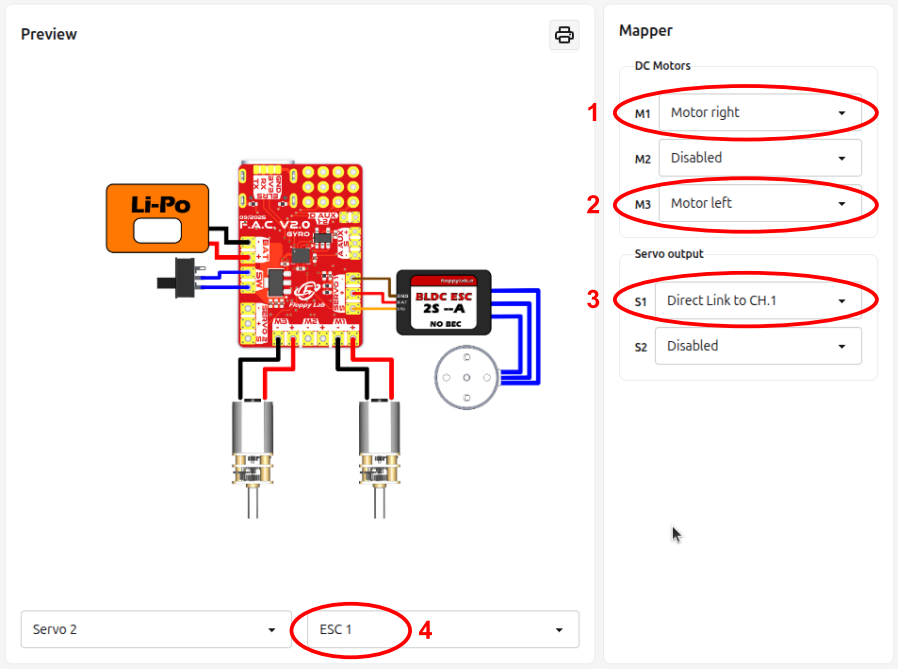



10. Now in the “Mix & SP.Functions” tab we will set the mix for the wheels and the special function for the weapon. Then we activate the “Simple Tank” and then select the channels we want to use for the “Throttle” and “Steering” accelerator. If we have the radio control in Stick Mode 2, we have asacceleratorChannel 2, and channel 1 for steering. The special function that allows us to directly control the ESC with the springless stick of the radio control (i.e., channel 3) is a “Direct link to channel.” So we activate the first by pressing “Enable” and select

channel 3.




11. Now that we've generated the outputs, we can assign them to the FAC's physical connections. On the left side of the interface, we have the Preview and the Mapper. Within the mapper, we can associate the Special Functions and Mix outputs with the FAC's actual connections. Recalling the requirements, we had: **M1 right engine**, **M3 left engine** and **servo 1 connected all'ESC del motore brushless**. So on the M1 drop-down menu we select right motor (Motor right), on M3 we select left motor (Motor left), finally on S1 "Direct Link to CH. 1", the unused ones should be set to "Disabled". The connections on the preview should have been updated. To choose to display an ESC with motor instead of the servo, we can select "ESC 1" from the drop-down menu at the bottom (these two menus only set the graphics, nothing else).




12. Now, as before, click on "Test settings" and if all the motors are turning correctly, you can press "Save to FAC". Otherwise, if the motors

aren't turning correctly, you can reverse the rotation in the “Servos & Motors” tab by clicking on the “Reverse” option for the desired motor and then test the settings again. I recommend enabling breaking on the DC motors used, so you have greater control over their speed.

13. Now you have the FAC set up correctly and ready to fight inside your robot!

# Questions and Answers (Q & A)

**Q.** I've set up the Tank Mix channels and motors correctly on the Mapper, but when I try to move forward, the robot spins. Should I swap the steering and throttle channels?
**A.** If you're sure you've selected the steering and throttle channels correctly, the problem is that one of the wheel motors is rotating backwards. Swap one of them in the "Servos & Motors" tab and you should be fine.

**Q.** The FAC tool freezes after connecting and won't read data from the FAC. Is the FAC broken?
**A.** No, the FAC isn't broken. For safety's sake, the FAC won't activate until it reads valid values from the receiver, so if the remote is off, the FAC won't turn on. Turn on the remote and make sure the receiver is connected. The FAC should play a song from the DC motors, and then the FAC tool will read the data.

# Information on the document

This manual was written by **Floppy Lab™** to provide information on the use and functionality of the FAC.

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Last modified 3/1/2026