Magic Sorter 3.0 User's Guide

Davide Tampellini

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Abstract

This book covers the use, configuration and troubleshooting for Magic Sorter machine.

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Chapter 1. Introduction

1. Product details

Title: Magic Sorter

Manufacturer: Fabbrica Binaria s.a.s. viale Luigi Cadorna 13, 51016 Montecatini Terme, Italy

Contacts: info@magic-sorter.com

EEE group: 3 (IT and/or telecommunication equipment), Device use: indoor only

Power supply: 90-135 VAC / 200-240 VAC (50-60 Hz)

Working temperature range: 18° - 38° C, indoor use only

Working humidity: 85% or less

Disclaimer

Failure to read the handbook may lead to personal injury, inferior results, or damage to the machine. Always ensure that anyone who operates the machine knows and understands the content of the Manual. We cannot control the conditions in which you assemble or operate the Magic Sorter. For this, and other reasons, we do not assume responsibility, and expressly disclaim liability for loss, injuries, damage, or expense arising out of, or in any way connected with, the assembly, handling, storage, use or disposal of the product. The information in this manual is provided without any warranty, expressed or implied, regarding its correctness.

Safety instructions

Warning

Please be very cautious during any interaction with the machine, the machine is an electrical device with moving parts

1. The device is for indoor use only. Do not expose the machine to rain or snow. Always keep the machine in a dry environment at a minimum distance of 30cm from other objects.
2. Always place the machine on a stable place, where it cannot fall or tip over.
3. The machine supply is household power outlet 230 VAC, 50Hz or 110 VAC / 60Hz. Never connect the machine to a different power supply; it may cause malfunction or damage to the machine.
4. Place the power cords so you cannot stumble on them or step on them, otherwise expose them to any potential damage. Also, make sure that the power cords are not mechanically or otherwise damaged. If so stop using damaged power cord immediately and replace it.
5. When you disconnect the power cord from the socket, pull the plug rather than the cord to reduce the risk of damage to the plug or the AC outlet.
6. Never disassemble the machine power supply; it does not contain any parts that could be repaired by an unskilled worker. All repairs must be performed by a qualified technician.
7. Do not reach inside the machine while it is still in operation. An injury may be caused by its moving parts.

8. Prevent children from unsupervised access to the machine even when the machine is not operating.

9. Do not leave the machine unattended while it's still on!

Chapter 2. Unboxing

1. Tools and room requirements

Note

Do you prefer a printed version of this guide? You can download the PDF version here [http://www.magic-sorter.com/images/assets/magic_sorter.pdf]. Please note that instructions will be updated frequently, so always double check with the online version if you're in doubt.

Magic Sorter doesn't need any special tools for maintenance, you only need a screwdriver and a pair of pliers. Other required tools (such as Allen keys of different sizes) are already included inside the package.

Metric vs Imperial

Magic Sorter is built using the metric system, so all parts (screws, bolts etc etc) are in metric. Most of the screws have a Philips head, so it really doesn't matter which system you're using, but some of them need an Allen key. Having a set of keys in metric will be useful, however if you need to perform some fixes on the fly, you can try to use a replacement. Here [https://handtoolessentials.com/blog/tools/hex-key-conversions-allen-wrench/] you can find an useful conversion table.

Please keep in mind there are some other requirements:

Internet Connection

The whole recognition process is performed in the cloud: Magic Sorter will take a picture, upload to the remote server and fetch back the results. This will allows us to easily update the database as soon as a new set is released or to push updates to all users with new features and bug fixes.

Required space

The machine has a dimension of 75cm x 65cm and it's 40cm tall, you'll need some extra space for better handling around the machine.

USB Keyboard

This is not a "real" requirement, but it's a "nice to have" piece of hardware. If anything goes wrong with the touchscreen interface, it's very helpful to have a proper input on the Raspberry, so you can fix everything without waiting for a patch.

MicroSD card reader

Again, this is a "nice to have" tool. If for some reasons you need to reset your installation, you can always flash again your SD card from scratch.

Power supply

The power adapter can handle an input of 110V or 220V, however please note that you might need a plug adapter for your country.

We can provide European Type C [https://www.iec.ch/worldplugs/typeC.htm] / Type E [https://www.iec.ch/worldplugs/typeE.htm] plugs or the US ones. If you need a different one, you can use a plug adapter or replace the power cord.

2. Unbox and setup the machine

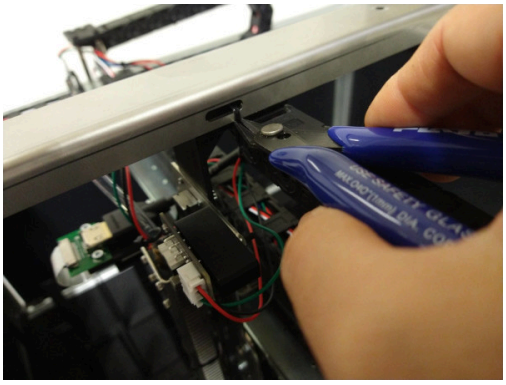
Magic Sorter will arrive assembled, but you'll have to remove some parts placed to protect the machine during transport: it's a pretty stiff machine and it comes with a lot of packaging, so it should survive even rougher couriers. On the other hand, I've seen drivers been very rough on packages (especially larger ones), so before continuing double check that there isn't any damage.

If you need to change or fix anything, please get in touch, so we can give you precise instructions (and if possible a video guide) on the steps you'll have to follow.

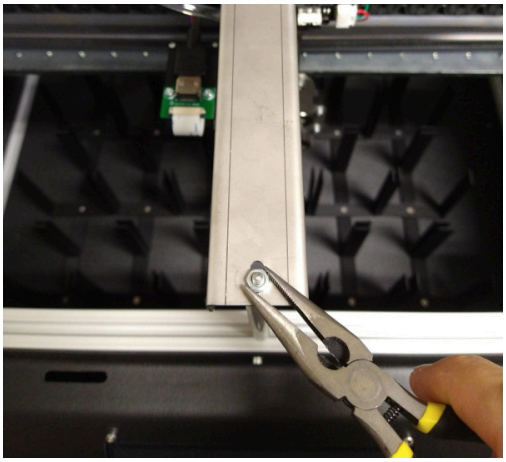
2.1. Remove top protection bar

To protect the machine from hits, an horizontal bar is placed on the top, right under the cover. This is just a temporary object used for protection, you need to remove it before starting to use the machine.

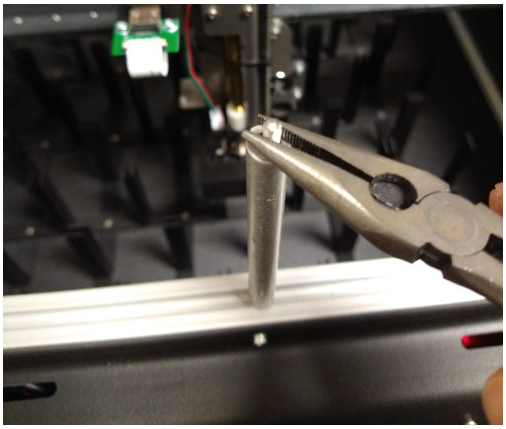
First of all, cut the zip tie that is holding the head locked in place.



Then remove the bolts that are securing the bar on the two small tube sections on the top.

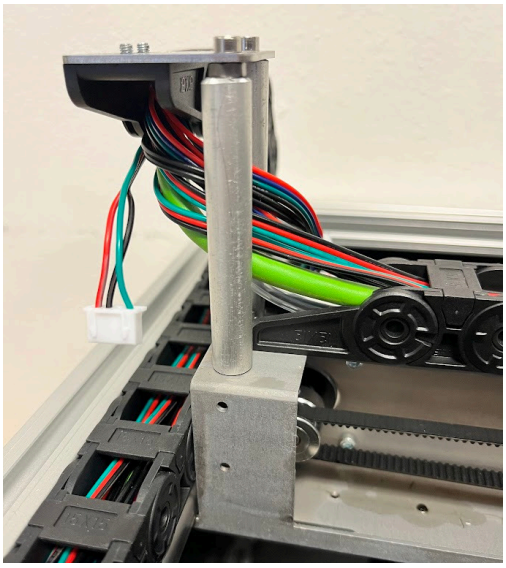


Finally, remove those sections as well. They are held in place by some T-Nuts, you simply have to unscrew the threaded rod to free them from the frame

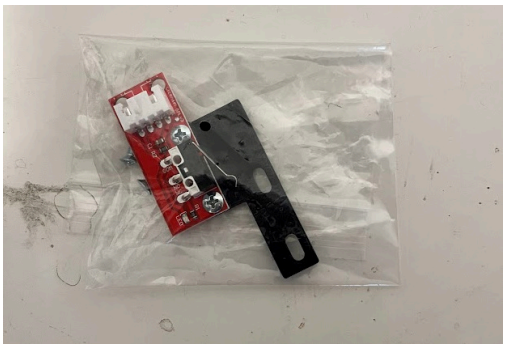


2.2. Attach X axis endstop

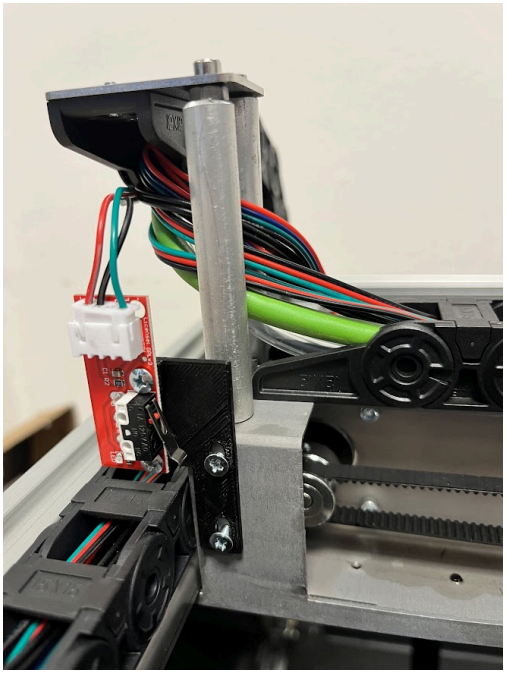
To avoid damage to during transit, the endstop for the X axis is not attached.



You can find the endstop in the spare box, attaching it is very easy: simply tight the two screws inside the threaded holes and you're good to go.

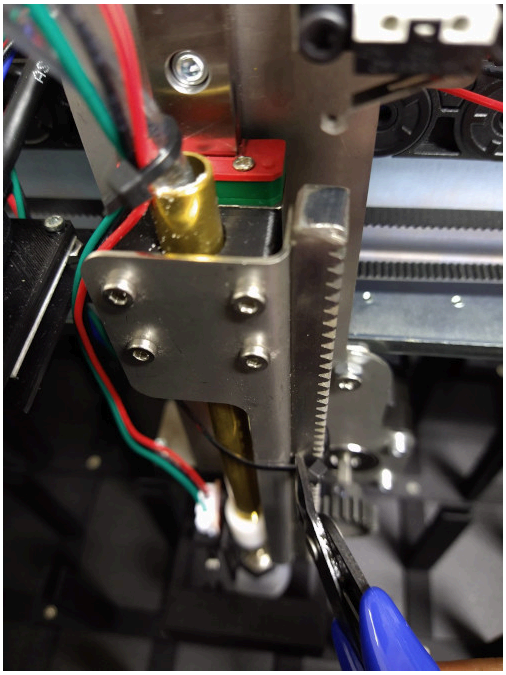


Before running the machine, double check that the endstop doesn't hit with the drag chain below and that the camera support can easily click on the lever.

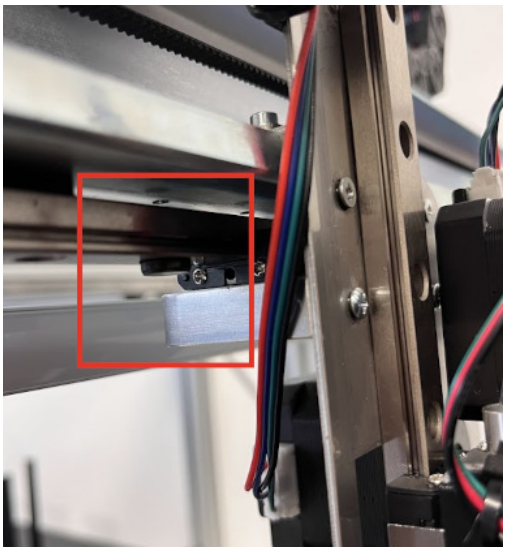


2.3. Free all the axis

Finally, cut the zip tie that is holding the suction cup raised.



Double check if there are any plugs on the X axis: we're using them to avoid the head to move too much during shipping. If they are present, please remove them.



Now the machine is good to go. Please double check that you can freely move every axis in the every direction. It's normal to feel some resistance since you have to move the idle motors.

2.4. Initial troubleshooting

Magic Sorter is carefully packaged, but couriers could (and will!) use a rough hand to handle packages, especially large boxes like this one. Fun fact: some time ago, a customer reported that the courier was delivering the unit by rolling it over on the sides...

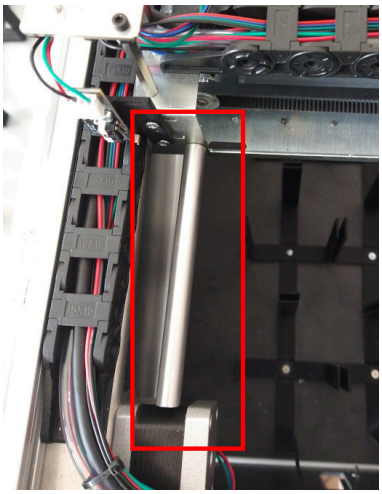
Inside the package you'll find a box with replacements for each plastic part, so you should be able to easily replace them in the unlucky scenario where something broke; simply drop an email and we will assist you in the process.

Another big enemy of assembled machines are vibrations: no matter how much a screw is tightened, they will eventually come loose. This is why every important screw is coated with thread-locking: it will prevent them to come loose, but you'll still be able to unscrew them in case you have to.

Checking for central bar being squared

During transport it could happen that the central bar moves a little, ending up being not squared anymore. If it's just a couple of millimeters, it's not a big deal; if it's more, it could affect the movements. You can easily check if the bar is squared by using the spacers you removed before and check if they both get in touch with the central bar.

If only one is touching, gently but firmly pull the other end, until it gets back in position.



Stuck vacuum pump

If the machine has been idle for some time, it could happen that the seal around the vacuum cylinder gets stuck. Magic Sorter performs some reset movements before starting an Organize command, however in some cases that's not enough.

When this happen, you would hear some noises coming from under the cover. The quickest way is to let the machine run, even if it can't properly create the vacuum; after few attempts it will free itself and everything should start working as expected. Restart the execution and you would be good to go.

If it's really stuck, don't worry, you can manually fix it. Open the bottom section of the cover, the vacuum pump is on the left. Manually turn the small arm holding the vacuum cylinder, after a couple of turns everything should be working again.

Rack and pinion not in contact

Sometimes is happens that during transport the rack is no longer in contact with the pinion. This happens because the four mounting holes that are holding the rack are a little larger to allow some adjustment, but it's very easy to fix. First of all, move the head all the way up, then push the rack against the pinion again. That's done!

If you feel that the rack is a little too lose, you can try to tight the upper screws a little, maybe they got loose due to vibrations during shipping.

Chapter 3. Configuration

Magic Sorter comes almost ready to be used, however there are some steps required to properly configure it for the first use.

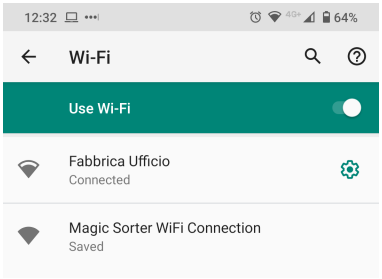
1. Configure Wi-Fi connection

In order to function properly, you'll have to provide Internet connection and access details to the recognition service. If Magic Sorter detects that it can't connect to the Web, it will automatically turn into an access point, so you can connect to it with your smartphone and provide the requested info.

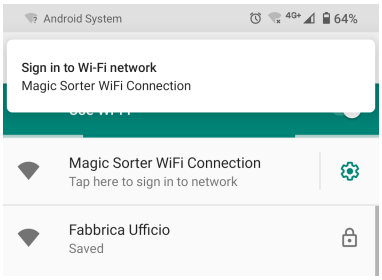
Let's take a look at the whole process step by step.

Connect to Magic Sorter Wi-Fi network

If no Internet access is found, Magic Sorter will automatically create a new Wi-Fi network with the name **Magic Sorter WiFi Connection**. With your smartphone, open the Wi-Fi section and identify it

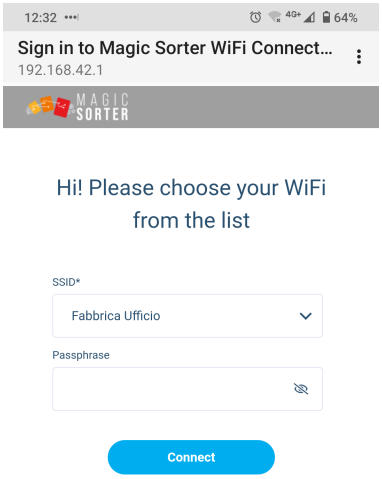


Tap on the network, a notification should be displayed to sign-in

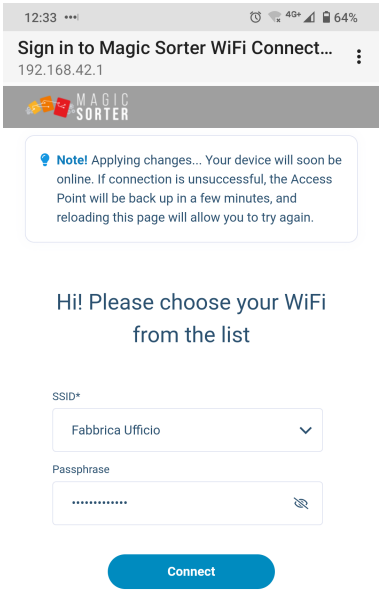


Provide connection details

A new screen should popup, from the dropdown list select the WiFi network you plan to use, fill in the password and submit the form. Those details will be passed to Magic Sorter, that will be used to connect to Internet.



If everything went fine, you'll be online in few moments; if it can't connect (for example wrong password), the Magic Sorter WiFi connection network will show up again and you can try again.



If you notice that every time you boot the machine you have to provide Internet access, most likely the culprit is the router. Sometimes it's not able to assign a new IP address, usually rebooting it fixes the problem, since it will empty the pool of unused IP addresses.

Chapter 4. The interface

The machine is provided with a touchscreen, where you can issue commands and review the system settings

1. Navigation bar

On the left there is the navigation bar that will let you choose different sections of the interface.

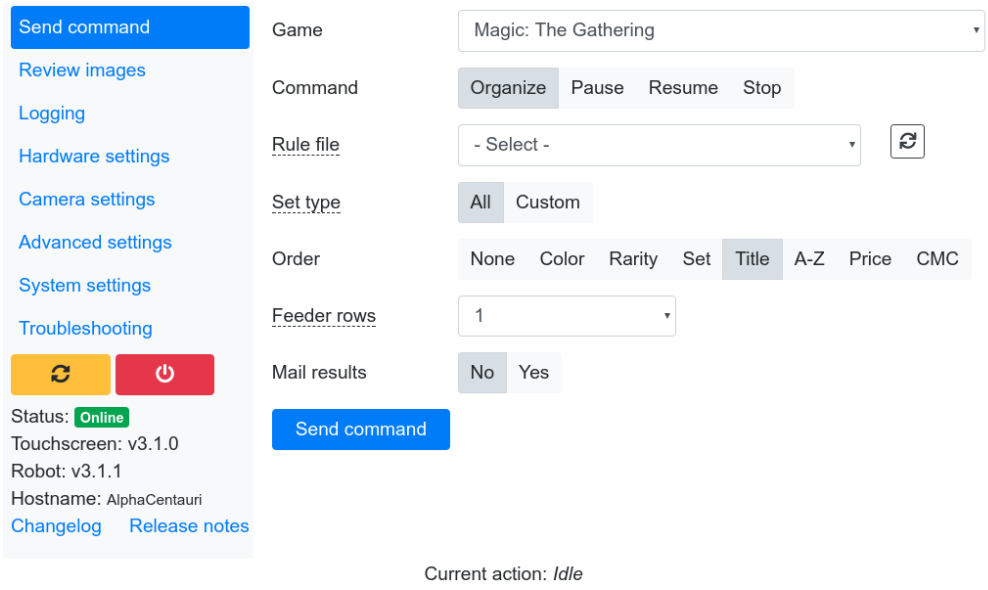
In the lower corner you'll find the version numbers currently installed and 3 buttons. From left to right, top to bottom, this is their function.

Reboot the machine	Reboots the machine (both the Raspberry and the sorting machine)
Shutdown the machine	Shutdown the machine

Below them, there's a link to the changelog to review the latest features and bugfix as well as a link to the Release Notes.

Finally, at the bottom of the screen there's a status message that informs you what's the current action performed by the machine.

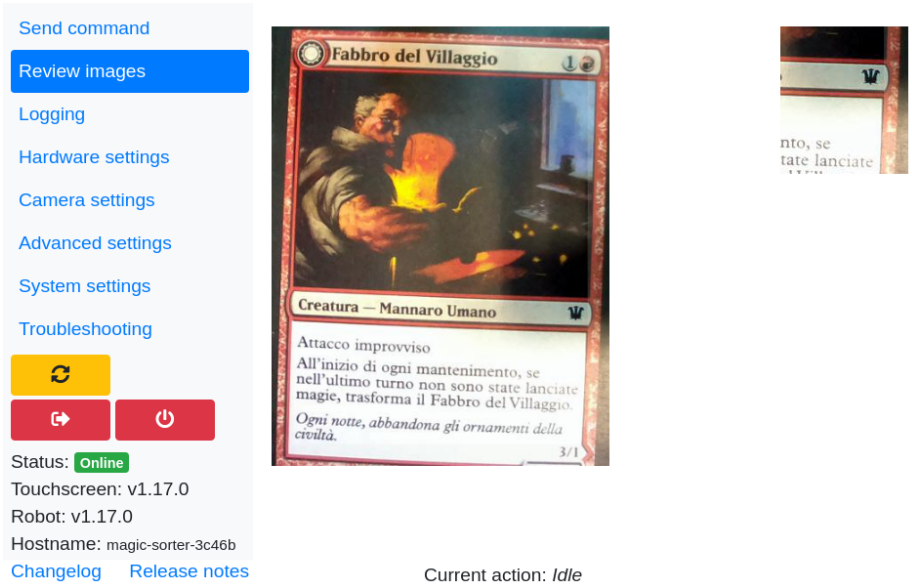
2. Commands



This will be the most used section of the interface. Here you can issue commands to machine, starting and stopping any sorting job. Currently you can issue the following commands:

Organize	Will start a new sorting job, accordingly to the ordering rules you set
Pause	Pauses the execution of the Organize command
Resume	Resumes the execution of a paused command
Stop	Stops everything

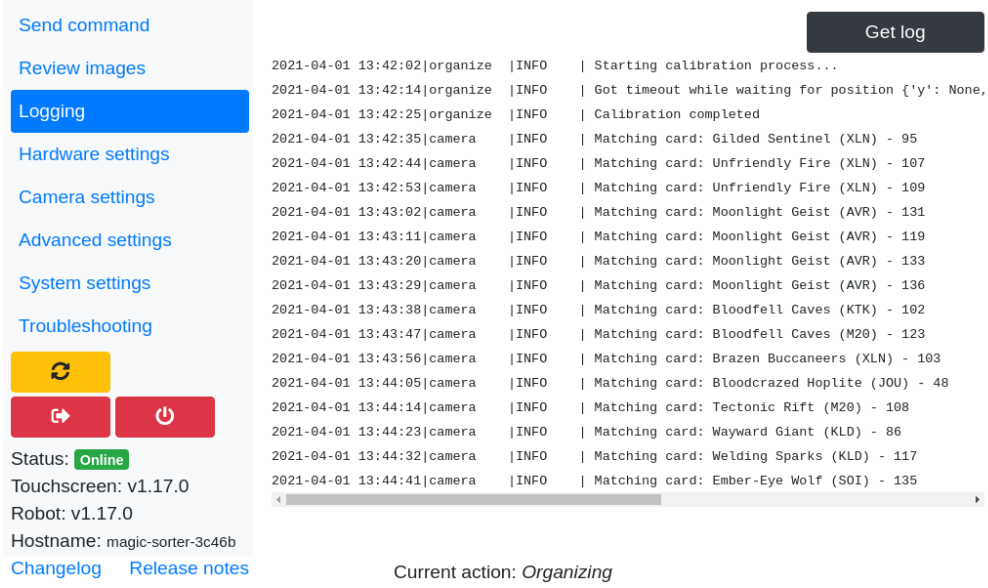
3. Review images



Here you can review what the camera is actually seeing and the images that are sent to the remote server. Please double check that your images are sharp and there isn't any direct light causing reflections on it, otherwise your detection rate will drop.

On the left there is the image used for card recognition, on the right there is the image used for set recognition.

4. Logging



During the sorter process, a detailed log will be produced. You'll find all the actions the machine is performing, including any unexpected values. This is useful if you want to review what's happening or you need to debug issues.

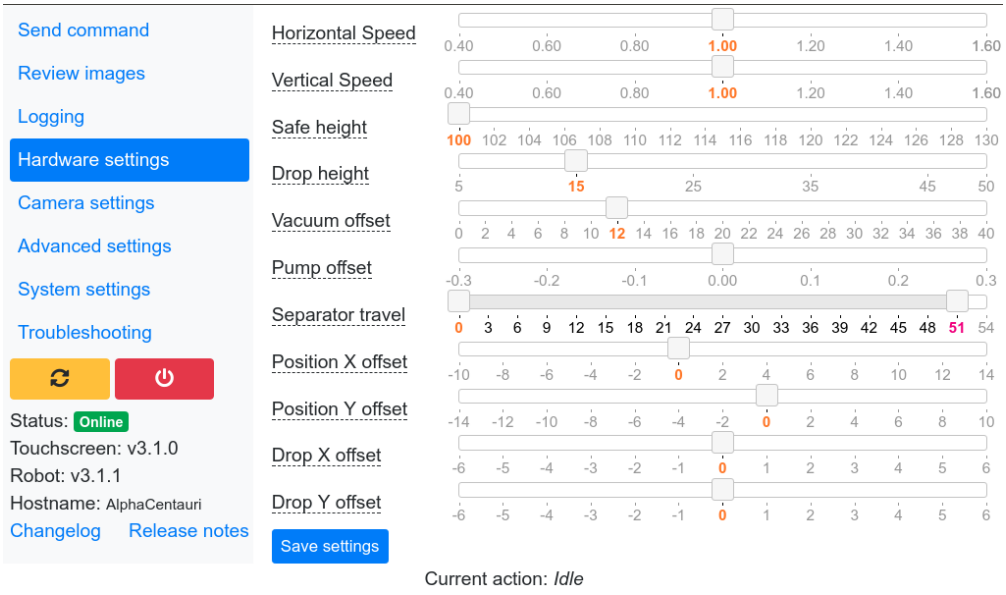
While matching cards, you will find the name of the card, its set and the matching score. This is really useful when you are troubleshooting illumination issues. The minimum score is 5, there is no maximum. Below you can find a breakdown of the meaning of the score:

- 30 - 40 Poor
- 40 -70 Mediocre
- 70 - 100 Good
- 100+ Very good

If near the set code there's a small question mark (?), it means that the set recognition service wasn't able to correctly detect the set, you should double check your Camera Settings and be sure that the set icon is inside the small rectangle in the Review Images tab.

The Get Log button will email the log file back to your email address, so you can submit it to tech support.

5. Hardware settings



In this section you can find several parameter to tweak your machine behaviour. Usually default values should work out of the box, but sometimes you might have to adjust some settings.

Be careful!

With great power comes great responsibility! Using the wrong value could cause harm to your machine! If you're in doubt, ask to tech support first.

Horizontal speed
: This option controls X and Y speed of the machine (left/right, back/forth). If for any reason the machine is not working at the expected speed, you can slow it down or speed it up.

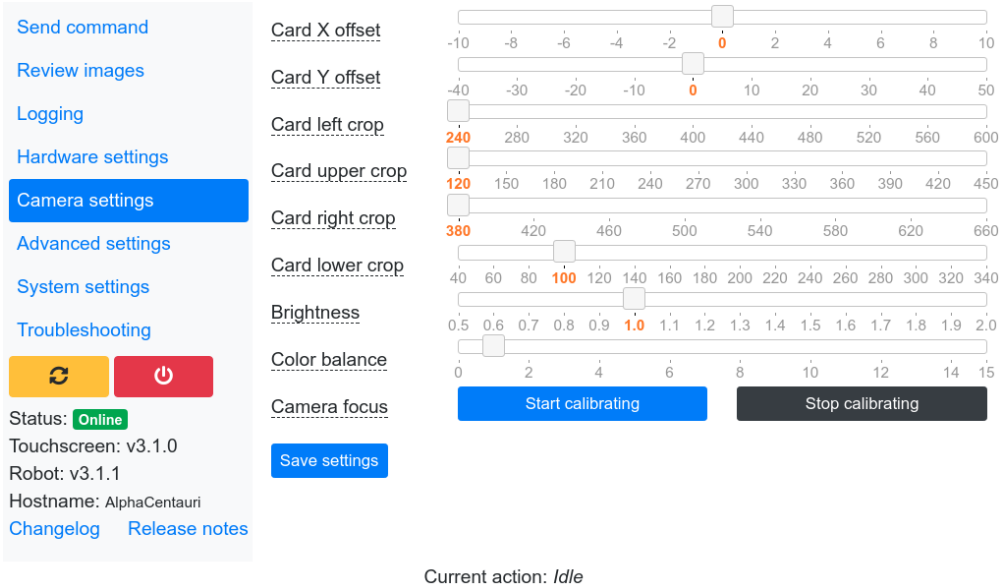
Vertical speed
: This option controls Z speed of the machine (up/down). You can tweak this parameter to better grab the cards and let drop any stuck card, you can slow it down or speed it up.

Safe height
: This is the height the machine will get back to avoid hitting the dividers and to bend the cards against the "separator" piece. Do not set it too low or you'll break everything!

Drop height
: This is the height the head will reach when dropping the card. You can set a lower height if you see that cards are not falling in the correct position

Vacuum offset	Sets the distance between the suction cup and the pile of cards, you can increase the value so the head will push harder against the cards.
Pump offset	Used to adjust the swing of the vacuum pump. If you hear that the vacuum pump is always hitting against the physical endstop, you should set it to a lower value
Separator travel	Adjust the swing of the dynamic separator
Position X offset	Offset to apply to the X axis (left/right) while picking up the cards from feeder positions. In order to avoid issues (sticking or dropping cards), the suction cup should pickup the card in the centre. This value will help you to correct any little build misalignment.
Position Y offset	Offset to apply to the Y axis (back/forth) while picking up the cards from feeder positions. In order to avoid issues (sticking or dropping cards), the suction cup should pickup the card in the centre. This value will help you to correct any little build misalignment.
Drop X offset	Offset to apply to the X axis (left/right) while dropping cards into destination buckets, adjust it if you see cards scraping too much while delivering them at destination.
Drop Y offset	Offset to apply to the Y axis (back/forth) while dropping cards into destination buckets, adjust it if you see cards scraping too much while delivering them at destination.

6. Camera settings



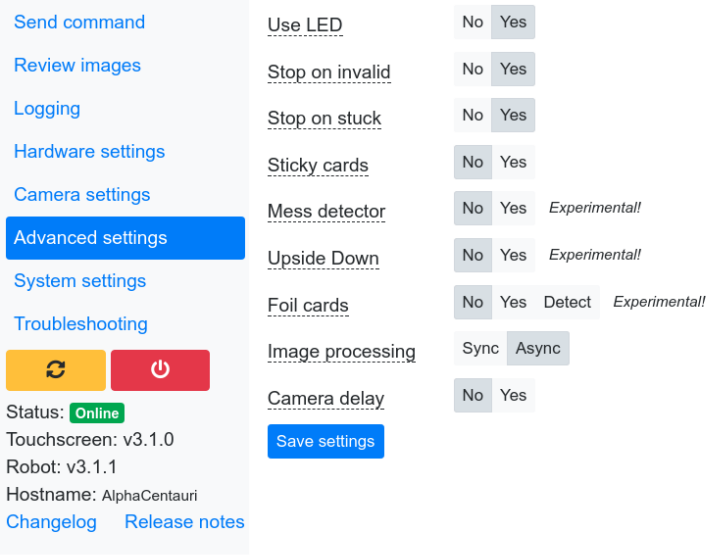
Believe it or not, this is the most important section of the whole machine. Here you'll configure the camera to take optimal images and increase your detection rate

Card X offset	Horizontal offset to apply to take a photo, usually used if the set icon is covered by the separator
Card Y offset	Vertical offset to apply to take a photo, usually used to reduce light reflection from the LED bar
Card left/upper/ rigt/lower crop	The image is too wide for processing, since it will take several positions at once. To avoid issues, you should crop it and remove any unnecessary parts from the image (for example other positions or the pick and place system)
Brightness	If the images are too dark, you can try to enhance the brightness using the software. Do not abuse this feature, since too bright images aren't good for the recognition engine

Color balance — In some light conditions, you can see a kind of "stain" applied to the image, resulting in distorted colors. Turn on this features to automatically correct the color balance (usually setting it to 2-3 is enough)

Camera focus — Those buttons will trigger or stop the calibration mode for the camera.

7. Advanced settings



In this section you can find the more advanced features:

Use LED — Should built-in LEDs be used or not? You can turn it off if you notice they are causing some issues

Stop on invalid — The machine will automatically stop after 10 invalid cards in a row; here you can disable such behavior

Stop on stuck — The machine will automatically stop after reading the same exact card 20 times in a row; here you can disable such behavior

Sticky cards — Sometimes cards tend to stick together more than they should, for example fresh packs or cards that were under pressure for a lot of time. Once you enable this option, the head of the machine will perform several extra movements to double check that no extra cards remain attached to the bottom of the card that is being removed

Mess detector — Sometimes cards could fall out of place, by enabling this feature Magic Sorter will take a picture and double check if the underlying position is in a clear state or something bad happened. In that case it will consider the position as "empty" until you pause or stop the machine.

Please note that when enabled the speed will be lower since the machine has to wait for the answer from the remote server before moving, it will automatically switch the **Image Processing** behavior to **Sync**

Upside Down — When enabled, the machine will try to understand if the image is upside down and automatically turn it for you. This should make your life easier and avoid you to manually adjust all the cards while loading the machine

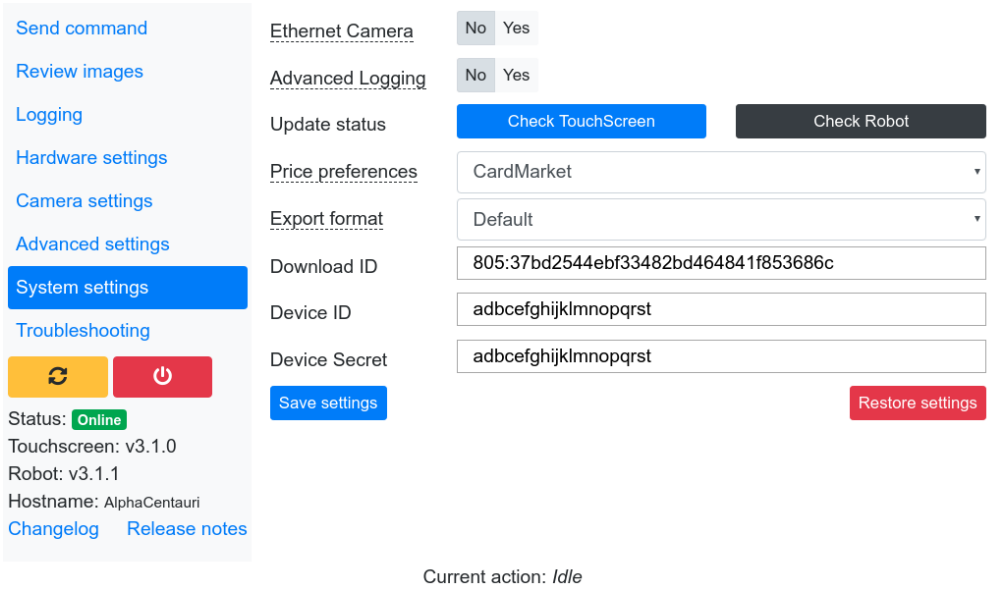
Foil cards — Here you can specify if current cards are all foils, normal or Magic Sorter should try to detect them. Please note that detection is performed using an algorithm, so there could be some inaccuracies.

Image processing
: To cut down waiting time, Magic Sorter will start to grab the card after it took a picture of the card. Usually the answer from the remote server will come back before the card is fully raised, so the arm already knows where to go. On very slow Internet connections, you could end up with the machine waiting for the result with the card raised up in the air. If it takes too long to arrive, the card could drop down.

  In such cases, you can switch the behavior to SYNC, so Magic Sorter will wait until the response from the remote server has arrived before getting in touch with the card.

Camera delay
: Sometimes it could happen that the camera is taking a photo "too soon" while the head is still moving. Forcing a small delay fixes the issue.

8. System settings



This section will let you customize your machine for best results.

Ethernet camera
: Enable this option if you're using the Ethernet cable as camera extender

Advanced Logging
: When enabled, the machine will produce a more verbose logging, useful for troubleshooting issues. You must reboot the machine for changes to take effect

Update status
: Magic Sorter will automatically fetch new updates at startup. You can force version check by clicking on the buttons

Price preferences
: From which site you want to fetch the prices?

Export format
: Choose the format for the CSV results file. More info here

Download ID
: Here you will find the Download ID used to fetch the latest updates

Device ID - Device Secret
: Those are your keys used to access the recognition service

Each time you save your settings, they will be uploaded to the API server, so you will have a backup copy. This is useful if somehow you have to reflash your SD card, you won't loose your configuration, you can simply restore it by clicking on the **Restore Settings** button.

Chapter 5. General Usage

Now that your machine is correctly assembled and configured, you can start using it!

1. Placing the cards

Cards should be placed in the first row, face up, with the image towards the inside of the machine. We're going to call these positions "feeders", since this is from where the cards will be picked up and moved to destination.

Before placing the cards you want to organize, you must put a "The End" card in each feeder. That will act as a "stop token" to tell the machine that it should consider the position empty and ignore it.

Empty all destination positions before use!

Each time you start an Organize command, Magic Sorter will assume that all destination positions are empty. If there are any leftover from a previous run, the machine won't know about it. This could cause some side effects like the head hitting the stack of already sorted cards or cards "overflow" position capacity since there are too many items in one place.

To prevent issues, please remove all cards from destination positions before starting a new sorting run.

2. Organize the cards

Currently the cards can be organized using the following rules:

Magic: The Gathering

- Color
- Set
- Title
- A-Z (initial only)
- Price

	• Rarity
	• CMC (Converted Mana Cost)
	• No sorting (scan only)
Flesh and Blood	• Class
	• Title
	• A-Z (initial only)
	• Rarity
	• No sorting (scan only)
Pokèmon	• Type
	• Set
	• Title
	• A-Z (initial only)
	• Price
	• Rarity
	• No sorting (scan only)
Yu-Gi-Oh!	• Type
	• Set
	• Title
	• A-Z (initial only)
	• Price
	• No sorting (scan only)
Lorcana	• Rarity
	• Title
	• A-Z (initial only)
	• Price
	• No sorting (scan only)
Digimon	• Set
	• Title
	• A-Z (initial only)

- Price
- No sorting (scan only)

One Piece

- Color
- Title
- A-Z (initial only)
- Price
- No sorting (scan only)

While organizing, you can tell if you want a report sent by email or not. Usually this is useful if you're scanning a bunch of cards for the first time or you're handling them again. In the first case you're interested in having a digital list of all the cards, in the latter, you only want to physical sort them.

What happens if a position is filled?

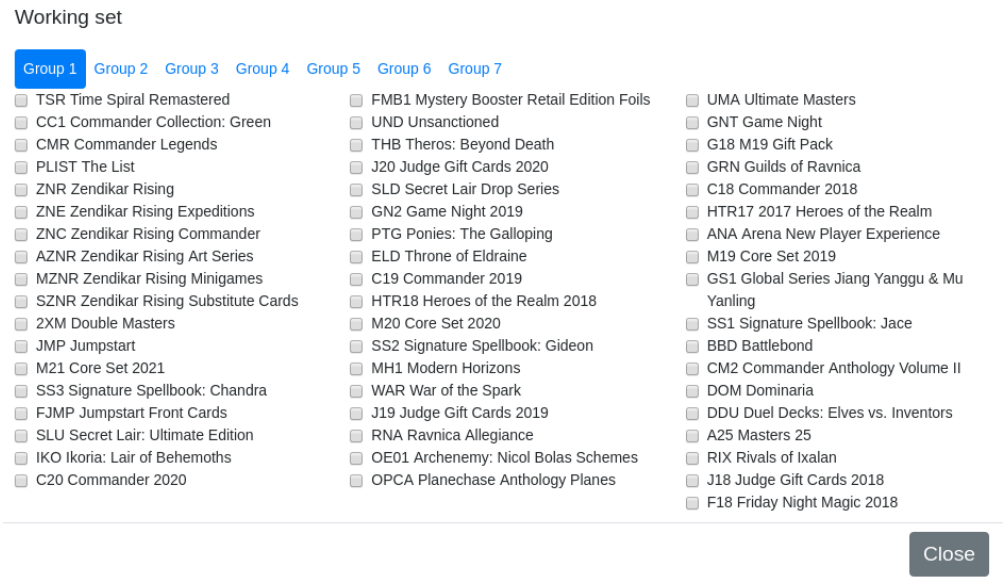
Each position can hold up to 250 cards (roughly). If you get more than that, the machine will automatically fetch a free one from the available ones, assign the same sorting criteria (ie **Only Green Cards**) and move on.

Create custom rules

Do you need something more advanced? Take a look at the Custom Rules Engine section, where you can create files containing your rules and save them.

Specify the working set

If you're working only on specific expansions, you could specify them to obtain better accuracy, increased speed and avoid set mismatches.



Let's analyze all the available rules and see how they can be used.

2.1. Sort by color

Number of feeders: 6-12

Games: Magic: The Gathering

Applying this rule, the machine will sort the cards by color, placing them in the following order

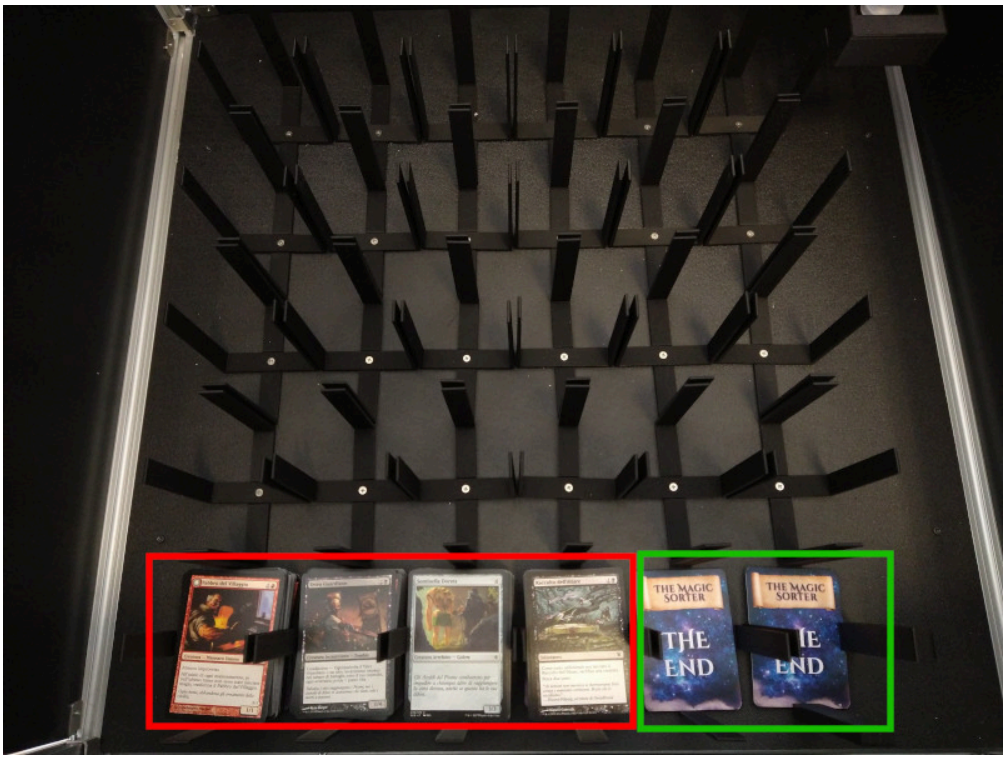
1. Multicolor
2. Red
3. Blue
4. White
5. Black
6. Green
7. Artifacts
8. No color
9. Cards not recognized

This rule is usually handy when you want to split a large collection or a new box into something smaller.

2.2. Sort by title/set/A-Z (sort by initial)

Number of feeders: 4

Games	Sort by title or A-Z: All games
	Sort by set: Magic The Gathering, Pokèmon, Yu-Gi-Oh!, Digimon



Positions marked in red are the starting ones, positions marked in green are the "spare" ones.

This is a special sorting: the machine will try to group cards with the same name, set or initial letter and place them all in the same position. When all positions are occupied, any new card will be placed in the spare feeders. Once the cards in the starting positions are finished, Magic Sort will process the ones in the "spare" positions: each card will occupy a position, if there are no positions left, they will be placed in the free feeders and so on.

You might have noticed that on each round, cards are placed *on top* of the previous ones. This is by design and it's a trade-off between speed and usability: when the whole process ends, in each position you'll have different cards, but they will be grouped by title/set. In this way you can simply pick them all up and easily divide them as you want.

If you don't like this behavior, you can simply turn it off by setting the option **Layer Sorting** to **Disabled**.

Please note that while sorting by title or by initial, Magic Sorter will work on the **English** name of the card, regardless of the actual language of the card.

2.3. Sort by value

Number of feeders	6-12
Games	Magic: The Gathering, Pokèmon, Yu-Gi-Oh, Lorcana, Digimon, One Piece

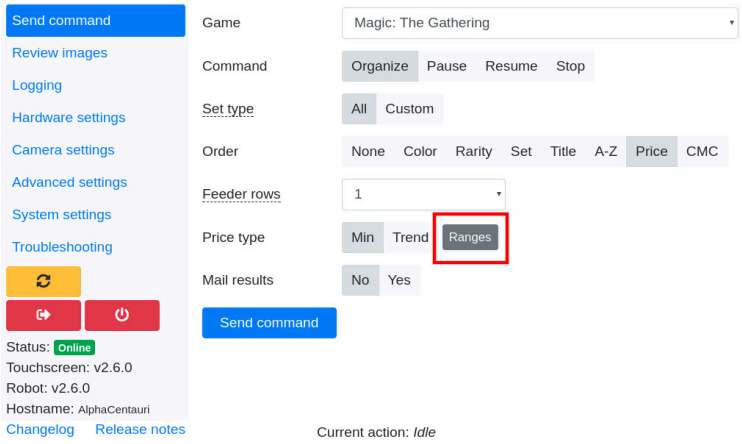
Cards will be divided by price, fetched from the digital e-commerce you chose:

1. More than 10 €/USD
2. Between 5€/USD and 10 €/USD
3. Between 2.50 €/USD and 5 €/USD
4. Between 0.50 €/USD and 2.50 €/USD
5. Between 0.10 €/USD and 0.50 €/USD
6. Less than 0.10 €/USD
7. Cards not recognized

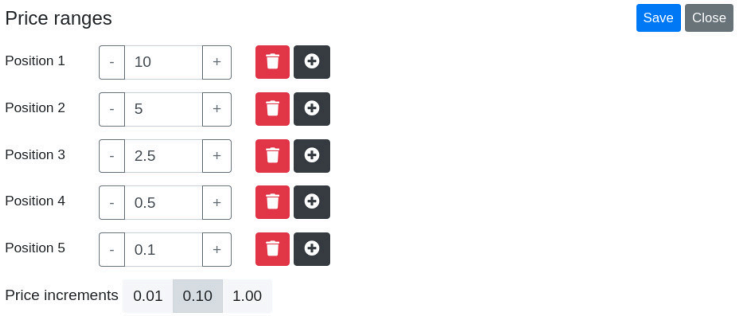
This is useful when you want to find something valuable inside a large collection.

2.3.1. Custom ranges

If you're not satisfied by default price ranges, you can always create your own! After selecting the **Price** option, click on the **Ranges** button



A new modal will open, where you can configure your own ranges



You can use the buttons to create a new range, modify its value (use the increments you select below) or delete it. Referring to the above image this traduces in:

1. More than 10 €/USD
2. Between 5€/USD and 10 €/USD
3. Between 2.50 €/USD and 5 €/USD
4. Between 0.50 €/USD and 2.50 €/USD
5. Between 0.10 €/USD and 0.50 €/USD
6. Less than 0.10 €/USD

Please note that there are some constrains that should be observed:

- **Ranges should be in order** They can go from high-low or from low-high, but they should be in sequence. For example 10-5-1 or 1-5-10 is OK, but 10-1-5 is not
- **No 0 position** Do not add a position for invalid or for cards below the latest range (referring the image above, it would be the range 0.10 - 0.00). Magic Sorter will automatically do that

2.4. Sort by Converted Mana Cost

Number of feeders	6-12

Games Magic: The Gathering

Cards will be divided by CMC (Converted Mana Cost), you can choose two type algorithms to separate the cards:

1. **First come first assigned basis**. When Magic Sorter finds a new card, it will check if its CMC has been already assigned to a position. If not, the first available one will be used. It's slightly faster, since more frequent values will be closer to the feeder row, but you will end up with piles not in order
2. **Fixed positions** Each position will be assigned a CMC, from 0 to 8 (or more). It's slightly slower, but piles will be in order

2.5. Sort by Type

Number of feeders 4

Games Pokèmon, Yu-Gi-Oh!

Magic Sorter will divide cards by their type, ie "Trap Card" or "Ritual Monster" for Yu-Gi-Oh! and "Darkness" or "Grass" for Pokèmon.

2.6. Sort by Class

Number of feeders 6-12

Games Flesh and Blood

Cards will be divided accordingly to the Hero class they belong to.

2.7. No sorting

Number of feeders 6-11

Games All

This rule is used when you have your cards already sorted, but you want to have a digital collection. The machine will simply take a picture of the card, recognize it and then it will be placed down one row lower, in the same column.

3. Receiving the results

Results are emailed back to you using the address you provided during the registration. Attached to the email you'll find a file in CSV, you can specify the format inside the System Settings tab; you can read more about the available formats here.

Chapter 6. Advanced usage

In this chapter you will find some info about advanced usage of your Magic Sorter machine.

1. Custom Rules Engine

The main logic behind custom rules is to create an INI file where you can specify all the settings, store it somewhere and then select it when you want to start an organize command. Once the INI file is ready, save it in the Shared Folder of your machine, it should appear in the field Rule File displayed on the Send Command tab.

Tip

Heads up! If you have troubles crafting the rules by hand, you can use our Rules Generator [https://www.magic-sorter.com/rules-generator]. Creating them manually is more powerful, since you can fine tune even the small details, but the interface should be able to cover your basic needs and get you started.

1.1. File format

Each file is made of a **[general]** section where there are several options defined. A file **MUST** always have the `title` and the `game` variables, if you want to use one of the ready to use rules (see below), you have to add the `rule` variable and the rule you want to apply.

```
[general]
title=My rule
game=list of games, leave blank for all games
```

Mind the syntax!

INI files are a bit pesky about the syntax: if it's not 100% correct, you get a parse error and the file can not be used (and yes, we know it's a pain. An interactive builder is under development, so hang in there). For example, the following syntaxes are NOT valid:

- `[ general]` Leading space between [and the name of the section
- `[destination_1 ]` Trailing space between the name of the section and]
- `title= My rule` Space between the equal sign and the value of the variable
- `title = My rule` Space before and after the equal sign and the value of the variable

When in doubt, simply copy and paste the example in documentation and then change only the sections you have to

1.2. Off-the-shelf rules

While you can create custom rules, Magic Sorter directly out of the box supports some specific rules. You only have to set the rule in the general section of the INI file and it will do the rest, creating the destination positions for you.

1.2.1. Interesting cards

With this rule you'll be able to define a list of cards marked as "interesting", Magic Sorter will set them aside.

```
[general]
```

```
title=Interesting cards
game=mtg
file=interesting.csv
rule=interesting
multiple_rows=1
```

If the field **multiple_rows** is present and has the value 1, it means that two rows will be used (like we do in sorting by Color, for example).

The list of cards that are flagged as "interesting" should be a CSV file placed in the public shared folder, too. The structure is the following:

```
set,title,num
XLN,Ravenous Daggertooth,202
M15,Verdant Haven,206
M20,Pulse of Murasa,189
XLN,Snapping Sailback,208
GN2,Grazing Whiptail,048
UMA,Groundskeeper,168
JOU,Golden Hind,124
ISD,Villagers of Estwald // Howlpack of Estwald,209
ORI,Vastwood Gorger,204
SOI,Equestrian Skill,204
VOW,"Kaya, Geist Hunter",280
```

1.2.2. Group sets

By default, while sorting by set, only one set will go in a specific destination. With this rule, Magic Sorter will fetch all the available sets and divide them into 24 groups, so you'll use the whole plate.

```
[general]
title=Group sets
game=mtg
rule=groupsets
```

1.2.3. Bundles of random cards

This rule will create random bundles in each destinations, ensuring that there are not duplicates (the check is performed on the expansion and the title of the card). You can set a different `amount` to create larger or smaller bundles.

If you want that the check for duplicates is performed against the title of the card only, you should use the option `unique_name=1` .

If you want the machine to stop when all the positions have enough cards in them (even if there are more cards to be processed), you should use the option `stop_on_full=1` .

When you use this rule, the first 6 positions will be used as feeders, all the rest (minus the last one) will be used as destination.

```
[general]
title=Bundle
game=list of games, leave blank for all games
rule=bundle
amount=how many unique cards should be added in each position
unique_names=0 or 1
stop_on_full=0 or 1
```

Example

```
[general]
title=Bundle
game=pokemon
rule=bundle
amount=50
```

1.3. Custom rules

This is a very advanced tool, meant to be used by power users. So be careful, because with great power comes great responsibility! Using this method, you can merge multiple criteria together, sorting your cards on different attributes. For example, you can have all cards with a value above 5$ going to position 1, cards belonging to expansions Ravnica Allegiance, Magic Origins and Crimson Vow Commander on position 2 and then divide the rest by color in different positions.

Experimental feature!

This feature is in its early stages, so there could be bugs or issues! Please report anything strange you see, so we can fix them!

1.3.1. General settings

Under the `[general]` section you can set some options, instead of selecting from the interface. This is pretty handy if you find yourself to select over and over the same options.

Mail results

Option name `sendmail`

Allowed values One of the following digits: `0`, `1`

Choose if you want to receive the results back by mail, default is 0 (No).

Feeder rows

Option name `feeder_rows`

Allowed values One of the following digits: `1`, `2`

Select how many rows you want to use as feeders, 1 or 2 (default 1)

Condition

Option name `condition`

Allowed values One of the following strings: `NM`, `LP`, `MP`, `HP`, `DM`

Sets the condition of the cards you're currently sorting

Set type

Option name `set_type`

Allowed values One of the following digits: `2`, `3`

Choose if recognition should be performed against all the expansions (value 2) or only a restricted list of them (value 3). In the latter case you have to provide a list of sets (see below).

Set list

Option name `set`

Allowed values A comma separated list of set codes, ie: `RNA,ORI,VOC`

If you are restricting the recognition to a custom list of sets, here if where you should provide that list. Please note that you should use the code of the set, uppercase, without spaces.

Language

Warning

This option is valid only while sorting for **Magic: The Gathering** cards

Option name `lang`

Allowed values One of the following values: `auto, en, es, fr, de, it, pt, ja, ko, ru, zhs, zht, he, la, grc, ar, sa, ph`

In this way you'll tell the recognition engine with language you are currently using, if you want it to detect the language of the card, you have to set it to `auto` .

List of interesting cards

Option name `interesting_list`

Allowed values Name of the CSV file in the Public Shared Folder that holds all the cards that are considered "interesting". The format is the same as the one detailed in this section

If you want some destinations to hold only cards that are inside your interesting list (a.k.a. buylist), you have to provide the list here, in the general section. Then, you'll be able to use the Interesting criteria for specific destinations.

1.3.2. Criteria list

Here you can find a list of supported criteria that can be assigned to each position. This is just an initial implementation, with time we will expand the amount of criteria that you'll be able to use.

1.3.2.1. MTG Color

Criteria name `color`

Allowed values One of the following strings: `(empty)`, `land`, `green`, `black`, `white`, `blue`, `red`, `multi`

This criteria applies to Magic: The Gathering cards. Please note that Magic Sorter will check the launching cost of the card, not its color identity. If more than one color is required to launch the spell, it will be considered multicolor. To match colorless cards (for example artifacts), simply leave the field empty.

1.3.2.2. Pokémon type

Criteria name `typepk`

Allowed values One of the following strings: `lightning`, `grass`, `dragon`, `water`, `darkness`, `metal`, `colorless`, `psychic`, `fire`, `fighting`, `none`, `fairy`, `multi`

This criteria applies to Pokèmon cards, cards of the matching type will be put inside the position.

1.3.2.3. Price

Criteria name `price` or `pricetrend`

Allowed values A price range with minimum and maximum values, separated by a comma ie: `0.00,5.00`

If the card has a value within the range you specified, it will be placed inside the position. If you want to create a range without an upper or lower limit (ie everything lower than 5.00$ or anything higher than 10.00$), simply place 0.00 instead of an actual value.

Following the previous example `0.00,5.00` will match everything lower than 5$ and `10.00,0.00` will match everything higher than 10.00$

1.3.2.4. Set

Criteria name `set`

Allowed values A comma separated list of set codes, ie: `RNA,ORI,VOC`

You can put as many set codes as you want, if a card belongs to one of them, it will be placed in that position

1.3.2.5. Rarity

Criteria name `rarity`

Allowed values `common`, `uncommon`, `rare`, `mythic`, `rare ultra`, `promo`, `super rare`, `majestic`, `legendary`, `fabled`

Cards with the selected rarity will be placed in the chosen position. Please note that the list includes rarity levels for the games Magic: The Gathering, Pokèmon, Yu-Gi-Oh and Flesh and Blood.

1.3.2.6. Collector's Number

Criteria name `ccn`

Allowed values An integer range with minimum and maximum values, separated by a comma ie: `1,100`

If card collector's number is within the range specified, it will be placed in that position

1.3.2.7. A-Z (alphabetical)

Criteria name `az`

Allowed values A list of uppercase chars, separated by a comma ie: `A,B,C`

Extra params You can add an extra parameter called `index`. This will be char that is used for sorting, ie `index=0`. This param is 0-based, this means that if you want to sort by the first char you have to use `index=0`, for the second one `index=1` and so on.

Here you can define a list of letters, if the title at the index you specified matches one letter in the list, it will be placed inside the position. By default index is considered equal 0 (sort by first letter), if you want to sort by different letters see the above example

1.3.2.8. Interesting

Criteria name `interesting`

Allowed values — Leave empty, since the list of allowed values will be populated from the CSV file you provided in the General section of the INI file.

Extra params — You can add an extra parameter called `negate`. If you leave it to 0 (`negate=0`), it means that only cards that are inside the list will be placed in this position; if you set it to 1 (`negate=1`), it means that all cards that are NOT inside the list will be placed here.

This is a VERY advanced usage. Let's say you have a list of cards that you're interested into (for example your buylist). You want to place everything that matches your buylist in this position, and leave everything else to the other rules. You can specify the CSV file that holds this list in the general section of the INI file, then everything that matches (or not, if set the option negate to 1) will get in this destination.

1.3.2.9. Popular

> ## There will be dragons!
>
> This is a VERY advanced usage, so keep your time to read it and setup the INI file correctly. Moreover, this feature is available for **Magic: The Gathering** only

Criteria name — `popular`

Allowed values — One of the following strings: `standard, modern, pauper, pioneer`

We will scan for Modern, Standard, Pauper and Pioneer tournament results and note down every deck that finished at least in the top 8 in any decent-size event. From that, we will create a list of played cards. This will allow you to pull out cards that have been used in any of those formats.

1.3.2.10. Language

Criteria name — `lang`

Allowed values — `en, es, fr, de, it, pt, ja, ko, ru, zhs, zht, he, la, grc, ar, sa, ph`

Cards with the selected language will be placed in the chosen position. Please note that this criteria requires language detection, so you'll have to set `lang=auto` inside the General Settings section. Moreover, **this criteria is valid only for Magic: The Gathering cards**, since language recognition is not available for other games.

1.3.2.11. Fixed

Criteria name — `fixed`

Allowed values — Only a single value is accepted: `true`

This criteria is used for cards not being found or when no other criteria is fulfilled. Each rule file **MUST HAVE AT LEAST ONE DESTINATION WITH A FIXED RULE**, otherwise it will be considered invalid.

1.3.3. Example file

Creating a file from scratch could be daunting, below you can find an example with several criteria, feel free to use it as a starting point and edit it as you wish:

```
[general]
title=Custom colors
game=mtg

[destination_1]
criteria=fixed
```

```
value=true

[destination_2]
criteria=color
value=red

[destination_3]
criteria=set
value=RNA,ORI,VOC

[destination_4]
criteria=price
value=0,5.00
```

1.3.4. Rules cookbook

Below you can find some ready to use files, that you can tweak accordingly to your needs

1.3.4.1. MTG, Sort by Color, filter by value

This rule will separate MTG cards into different colors, putting everything higher than 50c in a separate bucket.

```
[general]
title=Color, filter less than 50c
game=mtg

[destination_1]
criteria=fixed
value=true

[destination_2]
criteria=price
value=0.50,0.00

[destination_3]
criteria=color
value=multi

[destination_4]
criteria=color
value=red

[destination_5]
criteria=color
value=blue

[destination_6]
criteria=color
value=white

[destination_7]
criteria=color
value=black
```

```
[destination_8]
criteria=color
value=green

[destination_9]
criteria=color
value=

[destination_10]
criteria=color
value=land
```

2. Camera calibration

Your machine arrives with the camera already configured, but sometimes there's the need to perform some minor adjustments. For example, the camera could be out of focus or you need to adjust the cropping values.

2.1. Starting the calibration process

First of all you have to start the calibration process. Since it's pretty difficult to perform changes while the machine is sorting cards, there's a special command that will tell Magic Sorter to move to a specific bucket and will stand still while taking photos.

Get inside the Camera Settings tab and click on the **Start Calibration** button. The machine will calibrate on all axis and then it will move in the middle of the plate. It will take a new photo every second, you can review the output in the Review Images tab. To end the procedure, simply get inside the Camera Settings tab again and hit the **Stop Calibration** button; the machine will return in the parking position.

2.2. Adjust camera focus

Sometimes it happens that the camera will get out of focus, since the lenses aren't fixed in place so a small bump on it can make them turn resulting in a blurry image. After starting the calibration command, once the machine is in place, get inside the Review Images tab and check the output. If the images aren't sharp enough, slowly turn the lenses of the camera until they are focused on the subject.

If you have the camera with the Ethernet extender (green cable), you should use the white plastic disc to turn the lenses, otherwise they're too small to be moved by hand.

2.3. Adjust cropping values

The image that is being uploaded to the API server should contain only a single card and the photo should be cropped as close as possible to the card the you want to recognize. Magic Sorter already comes with the correct values, however over time you might need to adjust those values.

First of all start the calibration process and place one (and only one!) card on the first bucket on the left, where the camera will take all the photos.

Why should I place only one card?

That's actually a good question! When the stack of the cards is higher, we need to apply a smaller crop, since they are closer to the camera and the field of view is narrower. When you save the cropping values, you're storing the "worst case scenario", where the card is the farthest from the camera. Magic Sorter knows that, so it will automatically adjust the values accordingly with the height of the cards.

So place only one card, otherwise you will have incorrect results when you'll fill the position with cards.

Now you can start tweaking the values for the cropping on each side inside the Camera Settings tab: every time you change a value, hit the Save button and get back in the Review Images tab and check the result.

Once you're happy with the image that is being taken, you can get back inside the Camera Settings tab and hit the Stop Calibration button to end the process.

3. Remote access to your Magic Sorter machine

Magic Sorter uses a Rapsberry Pi under the hood, which means that you can access it using SSH or (more commonly) perform some file transfer using the SFTP protocol. There are several clients that allows you to connect to a remote computer using SFTP, but the most common one is FileZilla [https://filezilla-project.org/download.php?type=client].

If you want to connect using SSH to perform some tasks, you will need an SSH client. Linux and Mac OS systems can directly do that using their CLI tools, if you're under Windows you'll have to download an additional software called PuTTY [https://www.putty.org/]

In order to connect you need 4 piece of information: host, port, username and password. In our case the port is always 22 and you can get the host by looking at the touchscreen in the lower left corner. To obtain username and password, please contact support.

If you can't connect by using the host, you can use the IP address of the machine. Simply tap on the hostname and you'll get the current IP assigned to the machine.

3.1. Connect using Linux/Mac OS

You won't need any extra software, since both operating systems allows SSH connections out of the box. Open a new Terminal window and type the following command:

```
ssh <username>@<hostname>
```

Magic Sorter hostname

You can get the hostname of your machine by looking at the touchscreen in the lower left corner, it should be something like **magic-sorter-aaaaa** . If you can't connect by using the host, you can use the IP address of the machine. Simply tap on the hostname and you'll get the current IP assigned to the machine.

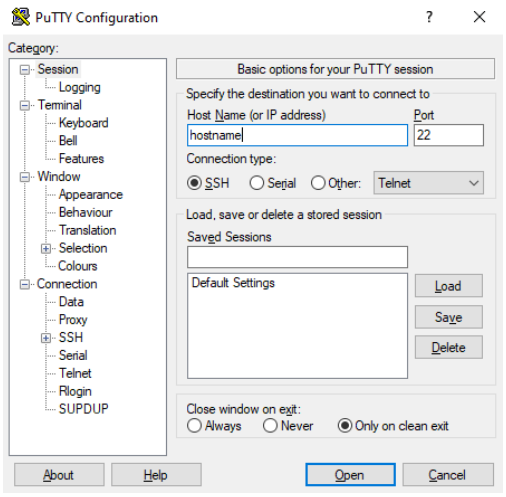
Replacing <username> and <hostname> with your correct data. You will be prompted for a password, type it when requested. **Please note!** For security reasons the password **IS NOT** displayed while you're typing it, so it's OK if you don't see any output on screen. When you hit the press the ENTER key to establish the connection.

3.2. Connect using Windows

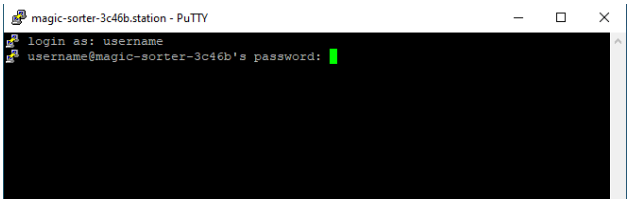
As explained before, things are a bit trickier if you're under Windows, since you'll need an extra software to perform an SSH connection. First of all download the PuTTY [https://www.putty.org/] software. Once installed, execute it and in the hostname field type the address of your Magic Sorter machine.

Magic Sorter hostname

You can get the hostname of your machine by looking at the touchscreen in the lower left corner, it should be something like **magic-sorter-aaaaa** . If you can't connect by using the host, you can use the IP address of the machine. Simply tap on the hostname and you'll get the current IP assigned to the machine.



You will prompted for username and password, type the info provided by support:



Then, you should be inside.

4. Results file format

If requested to, Magic Sorter will email you the results of your sorting process inside a CSV file. Beside the default format, there are different ones, so you can immediately upload your file to your e-commerce and update your inventory.

You can change the format for the export from the System Settings tab.

4.1. Default format

If you do not change anything, this is the default file format. It contains as much info as possible so you can handle it in a separate step (ie using Excel or by post-processing it with another program). These are the columns included:

- **set** Set code of the card
- **rarity** Card rarity (common, uncommon etc etc)
- **title** English title of the card
- **collector_num** Card collector's number
- **count** How many cards where found
- **price** Minimum price from the price source you chose
- **price_trend** Average price from the price source you chose
- **ecommerce_id** Product ID from the price source you chose

This is an example of the data contained in the file:

```
set,rarity,title,collector_num,count,price,price_trend,ecommerce_id
ISD,common,Village Ironsmith // Ironfang,168,1,0.00,0.00,250400
,,Not found,,1,0.0,0.0,0
JOU,common,Sigiled Skink,111,1,0.00,0.00,266728
ISD,common,Selhoff Occultist,73,1,0.00,0.00,250700
```

On top of that, in the Public Shared folder you'll find another CSV file with the same data, but arranged differently. Cards are not grouped together, but they are all listed, reporting their position on the grid and the height.

```
set,rarity,title,collector_num,condition,foil,position,height,price,price_trend,ecommerce_
SNC,common,Exhibition Magician,106,NM,0,8,0,0.01,0.07,652183
WAR,common,Ob Nixilis's Cruelty,101,NM,0,11,1,0.01,0.08,371816
WAR,common,Lazotep Reaver,96,NM,0,11,2,0.01,0.06,371913
SNC,common,Prizefight,154,NM,0,12,1,0.01,0.08,652199
WAR,common,Rising Populace,29,NM,0,10,0,0.01,0.03,371852
WAR,common,Goblin Assault Team,129,NM,0,8,1,0.01,0.04,371986
SNC,common,Broken Wings,136,NM,0,12,4,0.01,0.02,652192
```

4.2. BinderPOS format

Supported games

Please note! BinderPOS under the hood uses TCG Player SKU to identify the cards. This means that it only supports the games that are supported by the TCG Player format.

This format is compatible with BinderPOS platform, so you can immediately upload it inside their website. Some columns are blank but they are enough for BinderPOS to uniquely identify the card and update their inventory.

- **SKU** TCG Player SKU of the card
- **Name** Title, number and set code of the card
- **Product ID** Always blank, it's not required
- **Language** Fixed to English
- **Printing** Always blank, it's not required
- **Condition** Card condition
- **Quantity** How many cards were found

```
SKU,Name,"Product ID",Language,Printing,Condition,Quantity
4666200,"Abrade 659 (CMR)",,English,,"Near Mint",2
4674885,"Abrade 410 (CMR)",,English,,"Near Mint",2
506093,"Selhoff Occultist 73 (ISD)",,English,,"Near Mint",2
```

4.3. TCG Player format

This format is compatible with TCG Player inventory system; at the moment this format is available for **Magic: The Gathering**, **Pokèmon** and **Flesh and Blood** cards only. Some values will be filled with data coming from Magic Sorter (ie quantity)

TCG Player account type

PLEASE NOTE! Your TCG Player account must be enabled to use their inventory system, this feature is available only to a specific type of customers

- **TCGplayer Id**
- **Product Line**
- **Set Name**
- **Product Name**
- **Title**
- **Number**
- **Rarity**
- **Condition**
- **TCG Market Price**
- **TCG Direct Low**
- **TCG Low Price With Shipping**
- **TCG Low Price**
- **Add to Quantity**
- **Total Quantity**
- **TCG Marketplace Price**
- **My Store Reserve Quantity**
- **My Store Price**
- **Photo URL**

4.4. Crystal Commerce format

Supported games

Please note! Crystal Commerce has been tested with Magic: The Gathering only.

4.5. CardMarket integration

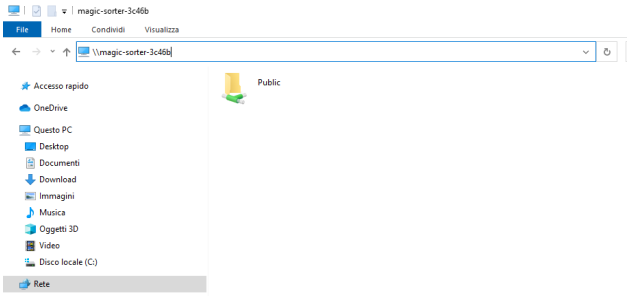
Currently CardMarket does not offer the feature to import your collection with a file upload, however TCG PowerTools [https://tcgpowertools.com/] can do that for you. It will perform the import and manage your inventory. And the good news is that the Default format is fully compatible with their system!

5. Public shared folder

Magic Sorter automatically create a public shared over the network, you can freely read and write in such folder, no authentication is required. To connect to it, simply open your file explorer and point it to <hostname>/Public . You can find the hostname of your machine looking at the bottom left corner of the touchscreen.

If connecting using the hostname doesn't work, try with the IP address: tap on the hostname on the interface to display the IP address currently assigned to the machine.

Please note that Windows might ask you for a username and password even if they are not required: you can supply any value (for example admin for both fields), since they are not required and not checked by the Raspberry Pi



At the end of the sorting process a copy of the results CSV file is created, so you can easily access it if you have troubles with email delivery.

6. Maintenance functions

In some situations you may need to perform some code maintenance tasks. Instead of asking you to remotely connect to your Magic Sorter machine and issue commands on the CLI, you can simply drop a file in the public shared folder. Magic Sorter is smart enough to understand that there's some extra work to do and it will do that for you.

6.1. Schedule SD check and repair

Even if we put in place the best practices to extend the life of the SD card, they are all doomed to fail, sooner or later. Before going for a SD card replacement (which is not very hard, just a little time-consuming), we can try to fix and repair it.

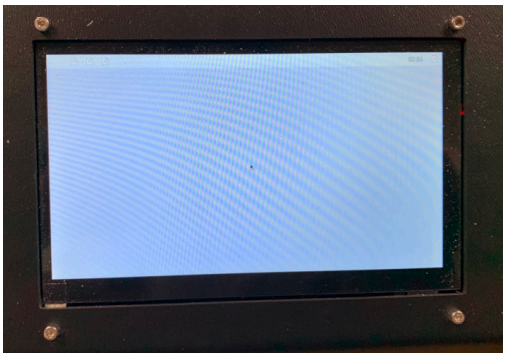
In the public shared folder, please create a file called `sd_check.txt` with no contents; then reboot your machine. At startup, Magic Sorter will detect that you'd wish to perform a check and repair of the filesystem and it will schedule it at the next reboot. Wait a couple minutes so the booting process finishes, then reboot again.

This time the boot time will taking way more than before: the system is checking for bad sectors and it's removed or repairing them. **Do not power off the machine during this execution, you could end up with a broken SD card**.

Once completed, you will return to the default GUI interface and you can start working again with your sorter.

6.2. Repair interface dependencies

In some rare situations, the interface could not show up due to a missing dependency:



In this case, before performing a manual update of the software, you can ask the system to try to install the dependencies from scratch. Please create a file that is called `fix_npm.txt` , then reboot your machine. Magic Sorter will try to install GUI libraries from scratch, this is a time consuming operation and you won't see any output on screen (because the interface is broken). Wait for about 40 minutes then reboot the machine.

If the operation was successful, the interface should show up.

6.3. Flash or update firmware

In some situations you'll have to flash again the firmware on the electric board. Instead of remotely connecting to the Raspberry, you can simply drop a file in the public folder called `flash_board.txt` with the contents **3.3** (that's the latest firmware version).

Magic Sorter will see the file and will reflash the electric board with the latest version.

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Version 1.3, 3 November 2008

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