BOUT Solutions
Improves your logistic operations

ScanSystems - User manual

For system version **V28.2**, and higher

Manual V1.3

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Intro

 Please **do not open** the Scannerbox/Buttonbox yourself, and **do not configure the ScanSystem and attached sensors and scanners yourself,** without receiving instructions to do so.

 Please note that the red PCB Buttonbox is officially not supported anymore, but a special branch of its firmware has been created to run the version of the Bout Solutions ScanSystems firmware this manual is written for. This is done since firmware that came with the red PCB Buttonbox, was not as stable as this new firmware. This is why clients with the older red PCB Buttonboxes can still use this stable version of the firmware. This manual has not been updated for the red PCB Buttonbox, but most information should be interchangeable between the green Buttonbox PCB revision, and the red Buttonbox PCB revision. The red PCB Buttonbox cannot make use of the HID language select functionality as described in the manual due to a hardware limitation. All other functions work.

This manual will go over everything you need to know to get started with the Bout Solutions - ScanSystems. We will discuss what hardware makes up our product, how to install it onto your forklift/production line, together with Zebra scanners of your choice.

This manual will refer to "your **ScanSystems contact person**" a few times. This contact person can be the retailer/installer of your ScanSystem(s) from the client's point of view. Product retailers/installers can omit these references in most cases.

The target audience of this manual are retailers/product installers. It can also contain useful information for customers, but note that the customer shouldn't have to go trough the setup steps in order to get the system working. This should be done by the installers, except if the customer wants to do it by themselves.

The manual is written for ScanSystems **V28.2**, and higher. If you have received a newer version of the ScanSystems, please make sure there is no newer manual available for this device. You can find out what software version you have by looking at the sticker on the back on either the Scannerbox, or Buttonbox. Please note that older versions didn't have this displayed on the back. In the troubleshooting section, you will find more ways to know what version you have.

The Zebra scanner used in this manual to demonstrate it's functionalities is the "Zebra FS40 Fixed Industrial scanner", together with Zebra Aurora version **6.1.7**

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Contents

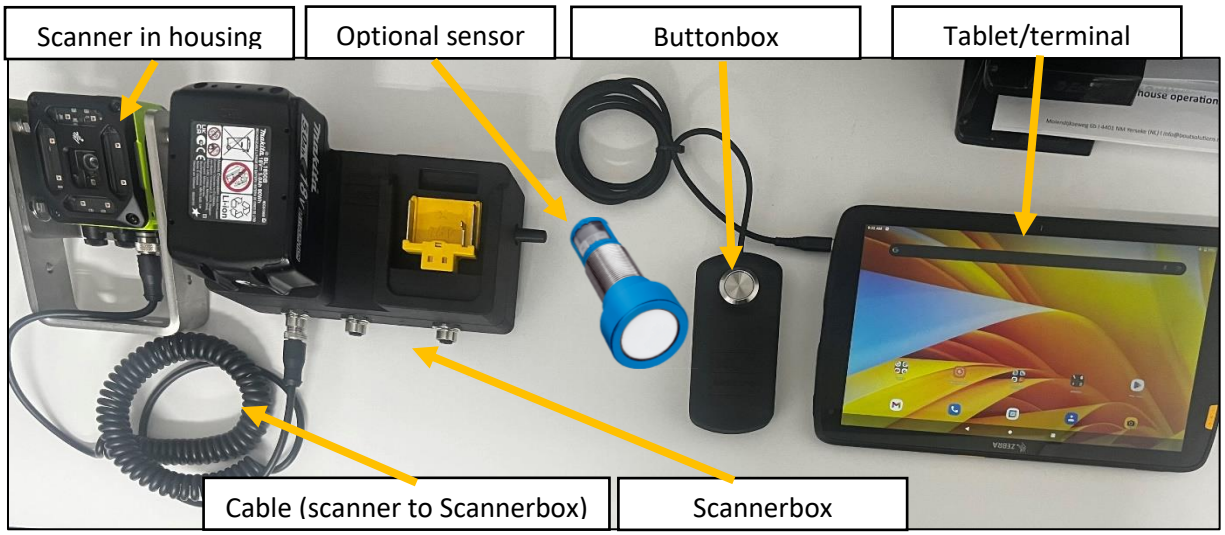
1. The hardware

This chapter explains what hardware there is to the ScanSystems, and what edge devices you need to unlock the device's full potential.

1.1. The ScanSystems hardware (minimum hardware requirements)

The Bout Solutions ScanSystems consists of the Buttonbox, and Scannerbox. The Buttonbox is used to trigger the Scannerbox to activate scanners connected to the Scannerbox to start scanning. The Buttonbox will also receive codes processed by the Scannerbox, and type them into the device it's connected to like the Buttonbox is a HID keyboard. This means there are no drivers required to get the system operational. Please note that HID is tested on Windows, Android, and IOS with a USB C/A cable. If you want to use HID on devices with different ports or operating systems, please contact your ScanSystems contact person to see what can be done for your use case.

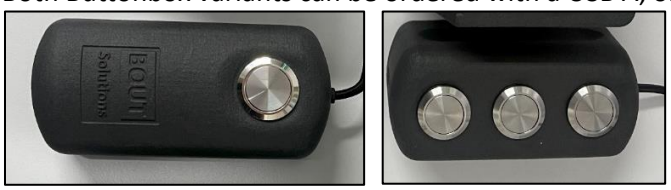
Please see the picture down below, which shows the components you can use with the ScanSystems:



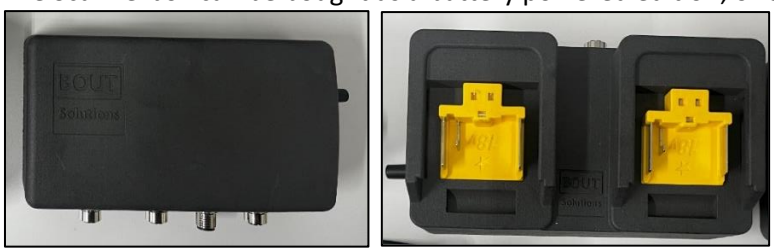
Available types:

The Buttonbox has a single button edition, and three button edition. The single button edition can only trigger both scanners at the same time, or one scanner if you only have installed one scanner. The three button Buttonbox can trigger both scanners at the same time, but also scanner 1, or 2 separately. Besides this, you can also use the special scan mode with this Buttonbox edition which is explained further in chapter 2.3. on the dipswitch cheat sheet.

Both Buttonbox variants can be ordered with a USB A, or C terminating cable.



The Scannerbox can be bought as a battery powered edition, or externally powered edition.



Communication:
The Scannerbox, and Buttonbox communicate wirelessly via WiFi (2.4Ghz) without the need to connect to the clients network (the network is self hosted). The devices are able to communicate with each other at a maximum range of about 20 meters when there are no metal obstructions between the devices.

Power:
Providing power to the **Buttonbox** can simply be done by connecting the Buttonbox cable to the terminal/computer of choice you want the scanned data to be input to. The Buttonbox runs completely of the USB bus power.

The **externally powered Scannerbox** wants a DC voltage between 12-30v at 5amps, and depending on the scanners connected to it, you want to provide the Scannerbox with a stable DC voltage, since power from the power supply is directly distributed to the attached scanners, and sensors.

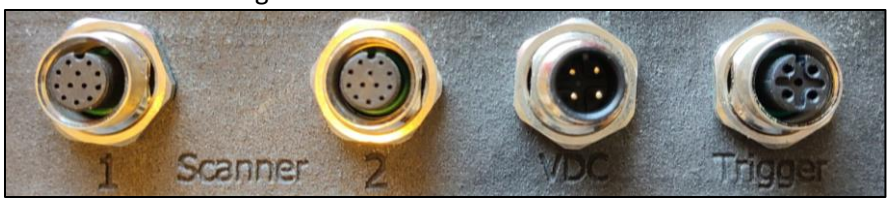
The **battery powered Scannerbox** likes it's power from official 18v 5amp Makita batteries. The Scannerbox can run off one battery at a time, but two can be connected for longer battery life. Also note that the batteries can be hot swapped.
Performance with one battery with one scanner at 20°C is 16h standby, and 500 scans. The same setup at -20 will give you a 10h standby time, and 500 scans.

The battery powered Scannerbox is developed with official 18v, 5amp Makita batteries in mind, use of other batteries is not recommended.

1.2. Edge devices
To get something useful out of the ScanSystems, you will want to hook up some scanners, and maybe sensors to the system. In this sub-chapter you will read about the cables, scanners, and sensors you can use with our system.

1.2.1. Cables
The Buttonbox only has a USB cable attached to it, which always comes with a new ScanSystem, so we will not be going into detail about that cable.

Connecting edge devices to the Scannerbox is done via several different types of connectors on the outside of the housing:



The scanner ports connect to 12 pin M12 male connectors (the two connectors on the left on the picture above), while the trigger (sensor) connector connects to a 5 pin M12 male connector, which can be seen on the right. If you got an externally powered Scannerbox, you will also notice the VDC connector between the sensor, and scanner connectors. This connector accepts a 4/5pin M12 female connector.

Please note that VDC connector, and Trigger connector pins 1 are + (positive), and pins 3 are - (negative).

When you need cables for your system, Bout Solutions can provide you with several types of cables to connect your scanner to our system.
If your scanners will not move in relation to the Scannerbox, you might want to use normal cables as shown underneath this text:

When you have an application where the scanners will move relatively to the Scannerbox, it's best to use the curled cables you can see in the picture below:

Both of these cable types and more can be ordered in different lengths like 1-2-4-10m. Please ask for a "Bout Solutions ScanSystem price list" from your ScanSystem contact person, to see what parts you can order from Bout Solutions. Bout Solutions can also machine custom housings for you scanners, and ScanSystem to mount to a fork board on a forklift for example.

1.2.2. Scanners

The protocol used by the ScanSystem to communicate with the scanners is simply RS232 via serial at 9600 baud. Bout Solutions recommends the Zebra FS40 to be used with the ScanSystem, since this scanner works really well as has been proven in the field at many customers sites. For forklift applications you can use the 2.3mp sensor variant since this is plenty for reading codes on pallets, for other applications where multiple codes should be read from a distance, consider looking at the 5mp variant on Zebra's website. Also notice that you can get the scanners with different fields of view. The wider the field of view, the less megapixels per cm^2. Too narrow, and you can't read your codes. Please calculate what field of view you need based on 80cm, which is about the minimum distance you want to trigger the scanners with the ScanSystems.

Smaller scanners are also available like the Zebra FS20, if a small scanner size is of the essence. You can find most relevant information about the Zebra FS series on Zebra's website.

1.2.3. Sensors

You can connect any sensor you want to the Scannerbox as long as it works between 12-30v DC, and it's of the type PNP. Sensors with 2 IO's can also work depending on how the Scannerbox is configured. The Scannerbox should already be configured correctly from the factory to work with either a 2 IO sensor, or single IO sensor, depending on the clients wishes.

Our recommendation is to use ultrasonic sensors if possible, since these types of sensors are way less susceptible to triggering at incorrect lengths based on the material it's seeing. When the system is mounted on a forklift for example, and you were to drive towards a pallet filled with cardboard boxes on it, the other pallet with cardboard boxes, and foil on it, and another pallet with plastic crates on it, your trigger distance would probably fluctuate with a laser sensor.

At different sites, Bout Solutions noticed consistent reads with the: "Pepperl+Fuchs UC2000-L2-E6-V15" Ultrasonic sensor which can either use a single, or 2 IO's.

If you don't need 2 IO's, you could always go for a "Pepperl+Fuchs UC2000-L2-U-V15" Ultrasonic sensor:

These sensors above, are Bout Solutions recommended sensors, but don't forget that you could use any sensor you want, as long as it follows the rules explained at the top of this sub-chapter.

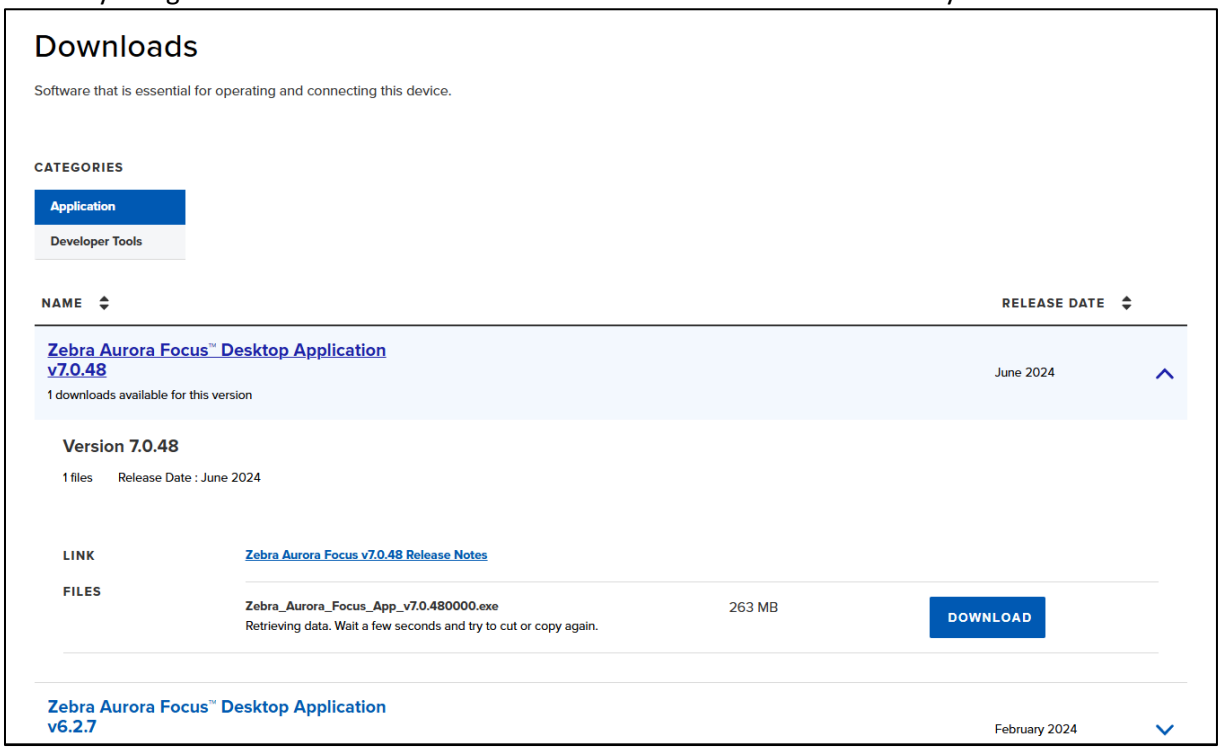
2. The installation

Please **do not open** the Scannerbox/Buttonbox yourself, and **do not configure the ScanSystem and attached sensors and scanners yourself,** without receiving instructions to do so. You may skip this chapter.

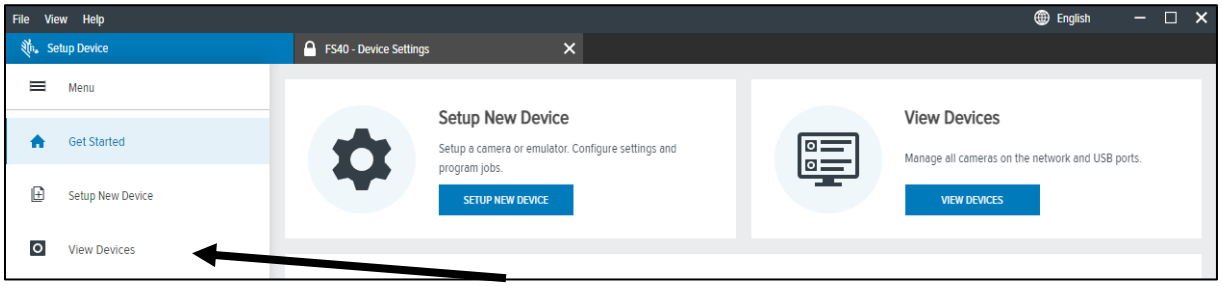
In this chapter, you will learn how to install our system onto a forklift/production line, together with setting up the Zebra scanners, and changing settings on the ScanSystem. This way, you can get started quickly!

2.1. Getting your Zebra scanner(s) ready

To set up the Zebra scanner of your choice, you will first need to connect them to our computer with a USB C cable. After you have done this, you can launch the Zebra Aurora software if you have already installed this software. If not, please search for the software online by the term "Zebra Aurora Focus download". On Zebra's site you will see a list of available versions of the program. This manual is currently using version **6.1.7**. You can download this version or a newer one as you see fit:

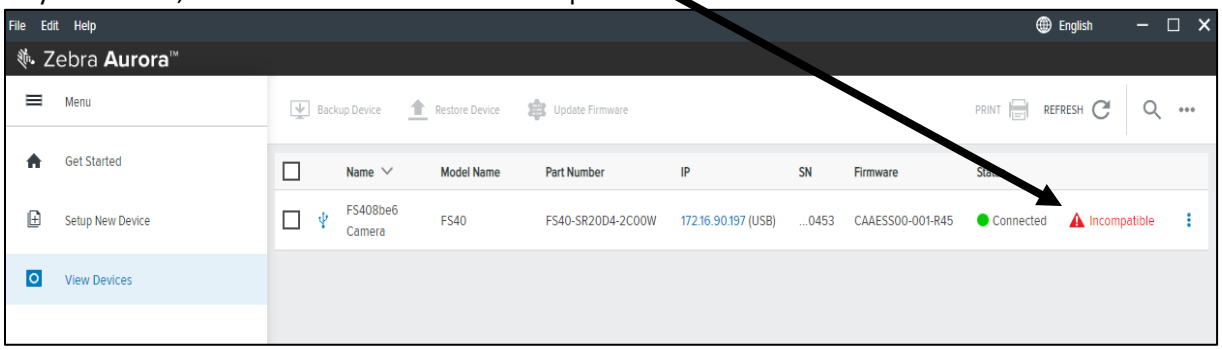


When you launch the software, you will see a screen that looks like this:

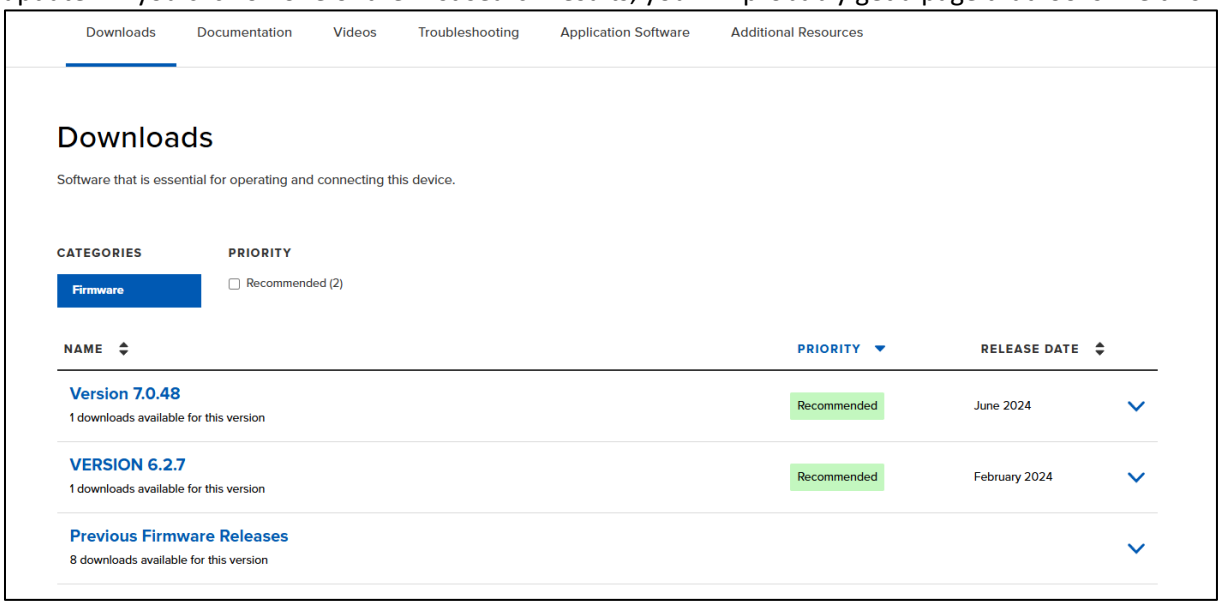


To get where we want to be, click on "View Devices".

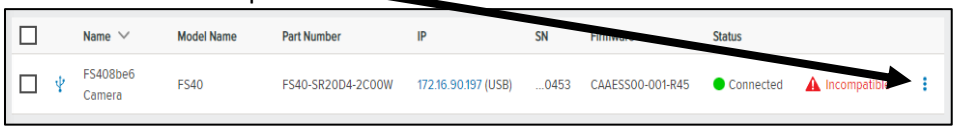
As you can see, our scanner needs a firmware update.



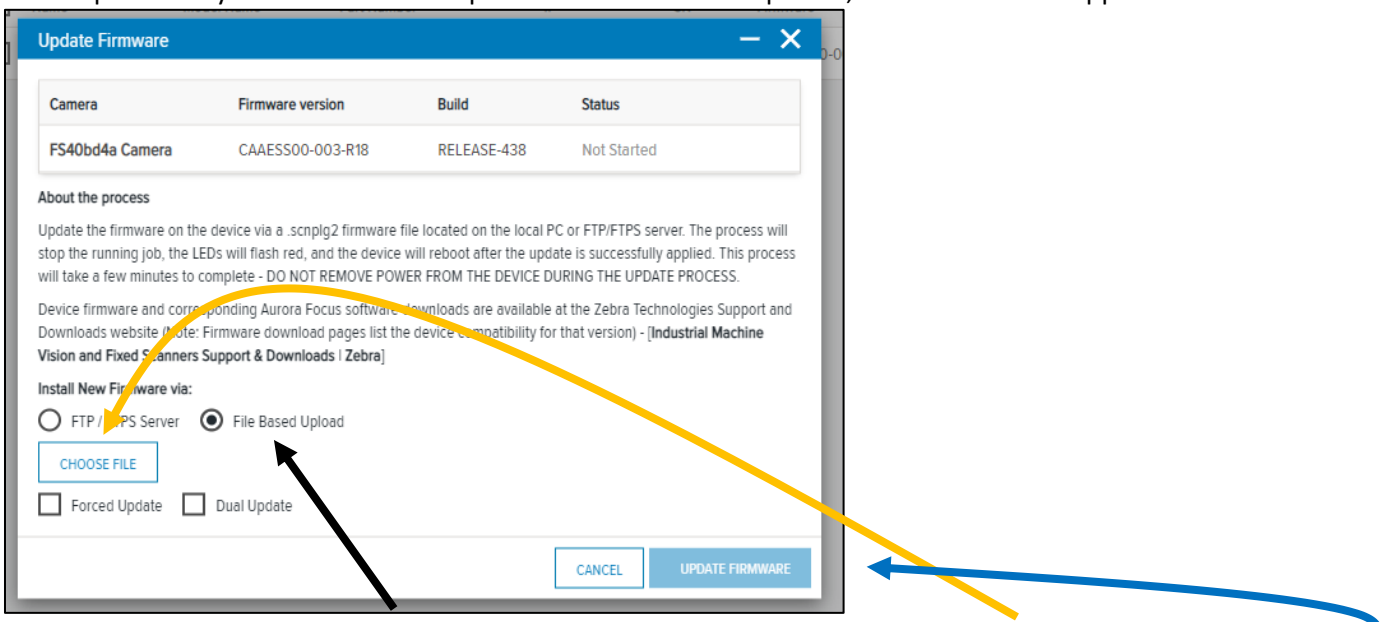
This can be solved by going to the internet, and searching for "Zebra *[scanner of choice]* firmware update". If you click on one of the first search results, you will probably get a page that looks like this:



Once you've downloaded the update file, you can go back to the Zebra software and click on the three dots to show more options:



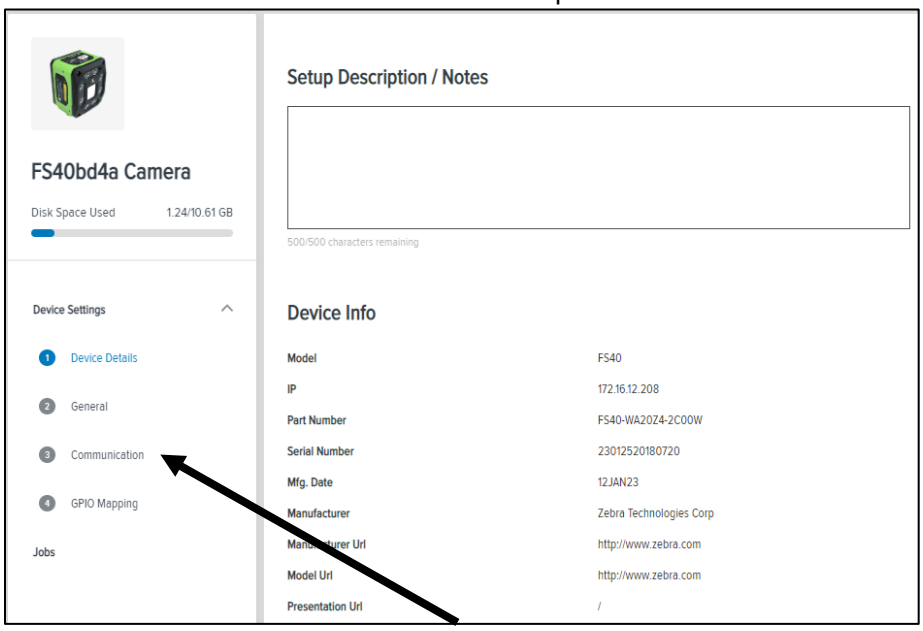
In the options list you can choose the option called "Firmware Update", a new screen will appear:



In this screen select the "File Based Upload" radio button, and then click on the "Choose File" button. A file picker screen will appear. In this screen select the update .scnplg2 file you've just downloaded from Zebra's website. With the file selected, click on the "Update Firmware" button.
Now you will have to wait until the update is finished (progress is displayed under the "Status" column). Once it is finished, you can close the "Update Firmware" screen. The scanner will reconnect.

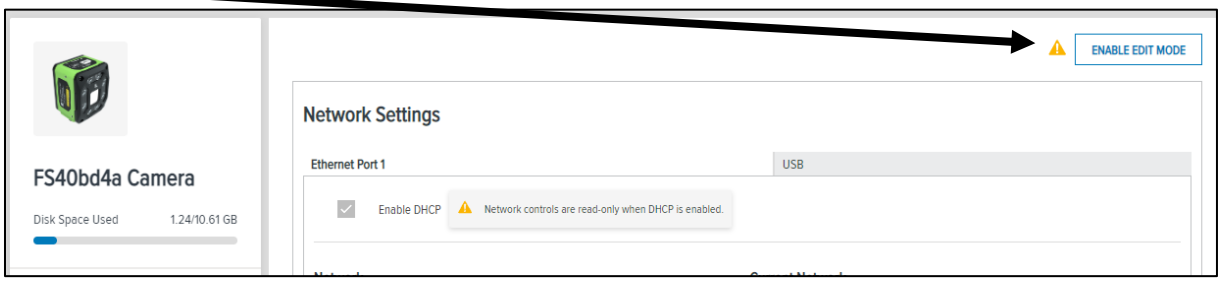
Once the scanner is reconnected, you will see a new button has appeared that you should click:

You will be taken to a new screen with a few options in a list:

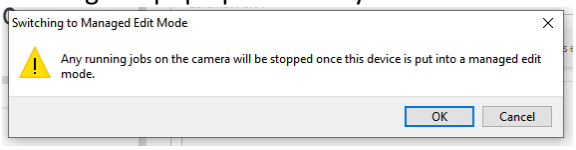


We're interested in setting up the communication protocol correctly first in the "Communication" screen.

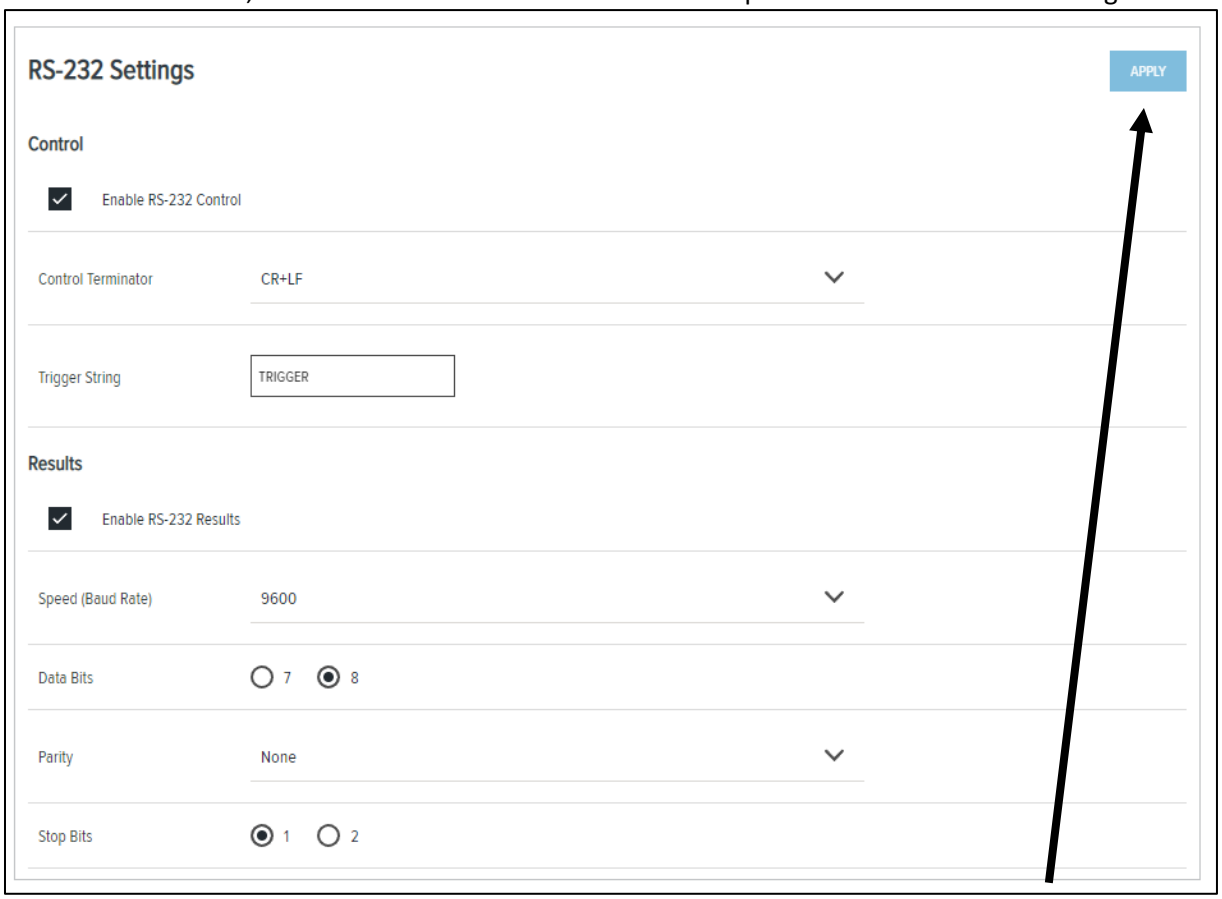
In this screen, you will first need to enable "Edit Mode". This can be done by clicking the "Enable Edit Mode" button:



A dialog will pop up to which you will click on the "Ok" button:

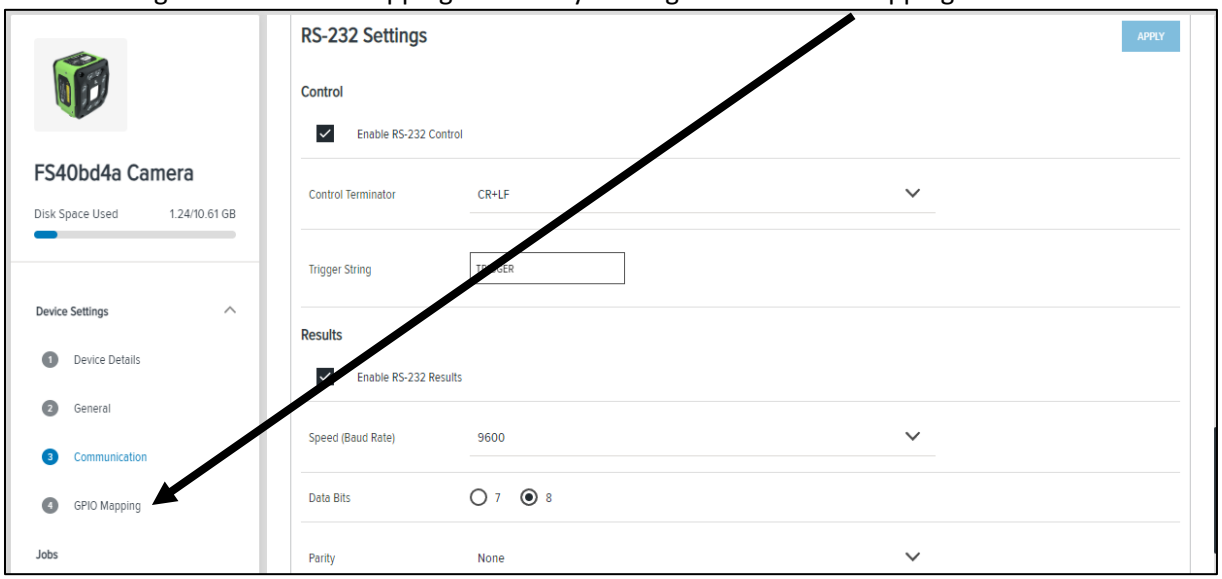


Once in "Edit Mode", scroll down in the list of communication protocols to the "RS232 Settings" field:

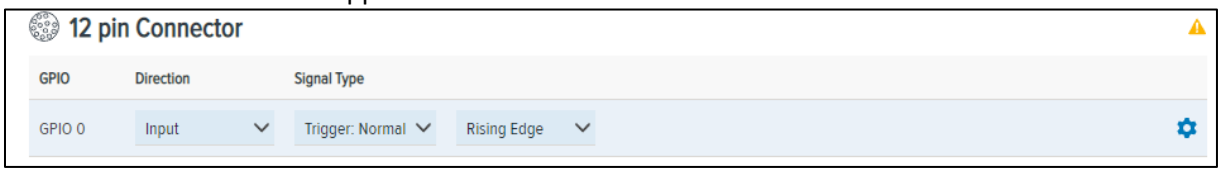


Please take over the settings exactly like in the image above. After that click on the "Apply" button.

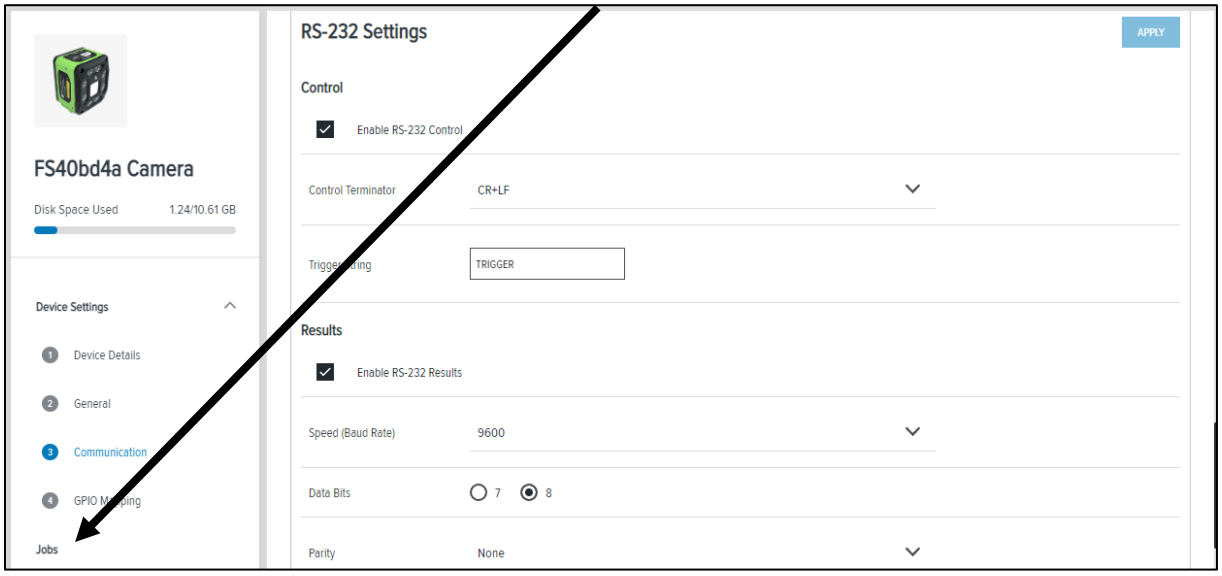
Now we will go to the "GPIO Mapping" screen by clicking on the "GPIO Mapping" button.



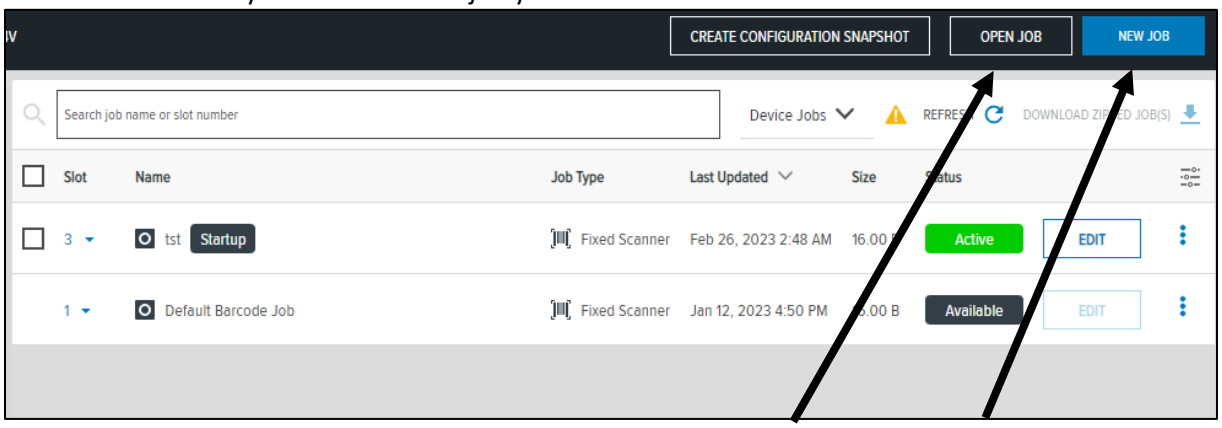
Only focus on taking over the settings for GPIO0 in the "12 pin Connector" field, since the rest of the GPIO's are not used for our application:



Now go to the "Jobs" screen, by clicking on the "Jobs" button:

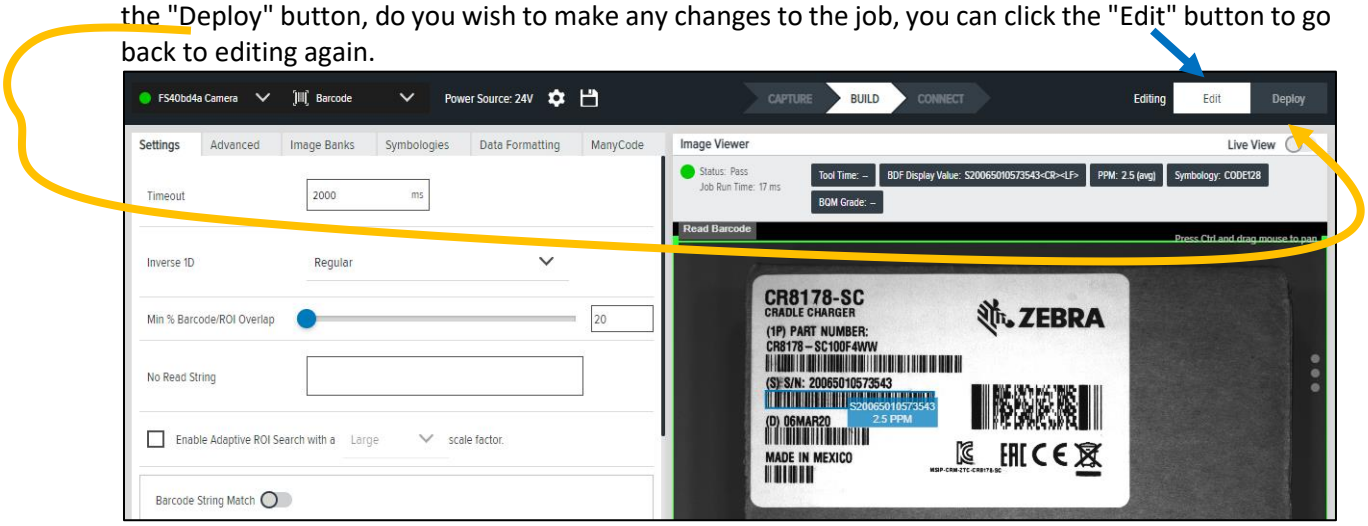


In the "Jobs" screen you can see which job your scanners has built in:

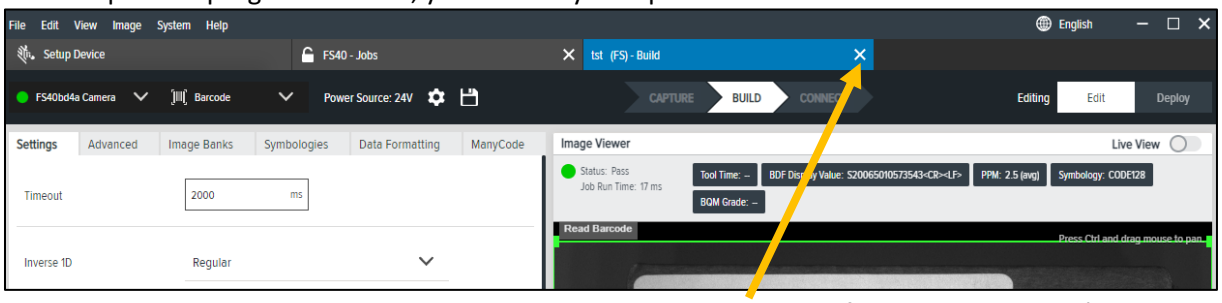


In the top right of the image above you can see two buttons. "Open Job", and "New Job". This manual won't go over how to create a .zjob yourself, since there are pre-made jobs you can use with the ScanSystem. Please ask your ScanSystems contact person for a .zjob if you don't have the default one for use with the ScanSystem yet. Please note that this Zjob might be made for an older version of Aurora. If you want to make your own job, it's also pretty easy! You can find everything to get started in the Zebra Aurora Manual: https://docs.zebra.com/content/tcm/us/en/scanners/fixed-mount/zebra-aurora-user-guide/c-aurora-zebra-aurora-user-guide.html. If the link doesn't work, please search for the "Zebra Aurora Manual" on the internet.

Now if you've successfully created, or opened a preset job, you can deploy it to the scanner by clicking the "Deploy" button, do you wish to make any changes to the job, you can click the "Edit" button to go back to editing again.

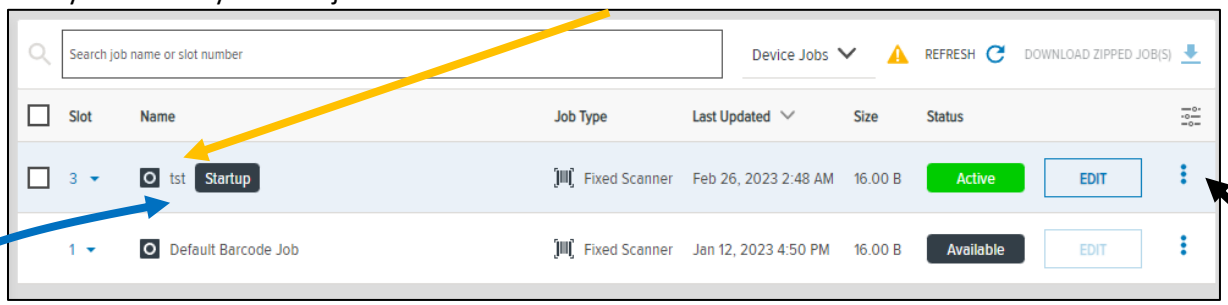


At the top of the program window, you can see your opened screens:



To exit the job edit screen, just close it by clicking on the cross symbol of the current job you're editing.

Now you can see your new job in the "Jobs" screen:



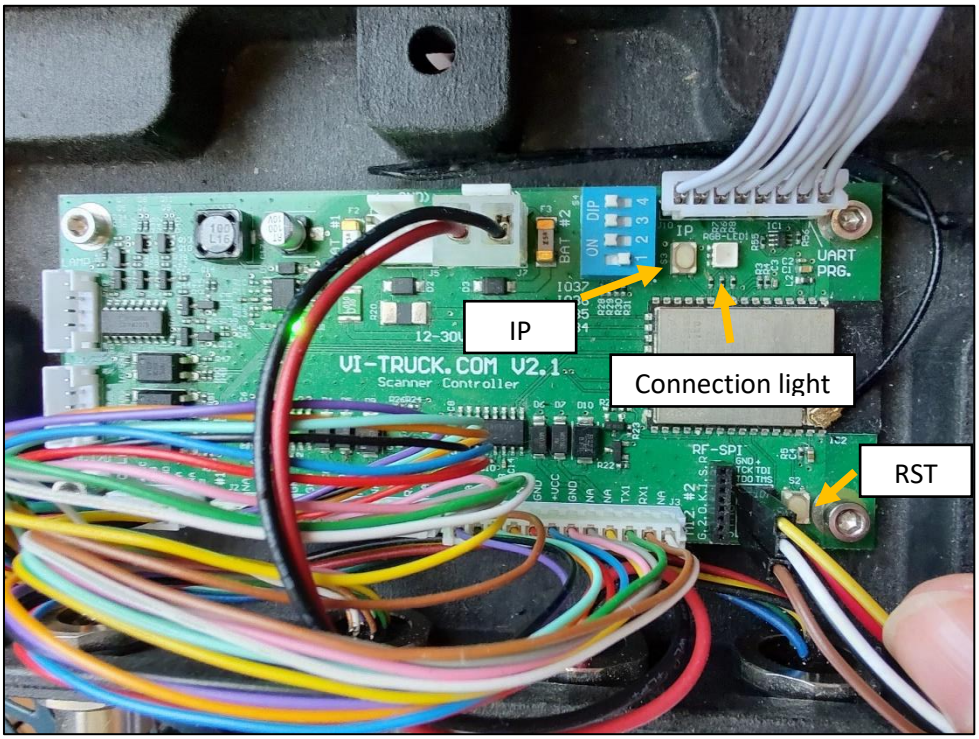
These is one more thing left to do. The Zebra scanner picks a job to run when it starts up, but we don't know yet if it will pick our new job. To set our job to run at scanner startup, you will need to click on the three dots to the job you want to be ran at startup.
In the list that appears, select the "Set As Startup" option. If successful, you will now see a "Startup" marker being displayed in the job you set as the startup job.

The last remaining step of configuring the scanner(s) is to adjust their focus, onboard lighting, and ISO, so they can detect codes most optimally. This is explained in more detail in sub chapter 2.4.

2.2. Connect your Scannerbox, and Buttonbox wirelessly

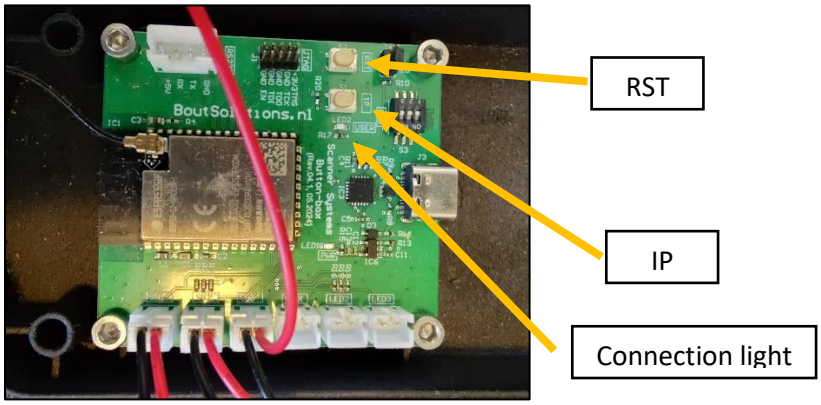
Skip this step when you got a new ScanSystem, since you don't have to connect Scannerbox, and Buttonbox together normally. They are pre-paired from the factory. It is **important** to check if the serial numbers on the Buttonbox, and Scannerbox match. This means that this Scannerbox Buttonbox pair has been paired in the factory. You should only follow this step if you're experiencing problems with the connecting or got a new Buttonbox you want to pair to the Scannerbox, or vice versa.

In order to connect the Scannerbox, and Buttonbox together, you will need to wirelessly pair them to each other. This is done by firstly taking the lid of the Scannerbox, and Buttonbox so you can access the buttons on the PCB's. After that, provide power to the Scannerbox, and hold the button labeled "IP" while pressing the button labeled "RST". Then release the RST button, and you should see a connection light lighting up. If so you can also release the IP button. The Scannerbox is now in pairing mode. If this is not the case, please try the button combinations again.



Scannerbox PCB

Now with the Buttonbox, please power the unit on. There should be a Button called "IP" on the PCB, which you can press and hold. After you're pressing the right connection button based on the Buttonbox PCB you have, the following steps are the same for both revisions. Press the button labeled "RST", or "Reset" and release it. After that, you can release the connection button you were holding. You should now see a connection light lighting up, after which the Buttonbox will connect to the Scannerbox. If done correctly, within a few seconds Scannerbox and Buttonbox should be connected. This is indicated by their connection lights blinking. If no Buttonbox connection light turned on, please remove power to the device and try the Buttonbox pairing steps again.



Green Buttonbox PCB revision

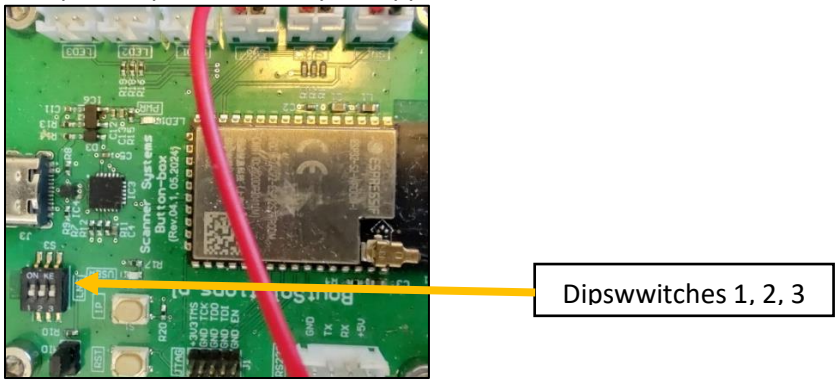
Finally if both devices connected successfully by blinking their connection lights, you should reset the devices by pressing the Reset or RST buttons on both PCB's. The devices should now be ready.

2.3. Change settings on the ScanSystem

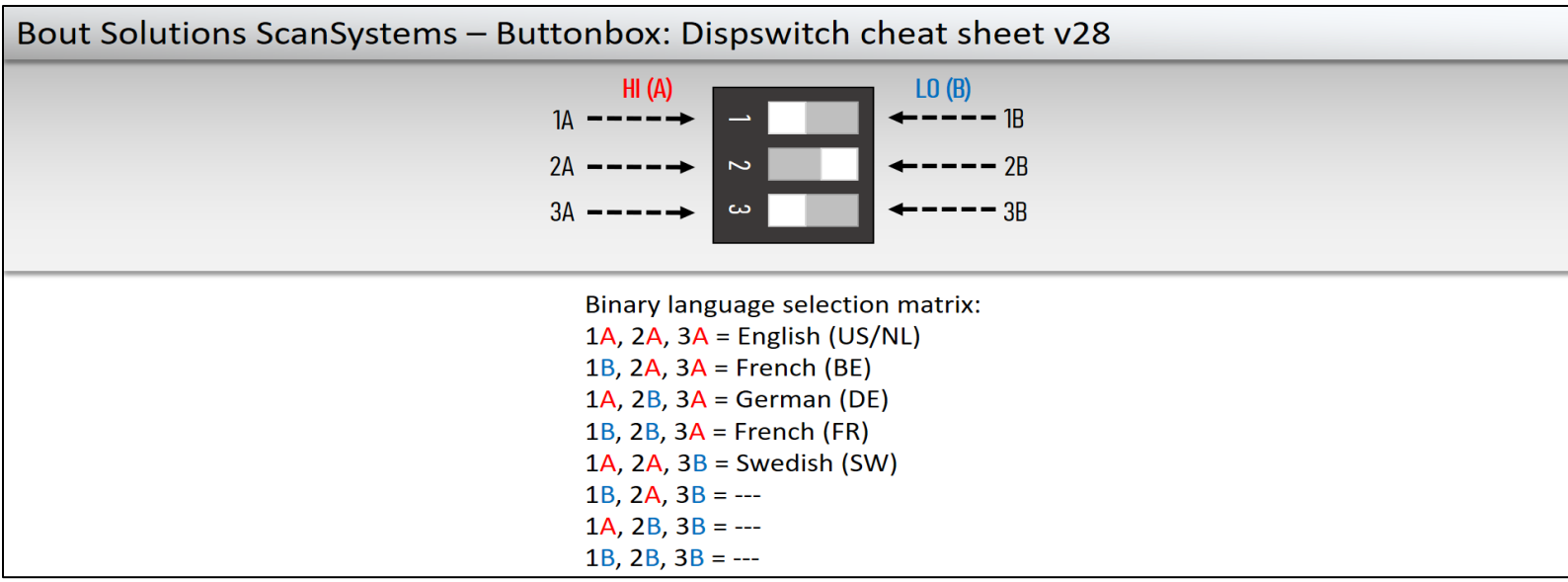
To configure different settings on the Scannerbox, and Buttonbox you can change the position of several dipswitches located on the PCB's of the Scannerbox, and Buttonbox. There are also some button combinations you can press to change some extra settings. Please remove the lids of the devices to get access to the PCB's.

2.3.1. The Buttonbox

The function of the dipswitches on the Buttonbox is to change the way the HID text is output to the connected device of choice. For example, a computer might be set to use the German keyboard layout while the ScanSystem is normally set to send HID instructions for a United States keyboard. This means that letters and symbols will be mixed up. To set the Buttonbox to output HID for your specified keyboard layout, you can use its dipswitches. Please look at the pictures down below on how you can set up the dipswitches for your application:



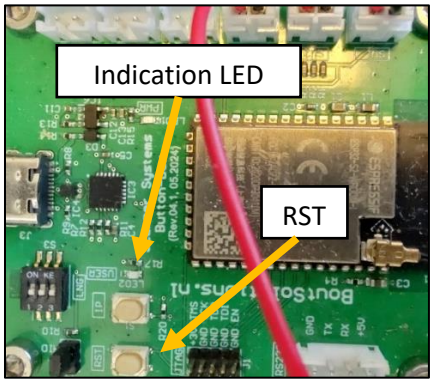
Buttonbox PCB



Buttonbox dipswitch configuration sheet for V24, and higher

Please note that the Buttonbox will require a reboot when setting dipswitches to apply the settings.

You can also change the HID typing speed of the Buttonbox, which is normally **15ms** total per HID event. Please read more about the inner workings of how the Buttonbox types in chapter 3.5.
The Buttonbox can also be set to type characters at **2ms** total per HID event. This can be done by holding the main scanner trigger button (the button that triggers both scanners). If you don't know which button should trigger two scanners (and you have a Buttonbox with multiple buttons), since you've only connected one scanner for example, open up the lid of the Scannerbox, and start pressing buttons, until you see a white LED flash, to indicate the Scannerbox is sending a trigger signal to both scanner ports. Now you should hold down the "trigger both scanners" button, and press the "RST" button on the Buttonbox PCB, like in the picture below:



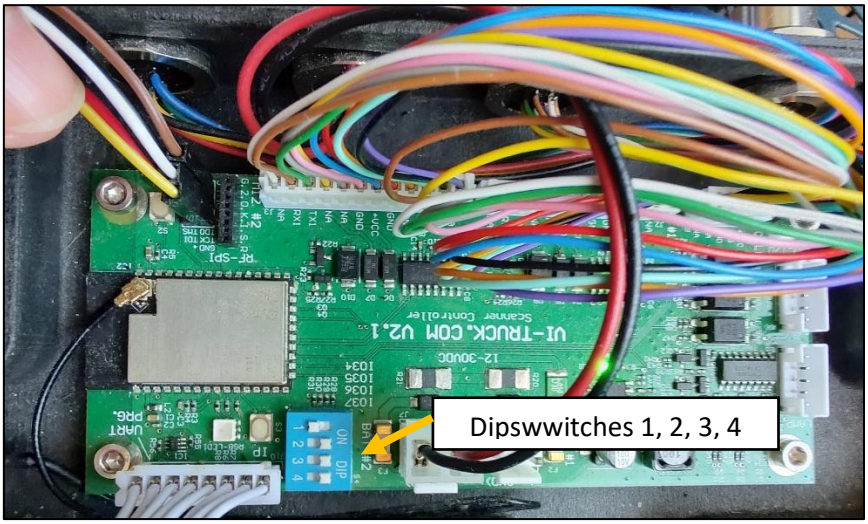
Buttonbox PCB

You can now release the "RST" button, and you should see a green LED on the Buttonbox PCB blink once or twice. If it blinks twice, it indicated that HID will now be typed at a fast speed. If the LED blinks once, it means that HID will type at a safe speed. You can repeat this procedure to switch between slower typing, and faster typing mode.

Be cautious about using the fast HID mode, since your data might be lost due to the Buttonbox typing codes too fast into your system. Please conduct tests to see if your system can handle this speed.

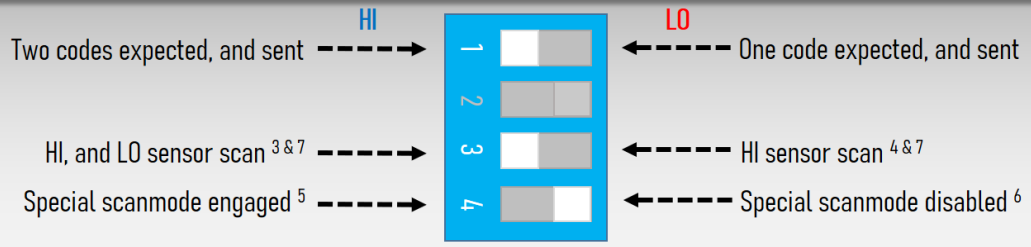
2.3.1. The Scannerbox

The dipswitches on the Scannerbox have quite different purposes. Most of them are to do with which scanners to trigger, and how many codes the system is expecting. Please look at the pictures down below on how you can set up the dipswitches for your application:



Scannerbox PCB

Bout Solutions ScanSystems – Scannerbox: Dipswitch cheat sheet v28



1. When dipswitch 3 is set to " HI ", the scanners will be triggered when approaching an object, and when getting away from the object. The scanned codes from when you approached the object won't be filtered out as duplicates when you get away from the object like what normally happens when a scan triggered by the sensor is initiated.
2. When dipswitch 3 is set to " LO ", the scanners will only be triggered when approaching an object, and when triggered again via a sensor trigger, the system will filter duplicate codes if it detects the same code is being scanned with the same scanner as last round.
3. When dipswitch 4 is set to " HI ", you can set which scanner will be triggered when triggering the photo cell, or by pressing the button on the Buttonbox that normally triggers both scanners (full scanner activation). You can set which scanners will be activated by using the buttons on the Buttonbox that normally control the activation of one scanner to set which scanner will be activated with sensor trigger on the Scannerbox. By pressing both the single scanner buttons at the same time, and holding them for 1 second, you will reset the full scanner activation to the sensor trigger on the Scannerbox, and both scanner trigger button on the Buttonbox again.
4. When dipswitch 4 is set to " LO ", all scanners will be triggered by scanning with the sensor on the Scannerbox, and pressing the button that triggers both scanners on the Buttonbox. !NOTICE! This mode only applies for the 3 button Buttonbox variant.
5. When dipswitch 3 is set to " HI " when using connector J9 with a double sensor, on hi trigger scan with scanner 1, on lo trigger scan with scanner 2. When dipswitch 3 is set to " LO " when using connector J9 with a double sensor, Trigger both scanners by default, or when Special scanmode is enabled, trigger scanners based on what you've set in that mode.

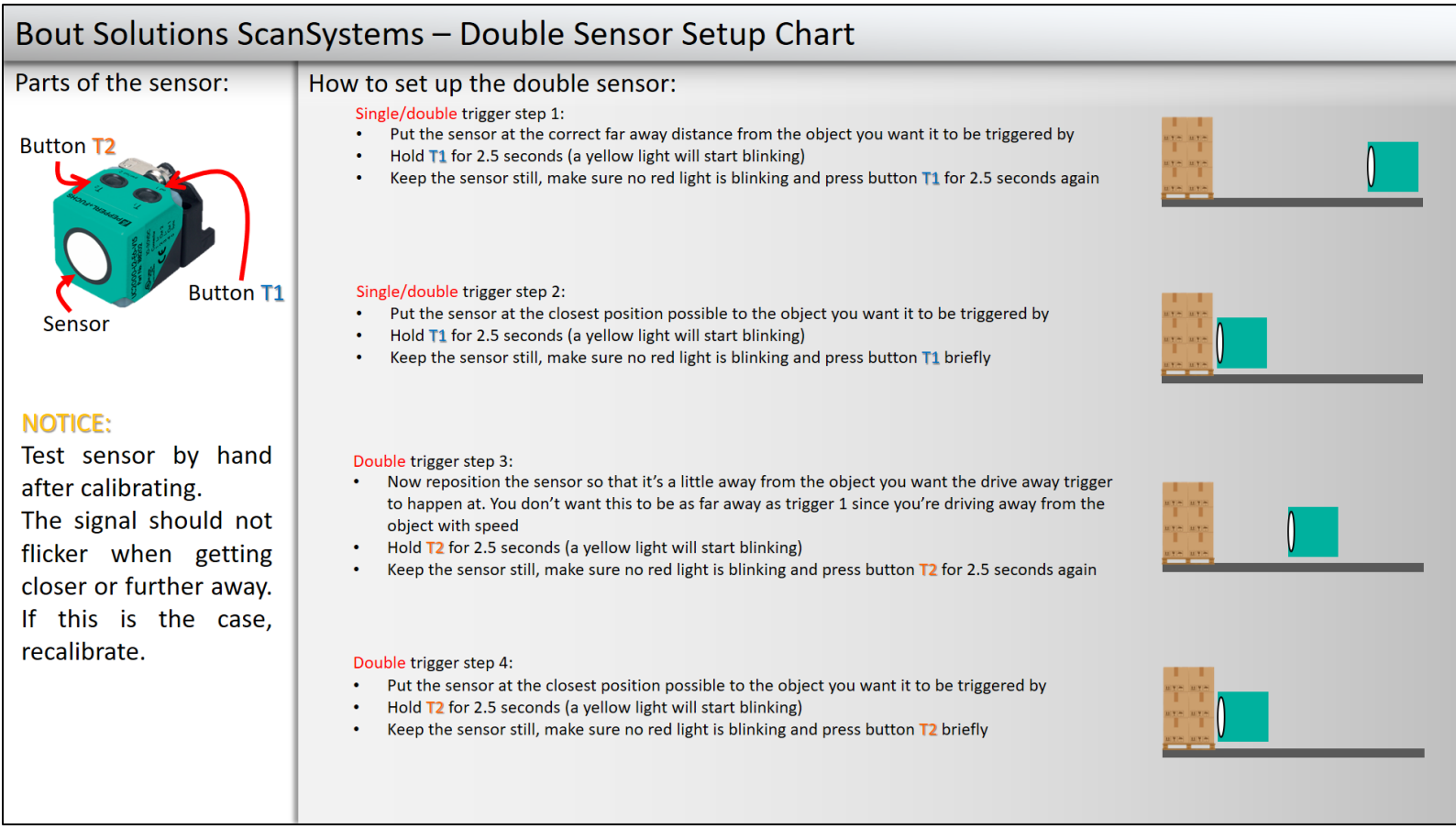
Scannerbox dipswitch configuration sheet for V28, and higher

* Connector "J9 with a double sensor": When connector J9 is routed from PCB to the sensor connector on the housing, and a double sensor is used. Read more in sub chapter 2.4.

2.4. Setting multi trigger sensors (and adjust scanner focus)

Setting up sensors is easy when you have a single IO sensor like the one depicted down below. You will probably find an adjustment screw or wheel to adjust the range at which the sensor will trigger.

When working with a double IO sensor, you can probably choose a near trigger point, and a far trigger point. In the picture down below, you can see how to setup our recommended sensor for the system, the Peffer Fuchs Uc2000-L2-E6-V15:



Peffer Fuchs Uc2000-L2-E6-V15 - setup chart

Please note that the double sensor has be routed to the J9 connector on the Scannerbox PCB via the sensor connector on the housing. This way the system can detect if a single sensor is used, or a double sensor.

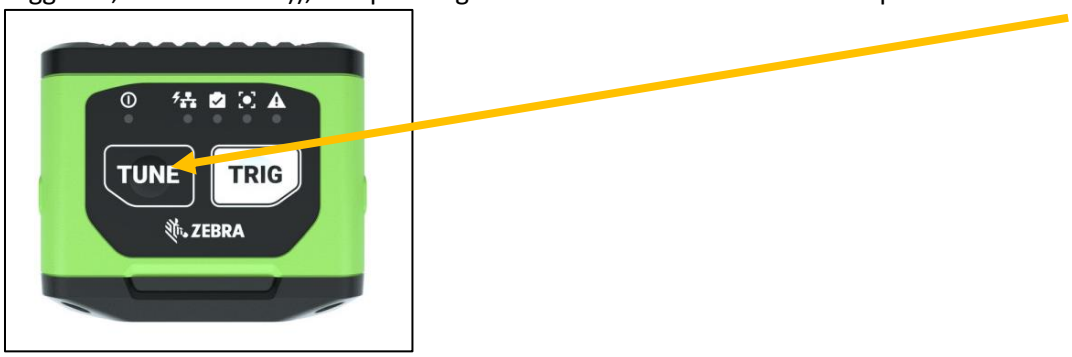
2.4.1. How to determine the trigger point(s)

The further away codes are, the longer they stay in focus for a camera lens if you approach them with a steady speed, versus if you approach codes with the same steady speed but closer by. This means that you don't want the sensors to be triggered too late, since your scanners will have a smaller focus timeframe, however if you trigger your sensors too early, you might get unintentional triggers, or the resolution of the scanners is too small to read a barcode. This will be made worse by bad lighting conditions, since the scanners will have to use their on board lighting, which won't reach as far forward to scan codes versus using good static internal lighting in a modern warehouse.

Since there are the above variables, and possibly more, the base trigger length to trigger the scanners is a practice of trial, and error. A good starting point would be to configure the trigger sensor to start triggering at 80-100cm. Keep in mind that depending on the scanner, there might be a slight delay between the trigger being given to the scanner (which with the ScanSystems is nearly instant) from receiving the trigger from the sensor, to the scanners being actually activated. You can test this by triggering the Scannerbox with the Buttonbox, or sensor, and see how long the attached scanner(s) need to start scanning. If there's a delay of 20ms for example, you should trigger 20ms early from the scanning sweet spot.

2.4.2. How to calibrate the camera for a specific trigger point

With the Zebra FS40, it's quite easy to calibrate the camera for a specific trigger point. This is done by holding the camera at the desired calibration spot (the point where you want the camera to start scanning (not the sensor trigger point per se, since there might be a delay between the scanner being triggered, and activated)), and pressing the "Tune" button as seen on the picture down below:



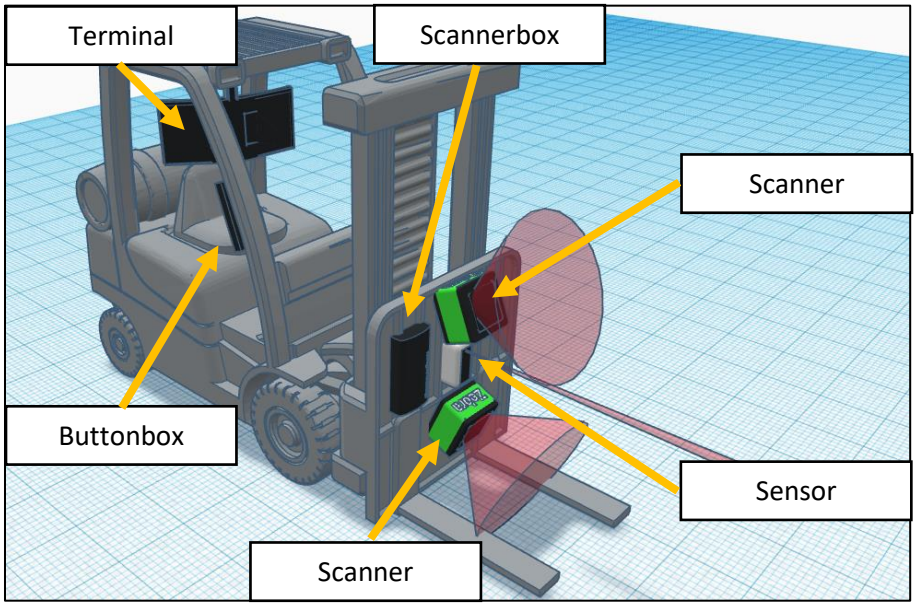
Please hold the scanner(s) stationary while they/it perform(s) their/it's calibration routine. After the routine is complete, you should hear a beep, or if not the case, you should see that no lights on the camera(s) are flashing anymore for 5 seconds anymore already.

The camera(s) should now be calibrated for the correct trigger length.

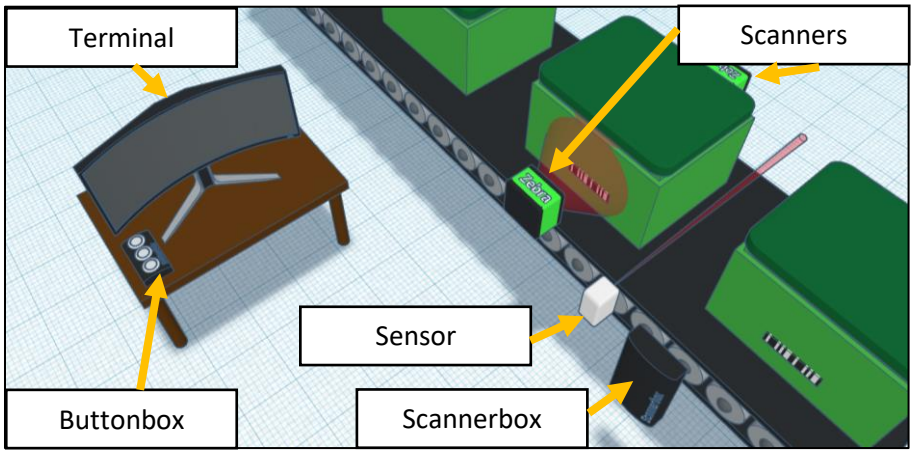
2.5. Where should everything be installed

In short, you provide power in some way to the Scannerbox. You connect the scanners of choice to the Scannerbox, then connect optional sensors, and lastly connect the Buttonbox to the device you want to get the codes to be typed into.

It doesn't exactly matter where you install the ScanSystem, and how, but you generally want to position the Scannerbox close to the Scanners, and in a way that the scanners will be stationary in relation to the position of the Scannerbox. This will ensure there will be no wear at all in the cables connecting the scanners to the Scannerbox. If you are installing the ScanSystem on a forklift, you would put the Scannerbox on the fork board besides the scanners. The Buttonbox can then go into the cabin of the forklift close to the terminal it's connected to, so the operator doesn't need to press buttons outside the cabin, and no cables need to go through the mast this way. The same rule applies to cable wear as with the scanners, and Scannerbox. Please connect the Buttonbox stationary relative to the terminal it's connected to so it's connecting wire won't move and also will not wear out. After installing the ScanSystem, it's cables, the sensors, and scanners, make sure no cables can get stuck between parts of the system you've attached the system to, and that cables are neatly organized so they have no chance of being caught by another machine or object.



ScanSystem mounted on a forklift

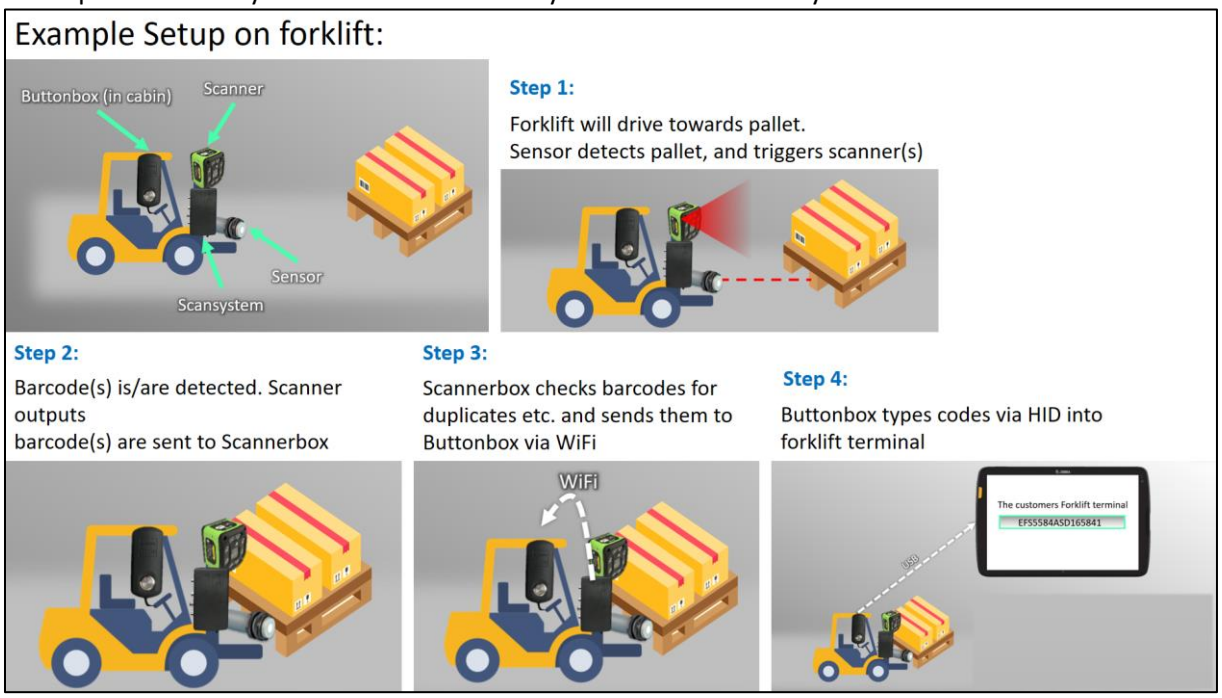


ScanSystem mounted on a box scanning line

3. The ScanSystems software

This chapter will explain how the software of the ScanSystem works, to give you a complete understanding of what the system will do in certain situations.

In the picture below you can see how a scan cycle works when the system is mounted on a forklift:



3.1. The boot-up sequence, and the wait state

If you supply power to the Buttonbox, and Scannerbox, they will boot up. This takes about 4 seconds max, after which the devices will go to their default wait state. If you were to press the connection button on one of the devices during the boot up stage, it will go into connection mode. A light will light up accordingly. Connection mode can be exited by pressing the reset button on the device. This will start the boot up process all over again.

3.1.1. The Scannerbox

In the default wait state, the Scannerbox will wait for a trigger from the Buttonbox, or a trigger from a connected sensor to start scanning.

3.1.2. The Buttonbox

In the default wait state, the Buttonbox will wait for a button press from the user, or codes from the Scannerbox.

3.2. Triggering

You can trigger the Scannerbox by either a trigger from the Buttonbox, or a connected sensor. When a connected sensor triggers the Scannerbox, it will give a sensor trigger to the system. Based on the Scannerbox Dipswitch settings (see chapter 2.3) the system will start scanning with one or more scanners.

You can also trigger the Scannerbox with the Buttonbox. When triggering with the one button Buttonbox, all attached scanners will be triggered. When triggering with the three button Buttonbox, depending on which button you use, different scanners might be triggered. This also depend on the dipswitch settings on the Scannerbox (see chapter 2.3).

3.3. Scanning

When scanners are triggered via the Scannerbox, they will look for codes as configured in the Zebra Aurora software when using Zebra scanners. When the scanners have found codes, these codes will be sent to the Scannerbox via RS232 which is waiting for the codes for a fixed amount of time. When no codes are received in time, codes that arrive later are ignored. If scanner data isn't terminated with **<ETX>**, codes will also be ignored. This is done so code's that aren't complete will not be processed. Codes might not be complete when they aren't transmitted in time, or they are too long, or not transmitted correctly. You do not have to start adding **<EXT>** to all of your codes, you can just configure the Zebra scanners to send one **<EXT>** character at the end of all scanner data of each scanner. This should already be included in the default job you got for the scanners. If not the case, please contact your ScanSystems contact person.

 Do not use any **<ETX>** characters in your scanner output as delimiter for example, only as an end suffix. Otherwise the system will think that the end of the output from one of the scanners has been reached. The Scannerbox basically sees the **<ETX>** as a stop bit. This is why there's no guarantee that characters received after **<ETX>** will be processed.

 Please note that the ScanSystems won't process more than a combined total of **254** characters per scan cycle. One scanner could send **200** characters, while the other would be able to send **54** characters more (including termination characters). You could also use one scanner to send for example **240** characters, and the other to send a maximum of **14** more characters.

 The ScanSystems can type an ever growing amount of Extended ASCII characters, however not all characters have been implemented yet. The ScanSystems support all English alphabetical characters (capital, and lowercase). Characters with accents are not yet supported. The following special characters are also supported: \ ' " \ ( ) [ ] { } , . ; : | < > ` ~ ! @ # $ % ^ & * - + / = _

3.4. Receiving codes

When the Scannerbox has received codes from one or more scanners, it will check if the code is a duplicate code from the same scanner from the previous scan if a sensor attached to the Scannerbox was used to trigger the scanner(s). When the scanner(s) was/were triggered by the Buttonbox, there will not be checked for duplicate codes. This is done since when using a sensor, it could potentially double trigger, and scan the same barcode multiple times, but when using the Buttonbox to trigger, the operator should know when to scan, and when not to scan. It also depends on the dipswitch configuration on the Scannerbox whether duplicate codes will be filtered out: (see chapter 2.3).

If only one code is received when the system expected two codes, it will take longer for the single code to be sent to the Buttonbox, since the Scannerbox is still waiting for the second code to arrive. If you only expect one code, please see (see chapter 2.3).

3.5. Typing codes into your system

Now when the codes have been received, and processed by the ScanSystem, they end up in the Buttonbox. The Buttonbox will then type the codes.

3.5.1. HID speed

Typing codes into a system of choice with HID normally happens at a speed of **15ms** per HID event (**14ms** delay between characters, and **1ms** keystroke time). The letter **a** takes **15ms** to type for example on a US lay-out system, but the letter **A** (capital) takes **30ms** to type on a US lay-out system, since shift has to be pressed, and then the scan code of the letter **a**. There are even more complex characters that take longer to type.

This **14ms** delay between characters was done to prevent data getting lost on slower Android systems. Bout Solutions concluded that **14ms** is the perfect balance between speed, and data integrity. However if you have a system that can handle a faster typing speed, you could set the Buttonbox to type at a **1ms** character delay, which essentially makes typing **7.5 times faster ((14+1)/(1+1))**. To see how you can set this speed, please read chapter chapter 2.3.

Of course, different languages use different key combinations to type, so depending on the selected language on your Buttonbox (chapter 2.3), it may take less, or more time to type data.

3.5.2. Set custom HID delays

There is one other formatting rule which can be very powerful. When you send an **<ESC>** character to the ScanSystems, it will pause for **50ms** per **<ESC>** character while typing with HID, at the place in the string you put the character. You can use as many characters as you like until the max allowed ScanSystems characters which you can read in sub chapter 3.3.

4. Updating the ScanSystems firmware

 Please **do not open** the Scannerbox/Buttonbox yourself, and **do not update the ScanSystem yourself,** without receiving instructions to do so.

If you want to see if you can update your ScanSystems to a newer firmware revision, please contact your ScanSystems contact person about the process to update your ScanSystems. Please also have a look at the following documents: **"Bout Solutions - ScanSystems Updater Tool manual"**, **"Bout Solutions - ScanSystems software hardware compatibility list"**.

5. Troubleshooting

 Please **do not open** the Scannerbox/Buttonbox yourself, and **do not configure the ScanSystem and attached sensors and scanners yourself,** without receiving instructions to do so. You may find faults with the system in this chapter, and report them back to your contact person, but please follow the rules above.

If you find that you are having problems with the ScanSystem, please consult this page to see if your problem can be solved this way. Don't you see your problem in the list, or you still can't find out why your system isn't working? Please reach out to your ScanSystems contact person. Also if you can't test the system for any specific reason, also don't hesitate to contact your contact person.

 If you report a problem to your contact person, please try to include your ScanSystems **version number**, which you can find on the label on the back of the Buttonbox, or Scannerbox if you got a newer version of the system. If you got an older version you can look up when the system was ordered, since Bout Solutions might know when that version was released. There's one other indicator. Starting with **V24**, when triggering all scanners, the LED on the Scannerbox PCB lights up white instead of the old versions where it lights up blue. If you have a Buttonbox with the red PCB revision, the version on the system has to be lower than **V28.2**, since from **V28.2**, the red Buttonbox PCB revision is not supported anymore.

5.1. System won't scan

If your ScanSystem won't scan, or the system is scanning, but the scanners aren't triggered, there could be problems with the scanners, or the Scannerbox itself.

Test the following to find out if your problem is the ScanSystem, or the scanner(s):
Take the lid of the Scannerbox, and please check if you can trigger the Scannerbox by using a sensor connected to it. If it can, you should see a LED light up on the PCB of the Scannerbox indicating a trigger was received, if no trigger was received, please try the Buttonbox to send a trigger to the device, if these methods don't work please see sub chapter 5.1.1. If you can trigger the Scannerbox, go to sub chapter 5.1.2. If the Scannerbox is triggered by only the attached sensor, you should try to reconnect the Buttonbox and Scannerbox together (seen in chapter 2.2), or move the devices closer to each other.

5.1.1 Scannerbox isn't triggered

If the Scannerbox isn't triggered by using the Buttonbox as a trigger, and/or an attached sensor, it could be that the Buttonbox isn't connected, and your connected sensor is broken. Please check if you still can't trigger the device using a new sensor. Also please try to reconnect the Scannerbox, and Buttonbox to each other according to the steps in chapter 2.2. Also check if the Scannerbox, and Buttonbox are powered on by reading sub chapter 5.3.

5.1.2 Scannerbox is triggered, but scanners aren't

Check if the scanners are turned on by looking at the power LED's on the scanners. If this is not the case, please look at sub chapter 5.3. If the scanners are turned on, it might still be possible that the cable connecting the scanners to the Scannerbox is broken even though it is providing power. Please replace the cable and see if this fixes the problem.

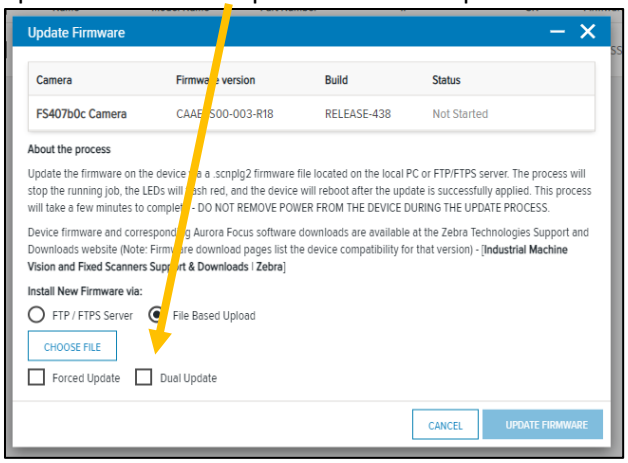
If the problem only happens with one scanner, and switching cables isn't helping, try switching the scanners around on the Scannerboxes scanner ports. If it works on the other port, the port might be faulty or cables connecting to the Scannerbox PCB might be loose. Please contact your ScanSystems contact person at that point.

If the problem happens with one scanner when two scanners are connected try to disconnect the working scanner to see if the other scanner can now trigger. If this is the case, it might be that your connected power source is not delivering enough amps. If you are using the battery powered Scannerbox, please replace the current battery/batteries with new Makita branded batteries, and if you're using the externally powered Scannerbox, please replace the power supply with one you know has enough amps to drive the scanner(s). Using a clean DC voltage between 12, and 30v also helps. The scanners might not like it if the power provided to them is not consistent. The Scannerbox delivers power to it's connected devices like sensors and scanners without smoothening it. If replacing the power source with a known good one doesn't help, please contact your ScanSystems contact person.

5.2. System scans but codes aren't typed into my terminal

Please make sure the Scannerbox, and Buttonbox are connected to each other, and are in a closer proximity to each other. Follow the steps in chapter 2.2 to make sure.

When using the Zebra FS scanners, there are two things that can go wrong with them which makes it seem like codes are scanned, but not typed into the terminal. Problem 1 is that if you've updated your Zebra scanners, make sure to factory reset them after the update. This is extremely important, and they might not send codes via serial connection to the Scannerbox anymore until you've factory reset them. Please follow the official factory reset procedure explained in the manual of the Zebra scanner you're using. Problem 2 is that the Zebra FS series of scanners have two banks where you can flash firmware to. This is done so that might the update in the primary bank crash/power off unexpectedly more than an x amount times, your Zebra scanners will choose to run on the old firmware in the fallback bank. It is therefore a good idea to update both of your Zebra scanners banks, so that it will run the same version of the firmware you've updated it to, no matter the amount of unexpected power off events/crashes, which means your systems continue to function. To do this, you need to check the option called "Dual update" like in the picture below when on the update screen:



Zebra Aurora - Firmware update screen

If after reconnecting the other steps, you are still not receiving any codes, make sure you're not using a USB power only cable. This shouldn't be the case if you haven't modified the cable that came attached to the Buttonbox, but if you have, please open up the Buttonbox, and try to replace the cable. It's a good idea anyway to replace the cable at this point to see if the cable might be broken. If this still doesn't fix this the issue, please contact your ScanSystems contact person.

5.3. System won't power on (Scannerbox, and/or scanner(s))

To diagnose if your ScanSystem Scannerbox, Buttonbox, or Scanner(s) attached to the Scannerbox won't power on we will test a few things. Please see if your problem is in one of the sub-chapters down below.

5.3.1. Test if your scanner(s) won't power on, but the Scannerbox will

To test if your Scannerbox powers on, but one or more of your scanners connected to it won't, please take the lid of the Scannerbox to see if an LED is burning.

If an LED isn't burning please look at sub chapter 5.3.2. If this doesn't solve the issue, please see sub chapter 5.5.

If an LED is burning, it probably means your Scanners are indeed not getting power.
Firstly determine how many scanners you have connected to the system. If you only have one scanner connected which doesn't work, or two scanners that don't work jump to sub chapter 5.3.1.2.

5.3.1.1. If only one scanner is powered on with 2 scanners connected

When only one scanner is powered on out of the two scanners connected to the Scannerbox, try swapping the cables of the scanners to see if this fixes the issue, if with different cables still only one scanner powers on, please disconnect the second scanner that did work and test if the first scanner powers on. If not, try swapping it to the other scanner connector port. If it still doesn't power on, there might be an issue with your scanner. Please reach out to your ScanSystems contact person. If your scanner that wouldn't power on before now powers on with only that scanner connected to the Scannerbox, it likely means that your power source can't provide enough amps. If you are using the battery powered Scannerbox, please swap the current battery/batteries with new Makita branded ones. If you are using an externally powered Scannerbox, please try a different power source with a stable DC voltage between 12, and 30v. If this doesn't solve the issue, please contact your ScanSystems contact person.

5.3.1.2. If no scanner(s) is/are powered on

If you only have one scanner connected to the system, please try to replace the cable connecting the scanner to the Scannerbox. If this doesn't work, try connecting the scanner to the other scanner port on the Scannerbox. If this works, it's likely one of the ports on the ScanSystem is faulty or not connected properly. Please reach out to your ScanSystems contact person. If your scanner still doesn't power up it could be a faulty scanner. Please try to connect a new scanner to the Scannerbox, and try again with different cables. if this still doesn't solve the issue, please check how many amps your power source is supplying to the system. If you're using the battery powered Scannerbox, please try using new originally branded Makita batteries, if you are using external power, try a different power source with sufficient amps. If the scanner still won't power on after this, contact your ScanSystems contact person.

If you have multiple scanners connected to the Scannerbox, try to replace the cables of both scanners. If this doesn't yield a desirable result, try disconnecting one scanner, and connect it to both ports on the Scannerbox. If it powers on, there is likely an issue with how many amps your power source can deliver to the system. If you are using the battery powered Scannerbox, please try to swap the probably faulty battery/batteries with original Makita branded new batteries to see if this solves the problem. If this doesn't solve the problem, please contact your ScanSystems contact person. If you are using an externally powered Scannerbox, please try connecting the Scannerbox to a new power source with ample amps.
If you think that your power source can deliver enough amps, it might be too instable which could harm the scanners internals. Please try to use a smooth DC voltage between 12, and 30v.

5.3.2. Test if your Scannerbox powers on

Please take the lid of your Scannerbox, and connect it to the power source you were using when the problem occurred (if the power source isn't obviously compromised) if you haven't already.

If you see an LED consistently lighting up on the Scannerbox, it means that the Scannerbox is getting power, and is likely not having any power related issues.

If an LED is not burning, you might need to try using a different Makita branded battery if you are using the Battery powered Scannerbox, or a cleaner power source between 12, and 30v.

5.3.3. Test if your Buttonbox powers on

Please take the lid of your Buttonbox, and connect it to the power source you were using when the problem occurred (if the power source isn't obviously compromised) if you haven't already.

If you see an LED consistently lighting up on the Buttonbox, it means that the Buttonbox is getting power. Try to wiggle the USB connection cable inside the Buttonbox and the connecting end a little to see if the LED starts flashing, if this is the case you will need a replacement cable.

If an LED is not visible, try replacing the cable to see if that solves the issue, if not, please reach out to your ScanSystems contact person. If an LED is consistently burning, the Buttonbox is likely not having any power issues.

5.4. Scannerbox, and Buttonbox won't connect

The distance between Scannerbox, and Buttonbox might be too big, or you could have had a new Buttonbox, or Scannerbox that needs to be connected to the other existing device. Please read how to connect Scannerbox, and Buttonbox together in chapter 2.2.

If the above solution doesn't work, check if the Scannerbox, and Buttonbox are both powered on. You can see this by taking the lid of both devices. If an LED burns on both devices, they are powered on. If this is the case, please reach out to your ScanSystems contact person about the problem.

5.5. Triggers via sensor aren't correct/don't work

If you know the Scannerbox is powered on, and you can activate the scanners by using the Buttonbox as a trigger but you can't trigger the Scannerbox by triggering the attached sensor, please check if the attached sensor is broken or configured incorrectly by configuring it according to it's manual, or replacing it or it's cable with another.

If a trigger is still not getting trough, and you're using a double IO sensor, it could be that the wires connecting the sensor port to the PCB are configured for a single IO scanner. Please try to connect a single IO sensor (a sensor that only outputs one HI/LO signal instead of multiples), and check if you can now activate the system with that sensor. If this works, please contact your ScanSystems contact person to see if it's possible to see if rerouting the sensor connector to the right Scannerbox PCB connector is the correct solution.

If you're using a single IO sensor, or the previous paragraph didn't help you find a solution with a double IO sensor, please contact your ScanSystems contact person.