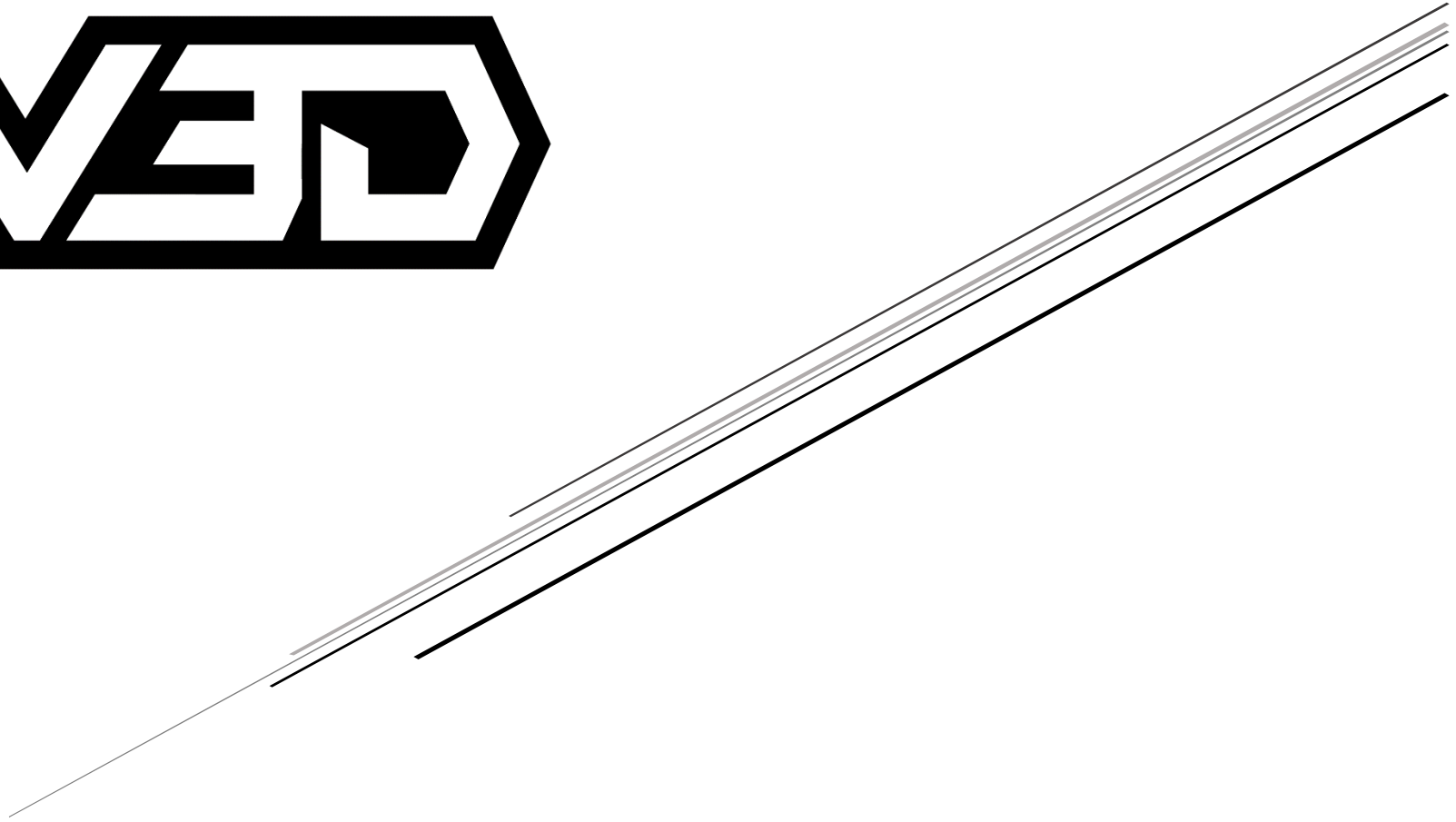
VLMP GUIDE

Vertical Linear Motion Press - Buyers Guide and Assembly Manual



Version 1.0

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Introduction

Congratulations on getting started with your Vertical Linear Motion Press! This documentation exists to help you through the purchase, assembly and setup process, guide you where to get help and support and hopefully answer any questions you may have.

A Note on Safety

One thing I do want to mention before we go any further is that this tool does integrate the use of a soldering iron in a way that it was not really intended to be used. Furthermore, soldering irons and the brass inserts they contact, do get very hot and can cause serious burns if not handled safely.

This documentation is intended as a guide to help give you the best chances of success with your press but neither the author(s) nor Vector 3D Limited will be liable for any harm caused in the assembly or use of this product.

Printing This Manual

If you need to print this guide out onto real paper then you can do it. It has been written in black and white so use of a laser printer is suggested as it's more efficient. However, I would strongly recommend against printing the manual out in light of considering the environmental impact, and having latest information available. Please don't print it unless you absolutely have to, even then consider printing part of it and not the whole thing.

Getting Help

You can ask on the Vector 3D discord in the #vlmp channel, we're here to help so come and join us using this link: https://discord.gg/xXmuUpJhxc

Giving Feedback

An important part of making a product or tool the best it can be is to collect feedback and create improvements based on that feedback. You don't have to provide feedback if you don't want to, but it is always welcome. The main port of call is for soldering iron grip sizes, please share in this google forms link the soldering iron you have, its dimensions, and the grip you used. Don't worry if you can't measure, fill in what you can, every little helps. Other feedback can be shared via the discord channel linked above.

Buyers Guide

The goal of this section of the guide is to make sure you have all the information you need to make an informed decision on your purchase. It'll cover what's included, getting the right size grip, soldering iron purchase tips as well as information on resellers.

Soldering Iron

VLMP requires a soldering iron to work but does not come with a soldering iron of any kind. This means that, unless you already have one, you will also need to purchase a soldering iron. It's fine to use a soldering iron for actual soldering as well as with VLMP for bass inserts but obviously these tasks cannot be performed at the same time. Additionally, it is recommended to switch out the soldering tip for a purpose-made insert tip (available on the website) so you'll need to wait for it to cool before switching tips.

If you need to purchase a soldering iron, here are a few tips to help you get a suitable model.

- Ensure it can reach around 300C or the melting point +30C of the plastic you want inserts pressed into.
- Ensure the iron uses the common exchangeable tips
- Ensure you can temperature control the soldering iron
- Ensure the iron has an on/off switch.
- Additionally soldering stations with removable soldering irons may be a useful option.

Soldering Iron Tips

While not required, it is highly recommended to use purpose-made threaded insert soldering tips on your soldering iron rather than standard soldering tips. A soldering iron tip is typically pointed, as you get closer to the tip which can cause two problems. Firstly the tip may protrude out the end of the threaded insert and touch the plastic directly which is undesirable. Secondly, the tip can easily get stuck in the threaded insert due to the force used to press it into the plastic.

A purpose-made tip for threaded inserts has a stepped tip which allows not only for pressure to be applied in a more controlled direction but also not get stuck in the body of the threaded insert. They can also be designed so that the tip does not protrude from the rear of the insert, although this is obviously also dependent on the size of the insert used. Figure 1 shows a comparison between a typically pointed soldering iron tip and a threaded insert tip.

These tips can be purchased with your VLMP, or seperately, just be sure that they fit your soldering iron.

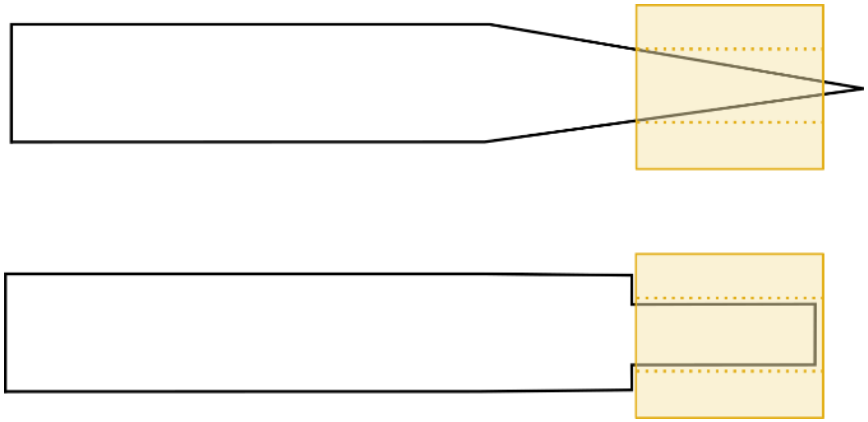


Figure 1: Typical soldering iron tip (top) compared to a purpose made threaded insert tip (bottom).

Getting a Grip

For the VLMP to correctly and safely hold the soldering iron it's important that the grip on the VLMP is the correct size. Getting the right size is fairly easy, and there is some flex in the printed part too so you don't have to be too precise.

The first method is to measure. As many soldering iron grips are tapered, meaning they are wider at one end than the other, the grip will need to reflect. Assuming that the taper on the grip is consistent, you'll need to take two measurements. Firstly measure the diameter of the grip in the region closest to the soldering tip. Secondly, measure the diameter again, but around 30mm further away from the tip. 30mm is selected because this is about the length of the VLMP grip.

If you are buying your printed parts directly from Vector 3D then you simply need to provide these two numbers in the provided field at checkout.

If you are going to 3D print the grip yourself, you can use these two dimensions you measured in the fusion360 file of the grip to get the correct size. In fusion360, open the provided grip file, then open the parameters. There are two variables which can be modified, diameter 1 and 2. Enter the first measurement you took, typically the larger one, as diameter 1 and the other as 2. Then close the box, and export the model as a mesh by right-clicking the top level component, then "save as mesh".

An alternative option for getting a grip would be to use a 3D Printing bureau service, contact a local maker space with 3D printers, or ask other community members that may be close by.

The other option for finding the correct size for your soldering iron is to use the community-contributed values. On this google sheets document are a number of entries submitted by other members of the VLMP community to help you get the right grip size. Simply look down the list or use ctrl+f and enter the model number of your soldering iron. There may be multiple entries, but with a bit of luck, they'll all have the same results, or at least very similar. Over time we'll try to verify as many soldering irons as possible and match them to specific grips so you can be 100% certain about what size you need.

Whether you printed the grip yourself or had one sent to you, please share the final size you settled on via this google form[AM1]. It will add your entry to the spreadsheet to help others have the same success.

Printing Parts Yourself

If you don't want to, or can't, print your own parts then you can buy them from the Vector 3D shop directly. However, since as many of you will own a 3D printer already, it may make sense to print your own parts and buy the hardware kit. If this is what you want to do just be sure to follow this advice to get the best results.

When slicing the files, the suggested settings are 2 perimeters and 15% infill for most of the parts. For the grip, increase to 3 perimeters. You can use more perimeters and infill if you want to, but I've found that this is plenty.

As most of the parts do not need any temperature resistance PLA is fine for the material, it makes the process easy and reliable. If you want to swap this out for PETG, ABS, or any other material this should be fine. For the grip, this must be printed in a temperature-resistant material like ABS, ASA, polycarbonate etc.

PART	QUANTITY	MATERIAL
GRIP	1	ABS/ASA/ABS+
FINGER NUT	1	PLA
HARD STOP	1	PLA
CARRIAGE	2	PLA
ARM	1	PLA
COUNTER ARM	1	PLA
IDLER	1	PLA
BASE	1	PLA

Table 1: Print Settings for VLMP 3D printed parts.

STL Files

If you have already purchased, the STL files for VLMP can be downloaded from the 'downloads' section on the 'my account' page so you'll need to login to the website. If you're looking to get the files, you'll get the STLs for free if you buy any hardware kit or printed parts. Alternatively you can purchase the STLs on their own.

Resellers

In order to get the VLMP to as many of you across the globe as possible, we will be working with resellers to distribute to other regions and countries. Please check our website for the current list of resellers.

Other Questions

- Is PLA strong enough?
  - Yes, definitely. PLA is actually a pretty strong material. It's only really weak against to very fast 'shock loading' or temperatures over around 50-60C. Most of the parts on VLMP do not have shock loading or high temperature. The grip obviously gets warm so ABS is used here.
- Where can I access the files?
  - If you have already purchased a VLMP from Vector3D directly then you'll be able to download the files from the 'downloads' section of the 'my account' page.
  - If you have not already purchased VLMP then the files are available to purchase separately.

Assembly

Tools

Assembly has been designed to be simple and easy, four tools are needed for assembly and calibration.

- 2mm Allen Key
- 3mm Allen Key
- 8mm Spanner or Hex Socket
- 10mm Thin Spanner

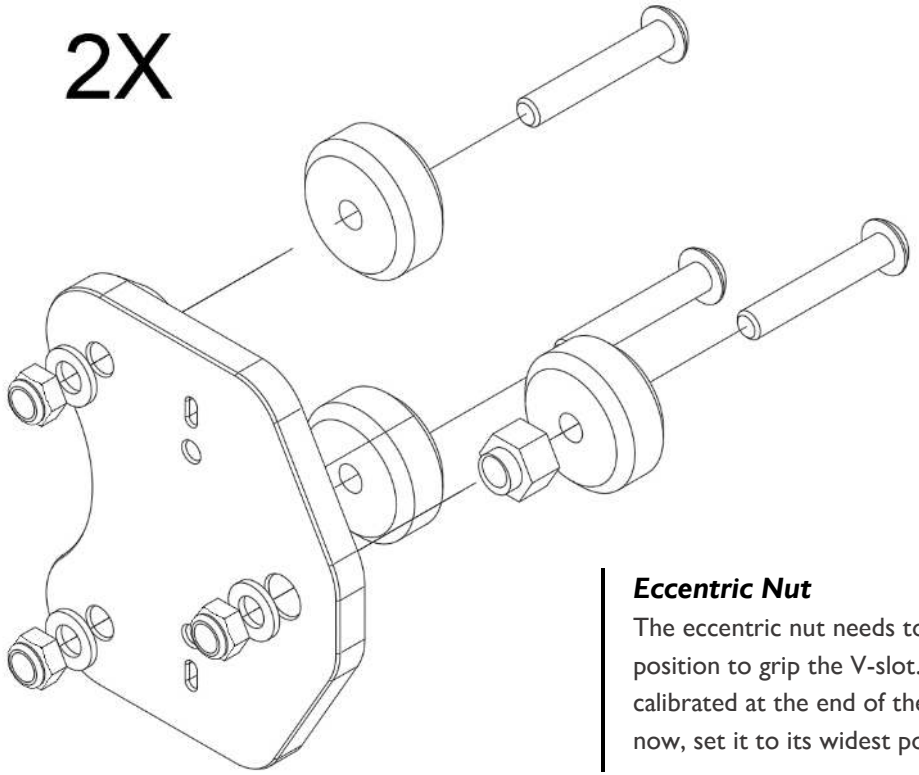
Hardware List

It might be a nice idea to check that you have all the parts you need before starting, the following is the included hardware list. You'll also need the 9 printed parts.

- 1x 2040 Extrusion
- 1x Rubber Foot
- 1x 6mm 2GT Belt
- 4x Bearing
- 2x M3 Hammer Nut
- 6x M3 Nyloc Nut
- 1x M3 Washer
- 6x M3 x 12 BTN Screw
- 2x M3 x 8 BTN Screw
- 2x M5 Eccentric Nut
- 8x M5 Nyloc Nut
- 1x 2040 Extrusion
- 1x Rubber Foot
- 1x 6mm 2GT Belt
- 4x Bearing
- 2x M3 Hammer Nut
- 6x M3 Nyloc Nut
- 1x M3 Washer
- 6x M3 x 12 BTN Screw
- 2x M3 x 8 BTN Screw
- 2x M5 Eccentric Nut
- 8x M5 Nyloc Nut
- 8x M5 Washer
- 4x M5 x 12 BTN Screw
- 2x M5 x 18 BTN Screw
- 6x M5 x 30 BTN Screw
- 1x M8 Nut
- 20x M8 x 38 x 1.5 Washer
- 1x M8 x 70 HEX Screw
- 6x V-Slot Wheels

Step 1 – Carriages

- 6x M5 x 30mm
- 6x V-Slot Wheel
- 6x Washer
- 6x M5 Nyloc Nut
- 2x Eccentric Nut



Eccentric Nut

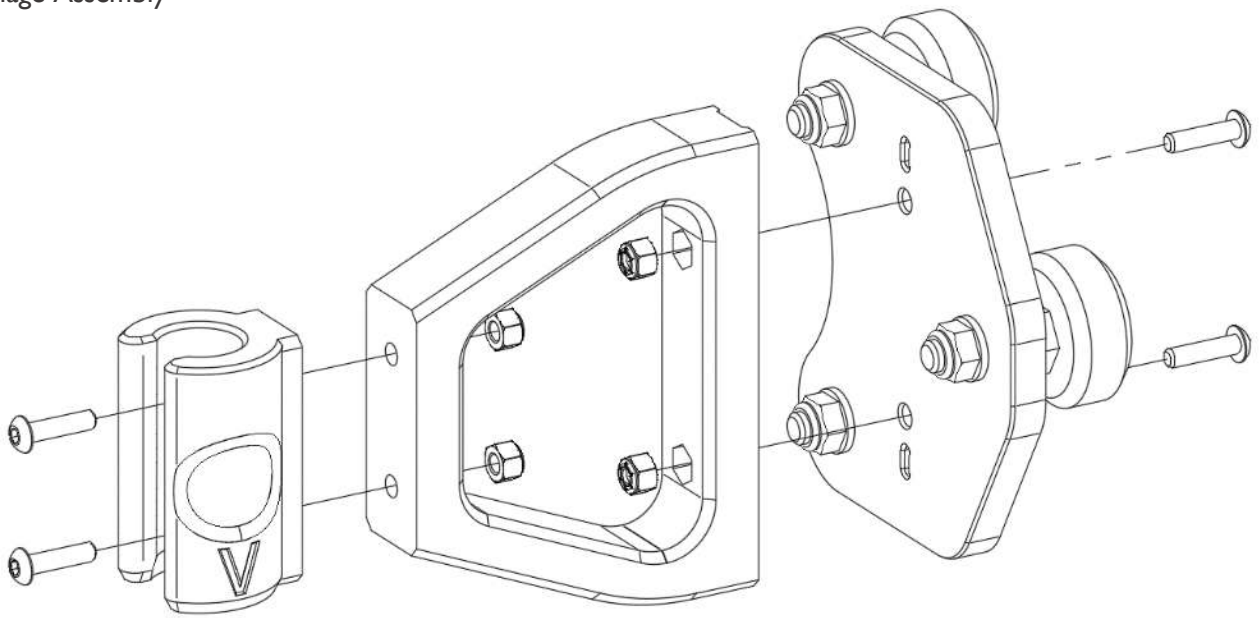
The eccentric nut needs to be in the correct position to grip the V-slot. This will be calibrated at the end of the assembly. For now, set it to its widest position.

Step 2 – Main Arm

- 4x M3 x 12mm
- 4x M3 Nyloc
- Grip
- Arm
- Carriage Assembly

Belt Grip

Don't tighten the M3 screws fully yet.



Iron Grip

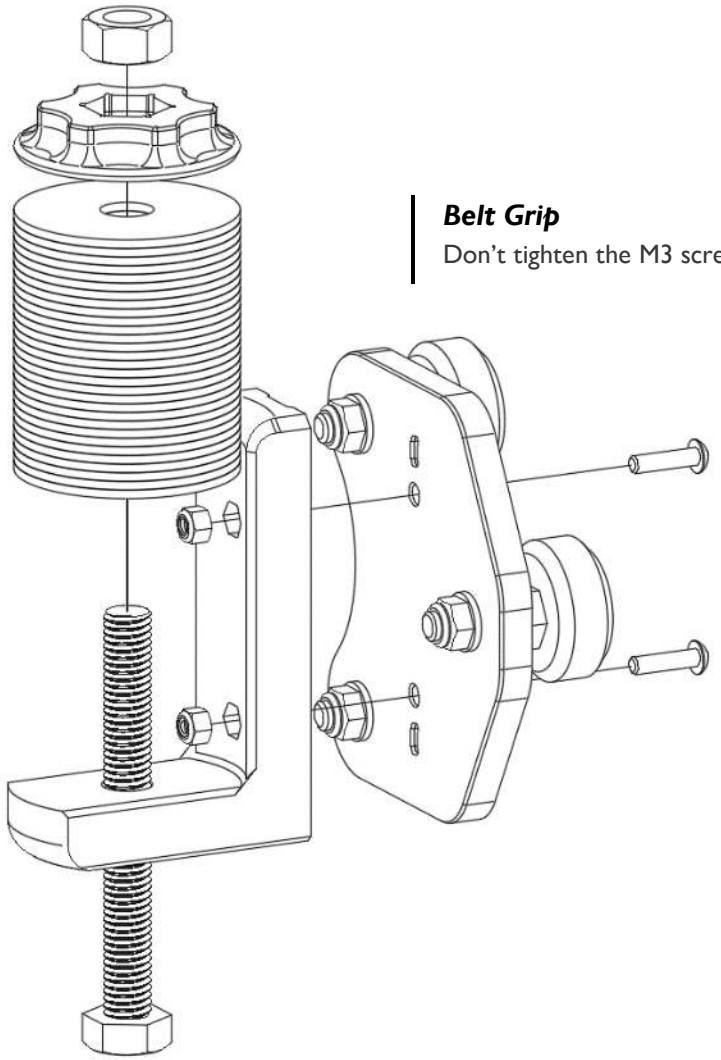
The V must point downwards for the taper to hold the soldering iron correctly.
Remember this for later.

Step 3 – Counterweight Arm

- 2x M3 x 12mm
- 2x M3 Nyloc
- 1x M8 x 70mm
- 1x M8 Nut
- 1x Counter Arm
- 1x Finger Nut
- 1x Carriage Assembly
- M8 x 38 Washers

Counterweight

No need to add all the washers, just add 10 now, we'll calibrate the weight at the end of the assembly.



Belt Grip

Don't tighten the M3 screws fully yet.

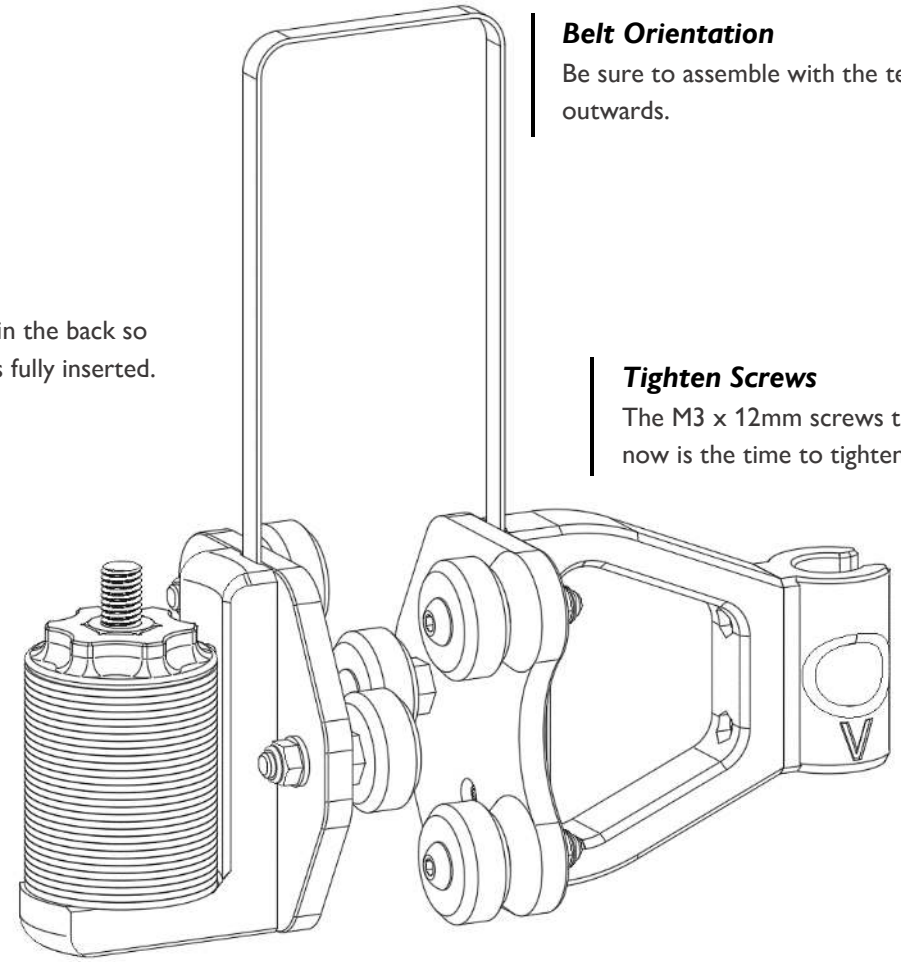
Step 4 – Belt

- 6mm wide belt

Belt Orientation
Be sure to assemble with the teeth pointing outwards.

Assembly Check
The carriage has a small slot in the back so you can check that the belt is fully inserted.

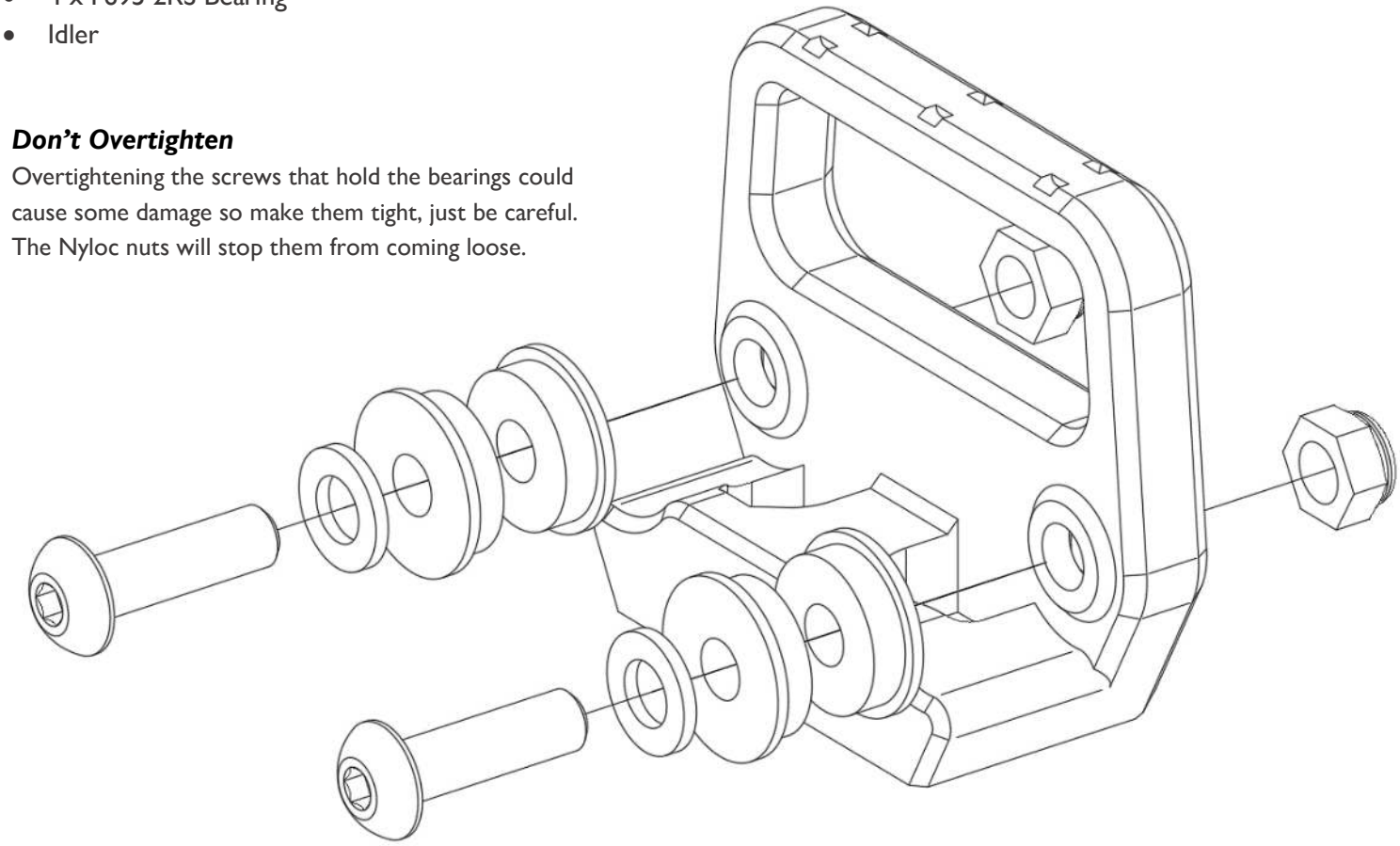
Tighten Screws
The M3 x 12mm screws that you left loose before, now is the time to tighten them to clamp the belt.



Step 5 – Idler

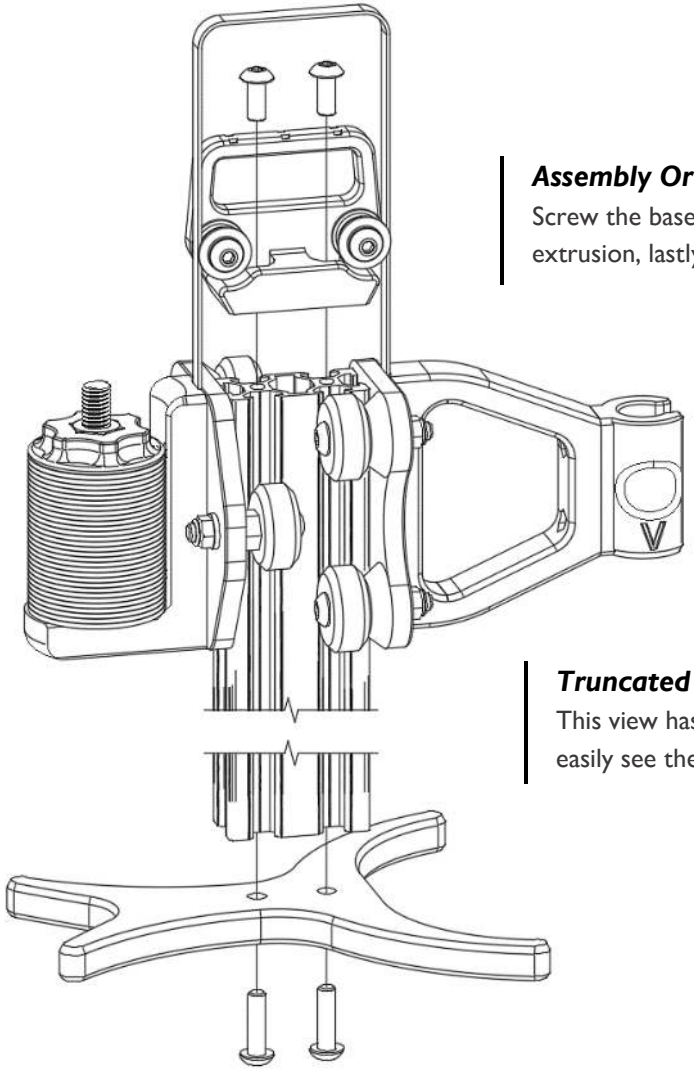
- 2x M5 x 18mm
- 2x M5 Washer
- 2x M5 Nyloc Nut
- 4 x F695 2RS Bearing
- Idler

> ***Don't Overtighten***
> Overtightening the screws that hold the bearings could cause some damage so make them tight, just be careful. The Nyloc nuts will stop them from coming loose.



Step 6 – Bring it Together

- 4x M5 x 12mm
- Carriages assembly with Belt
- Idler Assembly
- V-Slot Extrusion
- Base



Assembly Order

Screw the base on first, then slide the carriages onto the extrusion, lastly add the idler assembly on top.

Truncated View

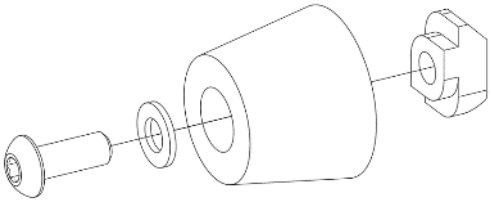
This view has been truncated so that you can more easily see the important parts.

V-Slot Wheels Don't fit?

The eccentric nut allows adjustment of the v-slot wheels. If the carriages don't fit onto the extrusion, try adjusting this nut.

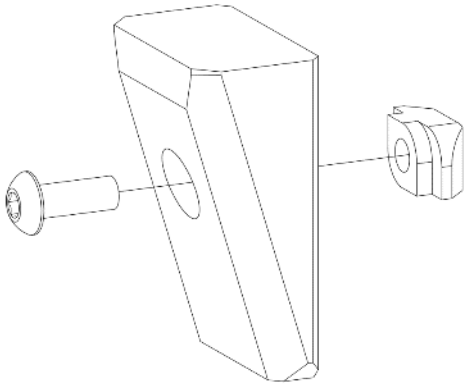
Step 7 – Endstops

- 2x M3 x 8mm
- 2x M3 Hammer Nut
- 1x M3 Washer
- Rubber Bump Stop
- Hard stop



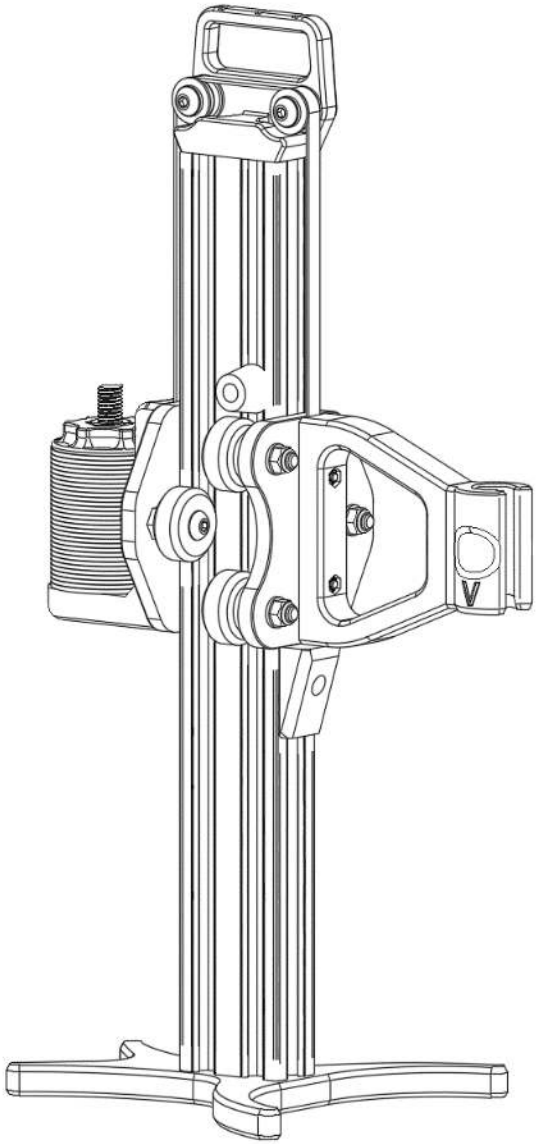
Soft Stop

The soft rubber end stop is designed to softly stop the reset motion driven by the counterweigh. You can place it anywhere, its fully adjustable in the V-slot.



Hard Stop

The hard 3d printed end stop is designed to mount beneath the soldering iron carriage for repeatable end stop insertion. It's fully adjustable and you can slide it to the bottom any time you don't need it.



Final Setup and Calibration

For ideal smooth and consistent motion its best to go through this quick setup and weight calibration procedure before using VLMP for the first time.

V-Slot Wheel Adjustment

The goal with V-slot wheel adjustment is to get low resistance motion without wobbling, this will be a little looser than what you might be used to on a 3D printer.

Each carriage has one eccentric nut which is used to adjust the v-slot wheels. The other nuts should be tight. To adjust the eccentric nut, first check how much the carriage wobbles, if it does, tighten the eccentric nut. The tightening is cyclic so either way can tighten, just find which way works for you. Next check the motion of the carriage, lift the second carriage so the belt is not under tension, then see if first carriage moves freely. If it does move freely, and there is no wobble, all is good, tighten the nyloc nut to ensure the eccentric nut cannot rotate and you're good to go. Repeat the process with the second carriage.

Weight Calibration

Only do weight calibration after adjusting the eccentric nuts for correct V-slot alignment. This is important as it affects rolling friction and therefore the counterweight needed.

Firstly, install your soldering iron into the grip and, if you want to manage the cable, zip tie it to the top handle ensuring that full motion is still possible. Also, prepare the counterweight by only having a few washers under the finger nut.

Next, test the motion by pulling the soldering iron down to the bench. Once you let go, it should slowly move upwards until the counterweight hits the bump stop. If it rises too fast, remove some of the washers. If it rises too slow, or not at all, add more washers. This is easiest if you just slide the washers loose over the screw as you make adjustments. Once you have decided on the correct counterweight, move them under the finger nut so they are set in position.

If there is not enough counterweight included, you should be able to get additional M8 washers from a local shop as an additional counterweight but this shouldn't be needed in most cases so check that your v-slot wheels are not too tight.

Soft End Stop Adjustment

You can move the soft end stop anywhere you link on the V-slot extrusion but my preference is to allow the counterweight to move to its lowest position and then raise it around 3mm and place it just beneath the adjustable wheel.

Hard End Stop Adjustment

The hard end stop is useful for cases where you need to do lots of inserts to exactly the same depth. Loosen the screw of the stop so it just grips the extrusion but can still slide, move it up to the carriage, then lower the soldering iron carriage to where the nut will be inserted, pushing the hard stop to the correct position. Tighten the hard stop in a position to ensure the motion is repeatable.

Usage Guide

Using the VLMP is really easy once you know how, it barely takes a second thought, but in case you're unfamiliar with the process It's all here.

1. Get everything ready; make sure you have the parts that need inserts, enough inserts to finish the job, and plenty of space to work.
2. Make sure you can hold and support the parts that need inserts. Typically this is easy if there is a flat face opposite the insert, but can be more complex.
3. Install an insert tip onto your soldering iron and install the iron into the VLMP ensuring it's fully seated and can't come loose.
4. Set the soldering iron temperature to slightly above the melting temperature of the filament for the parts. It normally takes a little longer for the tip to be the correct temperature even when it reads correctly.
5. Place the threaded insert onto the edge of the hole.
6. Holding from the grip, pull down the soldering iron and press onto the insert, applying gentle pressure until the insert is heated and recessed into the part, just sub flush.
7. Let go of the grip and it will return to the original position.
8. Leave the brass insert to cool, be careful of how you hold the part if there are multiple inserts in a single printed part as they stay quite hot for a while.