

FilafabTM

Assembly Manual



IMPORTANT

READ INSTRUCTION MANUAL BEFORE
CONNECTING OR OPERATING.
READ ALL SAFETY INFORMATION.
RETAIN FOR FUTURE REFERENCE.

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2. Disclaimer

This manual is intended for your safety and protection. This information could contain technical inaccuracies, typographical errors and out-of-date information. This document may be updated or changed without notice at any time. Use of the information is therefore at your own risk. In no event shall D3D Innovations Limited be liable for special, indirect, incidental or consequential damages resulting from or related to the use of this document. D3D Innovations Limited makes no representations or warranties, either expressed or implied, with respect to the contents hereof and specifically disclaims the implied warranties of merchantability or fitness for a particular purpose. D3D Innovations Limited will not be responsible for any breakages, failings or problems with the machine due to assembly and/or operational errors.

3. Warning

This is a mains electrical appliance and must be earthed. If you have any questions or are not qualified to work on the equipment – hire a licensed electrician. Isolate from mains supply before removing cover. This device is a work in development and should be treated as such. It is recommended that the device be inspected for use by a licensed electrician in the country of use prior to connecting to the mains supply.

4. *Safety Precautions*

READ ALL INSTRUCTIONS BEFORE ATTEMPTING TO ASSEMBLE THIS KIT

KEEP THESE INSTRUCTIONS FOR FUTURE REFERENCE

- **WARNING:** This appliance must be earthed.
- Before plugging in, check that the voltage on the rating label is the same as the main supply.
- Do not plug in or attempt to operate this machine without reading and understanding the FilaFab Operating Manual.

5. *Notices*

- No part of this manual may be reproduced, copied, transmitted, transcribed, stored in a retrieval system, or translated into any language in any form, by any means, without D3D Innovations Limited prior written permission.
- D3D Innovations Limited reserve the right to change the specifications of the hardware described in this manual at any time and without prior notice.
- D3D Innovations Limited will not be held liable for any damages resulting from the use of this product.
- While every effort has been made to ensure that the information in this manual is accurate and complete we accept no liability for errors or omissions. We would however appreciate it were you to bring any errors or omissions to the attention of D3D Innovations Limited.

- This symbol indicates that this device is to be collected separately.
- The following apply only to users in European countries:
- This device is designated for separate collection at an appropriate collection point. Do not dispose of as household waste.
- For more information, contact the retailer or local authorities in charge of waste management.



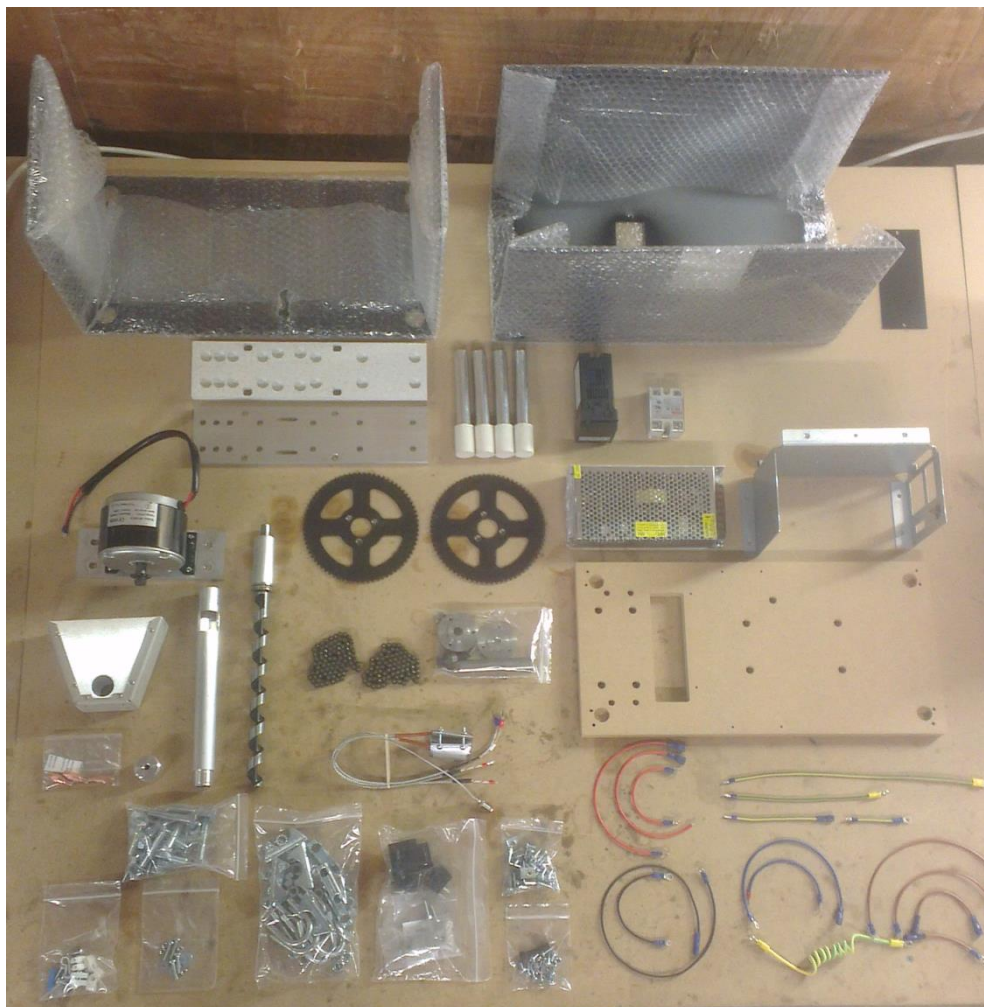
6. *Lifting and Transport Instructions*

- The machine parts weigh up to 16kg.
- Be careful when lifting or moving.

7. *Overview*

Thank you for purchasing a D3D Innovations Limited's FilaFab desktop thermoplastic extrusion system kit. Please make sure you read all of the safety precautions and keep this assembly manual for future reference. **This device is under development and should be treated as a conceptual testing machine.**

7.1 *Parts Overview*



7.2 Nozzle Sizes

FilaFab is shipped with 3 nozzles as per the following table.

| Nozzle Marking | Nozzle Aperture Size |
|----------------|----------------------|
| 1.0 | 1.0 "blank" |
| 1.2 | 1.6 |
| 1.6 | 2.6 |

Notice that the nozzle aperture size is different to the size of filament the nozzle is designed to produce. This is primarily due to nozzle swell which causes the filament to expand as it exits the nozzle. The nozzles are drilled to the sizes required when extruding with FilaFab supplied ABS pellets. Other types of polymer may require a different size nozzle. For this reason a "blank" 1mm nozzle is provided with each kit which can be drilled to the required size.

Nozzles and spare parts can also be purchased directly through www.filafab.co.uk.

7.3 Fastenings and Components



8. Fastening and Component List

| No. | Quantity | Description |
|-----|----------|--------------------------------------|
| 1 | 7 | M8 U-bolt |
| 2 | 7 | U-bolt Bracket |
| 3 | 18 | M8 U-bolt Nuts |
| 4 | 14 | M8 Shakeproof Washer |
| 5 | 4 | M10 x 50 Bolts (hex zinc) |
| 6 | 4 | M10 x 50 Socket Screw Countersunk |
| 7 | 8 | M10 Nut |
| 8 | 8 | M10 Form A Washer |
| 9 | 4 | M8 x 35 Bolt (hex zinc) |
| 10 | 4 | M8 Washer |
| 11 | 4 | M4 Nuts |
| 12 | 4 | M4 Form A Washer |
| 13 | 4 | M4 Form C Washer |
| 14 | 3 | M5 Nut |
| 15 | 3 | M5 Shakeproof Washer |
| 16 | 10 | L Bracket |
| 17 | 12 | Clip-on M4 Nut |
| 18 | 12 | M4 x 10 Pan Head Wood Screw |
| 19 | 8 | 5.5 x 16 Pan Head Wood Screw |
| 20 | 10 | 4.2 x 16 Pan Head Wood Screw |
| 21 | 4 | M5 x 8 Pan Head Screw |
| 22 | 2 | M4 x 16 Pan Head Screw |
| 23 | 3 | M5 x 8 Countersunk Screw Pozi |
| 24 | 3 | M5 x 12 Countersunk Screw Pozi |
| 25 | 7 | M4 x 20 Screw Pan Head |
| 26 | 1 | "Rapid 33-4060" Terminal Screw |
| 26a | 1 | 3.5 x 20 Slotted Wood Screw |
| 27 | 4 | M3 x 14 Pan Head Screw |
| 28 | 2 | 1 small and 1 large Terminal Block |
| 29 | 1 | Large P-Clip |
| 30 | 3 | Small P-Clip |
| 31 | 1 | Microswitch contact sleeve |
| 32 | 1 | M6 x 30 Socket Cap Screw |
| 33 | 1 | Fuse |
| 34 | 1 | Pinion Sprocket |
| 35 | 1 | Auger Adaptor |
| 36 | 1 | Sprocket Adaptor |
| 37 | 1 | Bearing Shaft |
| 38 | 1 | Power Inlet Connector |
| 39 | 1 | Microswitch |
| 40 | 1 | Motor Switch |
| 41 | 1 | 4 Way Earth Block |
| 42 | 1 | Nozzle Adaptor |
| 43 | 2 | Standard Spacer |
| 44 | 1 | Thin Spacer |
| 45 | 1 | Square Spacer |
| 46 | 1 | Auger Shaft |

9. Assembly Procedure

9.1 Before you Begin

FilaFab is not a toy and can be dangerous during assembly and operation.

Measures should be provided to ensure safety at all times, especially from the following key hazards:

- Burn & Fire Hazard – High temperatures.
- Crush Hazard – Moving parts.
- Electrocution Hazard – High Voltages.
- Toxins/Fume Hazards – Polymer decomposition/melting.

All images are representative only.

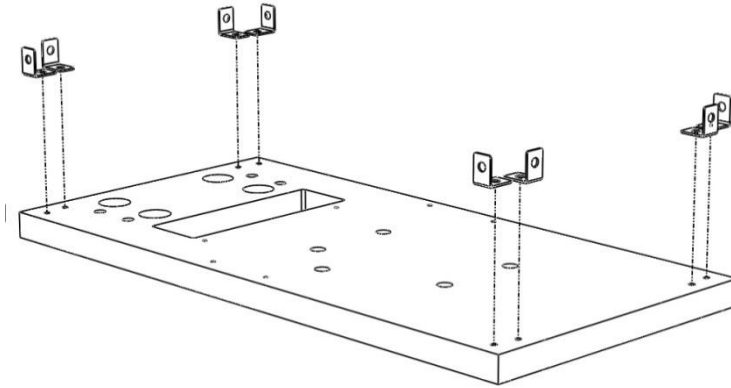
This kit is designed to be assembled using minimal tools and equipment. More experienced builders may choose to build in a different method to that described in this manual.

Check contents before you begin.

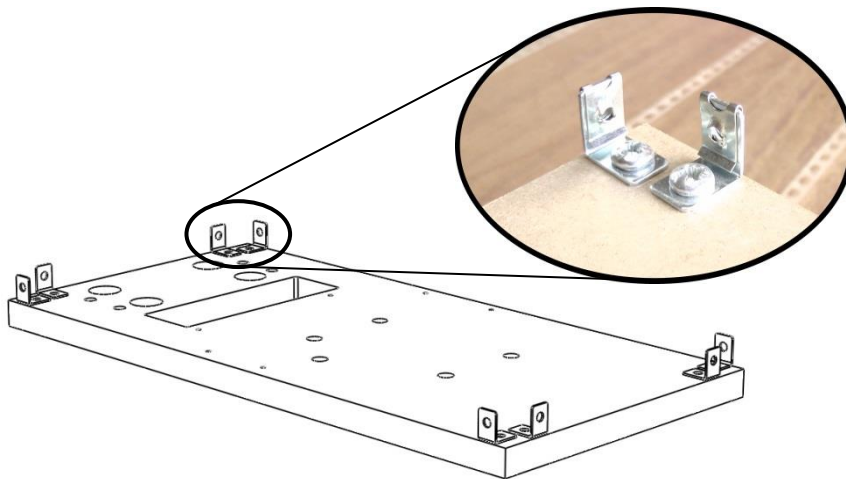
Kits are provided without warranty. Statutory rights still apply however.

9.2 Mechanical

1. Secure 8 x L brackets (**no16**) to base board using 8 x wood screw (**no19**) (*screws not shown*).

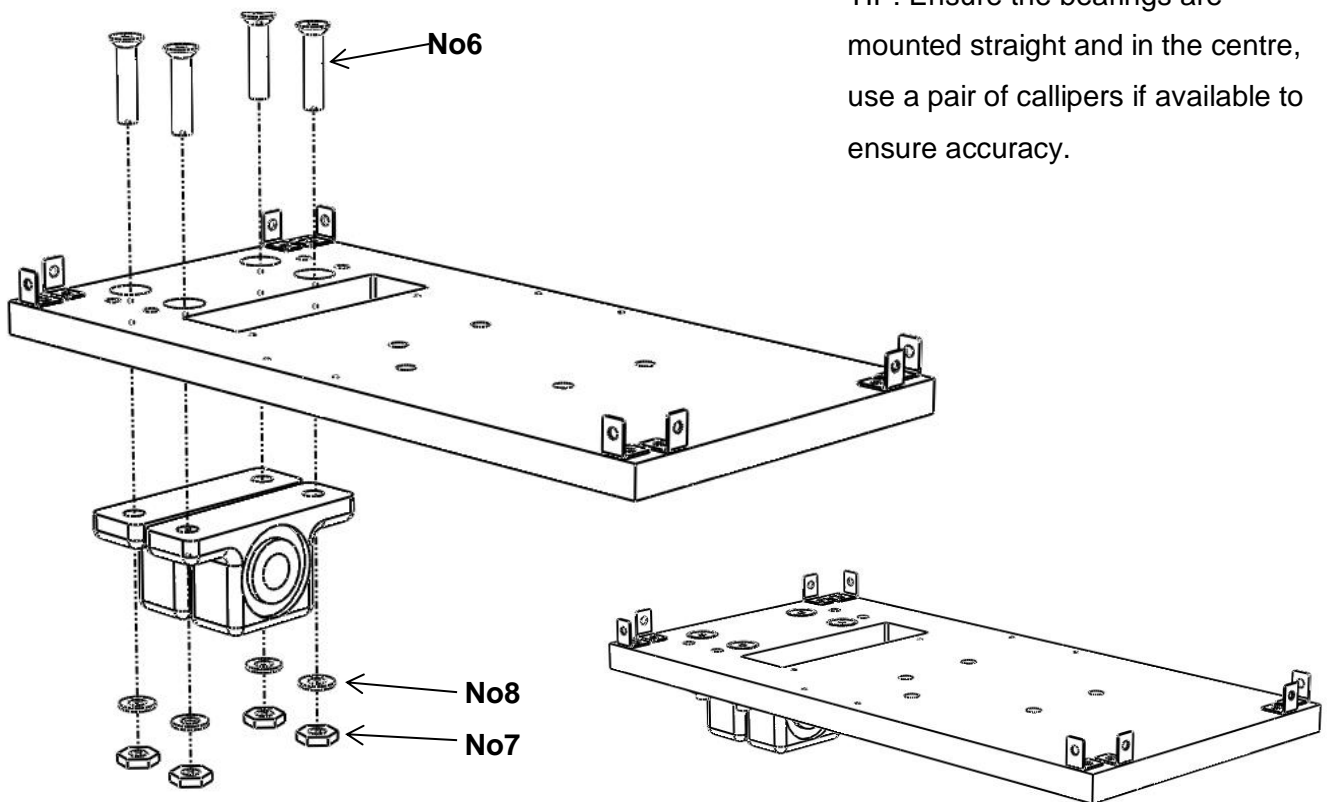


2. Push an M4 clip on nut (**no17**) flat side facing outwards on to each right angle bracket.

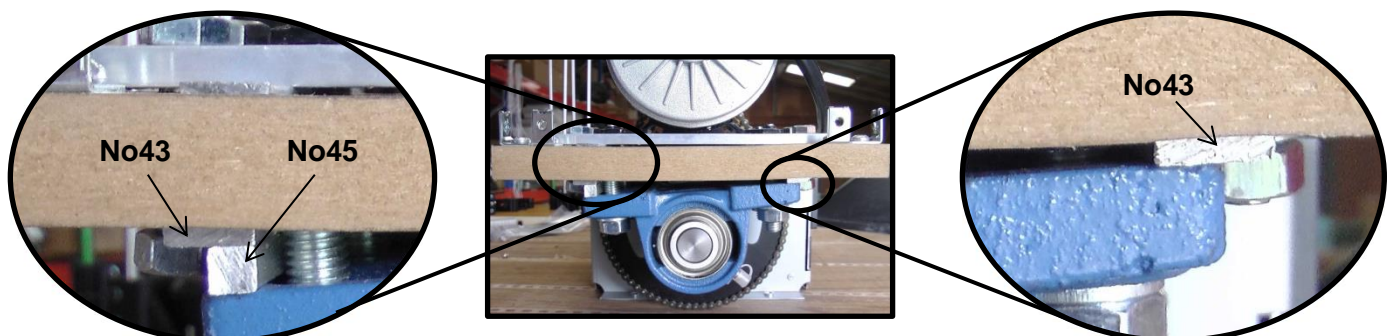
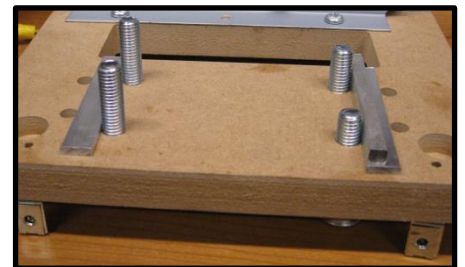


3. TIP: The bearings within the pillow block housings must be aligned correctly before mounting. They are designed to move but can sometimes be stiff. One method to align the bearings is to clamp each block to a bench top and use a long lever to adjust the bearing within the pillow block until straight.
4. Mount the pillow blocks (with spacers – see below) using 4 x M10 countersunk bolts, 4 x M10 washers and 4 x M10 nuts.

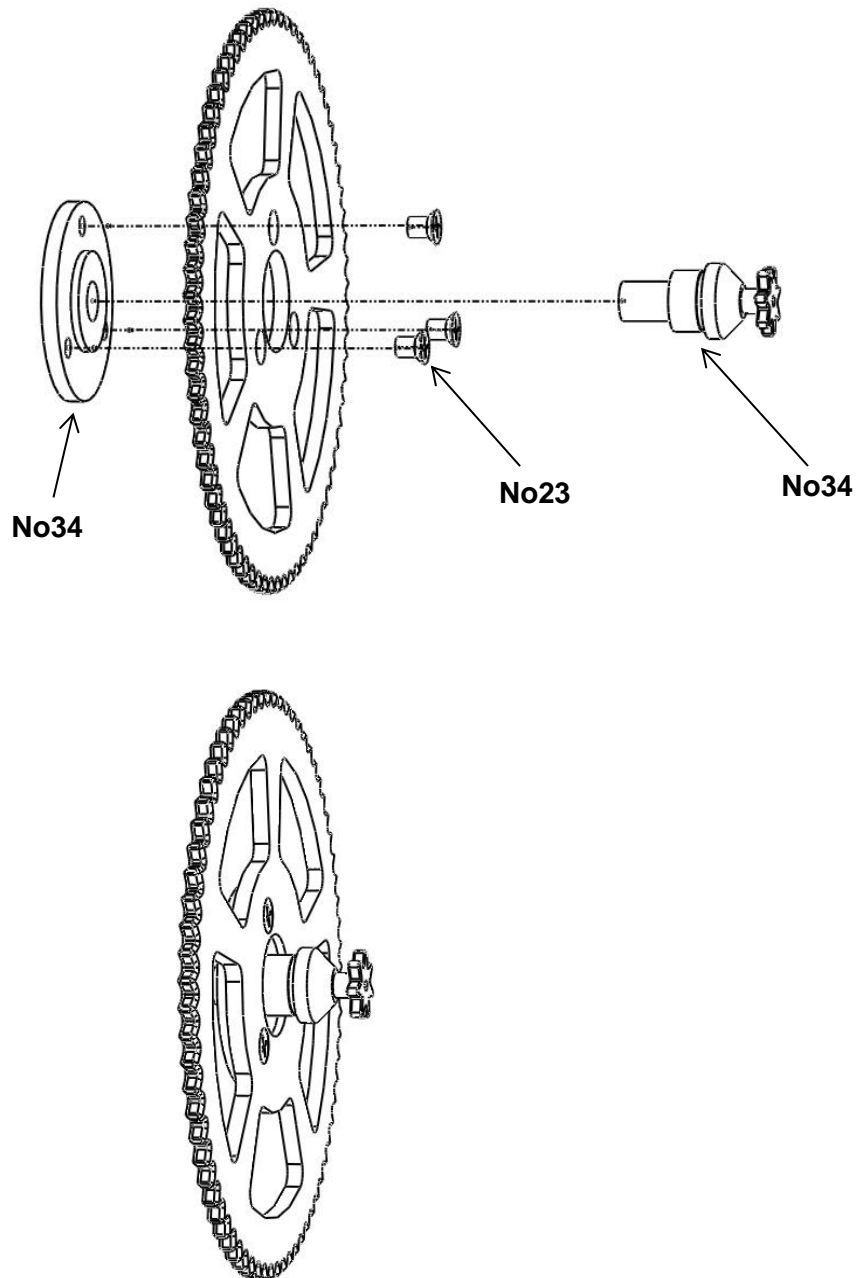
TIP: Ensure the bearings are mounted straight and in the centre, use a pair of callipers if available to ensure accuracy.



6. Spacers are used to ensure that the chain is under the correct tension. Position the spacers before tightening the bolts. The spacers should be placed against the outer side of the bolt. One side should have an additional square profile spacer as shown in the photographs.

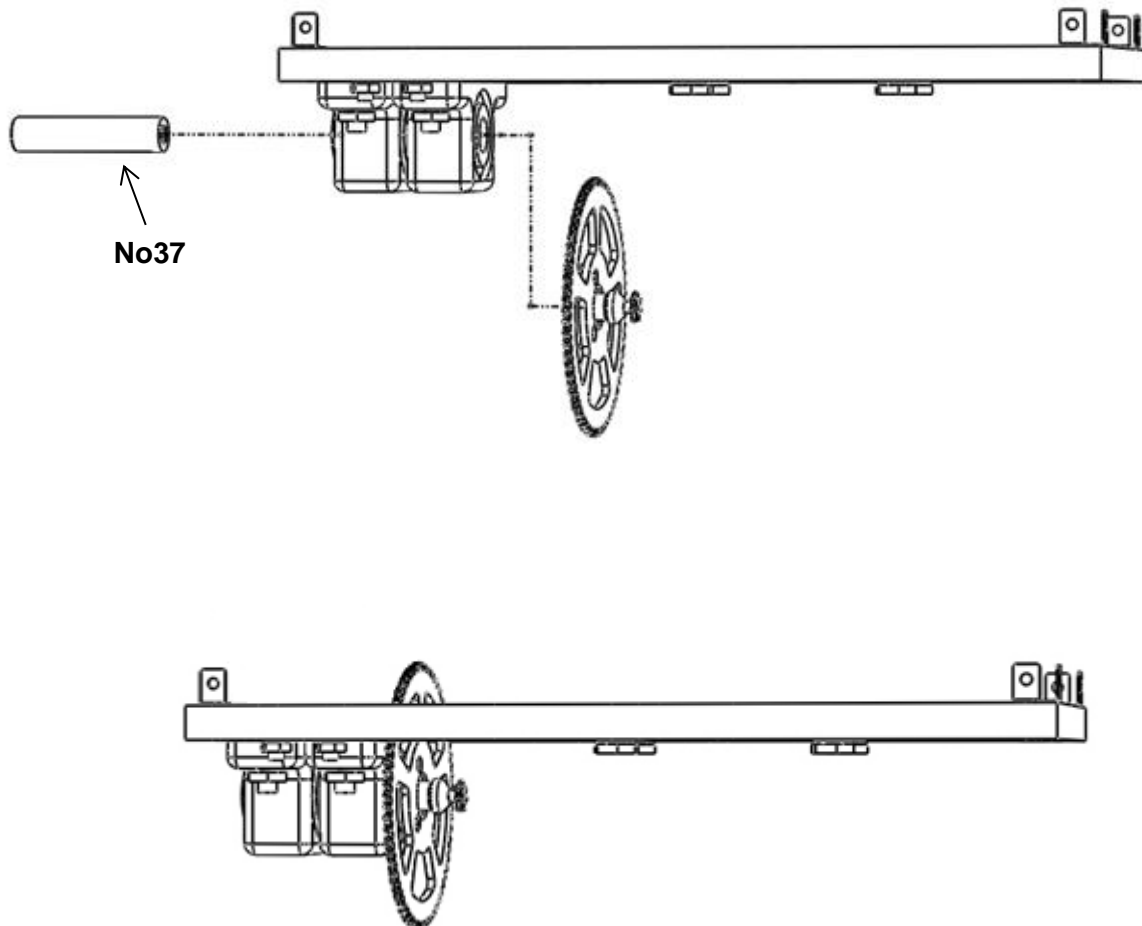


7. Connect the pinion plate to the large sprocket using 3 x countersunk screws (**no23**). Observe correct orientation of the sprocket so that the screws fit into the countersinks.
8. Screw the pinion sprocket in to the pinion plate

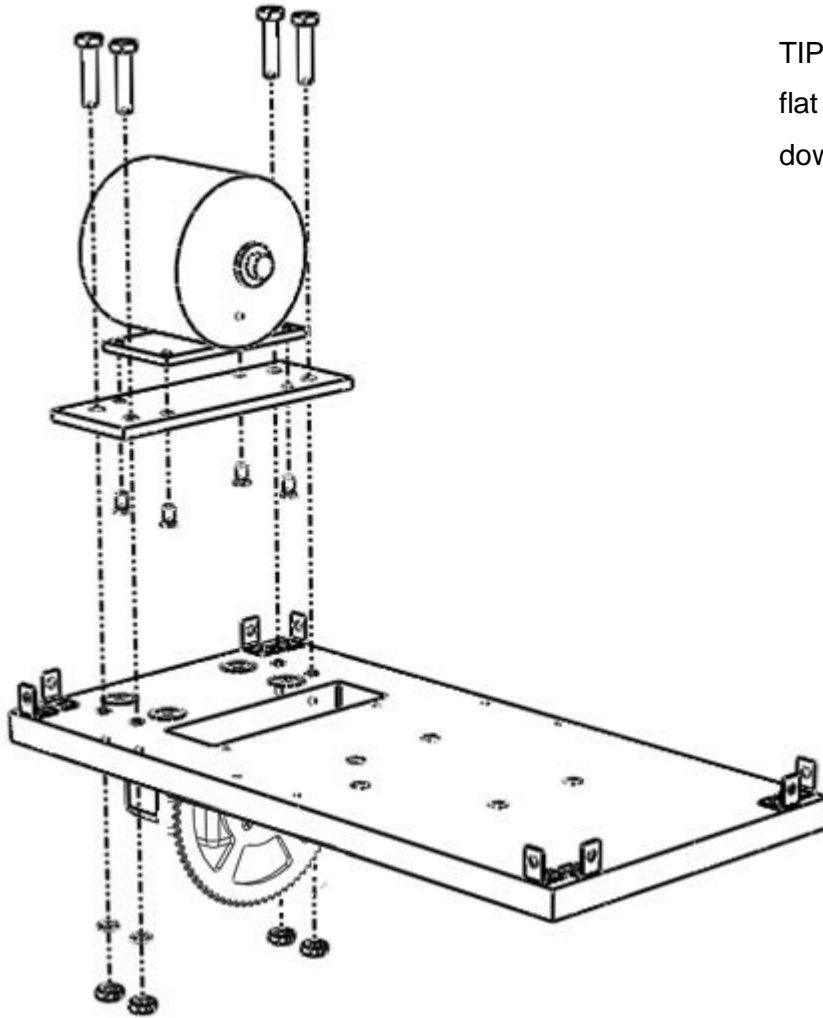


9. Push the bearing shaft through the bearings; ensure threaded inner end is towards slot in base board.

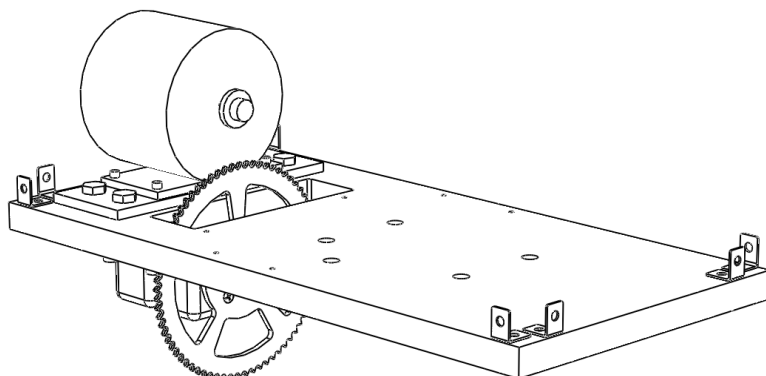
TIP: If the shaft does not slide into the bearings easily add some oil and/or rub with some fine emery paper.



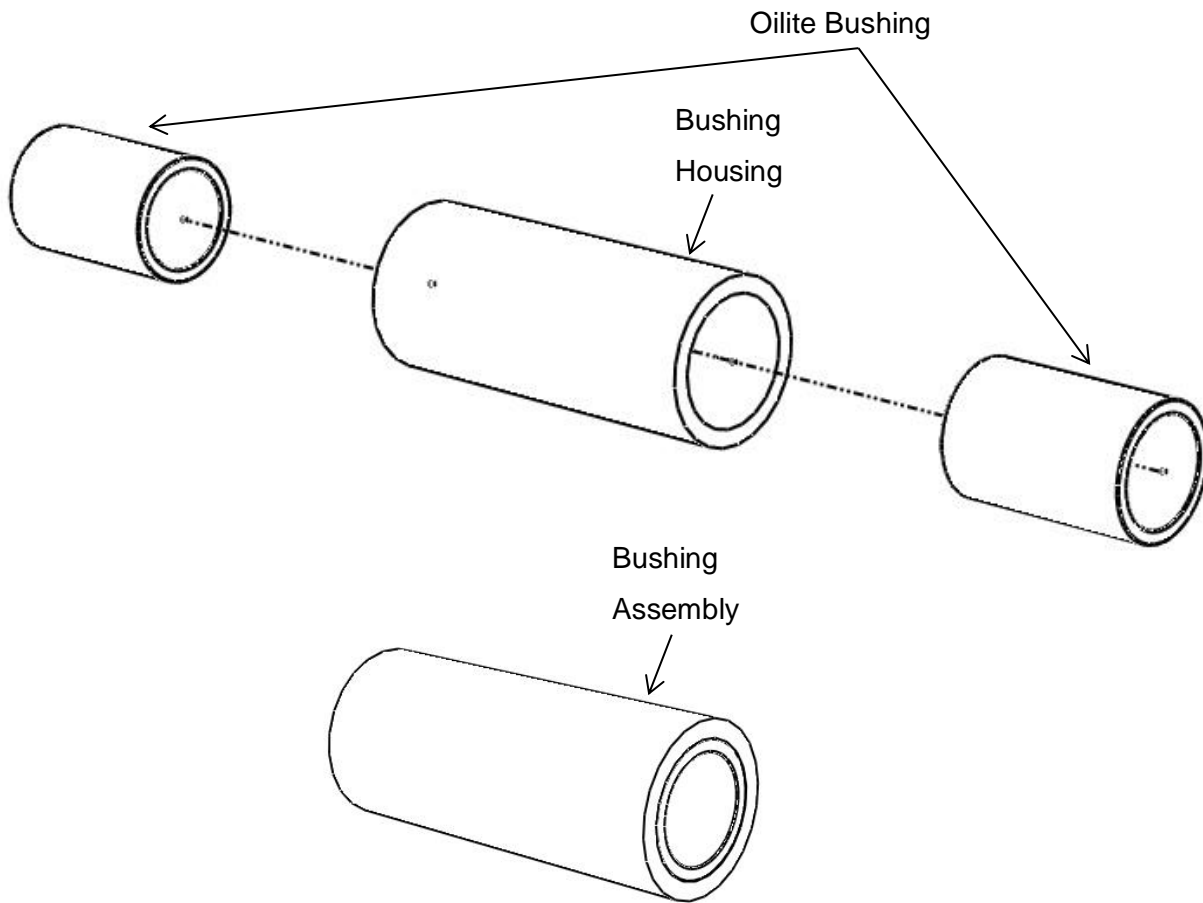
11. The motor is mounted with the thin spacer (**No44**) underneath, this ensures correct chain tension. Place the spacer adjacent to the mounting holes and position the motor.
12. Lean the motor forward towards the open slot in the base board and place the chain without a split link over the large lower sprocket and around the motor sprocket.
13. Push the 4 x M8 35mm bolts (**No9**) through the motor mounting plate and through the base board. Align the motor and secure with 4 x M8 washers (**No10**) and 4 x M8 nuts (**No3**).



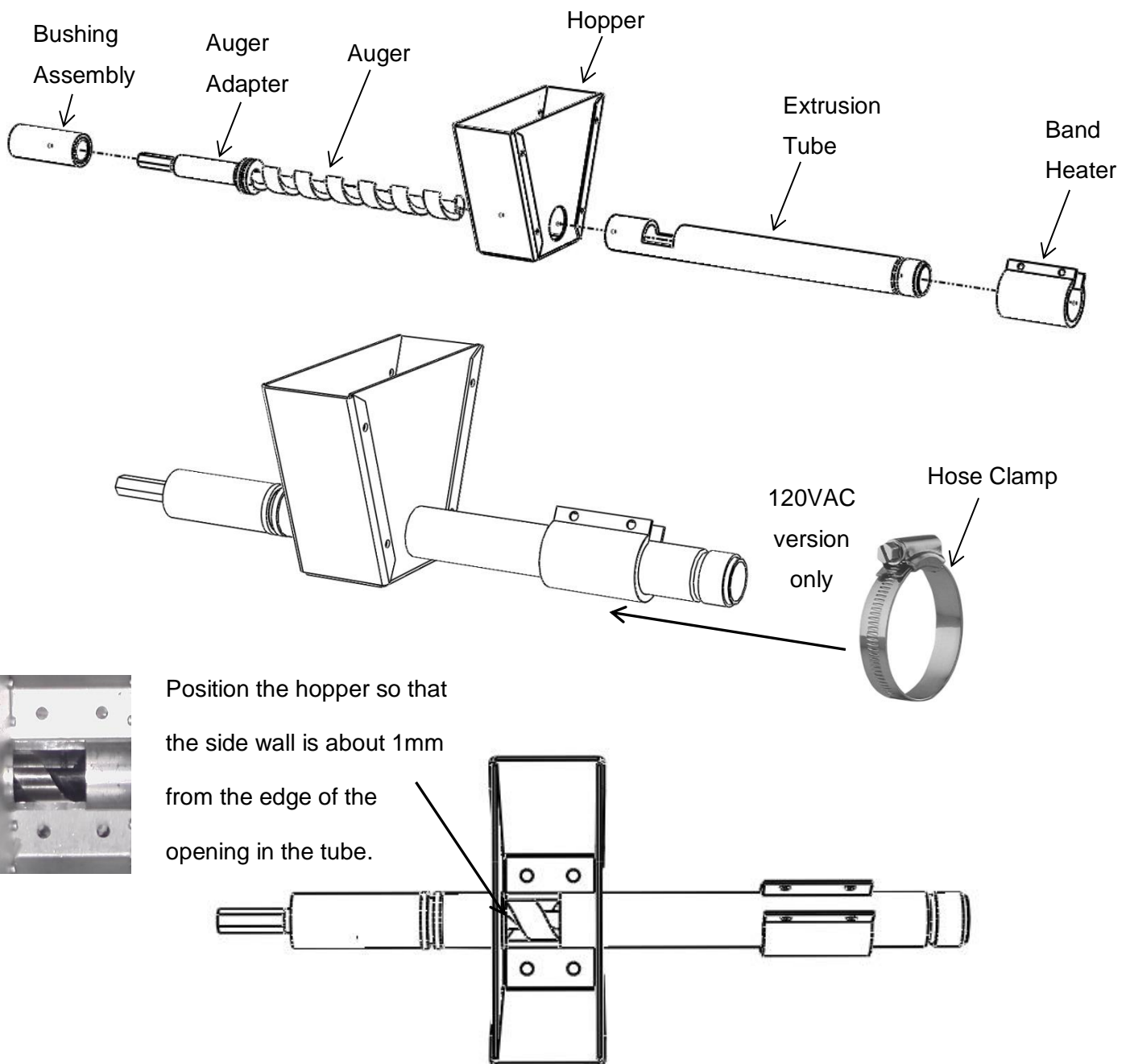
TIP: Use a clamp to hold the motor flat since the chain will pull the front down.



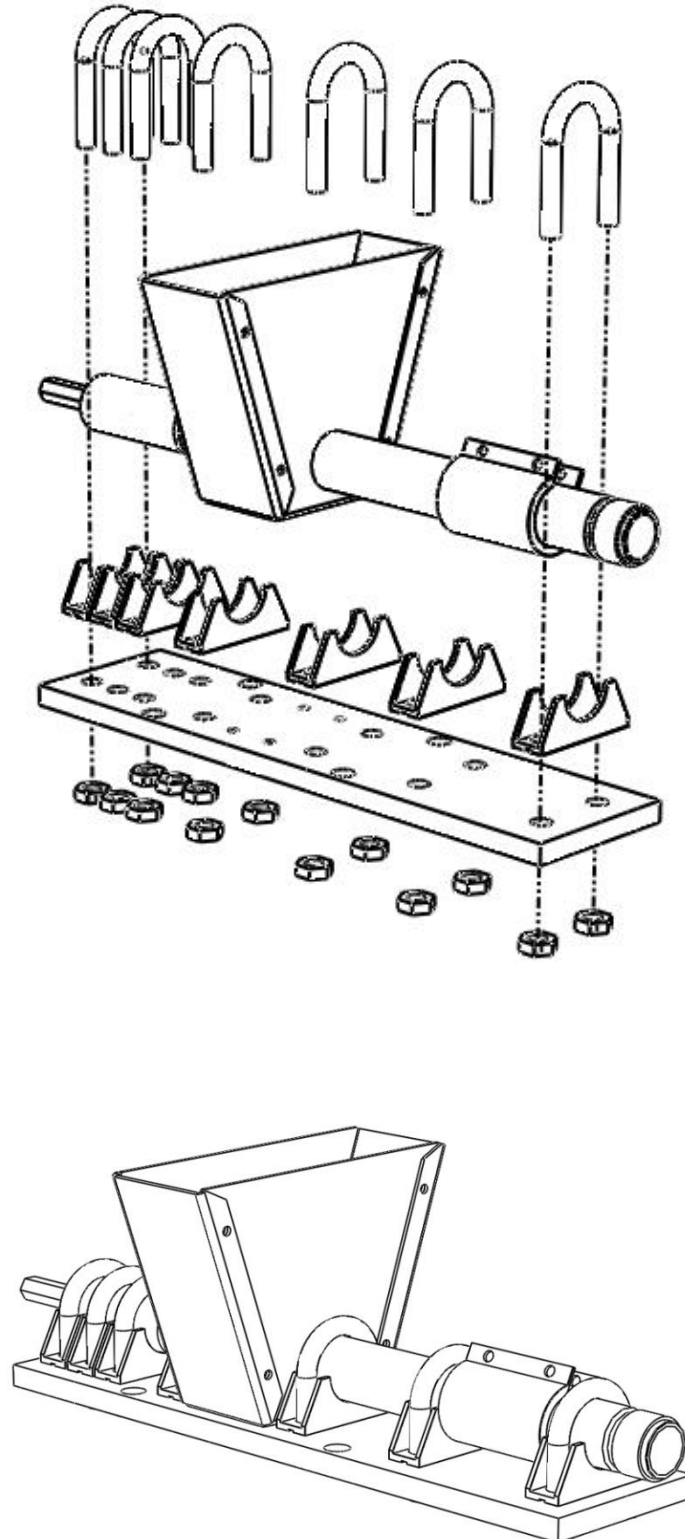
14. Push the Oilite bushings in to the bushing housing. (This step may have been done in the factory).



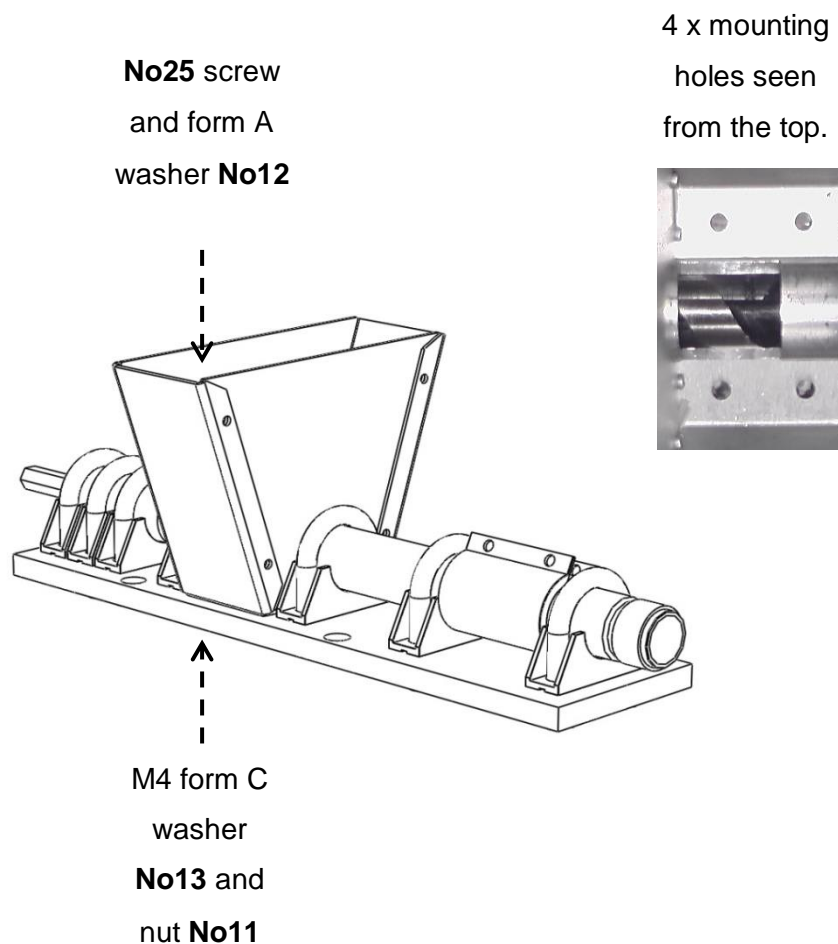
15. Push the hopper on to the extrusion tube.
16. Loosen the screw (or screws depending on version) on the band heater.
17. Push the band heater over the extrusion tube.
18. Push the auger in to the extrusion tube.
19. If you have a 120VAC kit then also place the worm drive hose clamp onto the tube (see photo below)
20. Push the bushing assembly on to the auger adapter.
21. TIP: oil the bushings prior to assembly.
22. TIP: de-bur and clean the auger before inserting.



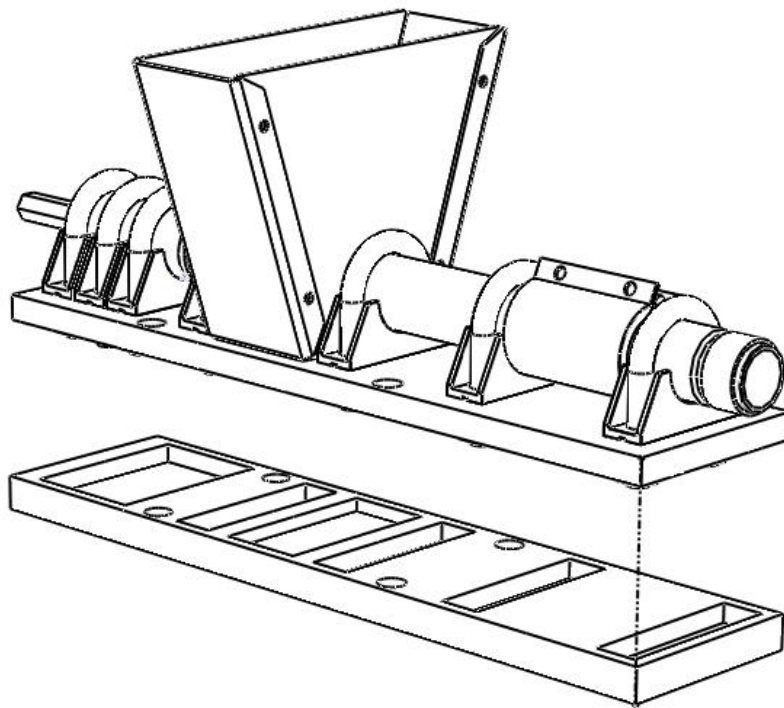
23. Position the auger assembly onto the clamps and secure using the U – bolts (**no7**). Notice that shake-proof washers (**No4**) (not shown below) should be placed on before the nuts (**No3**).



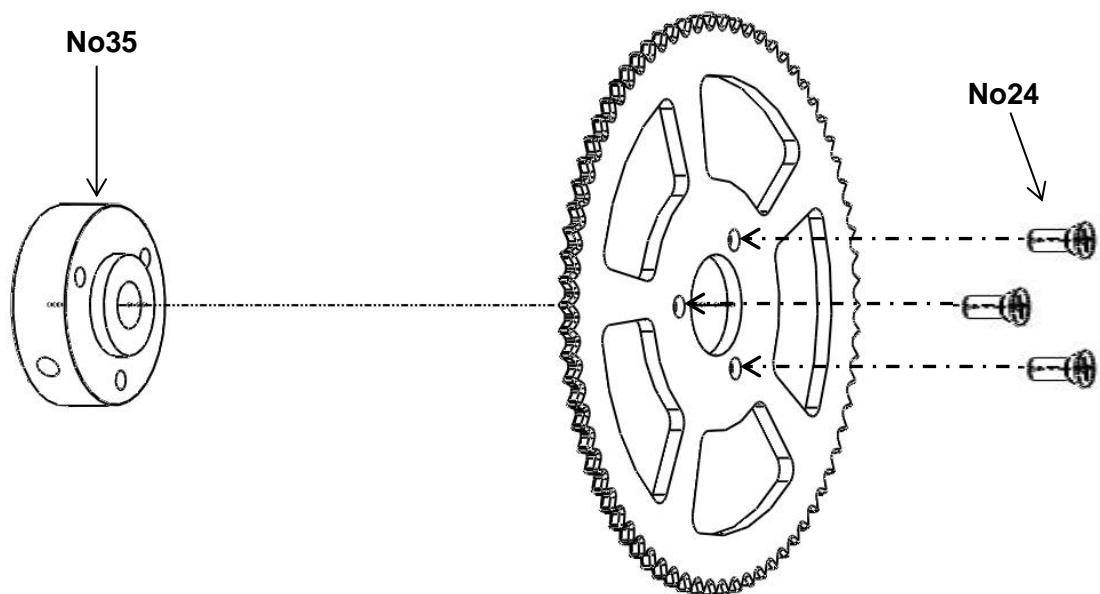
24. TIP Ensure that the thrust bearing is fitted against the bushing assembly without a gap.
25. TIP When securing in place position the whole assembly so that the end of the auger (hexagon profile) hangs over the edge as far as possible but without causing the bushing assembly to miss the supports.
26. TIP: Tighten the 3 U-bolts securing the bushing assembly first and then incrementally tighten the remaining. Use a spanner or wrench to turn the auger within the assembly. The aim is to tighten firmly but without over tightening. If the U-bolts are too tight then the auger will not turn, if the U-bolts are not tight enough then the extrusion tube may twist when the machine is run.
27. Secure the hopper using the 4 mounting holes. Place a form A washer onto the crew before sliding through the top of the hopper. Use a form C washer and nut on the underside to secure.



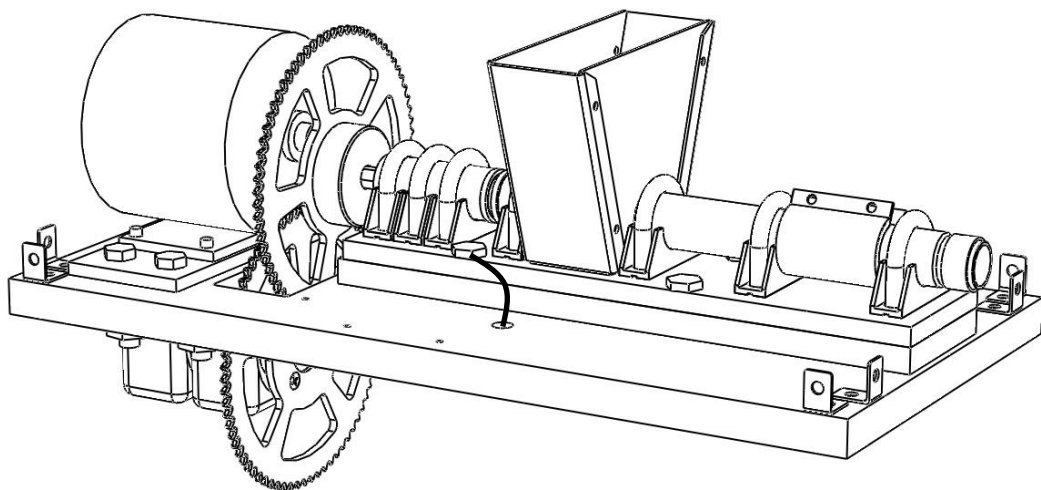
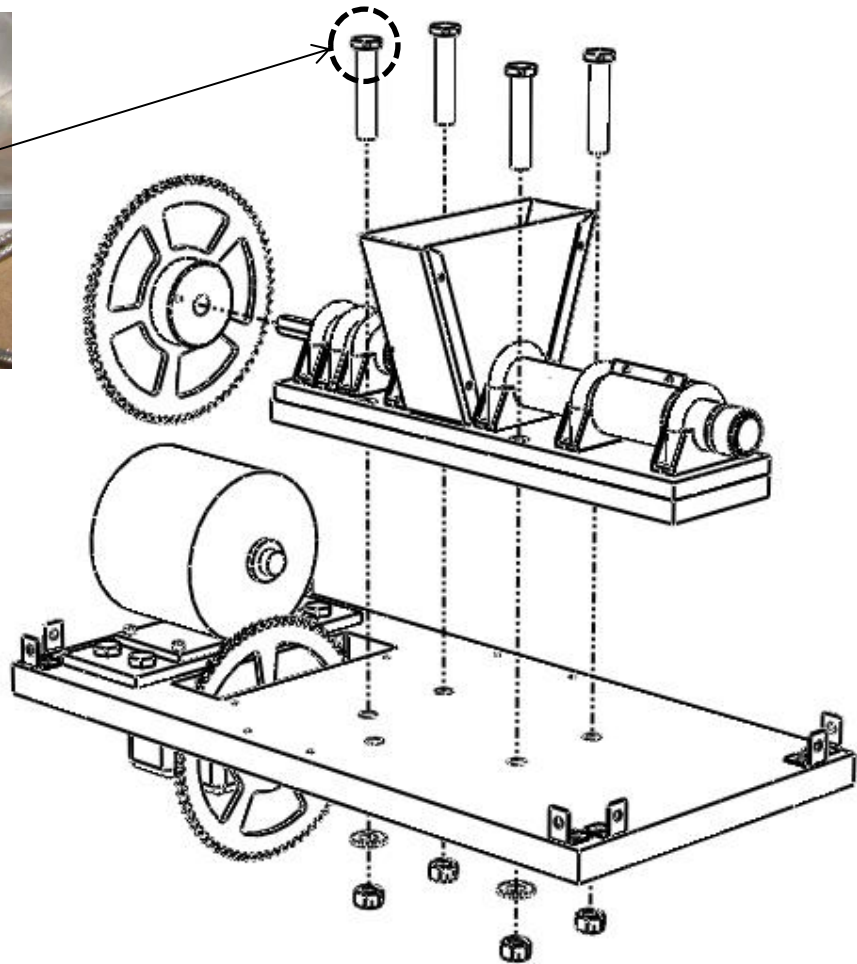
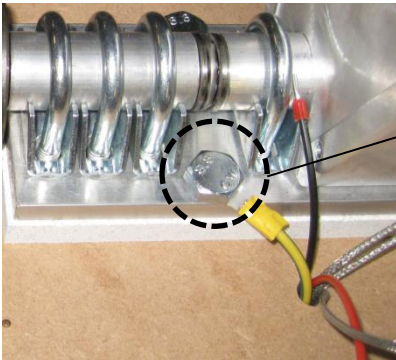
28. Once the extrusion assembly is completed line up the holes and place it on to the insulation board carefully.
29. TIP: handle the insulation board carefully since it is fragile.
30. TIP: the board may not fit precisely to the profile of the aluminium plate, this is normal and will not affect operation.



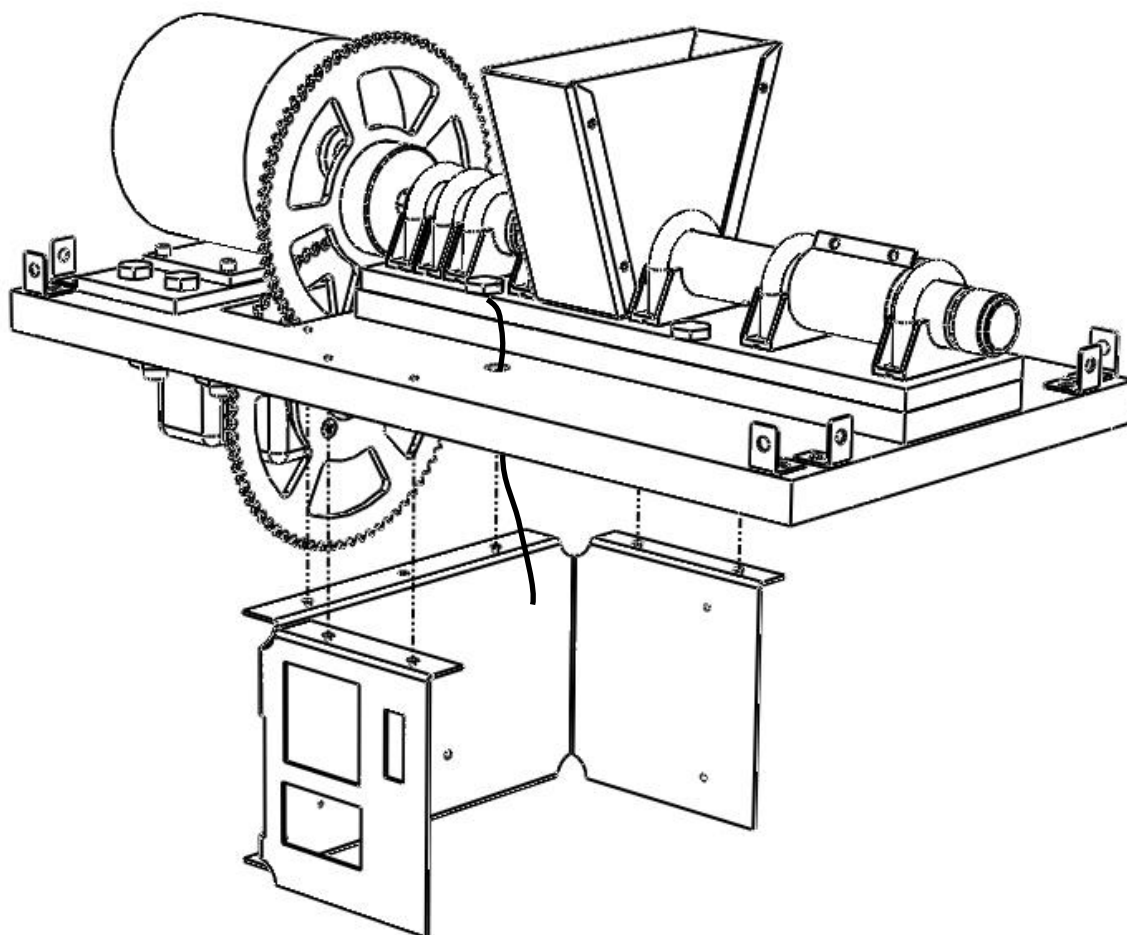
31. Assemble the auger sprocket assembly using 3 x countersunk screws (**No24**).



32. Push the Large Sprocket assembly on to the auger adapter (do not tighten the set screw yet).
33. Place the auger assembly on to the base board and secure with 4 x M10 bolts (**No5**), washers (**No8**) and nuts (**No7**). Fit earth wire E1 to the highlighted bolt as shown in the photograph.



34. Align the control panel to the base board and secure using 6 x wood screws (No20).



9.3 Electrical Wiring

Warnings:

- Electricity is dangerous.
- Electricity can cause electric shock, injury or death.
- Electricity can cause fire
- Seek professional assistance if you are inexperienced or unsure.



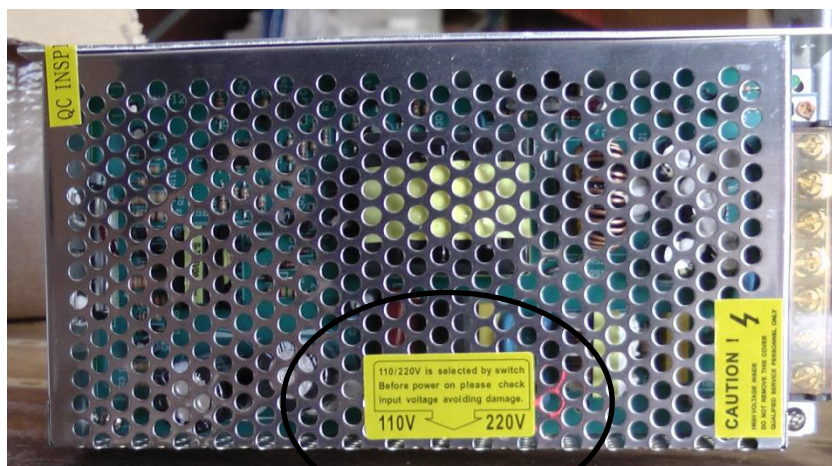
Voltage Selection:

BEFORE TURNING ON POWER THE INPUT VOLTAGE SELECTION SWITCH MUST BE CHANGED TO THE CORRECT POSITION.

ISOLATE THE ELECTRICITY SUPPLY BEFORE ATTEMPTING TO ADJUST THE INPUT VOLTAGE SWITCH.

MAKE SURE THE CORRECT VOLTAGE IS SELECTED.

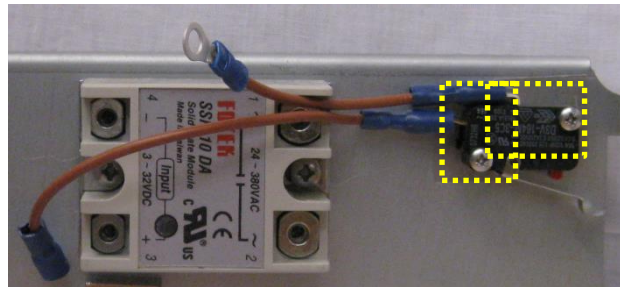
The Voltage selection switch is located on the power supply PCB itself. Use an insulated screw driver or similar to reach through the metal enclosure of the power supply and push the switch to the correct position. Do not touch any other components.



A wiring diagram has been provided along with a wire chart, refer to them whilst installing electrical system.

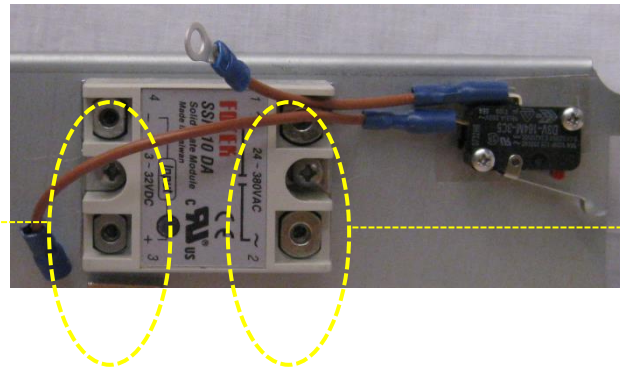


1. Ensure the Voltage selection switch is set to the correct Voltage (see above).
2. Mount 2 x mica insulating sheets underneath micro-switch and secure with 2 x M3 14mm screws (**No27**). Notice correct orientation of switch and insulation.



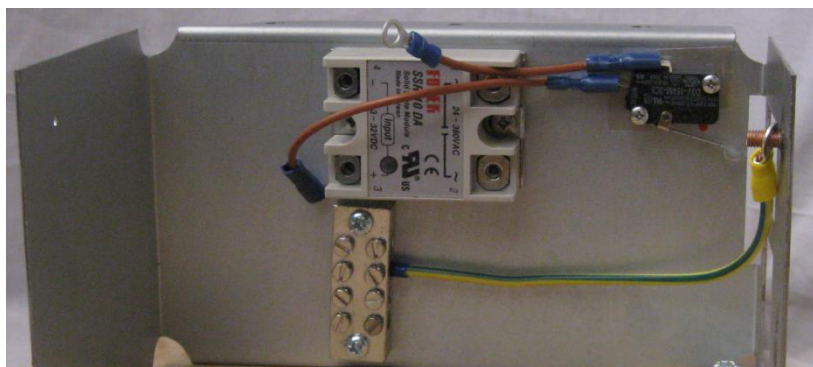
3. Mount the solid state relay using 2 x M4 20mm screws (**No25**). Notice correct orientation as shown.

Low Voltage
Input side



High Voltage
output side

4. Fit the earth block using 2 x M4 16mm screws (**No22**) and 2 x M4 nuts (**No11**).

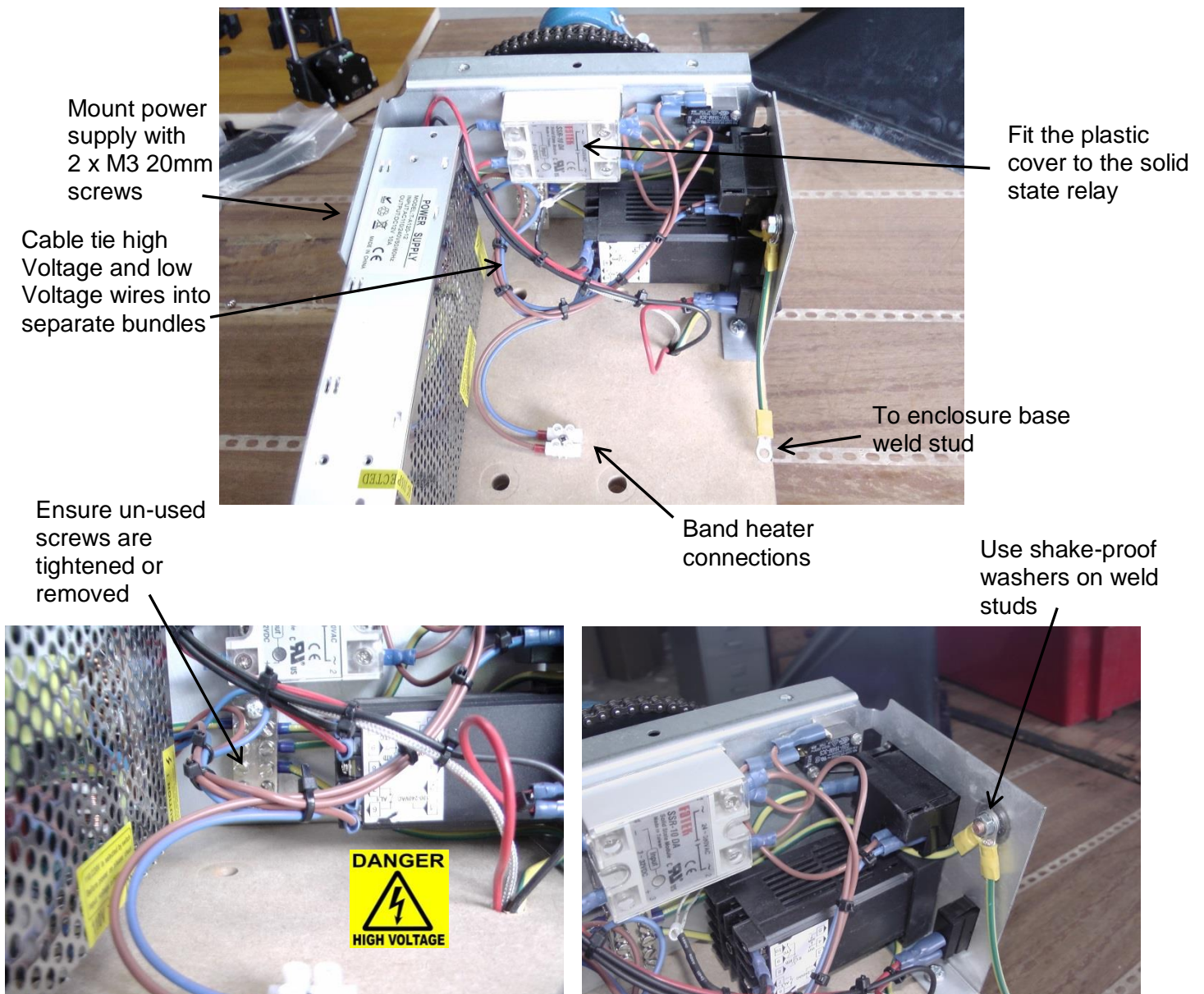


5. Fit the components to the control panel.

TIP: It may be useful to install the PID controller (inc bracket) but do not push the bracket all the way along until all wires are fitted, this allows some movement of the PID controller enabling easier wire fitting.

6. Feed the band heater, thermocouple and E1 wires through the base board. These must be fed through the base board before screwing in place. (E1 was fitted in step 34)

Use the wiring diagram along with the wiring chart to fit all of the connections. Check the wiring as you go. **If you are unsure seek assistance.**

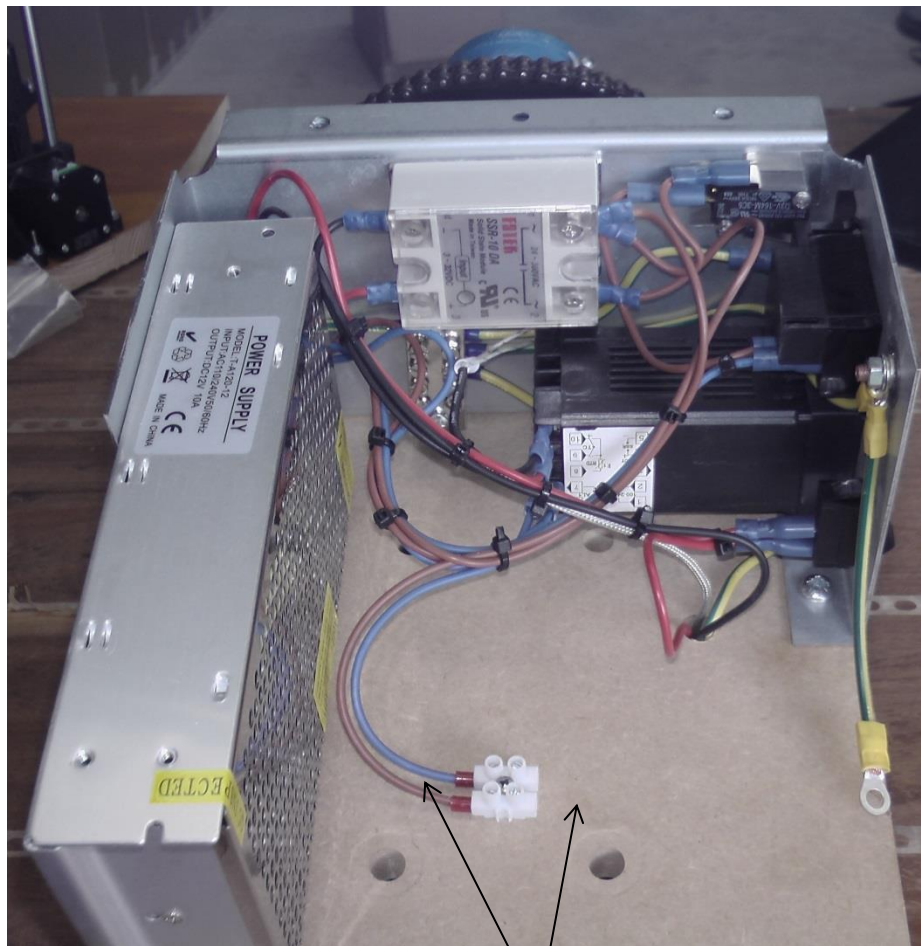


7. Use a large P Clip (**No29**) and a small P Clip (**No30**) to secure the motor wires to the base board using wood screws (**No19**).



No29 & No19

No30 & No19

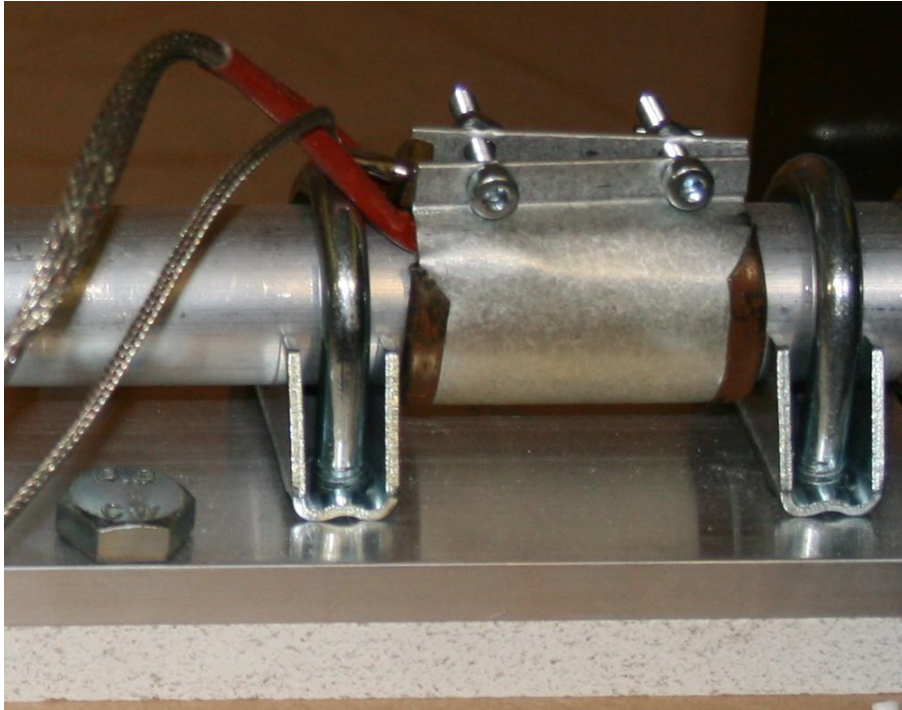


**Secure wires either side of the terminal block with No30 P clips & No19 screws
(band heater wires not shown)**

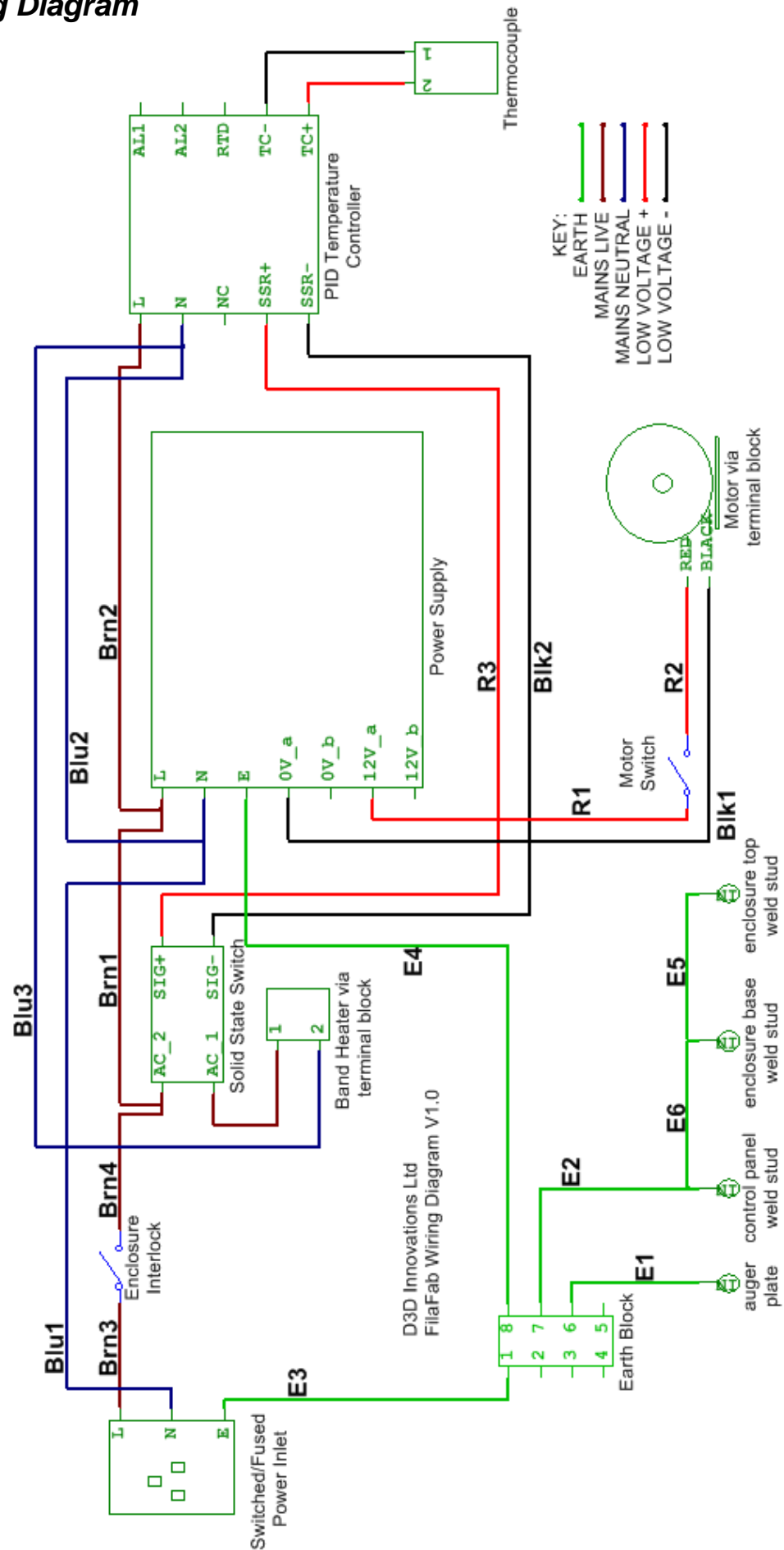
8. *230VAC Version:* Position the thermocouple underneath one of the band heater screws (as shown) and tighten both screws.

120VAC Version: Use the worm drive hose clamp to secure the thermocouple into position.

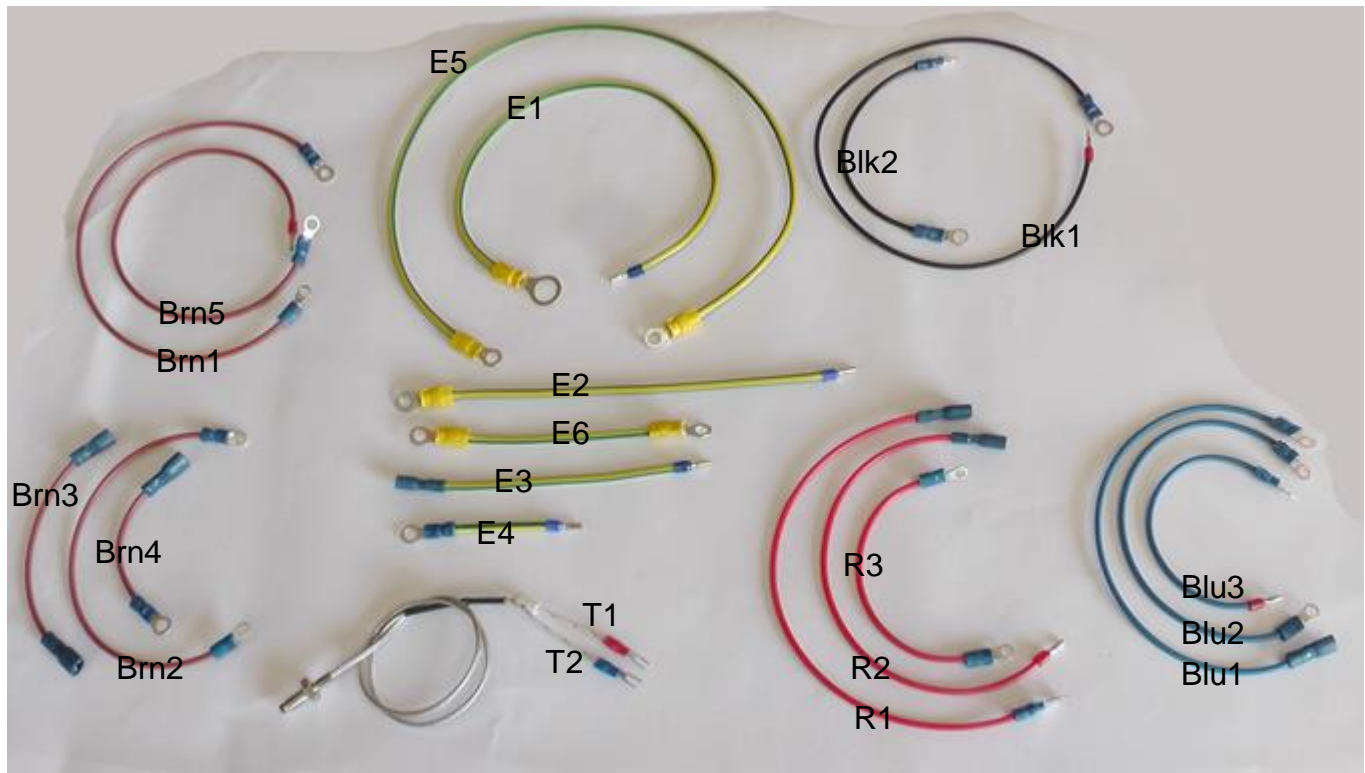
Also tighten band heater screw to secure.



9.4 Wiring Diagram



9.5 Wiring Chart



9.6 *Mechanical Continued*

1. Use small pair of pliers to split the chain split link.
2. Position chain over pinion and large sprocket and fit split pin.
3. TIP: The chain fits tightly around the sprockets therefore you may have to pull taught or rotate the sprockets by hand.
4. TIP: Wear gloves to avoid injury.
5. TIP: Make sure the chain is aligned correctly to avoid slippage or unnecessary wear.

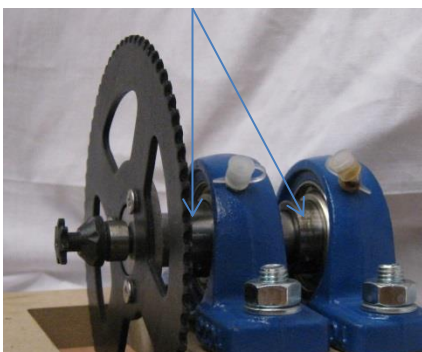


Align pinion sprocket shaft and auger sprocket before tightening locking screws.

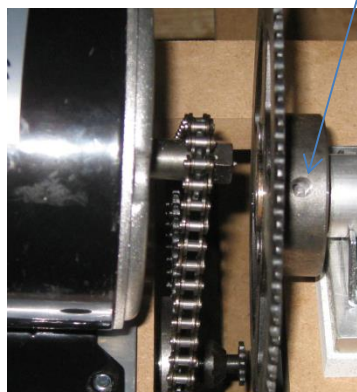
1 x locking screw is located on the auger sprocket.

4 x locking grub screws are located on the pillow block bearings.

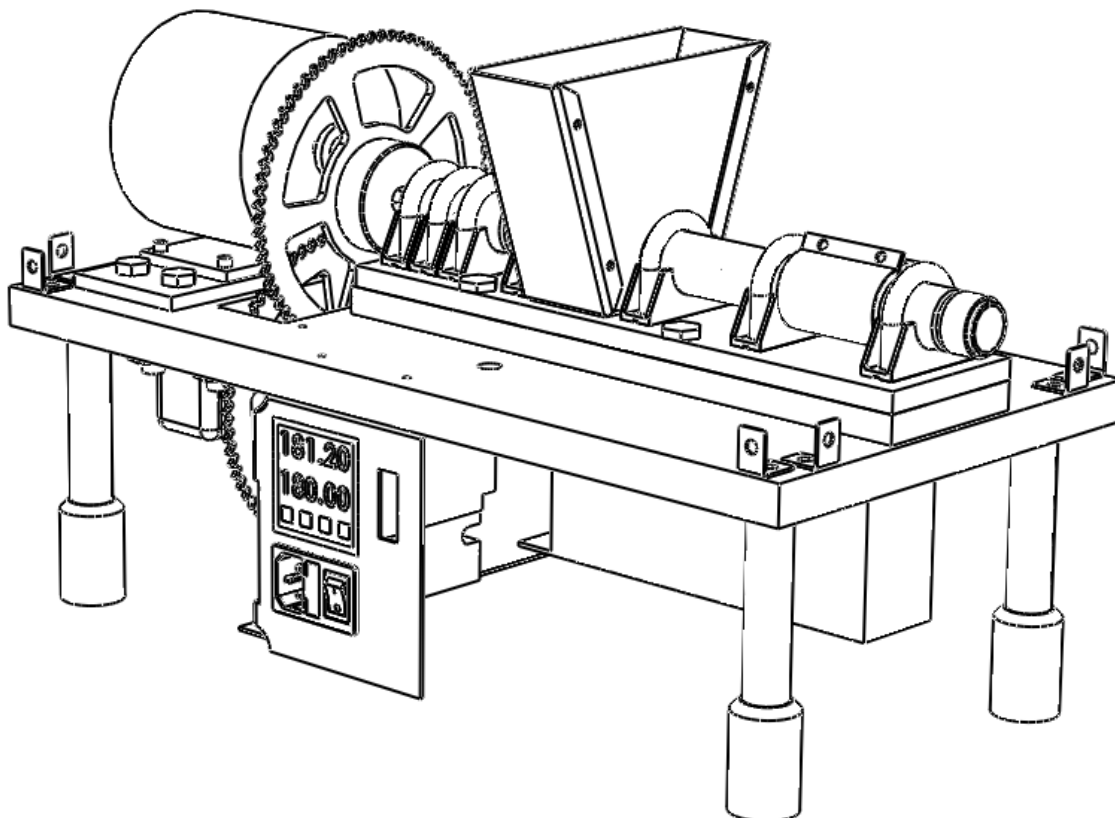
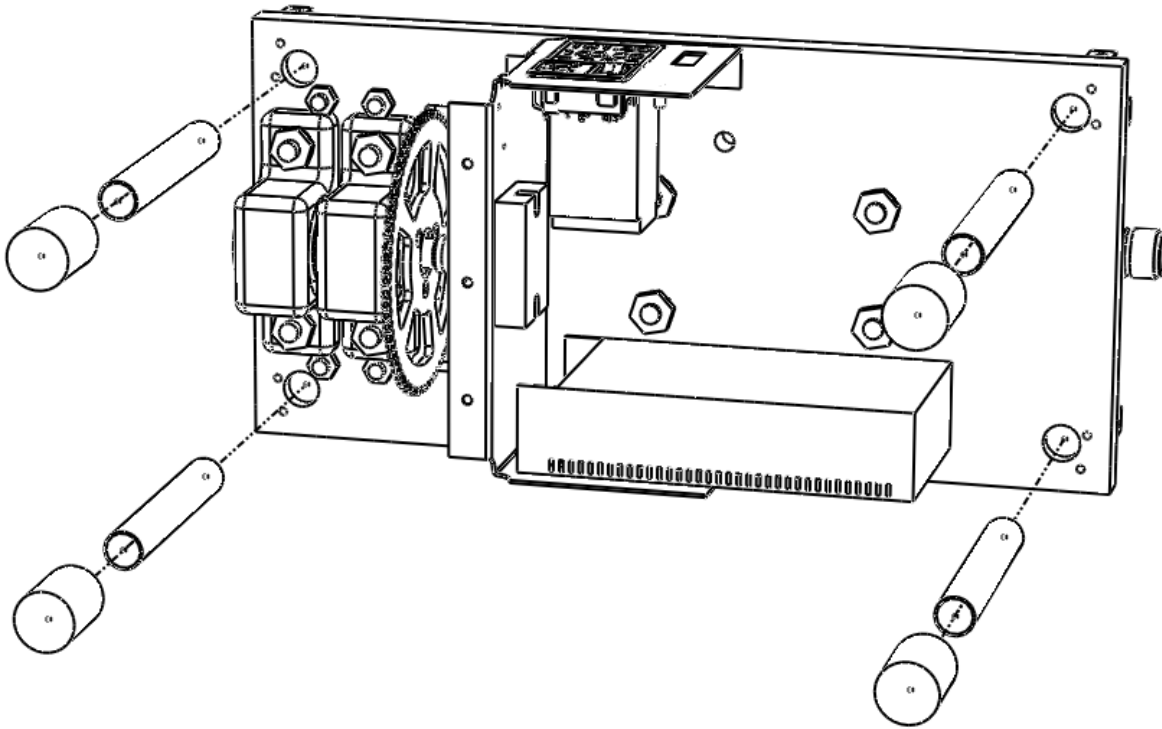
2 grub screws are located in each bearing.



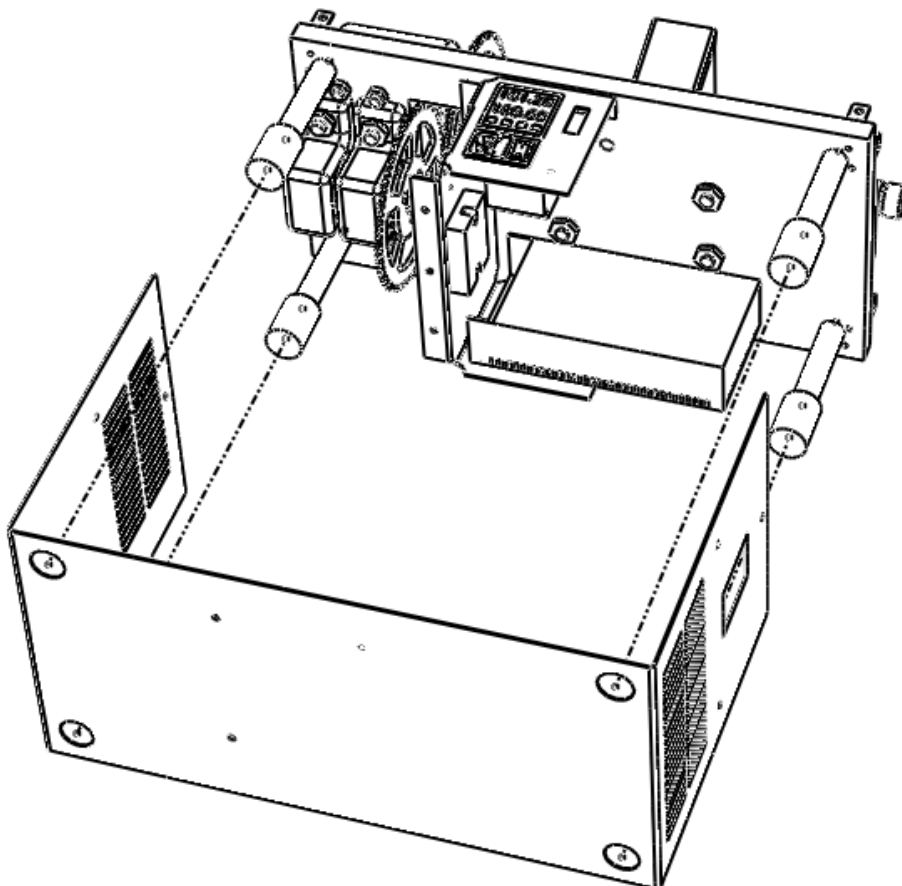
Use the **No32** screw to tighten sprocket adapter to auger shaft. Align to a flat.



6. Carefully position the assembly on its side.
7. Push a rubber foot on to each leg tube.
8. Carefully push the leg tube in to the mounting hole.

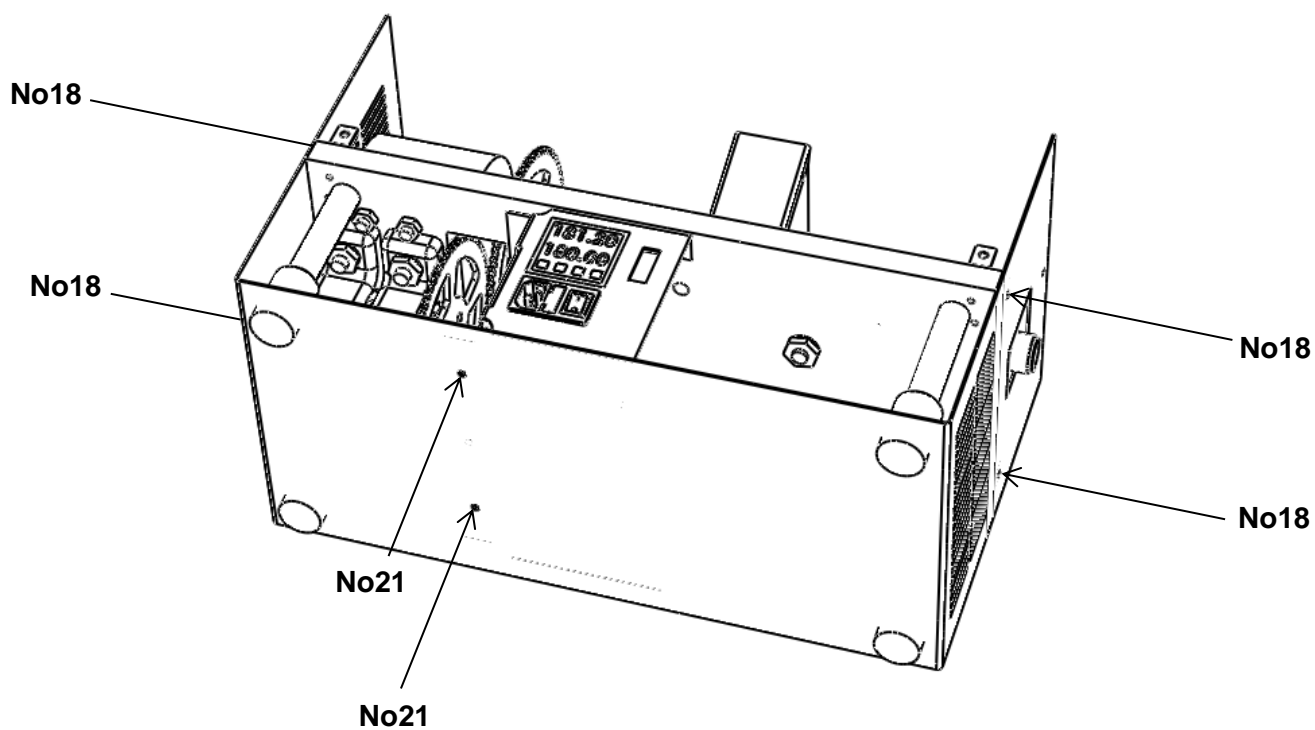


9. Fit the enclosure base.

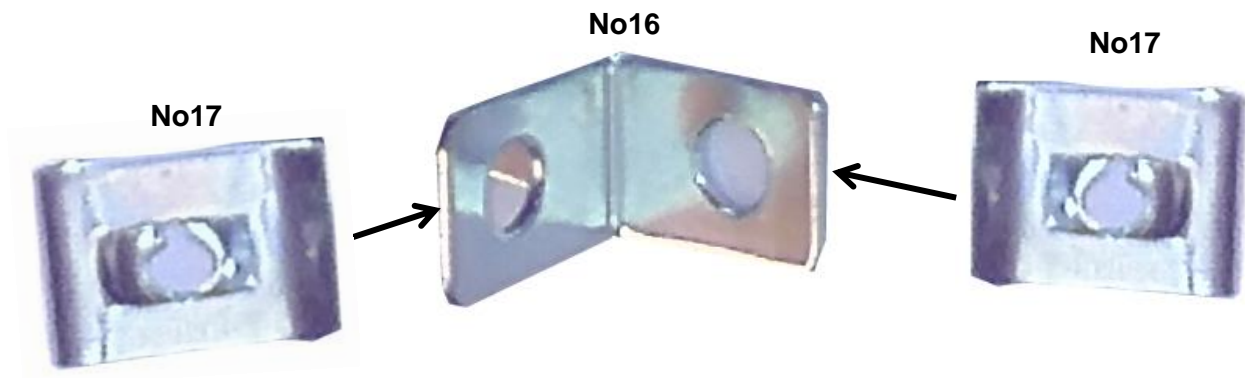


10. Screw in base screws, 2 x **No21**

11. Screw in side screws, 4 x **No18**

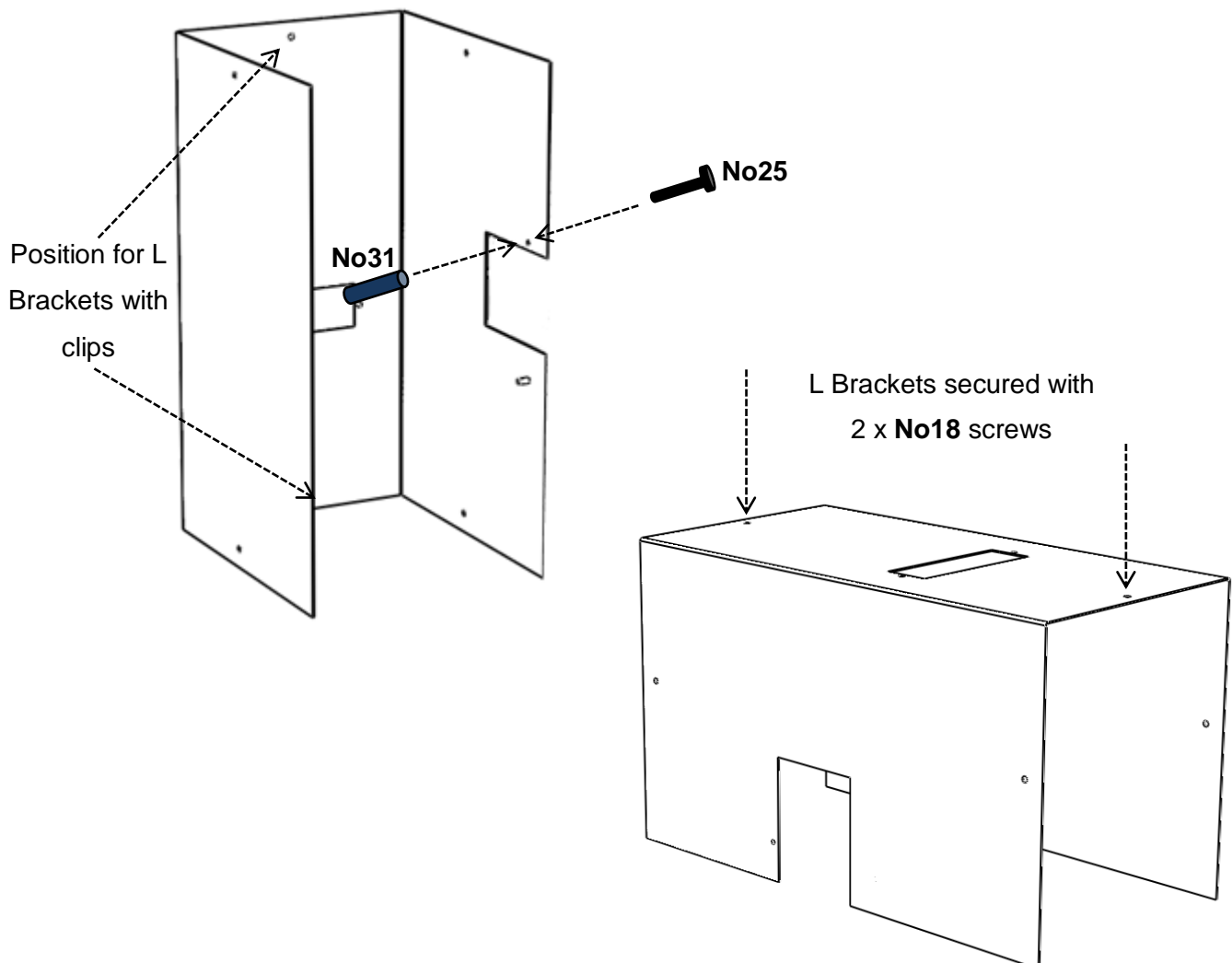


12. Prepare 2 x L brackets (**No16**) by clipping 2 clip-on-nuts (**No17**) to each bracket. Make sure the flush side faces outwards.

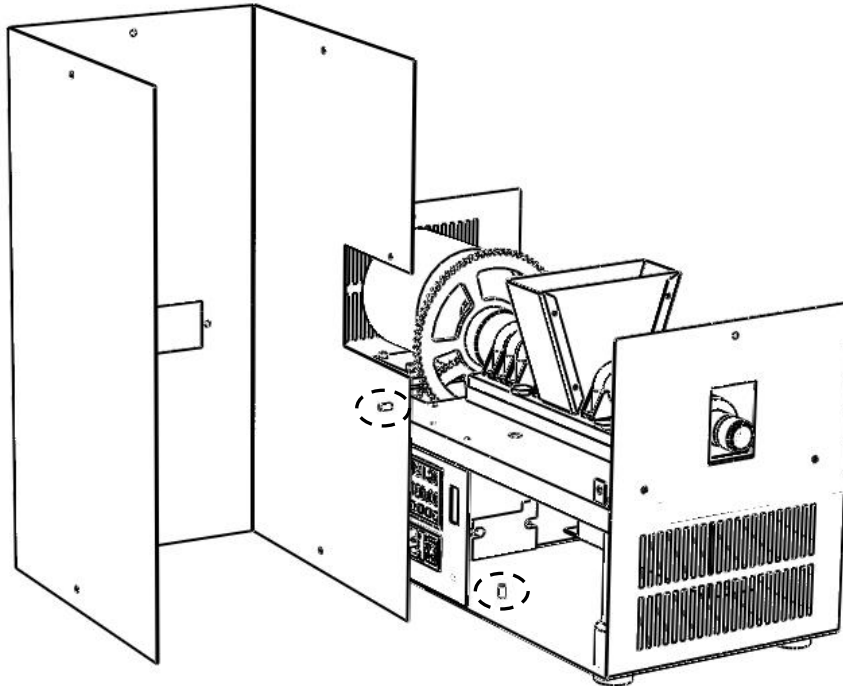


13. Fit L Brackets with clips on to enclosure using 2 x screws (**No18**).

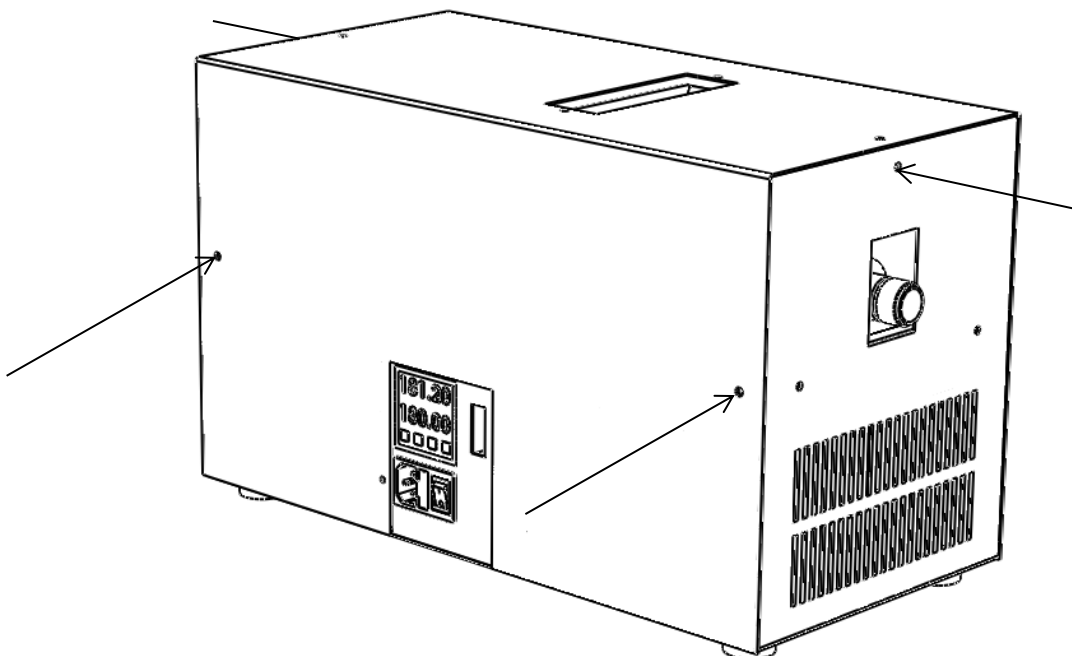
14. Push plastic cover on to interlock stop screw.



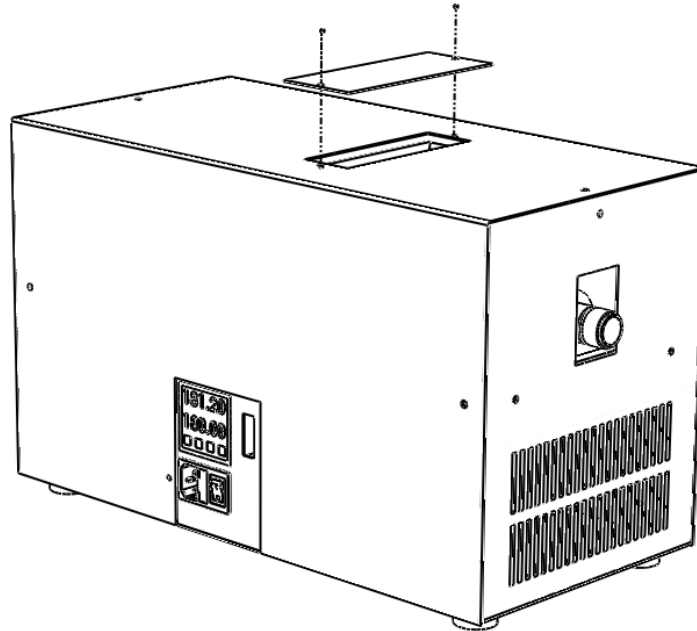
15. Place the enclosure top next to the assembly.
16. Secure the earth cable (**Wire E5**) from the enclosure base weld stud to the weld stud on the enclosure top using a M5 nut (**No14**) and shake proof washer (**No15**).



17. Secure the enclosure lid with 4 x M3 10mm screws (**No18**). When placing the enclosure into position pull the near side out so that the micro switch interlock stop screw is positioned into the slot on the control panel – this way it will depress the micro switch enabling power (Do not insert anything else into the control panel/electrical area).

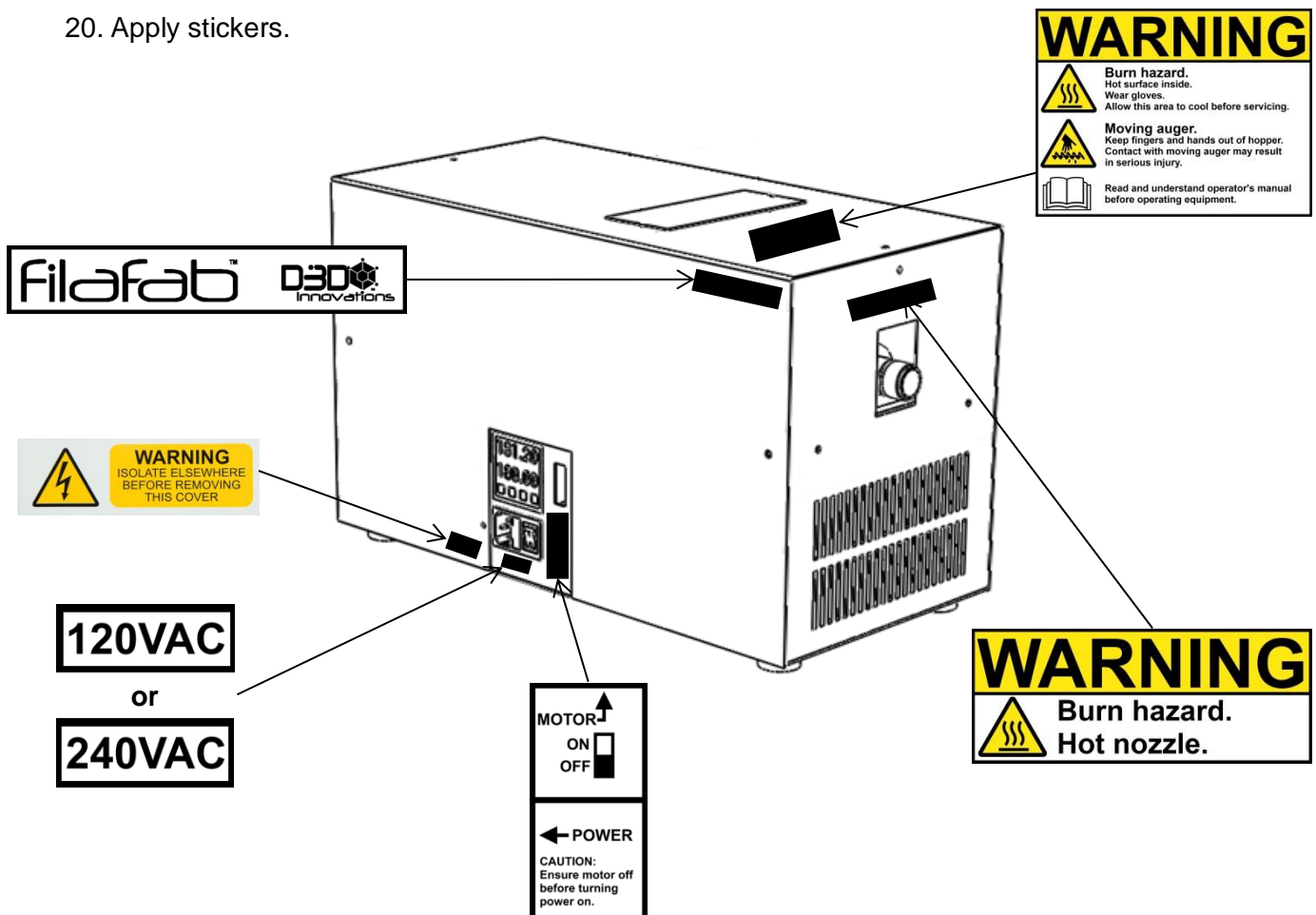


18. Screw in the hopper lid using 2 x screws.



19. Screw the nozzle adapter in to the extrusion tube and the nozzle in to the adapter.

20. Apply stickers.



Assembly Completed.

Read and understand the Operational Manual before powering up or attempting to operate.

10 Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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