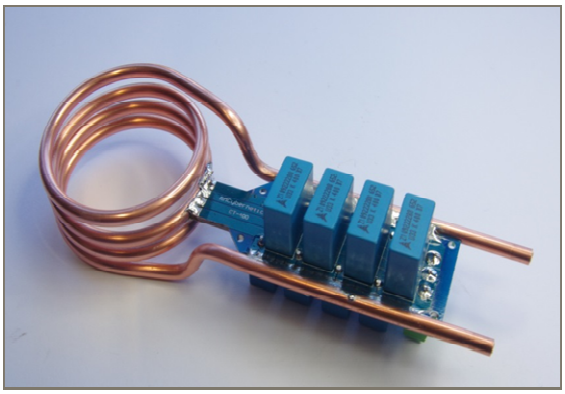
Induction Heater Coil Kit

Compact low voltage, high current induction coil

Model: CT-400-KIT



Features and Specifications

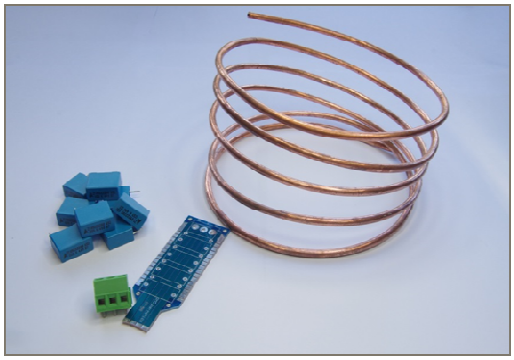
- High power water cool-able copper coil
- PCB Layout designed to reduce eddy losses while also cooling the capacitors via water cooling loop
- High quality double layer PTH, 2oz Copper PCB
- 8 x 330nF, 400V (AC) polypropylene capacitors
- Optional centre tap connection

This induction coil kit allows you to build a custom high power coil for use in induction heating or related applications. The 4mm copper tubing can be connected to many of our water cooling accessories allowing you to keep the system cool at high power levels.

Example Applications

- Induction Heating
- SSTC

Parts Included in the Kit



- 2 metres of 4mm od copper pipe
- High Frequency PCB
- 3 Way Terminal Block Connector
- 8x 330nF, 400V Polypropylene Capacitors

Tools Required for Assembly

- A good quality soldering iron with a large diameter tip
- Coil Form (a cylinder of some sort for winding the tubing around to form the coil)
- Bend Support (a smaller cylinder such as a sturdy pen for bending angles)
- Pipe Cutter
- Wire Cutters
- Table Vice/Clamp (optional but makes assembly easier)

Assembly Instructions

Step 1: Winding the main coil shape

We recommend cleaning the whole length of copper with wire wool prior to soldering, and then wearing gloves during the assembly process. This prevents contaminants from your skin from tarnishing the copper when heated.

Select a coil form to wrap the copper tube around. The size of your coil form will determine the inner diameter of your coil. It should be something fairly rigid such as some drainage pipe, or a rigid container. Here you can see (figure 1) we are using an old Tesla Coil secondary coil for the coil form. The coil form is removed after winding so you do not need to choose anything permanent.

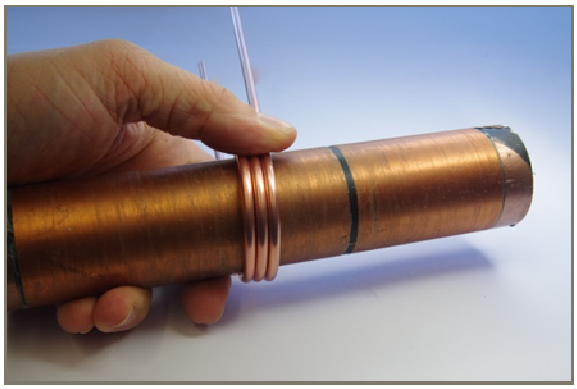


Figure 1: Wrapping around the coil form

We suggest wrapping from the middle of the copper length so that you have an equal length remaining on each side of the coil.

If you want to use a centre tap connection make sure that the number of turns used leaves you with a central one and the same number each side of it.

The copper is quite stiff so try to avoid kinks or sharp bends as this could restrict water flow or make it difficult to wind a good looking coil.

As you wind around the form, pull the copper tails against the previous winding as to ensure they are all closely spaced when finished.

Step 2: Bending the copper tails to meet the PCB

The copper tails will need to be bent two or three times so that they will run parallel with the PCB at the centre turn of the coil. The copper is quite stiff so take care when doing this part.

If your coil diameter is wider than the PCB, ensure that you bend the tails around then out from the coil parallel at the width of the PCB (25mm). In figure 2 below you can see a top down view of a coil with the tails brought out parallel with each other.

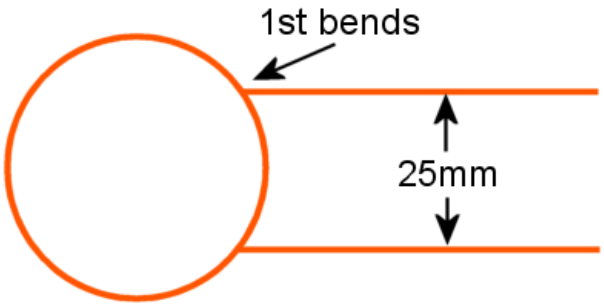


Figure 2: First bends to meet PCB width

Next you need to bend the tails towards the centre of the coil as shown in figure 3. Again do this by using the bend support held tightly against the copper. Once bent like shown below; stretch your coil like a spring so that none of the windings touch. Compress again or stretch further to reach your desired coil size.

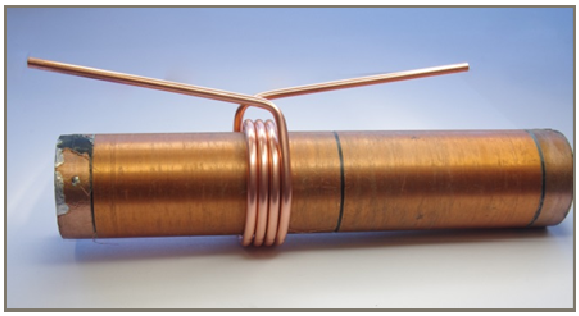


Figure 3: Tails bent towards centre

Now using the bend support again; bend the tails out again 90 degrees so they are parallel and aligned with the centre turn of your coil. You can use the PCB held up to the coil to help align the bends with the centre turn as shown in figure 4. If you do not wish to use a centre turn, you can bend them to any other angle as long as you have the tails running parallel and 25mm apart. The finished coil should look something like shown in figure 5

Figure 4: Alignment of tails with PCB

Figure 5: Finished Bends

Step 3: Soldering the PCB to the copper coil

This step can be difficult so try to prepare your workspace and get your soldering iron up to around 400℃. The copper coil and PCB will get very hot during soldering so you should make sure you have something to hold them in place and work on a heat proof surface.

Ensure that the copper tails are clean and shiny prior to soldering. It may help to scrub them lightly with some wire wool first as this helps the solder to stick more easily.

Use some masking tape to secure the copper tails to either side of the PCB. The PCB should be placed up against the central turn and parallel with the copper tails so that the PCB edges rest up against the copper as shown in figure 6. Inspect the area where the copper meets the PCB to ensure no kinks in the copper are causing gaps. Any gaps between the copper coil and the PCB edge need to be minimized to make soldering easier. It may help to use a hammer and a hard surface to gently tap out the kinks until it is very straight.

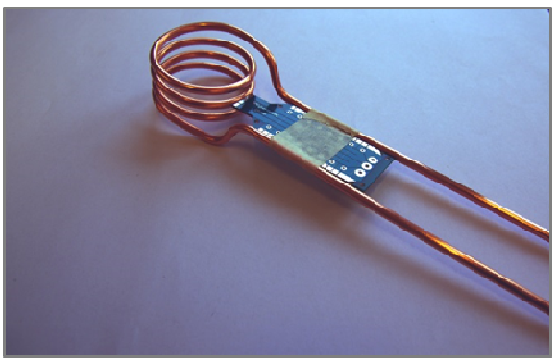


Figure 6: Securing the tails to the PCB prior to soldering

It is quite helpful to secure the coil in a vice as shown in figure 7. Here you can see two blocks of wood are also used to help prevent the copper being crushed and to prevent the metal vice drawing heat away when soldering. Tighten the vice to give a moderate amount of pressure but without deforming the PCB. This will ensure the copper and PCB edges are as close as possible and wont shift as the copper expands when being heated.

Once secure, apply a blob of solder to create a connection between the coil and PCB in three places; first at the center connection, then one at each side of the PCB at the end farthest from the coil. You will need to heat up the copper before any solder will stick to it which may take a minute or two when making the first join. It can help to have a large amount of solder on the tip of your iron as it improves surface contact and therefore heat transfer to the copper.

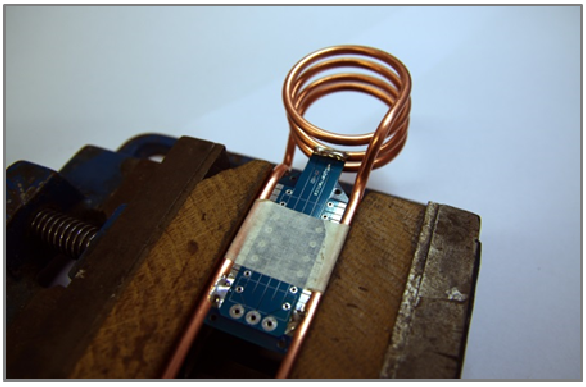


Figure 7: Clamping the assembly

The whole coil assembly and PCB will be very hot during soldering and for several minutes after! Do not handle it with bare hands until it has cooled.

Next open the clamp and remove the masking tape so that you can solder the remaining joints. Fix back into the clamp and solder each join.

Starting at the end nearest the coil, bring the copper up to temperature as before then slowly drag the iron tip towards the other end of the PCB while pushing in a good amount of solder. As you do this, the solder should flow and make a good join between the PCB edge and the copper pipe. You will need to repeat this step for each PCB edge and on both sides of the PCB. Use the same method for soldering both sides of the PCB to the center connection if also used. When soldering the reverse side of the PCB, ensure you do not heat the same place for too long otherwise the solder on the previously soldered side may melt and make a gap.

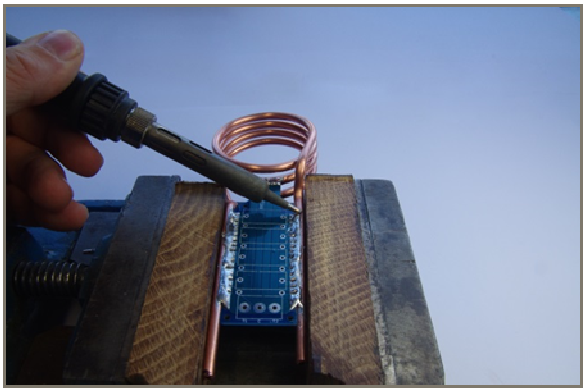


Figure 7: Soldering the PCB Edges

Step 4: Soldering the Capacitors and Terminal Block

Each part must be soldered one at a time and the PCB flipped over each time so parts are soldered on alternate sides. Start by soldering the green terminal block and then turn over the PCB to insert a capacitor in the holes nearest to it. Turn the assembly over to solder these connections and snip of any excess from the legs before inserting the next capacitor and repeating the process. The capacitors are non-polarized and can be soldered in either orientation.

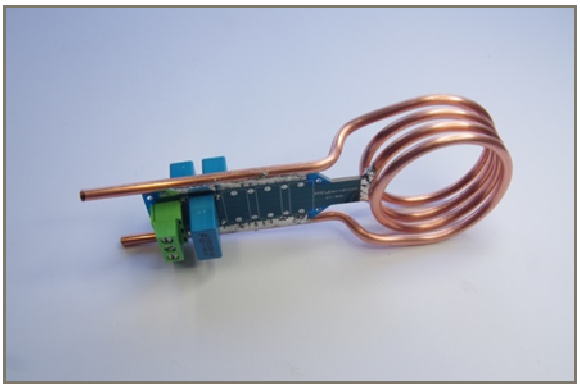


Figure 8: Soldering the PCB Edges

This completes the assembly of the CT-400-KIT