

## Buying an Arc Welder.

are many reports on the forum of cheap inverter welders failing within a few weeks of purchase. EBay tends to be the source and warranties can be tricky on there. Chinese made welders are best purchased from established UK based suppliers who can satisfy the warranty. It is in the interest of these suppliers to supply half decent ones to save on warranty claims.

Inverter welders do go wrong - they can be sensitive to knocks, power surges from the mains, dust and internal corrosion. Repairs will often cost more than the welder cost to buy in the first place. The difference between Chinese and European made inverters tends to be how sensitive they are to damage. And as a result how long they last.

### What about TIG?

The power source used in arc welders is very similar to the one used in TIG welders, and most (if not all) TIG welders can also be used for arc welding with the addition of a rod holder.

It doesn't work the other way around. TIG requires some extra features - a gas valve

and HF start (an easy starting method that avoids tungsten contamination). If you also want to TIG weld it's best to start off looking at welders that are sold as TIG welders.

### In more detail - what to look for?

DC is easier to start, and is safer than AC as the peak voltage is lower. Most rods can be run on DC.

#### \* Open circuit voltage (OCV)

Cheaper welders will tend to have 50V OCV, which will make them more difficult to start, make the arc less stable, and prevent the use of special rods. Most decent transformer machines and inverters will run 70-80V and these are the ones to look for.

#### \* Start current, crater fill and fancy stuff

Many DC machines, and most inverters will increase the current when starting the arc. It's a useful feature to have as it makes it much easier to start the arc.

Inverters often have crater fill which adds a little extra metal to fill the crater that is left is you pull the rod away to finish welding.

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### \* Maximum amps

An output of 140 amps is at the limit of a 13-amp supply (for inverter machines). This will allow the use of 3.2mm rods. (100 amps would be needed to run 2.5mm rods, and rods smaller than 2.5mm would require a lot more skill to use).

Higher outputs will allow the use of thicker rods, which will reduce the number of passes required on thicker materials.

### \* Duty cycle\*

Some of the air-cooled transformer arc welders have a very low duty cycle and can burn only one or two rods at full power before needing a long cooling period. Most other types should have an adequate duty cycle.

### \* Display

For beginners it's very useful to have a digital amp readout to accurately set the amps. This helps rule out one of the variables in learning.

Aside from that the main choices are price, robustness, size, efficiency on a limited amp supply, and typical life time (which will depend on the quality and also on the type).

### \*More on Duty Cycles

The duty cycle of a welder normally reflects how long it can weld in a 10-minute period before it has to cool down. A 70% duty cycle would allow 7 minutes welding over a 10-minute period and the duty cycle will reduce as amps increase. It's not easy to compare duty cycles in manufacturers specs as the standards for measuring it vary between manufacturers.

Some expensive welders will test themselves at an ambient temperature of 40 degrees, some will test at room temperature, and others prefer it chilly. Also the time the duty cycle is measured over will vary between manufacturers. 10 minutes is the normal standard, but the cheaper welders often go for 5 minutes, instantly doubling their duty cycle. Very cheap welders with low duty cycles won't burn a rod before thermal cut out.

### Types of Arc Welder

Arc welding has been around for a long time, and there are now a number of distinct types of arc welder. This page discusses the pros, cons and typical characteristics of these different types of welder.

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### DC inverters

Unlike traditional arc welders, modern DC inverter arc welders are very small, light and portable. Even the cheap ones available from as little as £100 function well, though the more expensive ones (up to £500) will be much more robust and will normally last much longer.

#### Pros:

- \* Very efficient - they can run up to about 140 amps on a 13-amp 240V supply, and tend to have good duty cycles (you can weld for longer on higher settings).

- \* Small, lightweight and very portable. Generally less than 10kg in weight.

- \* DC output results in easy arc starting

- \* Most inverters have features such as hot starting to improve the ease of starting, and a soft finish to reduce the crater at the end of a weld.

- \* All but the cheapest have 70V or 80V OCV (open circuit voltage)

- \* Most can be used for scratch start TIG. More expensive ones tend to have HF (high frequency) start functions for TIG welding.

- \* Pricier ones have features such as "arc force" which adjusts the voltage on the fly to cope with dirty plate.

#### Cons:

- \* Inverter machines are complex electronically, and repairs can be very expensive. The cheaper ones are sensitive to knocks and spikes in input voltage. The more expensive ones have more protection - some are designed to withstand being dropped from 0.5m.

#### Verdict:

DC inverters are the sensible buy for anyone new to arc welding. Even the cheapest ones tend to weld very nicely, the downside of the cheap ones being that cheap components that don't last very well.

### AC/DC inverters

These are normally aimed at TIG welding, and would not be bought for arc welding alone, but they generally have arc-welding settings.

#### Pros:

- \* Some rods are AC only. An AC/DC inverter can be used with these.

- \* AC is not susceptible to magnetism, which can cause

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stray arcs on DC machines.

### Cons:

For inverter welders the AC function takes a lot of electronics, so prices of half reasonable machines start at £1000.

### Verdict:

Fantastic for ARC welding, but only buy one if you also need to TIG aluminum.

### DC transformer welders

Transformer based arc welders are normally very heavy, and are aimed at TIG welding in a workshop rather than portability.

### Pros:

- \* These are excellent quality welders - for ease of use they are only bettered by decent inverter welders.

- \* Duty cycles tend to be higher than modern inverter welders, so these machines are still used by fabrication companies when they need to do long runs of weld at very high amps.

- \* Can last for much longer than inverter based machines, and are easier and cheaper to repair if they do go wrong. Many are still in regular use after 30 years.

### Cons:

- \* Not Portable: A Syncrowave 300 weighs 330kg and is the size of a house.

- \* The machines with huge power requirements - the Syncrowave manual recommends a 110 amp 240V supply.

- \* The buzz from the enormous transformers and 2-foot diameter fans create a lot of noise.

- \* Parts available for the older ones are becoming sketchy.

### Verdict:

Buy one secondhand if you want something that will last and have the space to keep it.

### AC oil cooled welders

### Pros:

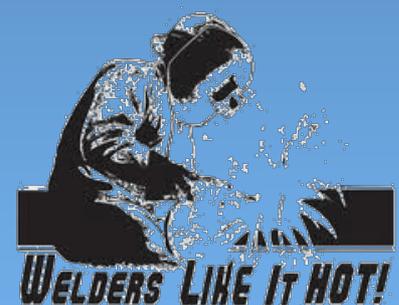
- \* Very simple heavily built welders that should last forever.

- \* Normally have both 50V and 80V settings. Smooth consistent arc while welding.

- \* Oil cooling results in an excellent duty cycle.

- \* It is possible to pick them up cheaply secondhand.

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### Cons:

\* Not Portable: Oil cooled welders are very heavy, even small units can weigh in excess of 100kg.

\* Starting the arc in AC is more difficult than with DC welders.

\* Can't be used for TIG welding.

### Verdict:

Old school equipment that you should never need to replace. Buy one second hand if you are old school, but bare in mind they take a little more skill to use.

### AC air-cooled welders

Often referred to as buzz boxes. A number of companies made reasonable quality air-cooled AC welders in the past. The technology is now the reserve of DIY stores selling welders to people who don't know any better. They are the least usable of any type of arc welder.

### Pros:

\* Cheap! Most large DIY stores will sell them for as little as £50.

### Cons:

\* They tend to have a low OCV (open circuit voltage), so

starting an arc is tricky.

\* The low OCV results in an unstable arc, and this gets worse as the transformer heats up. While they will weld it is to a lower standard than any of the other types of ARC welder.

\* Can't be used for special rods that require over 70V OCV (such as low hydrogen).

\* Very poor duty cycle: Many of the cheap ones will weld for only 30 seconds before needing a rest for 10 minutes on the maximum amp setting.

\* They are less efficient than inverter welders and will tend to require a dedicated supply to work on higher settings.

\* Can't be used for TIG welding.

### Verdict:

To a great extent these are a waste of money. They are the most difficult to use of any arc welder, so most DIY buyers will decide they don't like the process and give up. The duty cycles are annoyingly low. They are only really suitable for someone who wants an arc welder for very occasional use and doesn't want to spend money.

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