

WELDING TRANSFORMER MANUAL



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INTRODUCTION

This equipment must be used solely for welding operations. We urge you to pay especially close attention to the chapter on safety precautions. This manual must be carefully stored in a place familiar to everyone involved with the machine. It must be consulted whenever doubts arise and accompany the machine throughout its operative life-span. It shall also serve as a reference for ordering spare parts.

GENERAL DESCRIPTIONS

This welding machine is a constant current power source built using INVERTER technology, designed to weld covered electrodes (not including cellulosic) and for TIG procedures, with scratch start and high frequency. delivers direct current, while delivers both direct and alternating current.

PLACEMENT

Install the control panel, following the corresponding instructions. The welding machine must be placed in a sufficiently ventilated, non-dusty area, taking care not to obstruct the air entering or leaving the cooling slots. **WARNING: REDUCED AIR FLOW** causes the internal parts to overheat and may damage them. • Keep at least 200 mm of free space all around the machine. • Never connect any filtering device to the air intake passages of this welding machine. Use of any type of filtering device shall immediately void the warranty.

START-UP

Only skilled personnel should install the machine. Connections must be carried out according to current regulations, and in full observance of safety laws.

Negative output terminal, Positive output terminal

Connector for the TIG torch trigger, foot control or cooling unit.

The welding circuit must never be deliberately placed in direct or indirect contact with the safety conductor except on the workpiece.

If the workpiece is deliberately grounded by means of the safety wire, the connection must be as direct as possible, and made using a wire having a cross-section at least equal to that of the welding current return wire. It must also be connected to the workpiece at the same point as the return wire, using the return wire clamp or a second earth clamp placed immediately adjacent to it.

Every precaution must be taken to avoid welding current leakage.

Make sure that the supply voltage matches the voltage indicated on the specifications plate of the welding machine. • Connect the power cable, making sure that the brown, black and blue wires correspond to the three phases, and that the yellow-green wire corresponds to the earth terminal of the system

Types of Power Supply for Arc Welding.

To supply the electrical energy necessary for arc welding processes, a number of different power supplies can be used. The most common classification is constant current power supplies and constant voltage power supplies. In arc welding, the voltage is directly related to the length of the arc, and the current is related to the amount of heat input. Constant current power supplies are most often used for manual welding processes such as gas tungsten arc welding and shielded metal arc welding, because they maintain a relatively constant current even as the voltage varies. This is important because in manual welding, it can be difficult to hold the electrode perfectly steady, and as a result, the arc length and thus voltage tend to fluctuate. Constant voltage power supplies hold the voltage constant and vary the current, and as a result, are most often used for automated welding processes such as gas metal arc welding, flux cored arc welding, and submerged arc welding. In these processes, arc length is kept constant, since any fluctuation in the distance between the wire and the base material is quickly rectified by a large change in current. For example, if the wire and the base material get too close, the current will rapidly increase, which in turn causes the heat to increase and the tip of the wire to melt, returning it to its original separation distance.

Polarity Settings for Welding Electrodes

The type of current used in arc welding also plays an important role in welding. Consumable electrode processes such as shielded metal arc welding and gas metal arc welding generally use direct current, but the electrode can be charged either positively or negatively. In welding, the positively charged anode will have a greater heat concentration, and as a result, changing the polarity of the electrode has an impact on weld properties. If the electrode is positively charged, it will melt more quickly, increasing weld penetration and welding speed. Alternatively, a negatively charged electrode results in more shallow welds. Non-consumable electrode processes, such as gas tungsten arc welding, can use either type of direct current, as well as alternating current. However, with direct current, because the electrode only creates the arc and does not provide filler material,

a positively charged electrode causes shallow welds, while a negatively charged electrode makes deeper welds. Alternating current rapidly moves between these two, resulting in medium-penetration welds. One disadvantage of AC, the fact that the arc must be re-ignited after every zero crossing, has been addressed with the invention of special power units that produce a square wave pattern instead of the normal sine wave, making rapid zero crossings possible and minimising the effects of the problem.

The Advantages and Welding.

Flux Shielded Manual Metal Arc Welding is the simplest of all the arc welding processes. The equipment can be portable and the cost is fairly low. This process finds innumerable applications, because of the availability of a wide variety of electrodes. A wide range of metals and their alloys can be welded. Welding can be carried out in any position with highest weld quality. The process can be very well employed for hard facing and metal deposition to reclaim parts or to develop other characteristics like wear resistance etc. Joints (e.g. between nozzles and shell in a pressure vessel) which because of their position are difficult to be welded by automatic welding machines are easily accomplished by flux shielded metal arc welding.

The Disadvantages of Welding.

Because of the limited length of each electrode and brittle flux coating, it is difficult to automate the process. In welding long joints (e.g., in pressure vessels), as one electrode finishes, the weld is to be progressed with the next electrode. Unless properly cared, a defect (like slag inclusion or insufficient penetration) may occur at the place where welding is restarted with the new electrode. The process uses stick electrodes and thus it is slower as compared to MIG welding.

Arc Blow

“Arc Blow” is encountered with D.C welding equipment. The arc is forced away from the weld point notably when welding in corners. The conductors carrying the current namely the welding lead from the set, and the return lead from the work piece are carrying current in opposite direction so that a repulsive magnetic force is set up which effects the D.C. Welding Arc. This conditions occurs most when using currents above 200 or below 40 amps. The best method of connections are: Weld away from the earth connection. Change the position of the earth wire on the work. Wrap the welding cable a few turns around the work, if possible on girders etc. Change the position of the work on the table if working at a bench.

Welding Cables

The purpose of the cables is to carry the current required for the arc. One cable ends at the earth clamp. The other goes to the electrode holder. It is important that the cables are not too small in diameter. Small cables may have too high a resistance and may overheat during the welding operation. Most cables contain many strands of fine copper wire. This enables them to carry the electric current and it makes them very flexible.

The Electrode Holder

The electrode holder is an electrically insulated clamping device which holds the electrode. It is connected to one of the cables coming from the welding plant. The current passes from the cable through the electrode holder to the electrode.

Protection for the Operator.

- Ensure that there are no areas of exposed skin as ultra-violet rays from the weld arc will burn the skin. Only wear regulation inflammable overalls as arc-welding produces
- large amounts of hot sparks which will set flammable clothing alight. Suitable head cover should be worn to protect from sparks if welding overhead. Arc-welding produces heat, glare, sparks, ultra-violet & infra-red rays and harmful fumes. Welding gauntlets must be worn at all times. Face masks are designed to deflect fumes and should therefore be held close to the face. Ensure that the correct shade 11 EW filters are fitted in the face mask for manual metal arc welding Gas welding goggles do not afford protection for the face against the light intensity or the radiation and must not be used. Always wear protective goggles when chipping slag.
- Ensure adequate ventilation at source, when welding inside buildings.
- This is a requirement by law and is there to protect the operator and others. Welding of some materials (i.e. galvanised steel) produces highly toxic fumes Check your surroundings, when you are welding behind a dark face mask you will be unaware of what is happening around you. Clear the surroundings of flammable material and ensure there is a fire extinguisher available. Check all welding cables for any loose connections that would cause arching thereby creating a hazard. Ensure your surroundings are dry and where possible stand on a timber "duck-board". When welding in confined spaces please refer to separate training required for entering and working in confined spaces as this requires specialist knowledge, training and equipment. Do not work over Paint/Oils/Grease/Solvents as striking the arc will prove difficult and toxic fumes will be produced.

General Safety Precautions

Ensure a suitable Fire Extinguisher and fire blanket are readily available and easily accessible in the event of a small fire. Fire blankets may be used to protect small surrounding areas from sparks when completing tie-in or local welds. Ensure work area is tidy and all combustible/ flammable materials are removed from the work area to ensure that they are not ignited by excessive heat or stray sparks. Ensure adequate clear access is available to the work area in the event of accident or injury. Exits must be kept free of obstacles. Ensure that proper precautions are observed when handling hot materials and that they are not left un-attended for unsuspecting passer-bys to touch.