

TOTAL

One-Stop Tools Station

TOTAL

MMA WELDING MACHINE

TW21605,UTW21605,TW22005

INDUSTRIAL



CE



TABLE OF CONTENTS

TABLE OF CONTENTS.....	2
SAFETY PRECAUTIONS	3
PREPARATION OF THE WORKING AREA.....	8
SAFETY PRECAUTIONS FOR ARC WELDING.....	9
SYMBOLS.....	10
PRINCIPLES OF OPERATION	11
WELDING TECHNIQUES.....	12
MAINTENANCE	13
ACCESSORIES	14
SPECIFICATIONS	14
WIRING DIAGRAM.....	15

SAFETY PRECAUTIONS

!!!WARNING: AS WITH ALL MACHINERY, THERE ARE CERTAIN HAZARDS INVOLVED WITH THEIR OPERATION AND USE. EXERCISING RESPECT AND CAUTION WILL CONSIDERABLY LESSEN THE RISK OF PERSONAL INJURY. HOWEVER, IF NORMAL SAFETY PRECAUTIONS ARE OVERLOOKED, OR IGNORED, PERSONAL INJURY TO THE OPERATOR MAY RESULT. FAILURE TO FOLLOW THESE RULES MAY RESULT IN SERIOUS PERSONAL INJURY.

1. GENERAL PRECAUTIONS

A) BURN PREVENTION

Wear protective clothing - gauntlet gloves designed for use in welding, hat, and protective shoes. Button shirt collar and pocket flaps, and wear cuffless trousers to avoid entry of sparks and slag. Wear helmet with safety goggles or glasses with side shields underneath, appropriate filter lenses or plates (protected by clear cover glass). This is a **MUST** for welding or cutting, (and chipping) to protect the eyes from radiant energy and flying metal. Replace cover glass when broken, pitted, or spattered. Avoid oily greasy clothing. A spark may ignite them. Hot metal such as electrode stubs and workpieces should never be handled without gloves. First aid facilities and a qualified first aid person should be available for each shift unless medical facilities are close by for immediate treatment of flash burns of the eyes and skin burns. Ear plugs should be worn when working overhead or in a confined space. A hard hat should be worn when others work overhead. Flammable hair preparations should not be used by persons intending to weld or cut.

B) TOXIC FUME PREVENTION

Severe discomfort, illness or death can result from fumes, vapours, heat, or oxygen enrichment or depletion that welding (or cutting) may produce. Prevent them with adequate ventilation. **NEVER** ventilate with oxygen. Lead-, cadmium-, zinc-, mercury- and beryllium-, bearing materials, when welded (or cut) may produce harmful concentrations of toxic fumes. Adequate local exhaust ventilation must be used, or each person in the area as well as the operator must wear an air- supplied respirator. For beryllium, both must be used. Metals coated with or containing materials that emit toxic fumes should not be heated unless coating is removed from the work surface, the area is well ventilated, or the operator wears an air-supplied respirator.

Work in a confined space only while it is being ventilated and, if necessary, while wearing an air-supplied respirator. Vapours from chlorinated solvents can be decomposed by the heat of the arc (or flame) to form PHOSGENE, a highly toxic gas, and other lung and eye irritating products. The ultraviolet (radiant) energy of the arc can also decompose trichloroethylene and perchloroethylene vapours to form phosgene. DO NOT WELD where solvent vapours can be drawn into the welding or cutting atmosphere or where the radiant energy can penetrate to atmospheres containing even minute amounts of trichloroethylene or perchloroethylene.

C) FIRE AND EXPLOSION PREVENTION

Causes of fire and explosion are:

1. Combustibles reached by the arc, flame, flying sparks, hot slag or heated material;
2. Short circuits.

BE AWARE THAT flying sparks or falling slag can pass through cracks, along pipes, through windows or doors, and through wall or floor openings, out of sight of the goggled operator. Sparks and slag can fly 10m.

To prevent fires and explosion: keep equipment clean and operable, free of oil, grease, and (in electrical parts) of metallic particles that can cause short circuits. If combustibles are in area, do NOT weld. Move the work if practicable, to an area free of combustibles.

Avoid paint spray rooms, dip tanks, storage areas, ventilators. If the work cannot be moved, move combustibles at least 10m. away out of reach of sparks and heat; or protect against ignition with suitable and snug fitting, fire-resistant covers or shields.

Walls touching combustibles on opposite sides should not be welded on.

Walls, ceilings, and floor near work should be protected by heat resistant covers or shields. Fire watcher must be standing by with suitable fire extinguishing equipment during and for some time after welding if:

- a. appreciable combustibles (including building construction) are within 10m.
- b. appreciable combustibles are further than 10m but can be ignited by sparks.

- c. openings (concealed or visible) in floors or walls within 10m can expose combustibles to sparks.
- d. combustibles adjacent to walls, ceilings, roofs or metal partitions can be ignited by radiant or conducted heat.

After work is done, check that area is free of sparks, glowing embers, and flames. An empty container that held combustibles, or that can produce 8 flammable or toxic vapours when heated, must never be welded on, unless container has first been cleaned. This includes.....a thorough steam or caustic cleaning (or a solvent or water washing, depending on the combustible's solubility) followed by purging and inerting with nitrogen or carbon dioxide, and using protective equipment.

Water filling just below working level may substitute for inerting.

A container with unknown contents should be cleaned (see paragraph above), do NOT depend on sense of smell or sight to determine if it is safe to weld.

Hollow castings or containers must be vented before welding - they can explode.

In explosive atmospheres, never weld where the air may contain flammable dust, gas, or liquid vapours.

2. ELECTRIC ARC WELDING

Comply with precautions in 1, and this section. Arc welding, properly done, is a safe process, but a careless operator invites trouble. The equipment carries high currents at significant voltages. The arc is very bright and hot. Sparks fly, fumes rise, ultraviolet and infrared energy radiates, weldments are hot. The wise operator avoids unnecessary risks and protects himself and others from accidents.

2A) BURN PROTECTION

Comply with precautions in 2. The welding arc is intense and visibly bright. Its radiation can damage eyes, penetrate lightweight clothing, reflect from light colored surfaces, and burn the skin and eyes. Skin burns resemble acute sunburn, those from gas - shielded arcs are more severe and painful.

DON'T GET BURNED! COMPLY WITH PRECAUTIONS!

1) PROTECTIVE CLOTHING

Wear long sleeved clothing in addition to gloves, hat and shoes (2A). As necessary, use additional protective clothing such as leather jacket or sleeves, flameproof apron, and fire-resistant leggings. Avoid outer garments of untreated cotton. Bare skin protection. Wear dark substantial clothing. Button collar to protect chest and neck and button pockets to prevent entry of sparks.

2) EYE AND HEAD PROTECTION

Protect eyes from exposure to arc. NEVER look at an electric arc without protection. Welding helmet or shield containing a filter plate shade no. 12 or denser must be used when welding. Place over face before striking arc. Protect filter plate with a clear cover plate. Cracked or broken helmet or shield should NOT be worn; radiation can pass through to cause burns. Cracked, broken, or loose filter plates must be replaced IMMEDIATELY. Replace clear cover plate when broken, pitted, or spattered. WE SUGGEST you wear flash goggles with side shields under the helmet, to give some protection to the eyes should the helmet not be lowered over the face before an arc is struck. Looking at an arc momentarily with unprotected eyes (particularly a high intensity gas-shielded arc) can cause a retinal burn that may leave a permanent dark area in the field of vision. Before welding whilst wearing contact lenses, seek advice from your optician.

3) PROTECTION OF NEARBY PERSONNEL

For production welding, a separate room or enclosed bay is best. In open areas, surround the operation with low reflective, non-combustible screens or panels. Allow for free air circulation, particularly at floor level. Provide face shields for all persons who will be looking directly at the weld. Others working in the area should wear flash goggles. Before starting to weld, make sure that screen or bay doors are closed.

2B) TOXIC FUME PREVENTION

Comply with precautions in 2-B. Generator engine exhaust must be vented to the outside air. Carbon monoxide can kill.

2C) FIRE AND EXPLOSION PREVENTION

Comply with precautions in 2-C. Equipment's rated capacity. Do not overload arc welding equipment. It may overheat cables and cause a fire. Loose cable connections may overheat or flash and cause a fire. Never strike an arc on a pressure vessel. It creates a brittle area that can cause a violent

rupture or lead to such a rupture later under rough handling.

2D) SHOCK PREVENTION

Exposed live conductors or other bare metal in the welding circuit, or in unearthed, electrically-LIVE equipment can fatally shock a person whose body becomes a conductor. **DO NOT STAND, SIT, LIE, LEAN ON, OR TOUCH** a wet surface when welding, without suitable protection.

2E) PROTECTION FOR WEARERS OF ELECTRONIC LIFE SUPPORT DEVICES (PACEMAKERS)

Magnetic fields from high currents can affect pacemaker operation. Persons wearing electronic life support equipment (pacemaker) should consult with their doctor before going near arc welding operations.

2F) TO PROTECT AGAINST SHOCK:

Keep body and clothing dry. Never work in damp area without adequate insulation against electrical shock. Stay on a dry duckboard, or rubber mat when dampness or sweat can not be avoided. Sweat, sea water, or moisture between body and an electrically LIVE part - or earthed metal - reduces the 10 body surface electrical resistance, enabling dangerous and possibly lethal currents to flow through the body.

1) EARTHING THE EQUIPMENT

When arc welding equipment is earthed, and the work is earthed, a voltage may exist between the electrode and any conducting object.

Examples of conducting objects include, but are not limited to, buildings, electrical tools, work benches, welding power source cases, workpieces, etc. Never touch the electrode and any metal object unless the welding power source is off. When installing, connect the frames of each unit such as welding power source, control, work table, and water circulator to the building earth.

Conductors must be adequate to carry earth currents safely. Equipment made electrically LIVE by stray current may shock, possibly fatally. **Do NOT EARTH** to electrical conduit, or to a pipe carrying ANY gas or a flammable liquid such as oil or fuel.

2) ELECTRODE HOLDERS

Fully insulated electrode holders should be used. **Do NOT** use holders with

protruding screws or with any form of damage.

3) CONNECTORS

Fully insulated lock-type connectors should be used to join welding cable.

4) CABLES

Frequently inspect cables for wear, cracks and damage. **IMMEDIATELY REPLACE** those with excessively worn or damaged insulation to avoid possibly lethal shock from bared cable. Cables with damaged areas may be taped to give resistance equivalent to original cable. Keep cable dry, free of oil and grease, and protected from hot metal and sparks.

5) TERMINALS AND OTHER EXPOSED PARTS

Terminals and other exposed parts of electrical units should have insulating covers secured before operation.

6) SAFETY DEVICES

Safety devices such as interlocks and circuit breakers should not be disconnected or shunted out. Before installation, inspection, or service of equipment, shut OFF all power and remove line fuses (or lock or red-tag switches) to prevent accidental turning ON of power. Do not open power circuit or change polarity while welding. If, in an emergency, it must be disconnected, guard against shock burns, or flash from switch arcing. Always shut OFF and disconnect all power to equipment. Power disconnect switch must be available near the welding power source.

PREPARATION OF THE WORKING AREA

The working area must be sufficiently spacious, not humid, and well-ventilated as to avoid any fumes which develop from the welding process and from incidental material adhering to the pieces to be welded (oils, paints, tars...) which may cause annoyance to the operator.

Avoid welding by contact with humid parts nearby combustible liquids. Least of all, do not weld upon tanks which may contain inflammable residuals.

SAFETY PRECAUTIONS FOR ARC WELDING

ALWAYS ensure that there is full free air circulating around the outer casing of the machine, and that the louvers are unobstructed.

ALWAYS use a proper welding face shield or helmet, with suitable filter lenses. Proper gloves and working clothes should be worn at all times.

ALWAYS remove all flammable materials from the welding area.

NEVER remove any of the panels unless the machine is disconnected from the supply, AND never use the machine with any of the panels removed.

NEVER attempt any electrical or mechanical repair unless you are a qualified technician.

NEVER use or store in a wet/damp environment. DO NOT EXPOSE TO RAIN.

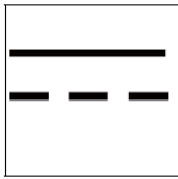
NEVER continue to weld, if, at any time, you feel even the smallest electric shock. Stop welding IMMEDIATELY, and DO NOT attempt to use the machine until the fault is diagnosed and corrected.

NEVER use the welder with input connections greater than 10M in length.

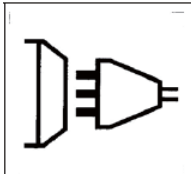
NEVER allow the cables to become wrapped around the operator or any person in the vicinity.

SYMBOLS

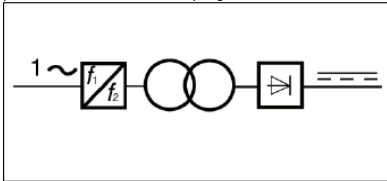
The following symbols will appear on your welder



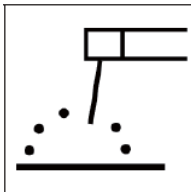
Direct Current (DC)



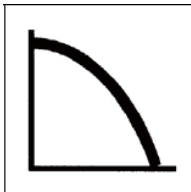
Inverter



Single Phase Static Frequency Converter-
Transformer-Rectifier



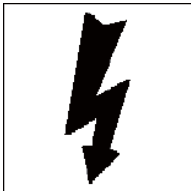
Shielded Metal Arc Welding (SMAW)



Constant current



Read instructions before using the welder.



Dangerous voltage

PRINCIPLES OF OPERATION

Shielded Metal Arc welding employs the heat of the arc to melt the base metal and the tip of a flux covered electrode.

The electrode and the workpiece are part of an electric circuit. This circuit begins with the electric power source and includes the welding cables, an electrode holder, a workpiece connection, the workpiece, and an arc welding electrode. One of the two cables from the power source is attached to the work. The other is attached to the electrode holder.

Welding commences when an electric arc is struck between the tip of the electrode and the work. The intense heat of the arc melts the tip of the electrode and the surface of the work close to the arc. Tiny globules of molten metal rapidly form on the tip of the electrode, then transfer through the arc stream into the molten weld pool. In this manner, filler metal is deposited as the electrode is progressively consumed.

The arc is moved over the work at an appropriate arc length and travel speed, melting and fusing a portion of the base metal and continuously adding filler metal. Since the arc is one of the hottest of the commercial sources of heat (temperatures above 90000F (50000C) have been measured at its centre), melting of the base metal takes place almost instantaneously upon arc initiation.

If welds are made in either the flat or the horizontal position, metal transfer is induced by the force of gravity, gas expansion, electric and electromagnetic forces, and surface tension. For welds in other positions, gravity works against the other forces.

The process requires sufficient electric current to melt both the electrode and a proper amount of base metal. It also requires an appropriate gap between the tip of the electrode and the base metal or the molten weld pool. These requirements are necessary to set the stage for coalescence.

The sizes and types of electrodes for shielded metal arc welding define the arc voltage requirements (within the overall range of 16 to 40V) and the current requirements (within the overall range of 20 to 550A). The current may be either alternating or direct, depending upon the electrode being used, but the power source must be able to control the level of current within a reasonable range in order to respond to the complex variables of the welding process itself.

WELDING TECHNIQUES

Arc welding cables are supplied with this machine.

To prepare the unit for ARC welding, it is important that you follow the procedure below.

1. With the ON/OFF switch, located on the rear panel, in the OFF position, connect the welding leads as follows:
 - Welding Electrode lead to the “+” terminal.
 - Earth Clamp lead to the “-” terminal.
2. Attach the work clamp to the workpiece - as close as possible to the area being welded. Clean with a wire brush where necessary to ensure the connection is as clean as possible.
3. An appropriate current must then be set by turning the Welding Current Selector located on the front panel of the machine. With practice you will gain a feel for the correct current setting for different welding electrode thicknesses.
4. Switch ON using the switch located on the rear panel. The green light on the front panel should glow, indicating the machine is ON.

NOTE: If the machine stops at any time and the amber light comes ON the thermal overload has intervened.

5. The most difficult aspect of the arc welding process, particularly for beginners, is that of striking an arc. We strongly recommend that you practice on some pieces of scrap metal to get the feel of the operation, before you start on an actual welding job.
6. Hold the electrode about 10mm from the work and at an angle of about 70° to 80° to the work surface; take care not to accidentally touch the workpiece until you are ready to commence.
7. Holding the welding mask close-up to the face, give a short stroke with the electrode on the workpiece. As soon as the arc is primed, withdraw the electrode from the workpiece to leave a tiny gap of around 1.5mm (1/16"). The current will flow across the gap with a crackling noise and brilliant arc. Continue to weld in one direction, maintaining the small gap as you

go. At the end of the run just withdraw the electrode fully from the workpiece.

NOTE: When you prime the arc be sure to withdraw the electrode fairly swiftly to leave the 1.5mm. gap, otherwise the electrode will weld itself to the workpiece. Should this occur give the electrode a short sharp jerk to free it and, if necessary prime the arc again. If you cannot free the electrode, switch the machine off immediately, and free it off.

8. Inspect the job carefully. With a correct combination of electrode size and current setting, the area of the weld should be a complete fusion of the electrode metal with the metals being joined. Slag forming on the surface should be chipped away with a chipping hammer or pick. ALWAYS wear your safety goggles when chipping away slag.

NOTE: If the resultant weld looks irregular or messy, or shows signs of porosity or slag contamination, you have almost certainly failed to achieve the correct combination, (or dirt /oil is present on workpiece). Do not worry as practice will soon cure this.

HEALTH WARNING:

When welding always ensure there is adequate ventilation in the work area as the welding process gives off toxic fumes.

MAINTENANCE

The ARC Inverter Welder, requires very little maintenance other than the guidelines shown below. Under normal working conditions removing the covers and cleaning with dry compressed air at reduced pressure once a year will be quite sufficient. Cleaning at more frequent intervals is advisable if the unit is operating in a dusty and dirty environment.

1. Keep the louvres clean to avoid a build up of dirt and oxides inside the machine, which can reduce machine output.
2. Check all cables periodically: They must be in good condition and not cracked.
3. Always try to avoid getting particles of metal inside the machine since they could cause short circuits.

IMPORTANT: Disconnect from mains before cleaning.

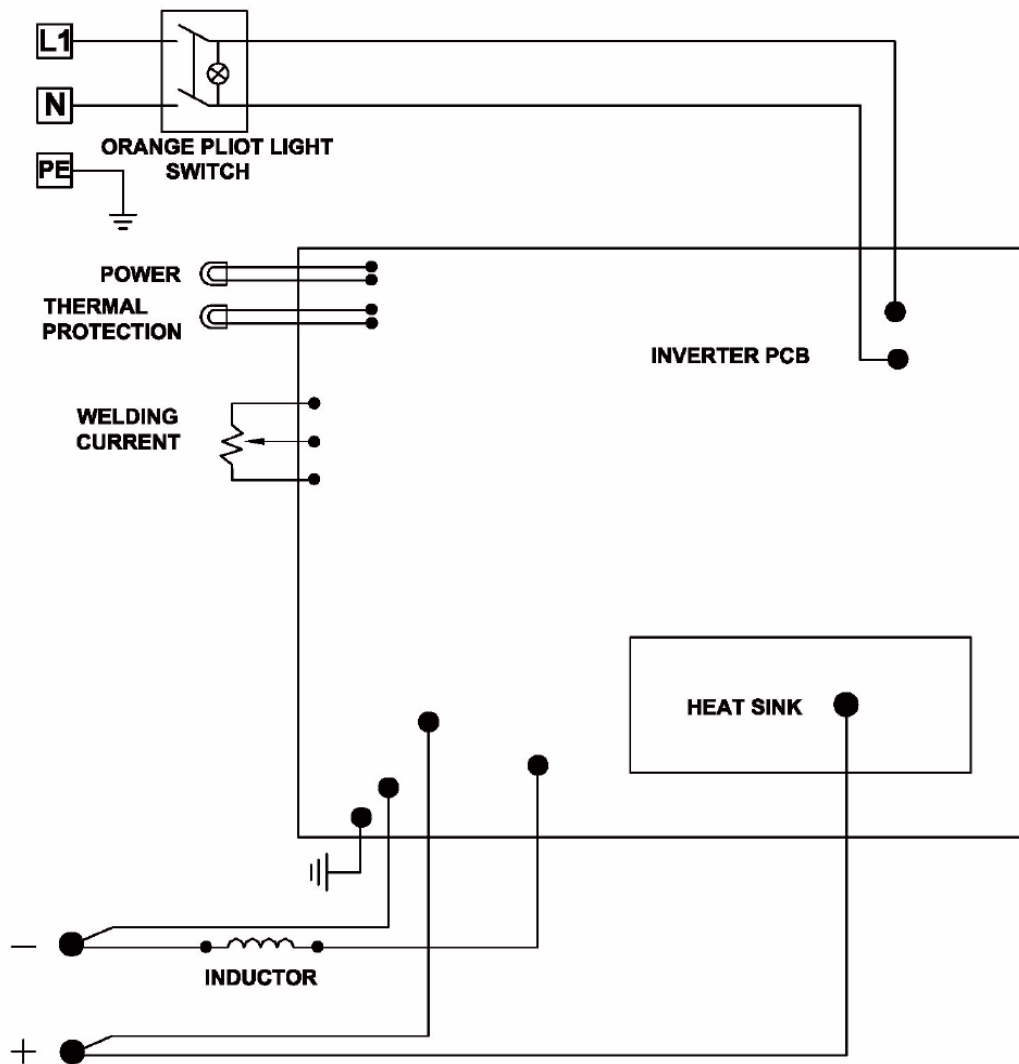
ACCESSORIES

1. Electrode Holder with cable
2. Earth Clamp with cable
3. Hammer Brush
4. Mask

SPECIFICATIONS

	TW21605	UTW21605	TW22005	UTW22005
Input voltage(V)	220-240	110-120	220-240	110-120
Input capacity(kVA)	6.3	6.3	8.4	8.4
No load voltage(V)	65	65	70	70
Current range(A)	10-160	10-160	10-200	10-200
Max. output(A)	160	160	200	200
Duty cycle(%)	60% @160A	60% @160A	60% @200A	60% @200A
Electrode size(mm)	1.6-4.0	1/16"-5/32"	1.6-5.0	1/16"-3/16"
Weight(Kgs)	5.2	11.5Lbs	5.3	11.7Lbs

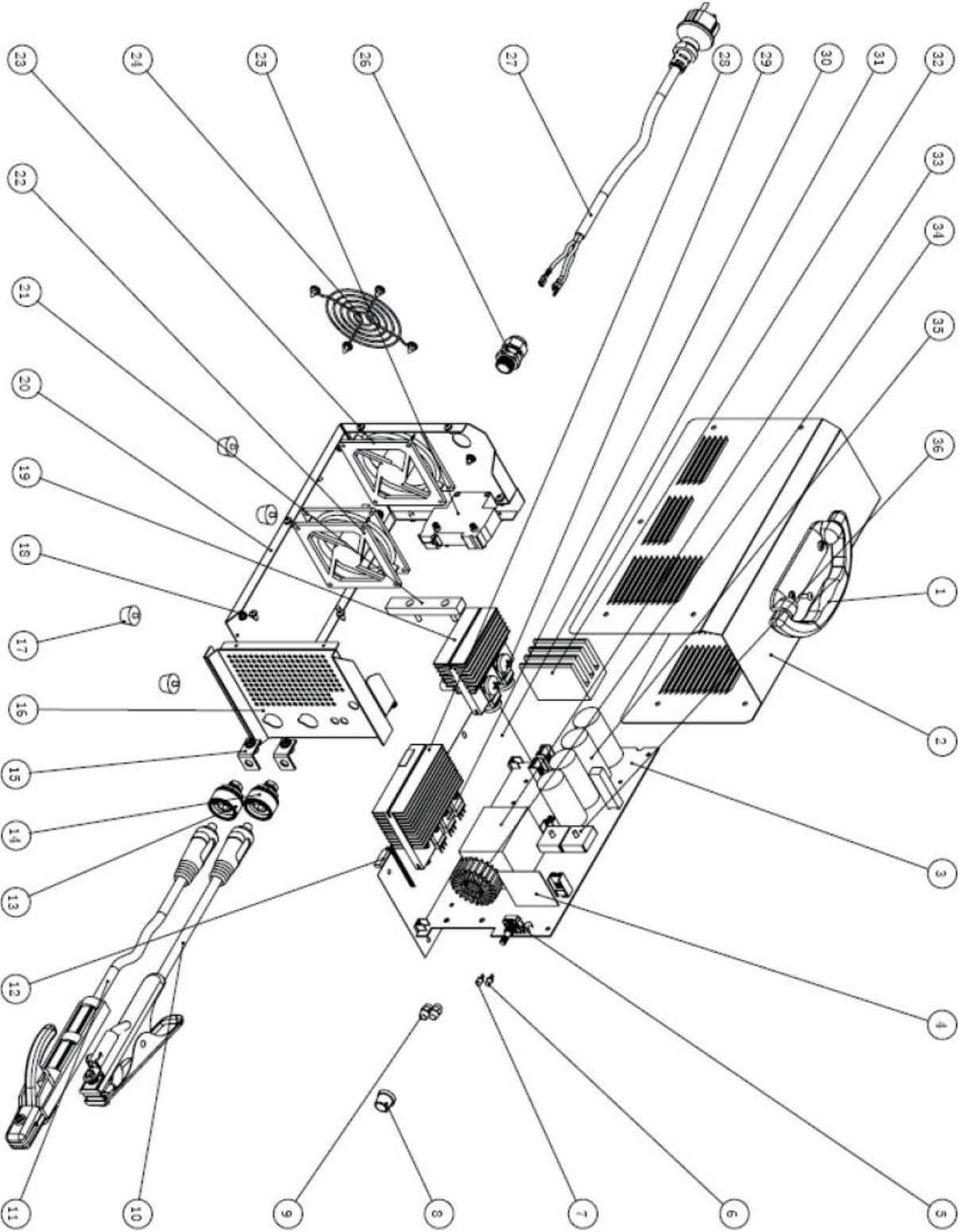
WIRING DIAGRAM



TW21605 Spare part list

No.	Part Description	Qty	No.	Part Description	Qty
1	Handle	1	21	IGBT Radiator Strip	1
2	Steel Cover	1	22	Fan-1	1
3	Main PCB Subassembly	1	23	Fan-2	1
4	Control PCB Subassembly	1	24	Fan Cover	1
5	Potentiometer	1	25	Air Brake Swift	1
6	Yellow LED	1	26	Cable Gland PG11L	1
7	Green LED	1	27	Main Cable	1
8	Potentiometer Botton	1	28	Rectifying Tube Radiator	1
9	LED Cover	2	29	IGBT FGH40N60SFD	2
10	Earth Clamp Subassembly	1	30	Rectifying TubeSTTH6003CW	3
11	Electrode Holder Subassembly	1	31	Insulation Paper	1
12	Temperature Controller	1	32	Radiator FOR Bridge	1
13	Quick Connector Subassembly1	1	33	Transformer	1
14	Quick Connector Subassembly2	1	34	Inductance	1
15	Brass Angle Iron	2	35	Capacitance	4
16	Plastic Front Cover	1	36	Bridge	2
17	Latex Cushion Subassembly	4			
18	4.2x9.5 Tapping Screw	13			
19	IGBT Radiator	1			
20	Steel Base	1			

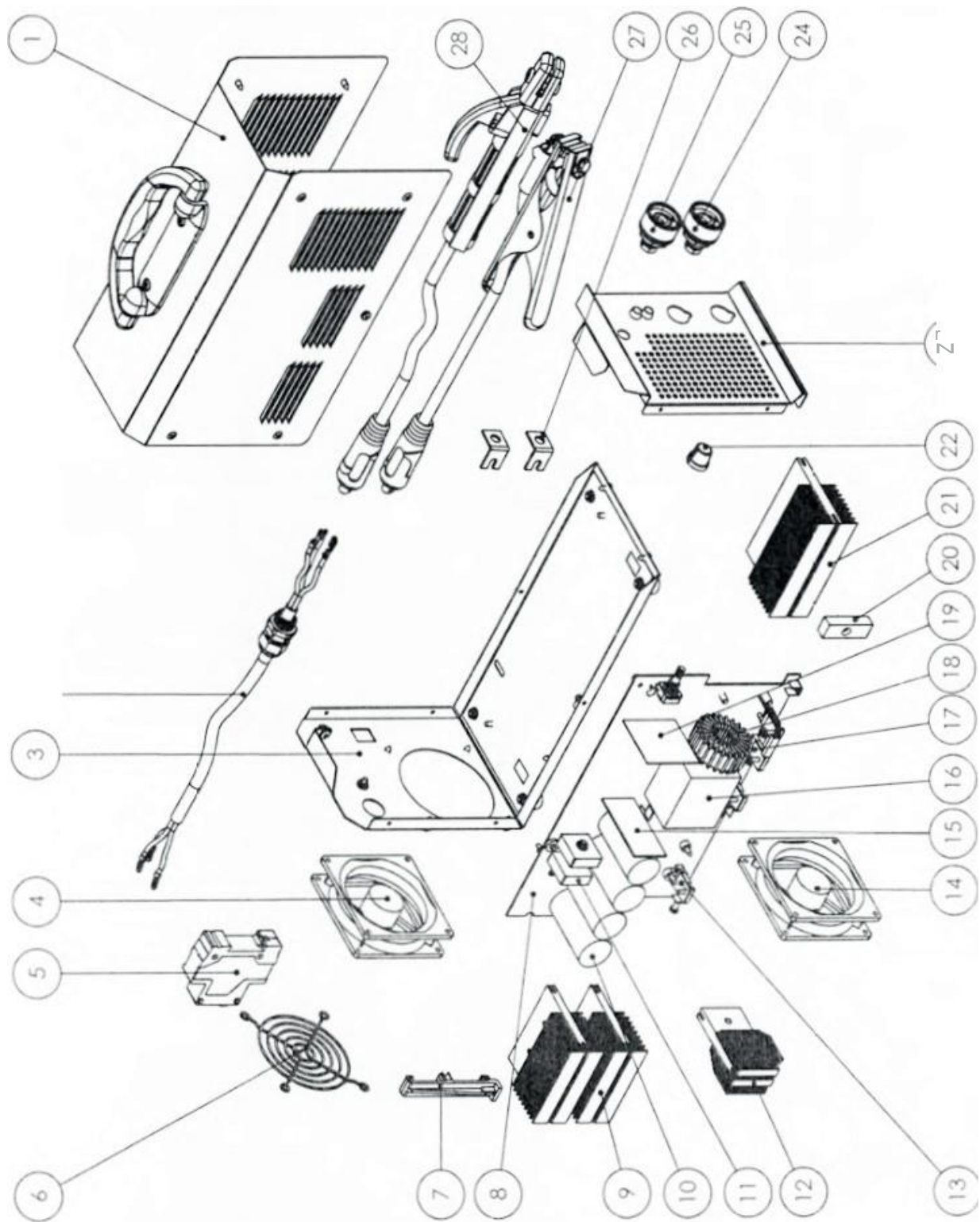
TW2 605 Exploding view



UTW21605 Spare part list

No.	Part Description	Qty	No.	Part Description	Qty
1	Top_housing	1	15	S AVS PCB	1
2	Power cable	1	16	Transformer	1
3	Bottom	1	17	Fast recovery diode	3
4	DC fan	1	18	Inductance	1
5	Switch	1	19	Control PCB	1
6	Fan hood	1	20	Rectifier tube radiator support bar	1
7	IGBT Radiator support bar	1	21	Rectifier tube radiator	1
8	Main PCB	2	22	Knob	1
9	IGBT Radiator	2	23	front cover	1
10	Capacitor	4	24	Quick connector(red)	1
11	Bridge rectifiers	2	25	Quick connector(black)	1
12	Bridge rectifier radiator	1	26	Angle iron(Cu)	2
13	IGBT	2	27	Earth clamp subassembly	1
14	DC fan	1	28	Electrode holder subassembly	1

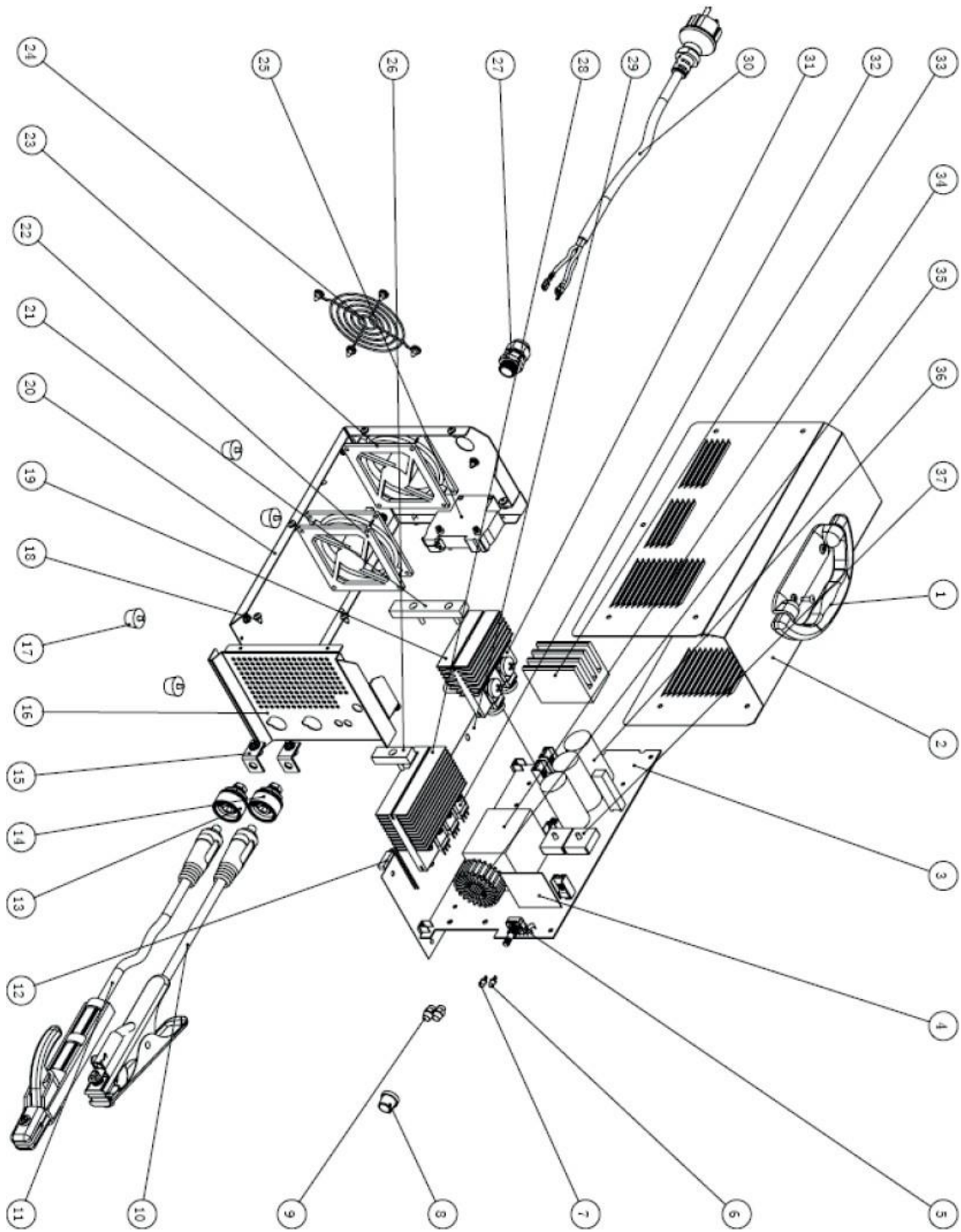
UTW2 605 Exploding view



TW22005 Spare part list

No.	Part Description	Qty	No.	Part Description	Qty
1	Handle	1	21	IGBT Radiator Strip	1
2	Steel Cover	1	22	Fan-1	1
3	Main PCB Subassembly	1	23	Fan-2	1
4	Control PCB Subassembly	1	24	Fan Cover	1
5	Potentiometer	1	25	Air Brake Swift	1
6	Yellow LED	1	26	Rectifying Tube Radiator Strip	1
7	Green LED	1	27	Cable Gland PG11L	1
8	Potentiometer Botton	1	28	Rectifying Tube Radiator	1
9	LED Cover	2	29	Insulation Paper	1
10	Earth Clamp Subassembly	1	30	Main Cable	1
11	Electrode Holder Subassembly	1	31	IGBT FGH60N60SMD	2
12	Temperature Controller	1	32	Rectifying TubeSTTH3003CW	6
13	Quick Connector Subassembly1	1	33	Radiator FOR Bridge	1
14	Quick Connector Subassembly2	1	34	Transformer	1
15	Brass Angle Iron	2	35	Inductance	1
16	Plastic Front Cover	1	36	Capacitance	3
17	Latex Cushion Subassembly	4	37	Bridge	2
18	4.2x9.5 Tapping Screw	13			
19	IGBT Radiator	1			
20	Steel Base	1			

TW22005 Exploding view



TOTAL

One-Stop Tools Station

TOTAL



MMA WELDING MACHINE

www.totaltools.cn TOTAL
TOOLS CO., LIMITED MADE
IN CHINA T0317.V06