597096
INVERTER 250AMP
MIG & ARC WELDER
HEAVY DUTY

TOOLEX® Industrial

INSTRUCTION MANUAL

CONSUMER SERVICE CENTRE
PO BOX 1012
HAMILTON NSW 2303 AUSTRALIA
Made in P.R.C.

SAVE THIS MANUAL

Keep this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures. Write the product's serial number in the back of the manual near the assembly diagram (or month and year of purchase if product has no number). Keep this manual and the receipt in a safe and dry place for future reference.

IMPROTANT SAFETY INFORMATION

In this manual, on the labeling, and all other information provided with this product:

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING: WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE: NOTICE is used to address practices not related to personal injury.

SAFETY WARNINGS AND PRECAUTIONS

WARNING: When using tool, basic safety precautions should always be followed to reduce the risk of personal injury and damage to equipment.

Read all instructions before using this tool!

WARNING!

READ AND UNDERSTAND ALL INSTRUCTIONS

Failure to follow all instructions listed below may result in electric shock, fire, and/or serious injury.

Work Area Precautions

1. **Keep your work area clean and well lit.** Cluttered benches and dark areas invite accidents.
2. **Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust.** Power tools create sparks which may ignite the dust or fumes.
3. **Keep bystanders, children, and visitors away while operating a power tool.** Distractions can cause you to lose control. Protect others in the work area from debris such as chips and sparks. Provide barriers or shields as needed.

Electrical Safety

1. **Grounded tools must be plugged into an outlet properly installed and grounded in accordance with all codes and ordinances. Never remove the grounding prong or modify the plug in any way. Do not use any adapter plugs. Check with a qualified electrician if you are in doubt whether the outlet is properly grounded.** If the tool should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user.
2. **Double insulated tools are equipped with a polarized plug (one blade is wider than the other). This plug will fit in a polarized outlet only one way. If the plug does not fit fully in the outlet, reverse the plug. If it still does not fit, contact a qualified electrician to install a polarized outlet. Do not change the plug in any way.** Double insulation eliminates the need for the three wire grounded power cord and grounded power supply system.
3. **Avoid body contact with grounded surfaces such as pipes, radiators, ranges, and refrigerators.** There is an increased risk of electric shock if your body is grounded.
4. **Do not expose power tools to rain or wet conditions.** Water entering a power tool will increase the risk of electric shock.
5. **Do not abuse the Power Cord. Never use the Power Cord to carry the tool or pull the Plug from an outlet. Keep the Power Cord away from heat, oil, sharp edges, or moving parts. Replace damaged Power Cords immediately.** Damaged Power Cords increase the risk of electric shock.
6. **When operating a power tool outside, sue an outdoor extension cord marker "W-A" or "W".** These extension cords are rated for outdoor use, and reduce the risk of electric shock.

Personal Safety

1. **Stay alert. Watch what you are doing, and use common sense when operating a power tool. Do not use a power tool while tired or under the influence of drugs, alcohol, or medication.** A moment of inattention while operating power tools may result in serious personal injury.
2. **Dress properly. Do not wear loose clothing or jewelry. Contain long hair. Keep your hair, clothing, and gloves away from moving parts.** Loose clothes, jewelry, or long hair can be caught in moving parts.
3. **Avoid accidental staring. Be sure the Power Switch is off before plugging in.** Carrying power tools with your finger on the Power Switch, or plugging in power tools with the Power Switch on, invites accidents.
4. **Remove adjusting keys or wrenches before turning the power tool on**. A wrench or a key that is left attached to a rotating part of the power tool may result in personal injury.
5. **Do not overreach. Keep proper footing and balance at all times.** Proper footing and balance enables better control of the power tool in unexpected situations.
6. **Use safety equipment. Always wear eye protection.** Dust mask, non-skid safety shoes, hard hat, or hearing

protection must be used for appropriate conditions.

Tool Use and Care

1. **Use clamps (not included) or other practical ways to secure and support the workpiece to a stable platform.** Holding the work piece by hand to against your body is unstable and may lead to loss of control.
2. **Do not force the tool. Use the correct tool for your application.** The correct tool will do the job better and safer at the rate for which it is designed.
3. **Do not use the power tool if the Power Switch does not turn it on or off.** Any tool that cannot be controlled with the Power Switch is dangerous and must be replaced.
4. **Disconnect the Power Cord Plug from the power source before making any adjustments, changing accessories, or storing the tool.** Such preventive safety measures reduce the risk of starting the tool accidentally.
5. **Store idle tools out of reach of children and other untrained persons.** Tools are dangerous in the hands of untrained users.
6. **Maintain tools with care. Keep cutting tools maintained and clean.** Properly maintained tools are less likely to bind and are easier to control. Do not use a damaged tool. Tag damaged tools “Do not use” until repaired
7. **Check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the tool’s operation. If damaged, have the tool serviced before using.** Many accidents are caused by poorly maintained tools.
8. **Use only accessories that are recommended by the manufacturer for your model.** Accessories that may be suitable for one tool may become hazardous when used on another tool.

Service

1. Tool service must be performed only by qualified repair personnel. Service or maintenance performed by unqualified personnel could result in a risk of injury.
2. When servicing a tool, use only identical replacement parts. Use of unauthorized parts or failure to follow maintenance instructions may create a risk of electric shock or injury.

SPECIFIC SAFETY RULES

1. **Maintain labels and nameplates on the tool.** These carry important information. If unreadable or missing, contact TOOLEX INDUSTRIAL for a replacement.
2. **Always wear the approved safety impact eye goggles and heavy work gloves when suing the tool.** Using personal safety devices reduce the risk for injury. Safety impact eye goggles and heavy work gloves are available from Harbor Freight Tools.
3. **Maintain a safe working environment.** Keep the work area well lit. Make sure there is adequate surrounding workspace. Always keep the work area free of obstructions, grease, oil, trash, and other debris. Do not use a power tool in areas near flammable chemicals, dusts, and vapors. Do not use this product in a damp or wet location.

4. **Avoid unintentional starting.** Make sure you are prepared to begin work before turning on the tool.
5. **Never leave the tool unattended when it is plugged into an electrical outlet.** Turn off the tool, and unplug it from its electrical outlet before leaving.
6. **Always unplug the tool from its electrical outlet before performing and inspection, maintenance, or cleaning procedures.**
7. **Prevent eye injury and burns.** Wearing and using the approved personal safety clothing and safety devices reduce the risk for injury.
    a. Wear the approved safety impact eye goggles with a welding helmet featuring at least a number 10 shade lens rating.
    b. Leather leggings, fire resistant shoes or boots should be worn when using this product. Do not wear pants with cuffs, shirts with open pockets, or any clothing that can catch and hold molten metal or sparks.
    c. Keep clothing free of grease, oil, solvents, or any flammable substances. Wear dry, insulating gloves and protective clothing.
    d. Wear an approved head covering to protect the head and neck. Use aprons, cape, sleeves, shoulder covers, and bibs designed and approved for welding and cutting procedures.
    e. When welding/cutting overhead or in confined spaces, wear flame resistant ear plugs or ear muffs to keep sparks out of ears.
8. **Prevent accidental fires.** Remove any combustible material from the work area.
    a. When possible, move the work to a location well away from combustible; protect the combustibles with a cover made of fire resistant material.
    b. Remove or make safe all combustible materials for a radius of 35 feet (10 meters) around the work area. Use a fire resistant material to cover or block all open doorways, windows, cracks, and other openings.
    c. Enclose the work area with portable fire resistant screens. Protect combustible walls, ceilings, floors, etc., from sparks and heat with fire resistant covers.
    d. If working on a metal wall, ceiling, etc., prevent ignition of combustibles on the other side by mobbing the combustibles to a safe location. If relocation of combustibles is not possible, designate someone to serve as a fire watch, equipped with a fire extinguisher, during the welding process and for at least one half hour after the welding is completed.
    e. Do not weld or cut on materials having a combustible coating or combustible internal structure, as in walls or ceilings, without an approved method for eliminating the hazard.
    f. Do not dispose of hot slag in containers holding combustible materials. Keep a fire extinguisher nearby and know how to use it.
    g. After welding or cutting, make a thorough examination for evidence of fire. Be aware that easily visible smoke or flame may not be present for some time after the fire has started. Do not weld or cut in

atmospheres containing

h. Dangerously reactive or flammable gases, vapors, liquids, and dust.
i. Provide adequate ventilation in work areas to prevent accumulation of flammable gases, vapors, and dust. Do not apply heat to a container that has held an unknown substance or a combustible material whose contents, when heated, can produce flammable or explosive vapors. Clean and purge containers before applying heat. Vent closed containers, including castings, before preheating, welding, or cutting.

WARNING

INHALATION HAZARD: Welding and Plasma Cutting Produce

TOXIC FUMES.

Exposure to welding or cutting exhaust fumes can increase the risk of developing certain cancers, such as cancer of the larynx and lung cancer. Also, some diseases that may be linked to exposure to welding or plasma cutting exhaust fumes are:

a. Early onset of Parkinson's Disease
b. Heart disease
c. Ulcers
d. Damage to the reproductive organs
e. Inflammation of the small intestine or stomach
f. Kidney damage
g. Respiratory diseases such as emphysema, bronchitis, or pneumonia

Use natural or forced air ventilation and wear a respirator approved by NIOSH to protect against the fumes produced to reduce the risk of developing the above illnesses.

9. Avoid overexposure to fumes and gases. Always keep your head out of the fumes. Do not breathe the fumes. Use enough ventilation or exhaust, or both, to keep fumes and gases from your breathing zone and general area.
   - ℓ Where ventilation is questionable, have a qualified technician take an air sampling to determine the need for corrective measures. Use mechanical ventilation to improve air quality. If engineering controls are not feasible, use an approved respirator.
   - ℓ Work in a confined area only if it is well ventilated, or while wearing an air-supplied respirator.
   - ℓ Follow OSHA guidelines for Permissible Exposure Limits (PEL's) for various fumes and gases.
   - ℓ Follow the American Conference of Governmental Industrial Hygienists recommendations for Threshold Limit Values (TLV's) for fumes and gases.
   - ℓ Have a recognized specialist in Industrial Hygiene or Environmental Services check the operation and air quality and make recommendations for the specific welding or cutting situation.
10. **Always keep hoses away from welding/cutting spot.** Examine all hoses and cables for cuts, burns, or worn areas before each use. If any damaged areas are found, replace the hoses or cables immediately.
11. **Read and understand all instructions and safety precautions as outlined in the manufacturer's**

Manual for the material you will weld or cut.

12. **Proper cylinder care.** Secure cylinders to a cart, wall, or post, to prevent them from falling. All cylinders should be used and stored in an upright position. Never drop or strike a cylinder. Do not use cylinders that have been dented. Cylinder caps should be used when moving or storing cylinders. Empty cylinders should be kept in specified areas and clearly marked “empty.”
13. **Never use oil or grease on any inlet connector, outlet connector, or cylinder valves.**
14. **Use only supplied Torch on this Inverter Air Plasma Cutter.** Using components from other systems may cause personal injury and damage components within.
15. People with pacemakers should consult their physician(s) before using this product. Electromagnetic fields in close proximity to a heart pacemaker could cause interference to, or failure of the pacemaker.
16. USE PROPER EXTENSION CORD.

    Make sure your extension cord is in good condition. When using an extension cord, be sure to sue one heavy enough to carry the current your product will draw. An undersized cord will cause a drop in line voltage resulting in loss of power and overheating. A 50 foot extension cord must be at least 12 gauges in diameter, and a 100 foot extension cord must be at least 10 gauges in diameter. If in doubt, use the next heavier gauge. The smaller the gauge number, the heavier the cord.

SPECIFICATIONS

Item \ Model	MIG- 200	MIG -250	MIG -250	MIG-315
Rated input voltage	1ph-220V/50/60Hz	1ph-220V/50/6	3ph-380V/50/60H	3ph-380V/50/60Hz
Rated input Current	30	40	13.4	16
Rated input power (KVA)	6.6	8.8	8.8	10.5
No load voltage (V)	62	62	62	62
Duty cycle	60%	60%	60%	60%
Welding current (A)	23-200	30-250	30-250	30-315
Welding voltage(V)	15-25	15-27	15-27	15-30
Finish arc current (A)	30-200	30-250	30-250	30-315
Finish arc voltage(V)	8-40	8-40	8-40	8-40
Wire diameter(mm)	Φ0.6-Φ1.0	Φ0.8-Φ1.2	Φ0.8-Φ1.2	Φ0.8-Φ1.2
Wire type	Solid/flux cord	Solid/flux cord	Solid/flux cord	Solid/flux cord
Welding type	Manual setting/Synergic	Manual setting/Synergi	Manual setting/Synergic	Manual setting/Synergic
Pre gas time(s)	0.1	0.1	0.1	0.1
Gas flow time(s)	0~5	0~5	0~5	0~5
Cover protection grade	IP21S	IP21S	IP21S	IP21S
Insulation	F	F	F	F
Dimension (W×D×Hmm)	630×400×700	630×400×700	630×400×700	630×400×700
Weight (kg)	47	48	48	49

Duty Cycle

Duty Cycle is the equipment specifications which defines the number of minutes within a 10 minute period that a piece of equipment can safely operate.

MAX (IGBT Module MIG machines with 60% duty cycle at maximum welding output, which means that it continuously operates for 6 minutes at maximum output during a 10 minute period.

CAUTION: Failure to observe the duty cycle limitations of this MIIG MACHINE can easily damage this equipment, and will void warranty.

UNPACKING

When unpacking, checks to make sure the following parts are included.

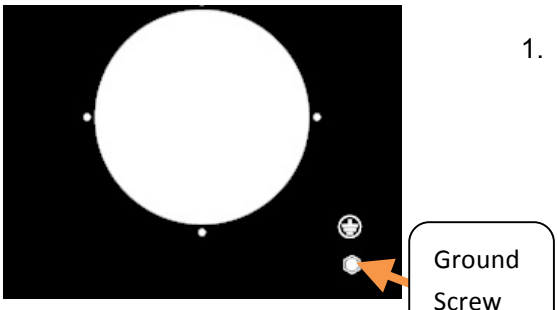
Inverter welding machine with
MIG torch with Power Cord
Ground cable with Clamp

If any parts are missing or broken, please call EACO ELECTRIC at the number on the cover of this manual.

Preparing Your Work Area

1. You must have a sturdy work table that is open below the area you are welding. Molten slag will be blown through the work metal, and must be able to fall away freely
2. Your work table must allow the work metal to be firmly clamped to prevent it accidentally falling or moving.
3. The floor and surrounding area of your work site must not be flammable. A clean cement floor is recommended. The cutting process will eject molten metal slag onto the floor, and it will scatter for 8-10 feet or more in any direction. Have an adequate fire extinguisher available if needed.

ASSEMBLY

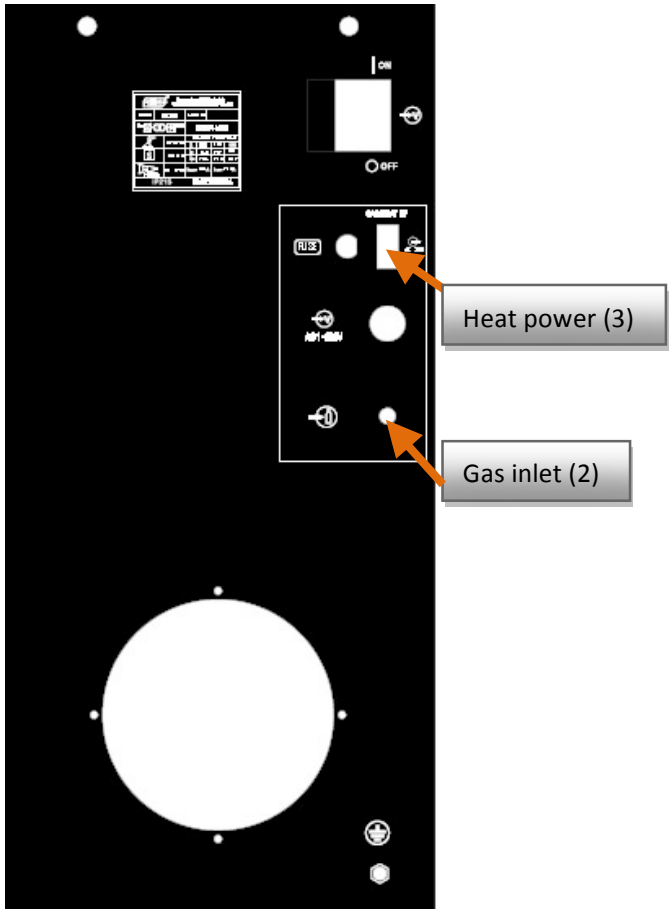


Grounding the tool:

Attach a ground wire to the screw on the lower right of the back of the welder. Connect the other end of the wire to an appropriate ground, such as a steel workbench, steel biding member or grounding electrode.

Attach air supply:

Caution: Do not use an Argon/Mixed pressure regulator/flow meter with CO_2 Shielding gas. To use CO_2 Shielding gas, you must install a CO_2 Shielding gas pressure regulator/flow meter.



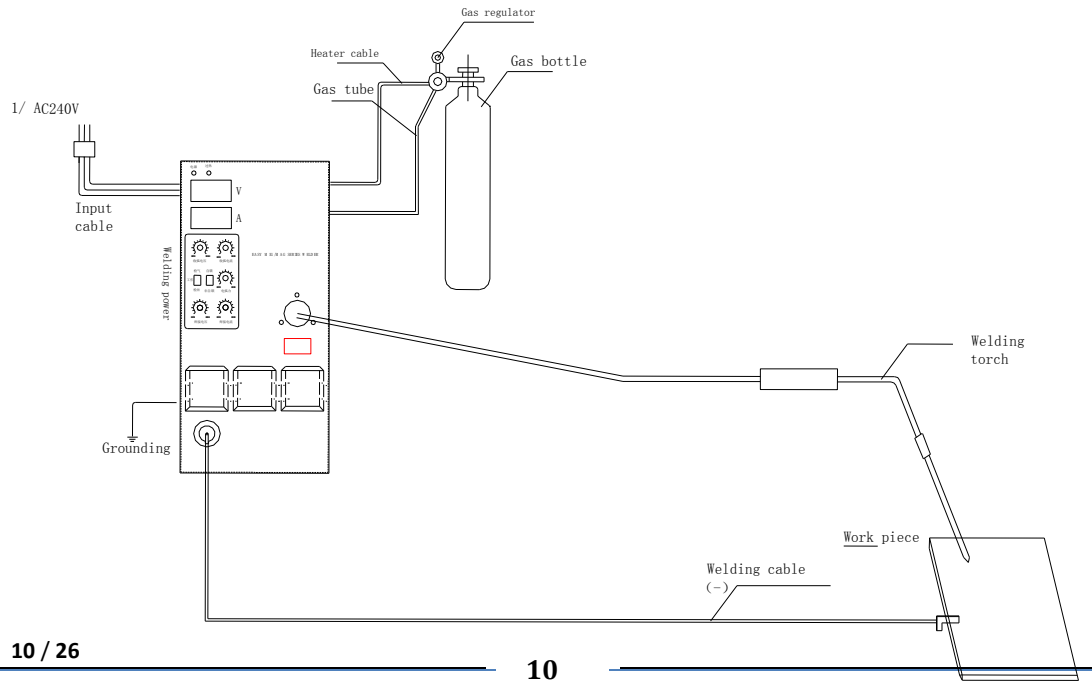
1. Make sure the Flow Adjust on the Pressure Regulator/Flow Meter is turned off. Then Pressure Regulator/Flow Meter firmly onto the cylinder valve.
Connect the gas air inlet (2) to your supply CO_2 Gas supply by one air hose (not supplied). And remember to fasten it with coupling.

3. Adjust the flow rate of the gas by turning the Flow Adjust. The typical flow rate is 10-30 CFH (cubic feet per Hour). **Make sure to check the Welding Wire manufacturer's recommended flow rate.**
4. Plug the cord plug of CO_2 Gas regulator into the heat power (3).

Distributing power and cables

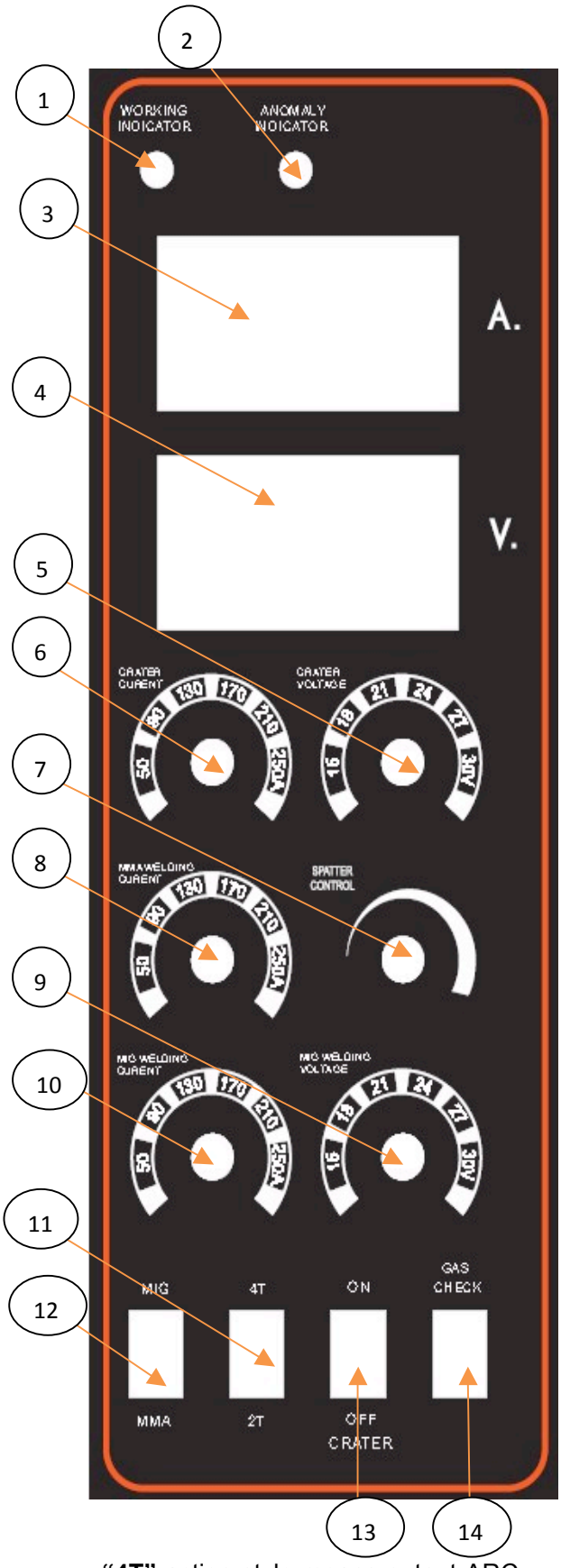
Model		MIG 200	MIG 250	MIG 250	MIG 315
Power		1 phrase AC(220V) 50HZ/60HZ	1 phrase AC(220V) 50HZ/60HZ	3 phrase AC(380V) 50HZ/60HZ	3 phrase AC(380V) 50HZ/60HZ
Capacity	Suitable power	6．6KVA	8．8KVA	8.8KVA	10.5KVA
	Dynamotor	≥7KVA	≥9KVA	≥9KVA	≥11KVA
Input protection	Fuse	32A	60A	32A	32A
	Breaker	32A	60A	32A	32A
Cables	Input cables	≥2.5mm^2	≥4mm^2	≥4mm^2	≥4mm^2
	Output cables	≥25mm^2	≥35mm^2	≥35mm^2	≥35mm^2
	Grounding cables	≥4mm^2	≥6mm^2	≥6mm^2	≥6mm^2

Installation and connection



Front Panel and Instruction

1. **Power indicator light:** This light will illuminate when the machine is power on
2. **Thermal Overload Indicator Lamp.** This light will come on, Machine auto-self protection when it is over-heated **or** MIG torch is damaged.
3. **Amperage Display:** Shows actual welding current, which will vary during operation.
4. **Voltage Display:** Shows actual welding voltage, which will vary during operation.
5. **Crater Voltage:** The finishing voltage can be adjusted by turning this knob.
6. **Crater Current:** The finishing Amperage can be adjusted by turning this knob.
7. **Spatter Control:** The spatter can be adjusted by turning this knob.
8. **MMA welding Current:** The MMA welding Amperage under MMA welding pattern can be adjusted by turning this knob.
9. **MIG welding Voltage:** The MIG welding Voltage under MIG welding pattern can be adjusted by turning this knob.
10. **MIG welding Current:** The MIG welding Amperage under MIG welding pattern can be adjusted by turning this knob.
11. **"4T/2T" selection button**：Selecting "4T/2T" procedure functions, MIG welding divides into "2T" action （non-self lock）and "4T" action（self lock）， "2T" means to start welding when press the torch switch and stop welding when the torch switch is released.



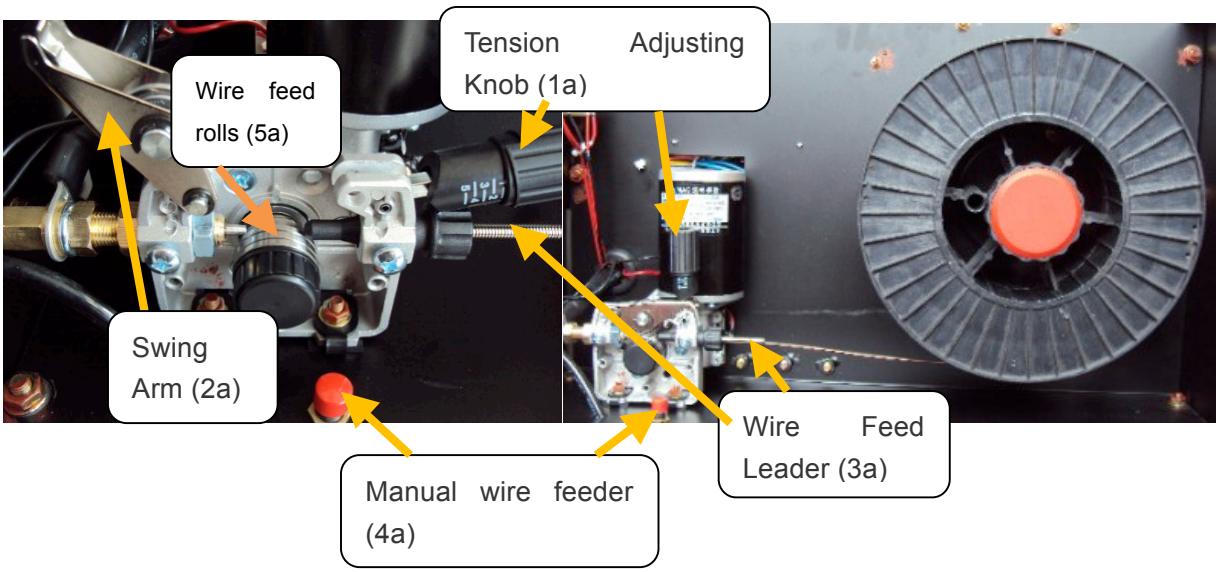
"4T" action style means output ARC striking current when press torch

switch for the first time, current up to standard welding current while releasing the torch switch. Press the torch switch again after welding is finished, and then welding current begin down to end-ARC current and retain it. The welding machine stops outputting current after releasing torch switch for the second time. This is suitable for long time welding.

12. **MIG/ARC:** This is to select MIG or MMA welding; Turn up is MIG welding, turn down is MMA welding.
13. **Crater on/off:** This is to select crater function or not.
14. **Gas Checking:** This is to select Gas checking beforehand or not.
15.  **MIG Torch connector:** when you chose MIG welding mode , please plug the welding plug with cable to the MIG control socket and plug the ground cable to socket
16. **"-"Ground cable connector:** Plug the ground cable to this connector and clamp the other end to the work piece.
17. **"+" MMA cable connector:** when you chose ARC welding mode(, please plug the MMA welding plug with cable to the MIG control socket and plug the ground cable to socket

Assembly the wire feeder

Note: When installing wire of a different size or composition, maybe you will also need to change wire settings, and, possibly, install a gas cylinder.



1. **Important:** Securely hold onto the end of the Welding Wire and keep tension on it during the following steps. If this is not done the welding wire will spring back and creating a tangled "bird's nest" and resulting in wasted wire.
2. Hold the Welding Wire securely while you cut enough Wire off the end of the Spool to remove all bent and crimped Wire. Make sure the cut end has no burrs or sharp edges (cut again, if needed).
3. Loosen and lower the Tension Adjusting Knob (1a) on the Wire Feed Assembly. Then,

raise the Swing Arm (2a)

4. Keep tension on the Welding Wire, and guide at least 12 inches of Wire into the Wire Feed Leader (3a).
5. Lower the Swing Arm (2a) on the Wire Feed Assembly. Lower and tighten the Tension Adjusting Knob (1a). Once the Wire is held in place, you may release it.
6. Lay the Torch Cable out in a straight line so that the Welding Wire moves through it easily.

Press the manual wire feeder knob (4a), the welding wire will keep running through the torch. Then cut off any excess Welding Wire over 1/2 inches.

OPERATION

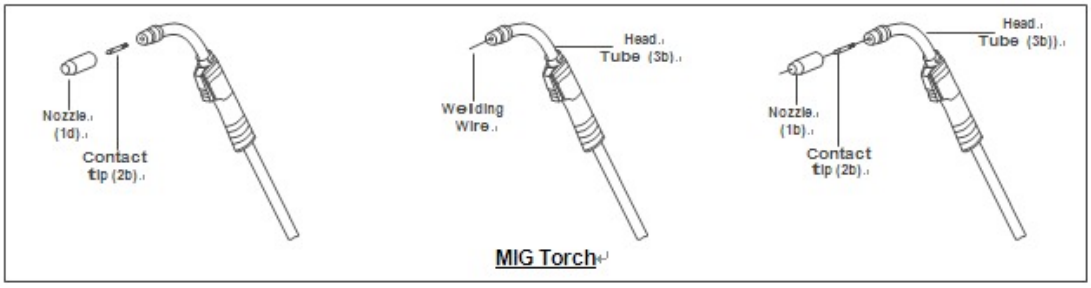
Note: Before beginning, please read and understand all the safety precautions staring on page 1 and especially the section "Specific Safety Rules" starting on page 3.

MIG Welding

1. Place the MIG welding unit no closer than six feet from the work piece to be welded
2. Connect the MIG torch control, cable plug as shown on page 10. Twist to lock in place.

Plug in the Grounding Cable into the Ground Connector on the upper of the unit front. Twist to lock.

3. Securely place the clamping end of the Grounding Cable Clamp to a part of the work piece or metal table that is clean of paint, oil, or dirt. Clamp as close as possible to the work piece without damaging the cable during welding.
4. Assembly wire feeder according page 11.and keep Welding Wire over 1/2 inches over the torch. Then assembly the torch well.
5. Assemble the desired accessories and tips inside the tip of the MIG Torch handle. Insert the Contact Tip (2b) onto the Welding Wire and screw it firmly into the Head Tube (3b) of the Torch Handle. Replace the Nozzle (1b), and cut off any excess Welding Wire over 1/2 inches.

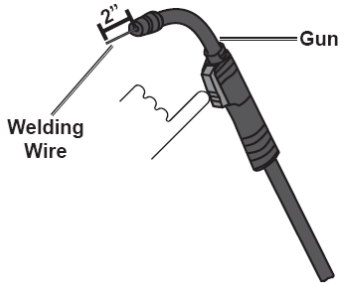


MIG Torch

6. Connect a hose and coupling from the gas regulator on a CO_2 gas tank (none included) to the CO_2 Gas Inlet on the back of the unit. Follow the gas cylinder manufacturer's instructions for set-up and use.
7. Put the metal to be welded on the metal weeding-cutting table. Ensure the metals to be welded are clean, so good welding efficiency can be promised.
8. Verify that the Power Switch is in the off position, and then connect the power cord into an appropriate outlet and turn the welder ON. The Power Light"  will

illuminate, but the Torch is not yet energized.

9. Point the torch away from all objects and press the trigger until the wire feeds out of the gun two inches. If necessary, move the Torch Handle slightly in a circular motion to help feed the Welding Wire properly out of the Head Tube



Caution: The Torch handle is now energized. Be careful not touch anything else with the Torch except the work piece to be welded.

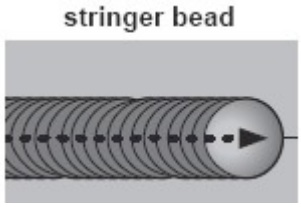
When everything is prepare well for welding. Preset parameter according the job needed. (Refer to panel instruction on page 9). Hold the Trigger down and tilt the torch forward. Keep the wire touch the work piece.

MIG Welding Tips

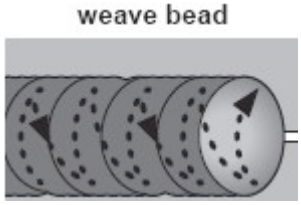
Welding current(A)	Welding voltage(V)	Dia. Of wire(mm)
60~80	17~18	0.8~1.0
80~130	18~21	1.0~1.2
130~200	20~24	1.0~1.2
200~250	24~27	1.0~1.2

Basic Welding Technique

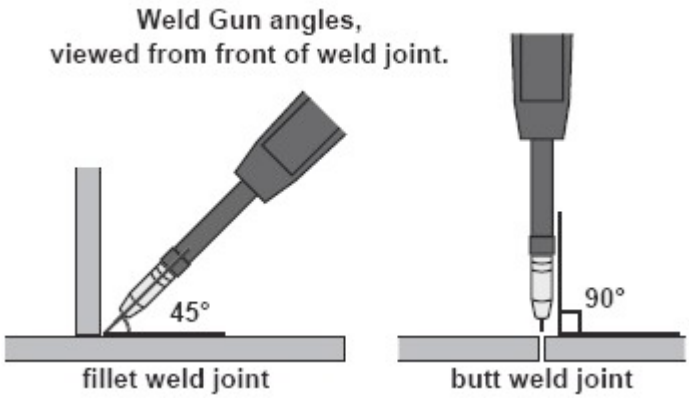
1. Press (and hold) trigger and contact area to be welded with electrode wire to ignite arc
2. For a narrow weld, you can usually draw the Welding Wire in a steady straight line. This is called a **"stringer bead".**



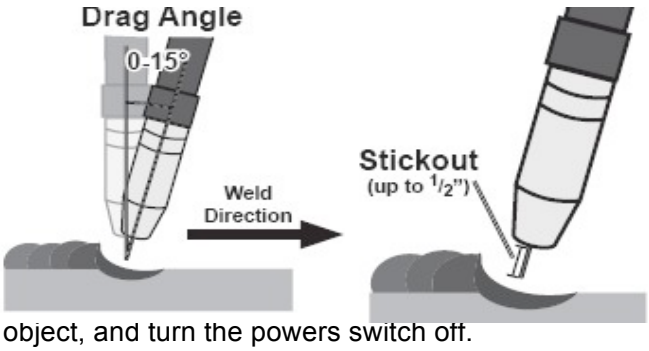
For a wider weld, draw the Welding Wire back and forth across the joint in a curve. This is called a **"weave bead"**.



3. Hold Torch in one hand and the face shield in the other.
4. Direct the welding wire straight into the joint. This gives an angle of 90^{o} (straight up and down) for butt (end to end) welds, and an angle of 45^{o} for filter (T-shaped) welds.



5. The end of torch should be tilted so that wire is angled anywhere in between straight on and 15o in the direction you are welding. The amount of tilt is called the ***drag angle***.



6. When the clearly away from any grounded object, and turn the powers switch off.

Arc (stick) Welding

1. Turn the Current Adjustment Knob to meet the needs of the job.
2. Move the Stick or TIG Switch to “TIG”
3. Connect the Electrode Clamp and Cable to the torch control connector (as 7 shown on page 9 and twist to lock in place.
4. Plug the cable of the Grounding Clamp into the DC ground connector and secure the clamp to a clean, exposed metal part of the work piece.
5. Place the metal portion of the welding rod inside the jaws of the Electrode Clamp. Welding rod types vary for welding different metals.

Note: If too much current is drawn from the welder; the Thermal Overload protector will activate, the Overload indicator will light, and the welder will turn off until it cools down. It will automatically reset.

When finished welding

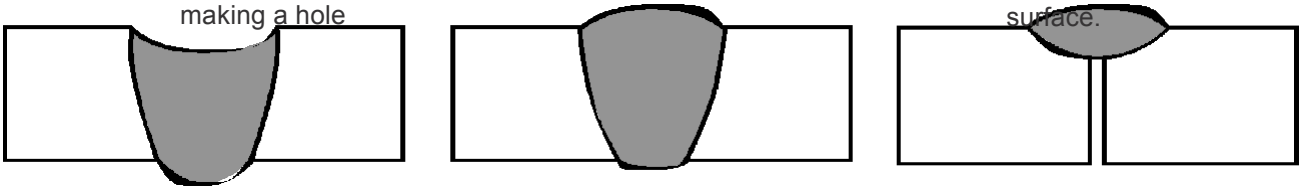
a) Release the Torch handle trigger and lift the Torch handle from the work piece,
b) Press the Power Switch to the Off (O) position.
c) Set the Torch handle down on the metal workbench,
d) Turn the air supply off,
e) Unplug the line cord from the electrical outlet.

Welding Penetration

Excess or Burn-through
Weld droops on top and underneath, or falls through entirely, making a hole

Proper
Weld is visible underneath and bulges slightly on top.

Inadequate
Weld does not contact the joint fully, just on the surface.

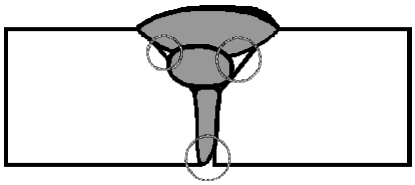


Possible causes and Solutions

1. **Excessive material at weld:**
   Reduce wire feed speed
2. **Overheating:**
   Increase welding speed and ensure that welding speed is kept steady.

Welding not adhering properly

Gaps present between weld and previous bead or between weld and work piece.



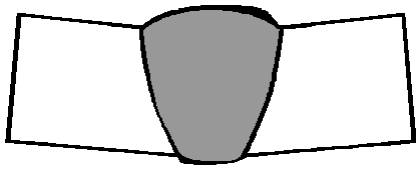
Possible causes and Solutions

1. **Dirty work piece:**
   Make certain that work piece is clean and free from oil, coatings, and other residues.
2. **Insufficient weld material:**
   Increase wire feed speed.
3. **Incorrect welding technique:**
   Place stringer bead at correct place in joint. Adjust work piece position or weld angle to permit proper welding at bottom of work- piece.
   Pause briefly at sides when using a weave bead. Keep arc on leading edge of weld puddle. Hold gun at proper angles and make tack welds to help hold pieces.

Possible causes and Solutions

1. **Work pieces too thick/close:**
   Joint design must allow weld to reach bottom of groove and allow proper welding procedures.
2. **Incorrect welding technique:**
   Maintain $1/2$"or less stick out. Keep arc on leading edge of weld puddle. Hold gun at proper angles.
3. **Insufficient weld material:**
   Increase wire feed speed.
4. **Insufficient weld heat:**
   Reduce Welding Speed.

Bent at joint



Possible causes and Solutions

1. **Improper clamping:**
   Make sure that pieces are clamped securely in place.
2. **Excessive heat:**
   Weld a small portion and allow cooling before proceeding. Reduce wire feed speed.

Inspection, Maintenance, and cleaning

⚠ Warnin
g!

Before performing any maintenance on the Welder, unplug the power cord (54) from its electrical outlet and allow all components of the Welder to completely cool.

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1. Periodically open the Access Panel from the machine and, using compressed air, blow out all dust and debris from the interior

2. Always store the welder in a clean, dry, safe location out of reach of children and other unauthorized people.

3. For optimal weld quality, clean and inspect the contact tip and nozzle before each use, as follows:

Nozzle Inspection, cleaning,

1. Turn the Nozzle (1b) counterclockwise while pulling to remove.

2. Scrub the interior of the Nozzle clean with a wire brush.

3. Examine the end of the nozzle(1a).The end should be flat and even, If the end is uneven, chipped, melted, cracked, or otherwise damaged, the nozzle will adversely effect the weld and should be replaced.

4. Reinstall the Nozzle (1a) after inspecting and cleaning the Contact Tip.

Contact tip Inspection, cleaning, and replacement

1. Make sure the entire Welding torch is completely cool before proceeding.

2. Remove the nozzle as explained above. Then remove the contact tip.

3. Scrub the exterior of the contact tip clean with a wire brush. Check that the contact tip is the proper type for the wire size used.

4. Examine the hole at the end of the contact tip for the following problems:

   Shape: The hole should be an even circle, and should not be oblong or have any bulges in it.

   4. inspect the Contact Tip (51b) and Nozzle (51a)

   Size: The Contact Tip will decrease in efficiency as the center hole enlarges. A Contact Tip that measures 150% or more the original size* should be replaced. **(*.045" or more for .030" tips; .035" or more for .023 tips.)**

5. If any problems are noted with a Contact Tip (1b), it is recommended to have it replaced.

6. When inspection and maintenance is completed, reinstall the Contact Tip (1b) and Nozzle (2b).

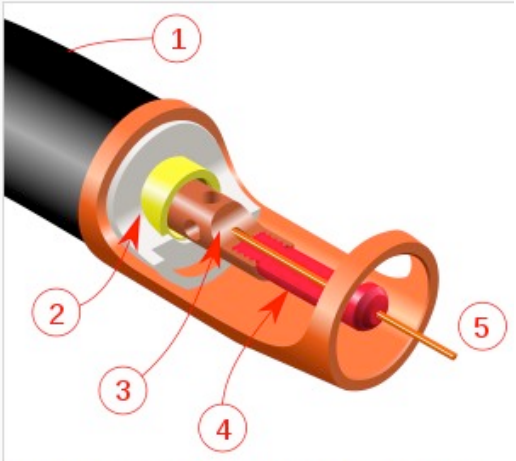
Gas metal arc welding

Gas metal arc welding (GMAW), sometimes referred to by its subtypes metal inert gas (MIG) welding or metal active gas (MAG) welding, is a semi-automatic or automatic arc welding process in which a continuous and consumable wire electrode and a shielding gas are fed through a welding gun. A constant voltage, direct current power source is most commonly used with GMAW, but constant current systems, as well as alternating current, can be used. There are four primary methods of metal transfer in GMAW, called globular, short-circuiting, spray, and pulsed-spray, each of which has distinct properties and corresponding advantages and limitations.

Gas metal arc welding

Welding gun and wire feed unit

The typical GMAW welding gun has a number of key parts—a control switch, a contact tip, a power cable, a gas nozzle, an electrode conduit and liner, and a gas hose. The control switch, or trigger, when pressed by the operator, initiates the wire feed, electric power, and the shielding gas flow, causing an electric arc to be struck. The contact tip, normally made of copper and sometimes chemically treated to reduce spatter, is connected to the welding power source through the power cable and transmits the electrical energy to the electrode while directing it to the weld area. It must be firmly secured and properly sized, since it must allow the passage of the electrode while maintaining an electrical contact. Before arriving at the contact tip, the wire is protected and guided by the electrode conduit and liner, which help prevent buckling and maintain an uninterrupted wire feed. The gas nozzle is used to evenly direct the shielding gas into the welding zone—if the flow is inconsistent, it may not provide adequate protection of the weld area. Larger nozzles provide greater shielding gas flow, which is useful for high current welding operations, in which the size of the molten weld pool is increased. The gas is supplied to the nozzle through a gas hose, which is connected to the tanks of shielding gas. Sometimes, a water hose is also built into the welding gun, cooling the gun in high heat operations. The wire feed unit supplies the electrode to the work, driving it through the conduit and on to the contact tip. Most models provide the wire at a constant feed rate, but more advanced machines can vary the feed rate in response to the arc length and voltage. Some wire feeders can reach feed rates as high as 30.5 m/min (1200 in/min), but feed rates for semiautomatic GMAW typically range from 2 to 10 m/min (75–400 in/min)



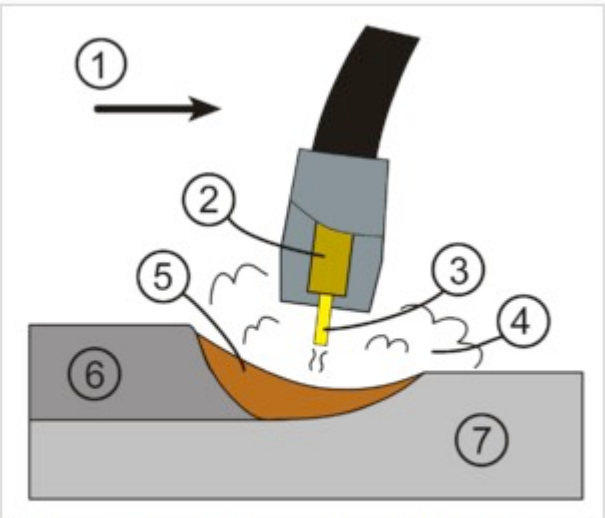
GMAW torch nozzle cutaway image. **(1)** Torch handle, **(2)** Molded phenolic dielectric (shown in white) and threaded metal nut insert (yellow), **(3)** Shielding gas diffuser, **(4)** Contact tip, **(5)** Nozzle output face

Power supply

Most applications of gas metal arc welding use a constant voltage power supply. As a result, any change in arc length (which is directly related to voltage) results in a large change in heat input and current. A shorter arc length will cause a much greater heat input, which will make the wire electrode melt more quickly and thereby restore the original arc length. This helps operators keep the arc length consistent even when manually welding with hand-held welding guns. To achieve a similar effect, sometimes a constant current power source is used in combination with an arc voltage-controlled wire feed unit. In this case, a change in arc length makes the wire feed rate adjust in order to maintain a relatively constant arc length. In rare circumstances, a constant current power source and a constant wire feed rate unit might be coupled, especially for the welding of metals with high thermal conductivities, such as aluminum. This grants the operator additional control over the heat input into the weld, but requires significant skill to perform successfully. Alternating current is rarely used with GMAW; instead, direct current is employed and the electrode is generally positively charged. Since the anode tends to have a greater heat concentration, this result in faster melting of the feed wire, which increases weld penetration and welding speed? The polarity can be reversed only when special emissive-coated electrode wires are used, but since these are not popular, a negatively charged electrode is rarely employed

Technique

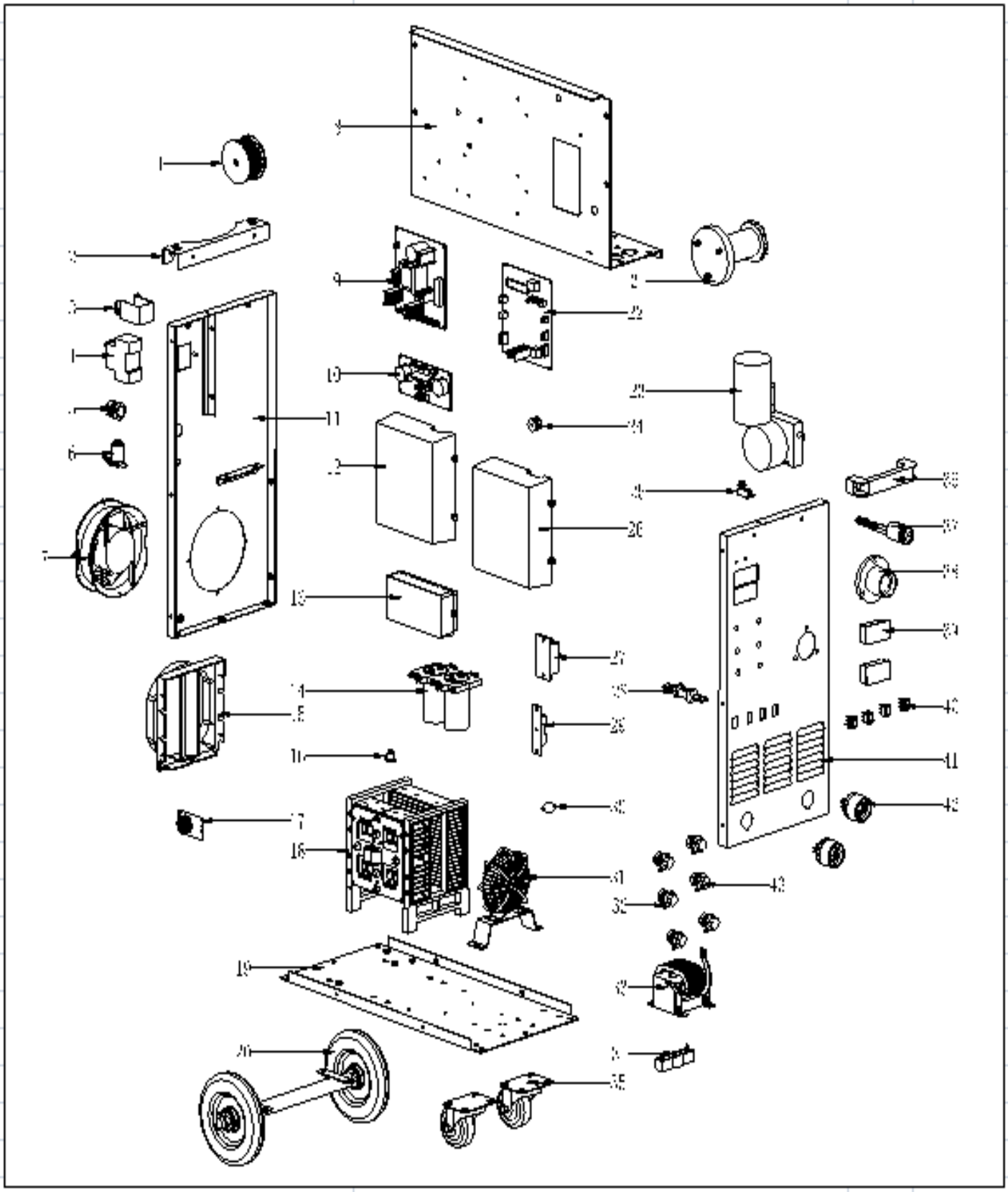
The basic technique for GMAW is quite simple, since the electrode is fed automatically through the torch. By contrast, in gas tungsten arc welding, the welder must handle a welding torch in one hand and a separate filler wire in the other, and in shielded metal arc welding, the operator must frequently chip off slag and change welding electrodes. GMAW requires only that the operator guide the welding gun with proper position and orientation along the area being welded. Keeping a consistent contact tip-to-work distance (the *stick out* distance) is important, because a long stick out distance can cause the electrode to overheat and will also waste shielding gas. Stick out distance varies for different GMAW weld processes and applications. For short-circuit transfer, the sickout is generally 1/4 inch to 1/2 inch, for spray transfer the stick out is generally 1/2 inch. The position of the end of the contact tip to the gas nozzle are related to the stick out distance and also varies with transfer type and application. The orientation of the gun is also important—it should be held so as to bisect the angle between the work pieces; that is, at 45 degrees for a fillet weld and 90 degrees for welding a flat surface. The travel angle, or lead angle, is the angle of the torch with respect to the direction of travel, and it should generally remain approximately vertical. However, the desirable angle changes somewhat depending on the type of shielding gas used—with pure inert gases; the bottom of the torch is often slightly in front of the upper section, while the opposite is true when the welding atmosphere is carbon dioxide.



GMAW weld area. **(1)** Direction of travel, **(2)** Contact tube, **(3)** Electrode, **(4)** Shielding gas, **(5)** Molten weld metal, **(6)** Solidified weld metal, **(7)** Workpiece.

ASSEMBLY DIAGRAM

The structure of ADVAN MIG 250(reference only):



PART LIST (MIG 250)

Item no.	PN	Name	Specification	Unit	Qty
1	303026016	magnetic core	H60*38*20/2K	PCS	1
2	205002376	gas cylinder bracket	For NB series	PCS	1
3	205004042	2P switch bracket	For NB series	PCS	1
4	303017039	breaker	DZ47-60-C60-2P/double-stage	PCS	1
5	305006016	ply-yarn drill	PG-16/black	PCS	1
6	301009030	solenoid valve	VQ22XD/ZCT-2DC24V	PCS	1
7	303023009	fan	G17050HA2BL/220V (with net)	PCS	1
8	205012871	clapboard	NB-250L/IGBT single tube patch board	PCS	1
9	202000389	on and off power board	FHP09420811-2(FHP09420811-1)	PCS	1
10	202000969	DSP(IGBT) driving board	EP09100005-2	PCS	1
11	2050131725	back panel	ADVAN MIG 250	PCS	1
13	304014032	Fixed box for driving board	For IGBT machine(EAC0-18)	PCS	1
14	30300302065	electrolytic capacitor	1500UF/400V	PCS	2
14	304014026	Fixed holder for capacitor	For fixing 2200uF/400V capacitor	PCS	2
15	304014028	fan shroud	φ150 /For G17050HA2BL fan usage	PCS	1
17	202000523	Inspection flow board	FHP06260607	PCS	1
18	2020001007	deck mechanism	FHP06660606-3/APT30GT60BRDQ2	PCS	1
19	205012872	bottom case	For MIG 250	PCS	1
20	301010008	rubber wheel	6 inch	PCS	2
20	205012076	axletree	for MIG 250	PCS	1
21	304007030	wire dish shaft	nylon	PCS	1
22	202000782	control board	EP11050070-3(EP11050070-2)	PCS	1
23	304007141	wire feeder	ZK-76ZY01/DC24V-NBC/ English label	PCS	1
24	301008016	shielding line	two core	meter	0.95
24	303026008	magnetic loop	H31*19*13mm	PCS	3
25	303017021	button switch	KW3A/RV-16-1C25	PCS	1
27	303008112	rectifier bridge	MDQ100A/1600V-W40	PCS	1
28	303014012	shunt	300A/75mV	PCS	1
29	303004168	fast recovery rectifiers	DH2F160N4SE	PCS	1
31	204002114	main transformer	ET11040022	PCS	1
32	303002039	potentiometer	WX010-2W/5K	PCS	5
33	204004042	reactance	NB-350L/ZX7-315L	PCS	1
34	30300103015	SQP	RX27-40W/390R	PCS	1
35	301010005	small rolls	2-3689-52（change to be 2-36893-52）	PCS	2
36	302001010	handle	134mm	PCS	1

37	301008158	CO2 flange	English style	PCS	1
38	301008156	CO2 central plug receptacle	English style	PCS	1
39	303018056	digital display meter	LXD5135-2V/1999	PCS	2
40	303017010	rocky switch	MR1-120-C5N-BBAAE	PCS	4
41	2050131724	front panel	for ADVAN MIG 250	PCS	1
42	301008150	quick receptacle	35-70	PCS	2
43	303002045	potentiometer	2W/47K	PCS	1
12\26	304014033	circuit board Dustproof box	For IGBT machine (EAC0-12)	PCS	2
12\26	304014034	cover for circuit board Dustproof box	For IGBT machine(EAC0-13)	PCS	2
16\30	303021029	temperature controller	KSD301 close-250V/10A-75℃	PCS	2

TROUBLESHOOTING

IMPORTANT!

BE CERTAIN to shut off the Welder, disconnect it from power, and discharge the torch to ground before adjusting, cleaning, or repairing the unit.

Wire feed motor runs but wire does not feed properly
Possible causes and solutions

1. **Insufficient wire feed pressure:**

   Increase wire feed pressure properly - follow instructions on page 11-12.

2. **Incorrect wire feed roll size:**

   Replace with the proper one - follow the ***wire spool*** instructions on page 11.

3. **Damaged torch, cable, or liner assembly:**

   Have a qualified technician inspect these parts and replace as necessary.

Wire creates a bird's nest during operation
Possible causes and solutions

1. **Excess wire feed pressure:**

   Adjust wire feed pressure properly - follow instructions on page 11-12

2. **Incorrect contact tip size:**

   Replace with the proper tip for the wire size used.

3. **Gun end not inserted into drive housing properly:**

   Loosen gun securing bolt and push gun end into housing just enough so that it does not touch wire feed mechanism.

4. **Damaged liner:**

   Have a qualified technician inspect and repair/replace as necessary

Welding arc not stable
Possible causes and solutions

1. **Wire not feeding properly:**

See first ***troubleshooting*** section above.

2. **Incorrect contact tip size:**
   Replace with the proper tip for the wire size used.
3. **Incorrect wire feed speed:**
   Adjust wire feed speed to achieve a more stable arc.
4. **Loose torch cable or ground cable:**
   Check to ensure that all connections are tight.
5. **Damaged torch or loose connection within torch:**
   Have a qualified technician inspect and repair/replace as necessary.

TROUBLESHOOTING (continue)

IMPORTANT!

BE CERTAIN to shut off the Welder, disconnect it from power, and discharge the torch to ground before adjusting, cleaning, or repairing the unit.

Welder does not function when switched on
Possible causes and solutions

1. **tripped thermal protection device:**
   Shut the welder's switch to off and allow it to cool for at least 20 minutes.
   Reduce duration or frequency of welding periods to help reduce wear on the welder.
   Refer to ***Duty Cycle*** section on page 8.
2. **Faulty or improperly connected control Switch:**
   Have a technician check and secure/replace Control Switch.
3. **Internal fuse blown:**
   Have a qualified technician check/replace.

Weak arc strength
Possible causes and solutions

1. **Incorrect line voltage:**
   Check the line voltage and, if insufficient, have a licensed electrician remedy the situation.

Wire Feeds, but arc does not ignite
Possible causes and solutions

1. **Improper ground connection:**
   Make certain that the work piece is contacted properly by the Ground Clamp and that the work piece is properly cleaned near the ground clamp and the welding location.
2. **Improperly sized or excessively worn contact tip (51b):**
   Verify that Contact Tip (51b) is the proper size for the welding wire used. Check that the hole in the tip is not deformed or enlarged. Also, check that the tip is not dirty; this would prevent a good connection. If needed, replace Contact Tip (51b) with proper size and type.

TROUBLESHOOTING (continue)

IMPORTANT!

BE CERTAIN to shut off the Welder, disconnect it from power, and discharge the torch to ground before adjusting, cleaning, or repairing the unit.

Wire feeds, but shielding gas does not Flow
Possible causes and solutions

1. **Empty Gas cylinder:**
   Check gas cylinder.
2. **Nozzle plugged:**
   Clean nozzle. If damaged, replace.
3. **Regulator or cylinder valve closed:**
   Make sure both valves are adjusted properly.
4. **Gas line blocked:**
   Check external hose, and hose within Torch cable.
5. **Gas solenoid broken or not connected properly:**
   Have a qualified technician check/replace.

MAINTENANCE

WARNING! Make sure the Power Switch of the Plasma Cutter is in its "OFF" position and that the tool is unplugged from the electrical outlet before performing any inspection, maintenance, or cleaning procedures.

1. Before each use, inspect the general condition of the Welder. Check for loose cable connections, misalignment or binding of the fan, cracked or broken parts, damaged electrical wiring, and any other condition that may affect its safe operation. If abnormal noise or vibration occurs, have the problem corrected before further use. Do not use damaged equipment.
2. Periodically recheck all nuts, bolts, and screws for tightness.
3. Periodically blow the dust from the cooling vents with compressed air.
4. Verify that the cooling fan is operational before cutting.
5. If the unit repeatedly shuts down from thermal overload, stop all use. Have the welder inspected and repaired by a qualified service technician.
6. Store the welder and accessories in a clean and dry location.
7. Periodically disassemble and clean the Torch Head components with steel wool. Replace burnt, cracked, distorted, or coated components, Refer to the assembly drawing on page 21.

8. To gain access to the internal components of the unit, remove screws from Main Body Cover. The home user is strongly advised not to remove the tool covers and not to attempt any electronic repairs. Any repairs must be completed by a qualified technician. Opening the tool will void any warranties, and may result in damage to equipment or possible personal injury. Don't do it.
9. On a daily basis check for any of the following problems: If any are found, take the tool to a qualified repair technician.
    a. Abnormal vibration, sound or smell.
    b. Abnormal heating at any cable connection.
    c. Then fan does not work properly.
    d. Any switch or control does not work properly.
    e. Any damage to cable