TOOLIOM® TL-250M PRO USER'S MANUAL



Note: Please read this user's manual carefully before using this product.

The TOOLIOM TL-250M PRO WELDER is designed for use by the serious hobbyist or the professional with the versatility to MIG, Stick or Lift TIG weld all from a single compact, space-saving and light-weight unit combined with self-sensing, dual-voltage capability for go anywhere convenience. The latest IGBT inverter technology produces the most stable arc possible and provides the capability of welding thin or heavy gauge steel with precision and ease. A powerful, 250 amp maximum welding output allows welding up to 13/64" thick steel.

READ AND UNDERSTAND ALL INSTRUCTIONS AND PRECAUTIONS BEFORE OPERATION.

This unit emits a powerful high voltage and extreme heat which can cause severe burns, dismemberment, electrical shock and death. TOOLIOM shall not be held liable for consequences due to deliberate or unintentional misuse of this product.

SPECIFICATIONS

	MIG				
Input Voltage	Input Current	Compatible Welding Wire	wire feeding speed(inch/min)	Output Voltage(V)	inching speed (inch/min)
110V	l1 max=45A l1eff=34.8A	D100/D200 .030''(0.8mm)	66~569(Manual MIG) 66~569(Synergic MIG)	12~25(Manual MIG) 12~22.7(Synergic MIG)	85-780
220V	l1 max=33A l1eff=25.5A	.035"(0.9mm) .045"(1.2mm)	66~858(Manual MIG) 66~858(Synergic MIG)	12~25(Manual MIG) 12~25(Synergic MIG)	00-700

Stick					Lift TIG	
Input Voltage	Output Current Range	Welding Rods Type	Compatible Welding Rods	Input Voltage	Output Current Range	Captable Lift TIG Torch
110V	20~162A	E7018	1/16" 3/32"	110V	20~180A	TI_WP-17V-35-50
220V	20~225A	2/010	1/8"	220V	20~250A	12-001-17-0-00-00

DUTY CYCLE

The rated duty cycle refers to the amount of welding that can be done within an amount of time. The TOOLIOM TL-250M PRO has a duty cycle of 60% at 250A for 110/220V. It is easiest to look at your welding time in blocks of 10 minutes and the duty cycle being a percentage of that 10 minutes. If welding at 250A with a 60% duty cycle, within a 10 minute block of time you can weld for 6 minutes with 4 minutes of cooling for the welder. If the duty cycle is exceeded, the welder will automatically shut off, however the fan will continue running to cool the components. When a safe temperature has been reached, the welder will automatically switch the welder output back on, To increase the duty cycle you can turn down the voltage output control.

SAFETY INFORMATION

Welding can be dangerous to you and other persons in the work area. Read and understand this instruction manual before using your TOOLIOM welding machine. Injury or death can occur if safe welding practices are not followed.

Safety information is set forth below and throughout this manual.

The following explanations are displayed in this manual, on the labeling, and on all other information provided with this product:

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

A WARNING

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

A CAUTION

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

A NOTICE

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



READ INSTRUCTIONS

Thoroughly read and understand this manual before using. Save for future reference.



A DANGER ELECTRIC SHOCK CAN CAUSE INJURY OR DEATH!

- Improper use of an electric Welder can cause electric shock, injury and death! Read all precautions described in the Welder Manual to reduce the possibility of electric shock.
- Disconnect Welder from power supply before assembly, disassembly or maintenance of the torch, contact tip and when installing or removing nozzles.
- Always wear dry, protective clothing and leather welding gloves and insulated footwear. Use suitable clothing made from durable flame-resistant material to protect your skin.
- Always operate the Welder in a clean, dry, well ventilated area. Do not operate the Welder in humid, wet, rainy or poorly ventilated areas.
- The electrode and work (or ground) circuits are electrically "hot" when the Welder is on. Do not allow these "hot" parts to come in contact with your bare skin or wet clothing.
- Separate yourself from the welding circuit by using insulating mats to prevent contact from the work surface.
- Be sure that the work piece is properly supported and grounded prior to beginning an electric welding operation.
- Always attach the Work Clamp to the piece to be welded and as close to the weld area as possible. This will give the least resistance and best weld.



A DANGER WELDING SPARKS CAN CAUSE FIRE OR EXPLOSION!

- Electric welding produces sparks which can be discharged considerable distances at high velocity igniting flammable or exploding vapors and materials.
- DO NOT operate electric arc Welder in areas where flammable or explosive vapors are present.
- DO NOT use near combustible surfaces. Remove all flammable items from the work area where welding sparks can reach (min. of 35 feet).
- Always keep a fire extinguisher nearby while welding.
- Use welding blankets to protect painted and or flammable surfaces; rubber weatherstripping, dash boards, engines, etc.
- Ensure power supply has properly rated wiring to handle power usage.



A WARNING ELECTROMAGNETIC FIELDS CAN BE A HEALTH HAZARD!

- The electromagnetic field that is generated during arc welding may interfere with various electrical and electronic devices such as cardiac pacemakers. Anyone using such devices should consult with their physician prior to performing any electric welding operations.
- Exposure to electromagnetic fields while welding may have other health effects which are not known.



A WARNING ARC RAYS CAN INJURE EYES AND BURN!

- Arc rays produce intense ultraviolet radiation which can burn exposed skin and cause eye damage. Use a shield with the proper filter (a minimum of #11) to protect your eyes from sparks and the rays of the arc when welding or when observing open arc welding (see ANSI Z49.1 and Z87.1 for safety standards).
- Use suitable clothing made from durable flame-resistant material to protect your skin.
- If other persons or pets are in the area of welding, use welding screens to protect bystanders from sparks and arc rays.



A WARNING FUMES AND WELDING GASES CAN BE A HEALTH HAZARD!

- Fumes and gasses released during welding are hazardous. Do not breathe fumes that are produced by the welding operation. Wear an OSHA-approved respirator when welding.
- · Always work in a properly ventilated area.
- Never weld coated materials including but not limited to: cadmium plated, galvanized, lead based paints.



A CAUTION HOT METAL AND TOOLS WILL BURN!!

- Electric welding heats metal and tools to temperatures that will cause severe burns!
- Use protective, heat resistant gloves and clothing when using TOOLIOM or any other welding equipment. Never touch welded work surface, torch tip or nozzle until they have completely cooled.



A CAUTION FLYING METAL CHIPS CAN CAUSE INJURY!

- Grinding and sanding will eject metal chips, dust, debris and sparks at high velocity. To prevent eye injury wear approved safety glasses.
- · Wear an OSHA-approved respirator when grinding or sanding.
- Read all manuals included with specific grinders, sanders or other power tools used before and after the welding process. Be aware of all power tool safety warnings.



A CAUTION INADEQUATE WIRING CAN CAUSE FIRE AND INJURY!

Verify that the facility power source has properly rated wiring to handle power requirements of this Welder.

CONTENTS

Remove all items from the box. Compare with list below to make sure unit is complete.

- 1. TL-250M PRO MIG Welder
- 2. Power Cord Adapter
- 3. Shielding Gas Hose
- 4. Work Clamp
- 5. MIG Gun with Accessories
- 6. Electrode Holder
- 7. Wire Feed Roller
- 8. Graphene Liner



CONTROL AND DISPLAY PANEL



1 Wire Feeding Speed/Amperage

Display the wire feeding speed(inch/min) in MIG welding; display the current value in Stick/Lift TIG welding. Adjust the value of wire feeding speed(inch/min) or current by rotate the knob [G]

Voltage Display

Display the voltage value in Stick/Lift TIG welding.

Display the voltage value and inductance value in Manual&Synergic MIG welding.

E Welding Mode

Select welding modes Manual MIG, Synergic MIG, Lift TIG, Stick by press button [D]

Welding Wire

Select diameter of solid/flux core/aluminum welding wire .030"(0.8mm)/.035"(0.9mm)/.045"(1.2mm) by press button [A]

Note: This MIG welder can use .030"(0.8mm)/.035"(0.9mm) solid/flux welding wire and .035"(0.9mm)/.045"(1.2mm) aluminum welding wire.

Welding Data

Select welding material of Fe(CO₂ 100%) / Fe+SS(MIX Gas) / Flux(Gasless) or Aluminum(Ar 100%) by press button [B]

Steps Mode

Select welding step mode of **2T** or **4T** by press button [C] Note: 2T provides weld power only while the trigger switch is depressed. 4T Trigger interlock mode eliminates the need to hold the gun trigger while welding.

7 Input Voltage

Auto identify the input voltage

Inductance

Press the knob [F] switch voltage adjustment to inductance adjustment, rotate the knob from soft to hard on arc sparking(-5~+5).

Pulse MIG Indicator

Choose the pulse MIG by press knob [G]

Note: Pulse MIG can only be used in the mode of synergic MIG aluminum welding, and can't be used in spool gun mode.

When press the button [G], the mode automatically switchs to synergic MIG aluminum welding.

Inching Button

Feed the wire down the torch cable through to the torch head by press button [E] Note: The longer press, the faster wire goes.

Welding Mode	Input Voltage	Wire Feeding Speed(inch/min)	Current(A)	Voltage(V)	Inching Speed(inch/min)	Inductance	2T/4T
Manual MIC	110V	66~569	/	12~25			
Manual MiG	220V	66~858	/	12~25			
Currenzie MIC	110V	66~569	/	12~22.7	85~780	-5~+5	2T/4T
Synergic MiG	220V	66~858	/	12~25			
Synergic MIG	110V	85~507	/	15.6~24.9			
(Pluse)	220V	101~608	/	15.6~25			
Chield	110V	/	20~162	/			
Slick	220V	/	20~225	/		1	1
	110V	/	20~180	/		/	
	220V	/	20~250	/			

The voltage can only be micro adjusted from -3~+3V as you need in synergic MIG.

Note: In synergic MIG welding, the wire feeding speed and voltage will be auto fitted by welder data inside machine CPU (Synergic Setting on welder data).

In **Stick** welding mode, the functions such as **Hot Start/Push (ARC Force)/VRD/Anti-Stick** can be adjusted. Press button [F] to switch the function, rotate the knob [G] to adjust the value or turn on/off.

Welding Mode	Hot v	P15 *	oFF ^ urd ^v	an ^ Ant '
	Hot Start(A)	Push=ARC Force(A)	VRD	Anti-Stick
Stick	0~100	0~70	ON/OFF	ON/OFF

Thermal protection LED illuminates when the unit has reached the maximum internal component temperature. This occurs when the duty cycle has been exceeded.

The Welder will automatically shut off however the fan will continue running to cool the overheated components. When a safe temperature has been reached, the protective circuit will automatically switch the welder output back on.







- Positive Connector(+)
- Wire Drive Polarity Lead
- Negative Connector(-)
- E MIG Gun Connector
- E Power Switch
- Power Input
- Gas Input
- E Wire Spool Spindle
- Two-Roll Wire Feeder
- Rocker Switch (select spool gun or MIG gun)

INSTALLATION

A DANGER ELECTRIC SHOCK HAZARD!

Turn welder off and unplug from electrical outlet before disassembly, assembly, or replacing torch consumables, or changing wire spool.

INSTALLATION OF MIG GUN, WORK CLAMP AND ELECTRODE HOLDER

1) Manual MIG&Synergic MIG Welding

Insert the terminal connection of MIG gun through MIG gun Connector. Insert the wire drive polarity lead through the positive hole (+). Insert the terminal connection of the work clamp through the negative hole (-).



2) Flux MIG Welding

Insert the terminal connection of MIG gun through MIG gun Connector. Insert the wire drive polarity lead through the negative hole (-). Insert the terminal connection of the work clamp through the positive hole (+).





3) Stick Welding

Insert the terminal connection of the work clamp through the negative hole (-). Insert the terminal connection of the electrode holder through the positive hole (+).





3) Lift TIG Welding

Insert the terminal connection of the work clamp through the positive hole (+). Insert the terminal connection of the lift TIG torch (Not included in the machine) through the negative hole (-).





A DANGER ELECTRIC SHOCK CAN CAUSE INJURY OR DEATH!

Disconnect welder from power supply before beginning.



INSTALLING D100 WIRE SPOOL

- 1. Open the side door of the welder
- 2. Unscrew and remove the wire spool retention cap used for D200 spools (A) and store it someplace safe.
- 3. Unscrew and remove wing nut (B), spacer (C), spring (D) and spacer (E) from the spool spindle(14), store these someplace safe.
- 4. Remove the spindle adapter for D200 spools (F) and store it someplace safe.
- 5. Place the D100 (4") Wire Spool onto the spindle.
- 4. Reinstall the spacers, spring and the wing nut, Tighten the wing nut till there is a slight resistance to spin the wire spool on the spindle. If the tension is loosely set, the wire spool will spin on the shaft and un-spool all of the wire. If the tension is tightly set, the drive roller will have difficulty feeding the wire, and may cause slipping.

NOTE: Hold the exposed wire end to keep the spool visible.

INSTALLING D200 WIRE SPOOL

- 1. Open the side door of the welder
- Unscrew and remove the wire spool retention cap (A).
 NOTE: If the wire spool retention cap and the spindle adapter for D200 spools (F) are not present (machine was last used with D100 spool) put the spindle adapter for D200 spools back in place.
- 3. Make sure all of the components used for D100 spool are still in place. They are necessary for D200 spools as well (wing nut (B), spacer (C), spring (D) and spacer (E))
- 4. Place the D200 (8") Wire Spool onto the spindle.
- 5. Reinstall the spacers, spring and the wingnut, Tighten the wing nut till there is a slight resistance to spin the wire spool on the spindle. If the tension is loosely set, the wire spool will spin on the shaft and unspool all of the wire. If the tension is tightly set, the drive roller will have difficulty feeding the wire, and may cause slipping.

CHANGING THE DRIVER ROLLER

TL-250M PRO comes with the drive roller installed for using .030(0.8mm) solid welding wire. Please select the appropriate drive roller according to the actual wire size and type.

A DANGER ELECTRIC SHOCK HAZARD!

Turn welder off and unplug from electrical outlet before removing or installing the Drive Roller.







- 1. Release the drive roll pressure arm (B) by pulling the pressure arm adjustment knob (A) toward you.
- 2. Lift the pressure arm (B) and rotate and loosen the set screw (C)
- 3. Slide the drive roller (D) off the shaft.
- Determine which size wire is going to be used and slide the drive roller back onto the shaft.
 NOTE: The stamped marking on the side of the drive roller indicates the size of the groove on the side of the roller.

The groove closest to the drive motor is the groove that will be used.

- If setting up to .030"(0.8mm) wire, the '0.8' stamping should be installed on the inside.
- 5. Tighten the set screw on the drive roller and lower the pressure arm (B) back into place.
- 6. Lift the pressure adjuster (A) to put it back in place and adjust as necessary.

INSTALLING MIG GUN with EURO CONNECTOR (TL-L150-10E)



- 1. Remove the gas nozzle (E) and contact tip (F) from the end of the gun assembly.
- 2. Choose the matched contact tip according to the diameter of the welding wire you use.
- 3. Press the wire inching speed button [E] on the panel to feed the wire through the gun assembly.
- 4. When at least one inch of wire sticks out past the end of the gun, release the button.
- 5. Slide the contact tip (F) over the wire protruding from the end of the gun.
- 6. Install the gas nozzle (E) on the gun assembly.

INSTALLING SPOOL GUN



1. Install TL-LBT150 spool gun with Euro 2. Open the cover and replace the connector into MIG Gun Connector on the matched wire feeder wheel (U Type) front panel then tighten it.





3. Remove the gas nozzle and contact tip from the torch neck. Install matched contact tip (.035" or .045" aluminum welding wire)



4. Adjust spool holder tension and apply 5. Press the torch switch to feed the wire suitable pressure for the drive roller.



into torch neck



6. Set spool gun selector switch which is inside the machine. Turn on the MIG welder.

REPLACING MIG GUN GRAPHENE LINER FOR ALUMINUM WELDING

- Ensure the power supply is off and the gun is removed from the feeder before proceeding.
- Remove the nozzle and contact tip by handy spanner (FIG. 1).
- Remove the liner retaining nut (FIG. 2).
- With the gun straightened, pull the steel liner out of the gun and keep it in safe place (FIG. 3).
- Take out the graphene liner (Black) and insert it into the gun from the back end, pushing it all the way through until it exits at the front end. Avoid kinking the liner. Kinking the liner will damage it and require replacement (FIG. 4, FIG. 5).
- Install the liner retainer and nut onto the back end of the gun (FIG. 6).
- Remove the drive roller cap and drive roller (FIG. 7).
- Remove the tube holder with screwdriver then rotate inlet guide tube to remove it (FIG. 8).
- Remove the black clip on the outlet guide tube and push tube out the front of the machine with a wire (FIG. 9, FIG. 10).

Note: use a screwdriver against the front of the tube inside the gun connector to better remove the black clip.

• Cut a same length of liner as the outlet guide tube with wire cutter (FIG. 11).

Note: remove any burr that may obstruct wire feed.

- Put the gun back on the machine and tighten it, the liner will be just very close to the wire feeder roller but without touching (FIG. 12).
- Cut another section of liner from the excess graphene liner to the same length as the inlet guide tube and then replace on the tube holder (FIG. 13).

Note: remove any burr that may obstruct wire feed.

- Place the tube holder back (FIG. 14).
- Repalce the correct size U-knurled drive roller (FIG. 15).
- Install the matched aluminum A+ contact tip and nozzle back into the MIG gun (FIG. 16).





Remove the MIG gun consumables.

Remove the liner retaining nut.



Pull out and completely remove the liner.



Take out the graphene liner (black).



Insert the new liner into the gun from the back end, pushing it all the way through until it exits at the front end.



Install the liner retainer and nut onto the back end of the gun.

Remove the drive roller cap and drive roller.



Remove the tube holder with screwdriver Remove the black clip on the outlet guide tube. Note: Use a screwdriver against the front of the

Remove the black clip on the outlet guide tube. **Note:** Use a screwdriver against the front of the tube inside the gun connector to better remove the black clip.



the machine with a wire.



Push the outlet guide tube out the front of Cut a same length of liner as the outlet Put the gun back on the machine and guide tube with wire cutter.



tighten it.





Cut another section of liner from the excess graphene liner to the same length as the inlet guide tube and then replace on the inlet guide.





roller.

Repalce the correct size U-knurled drive Install the matched aluminum A+ contact tip and nozzle back into the MIG gun.

MIG WELDING SET UP

- A shielding gas bottle is NOT INCLUDED with TOOLIOM TL-250M PRO but is necessary to weld using solid&aluminum welding wire. It can be bought at most local welding supply stores.
- Place the TOOLIOM TL-250M PRO in its dedicated area or on a welding cart.
- · Connect either end of the gas line (included) with TOOLIOM TL-250M PRO to the fitting on the regulator and tighten with a wrench until snug.
- Connect the other end of the gas line to the gas input on the rear of the TOOLIOM TL-250M PRO and tighten with a wrench until snug.
- · Slowly open the valve on the gas cylinder and check the gas line for leaks. The valve on the gas cylinder should always be fully open when welding.

Attention: Flux MIG do not require gas.

- 1) Press button [D] to choose welding mode on Manual or Synergic MIG
- 2) Press button [B] to choose welding material on Fe(CO2 100%) / Fe+SS(MIX Gas) / Flux(Gasless) or Aluminum(Ar 100%)
- 3) Press button button [A] to choose diameter of welding wire. Note: This MIG welder can use .030"(0.8mm)/.035"(0.9mm) solid / flux welding wire

FIG

Place the tube holder back.

and .035"(0.9mm)/.045"(1.2mm) aluminum welding wire.

4) Press button [C] to choose 2T/4T selection.

Note: 2T provides weld power only while the trigger switch is depressed. 4T Trigger inter-lock mode eliminates the need to hold the gun trigger while welding.

- 5) Rotate the knob [G] to adjust the current as you need.
- 6) Rotate the knob [F] to adjust the voltage, press and rotate the knob [F] to adjust the inductance as you need. Increasing inductance produces a more fluid, softer arc. Decreasing inductance produces a stiffer arc.
- 7) Press the knob [E] to feed the wire down the torch cable through to the torch head.

Welding Mode	Input Voltage	Welding Data	Welding Wire Diameter	Wire Feeding Speed(inch.min)	Output Voltage(V)	Inductance	
		En(CO: 100%)	.030"(0.8mm)	85~549			
		16(00210076)	.035"(0.9mm)	78~358			
			.030"(0.8mm)	97~452			
	110\/	Fe+33(IVIIX Gas)	.035"(0.9mm)	78~358	10.05		
	1100	Elux(Gaelose)	.030"(0.8mm)	93~421	12~25		
		Tiux(Gasiess)	.035"(0.9mm)	66~249			
		AL (Ar 100%)	.035"(0.9mm)	171~569			
Manual MIG		AL(AI 100%)	.045"(1.2mm)	78~245			
Manual MiG		Eq(COn 100%)	.030"(0.8mm)	85~858			
		Fe(CO2 100 %)	.035"(0.9mm)	78~518			
			.030"(0.8mm)	97~616			
	2201/	Fe+33(IVIIX Gas)	.035"(0.9mm)	78~518	10.05		
	2200	Flux(Cooleen)	.030"(0.8mm)	93~631	12~25		
		Flux(Gasless)	.035"(0.9mm)	66~393		- - - -	
		AL(Ar 100%)	.035"(0.9mm)	171~768	14.5~22.7		
			.045"(1.2mm)	78~343			
		Fe(CO: 100%)	.030"(0.8mm)	85~549			
		Fe(CO2 100 %)	.035"(0.9mm)	78~358	16.5~21.9		
		Fe+SS(MIX Gas)	.030"(0.8mm)	97~452	14.6~19.2		
	110\/		.035"(0.9mm)	78~358	14.6~19.2		
	1100	Flux(Gasless)	.030"(0.8mm)	93~421	14.7~22.2		
			.035"(0.9mm)	66~249	14.7~22.2		
		AL (A. 4000()	.035"(0.9mm)	171~569	13.2~17.9		
Supergie MIC		AL(AI 100%)	.045"(1.2mm)	78~245	12~18		
Synergic Mild		Eo(COo 100%)	.030"(0.8mm)	85~858	14.5~25		
		1 8(002 100 %)	.035"(0.9mm)	78~518	16.5~25		
		Eques(MIX Gas)	.030"(0.8mm)	97~616	14.6~21		
	2201/	1 e+33(iviix das)	.035"(0.9mm)	78~518	14.6~21.5		
2200	2200	Elux(Gaelose)	.030"(0.8mm)	93~631	14.7~25		
		Tiux(Gasiess)	.035"(0.9mm)	66~393	14.7~25		
		AL (Ar 100%)	.035"(0.9mm)	171~768	13.2~20.6		
		AL(Ar 100%)	.045"(1.2mm)	78~343	12~21.4		
	110V		.035"(0.9mm)	156~507	15.6~24.9		
Synergic MIG	1.00	AI (Ar 100%)	.045"(1.2mm)	101~347	15.6~20.5		
(Pluse)	220V	, (CI 100 /0)	.035"(0.9mm)	156~608	15.6~25		
	2201	2201		.045"(1.2mm)	101~452	15.6~23.2	

STICK WELDING SET UP

- 1) Press button [D] to choose welding mode on Stick
- 2) Rotate the knob [G] to adjust the current as you need.
- 3) Press button [F] to switch the Hot Start/ VRD/ Anti Stick function, rotate the knob [G] to adjust the value or turn ON/OFF.

Welding Mode	Input Voltage	Current(A)
Stick	110V	20~162
	220V	20~225

Lift TIG WELDING SET UP

1) Press button [D] to choose welding mode on Lift TIG

2) Rotate the knob [G] to adjust the current as you need.

Welding Mode	Input Voltage	Current(A)
Lift TIG	110V	20~180
	220V	20~250

CONNECTING THE WELDER TO A POWER SOURCE

The TOOLIOM TL-250M PRO Welder requires a dedicated AC single phase 110V/220V, 50/60HZ grounded outlet protected by a (50A@110V/40A@220V) circuit breaker.

MIG WELDING OPERATION

Your TOOLIOM TL-250M PRO can be used to form many different joints and welds all of which will require practice and testing before using on an actual project piece. This following welding process is just a baseline to get you started.

- Connect your Work Clamp to the work pieces that are to be welded. Make sure the Work Clamp contacts are placed on a clean piece of metal free of paint, grease, rust, oils, etc. It is recommended to place your Work Clamp as close to the weld area as possible.
- Assess your weld area and make sure the welding area is also cleaned of any paint, grease, rust, oils, etc.
- Plug in the Welder and move the Power Switch at the Upper Back Panel to the "ON" position Depress the Welding Gun trigger or Button "INCHING" pointing the welding gun away from your body and then let go of the trigger and cut the wire back to 1/4" stick out length.
- Wearing your welding helmet, gloves, and long sleeve shirt and pants, put the end of the wire sticking out of the gun into the joint to be welded.
- Position the MIG Gun so that it is perpendicular to the base metal with -20° tilt back.
- Depress the trigger to start the inching which starts the arc.

NOTE: A push, perpendicular, or drag technique can be used to weld the pieces together; the type used depends on the type of joint as well as other influential conditions.

- Once you depress the trigger and the arc has started, you will notice a molten puddle will form; this
 puddle is the weld bead and will follow the motion of the MIG Gun. Watching the size of the puddle
 dictates how fast you should be moving with the torch. If you burn through the material you are either
 moving to slow or you need to make some setting adjustments to the Welder settings. If you're not
 penetrating the base metal you're either moving too fast or you need to make adjustments to the
 Welder settings.
- Release the trigger on the MIG Gun to stop the weld.
- After welding is complete, turn off the Welder and disconnect from power source.

SHEET METAL WELDING TECHNIQUES

When welding sheet metal a different approach is usually taken to account for how thin the metal is and it's susceptible to warping it is. The technique most often used is called Stitch Welding and this process is described below:

- Clean the metal to be welded of any paint, rust, oil, grease, dirt or any other contaminants that may be on the surface of the piece.
- Secure the pieces to be welded in place using clamps. Be sure to leave a small gap between the two pieces of sheet metal for the weld to flow into, this will result in a lower bead height which will require minimal finishing.
- Consult the Suggested Settings Chart and set the Voltage and Wire Speed knobs appropriately.
- Once the settings have been fine tuned tack weld your final pieces in places and remove the clamps if they are in the way of the weld.

- The Stitch Welding technique can now be utilized which is basically a series of tacks connecting together. To perform the technique, trigger the gun to form a tack weld and then continue to trigger on and off the gun making a series of connected tack welds following along the path of the weld joint. Continue the series of tacks for an inch or so and then move to a different section of the weld and perform the process there. It is essential to keep moving around to spread out the heat making sure not to get one section too hot and warp the metal.
- Once the entire weld has been completed allow the metal to cool. If necessary follow up with a flap disc to grind the weld bead flush.

HEAVY GAUGE METAL WELDING TECHNIQUES

When welding heavy gauge metal, a continuous bead is formed using a 'push' method. This process is described below:

- Clean the metal to be welded of any paint, rust, oil, grease, dirt or any other contaminants that may be on the surface of the piece.
- Secure the pieces to be welded in place using clamps. Be sure to leave a small gap between the two pieces of metal for the weld to flow into, this will result in a lower bead height which will require minimal finishing. Any material thicker than 1/8" should be beveled using an angle grinder.
- Consult the Suggested Settings Chart and set the Voltage and Wire Speed knobs appropriately.
- Get some pieces of scrap metal of the same thickness and verify that the settings will work for the specific weld you will be making.
- Once the settings have been fine-tuned tack weld your final pieces in places and remove the clamps if they are in the way of the weld.
- When welding heavy gauge metal there are two basic approaches to creating the weld. The first is a continuous bead with steady gun movement along the length of the joint. The second type of weld is a Stringer or Weave bead. This is accomplished by moving the torch in a circular or zig zag pattern. Either of these techniques will create strong welds but in some cases the Stringer or Weave type will create a more aesthetically pleasing weld bead.
- Once the entire weld has been completed, allow the metal to cool. If necessary, follow up with a flap disc to grind the weld bead flush.

STICK WELDING OPERATION

STICK WELDING OPERATION

Electrode Selection

Before beginning welding with your TOOLIOM TL-250M PRO, you will need to purchase electrodes as these are a consumable item in the ARC welding process. There are a variety of different types of rods available and should be selected depending on the project on hand. The chart below is an overview of some of the most popular electrodes.

Electrode	Polarity	Usage
E7018	DCEP	This electrode is best for use with clean, bare steel and is suitable for moderate penetration.

POLARITY SELECTION

The TOOLIOM TL-250M PRO can weld in both Direct Current Electrode Positive (DCEP) and Direct Current Electrode Negative (DCEN). The electrode, or rod, when welding in DCEP is positive and the grounded surface is negative. This polarity is used with electrodes that specify it and is usually the most commonly used polarity when ARC welding for general purpose use. The electrode when welding in DCEN is negative and the grounded surface is positive. This polarity is used with electrodes that require using this polarity and is usually used for building up heavy deposits of material with less penetration.

To use the TOOLIOM TL-250M PRO in DCEP:

- Locate the Work Clamp with Cable and connect the plug on the cable end to the Ground Cable Connector (-) on the Welder. To connect the plug line up the key on the plug with the keyway on the socket of the Welder, insert the plug and twist until it is tight.
- Locate the Electrode Holder with Cable and connect the plug on the cable end to the Electrode Holder Connector (+) on the Welder. To connect the plug line up the key on the plug with the keyway of the socket on the Welder, insert the plug and twist until it is tight.

To use the TOOLIOM TL-250M PRO in DCEN:

- Locate the Work Clamp with Cable and connect the plug on the cable end to the Positive Connector (+) on the Welder. To connect the plug line up the key on the plug with the keyway on the socket of the Welder, insert the plug and twist until it is tight.
- Locate the Electrode Holder with Cable and connect the plug on the cable end to the Negative Connector (-) on the Welder. To connect the plug line up the key on the plug with the keyway on the socket of the Welder, insert the plug and twist until it is tight.

Lift TIG WELDING OPERATION

A Shielding Gas Bottle is **NOT INCLUDED** with your TOOLIOM TL-250M PRO Lift TIG Torch Kit but is necessary for Lift TIG welding. A Shielding Gas Bottle can be bought at most local Welding Supply Stores. TOOLIOM recommends the use of 100% Argon shielding gas when Lift TIG welding Steel and Stainless Steel.

After connecting your Shielding Gas Regulator, the gas flow rate needs to be adjusted so that the proper amount of Shielding Gas is flowing over your weld. If there is too little gas flow there will be porosity in your welds as well as excessive spatter, if there is too much gas flow you will be wasting gas and may affect the weld quality.

- Place the TOOLIOM TL-250M PRO in its dedicated area or on a welding cart.
- Secure your Shielding Gas Bottle to a stationary object or mount to your welding cart if it is equipped to hold one so that the cylinder cannot fall over.
- Remove the cap from the Shielding Gas Bottle.
- Install the Regulator Knob on the Shielding Gas Regulator.
- Insert the large brass male fitting on the Shielding Gas Regulator into the female fitting on the Shielding Gas Bottle.

A NOTICE

•Do not use White Thread Sealing Tape on this connection as it is an inert gas fitting and does not require it. If you have a leak check for burrs or dirt in the threads.

- Tighten the fitting with a wrench until snug, do not over tighten.
- Connect Lift TIG Torch gas line to the fitting on the Regulator and wrench-tighten until snug.
- Check the gas line for leaks by slowly opening the valve on the gas bottle. When welding, the valve on the bottle should always be fully open.

TORCH ASSEMBLY/DISASSEMBLY

Disassembly:

- Make sure the welder is turned OFF and unplugged.
- Remove the Back Cap from the Torch.
- If there is a Tungsten installed in the Torch pull it out of the front of the Torch.
- Slide the Collet out of the Torch.
- Unscrew and remove the Gas Shielding Nozzle.
- · Unscrew and remove the Collet body.



Assembly: (FIG. 17)

- Select a Collet body that matches your Tungsten diameter size and thread it into the front of the Torch.
- Select a Collet that matches your Tungsten diameter size. Insert the Tungsten into the Collet and put the Collet and Tungsten back into the Torch.



• The Gas Shielding Nozzle size should be changed according to shielding gas requirements for the material being welded. Thicker material requires a larger Nozzle. Select the correct Gas Shielding Nozzle and thread it onto the Collet body.

Install the back cap to lock the tungsten in place. Always make sure the tungsten protrudes 1/8" to 1/4" beyond the gas shielding nozzle (FIG. 18).

SHARPENING THE TUNGSTEN

To avoid contamination of the tungsten and ultimately the weld, it is imperative to have a dedicated grinding wheel used for tungsten grinding only. A fine grit standard 6" synthetic stone grinding wheel on a bench top grinder is sufficient or our specifically designed TOOLIOM tungsten grinders are available.

- Shut off the welder.
- Make sure the tungsten and torch are sufficiently cooled for handling then loosen and remove the back cap then the collet and remove the tungsten from the FRONT of the torch only. (Removing from the rear will damage the collet).





- If the tungsten is used and the end is contaminated, use pliers or a suitable tool to grip the tungsten above the contaminated section and snap off the end of the Tungsten.
- Holding the tungsten tangent to the surface of the grinding wheel, rotate the tungsten while exerting light pressure until a suitable point is formed. The ideal tip will have the length of the conical portion of the sharpened area at 2-1/2 times the tungsten rod diameter (FIG. 19).
- Replace the tungsten in the collet with the tip extending 1/8"-1/4" beyond the gas shielding nozzle, then re-tighten the back cap (FIG. 20).

OVERLOAD PROTECTION

Your TOOLIOM TL-250M PRO Welder is equipped with an overload breaker. This device will protect your Welder if the duty cycle is exceeded. If the output is exceeded, the internal breaker will trip and stop power supply to the drive motor although the fan will still run to cool the unit. If the breaker tripped resulting from an over-load, the Overload Indicator will illuminate E 2. Allow the Welder to cool for a minimum of 15 minutes before attempting to resume welding.

TYPES OF WELD JOINTS



BUTT WELD

is a joint between two pieces that are laying in the same direction.



CORNER WELD

is a joint between two pieces that meet at or near perpendicular at their edges.

LAP WELD is a joint between two overlapping pieces.

EDGE WELD

is a joint between two pieces where the edges are being joined.

TEE WELD

is a joint between two pieces where one is perpendicular to the other.

PLUG WELD

is a joint which joins two overlapping pieces by filling in a hole punched in the top piece.



STICK WELD TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTION
Electrode	Arc Too Short	While welding, keep the ignited end of the electrode further from the weld joint.
Sticking	Current Too Low	Adjust the current on the front of the Welder to a higher current setting.
Holes in Weld Bead	Arc Too Long	While welding, keep the ignited end of the electrode closer to the weld joint.
(Porosity)	Moisture in Electrode	Replace electrode with a new one.
Excessive Spatter	Arc Too Long	While welding, keep the ignited end of the electrode closer to the weld joint.
	Current Too High	Adjust the current on the front of the welder to a lower current setting.
Poor Penetration	Poor Joint Preparation	Clean the weld joint of any dirt, grease, paint of other pos- sible contaminates. If the pieces being Welder are of a heavy gauge it may be necessary to bevel the edges of the pieces.
	Current Too Low	Adjust the current on the front of the welder to a higher current setting.
	Travel Speed Too Fast	Slow down the travel speed of the electrode while welding.
Overload Light On	Duty Cycle Exceeded	Allow the Welder to cool for a minimum of 15 minutes be- fore attempting to use again.

MIG WELD TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTION
	High Voltage	Adjust voltage output to lower setting.
Burn Through	Lack of Tack Welds	Adjust wire speed to slower setting.
	Slow Gun Travel	Increase your travel speed with the Welding Gun.
	Low Voltage	Adjust voltage output to higher setting.
	Slow Wire Speed	Adjust wire speed to faster setting.
Lack of	Fast Gun Travel	Slow your travel speed of the Welding Gun making sure to pull or drag the molten metal puddle.
Penetration	Excessive Wire Protruding	Move the Contact Tip on the Welding Gun closer to the work piece to shorten the length of exposed wire.
	Material Too Thick	The TL-250M PRO is rated for a maximum thickness of 3/8", exceeding this will result in poor penetration.

	Poor Material Prep	If welding heavy gauge metals, it may be necessary to in- crease the welding gap between the two pieces and also bevel the edges on the weld side of the pieces.
_ .	High Voltage	Adjust voltage output to lower setting.
Excessive	Fast Wire Speed	Adjust wire speed to slower setting.
- onoticution	Slow Gun Travel	Increase your travel speed with the Welding Gun.
	Lack of Tack Welds	Tack weld the pieces in multiple areas to keep the pieces from pulling apart.
	No Clamping	Use welding clamps to secure the pieces in the proper shape.
Warping	Poor Technique	To prevent warping, allow the workpiece to cool after weld- ing small sections at a time. Move your welding areas around by not completing all the welding in one section all at once, rather, welding a small amount in one area and then move to another section area to spread out the heat in the piece.

TIG WELDING TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTION
Arcis	Incomplete Circuit	Check Ground connection. Make sure that the ground is on a freshly cleaned surface and close to the welding area. It is suggested to weld towards the ground connection.
Triggered but Will Not Start	Incorrect Tungsten	Consult chart for proper Tungsten for the base metal being welded. In most cases Thoriated will be used for all steels.
	No Shielding Gas	Make sure the shielding gas cylinder is turned all the way open and set at the correct flow rate.
	Poorly Prepped Tungsten	Follow guidelines for prepping Tungsten.
	Poor Gas Flow	Adjust the flow rate of the shielding gas (refer to settings chart). Check for loose fittings where gas could be leaking.
Are wanders	Contaminated Tungsten	Remove Tungsten from Torch, break off contaminated sec- tion, and resharpen.
and it is Hard to Concentrate	Incorrect Arc Length	Make sure the Tungsten is held 1/8 to 1/4 inch off the work piece.
Heat in a Specific Area	Incomplete Circuit	Check Ground connection. Make sure that the ground is on a freshly cleaned surface and close to the welding area. It is suggested to weld towards the ground connection.
	Contaminated Base Metal	Clean base metal making sure to remove any oil, debris, coatings, or moisture. If base metal is aluminum make sure all of the oxide is removed using either a dedicated stainless brush or flap wheel.

Porosity in Weld Bead	Poor Gas Flow	Adjust the flow rate of the shielding gas. Check for loose fit- tings where gas could be leaking.
	Contaminated Filler Metal	Clean filler metal making sure to remove any oil, debris, or moisture.
	Contaminated Filler Metal	Clean base metal making sure to remove any oil, debris, coatings, or moisture.
	Contaminated Base Metal	Make sure to be in an area with no wind and with any fans turned off. Wind or fans will blow the shielding gas away from the weld causing porosity.
	Poor Shielding	Adjust the Tungsten so that 1/8 to $^{1\!\!/}_{4}$ inch protrudes from the Collet.
Contamination in Weld Bead	Contamination Tungsten	Remove Tungsten from Torch and break off contaminated section and resharpen.
	Contaminated Filler Metal	Clean filler metal making sure to remove any oil, debris, or moisture.
	Contaminated Base Metal	Clean base metal making sure to remove any oil, debris, coatings, or moisture. If base metal is cold rolled steel make sure to remove any mill scale.
Melting Tungsten	Poor Gas Flow	Adjust the flow rate of the shielding gas. Check for loose fit- tings where gas could be leaking.
	Wrong Size Tungsten	Increase Tungsten diameter. Refer to chart for proper siz- ing.
	Incorrect Shielding Gas	Only use 100% Argon when TIG Welding.
Poor Penetration	Low Voltage	Voltage setting is too low for material/thickness. Increase as needed.
Tungsten Contaminated	Contact of Tungsten with Base Metal	Keep Tungsten 1/8 to 1/4 inch from the base metal. If Tungsten comes in contact break off end and resharpen immediately.
Poor Weld Appearance	Incorrect Positioning	The angle between the filler metal and the Torch must be less than 90 degrees otherwise the filler metal will prema- turely melt and glob off causing poor weld appearance.

TIG WELDING TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTION
Crater in the End of the Weld Bead	Insufficient Shielding	Keep the Torch on the base metal while the post flow shielding gas flows to protect and cool the metal and Tungsten.
	Not Enough Filler Material	Reduce current and add more filler at end of weld. It may also be beneficial to back step to ensure no crater will form.
Weld Bead is Cracking	Too Much Heat in Material	Reduce heat and allow more time between passes.
	Base Metal is Absorbing Too Much Heat	Preheat base metal (consult welding codes for require- ments)
	Incorrect Filler Wire	Use appropriate filler wire type and diameter for the joint being welded.
Material is Warping	Insufficient Clamping	Clamp work piece tightly and weld while clamps are in place.
	Insufficient Tack Welds	Add more tack welds until rigidity and stiffness is developed.
	Too Much Heat in Material	To reduce heat it is best to spread the welding out around the area. This can be done by using stitch welding tech- niques, alternating sides, and/or taking your time and al- lowing the pieces to cool between passes.

WIRING DIAGRAM



