



OM-229 038D 2007-04

Effective with serial number 226 214

Processes



MIG (GMAW) Welding

Flux Cored (FCAW) Welding

Description

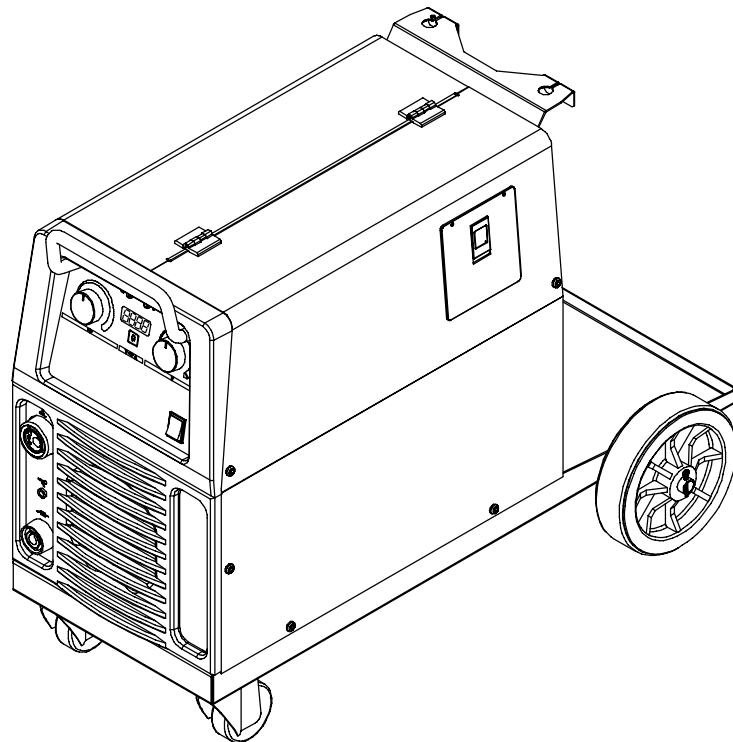


Arc Welding Power Source

Wire Feeder



Migmatic[®] 221/253



OWNER'S MANUAL

From Miller to You

Thank you and congratulations on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide which exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.



Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog sheets.



Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.



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Declaration of Conformity for European Community (CE) Products

NOTE

This information is provided for units with CE certification (see rating label on unit).

Manufacturer:

ITW Welding Products Italy S.r.l.
Via Privata Iseo 6/E
20098 San Giuliano
Milanese, Italy
Phone: 39(02)98290-1

European Contact:

Mr. Danilo Fedolfi,
Managing Director
ITW Welding Products Italy S.r.l.
Via Privata Iseo 6/E
20098 San Giuliano
Milanese, Italy
Phone: 39(02)98290-1
Fax: 39(02)98290203

European Contact Signature: _____

Declares that this product:

Migmatic 221/253

conforms to the following Directives and Standards:

Directives

Electromagnetic Compatibility Directives: 89/336/EEC

Low Voltage: 73/23/EEC

Machinery Directives: 89/392/EEC

And their amendments 91/368/EEC, 92/31/EEC, 93/44/EEC, 93/68/EEC, 98/37/EC

Standards

Electromagnetic compatibility (EMC) EN50199: August 1995

Safety Requirements for Arc Welding Equipment Part 1: EN 60974-1: 1998

And their amendments EN60974-1:2005, EN60974-10:2003

The product technical file is maintained by the responsible Business Unit(s) located at the manufacturing facility.

SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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▲ **Warning: Protect yourself and others from injury — read and follow these precautions.**

1-1. Symbol Usage



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ Means "Note"; not safety related.



This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Arc Welding Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**



ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also

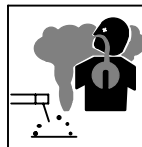
live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a semiautomatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder, or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.

- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

SIGNIFICANT DC VOLTAGE exists in inverter-type welding power sources after removal of input power.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove welding fumes and gases.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



ARC RAYS can burn eyes and skin.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

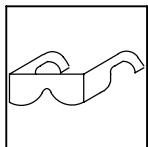
- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather, heavy cotton, or wool) and foot protection.



WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Do not weld where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



FLYING METAL can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



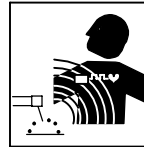
BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



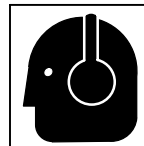
HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on gun or torch.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.



MAGNETIC FIELDS can affect pacemakers.

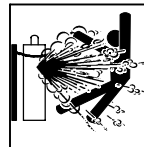
- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.



NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

1-3. Additional Symbols For Installation, Operation, And Maintenance



FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.



FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



OVERUSE can cause OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



MOVING PARTS can cause injury.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.



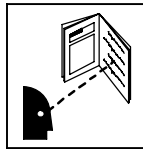
WELDING WIRE can cause injury.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.



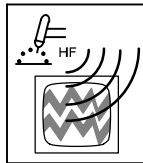
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before re-connecting input power.



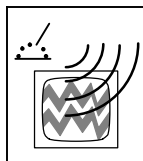
READ INSTRUCTIONS.

- Read Owner's Manual before using or servicing unit.
- Use only genuine Miller/Hobart replacement parts.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

1-4. California Proposition 65 Warnings

- ▲ **Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**
- ▲ **Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**

For Gasoline Engines:

- ▲ **Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

For Diesel Engines:

- ▲ **Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**

1-5. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping, American Welding Society Standard AWS F4.1 from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1735 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102 (phone: 703-412-0900, website: www.cganet.com).

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale

Boulevard, Rexdale, Ontario, Canada M9W 1R3 (phone: 800-463-6727 or in Toronto 416-747-4044, website: www.csa-international.org).

Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 11 West 42nd Street, New York, NY 10036-8002 (phone: 212-642-4900, website: www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (there are 10 Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

1-6. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: "The body of evidence, in the committee's judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard." However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

Pacemaker wearers consult your doctor before welding or going near welding operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 – DEFINITIONS

Warning! Watch Out! There are possible hazards as shown by the symbols.

1 Electric shock can kill.

1.1 Wear dry insulating gloves. Do not touch electrode with bare hand. Do not wear wet or damaged gloves.

1.2 Protect yourself from electric shock by insulating yourself from work and ground.

1.3 Disconnect input plug or power before working on machine.

2 Breathing welding fumes can be hazardous to your health.

2.1 Keep your head out of the fumes.

2.2 Use forced ventilation or local exhaust to remove the fumes.

2.3 Use ventilating fan to remove fumes.

3 Welding sparks can cause explosion or fire.

3.1 Keep flammables away from welding. Do not weld near flammables.

3.2 Welding sparks can cause fires. Have a fire extinguisher nearby, and have a watchperson ready to use it.

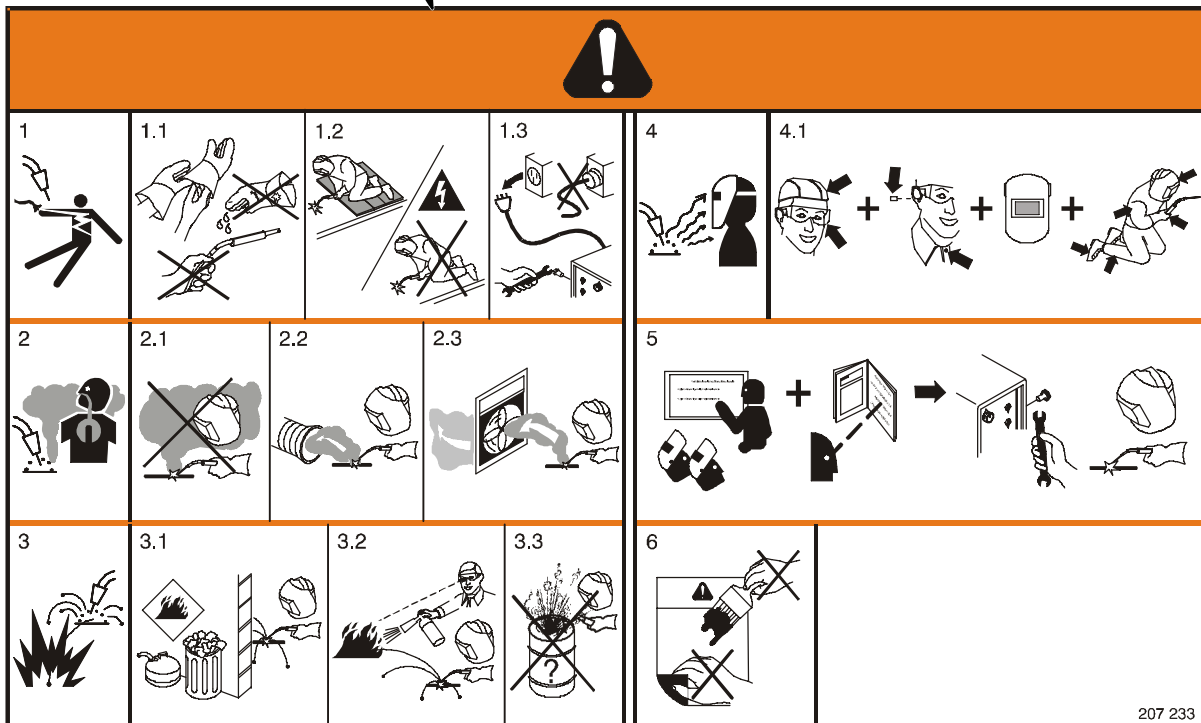
3.3 Do not weld on drums or any closed containers.

4 Arc rays can burn eyes and injure skin.

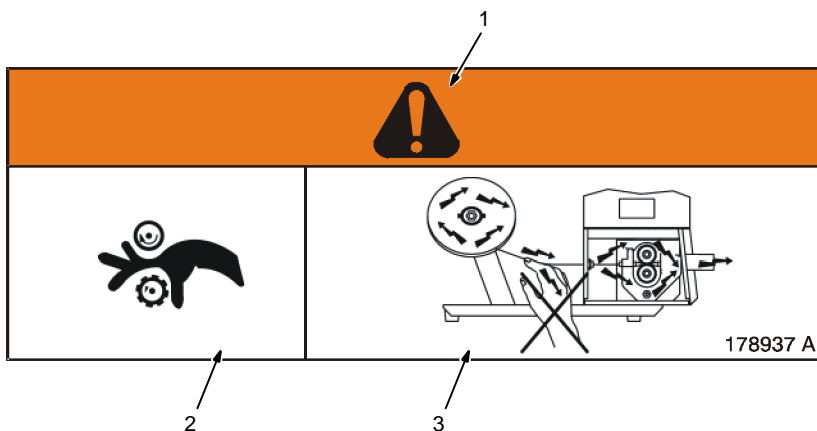
4.1 Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.

5 Become trained and read the instructions before working on the machine or welding.

6 Do not remove or paint over (cover) the label.



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1 Warning! Watch Out! There are possible hazards as shown by the symbols.

2 Drive rolls can injure fingers

3 Welding wire and drive parts are at welding voltage during operation – keep hands and metal objects away.

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Warning! Watch Out! There are possible hazards as shown by the symbols.

Electric shock from wiring can kill.

Disconnect input plug or power before working on machine.

Read the Owner's Manual before working on this machine.

- 1 Consult rating label for input power requirements, and check power available at the job site – they must match.
- 2 Read Owner's Manual and inside labels for connection points and procedures.
- 3 Move jumper links as shown on inside label to match voltage at job site.
- 4 Having a loop of extra length, connect grounding conductor first.
- 5 Connect line input conductors as shown on inside label – double-check all connections, jumper link positions, and input voltage before applying power.

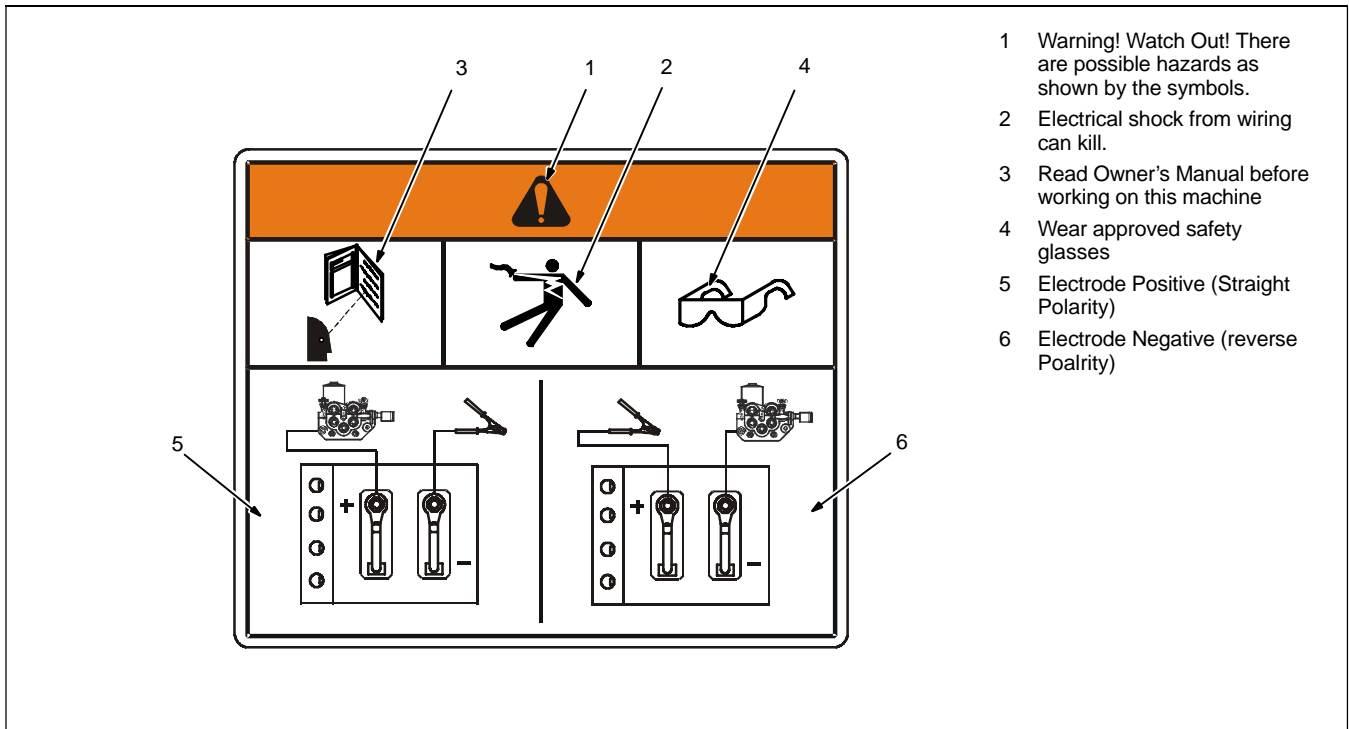
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- 1 Warning! Watch Out! There are possible hazards as shown by the symbols.
- 2 Moving parts, such as fans, can cut fingers and hands and cause injury. Keep away from moving parts.

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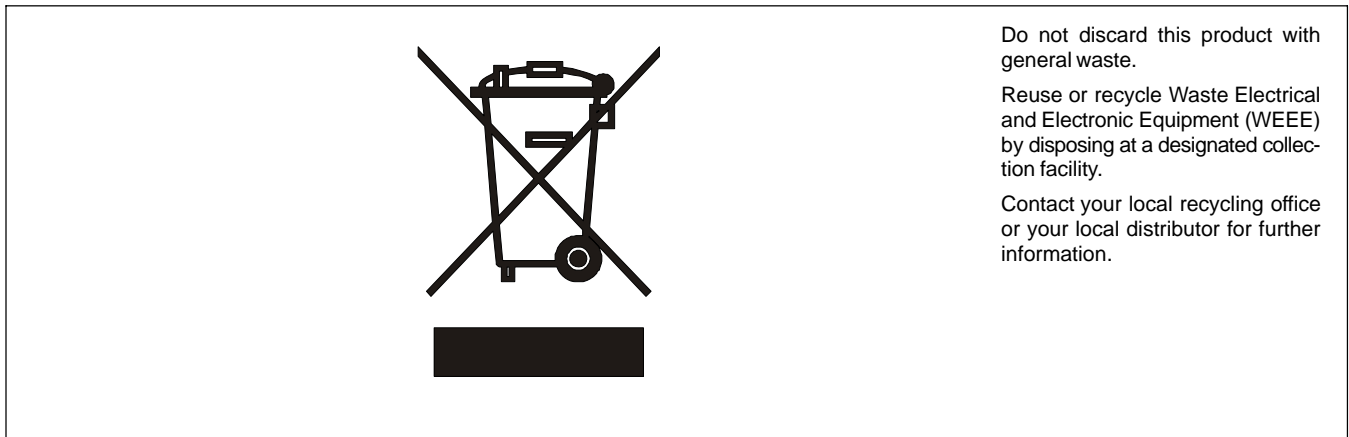
- 1 Warning! Watch Out! There are possible hazards as shown by the symbols.
- 2 Falling unit can cause injury. Do not move or operate unit where it could tip.
- 3 Cylinders can explode if damaged. Protect compressed gas cylinders from excessive heat, mechanical shock, slag, open flames, sparks, and arcs.

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- 1 Warning! Watch Out! There are possible hazards as shown by the symbols.
- 2 Electrical shock from wiring can kill.
- 3 Read Owner's Manual before working on this machine
- 4 Wear approved safety glasses
- 5 Electrode Positive (Straight Polarity)
- 6 Electrode Negative (reverse Polarity)

2-1. WEEE Label



Do not discard this product with general waste.

Reuse or recycle Waste Electrical and Electronic Equipment (WEEE) by disposing at a designated collection facility.

Contact your local recycling office or your local distributor for further information.

SECTION 3 – INSTALLATION

3-1. Specifications



Model	Rated Output			Max. Open Circuit Voltage	Rated Input Amperage at Rated Output		Dimension (mm)	Weight (kg)
	100%	60%	20%		220/230 VAC 50Hz			
221	90 A 18.5 V	116 A 20.0 V	210 A 24.0 V	41	32 A 3 A*		480 x 800 x 1050	85 Net

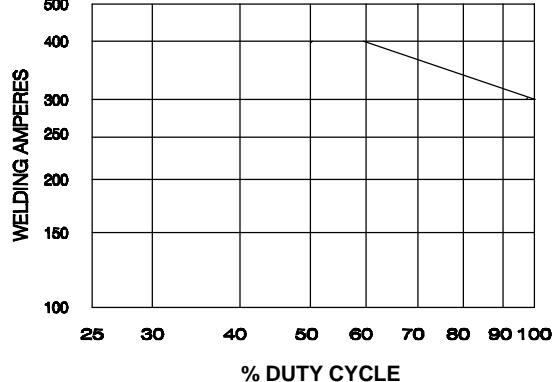
Wire feed speed range 1.3 mpm to 20 mpm.
* While idling

Model	Rated Output			Max. Open Circuit Voltage	Rated Input Amperage at Rated Output		Dimension (mm)	Weight (kg)
	100%	60%	35%		230 V	400 V		
253	145 A 21.0 V	190 A 23.0 V	250 A 26.5 V	38	23 A 3 A*	13 A 1.38 A*	480 x 800 x 1050	85-103 Net

Wire feed speed range 1.3 mpm to 20 mpm.
* While idling

3-2. Duty Cycle And Overheating



WELDING AMPERES

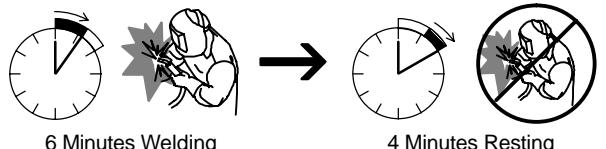
% DUTY CYCLE

Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

If unit overheats, thermostat(s) opens, output stops, and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or voltage, or duty cycle before welding.


▲ Exceeding duty cycle can damage unit and void warranty.

60% Duty Cycle At 400 Amperes



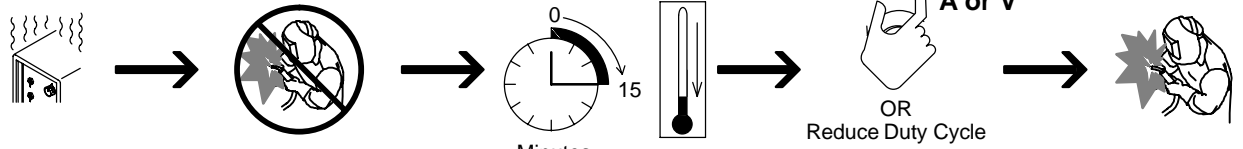
6 Minutes Welding → 4 Minutes Resting

100% Duty Cycle At 300 Amperes



Continuous Welding

Overheating



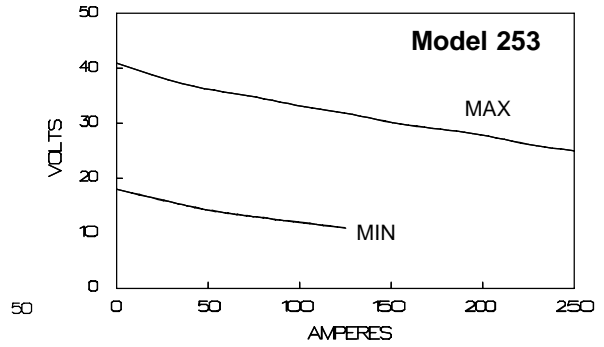
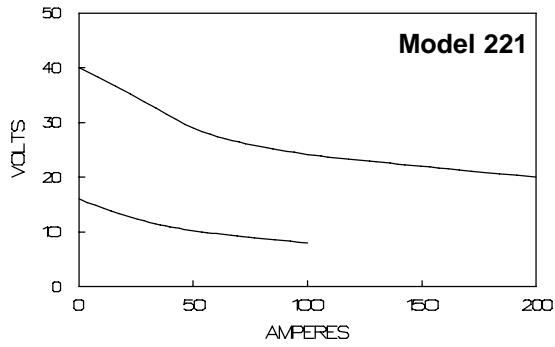
Minutes

A or V
OR
Reduce Duty Cycle

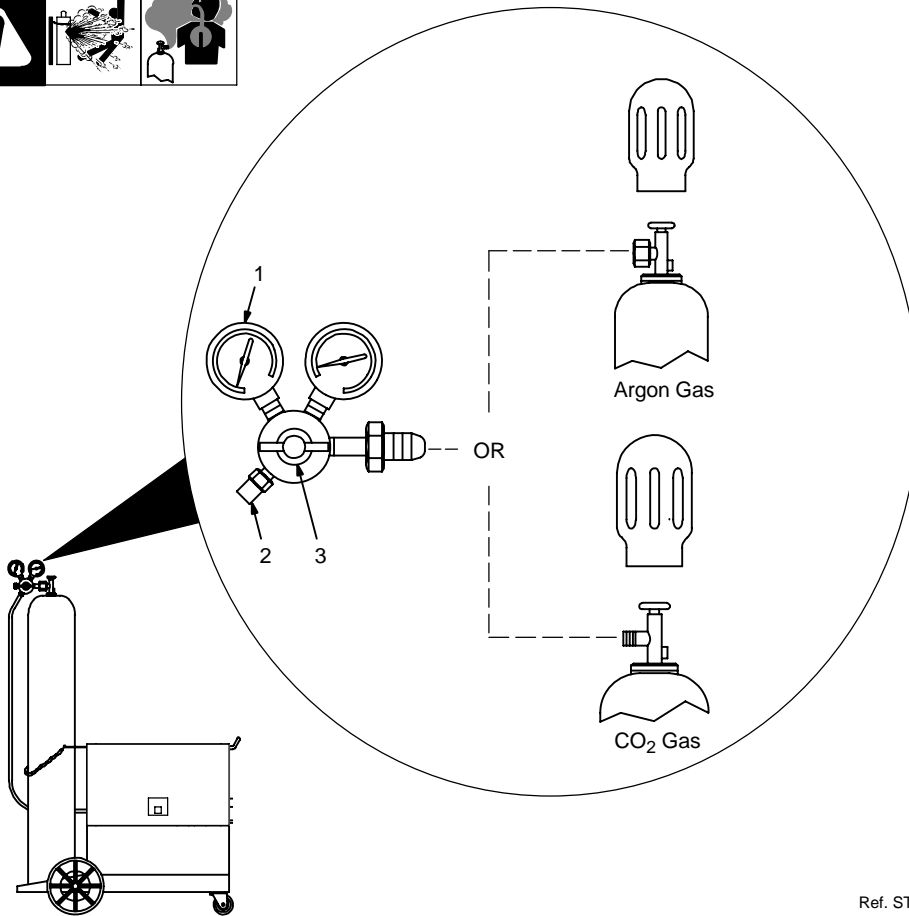
sduty1 5/95 / 187 478-A

3-3. Volt-Ampere Curves

The volt-ampere curves show the normal minimum and maximum voltage and amperage output capabilities of the welding power source. Curves of other settings fall between the curves shown.



3-4. Installing Gas Supply



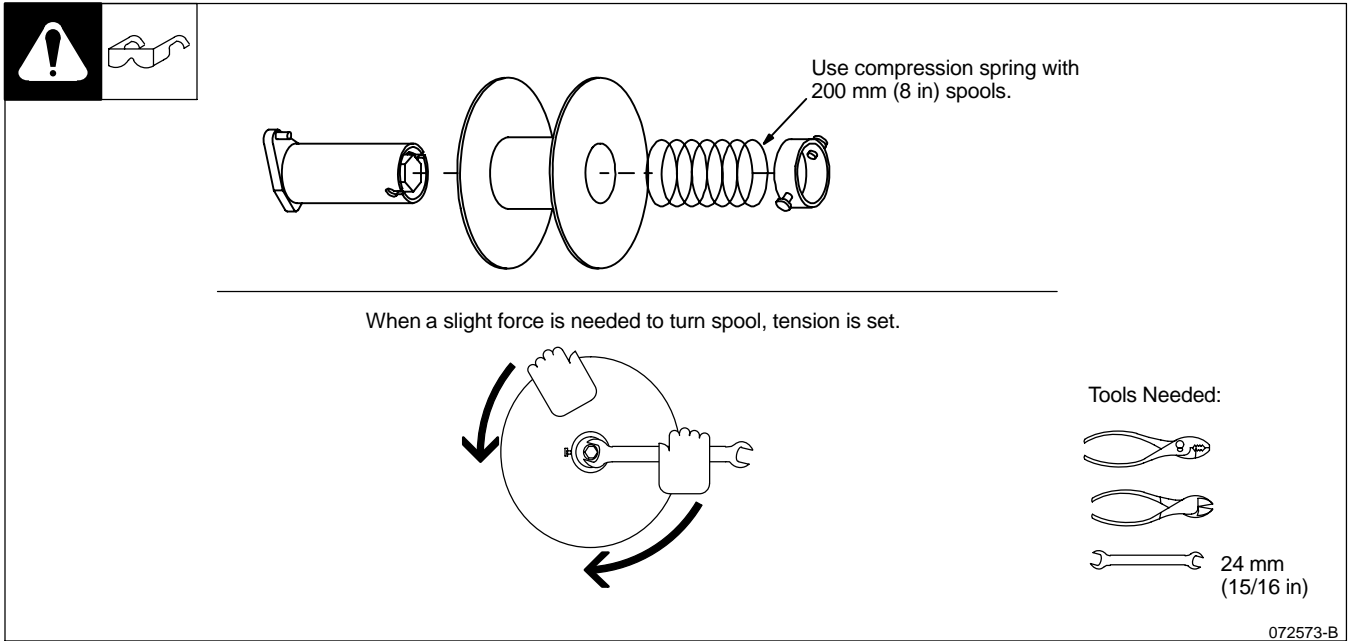
Chain gas cylinder to running gear, wall, or other stationary support so cylinder cannot fall and break off valve.

- 1 Regulator/Flow Gauge
Install so face is vertical.
- 2 Gas Hose Connection
- 3 Flow Adjust

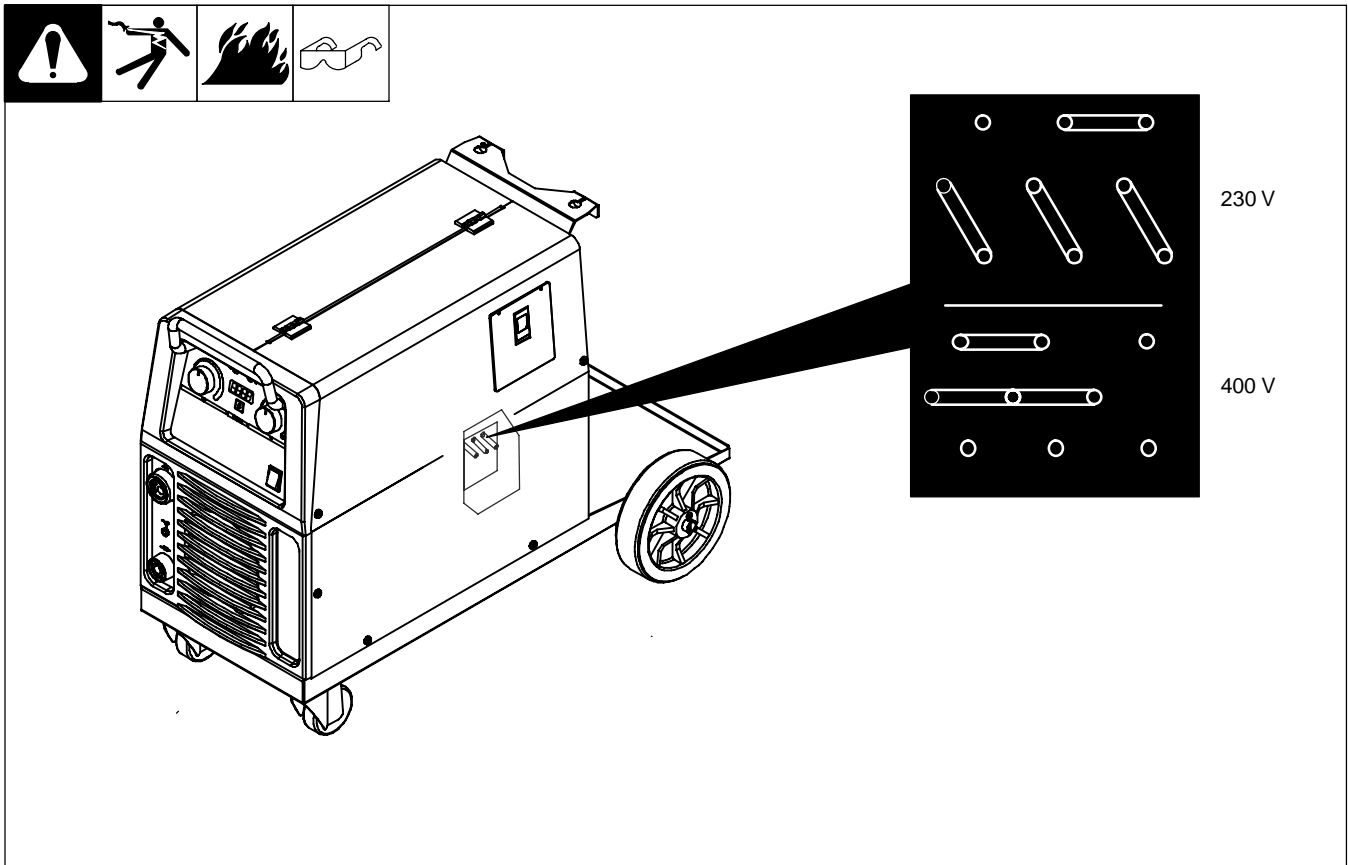
Typical flow rate is 0.9 liters per minute. Check wire manufacturer's recommended flow rate. This flow gauge can be adjusted between 2.36 and 11.8 liters per minute.

Ref. ST-148 265-B / Ref. ST-149 827-B / Ref. ST-158 697-A

3-5. Installing Wire Spool and Adjusting Hub Tension



3-6. Positioning Jumper Links (230/400V 3-Phase Models)




3-7. Electrical Service Guide

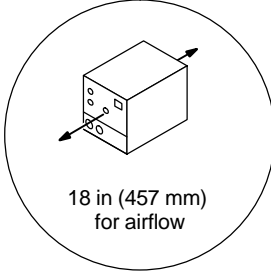
Migmatic Model	221	253	
Input Voltage	220/230	230	400
Input Amperes at Rated Output	26	23	13
Max Recommended Standard Fuse or Circuit Breaker Rating in Amperes	26	23	13
** Input Conductor Size in mm ²	4	4	4
** Grounding Conductor Size in mm ²	4	4	4

** Power cord supplied with the unit is sized for 230V operation. Larger power cord may be required for cable lengths greater than 3 meters. Consult national and local regulations.

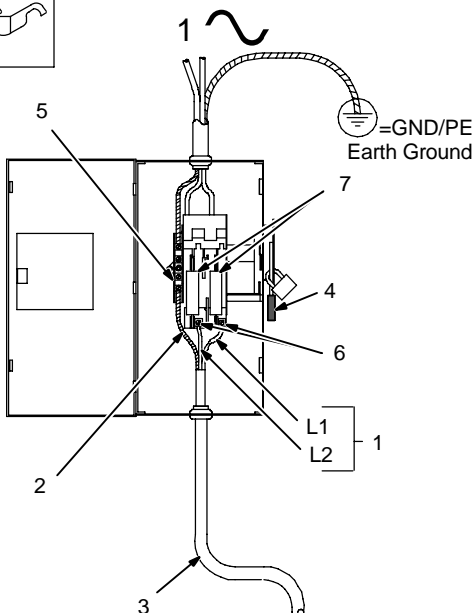
3-8. Selecting a Location and Connecting Input Power (1-Phase and 3-Phase)

A. 1-Phase





18 in (457 mm)
for airflow



- ▲ Installation must meet all National and Local Codes – have only qualified persons make this installation.
- ▲ Disconnect and lockout/tagout input power before connecting input conductors from unit.
- ▲ Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.

- 1 Black And White Input Conductor (L1 And L2)
- 2 Green Or Green/Yellow Grounding Conductor
- 3 Input Power Cord.
- 4 Disconnect Device (switch shown in the OFF position)
- 5 Disconnect Device Grounding Terminal
- 6 Disconnect Device Line Terminals

Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.

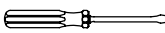
Connect input conductors L1 and L2 to disconnect device line terminals.

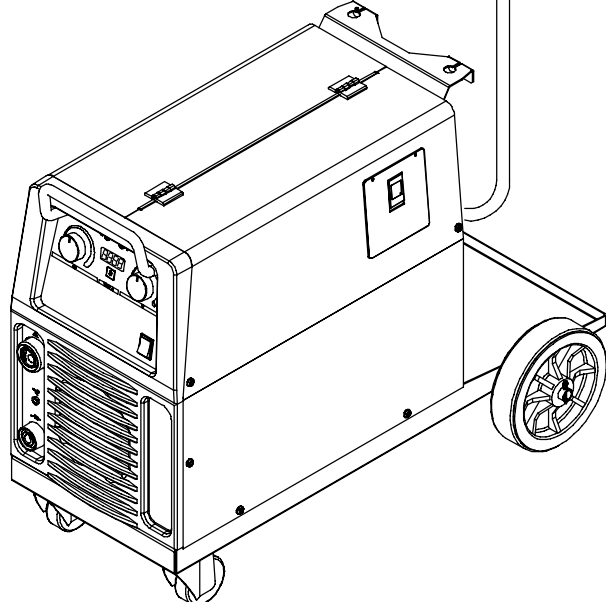
7 Over-Current Protection

Select type and size of over-current protection using Section 3-7 (fused disconnect switch shown).

Close and secure door on disconnect device. Remove lockout/tagout device, and place switch in the On position.

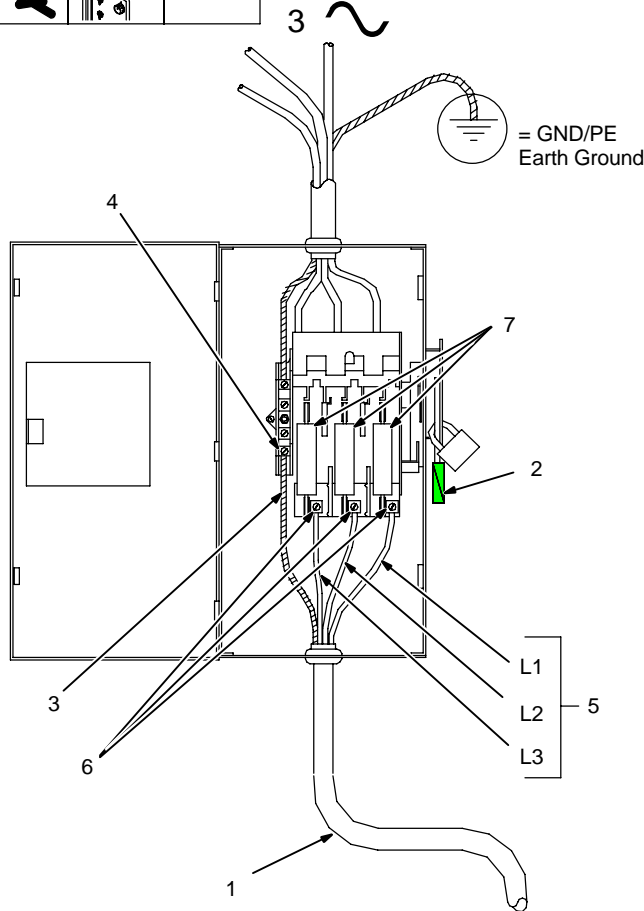
Tools Needed:





803 766-B

B. 3-Phase



▲ Installation must meet all National and Local Codes – have only qualified persons make this installation.

▲ Disconnect and lockout/tagout input power before connecting input conductors from unit.

▲ Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.

For Three-Phase Operation

- 1 Input Power Cord.
- 2 Disconnect Device (switch shown in the OFF position)
- 3 Green Or Green/Yellow Grounding Conductor
- 4 Disconnect Device Grounding Terminal
- 5 Input Conductors (L1, L2 And L3)
- 6 Disconnect Device Line Terminals

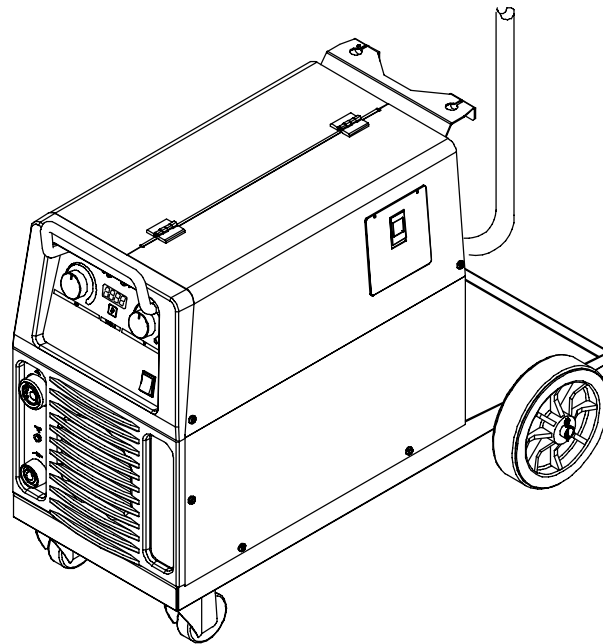
Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.

Connect input conductors L1, L2, and L3 to disconnect device line terminals.

7 Over-Current Protection

Select type and size of over-current protection using Section 3-7 (fused disconnect switch shown).

Close and secure door on disconnect device. Remove lockout/tagout device, and place switch in the On position.

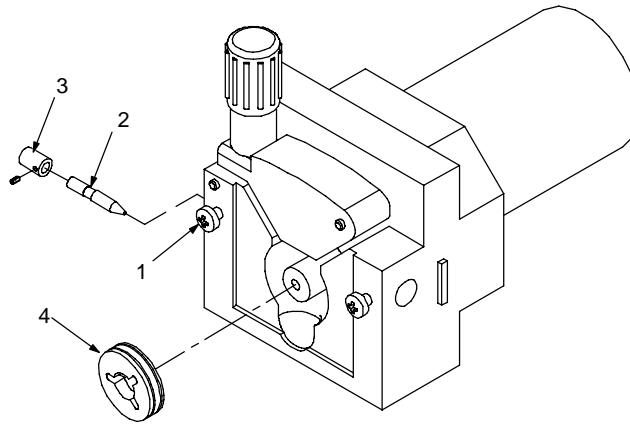


Tools Needed:



803 766-A

3-9. Installing Drive Rolls and Wire Guide



1 Securing Screw

2 Inlet Wire Guide

Loosen screw. Slide tip as close to drive rolls as possible without touching. Tighten screw.

3 Anti-Wear Guide

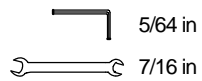
Install guide as shown.

4 Drive Roll

The drive roll consists of two different sized grooves. The stamped markings on the end surface of the drive roll refers to the groove on the opposite side of the drive roll. The groove closest to the motor shaft is the proper groove to thread.

Turn nut one click to secure drive roll.

Tools Needed:

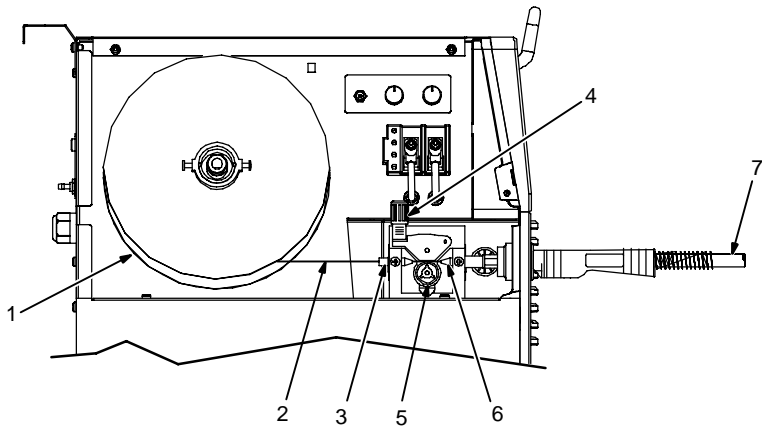


221-253-7

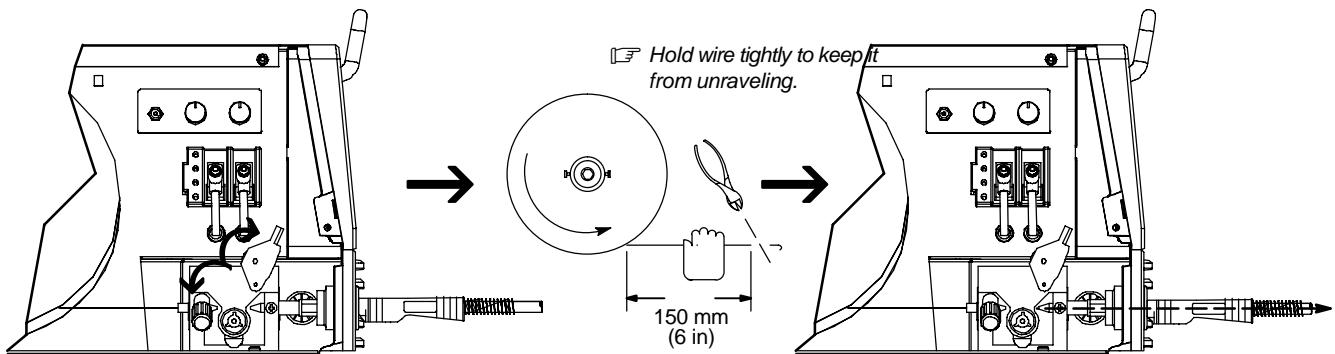
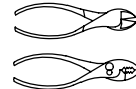
3-10. Threading Welding Wire and Adjusting Pressure Roll Tension



- 1 Wire Spool
 - 2 Welding Wire
 - 3 Inlet Wire Guide
 - 4 Pressure Adjustment Knob
 - 5 Drive Roll
 - 6 Outlet Wire Guide
 - 7 Gun Conduit Cable
- Lay gun cable out straight.



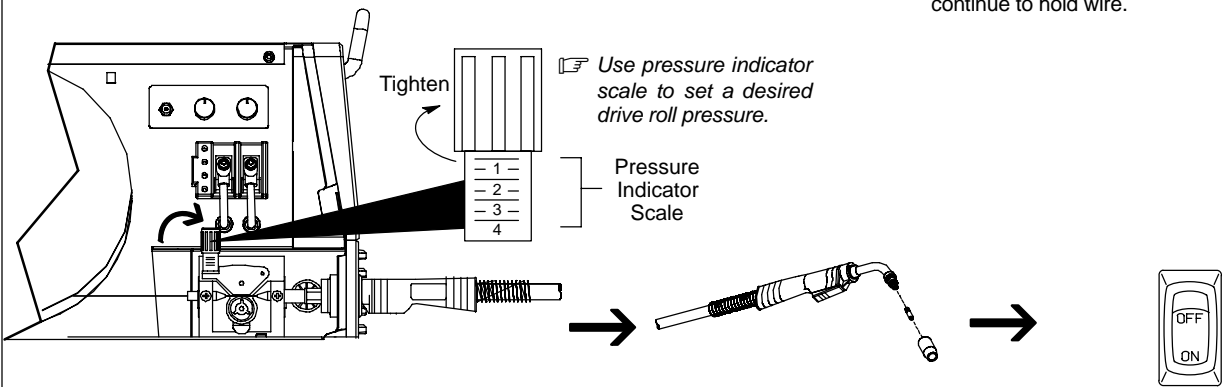
Tools Needed:



Open pressure assembly.

Pull and hold wire; cut off end.

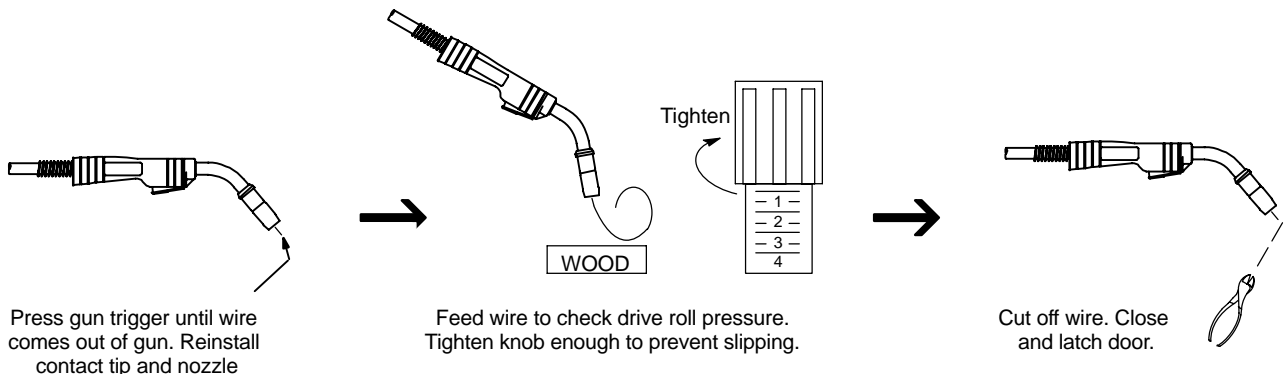
Push wire thru guides into gun; continue to hold wire.



Close and tighten pressure assembly, and let go of wire.

Remove gun nozzle and contact tip.

Turn On.



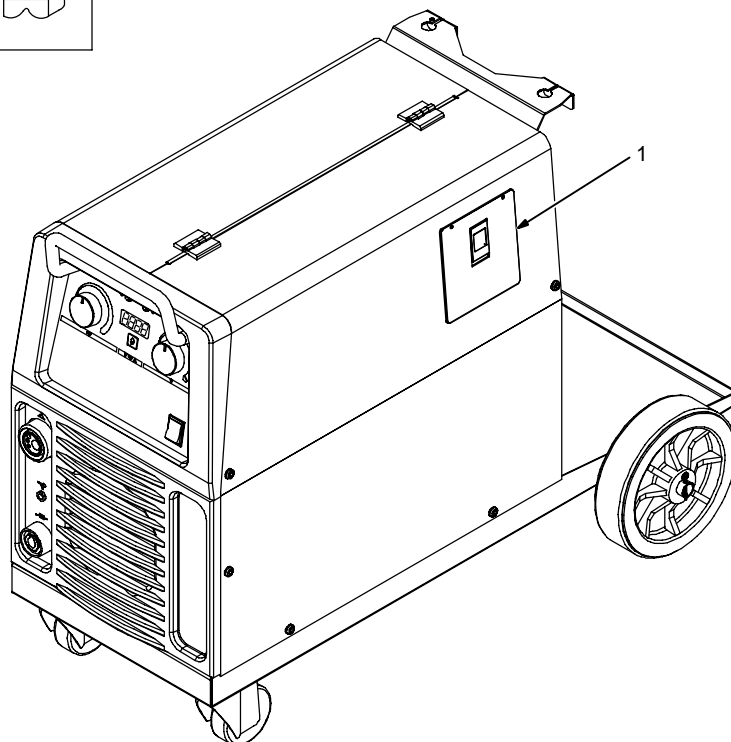
Press gun trigger until wire comes out of gun. Reinstall contact tip and nozzle

Feed wire to check drive roll pressure. Tighten knob enough to prevent slipping.

Cut off wire. Close and latch door.

Ref. 802 064-D / S-0627-A

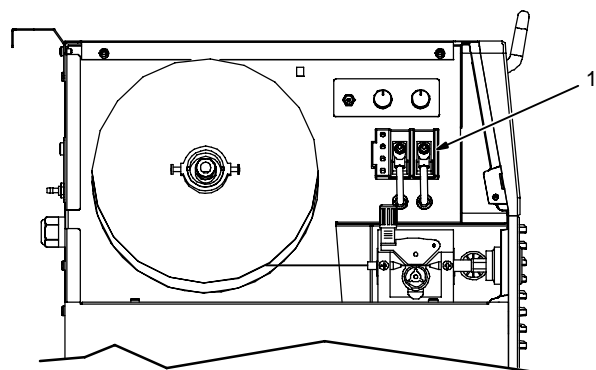
3-11. Using Gun/Cable Holder



1 Consumable Storage Compartment

Press latch down to release and open door. Provides storage space for gas nozzles, contact tips, gas diffusers.

3-12. Setting Gun Polarity for Wire Type (Optional)

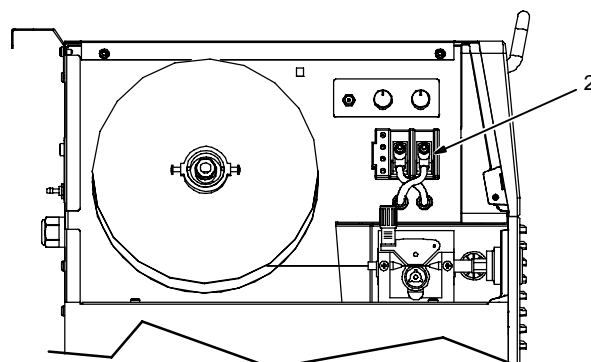


1 Electrode Positive (DCEP)

For solid steel, stainless steel, aluminum, or flux core with gas, wires (GMAW).

2 Electrode Negative (DCEN)

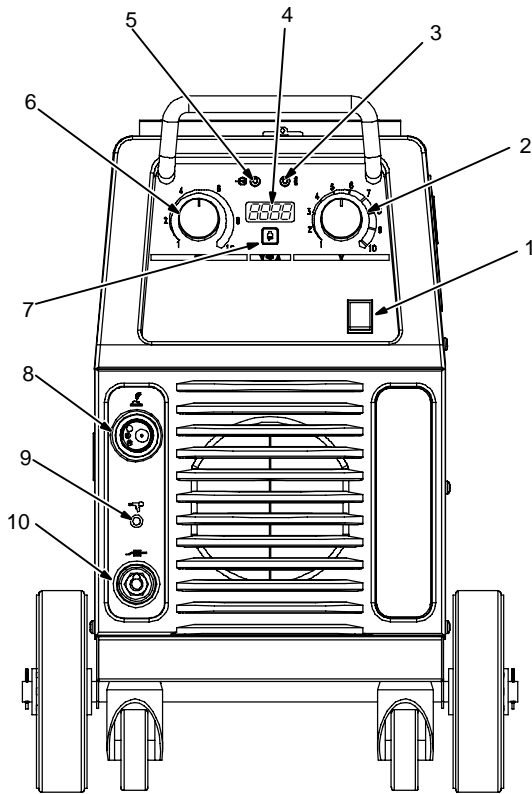
For gasless flux core wires (FCAW), wire drive assembly becomes negative.



221-253-4 / 221-253-5

SECTION 4 – OPERATION

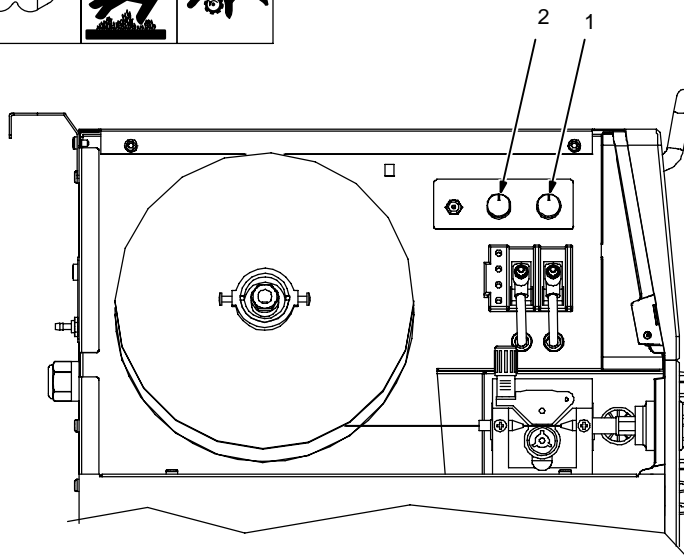
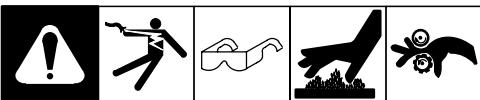
4-1. Controls for Migmatic 221/253



- 1 Power Switch
 - 2 Voltage Control
Turn control clockwise to increase voltage.
 - 3 High Temperature Shutdown Light (Orange LED)
 - 4 Digital Display*
Volts/Amps/Wire Feed Speed with last value hold function. Trigger mode (2T/4T) is shown at power on for 3 seconds and when Trigger mode is changed.
 - 5 Power Indicator Light (White LED)
 - 6 Wire Feed Speed Control
Turn control clockwise to increase wire feed speed. This control also controls optional spool gun if connected.
 - 7 Digital Display Function Button*
 - 8 MIG Torch Connection
Connection for Euro style MIG gun or optional spoolmate gun.
 - 9 Spool Gun Connection Jack Plug Receptacle
Insert jack plug of Spoolmate gun to enable torch motor.
 - 10 Work Lead Connection
- * Optional

221-253-2

4-2. Burnback and Spot Weld Timer Controls



- 1 Burnback Control
Time that welding wire stays energized after trigger is released.
- 2 Spot Weld Timer
Time that welding arc is active before shutting off automatically.
Spot Timer resets after releasing gun trigger.

221-253-4

SECTION 5 – MAINTENANCE & TROUBLESHOOTING

5-1. Routine Maintenance

				▲ Disconnect power before maintaining.		<i>Maintain more often during severe conditions.</i>
	3 Months	Replace unreadable labels			Repair or replace cracked weld cable	
		Clean and tighten weld terminals				
	6 Months	Blow out or vacuum inside.			Remove drive roll and carrier. Apply light coat of oil or grease to drive motor shaft.	

5-2. Circuit Breaker CB1

					<ol style="list-style-type: none"> 1 Circuit Breaker CB1 CB1 protects the unit from overloading of drive motor M1. If CB1 opens, wire feeding stops. 2 Welding Gun Check gun liner for blockage or kinks. 3 Wire Drive Assembly Check for jammed wire, binding drive gear or misaligned drive rolls. Allow cooling period and reset breaker. Close door.

221-253-4

5-3. Unit Overload



Thermal switches TP1 in XFMR and TP2 in SR1 protect the unit from damage due to overheating. If the thermal indicator illuminates, wait for unit to cool allowing fan motor to run before trying to weld. If unit is cool and no weld output continues, contact Factory Authorized Service Agent.

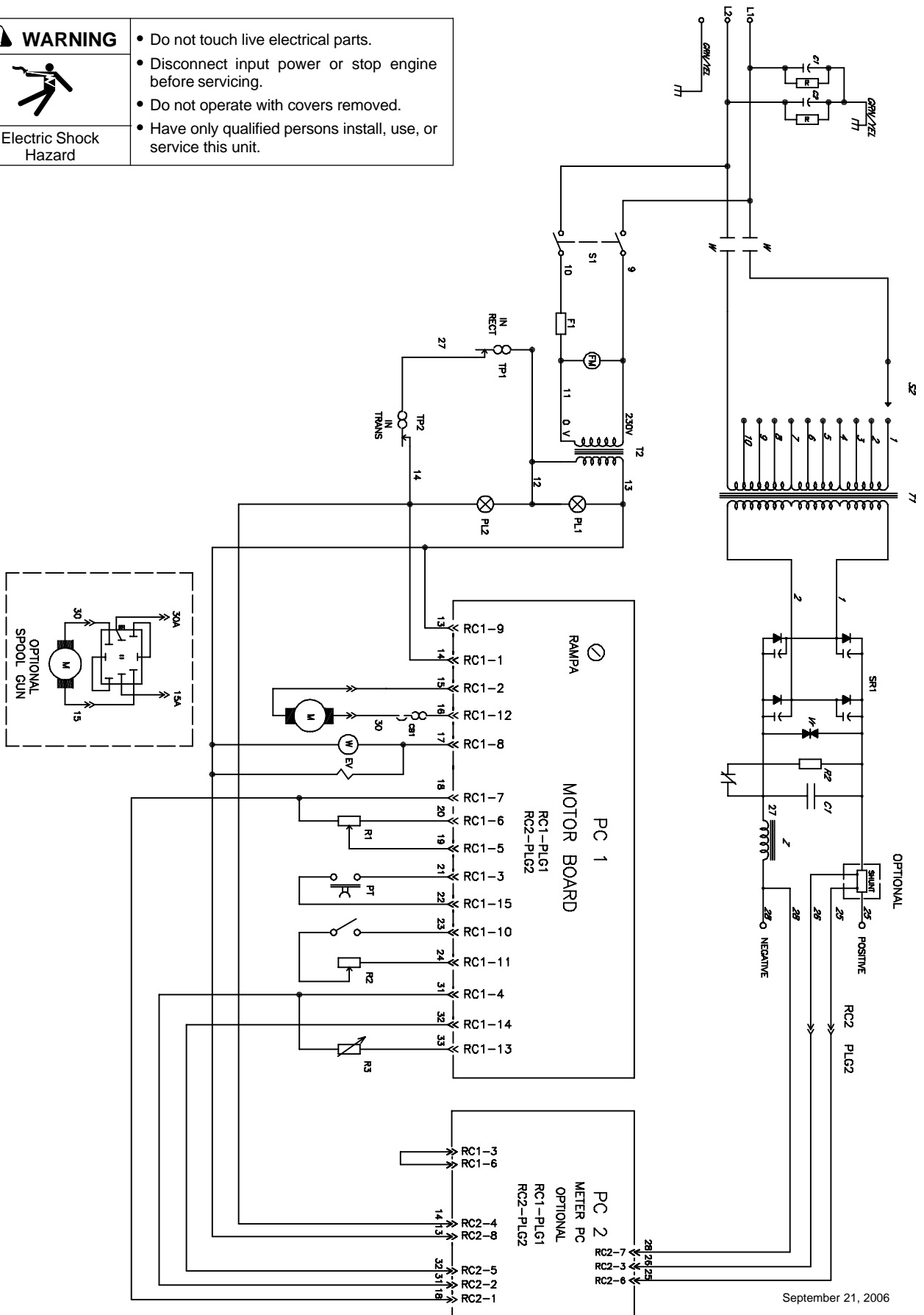
5-4. Troubleshooting



Trouble	Remedy
No weld output; wire does not feed.	Be sure line disconnect switch is On (see Section 3-8).
	Replace building line fuse or reset circuit breaker if open.
	Reset circuit breaker CB1 (see Section 5-2).
	Secure gun trigger connections.
	Check continuity of power switch S1 and replace if necessary.
	Check main transformer T1 for signs of winding failure. Check continuity across windings and check for proper connections. Check secondary voltages. Replace T1 if necessary.
	Check continuity of thermostats TP1 and TP2. Replace TP1 and TP2 if necessary.
	Check main control board PC1 and connections and replace if necessary.
No weld output; wire feeds.	Connect work clamp to get good metal to metal contact.
	Replace contact tip (see gun Owner's Manual).
	An overload condition occurred (see Section 5-3)
	Check diodes in main rectifier SR1, and replace if necessary.
	Check stabilizer Z1 for signs of winding failure. Check continuity across windings and check connections. Replace Z1 if necessary.
	Check main transformer T1 for signs of winding failure. Check continuity across windings and check connections. Check secondary voltages. Replace T1 if necessary.
	Check voltage switch(s). Replace if necessary.
Low weld output.	Connect unit to proper input voltage or check for low line voltage (see Section 3-6).
	Check input voltage jumper links and correct position if necessary (see Section 3-6).
	Check main rectifier SR1, and replace if necessary.
	Check voltage switch(s). Replace if necessary.
Low, high, or erratic wire speed.	Readjust front panel settings (see Section 4-1).
	Change to correct size drive rolls.
	Readjust drive roll pressure (see Section 3-10).
	Replace inlet guide, contact tip, and/or liner if necessary.
	Check position of input jumper links (see Section 3-6).
	Check Wire Speed control R1, and replace if necessary.
	Check diodes in main rectifier SR1, and replace if necessary.
	Check main control board PC1 and connections and replace if necessary.
No wire feed.	Reset circuit breaker CB1 (see Section 5-2).
	Rotate Wire Speed control R1 to higher setting (see Section 4-1).
	Clear obstruction in gun contact tip or liner (see gun Owner's Manual).

SECTION 6 – ELECTRICAL DIAGRAMS


 WARNING	<ul style="list-style-type: none"> Do not touch live electrical parts. Disconnect input power or stop engine before servicing. Do not operate with covers removed. Have only qualified persons install, use, or service this unit.
	
Electric Shock Hazard	



September 21, 2006

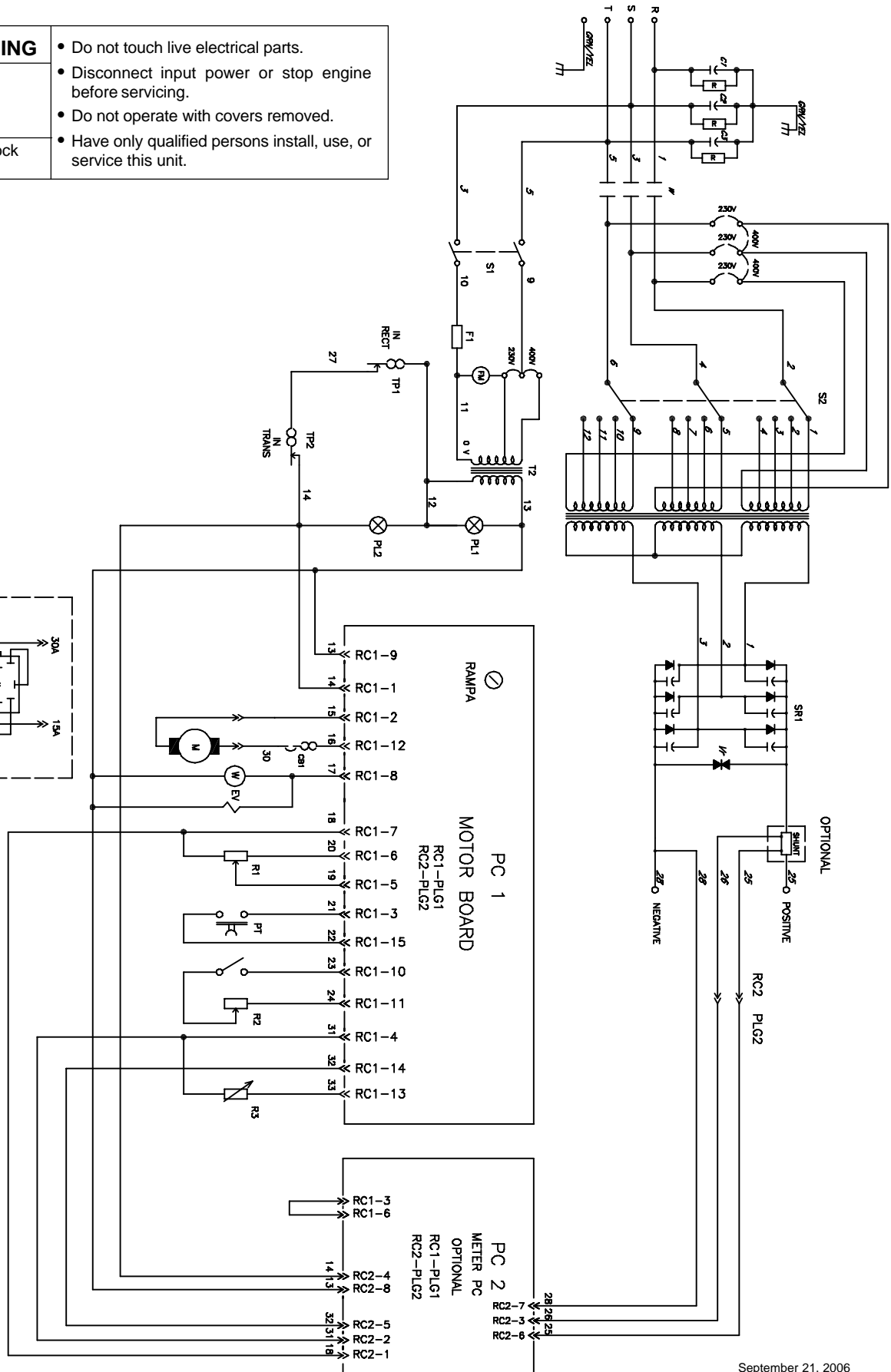
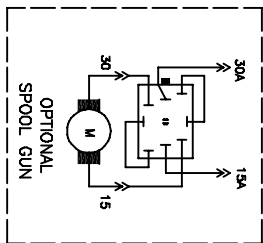
Figure 6-1. Circuit Diagram for Migmatic 221

WARNING



Electric Shock Hazard

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.



September 21, 2006

Figure 6-2. Circuit Diagram for Migmatic 253 (400 VAC)

SECTION 7 – PARTS LIST

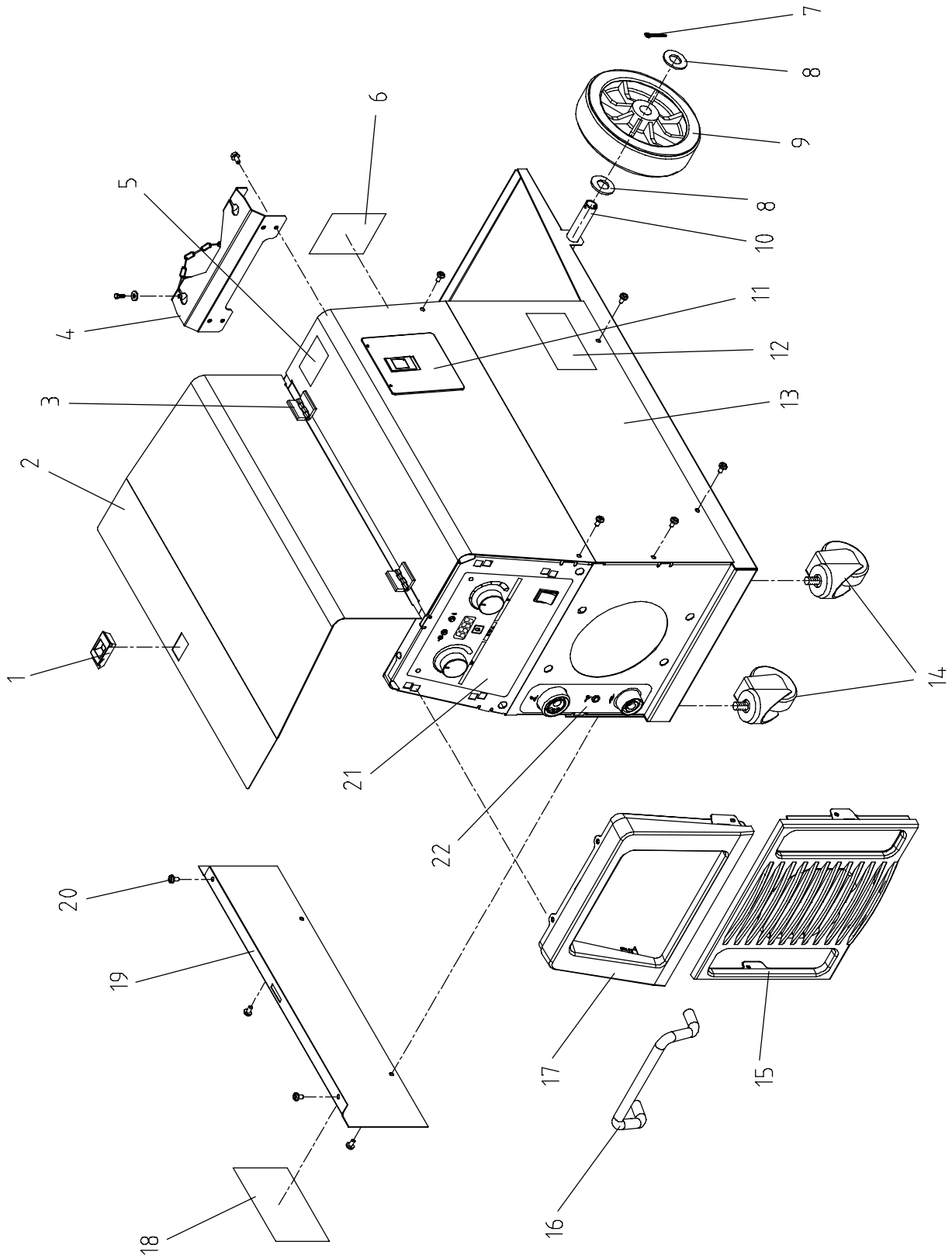


Figure 7-1. Wrapper Assembly, All Models

Item No.	Part No.	Description	Quantity
----------	----------	-------------	----------

Figure 7-1. Wrapper Assembly, All Models

... 1	156034005	.. Catch, side panel	2
... 2	156122062	.. Side Panel, hinged	1
... 3	156034004	.. Hinge	2
... 4	156005106	.. Cylinder Rack, upper support	1
... 5	000207235	.. Label, warning, tilt	1
... 6	956142560	.. Rating Plate, Migmatic 221	1
... 6	956142543	.. Rating Plate, Migmatic 253 – 400V	1
... 6	956142565	.. Rating Plate, Migmatic 333 – 253–230/400V	1
... 7	156087017	.. Pin, split	2
... 8	156009067	.. Washer	2
... 9	056054064	.. Wheel, rear, 250 O.D.	2
... 10	156012119	.. Axle, rear wheel	1
... 11	000204326	.. Box, consumable	1
... 12	000207291	.. Label, primary power connections	1
... 13	+156121026	.. Cover	1
... 14	056054068	.. Wheel/Caster, front 80 O.D.	2
... 15	000213051	.. Bezel, lower	1
... 16	156002045	.. Handle	1
... 17	000213053	.. Plastic, upper	1
... 18	000207233	.. Label, general precautionary	1
... 19	+156122063	.. Plate, expanded	1
... 20	000208044	.. Screw, torx self-tapping	10
... 21	316029709	.. Nameplate, upper Migmatic 253	1
... 21	316029714	.. Nameplate, upper Migmatic 221	1
... 22	956142537	.. Nameplate, lower, Migmatic	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

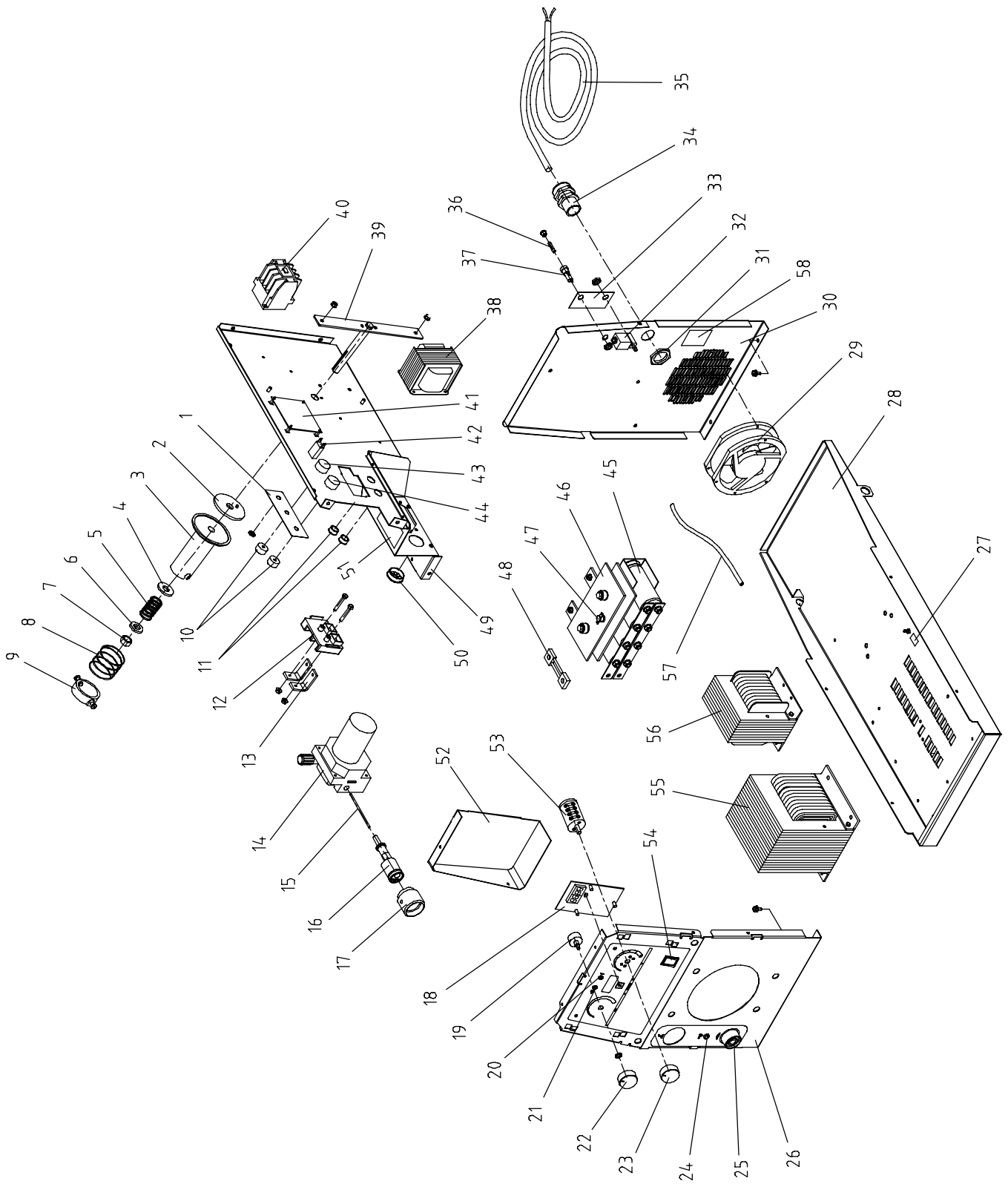


Figure 7-2. Main Assembly for Migmatic 221

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
----------	------------	----------	-------------	----------

Figure 7-2. Main Assembly for Migmatic 221

1		956142538	Label	1
2		000186436	Washer, plastic	1
3		000186435	Hub	1
4		156009075	Washer, flat	1
5		156032064	Spring	1
6		156009079	Washer, flat	1
7		156018033	Nut	1
8		156032128	Spring	1
9		000058427	Ring	1
10		000207076	Knob, pointer	2
11		656043043	Grommet, blank plug	2
12		000193144	Plastic, change polarity	1
13		356031003	Buss Terminal, polarity change	2
14		028033029	Wire Drive System, 2 roll d.37	1
15		156090018	Wire Guide, outlet	1
16		028066257	Connector, quick female	1
17		V56005028	Plastic, Euro	1
18	PC2	057095015	Circuit Board, digital volt / amp / wire speed display	1
19	RC1	056059274	Potentiometer, 1k ohms	1
20	PL2	056072075	Lamp, pilot 24v orange	1
21	PL1	056072076	Lamp, pilot 24v white	1
22		000207075	Knob, pointer	1
23		056020069	Knob, pointer d.7	1
24	RC1	028066258	Receptacle, Spoolmate jack plug	1
25		056076152	Coupler, female 50mmq	1
26		116118175	Panel, front	1
27		000155436	Label, ground	1
28		156006040	Base	1
29	FM1	057035018	Motor, fan	1
30		116116176	Panel, rear	1
31		V56018092	Nut, plastic	1
32	GSV	056061042	Solenoid, gas valve 24 vac	1
33		956142504	Label, rear	1
34		V56091091	Clamp	1
35		057014199	Line Cable	1
36	F1	*056092039	Fuse, 10a 500v	1
37		056092094	Fuseholder	1
38	T2	058021141	Transformer, auxillary	1
39		156005108	Support, spool	1
40	W	057079032	Contact, 7.5 kw-230v	1
41	PC1	057084126	Circuit Board, control	1
42	CB1	056067188	Circuit Breaker	1
43	R2	056059275	Potentiometer, 10k	1
44	R3	056059277	Potentiometer, 10k+sw	1
45	C1	056082098	Capacitor, 15,000 mf	4
46	SR1	056050151	Rectifier, silicon	1
47	TP1	056159008	Thermostat 115°	1
48		056059257	Shunt, 300 mA	1
49		117060018	Plate, baffle	1
50		V56033124	Grommet, cable entry	1
51		000178937	Label, drive	1
52		116014026	Support, front	1
53	S2	056067189	Switch, 25a 10 pos	1
54	S1	056067251	Switch, primary power on/off	1
55	T1	028021464	Transformer, 3ph 250a 230/400v	1
56	Z1	058028019	Stabilizer, 210a	1
57		027061026	Hose, gas mt 1.7 5*11	1
58		000176106	Label, fan	1

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

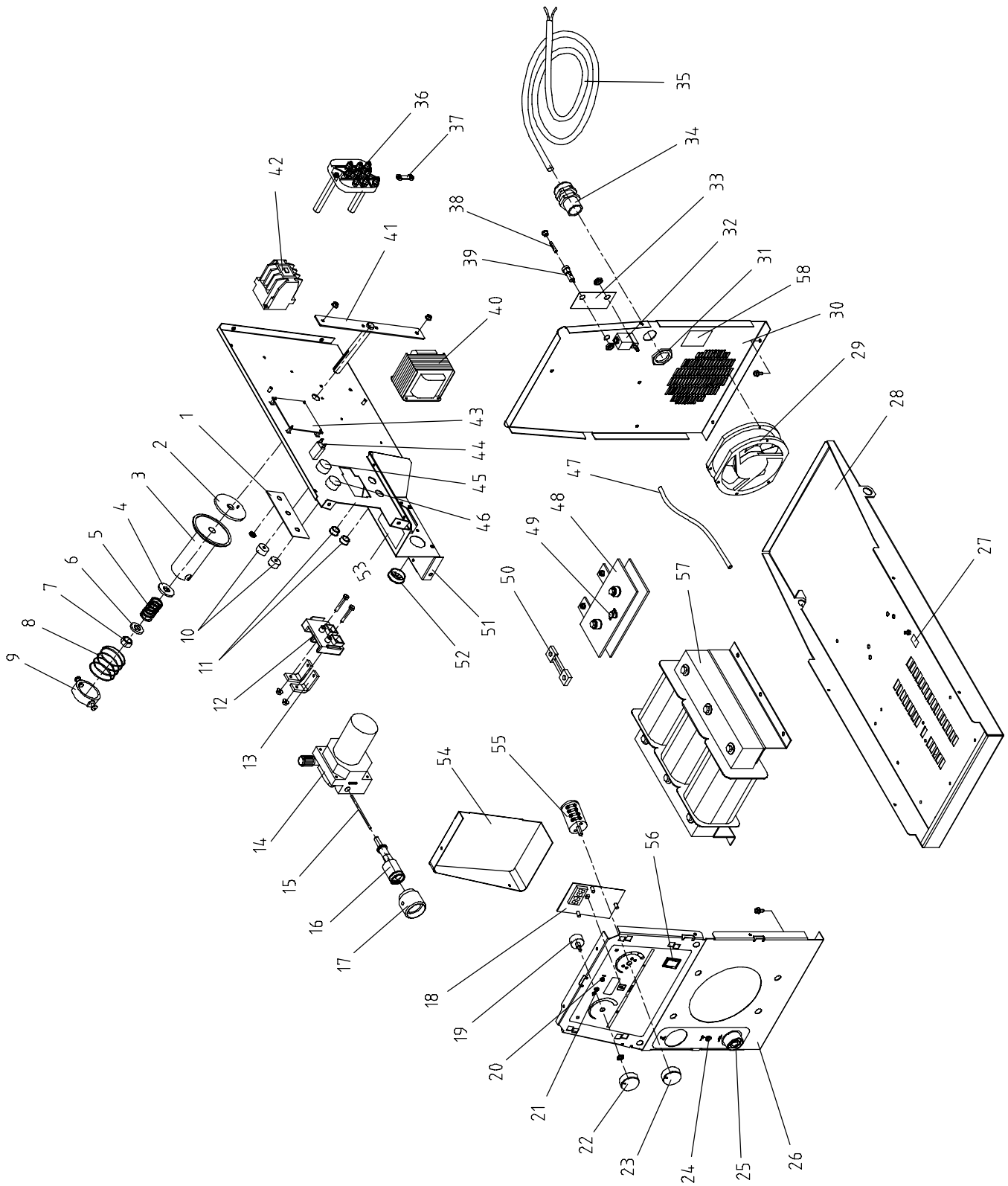


Figure 7-3. Main Assembly for Migmatic 253

Item No.	Dia. Mkgs.	Part No.	Description	Quantity	
				230V	400V
Figure 7-3. Main Assembly for Migmatic 253					
1		956142538	Label	1	1
2		000186436	Washer, plastic	1	1
3		000186435	Hub	1	1
4		156009075	Washer, flat	1	1
5		156032064	Spring	1	1
6		156009079	Washer, flat	1	1
7		156018033	Nut	1	1
8		156032128	Spring	1	1
9		000058427	Ring	1	1
10		000207076	Knob, pointer	2	2
11		656043043	Grommet, blank plug	2	2
12		000193144	Plastic, change polarity	1	1
13		356031003	Buss Terminal, polarity change	3	2
14		028033029	Wire Drive System, 2 roll d.37	1	1
15		156090018	Wire Guide, outlet	1	1
16		057052033	Connector, quick female	1	1
17		V56005028	Plastic, Euro	1	1
18	PC2	057095015	Digital, volt/amp/wire speed display	1	1
19	R1	056059274	Potentiometer, 1k ohms	1	1
20	PL2	056072075	Lamp, pilot 24v orange	1	1
21	PL1	056072076	Lamp, pilot 24v white	1	1
22		000207075	Knob, pointer	1	1
23		056020069	Knob, pointer d.7	1	1
24	RC1	028066258	Receptacle, jack plug spoolmate	1	1
25		056076152	Coupler, female 50mmq	1	1
26		116118175	Panel, front	1	1
27		000155436	Label, ground	1	1
28		156006040	Base	1	1
29	FM1	057035018	Motor, fan	1	1
30		116116176	Panel, rear	1	1
31		V56018092	Nut, plastic	1	1
32	GSV	056061042	Solenoid, gas valve 24 vac	1	1
33		956142504	Label, rear	1	1
34		V56091091	Clamp	1	1
35		057014197	Line Cable	1	1
36		756069012	Bracket, change tension	1	1
37		556070011	Link, primary power terminal 230/460	3	1
38	F1	*056092039	Fuse, 10a 500v	1	1
39		056092094	Fuseholder	1	1
40	T2	058021141	Transformer, auxillary	1	1
41		156005108	Support, spool	1	1
42	W	057079032	Contact, 7.5 kw-230v	1	1
43	PC1	057084126	Circuit Board, control	1	1
44	CB1	056067188	Circuit Breaker	1	1
45	R2	056059275	Potentiometer, 10k	1	1
46	R3	056059277	Potentiometer, 10k+sw	1	1
47		027061026	Hose, gas mt 1.7 5*11	1	1
48	SR1	056050150	Rectifier, silicon	1	1
49	TP1	056159008	Thermostat 115°	1	1
50		056059257	Shunt, 300 mA	1	1
51		117060018	Plate, baffle	1	1
52		V56033124	Grommet, cable entry	1	1
53		000178937	Label, drive	1	1
54		116014026	Support, front	1	1
55	S2	056067183	Switch, 25a 10 pos	1	1
56	S1	056067251	Switch, primary power on/off	1	1
57	T1	028021463	Transformer, 3ph 250a 230/400v	1	1
58		000176106	Label, fan	1	1

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Table 7-1. Drive Roll And Wire Guide Kits (2 Roll Models)

NOTE



Base selection of drive rolls upon the following recommended usages:

1. *V-Grooved rolls for hard wire.*
2. *U-Grooved rolls for soft and soft shelled cored wires.*
3. *U-Cogged rolls for extremely soft shelled wires (usually hard surfacing types).*
4. *V-Knurled rolls for hard shelled cored wires.*
5. *Drive roll types may be mixed to suit particular requirements (example: V-Knurled roll in combination with U-Grooved).*

Wire Diameter			Drive Roll		Wire Guide
Metric	Fraction	Decimal	Part No.	Type	Inlet
0,6/0,8 mm	0,023/0,030 in	0,023/0,030 in	156053100	V	156090018
0,8/1 mm	0,030/0,035 in	0,030/0,035 in	156053101	V	156090018
1/1,2 mm	0,035/0,045 in	0,035/0,045 in	156053102	V	156090018
1/1,2 mm	0,035/0,045 in	0,035/0,045 in	156053104	U	156090018
1/1,2 mm	0,035/0,045 in	0,035/0,045 in	156053106	V-K	156090018

TRUE BLUE[®]

WARRANTY

Effective January 1, 2007

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions below, ITW Welding Products Italy S.r.l., warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. **THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.**

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original end-user purchaser, and not to exceed one year after the equipment is sent to a European distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts – 3 Years Labor
 - * Original main power rectifiers
 - * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
 - * Transformer/Rectifier Power Sources
 - * Plasma Arc Cutting Power Sources
 - * Semi-Automatic and Automatic Wire Feeders
 - * Inverter Power Sources (unless otherwise stated)
 - * Water Coolant Systems (integrated)
 - * Intelligit
 - * Maxstar 150
 - * Engine Driven Welding Generators
(NOTE: Engines are warranted separately by the engine manufacturer.)
3. 2 year – Parts and Labor (Panther only)
 - * Hydramate 1&2 Water Cooling Unit
4. 1 year – Parts and Labor unless specified
 - * DC 253 & 403 Rectifier (April 06>)
 - * Migmatic 171 (April 06>)
 - * Motor Driven Guns (w/exception of Spoolguns)
 - * Process Controllers
 - * Positioners and Controllers
 - * Automatic Motion Devices
 - * RFCS Foot Controls
 - * IHPS Power Sources and Coolers
 - * Water Coolant Systems (non-integrated)
 - * Flowgauge and Flowmeter Regulators (No Labor)
 - * HF Units
 - * Grids
 - * Spot Welders
 - * Load Banks
 - * Arc Stud power sources and Arc Stud guns
 - * Running Gear/Trailers
 - * Plasma Cutting Torches (except APT & SAF Models)
 - * Field Options
(NOTE: Field options are covered under True Blue[®] for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
5. 6 Months — Batteries
6. 90 Days — Parts
 - * MIG Guns/TIG Torches
 - * Induction heating coils and blankets

- * APT Model Plasma Cutting Torches
- * Remote Controls
- * Accessory Kits
- * Replacement Parts (No labor)
- * Spoolmate Spoolguns
- * Canvas covers

Miller's True Blue[®] Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear.**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at ITW Welding Products Group Europe, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

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Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.



Owner's Record

Please complete and retain with your personal records.

Model Name

Serial/Style Number

Purchase Date

(Date which equipment was delivered to original customer.)

Distributor

Address

Country

Zip/Postal Code



For Service

Contact a **DISTRIBUTOR** or **SERVICE AGENCY** near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

Welding Supplies and Consumables

Options and Accessories

Service and Repair

Replacement Parts

Owner's Manuals

Contact the Delivering Carrier to:

File a claim for loss or damage during shipment.

For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

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Milanese, Italy

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Fax: 39 (0) 298290-203

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