



OM-224 043B

2006-07

**Processes**



Multiprocess Welding

**Description**

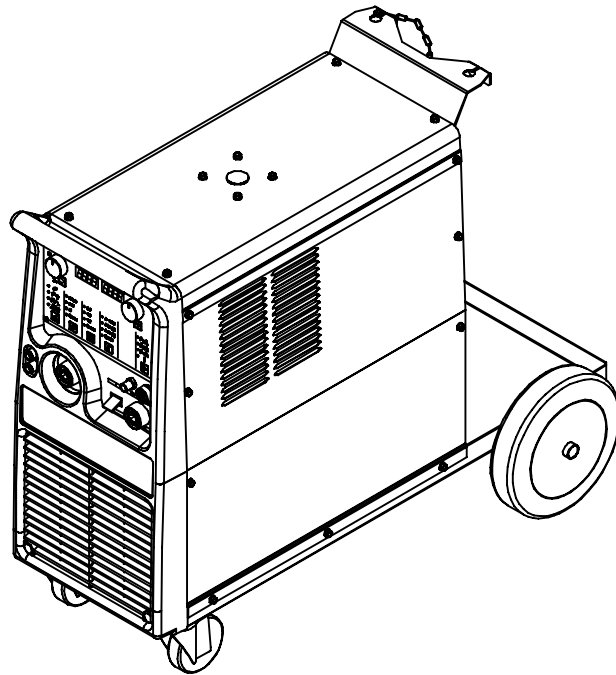


Arc Welding Power Source

CE

# XMS<sup>®</sup> 4000

## 400 Volts



**OWNER'S MANUAL**

# From Miller to You

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*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:

## **XMS 4000**

conforms to the following Directives and Standards:

### Directives

*Electromagnetic compatibility Directives: 89/336/EEC, 92/31/EEC*

*Low Voltage Directive: 73/23/EEC*

*Machinery Directives: 89/392/EEC  
and their amendments 91/368/EEC, 92/31/CEE, 133/04, 93/68/EEC*

### Standards

*Electromagnetic compatibility (EMC) Product standard for arc welding equipment: EN50199: Augusst1995*

*Safety Requirements for Arc Welding Equipment part 1: EN 60974-1: 1990*

*Degrees of Protection provided by Enclosures (IP code): IEC 529: 1989*

*Insulation coordination for equipment within low-voltage systems:  
Part 1: Principles, requirements and tests: IEC 664-1: 1992*

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

# SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

som \_3/05

▲ **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

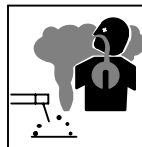
live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- 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.

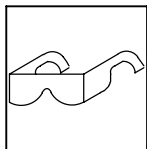
- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect 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.



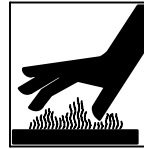
### FLYING METAL can injure eyes.

- 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.



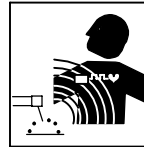
### BUILDUP OF GAS can injure or kill.

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



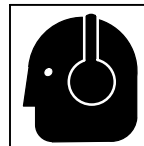
### HOT PARTS can cause severe burns.

- 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.

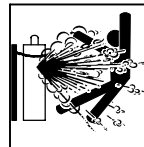
- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.



### 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



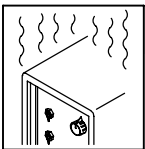
### FIRE OR EXPLOSION hazard.

- 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.



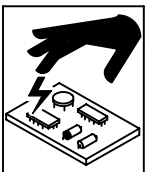
### FALLING UNIT can cause injury.

- 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.



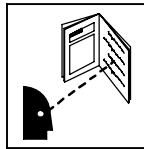
### WELDING WIRE can cause injury.

- 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.



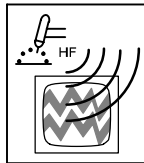
### MOVING PARTS can cause injury.

- 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.



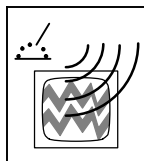
### READ INSTRUCTIONS.

- 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

## 2-1. Manufacturer's Warning Label 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.

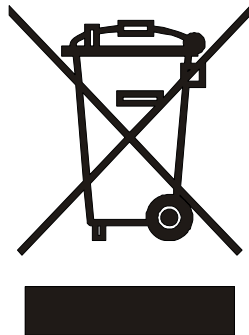
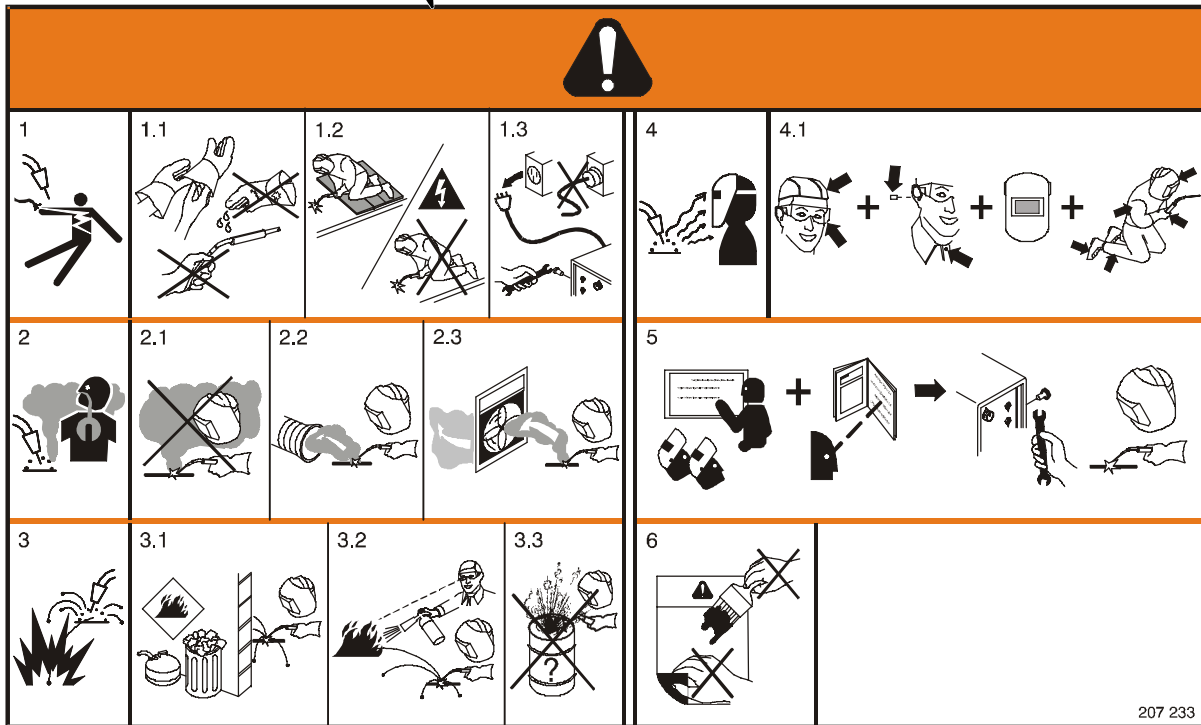
3.3 Do not weld on drums or any closed containers.

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.



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.

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

- 1 Electric shock from wiring can kill.
- 2 Disconnect input plug or power before working on machine.
- 3 Hazardous voltage remains on input capacitors after power is turned off. Do not touch fully charged capacitors.
- 4 Always wait 60 seconds after power is turned off before working on unit, OR
- 5 Check input capacitor voltage, and be sure it is near 0 before touching any parts.
- 6 When power is applied failed parts can explode or cause other parts to explode.
- 7 Flying pieces of parts can cause injury. Always wear a face shield when servicing unit.
- 8 Always wear long sleeves and button your collar when servicing unit.
- 9 After taking proper precautions as shown, connect power to unit.

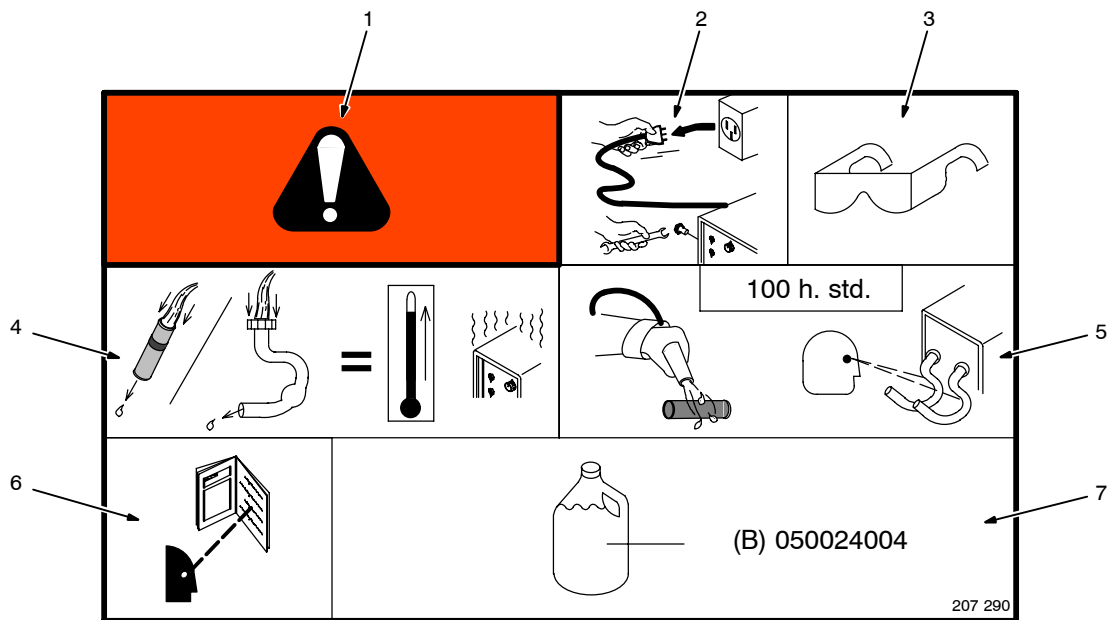
Warning! Watch Out! There are possible hazards as shown by the symbols.

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 Not Applicable
- 4 Having a loop of extra length, connect grounding conductor first.
- 5 Not Applicable



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

2 Disconnect input plug or power before working on machine.

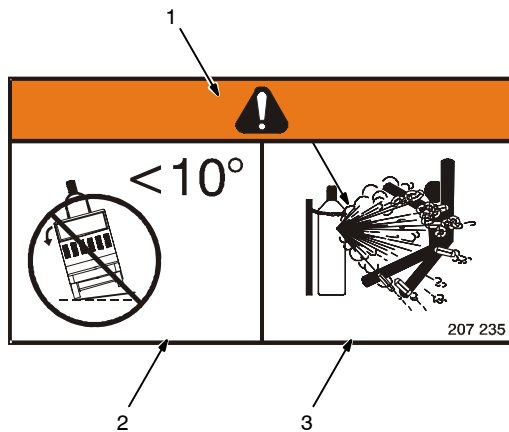
3 Wear approved safety glasses with side shields while working on the unit.

4 Plugged filter or hoses can cause overheating to the power source and torch.

5 Every 100 hours, check and clean filter and check condition of hoses.

6 Read Owner's Manual.

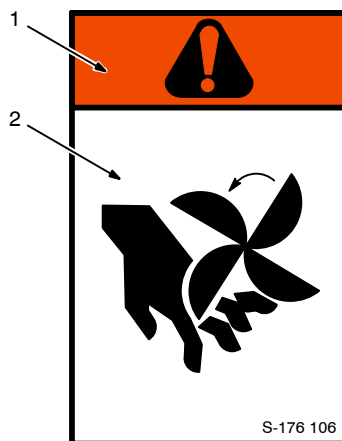
7 Use coolant suggested by manufacturer.



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.

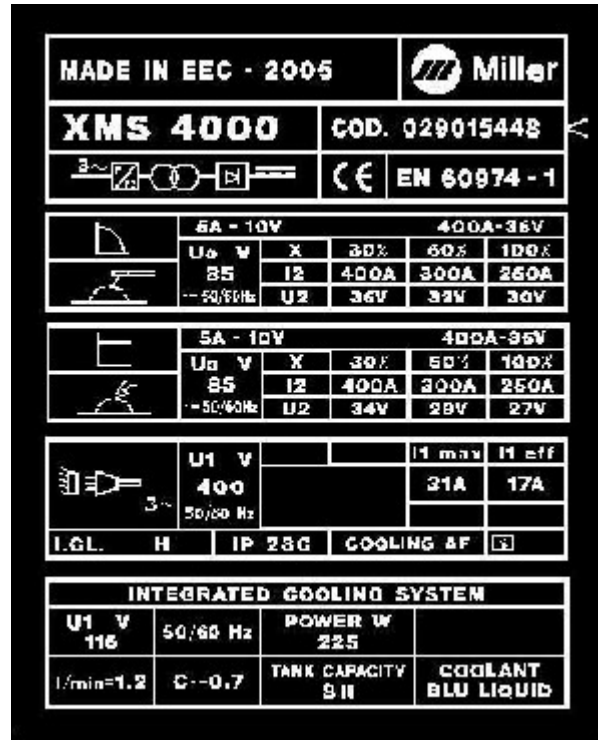
3 Cylinders can explode if damaged. Protect compressed gas cylinders from excessive heat, mechanical shock, slag, open flames, sparks, and arcs.



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

2 Moving parts can cause injury. Keep away from moving parts such as fans.

## 2-2. Manufacturer's Rating Labels



## 2-3. Symbols And Definitions

|                      |  |                         |                              |                         |                                   |           |   |
|----------------------|--|-------------------------|------------------------------|-------------------------|-----------------------------------|-----------|---|
| <b>A</b>             | Amperage   | <b>V</b>                | Voltage                      |                         | Alternating Current (AC)          | <b>Hz</b> | Hertz   |
|                      | Remote   | <b>I</b>                | On                           |                         | Off                               |           | Protective Earth (Ground)   |
|                      | Line connection  | <b>3~</b>               | Three Phase                  |                         | Direct Current (DC)               |           | Increase  |
|                      | Constant Voltage   |                         | Constant Current             |                         | Lift-Arc Operation (GTAW)         |           | Gas Tungsten Arc Welding  |
|                      | Three Phase Static Frequency Converter-Transformer-Rectifier |                         | Gas Metal Arc Welding (GMAW) |                         | Shielded Metal Arc Welding (SMAW) |           | Recycle or dispose of used coolant in an environmentally safe way |
| <b>U<sub>1</sub></b> | Primary Voltage  | <b>I<sub>1max</sub></b> | Rated Maximum Supply Current | <b>I<sub>1eff</sub></b> | Maximum Effective Supply Current  |           |   |
| <b>U<sub>2</sub></b> | Conventional Load Voltage                                    | <b>I<sub>2</sub></b>    | Rated Welding Current        | <b>X</b>                | Duty Cycle                        | <b>%</b>  | Percent   |
| <b>U<sub>0</sub></b> | Rated No Load Voltage (Average)                              | <b>IP</b>               | Degree Of Protection         |                         |                                   |           |   |

Symbols not shown here are detailed in this manual when they are relevant.



# SECTION 3 – INSTALLATION

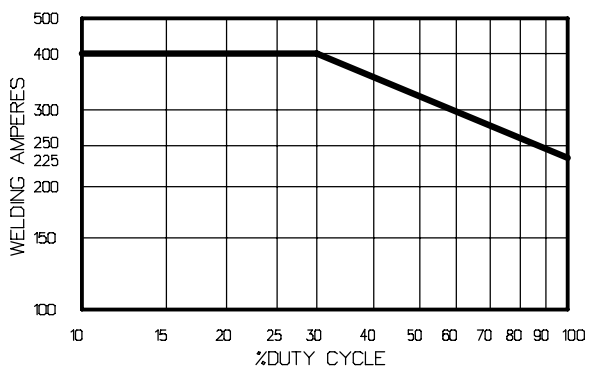
## 3-1. Specifications

| Rated Welding Output                      | Voltage Range | Amperage Range | Maximum Open-Circuit Voltage DC | IP Rating | Amperes Input at Rated Load Output 50/60 Hz |                 |                 |
|---|---------------|----------------|---------------------------------|-----------|---|-----------------|-----------------|
|   |               |                |                                 |           | 400 V                                       | KVA             | KW              |
| 300 A @<br>32 Volts DC,<br>60% Duty Cycle | 10 – 35       | 5 – 400        | 90                              | 23C       | 17.0<br>(0,15*)                             | 12.4<br>(0,09*) | 11.5<br>(0,04*) |

\*While idling

## 3-2. Duty Cycle And Overheating



WELDING AMPERES

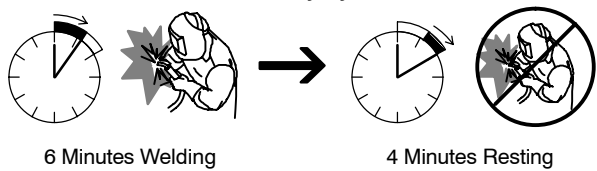
%DUTY CYCLE

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

If unit overheats, output stops, a Help message is displayed (see Section 5-3), and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or duty cycle before welding.

**▲ Exceeding duty cycle can damage unit and void warranty.**

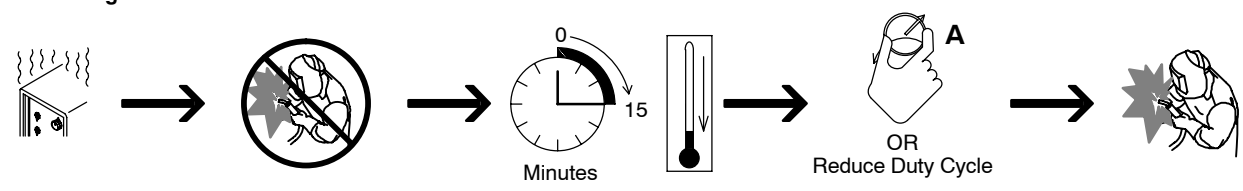
**60% Duty Cycle**



6 Minutes Welding      4 Minutes Resting

---

**Overheating**



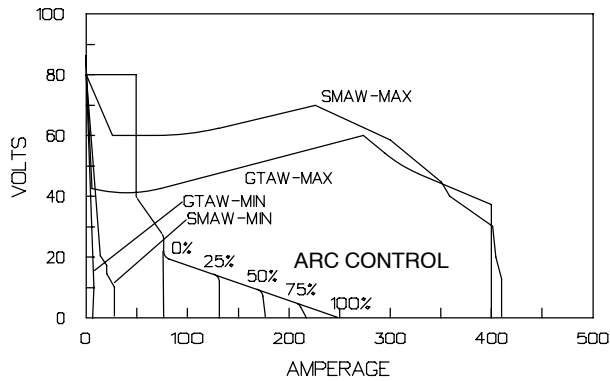
Minutes      OR      Reduce Duty Cycle

Ref. SA-178 651

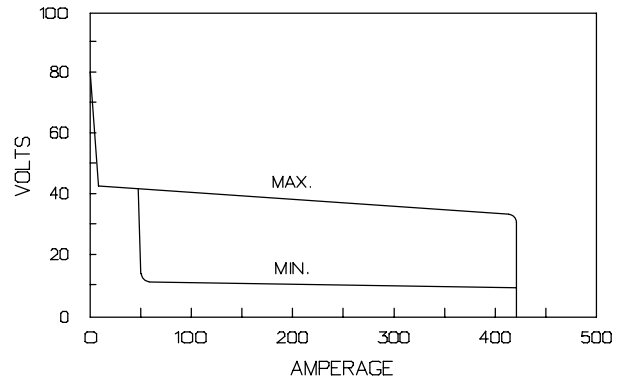
### 3-3. Volt-Ampere Curves

Volt-ampere curves show minimum and maximum voltage and amperage output capabilities of unit. Curves of other settings fall between curves shown.

**A. CC Mode**

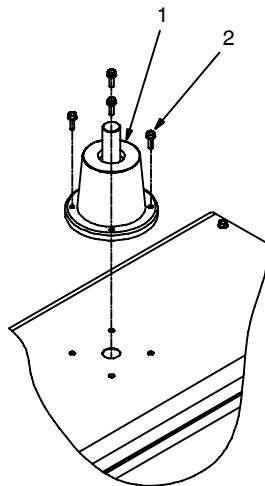


**B. CV Mode**



va\_curve1 4/95 - SA-178 652 / SA-178 653

### 3-4. Installing Turntable for Wire Feeder on Power Source (Optional)



▲ **Turn off welding power source and disconnect input power before proceeding.**

Remove wire spool.

- 1 Turntable
- 2 Screw

Remove the 4 screws and the plastic cap on the power source upper cover and keep them for future use.

Insert the turntable in the upper hole and secure with 4 screws. Be sure screws are tight.

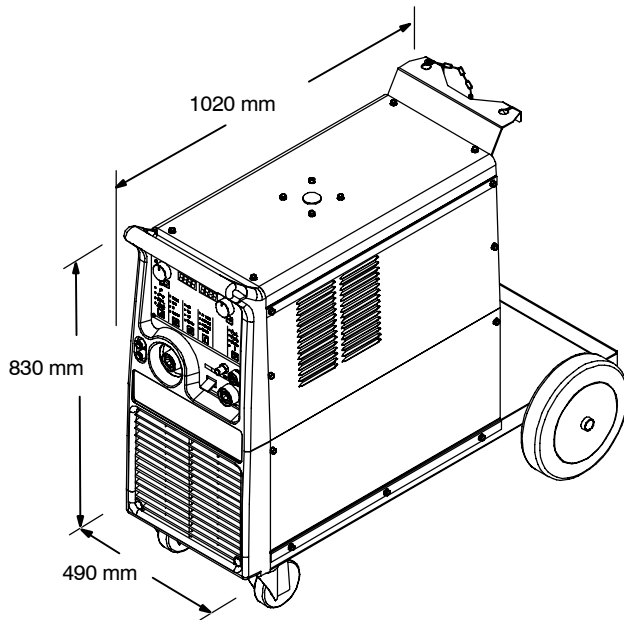
If desired, install the wire feeder on the turntable using the hole in the bottom of the feeder.

### 3-5. Selecting A Location



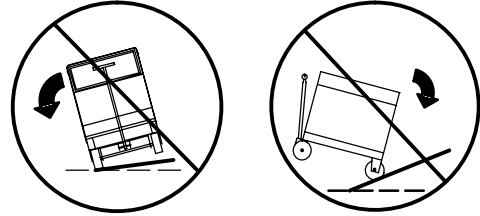
#### Dimensions and Weight

86 kg



#### Movement

▲ Do not move or operate unit where it could tip.



#### 1 Lifting Handles

Do not use handle to lift unit.

#### 2 Rating Label

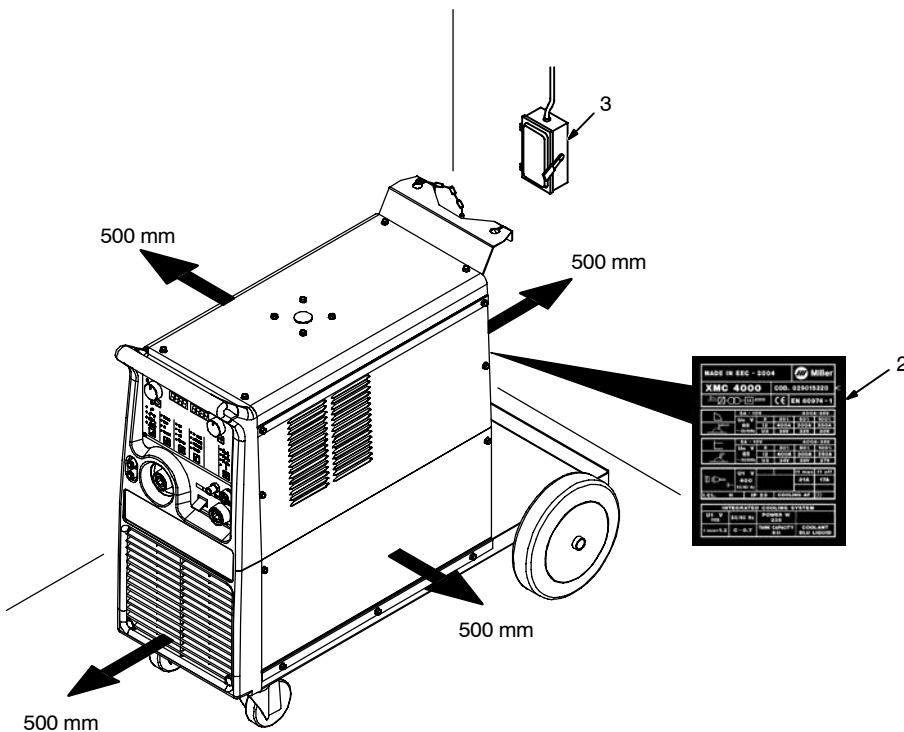
Use label to determine input power needs.

#### 3 Line Disconnect Device

Locate unit near correct input power supply.

▲ **Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.**

#### Location



### 3-6. Weld Output Terminals And Selecting Cable Sizes



**▲ ARC WELDING can cause Electromagnetic Interference.**

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.

| <br><b>Weld Output Terminals</b> | <b>Welding Amperes</b> | <b>Total Cable (Copper) Length In Weld Circuit Not Exceeding</b> |                                 |                             |             |             |             |              |              |
|----------------------------------|------------------------|--|---------------------------------|-----------------------------|-------------|-------------|-------------|--------------|--------------|
|                                  |                        | <b>30 m Or Less</b>  |                                 | <b>45 m</b>                 | <b>60 m</b> | <b>70 m</b> | <b>90 m</b> | <b>105 m</b> | <b>120 m</b> |
|                                  |                        | <b>10 – 60%<br/>Duty Cycle</b>                                   | <b>60 – 100%<br/>Duty Cycle</b> | <b>10 – 100% Duty Cycle</b> |             |             |             |              |              |
|                                  | 100                    | 20   | 20                              | 20                          | 30          | 35          | 50          | 60           | 60           |
|                                  | 150                    | 30   | 30                              | 35                          | 50          | 60          | 70          | 95           | 95           |
|                                  | 200                    | 30   | 35                              | 50                          | 60          | 70          | 95          | 120          | 120          |
|                                  | 250                    | 35   | 50                              | 60                          | 70          | 95          | 120         | 2//70        | 2//70        |
|                                  | 300                    | 50   | 60                              | 70                          | 95          | 120         | 2//70       | 2//95        | 2//95        |
|                                  | 350                    | 60   | 70                              | 95                          | 120         | 2//70       | 2//95       | 2//95        | 2//120       |
|                                  | 400                    | 60   | 70                              | 95                          | 120         | 2//70       | 2//95       | 2//120       | 2//120       |
|                                  | 500                    | 70   | 95                              | 120                         | 2//70       | 2//95       | 2//120      | 3//95        | 3//95        |
| 600                              | 95                     | 120  | 2//70                           | 2//95                       | 2//120      | 3//95       | 3//120      | 3//120       |              |

// means 2 cables with the same section in parallel.

### 3-7. Remote 7 Receptacle Information (TIG And STICK Only)

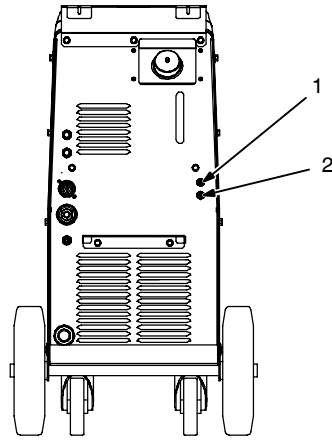
|  | <b>Socket</b> | <b>Socket Information</b>             |
|--|---------------|---------------------------------------|
|  | 1             | +10 volts dc supply voltage to remote |
|  | 2             | GND Remote control circuit common     |
|  | 3             | IREF 0 to 10 current control signal   |
|  | 4             | Not used.                             |
|  | 5             | UP 0V/10V digital signal              |
|  | 6             | Not used.                             |
|  | 7             | TYPE 0V/10V digital signal            |

Note: This remote receptacle cannot be used with a standard Miller remote control. A customer supplied remote control is required to use the remote receptacle.

Some signals can be enabled when TIG or Stick welding. Contact Factory Authorized Service Agent for confirmation.



### 3-8. Circuit Breakers



Circuit breakers with numbers 7 and 10 are placed inside the welder on the wire feeder side as shown.

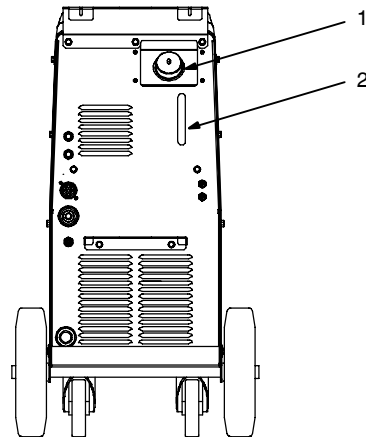
**1 Circuit Breaker 7**

Protects the auxiliary 115 volt AC used for the water cooling unit inside the power source, from overload.

**2 Circuit Breaker 10**

Protects the auxiliary 24 volt AC used for the wire feeder unit inside the power source, from overload.

### 3-9. Filling Coolant Tank



**Rear View**

☞ *Operating cooler when coolant is low can damage cooler and torch components. Always have proper amount of coolant in tank and use coolant recommended by the manufacturer.*

- 1 Coolant Tank Cap
- 2 Coolant Level Indicator

☞ *Remove shielding gas cylinder from rear of unit to fill coolant tank.*

Unscrew cap from tank.

Use table to select proper coolant, and fill tank until coolant appears in upper half of indicator.

Check coolant level after attaching torch coolant hoses and running cooler. Be sure coolant appears in upper half of indicator. Add coolant if necessary.

| Application | GTAW Or Where HF* Is Used   | GMAW Or Where HF* Is Not Used  | Where Coolant Contacts Aluminum Parts            |
|-------------|---|--|--|
| <br>Coolant | MILLER Low Conductivity Coolant No. 043 810**;<br>Distilled Or Deionized Water<br>OK Above 32° F (0° C) | MILLER Low Conductivity Coolant No. 043 810**;<br>Or<br>MILLER Aluminum Protecting Coolant No. 043 809**;<br>Distilled Or Deionized Water<br>OK Above 32° F (0° C) | MILLER Aluminum Protecting Coolant No. 043 809** |

\*HF: High Frequency Current

\*\*MILLER coolants protect to -37° F (-38°C) and resist algae growth.

**▲ Use of any coolant other than those listed in the table voids the warranty on any parts that come in contact with the coolant (pump, radiator, etc.).**

### 3-10. Electrical Service Guide

#### NOTE



Actual input voltage should not exceed  $\pm 10\%$  of indicated required input voltage. If actual input voltage is outside of this range, output may not be available.

|  | 50/60 Hz Three Phase |
|--|----------------------|
| Input Voltage  | 400                  |
| Input Amperes At Rated Output                                  | 17                   |
| Max Recommended Standard Fuse Rating In Amperes <sup>1</sup>   |                      |
| Time-Delay <sup>2</sup>  | 20                   |
| Normal Operating <sup>3</sup>                                  | 25                   |
| Min Input Conductor Size In mm <sup>2</sup> , <sup>4</sup>     | 2.5                  |
| Max Recommended Input Conductor Length In Meters               | 41                   |
| Min Grounding Conductor Size In mm <sup>2</sup> , <sup>4</sup> | 2.5                  |

Reference: 1999 National Electrical Code (NEC)

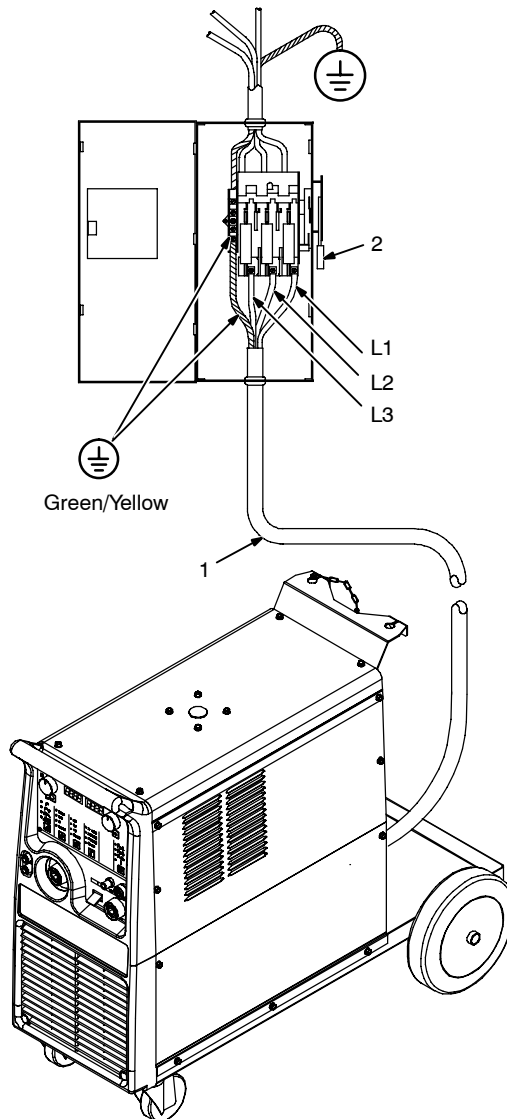
1 Consult factory for circuit breaker applications.

2 "Time-Delay" fuses are UL class "RK5" .

3 "Normal Operating" (general purpose - no intentional delay) fuses are UL class "K5" (up to and including 60 amp), and UL class "H" ( 65 amp and above).

4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.16. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

### 3-11. Connecting Input Power



▲ Always connect green/yellow wire to supply grounding terminal, never to a line terminal.

Check input voltage available at site.

1 Input And Grounding Conductors

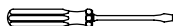
2 Line Disconnect Device

Select type and size of overcurrent protection using Section 3-10.

▲ Always connect grounding conductor first.

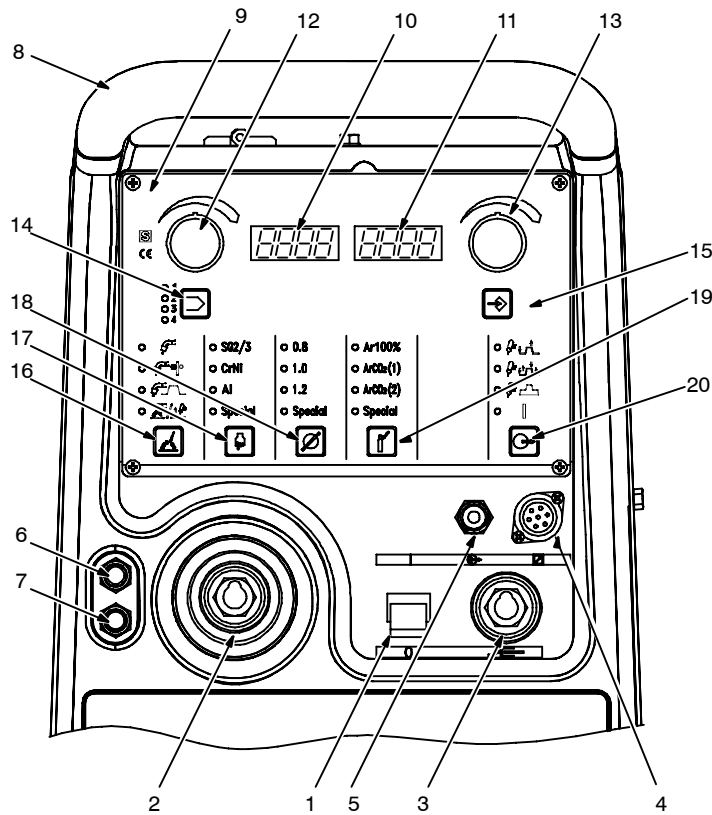
= GND/PE

Tools Needed:



# SECTION 4 – OPERATION

## 4-1. Front Panel Controls



**1 ON/OFF Switch (I/O)**

Use switch to turn unit On/Off.

*Fan is thermostatically controlled and runs only when necessary (Fan On Demand).*

*Water cooling is automatically controlled and runs only when necessary. (Cooling On Demand).*

**2 Positive Power Connection for TIG and Stick Welding.**

Do not use for MIG welding.

**3 Negative Power Connection for MIG, TIG and Stick Welding.**

**4 Remote Control Receptacle for TIG and Stick welding**

**5 Gas Connector (3/8) for TIG Welding.**

**6 Red Quick Connect Fitting**

Coolant return from torch.

**7 Blue Quick Connect Fitting**

Coolant output to torch.

**8 Handle**

**9 Control Panel**

**10 D1 (Display 1)**

Displays values and parameters for selected welding process. During welding it shows measured welding voltage.

**11 D2 (Display 2)**

Displays values and parameters for selected welding process. During welding it shows measured welding current.

**12 E1 (Encoder Control 1)**

Use control to change values and parameters that appear on D1.

**13 E2 (Encoder Control 2)**

Use control to change values and parameters that appear on D2.

**14 P1 (Memory Push Button)**

Allows selecting program storage locations 1-4 as indicated by LED's (Tig and Stick only).

**15 P2 (Setup Push Button)**

Allows selecting setup or advanced programming menus.

**16 P3 (Process Push Button)**

Allows selecting welding process.

**17 P4 (Material Push Button)**

Allows selecting material type for synergic MIG and synergic pulsed MIG processes.

**18 P5 (Wire Diameter Push Button)**

Allows selecting desired welding wire diameter for synergic MIG and synergic pulsed MIG processes.

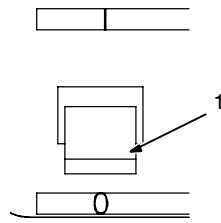
**19 P6 (Gas Selection Push Button)**

Allows selecting desired welding gas type for synergic MIG and synergic pulsed MIG processes.

**20 P7 (Trigger Selection Push Button)**

Allows selecting desired trigger mode in TIG welding and switch ON/OFF power in STICK welding.

## 4-2. Switching On the Unit and Recalling Factory Parameters



☞ Write down any parameters that need to be restored before performing this procedure.

1 Power Switch

Use power switch to turn unit On.

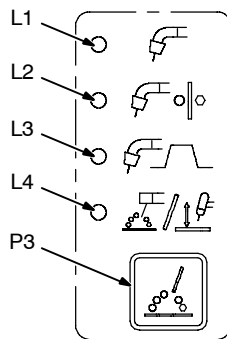
When ITW appears on D1 and D2, press P3 and P8 simultaneously.

When MEMO CLEAR appears on D1 and D2, release P3 and P8.

Wait until DONE appears on D1, and turn unit Off.

The next time unit is turned On, all parameters will return factory default settings.

## 4-3. Welding Process Selection



L1 LED

L2 LED

L3 LED

L4 LED

P3 Push Button

Press P3 until desired process LED illuminates.

Values and parameters that appear on D1 and D2 are either factory default settings or last settings entered for the selected process.

L1 selection is Manual MIG welding.

D1 value is welding voltage, default is 18.5V (range is 10 V to 50 V).

D2 value is wire feed speed, default is 5.0 m/min (range is 1 m/min to 20 m/min). See Section 4-10.

L2 selection is Synergic MIG welding (non-pulsed).

D1 value is trim, default is 0.0 T (range is -5.0 T to 5.0 T).

D2 value is wire feed speed (from minimum to maximum value according to welding curve selection).

☞ When L2 is flashing, material transfer in the arc is by large droplets (globular transfer) and produces considerable spatter. This is the result of selecting a specific material, wire, gas, voltage, and current combination. To avoid this situation, Synergic Pulsed MIG welding with the same parameter combination is recommended. When L2 is On continuously (not flashing), material transfer in the arc is either short circuit (Short Arc) or by small droplets (Spray Transfer). Both MIG processes provide a stable arc and minimum spatter.

L3 selection is Synergic Pulsed MIG welding.

D1 value is trim, default is 0.0 T (range is -5.0 T to 5.0 T).

D2 value is wire feed speed (from minimum to maximum value according to welding curve selection).

L4 selection is TIG welding or STICK welding.

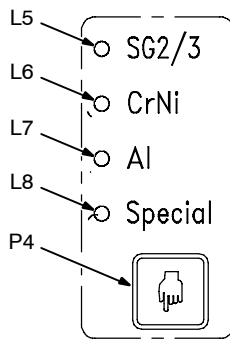
If selected process is TIG:

D1 displays TIG, and D2 value is welding current, default is 220 A (range is 10 A to 400 A).

If selected process is STICK:

D1 initially displays STICK and changes to open circuit voltage at approximately 85 V, and D2 value is welding current, default is 220 A (range is 10 A to 400 A).

#### 4-4. Wire Type Selection in Synergic MIG or Synergic Pulsed MIG Welding



L5 LED  
L6 LED  
L7 LED  
L8 LED  
P4 Push Button

Press P4 until desired material LED illuminates. D1 and D2 will show material name only momentarily, and then return to the main display.

*☞ D1 and D2 will show NO PROG or a selection will not be allowed when*

*there is no program for the process, material, wire diameter, and shielding gas combination.*

L5 selection is for carbon steel.

L6 selection is for stainless steel.

L7 selection is for aluminum.

L8 selection is for other wire types not provided by standard selection.

Pressing P2 push button after a selection is made to allow choosing other wire types within the main selection.

SG2/3 allows selecting SG2 or SG3.

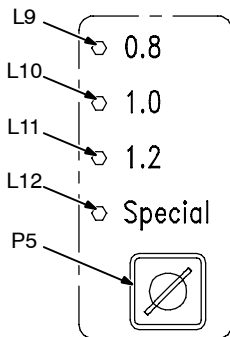
CrNi allows selecting 308L, 309L, or 316L.

Al allows selecting AIMg (AIMg5) or AISi (AISi5).

Special allows selecting cored wire or special wire (abbreviations for the different wire types will appear on D1 and D2).

*☞ Be aware that the wire type selection is retained in the welding process memory until a new selection is made.*

#### 4-5. Wire Diameter Selection In Synergic MIG Or Synergic Pulsed MIG Welding



L9 LED  
L10 LED  
L11 LED  
L12 LED  
P5 Push Button

Press P5 until desired wire diameter LED illuminates. D1 and D2 will show trim in m/min values.

*☞ D1 and D2 will show NO PROG or a selection will not be allowed when there is no program for the process, material, wire diameter, and shielding gas combination.*

L9 selection is for 0.8 mm diameter wire.

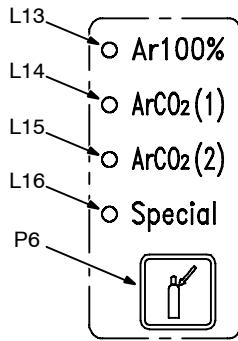
L10 selection is for 1.0 mm diameter wire.

L11 selection is for 1.2 mm diameter wire.

L12 selection is for other wire diameters not provided by standard selection.

Pressing P2 push button after the special selection is made to allow choosing other wire diameters no available by standard selection.

## 4-6. Gas Selection in Synergic MIG or Synergic Pulsed MIG Welding



L13 LED

L14 LED

L15 LED

L16 LED

P6 Push Button

Press P6 until gas LED illuminates. D1 and D2 will show gas name momentarily and

then it will return to the main display. If it is allowed, change gas type during this time.

**⚠** D1 and D2 will show NO PROG or a selection will not be allowed when there is no program for the process, material, wire diameter, and shielding gas combination.

L13 (Ar 100%) selection is for 100% Argon

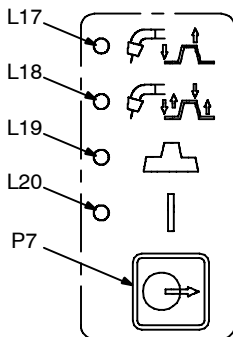
(generally used with aluminum and light alloys).

L14 (ArCO<sub>2</sub>[1]) selection is for mixed gas with Argon and CO<sub>2</sub> around 20% (generally used with carbon steel).

L15 (ArCO<sub>2</sub>[2]) selection is for mixed gas with Argon and CO<sub>2</sub> around 2% (generally used with stainless steel).

L16 (Special) selection is for other gas type not provided by standard selection.

## 4-7. Trigger Mode Selection (TIG and STICK Only)



**⚠** Always check and set a trigger mode. If trigger mode is undefined for a welding process, select the desired mode.

L17 LED

L18 LED

L19 LED

L20 LED

P7 Push Button

Trigger mode can be set for TIG only.

Trigger mode also allows enabling and disabling STICK welding.

In TIG welding, pressing P6 will change the trigger mode, but D1 and D2 will not change values.

In STICK welding, pressing P6 will enable welding (L20 ON, D1 shows open circuit

voltage or weld voltage and D2 shows set current or welding current) or disable welding (L20 OFF, D1 shows STK and D2 shows set current).

Press P7 to select the desired trigger mode:

L17 ON selects 2 times trigger function.

When trigger is pressed, welding starts.

When trigger is released, welding stops.

L18 ON selects 4 times trigger function.

When trigger is pressed, welding starts.

When trigger is released, welding continues.

When trigger is pressed and released a second time, welding stops.

L19 ON selects 3 levels trigger function.

When trigger is pressed, welding starts with level 1 parameters.

When trigger is released, welding continues with main parameters.

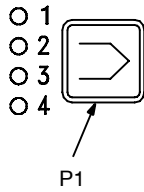
When trigger is pressed a second time, welding continues at level 2 parameters.

When trigger is released the second time, welding stops.

**⚠** L19 trigger mode is useful for thin materials and for a crater fill sequence.

L20 ON means weld output power is present at weld connectors. This LED must be on for the STICK process to enable welding. LED will turn on when weld output power is present at weld connectors for MIG and TIG processes.

## 4-8. Setting And Using Weld Parameters From Memory (TIG and STICK Only)



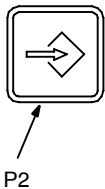
☞ Check memory parameter for proper settings before the selections.

Four memory selections are available for each welding process (20 total).

These memory selections provide quick changes to welding processes with preset parameter values. All memory selections have factory set defaults and may require changes for the desired weld characteristics.

Press P1 until desired memory selection LED illuminates.

## 4-9. Setup Push Button And Advanced Programming



Press P2 to enter SET UP menu.

SET UP will appear on D1 and D2 only momentarily and then change to the selected process parameter values.

Setup allows viewing and changing default parameter values for all welding processes for the desired weld characteristics.

D1 shows the welding parameter.

D2 shows the parameter value.

E1 changes the welding parameter.

E2 changes the parameter value.

☞ *Incorrect settings in any process can result in a program with undesirable weld characteristics. Setup should only be used by operators familiar with various welding processes and parameters.*

Pressing P2 again allows changing wire type selections (see Section 4-4).

### Setting Menu Type (TIG and STICK only)

☞ *MENU EASY only shows basic parameters for welding processes. MENU FULL shows all parameters for welding processes.*

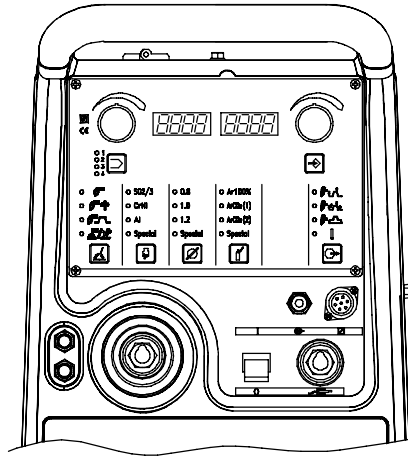
To set menu type, proceed as follows:

Press P2 to enter SET UP menu.

Use E1 to select MENU EASY on D1 and D2 (default setting).

Use E2 to change D2 to FULL.

## 4-10. Preparing Unit For MIG Welding



To select MIG welding process, proceed as follows:

Follow safety precautions according to Section 1.

Prepare unit according Section 3.


Using the proper cable bundle, connect unit to the wire feeder (see Wire Feeder manual).

Using a cable with a proper adapter, connect gun to the MIG gun connector on wire

feeder (see Wire Feeder manual).

Connect work clamp cable to the WORK connector.

If using a water-cooled gun, connect input coolant hose to blue quick connect fitting and return coolant hose to red quick connect fitting.

 Check coolant level after attaching torch coolant hoses and running cooler. Be sure coolant appears in upper

half of indicator. Add coolant if necessary (see Section 3-9).

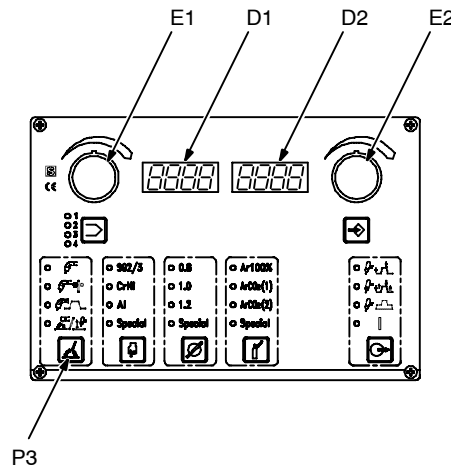
If a remote control is desired, connect it to the Remote Control receptacle on the wire feeder (see Wire Feeder manual).

Turn unit On.

Allow time for unit to complete its start up cycle.

Set MIG welding process using P3 push button.

## 4-11. Selecting Manual MIG Welding



Set Manual MIG welding process using P3 push button.

In Manual MIG mode, the operator may need to adjust main welding parameters for specific arc characteristics. Wire feed speed and arc voltage will appear on D1 and D2.

### During Setting :

D1 value is default voltage setting of 18.5 V (range is 10.0 V to 50.0 V).

D2 value is default wire feed speed setting of 5.0 m/min (range is 1.0 m/min to 20.0 m/min).


### During MIG Welding:

D1 value is Measured Welding Voltage in Volts.

D2 value is Measured Welding Amperage in Amperes.

See Wire Feeder manual for all other remaining manual MIG settings.

### Setting Cooler Status

 Be sure that cooler is turned on for water-cooled torch to prevent damage to torch components.

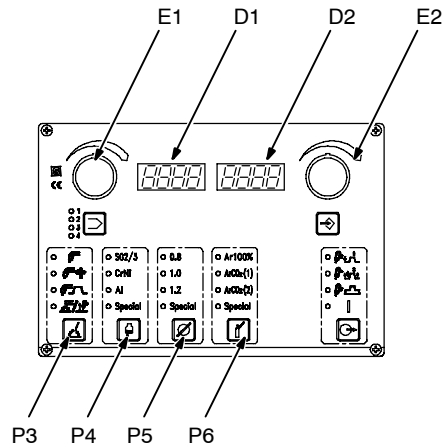
Use E1 to change D1 to W-ON.

D2 value is default setting of ON.

Use E2 to change D2 value to OFF, if applicable.



## 4-12. Selecting Synergic MIG Welding



Set Synergic MIG welding process using P3 push button.

In Synergic MIG mode, the operator may need to adjust welding data (wire type, wire diameter, and gas type) and only one weld parameter. Generally, wire feed speed is adjusted and the synergic process automatically sets appropriate weld voltage. Synergic welding also sets many secondary welding parameters automatically for improved weld quality.

### During Setting :

D1 value is default voltage setting (range is defined by wire type, wire diameter and gas type selection).

D2 value is the default current setting (range is defined by wire type, wire diameter and gas type selection).

### During Synergic MIG Welding:

D1 value is Measured Welding Voltage in Volts.

D2 value is Measured Welding Amperage in Amperes.

See Wire Feeder manual for all remaining Synergic MIG settings.

Select wire type using P4 push button.

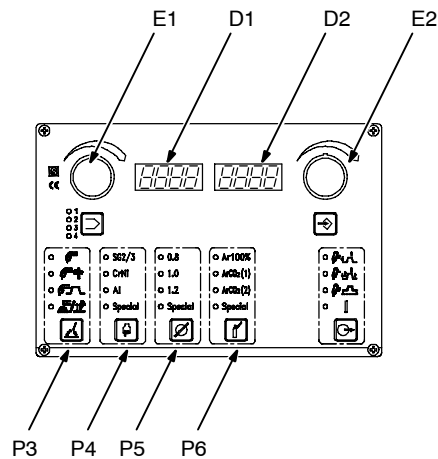
Select wire diameter using P5 push button.

Select trigger mode using P7 push button.

See Wire Feeder manual for all remaining Synergic MIG settings.

**Setting Cooler Status (see Section 4-11)**

## 4-13. Selecting Synergic Pulsed MIG Welding



Set Synergic Pulsed MIG welding process using P3 push button.

Synergic Pulsed MIG welding is a high quality welding process that produces very little spatter. This process works well on thin metals such as stainless steel and aluminum.

In Synergic Pulsed MIG mode, the operator may need to adjust welding data (wire type, wire diameter, and gas type) and only one weld parameter. Generally, wire feed speed is adjusted and the synergic process automatically sets appropriate weld voltage. Synergic welding also sets many secondary welding parameters automatically for improved weld quality.

### During Setting:

D1 value is the default voltage setting (range is defined by wire type, wire diameter and gas type selection).

D2 value is the default current setting (range is defined by wire type, wire diameter and gas type selection).

### During Synergic MIG Welding:

D1 value is Measured Welding Voltage in Volts.

D2 Value is Measured Welding Amperage in Amperes.

Select wire type using P4 push button.

Select wire diameter using P5 push button.

Select trigger mode using P6 push button.

See wire feeder manual for all the remaining Synergic MIG settings.

### Setting Cooler Status (see Section 4-11)

### Setting Synergic Double Pulsed MIG Welding

Some metals weld better using the Synergic Pulsed Welding process due to the unique pulsing of the welding arc. Heat generated in the workpiece is generally lower and the arc characteristics produce a better weld bead appearance especially on aluminum. The Synergic Double Pulsed MIG process allows control all parameters to produce high quality welds on aluminum.

*Incorrect settings in Synergic Double Pulsed Welding process can result in a program with undesirable weld characteristics. Setup should only be used by operators familiar with various welding processes and parameters. In some cases, standard Synergic Pulsed MIG welding can produce better welds.*

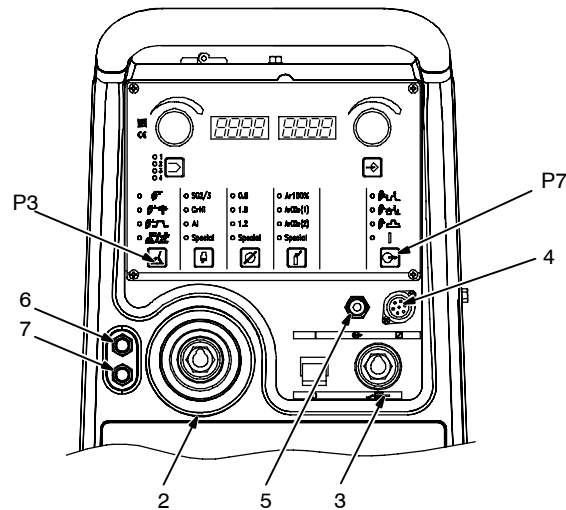
Use E1 to change D1 to DP.

D2 value is default setting of OFF.

Use E2 to change D2 value to ON. This setting will enable or disable Double Pulse in Synergic Pulsed MIG welding.

*On power source, only Double pulse enabling and disabling is possible. All the remaining Double Pulse settings are made on the wire feeder (see Wire Feeder manual). From the wire feeder it is possible to recall Synergic MIG, Synergic Pulsed MIG and Synergic Double Pulsed MIG programs (see Wire Feeder manuals).*

## 4-14. Preparing Unit For TIG Welding



To select TIG welding process, proceed as follows:


Follow safety precautions according to Section 1.

Prepare unit according Section 3.

Connect torch to the WORK connector 3 and the gas pipe to the gas connector 5.

Using a cable with a proper adapter, connect work clamp cable to the MIG gun connector.

If using a water-cooled torch, connect input coolant hose to blue quick connect fitting and return coolant hose to red quick connect fitting.

 Check coolant level after attaching torch coolant hoses and running cooler. Be sure coolant appears in upper half of indicator. Add coolant if necessary (see Section 3-9).

Turn unit On.

Allow time for unit to complete its start up cycle.

Set TIG welding process using P3 push button.

Purge air from torch gas hose using Torch Trigger (Manual Purge).

Select trigger mode using P7 push button (see Section 4-7).

### Setting Initial And Final Amperage (only in MENU FULL)

To set initial and final amperage, proceed as follows:

Press P2 to enter SET UP menu.

Select MENU FULL on D1 and D2 (see Section 4-9).

Use E1 to change D1 to IN-A.

D2 value is default setting of 20 A (range is 0 A to 350 A).

Use E2 to change D2 value.

This parameter allows starting the welding process at a lower initial amperage setting.

Use E1 to change D1 to FI-A.

D2 value is default setting of 20 A (range is 0 A to 350 A).

Use E2 to change D2 value.

This parameter allows finishing the welding process at a lower final amperage setting.

### Setting Postflow (only in MENU FULL)


Select MENU FULL on D1 and D2 (see Section 4-9).

Use E1 to change D1 to POSG.

D2 value is default setting of 0.1 second (range is 0.0 seconds to 10.0 seconds).

Use E2 to change D2 value.

### Setting Cooler Status (only in MENU FULL)

 To prevent damage to water-cooled torch components, be sure that coolant is turned on.

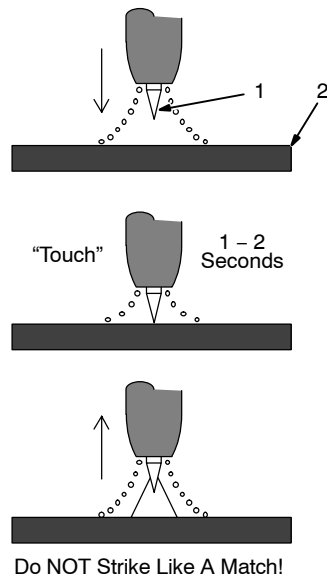
Select MENU FULL on D1 and D2 (see Section 4-9).

Use E1 to change D1 to W-UN.

D2 value is default setting of ON.

Use E2 to change D2 value to OFF, if applicable.

## 4-15. TIG Lift-Arc Welding



### Lift-Arc Start

When Lift-Arc™ button light is On, start arc as follows:

- 1 TIG Electrode
- 2 Workpiece

Touch tungsten electrode to workpiece at weld start point, enable output and shielding gas with torch trigger, foot control, or hand control. **Hold electrode to workpiece for 1-2 seconds**, and slowly lift electrode. Arc is formed when electrode is lifted.

Normal open-circuit voltage is not present before tungsten electrode touches workpiece; only a low sensing voltage is present between electrode and workpiece. The solid-state output contactor does not energize until after electrode is touching workpiece. This allows electrode to touch workpiece without overheating, sticking, or getting contaminated.

### Application:

Lift-Arc is used for the DCEN or AC GTAW process when HF Start method is not permitted, or to replace the scratch method.

Ref. S-156 279

## 4-16. Preparing Unit For Stick Welding

To select STICK welding process, proceed as follows:

Follow safety precautions according to Section 1.

Prepare unit according to Section 3.

Connect electrode holder to the Positive power connector 2.


Connect work clamp cable to the Work connector 3.

If a remote control is desired, connect it to the Remote Control receptacle 4.

Turn unit On.

Allow time for unit to complete its start up cycle.

Set STICK welding process using P3 push button.

 Be aware that STICK welding can be enabled (L20 On) or disabled (L20 Off) using P7 push button, and this status is retained in the STICK welding process memory.

### HOT START Setting (only in MENU FULL)

To change HOT START setting, proceed as follows:

Press P2 to enter SET UP menu.

Select MENU FULL on D1 and D2 (see Section 4-9).

Use E1 to change D1 to HOT.

D2 value is default setting of 100% (range is 0% to 100%).

Use E2 to change D2 value.

This parameter increases output amperage at the start of a weld to eliminate electrode sticking.

### ARC FORCE Setting (only in MENU FULL)

To change ARC FORCE setting, proceed as follows:

Press P2 to enter SET UP menu.

Select MENU FULL on D1 and D2 (see Section 4-9).

Use E1 to change D1 to ARC.

D2 value is default setting of 80% (range is 0% to 100%).

Use E2 to change D2 value.

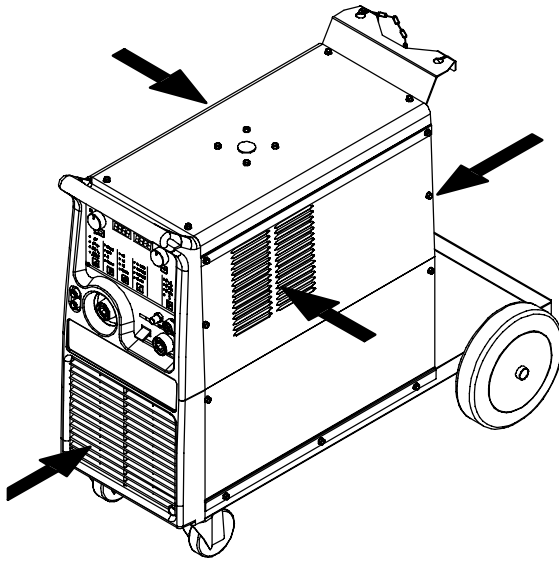
When setting is increased, short-circuit amperage at low arc voltage increases.

# SECTION 5 – MAINTENANCE & TROUBLESHOOTING

## 5-1. Routine Maintenance

|                  |  |                                   |   |  |   |
|------------------|--|-----------------------------------|---|--|---|
|                  |  |                                   |   | <p><b>Disconnect power before maintaining.</b></p> | <p><i>Maintain more often during severe conditions.</i></p> |
| <b>3 Months</b>  |  |                                   |   |  |   |
|                  |  |                                   |   | <p>Replace Damaged Or Unreadable Labels</p>        |   |
|                  |  |                                   |   | <p>Repair Or Replace Cracked Cables</p>            |   |
|                  |  | <p>Replace Cracked Torch Body</p> |   |  |   |
|                  |  |                                   |   |  |   |
|                  |  |                                   |   | <p>Repair Or Replace Cracked Cables And Cords</p>  |   |
|                  |  |                                   |   | <p>Clean And Tighten Weld Connections</p>          |   |
| <b>6 Months</b>  |  |                                   |   |  |   |
|                  |  |                                   | <p>Blow Out Inside</p>                          |  |   |
|                  |  |                                   | <p>Replace Cracked Hoses</p>                    |  |   |
|                  |  |                                   | <p>Blow Out Heat Exchanger Fins</p>             |  |   |
|                  |  |                                   | <p>Change Coolant (If Using Water)</p>          |  |   |
| <b>12 Months</b> |  |                                   |   |  |   |
|                  |  |                                   | <p>Change Coolant (If Using MILLER Coolant)</p> |  |   |

## 5-2. Blowing Out Inside Of Unit



▲ **Do not remove case when blowing out inside of unit.**

To blow out unit, direct airflow through front, side, and back louvers as shown.

## 5-3. Help Displays

☞ *All directions are in reference to the front of the unit. All circuitry referred to is located inside the unit.*

### Help 0

Indicates shorted thermistor RT2 on left side of unit. Contact a Factory Authorized Service Agent.

### Help 1

Indicates a malfunction in the primary power circuit. Contact a Factory Authorized Service Agent.

### Help 2

Indicates a malfunction in the thermal protection circuitry on left side of unit. Contact a Factory Authorized Service Agent.

### Help 3

Indicates overheating on left side of unit. Unit will shutdown and fan will run until internal temperature drops within operational range.

### Help 4

Indicates a malfunction in the thermal protection circuitry on right side of unit. Contact a Factory Authorized Service Agent.

### Help 5

Indicates overheating on right side of unit. Unit will shutdown and fan will run until internal temperature drops within operational range.

### Help 6

Indicates input voltage is too low and unit has automatically shut down. Operation will continue when voltage is within an acceptable lower range limit (15% below acceptable input voltage). Contact an electrician to check input line voltage.

### Help 7

Indicates input voltage is too high and unit has automatically shut down. Operation will continue when voltage is within an acceptable upper range limit (15% above acceptable input voltage). Contact an electrician to check input line voltage. HELP 7 may also indicate a bus voltage imbalance.

### Help 8

Indicates a malfunction in the secondary power circuit of the unit. Contact a Factory Authorized Service Agent.

### Help 9

Indicates a shorted thermistor RT1 on right side of unit. Contact a Factory Authorized Service Agent.

### Help 15

Indicates a malfunctioning cooling unit. Unit will shut down immediately. Turn off primary power. Check and repair cooling unit components as necessary. Unit will operate when power to unit is turned off and back on.

### Help 50

Indicates an overload at the power module. Reduce weld parameter settings and/or duty cycle. If error continues, contact a Factory Authorized Service Agent.

## 5-4. Troubleshooting

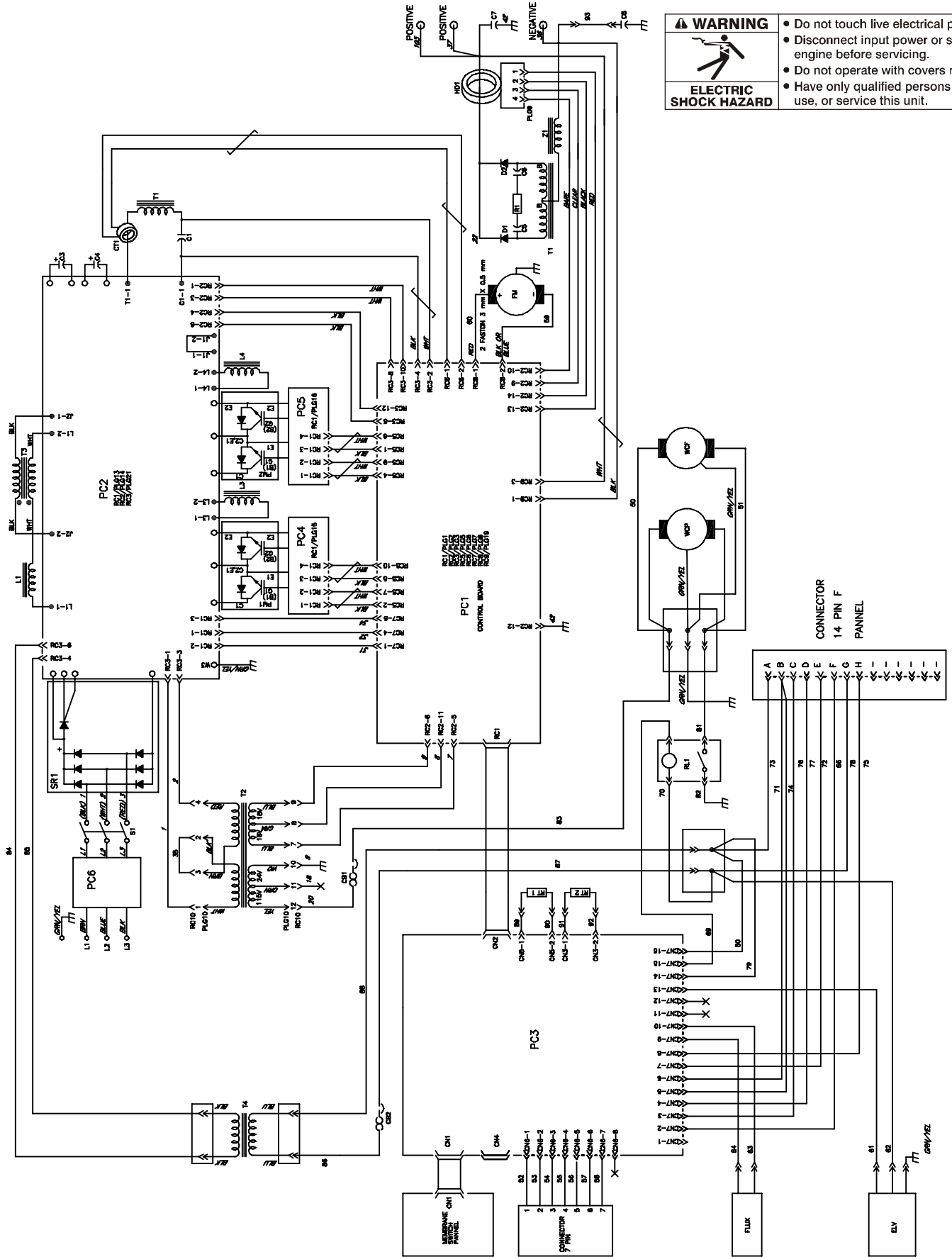


| Trouble  | Remedy   |
|--|--|
| No weld output: unit completely inoperative.                             | Place line disconnect switch in On position (see Section 3-10).                            |
|  | Check and replace line fuse(s), if necessary, or reset circuit breaker (see Section 3-10). |
|  | Check for proper input power connections (see Section 3-10).                               |
| No weld output; meter display On.  | Verify welding parameter settings.   |
|  | Verify Help messages and correction procedures as necessary.                               |
|  | Check, repair, or replace remote control.  |
|  | Unit overheated. Allow fan to run and unit cool (see Section 3-2).                         |
| Erratic or improper weld output.   | Use proper size and type of weld cable (see Section 3-6).                                  |
|  | Clean and tighten all weld connections.  |
| Coolant system not working (HELP 15 is displayed).                       | Check and secure coolant hose connectors.  |
|  | Reset circuit breaker CB7 (see Section 5-3).   |
|  | Motor overheated. Allow motor to cool and restart operation.                               |
|  | Have Factory Authorized Service Agent check cooling unit.                                  |
| Reduced or no coolant flow from cooling unit (HELP 15 can be displayed). | Add coolant.   |
|  | Check for blockage at hoses.   |
| Control panel not functioning properly.<br>Software problems.            | Switch unit off and back on again to verify LED's and display status.                      |
|  | Reinstall factory parameters (see Section 4-2).  |
|  | Contact a Factory Authorized Service Agent.  |





# SECTION 6 - ELECTRICAL DIAGRAM




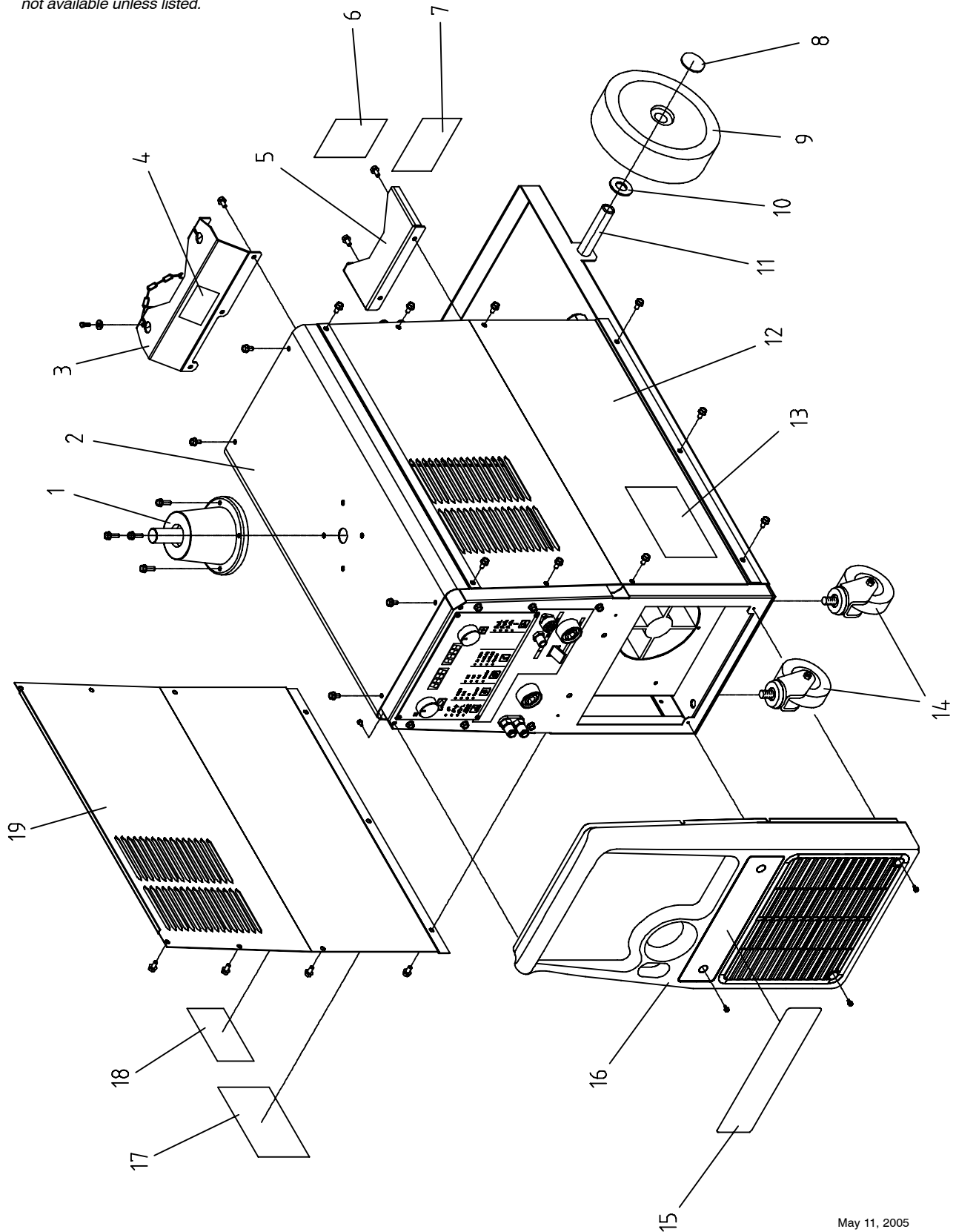
**⚠ WARNING**

**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.

# SECTION 7 – PARTS LIST

 Hardware is common and not available unless listed.



May 11, 2005

**Figure 7-1. Unit Outer Assembly**

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

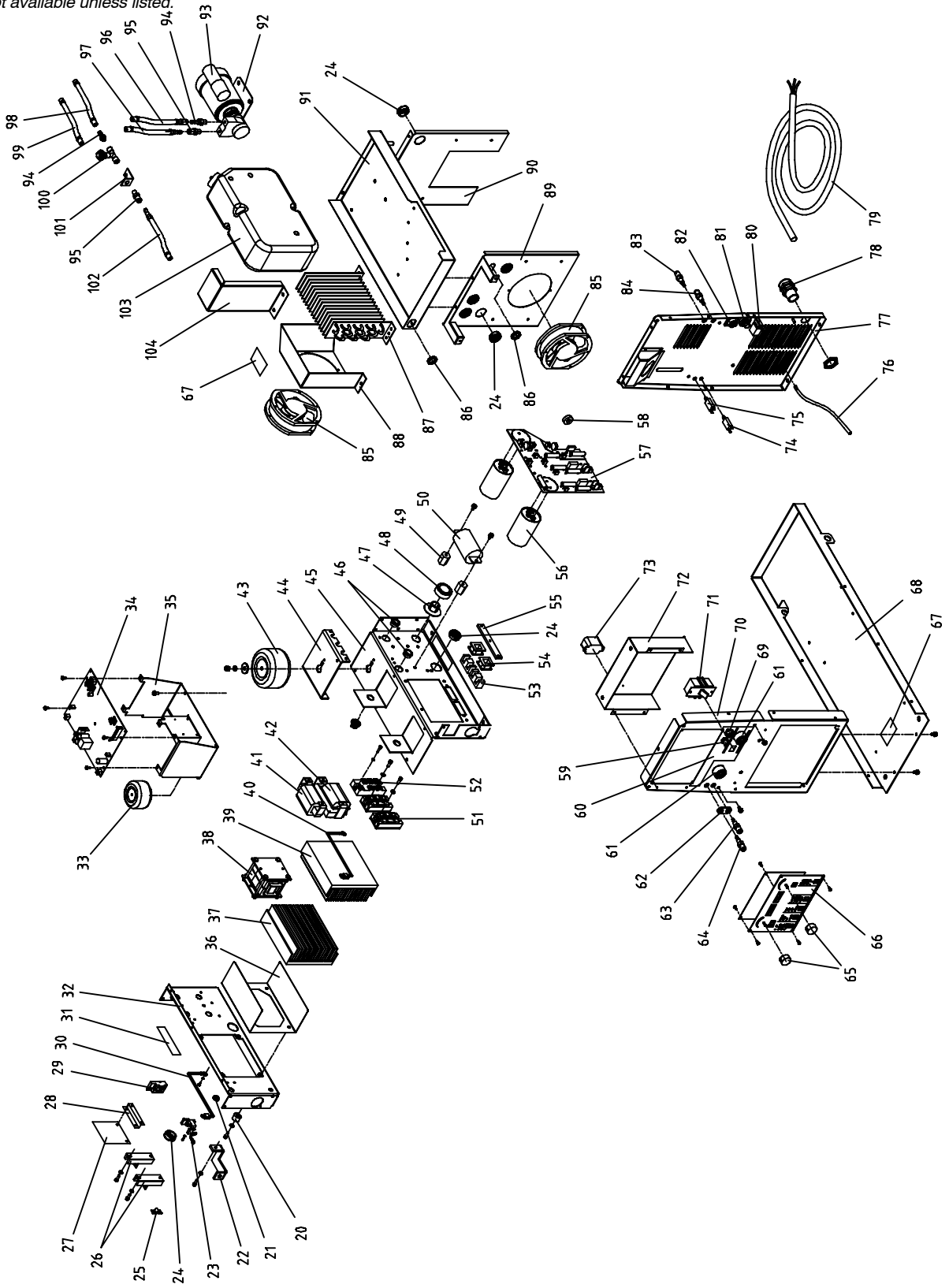
**Figure 7-1. Unit Outer Assembly**

|        |  |            |                                  |   |
|--------|--|------------|----------------------------------|---|
| ... 1  |  | V57038158  | ... Turntable                    | 1 |
| ... 2  |  | +V17031141 | ... Cover                        | 1 |
| ... 3  |  | +V56005145 | ... Cylinder support             | 1 |
| ... 4  |  | 000207235  | ... Label, warning, tilting      | 1 |
| ... 5  |  | V56014164  | ... Cylinder, security           | 1 |
| ... 6  |  | 000207290  | ... Label, warning, cooling unit | 1 |
| ... 7  |  | V56142088  | ... Label, rating plate          | 1 |
| ... 8  |  | 56043030   | ... Cap                          | 2 |
| ... 9  |  | 056054067  | ... Wheels, rubber, 250 mm dia   | 2 |
| ... 10 |  | 156009066  | ... Washer, 21 mm dia            | 2 |
| ... 11 |  | 156012013  | ... Wheels, pivot                | 1 |
| ... 12 |  | +V16122151 | ... Expanded plate dx            | 1 |
| ... 13 |  | 000207233  | ... Label, warning               | 1 |
| ... 14 |  | 056054074  | ... Wheels, pivoting 100 mm dia  | 2 |
| ... 15 |  | V56142156  | ... Label, logo                  | 1 |
| ... 16 |  | 000208154  | ... Panel, front, plastic        | 1 |
| ... 17 |  | 000207233  | ... Label, warning               | 1 |
| ... 18 |  | 000207291  | ... Label, warning, input        | 1 |
| ... 19 |  | +V16122152 | ... Expanded plate sx            | 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.**

☞ Hardware is common and not available unless listed.



May 11, 2005

Figure 7-2. Unit Main Assembly

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

**Figure 7-2. Unit Main Assembly**

|    |          |             |                                |   |
|----|----------|-------------|--------------------------------|---|
| 20 | CR5,6,R1 | 000175940   | Resistor/Capacitors            | 1 |
| 21 |          | 000199840   | Bus bar, diode                 | 2 |
| 22 | D1,2     | 000201531   | Kit Diode, secondary circuit   | 1 |
| 23 | PC6      | 000185697   | Circuit Board, EMI filter      | 1 |
| 24 | HD1      | 000189567   | Transducers, current 300A      | 1 |
| 25 | RT2      | 000173632   | Thermistor, NTC 30k ohms       | 2 |
| 26 | T4       | V58021080   | Transformer, auxiliary         | 1 |
| 27 | PC1      | 000215042   | Circuit board, control         | 1 |
| 28 | T1       | 000179616   | Transformer, HF                | 1 |
| 29 | RT1      | 000173632   | Thermistor, NTC 30 K ohm       | 2 |
| 30 | L1       | 000173563   | Inductor, input                | 1 |
| 31 | Z1       | 000173570   | Stabilizer                     | 1 |
| 32 | T2       | 000195829   | Transformer, control           | 1 |
| 33 | C1       | 000188446   | Capacitor, 5 uf 900 VDC        | 1 |
| 34 | PM1,2    | 000208173   | Kit, IGBT                      | 1 |
| 35 | SR1      | 000179629   | Kit Diode, primary circuit     | 1 |
| 36 | C3,4     | 000192935   | Capacitor, 2700 uf 450 VDC     | 2 |
| 37 | PC2      | 000212210   | Circuit board, interconnect    | 1 |
| 38 |          | V5049205    | Connector, 1/2 gas             | 1 |
| 39 |          | V16029188   | Panel, front, plastic          | 1 |
| 40 |          | **000129525 | Connector, power               | 2 |
| 41 |          | 556049369   | Connector, coupling, blue fast | 1 |
| 42 |          | 556049368   | Connector, coupling, red fast  | 1 |
| 43 |          | 000193919   | Knob, pointer                  | 2 |
| 44 | PC3      | V57084081   | Circuit board, control         | 1 |
| 45 |          | 000176106   | Label, warning, fan            | 2 |
| 46 |          | V16006153   | Base                           | 1 |
| 47 |          | **V57094063 | Receptacle kit, 7 pin          | 1 |
| 48 |          | V16118147   | Panel, front                   | 1 |
| 49 |          | 000128756   | Switch, 40 A 600 VAC           | 1 |
| 50 |          | V56014149   | Board protection               | 1 |
| 51 | RL1      | 000006393   | Relay, 24 VAC                  | 1 |
| 52 | CB1      | 000161078   | Circuit breaker, 7A 250 VAC    | 1 |
| 53 | CB2      | 000083432   | Circuit breaker, 10 A 250 VAC  | 1 |
| 54 |          | V56026083   | Pipe 6*8*1000                  | 1 |
| 55 |          | +V16118146  | Panel, rear                    | 1 |
| 56 |          | V56091091   | Cable holder                   | 1 |
| 57 |          | V57014066   | Main cable, 4m                 | 1 |
| 58 | ELV      | 056061042   | Solenoid valve, 24 VAC         | 1 |
| 59 |          | **000129525 | Power connector                | 1 |
| 60 |          | V58079173   | Cable kit, XMS-4000            | 1 |
| 61 |          | 556049368   | Connector, coupling, red fast  | 1 |
| 62 |          | 556049369   | Connector, coupling, blue fast | 1 |
| 63 | M        | V56126046   | Fan motor, 24 VDC              | 1 |
| 64 |          | 056082094   | Radiator                       | 1 |
| 65 | WCF      | V56126161   | Fan motor, 115 VDC             | 1 |
| 66 |          | V56014162   | Front conveyor                 | 1 |
| 67 |          | V56014163   | Rear conveyor                  | 1 |
| 68 |          | V16117150   | Baffle plate                   | 1 |
| 69 |          | 056061049   | Pressure switch                | 1 |
| 70 |          | V56049211   | Water distribution block       | 1 |
| 71 | WCP      | V57010072   | Motor, 115 VDC, 120 W          | 1 |
| 72 |          | V57011071   | Pump, 3/8" gas                 | 1 |
| 73 |          | V56049064   | Connector, water T             | 1 |
| 74 |          | V27042020   | Tank, 8 liter                  | 1 |

\*\* Order complete connector.

+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.**



# TRUE BLUE<sup>®</sup>

## WARRANTY

Effective January 1, 2006

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 retail purchaser, or 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<sup>®</sup> 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<sup>®</sup> 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.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

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.

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|            |                     |
|------------|---------------------|
| Model Name | Serial/Style Number |
|------------|---------------------|

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|               |  |
|---------------|--|
| Purchase Date | (Date which equipment was delivered to original customer.) |
|---------------|--|

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|             |  |
|-------------|--|
| Distributor |  |
|-------------|--|

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|         |  |
|---------|--|
| Address |  |
|---------|--|

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|         |                 |
|---------|-----------------|
| Country | Zip/Postal Code |
|---------|-----------------|

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# For Service

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

Always provide Model Name and Serial/Style Number.

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|                               |                                  |
|-------------------------------|----------------------------------|
| Contact your Distributor for: | Welding Supplies and Consumables |
|                               | Options and Accessories          |
|                               | Service and Repair               |
|                               | Replacement Parts                |
|                               | Owner's Manuals                  |

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|                                    |  |
|------------------------------------|--|
| 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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**ITW Welding Products Italy S.r.l.**  
 Via Privata Iseo, 6/E  
 20098 San Giuliano  
 Milanese, Italy  
 Phone: 39 (0) 2982901  
 Fax: 39 (0) 298290-203  
 email: miller@itw-welding.it





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