



OM-263 920A

2013-06

**Processes**



TIG (GTAW) Welding

**Description**

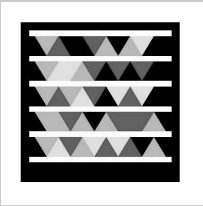


Diversion 165: 230 Volt Arc Welding Power Source

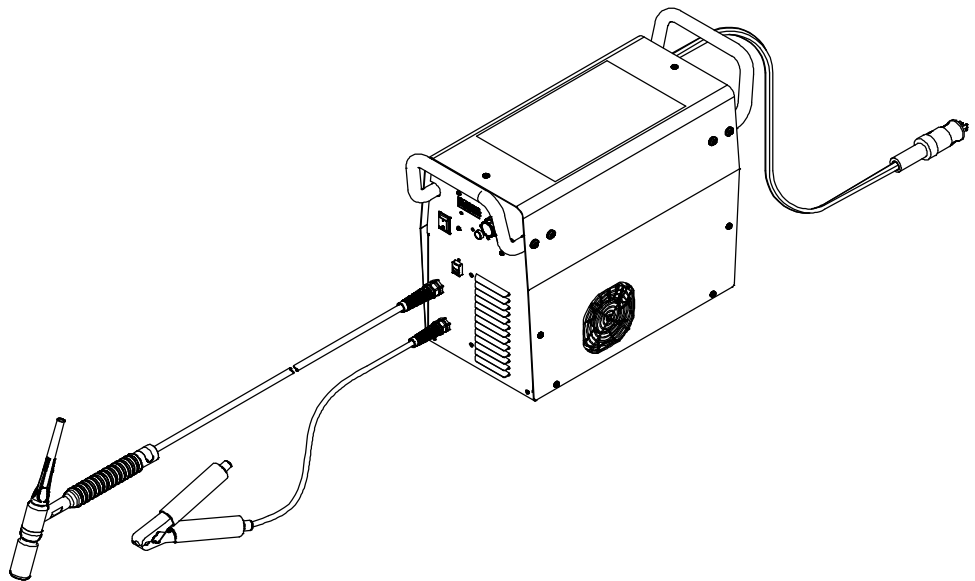
Diversion 180: 115-230 VAC Arc Welding Power Source w/Auto-Line™

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# DIVERSION™ 165 And DIVERSION™ 180 w/Auto-Line™ (WP-17 Torch)



File: TIG (GTAW)



## OWNER'S MANUAL



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# 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 the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.



Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001 Quality System Standard.

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 specification sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at [www.MillerWelds.com](http://www.MillerWelds.com) on the web.**



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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# SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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 Protect yourself and others from injury — read, follow, and save these important safety precautions and operating instructions.

## 1-1. Symbol Usage



**DANGER!** – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

**NOTICE** – Indicates statements not related to personal injury.

 Indicates special instructions.



This group of symbols means Warning! Watch Out! 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, ground, and operate 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.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- 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. Disconnect cable for process not in use.

### SIGNIFICANT DC VOLTAGE exists in inverter 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.



### HOT PARTS can burn.

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



### 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 from arc rays and sparks 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.

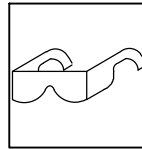


### WELDING can cause fire or explosion.

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 containers that have held combustibles, or on closed containers such as tanks, drums, or pipes unless they are properly prepared according to AWS F4.1 and AWS A6.0 (see Safety Standards).
- Do not weld where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- 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.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or bypass them.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



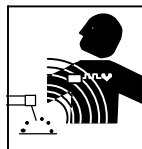
### FLYING METAL or DIRT can injure eyes.

- 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.



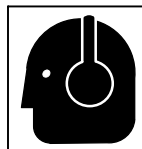
### BUILDUP OF GAS can injure or kill.

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



### ELECTRIC AND MAGNETIC FIELDS (EMF) can affect Implanted Medical Devices.

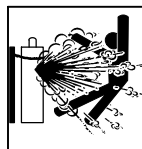
- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.



### 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.

Compressed 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 compressed 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



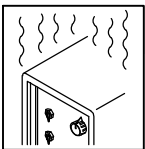
### FIRE OR EXPLOSION hazard.

- 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.



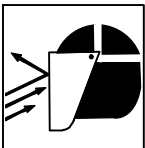
### FALLING EQUIPMENT can injure.

- 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.
- Keep equipment (cables and cords) away from moving vehicles when working from an aerial location.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94-110) when manually lifting heavy parts or equipment.



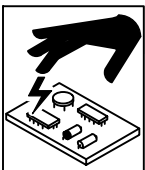
### OVERUSE can cause OVERHEATING

- 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.



### FLYING SPARKS can injure.

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Sparks can cause fires — keep flammables away.



### 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.



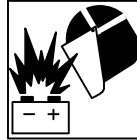
### MOVING PARTS can injure.

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



### WELDING WIRE can injure.

- 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.



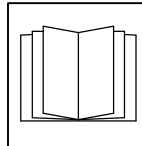
### BATTERY EXPLOSION can injure.

- Do not use welder to charge batteries or jump start vehicles unless it has a battery charging feature designed for this purpose.



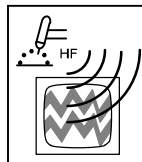
### MOVING PARTS can injure.

- 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 and troubleshooting as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.



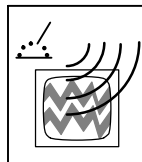
### READ INSTRUCTIONS.

- Read and follow all labels and the Owner's Manual carefully before installing, operating, or servicing unit. Read the safety information at the beginning of the manual and in each section.
- Use only genuine replacement parts from the manufacturer.
- Perform maintenance and service according to the Owner's Manuals, industry standards, and national, state, and local codes.



### 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.)**

 **This product contains chemicals, including lead, known to the state of California to cause cancer, birth defects, or other reproductive harm. Wash hands after use.**

## 1-5. Principal Safety Standards

*Safety in Welding, Cutting, and Allied Processes*, ANSI Standard Z49.1, is available as a free download from the American Welding Society at <http://www.aws.org> or purchased from Global Engineering Documents (phone: 1-877-413-5184, website: [www.global.ihs.com](http://www.global.ihs.com)).

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

*Safe Practices for Welding and Cutting Containers that have Held Combustibles*, American Welding Society Standard AWS A6.0, from Global Engineering Documents (phone: 1-877-413-5184, website: [www.global.ihs.com](http://www.global.ihs.com)).

*National Electrical Code*, NFPA Standard 70, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: [www.nfpa.org](http://www.nfpa.org) and [www.sparky.org](http://www.sparky.org)).

*Safe Handling of Compressed Gases in Cylinders*, CGA Pamphlet P-1, from Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151 (phone: 703-788-2700, website: [www.cganet.com](http://www.cganet.com)).

*Safety in Welding, Cutting, and Allied Processes*, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060

Spectrum Way, Suite 100, Ontario, Canada L4W 5NS (phone: 800-463-6727, website: [www.csa-international.org](http://www.csa-international.org)).

*Safe Practice For Occupational And Educational Eye And Face Protection*, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (phone: 212-642-4900, website: [www.ansi.org](http://www.ansi.org)).

*Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, NFPA Standard 51B, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: [www.nfpa.org](http://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 15250-7954 (phone: 1-866-512-1800) (there are 10 OSHA Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: [www.osha.gov](http://www.osha.gov)).

*Applications Manual for the Revised NIOSH Lifting Equation*, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30333 (phone: 1-800-232-4636, website: [www.cdc.gov/NIOSH](http://www.cdc.gov/NIOSH)).

## 1-6. EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). Welding current creates an EMF field around the welding circuit and welding equipment. EMF fields may interfere with some medical implants, e.g. pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, restrict access for passers-by or conduct individual risk assessment for welders. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.

4. Keep head and trunk as far away from the equipment in the welding circuit as possible.
5. Connect work clamp to workpiece as close to the weld as possible.
6. Do not work next to, sit or lean on the welding power source.
7. Do not weld whilst carrying the welding power source or wire feeder.

### About Implanted Medical Devices:

Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.



# SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

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**!** Pour écarter les risques de blessure pour vous-même et pour autrui — lire, appliquer et ranger en lieu sûr ces consignes relatives aux précautions de sécurité et au mode opératoire.

## 2-1. Symboles utilisés



**DANGER!** – Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.



Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.

**NOTE** – Indique des déclarations pas en relation avec des blessures personnelles.

 Indique des instructions spécifiques.



Ce groupe de symboles veut dire Avertissement! Attention! DANGER DE CHOC ELECTRIQUE, PIECES EN MOUVEMENT, et PIECES CHAUDES. Consulter les symboles et les instructions ci-dessous y afférant pour les actions nécessaires afin d'éviter le danger.

## 2-2. Dangers relatifs au soudage à l'arc



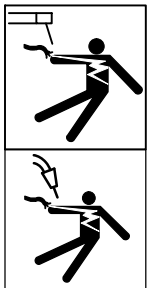
Les symboles représentés ci-dessous sont utilisés dans ce manuel pour attirer l'attention et identifier les dangers possibles. En présence de l'un de ces symboles, prendre garde et suivre les instructions afférentes pour éviter tout risque. Les instructions en matière de sécurité indiquées ci-dessous ne constituent qu'un sommaire des instructions de sécurité plus complètes fournies dans les normes de sécurité énumérées dans la Section 2-5. Lire et observer toutes les normes de sécurité.



Seul un personnel qualifié est autorisé à installer, faire fonctionner, entretenir et réparer cet appareil.



Pendant le fonctionnement, maintenir à distance toutes les personnes, notamment les enfants de l'appareil.



### UNE DÉCHARGE ÉLECTRIQUE peut entraîner la mort.

Le contact d'organes électriques sous tension peut provoquer des accidents mortels ou des brûlures graves. Le circuit de l'électrode et de la pièce est sous tension lorsque le courant est délivré à la sortie. Le circuit d'alimentation et les circuits internes de la machine sont également sous tension lorsque l'alimentation est sur Marche. Dans le mode de soudage avec du fil, le fil, le dérouleur, le bloc de commande du rouleau et toutes les parties métalliques en contact avec le fil sont sous tension électrique. Un équipement installé ou mis à la terre de manière incorrecte ou impropre constitue un danger.

- Ne pas toucher aux pièces électriques sous tension.
- Porter des gants isolants et des vêtements de protection secs et sans trous.
- S'isoler de la pièce à couper et du sol en utilisant des housses ou des tapis assez grands afin d'éviter tout contact physique avec la pièce à couper ou le sol.
- Ne pas se servir de source électrique à courant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique à courant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique à courant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- D'autres consignes de sécurité sont nécessaires dans les conditions suivantes : risques électriques dans un environnement humide ou si l'on porte des vêtements mouillés ; sur des structures métalliques telles que sols, grilles ou échafaudages ; en position coincée comme assise, à genoux ou couchée ; ou s'il y a un risque élevé de contact inévitable ou accidentel avec la pièce à souder ou le sol. Dans ces conditions, utiliser les équipements suivants,

dans l'ordre indiqué : 1) un poste à souder DC à tension constante (à fil), 2) un poste à souder DC manuel (électrode) ou 3) un poste à souder AC à tension à vide réduite. Dans la plupart des situations, l'utilisation d'un poste à souder DC à fil à tension constante est recommandée. En outre, ne pas travailler seul !

- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installez, mettez à la terre et utilisez correctement cet équipement conformément à son Manuel d'Utilisation et aux réglementations nationales, gouvernementales et locales.
- Toujours vérifier la terre du cordon d'alimentation. Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée, fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Les câbles doivent être exempts d'humidité, d'huile et de graisse; protégez-les contre les étincelles et les pièces métalliques chaudes.
- Vérifier fréquemment le cordon d'alimentation afin de s'assurer qu'il n'est pas altéré ou à nu, le remplacer immédiatement s'il l'est. Un fil à nu peut entraîner la mort.
- L'équipement doit être hors tension lorsqu'il n'est pas utilisé.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- Ne pas toucher des porte électrodes connectés à deux machines en même temps à cause de la présence d'une tension à vide doublée.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité si l'on doit travailler au-dessus du sol.
- S'assurer que tous les panneaux et couvercles sont correctement en place.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.
- Ne pas raccorder plus d'une électrode ou plus d'un câble de masse à une même borne de sortie de soudage. Débrancher le câble pour le procédé non utilisé.

## Il reste une TENSION DC NON NÉGLIGEABLE dans les sources de soudage onduleur UNE FOIS l'alimentation coupée.

- Arrêter les convertisseurs, débrancher le courant électrique et décharger les condensateurs d'alimentation selon les instructions indiquées dans la partie Entretien avant de toucher les pièces.



### LES PIÈCES CHAUDES peuvent provoquer des brûlures.

- Ne pas toucher à mains nues les parties chaudes.
- Prévoir une période de refroidissement avant de travailler à l'équipement.
- Ne pas toucher aux pièces chaudes, utiliser les outils recommandés et porter des gants de soudage et des vêtements épais pour éviter les brûlures.



### LES FUMÉES ET LES GAZ peuvent être dangereux.

Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- À l'intérieur, ventiler la zone et/ou utiliser une ventilation forcée au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est médiocre, porter un respirateur anti-vapeurs approuvé.
- Lire et comprendre les spécifications de sécurité des matériaux (MSDS) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraissants.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.



### LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

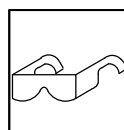
- Porter un casque de soudage approuvé muni de verres filtrants appropriés pour protéger visage et yeux pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des lunettes de sécurité avec écrans latéraux même sous votre casque.
- Avoir recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements les éblouissements et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l'arc.
- Porter des vêtements confectionnés avec des matières résistantes et ignifuges (cuir, coton lourd ou laine) et des bottes de protection.



### LE SOUDAGE peut provoquer un incendie ou une explosion.

Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l'arc de soudure. La projection d'étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l'électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s'assurer que l'endroit ne présente pas de danger.

- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologués.
- Ne pas souder dans un endroit où des étincelles peuvent tomber sur des substances inflammables.
- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 et AWS A6.0 (voir les Normes de Sécurité).
- Ne soudez pas si l'air ambiant est chargé de particules, gaz, ou vapeurs inflammables (vapeur d'essence, par exemple).
- Brancher le câble de masse sur la pièce la plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution, d'étincelles et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.
- Une fois le travail achevé, assurez-vous qu'il ne reste aucune trace d'étincelles incandescentes ni de flammes.
- Utiliser exclusivement des fusibles ou coupe-circuits appropriés. Ne pas augmenter leur puissance; ne pas les ponter.
- Une fois le travail achevé, assurez-vous qu'il ne reste aucune trace d'étincelles incandescentes ni de flammes.
- Utiliser exclusivement des fusibles ou coupe-circuits appropriés. Ne pas augmenter leur puissance; ne pas les ponter.
- Suivre les recommandations dans OSHA 1910.252(a)(2)(iv) et NFPA 51B pour les travaux à chaud et avoir de la surveillance et un extincteur à proximité.



### DES PIÈCES DE METAL ou DES SALETES peuvent provoquer des blessures dans les yeux.

- Le soudage, l'écaillage, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.



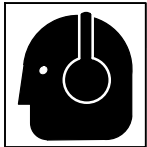
### LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz comprimé en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.



### Les CHAMPS ÉLECTROMAGNÉTIQUES (CEM) peuvent affecter les implants médicaux.

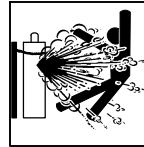
- Les porteurs de stimulateurs cardiaques et autres implants médicaux doivent rester à distance.
- Les porteurs d'implants médicaux doivent consulter leur médecin et le fabricant du dispositif avant de s'approcher de la zone où se déroule du soudage à l'arc, du soudage par points, du gougeage, de la découpe plasma ou une opération de chauffage par induction.



### LE BRUIT peut endommager l'ouïe.

Le bruit des processus et des équipements peut affecter l'ouïe.

- Porter des protections approuvées pour les oreilles si le niveau sonore est trop élevé.



### LES BOUTEILLES peuvent exploser si elles sont endommagées.

Les bouteilles de gaz comprimé contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

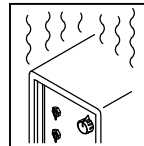
- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, des dommages physiques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d'explosion.
- Utiliser seulement des bouteilles de gaz comprimé, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Détourner votre visage du détendeur-régulateur lorsque vous ouvrez la soupape de la bouteille.
- Le couvercle du détendeur doit toujours être en place, sauf lorsque la bouteille est utilisée ou qu'elle est reliée pour usage ultérieur.
- Utiliser les équipements corrects, les bonnes procédures et suffisamment de personnes pour soulever et déplacer les bouteilles.
- Lire et suivre les instructions sur les bouteilles de gaz comprimé, l'équipement connexe et le dépliant P-1 de la CGA (Compressed Gas Association) mentionné dans les principales normes de sécurité.

## 2-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance



### Risque D'INCENDIE OU D'EXPLOSION.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces inflammables.
- Ne pas installer l'appareil à proximité de produits inflammables.
- Ne pas surcharger l'installation électrique – s'assurer que l'alimentation est correctement dimensionnée et protégée avant de mettre l'appareil en service.



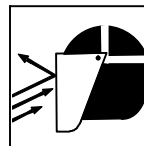
### L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Prévoir une période de refroidissement ; respecter le cycle opératoire nominal.
- Réduire le courant ou le facteur de marche avant de poursuivre le soudage.
- Ne pas obstruer les passages d'air du poste.



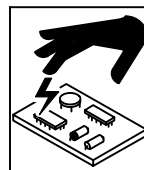
### LA CHUTE DE L'ÉQUIPEMENT peut provoquer des blessures.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariots, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un équipement de levage de capacité suffisante pour lever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.
- Tenir l'équipement (câbles et cordons) à distance des véhicules mobiles lors de toute opération en hauteur.
- Suivre les consignes du Manuel des applications pour l'équation de levage NIOSH révisée (Publication N°94-110) lors du levage manuel de pièces ou équipements lourds.



### LES ÉTINCELLES PROJETÉES peuvent provoquer des blessures.

- Porter un écran facial pour protéger le visage et les yeux.
- Affûter l'électrode au tungstène uniquement à la meuleuse dotée de protecteurs. Cette manœuvre est à exécuter dans un endroit sûr lorsque l'on porte l'équipement homologué de protection du visage, des mains et du corps.
- Les étincelles risquent de causer un incendie – éloigner toute substance inflammable.



### LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimés.



### Les PIÈCES MOBILES peuvent causer des blessures.

- Ne pas s'approcher des organes mobiles.
- Ne pas s'approcher des points de coincement tels que des rouleaux de commande.



### LES FILS DE SOUDAGE peuvent provoquer des blessures.

- Ne pas appuyer sur la gâchette avant d'en avoir reçu l'instruction.
- Ne pas diriger le pistolet vers soi, d'autres personnes ou toute pièce mécanique en engageant le fil de soudage.



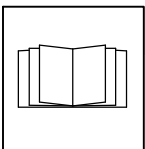
### L'EXPLOSION DE LA BATTERIE peut provoquer des blessures.

- Ne pas utiliser l'appareil de soudage pour charger des batteries ou faire démarrer des véhicules à l'aide de câbles de démarrage, sauf si l'appareil dispose d'une fonctionnalité de charge de batterie destinée à cet usage.



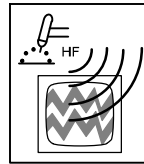
### Les PIÈCES MOBILES peuvent causer des blessures.

- S'abstenir de toucher des organes mobiles tels que des ventilateurs.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.
- Lorsque cela est nécessaire pour des travaux d'entretien et de dépannage, faire retirer les portes, panneaux, recouvrements ou dispositifs de protection uniquement par du personnel qualifié.
- Remettre les portes, panneaux, recouvrements ou dispositifs de protection quand l'entretien est terminé et avant de rebrancher l'alimentation électrique.



### LIRE LES INSTRUCTIONS.

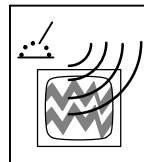
- Lire et appliquer les instructions sur les étiquettes et le Mode d'emploi avant l'installation, l'utilisation ou l'entretien de l'appareil. Lire les informations de sécurité au début du manuel et dans chaque section.
- N'utiliser que les pièces de rechange recommandées par le constructeur.
- Effectuer l'entretien en respectant les manuels d'utilisation, les normes industrielles et les codes nationaux, d'état et locaux.



### LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le rayonnement haute fréquence (H.F.) peut provoquer des interférences avec les équipements de radio-navigation et de communication, les services de sécurité et les ordinateurs.

- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et un blindage pour réduire les interférences éventuelles.



### LE SOUDAGE À L'ARC risque de provoquer des interférences.

- L'énergie électromagnétique risque de provoquer des interférences pour l'équipement électronique sensible tel que les ordinateurs et l'équipement commandé par ordinateur tel que les robots.
- Veiller à ce que tout l'équipement de la zone de soudage soit compatible électromagnétiquement.
- Pour réduire la possibilité d'interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que ce poste de soudage soit posé et mis à la terre conformément à ce mode d'emploi.
- En cas d'interférences après avoir pris les mesures précédentes, il incombe à l'utilisateur de prendre des mesures supplémentaires telles que le déplacement du poste, l'utilisation de câbles blindés, l'utilisation de filtres de ligne ou la pose de protecteurs dans la zone de travail.

## 2-4. Proposition californienne 65 Avertissements

**!** Les équipements de soudage et de coupage produisent des fumées et des gaz qui contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des malformations congénitales et, dans certains cas, des cancers. (Code de santé et de sécurité de Californie, chapitre 25249.5 et suivants)

**!** Ce produit contient des produits chimiques, notamment du plomb, dont l'État de Californie reconnaît qu'ils provoquent des cancers, des malformations congénitales ou d'autres problèmes de procréation. *Se laver les mains après utilisation.*

## 2-5. Principales normes de sécurité

*Safety in Welding, Cutting, and Allied Processes*, ANSI Standard Z49.1, is available as a free download from the American Welding Society at <http://www.aws.org> or purchased from Global Engineering Documents (phone: 1-877-413-5184, website: [www.global.ihs.com](http://www.global.ihs.com)).

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

*Safe Practices for Welding and Cutting Containers that have Held Combustibles*, American Welding Society Standard AWS A6.0, from Global Engineering Documents (phone: 1-877-413-5184, website: [www.global.ihs.com](http://www.global.ihs.com)).

*National Electrical Code*, NFPA Standard 70, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: [www.nfpa.org](http://www.nfpa.org) and [www.sparky.org](http://www.sparky.org)).

*Safe Handling of Compressed Gases in Cylinders*, CGA Pamphlet P-1, from Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151 (phone: 703-788-2700, website: [www.cganet.com](http://www.cganet.com)).

*Safety in Welding, Cutting, and Allied Processes*, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060

Spectrum Way, Suite 100, Ontario, Canada L4W 5NS (phone: 800-463-6727, website: [www.csa-international.org](http://www.csa-international.org)).

*Safe Practice For Occupational And Educational Eye And Face Protection*, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (phone: 212-642-4900, website: [www.ansi.org](http://www.ansi.org)).

*Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, NFPA Standard 51B, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: [www.nfpa.org](http://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 15250-7954 (phone: 1-866-512-1800) (there are 10 OSHA Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: [www.osha.gov](http://www.osha.gov)).

*Applications Manual for the Revised NIOSH Lifting Equation*, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30333 (phone: 1-800-232-4636, website: [www.cdc.gov/NIOSH](http://www.cdc.gov/NIOSH)).

## 2-6. Informations relatives aux CEM

Le courant électrique qui traverse tout conducteur génère des champs électromagnétiques (CEM) à certains endroits. Le courant de soudage crée un CEM autour du circuit et du matériel de soudage. Les CEM peuvent créer des interférences avec certains implants médicaux comme des stimulateurs cardiaques. Des mesures de protection pour les porteurs d'implants médicaux doivent être prises: Limiter par exemple tout accès aux passants ou procéder à une évaluation des risques individuels pour les soudeurs. Tous les soudeurs doivent appliquer les procédures suivantes pour minimiser l'exposition aux CEM provenant du circuit de soudage:

1. Rassembler les câbles en les torsadant ou en les attachant avec du ruban adhésif ou avec une housse.
2. Ne pas se tenir au milieu des câbles de soudage. Disposer les câbles d'un côté et à distance de l'opérateur.
3. Ne pas courber et ne pas entourer les câbles autour de votre corps.

4. Maintenir la tête et le torse aussi loin que possible du matériel du circuit de soudage.
5. Connecter la pince sur la pièce aussi près que possible de la soudure.
6. Ne pas travailler à proximité d'une source de soudage, ni s'asseoir ou se pencher dessus.
7. Ne pas souder tout en portant la source de soudage ou le dévidoir.




### En ce qui concerne les implants médicaux :

Les porteurs d'implants doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de soudage par points, de gougeage, du coupage plasma ou de chauffage par induction. Si le médecin approuve, il est recommandé de suivre les procédures précédentes.













## SECTION 3 – DEFINITIONS

### 3-1. Additional Safety Symbols And Definitions

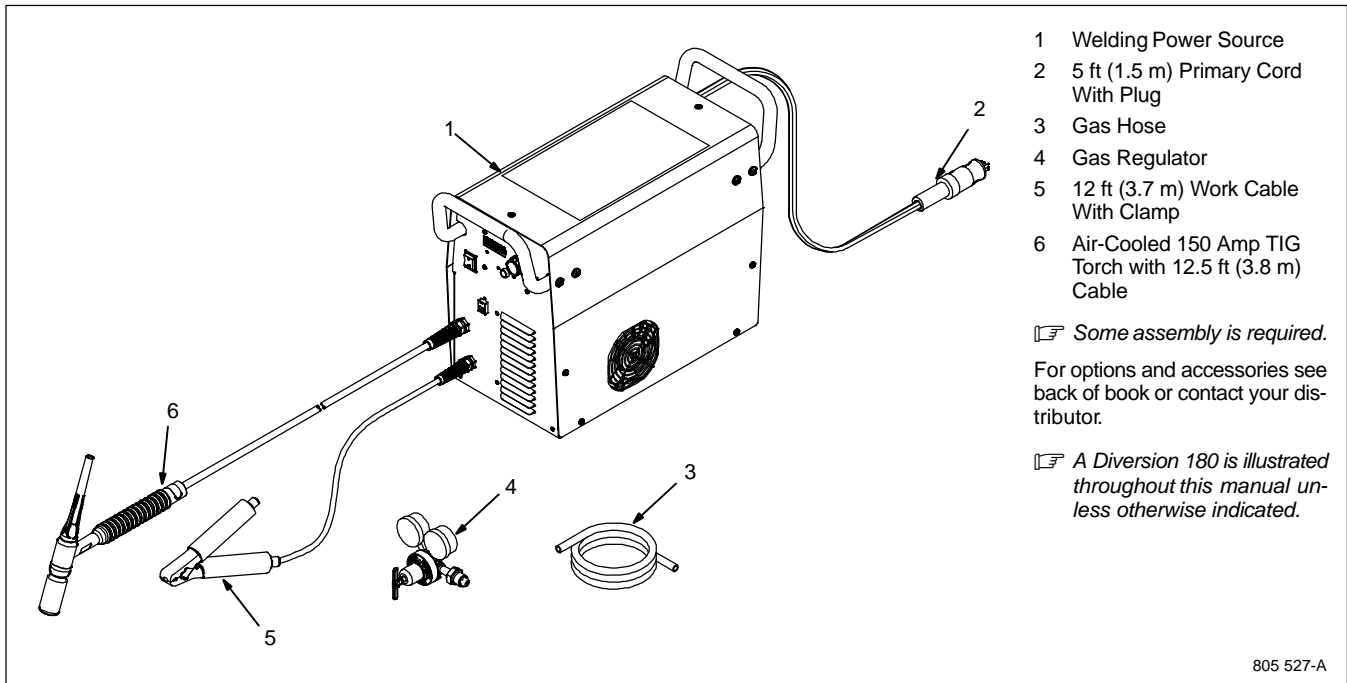
	Warning! Watch Out! There are possible hazards as shown by the symbols. <span style="float: right;">Safe1 2012-05</span>
	GND/PE, Ground/Protective Earth <span style="float: right;">Safe 114 2013-04</span>
	When power is applied failed parts can explode or cause other parts to explode. <span style="float: right;">Safe26 2012-05</span>

### 3-2. Miscellaneous Symbols And Definitions

<b>A</b> Amperes	<b>V</b> Volts		
<b>I</b> On	<b>O</b> Off		<b>I<sub>2</sub></b> Rated Welding Current
<b>X</b> Duty Cycle	<b>U<sub>1</sub></b> Primary Voltage		<b>U<sub>2</sub></b> Conventional Load Voltage
<b>U<sub>0</sub></b> Rated No Load Voltage (Average)	<b>IP</b> Degree Of Protection	<b>I<sub>1max</sub></b> Rated Maximum Supply Current	<b>I<sub>1eff</sub></b> Maximum Effective Supply Current
<b>Hz</b> Hertz	<b>%</b> Percent		<b>S</b> Suitable For Areas Of Increased Shock Hazard
			
			

## SECTION 4 – SPECIFICATIONS

### 4-1. Included with Your Unit



### 4-2. Serial Number And Rating Label Location

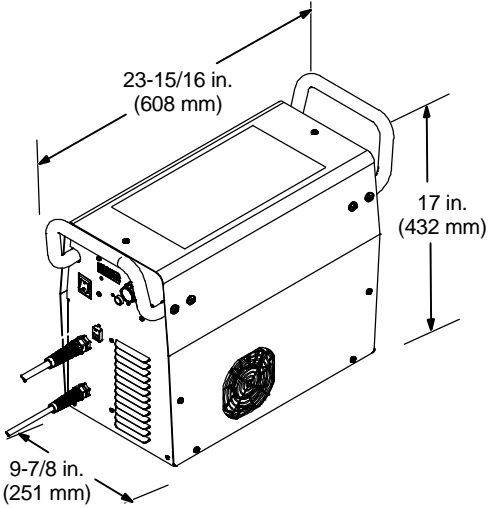
The serial number and rating information for the power source is located on the rear of the machine. Use the rating labels to determine input power requirements and/or rated output. For future reference, write serial number in space provided on back cover of this manual.

### 4-3. Specifications

Diversion 180						
Input Power	Welding Amperage Range	Rated Output	Amps Input At Rated Output	KVA	KW	Max. OCV
115 VAC	10 – 125	60 A at 12.4 V, 100% Duty Cycle	11.3 (.88)*	1.3 (.1)*	1.2 (.03)*	80 VDC
		125 A at 15 V, 35% Duty Cycle	26.5 (.88)*	3.1 (.1)*	3.0 (.03)*	
230 VAC	10 – 180	60 A at 12.4 V, 100% Duty Cycle	5.6 (.44)*	1.3 (.1)*	1.2 (.03)*	
		150 A at 16 V, 20% Duty Cycle	16 (.44)*	3.7 (.1)*	3.6 (.03)*	
		180 A at 17.2 V, 10% Duty Cycle	20 (.44)*	4.7 (.1)*	4.6 (.03)*	
* () While idling.						
Diversion 165						
230 VAC	10 – 165	60 A at 12.4 V, 100% Duty Cycle	8 (.20)*	1.8 (.04)*	1.2 (.02)*	80 VDC
		150 A at 16 V, 20% Duty Cycle	23 (.20)*	5.3 (.04)*	3.7 (.02)*	
		165 A at 16.6 V, 15% Duty Cycle	25.5 (.20)*	5.9 (.04)*	4.2 (.02)*	
* () While idling.						



## 4-4. Dimensions And Weights

 <p>23-15/16 in. (608 mm)</p> <p>17 in. (432 mm)</p> <p>9-7/8 in. (251 mm)</p> <p>Ref. 805 527 A</p>	<b>Dimensions</b>	
	Height	17 in. (433 mm)
	Width	9.88 in. (251 mm)
	Length	23.93 in. (608 mm) w/handles 19.25 in. (489 mm) w/o handles
	<b>Weight</b>	
50 lbs (23 kg)		

## 4-5. Environmental Specifications

### A. IP Rating

IP Rating	Operating Temperature Range	Storage Temperature Range
IP23 This equipment is designed for outdoor use. It may be stored, but is not intended to be used outside during precipitation unless sheltered.	14 to 104 °F (-10 to 40°C)	-4 to 122 °F (-20 to 50°C)

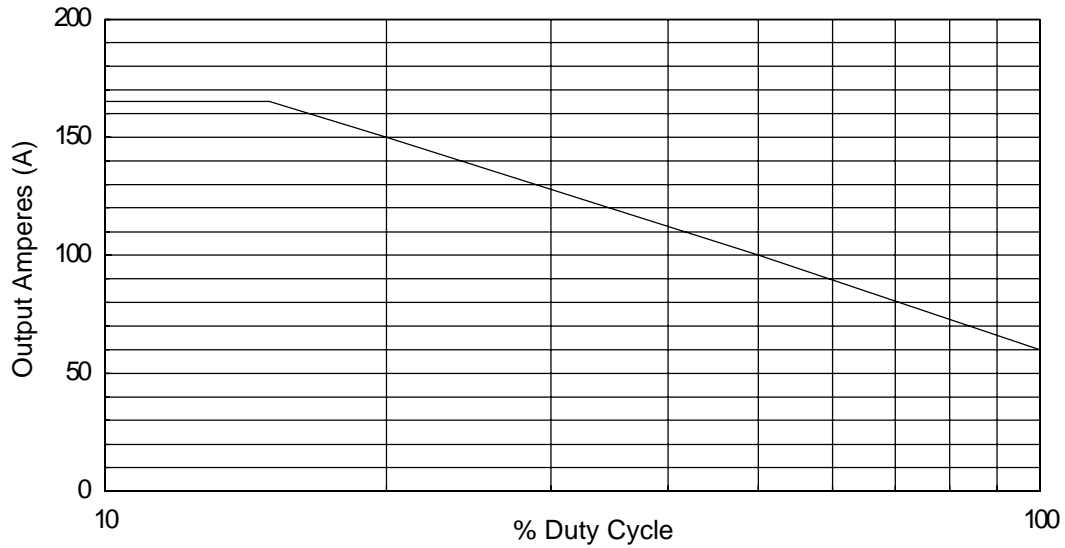
## 4-6. Duty Cycle Charts



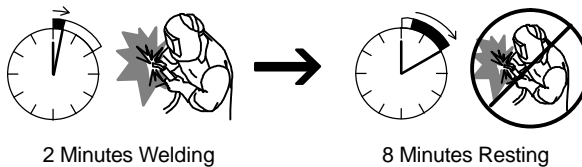
Duty cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

**NOTICE** – Exceeding duty cycle can damage unit and void warranty.

### Diversion 165 Models

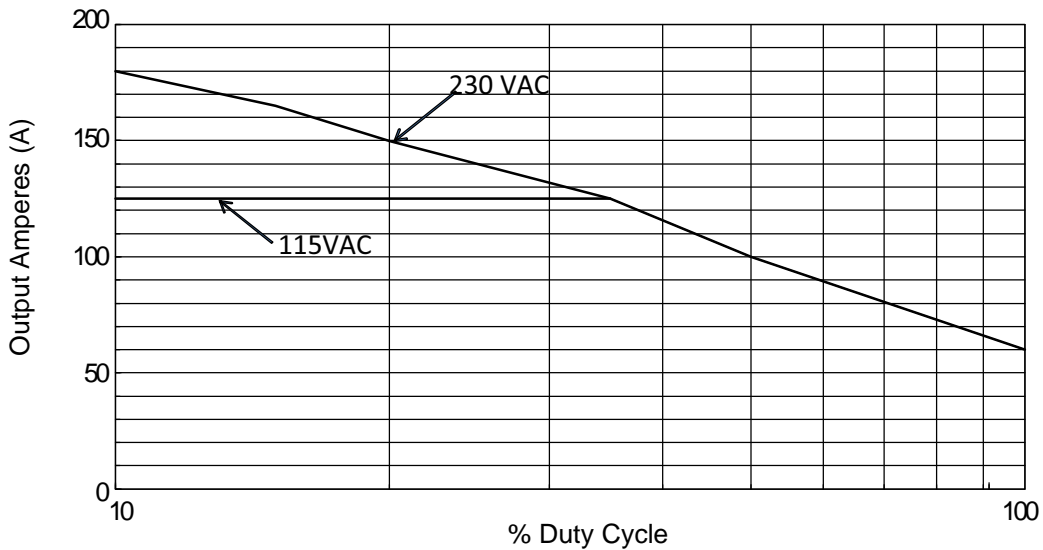


20% Duty Cycle at 150 A AC/DC

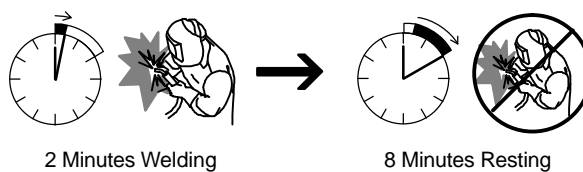


232 918-B

### Diversion 180 Models




20% Duty Cycle at 150 A AC/DC



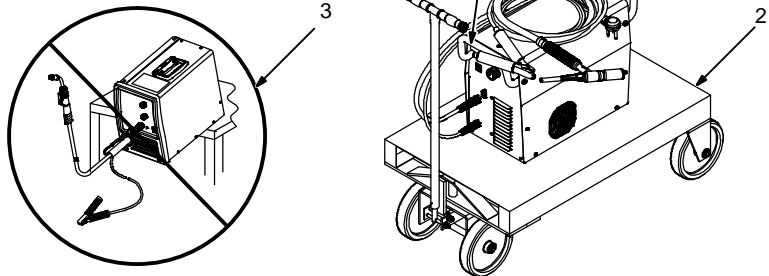
246 526-A

# SECTION 5 – INSTALLATION

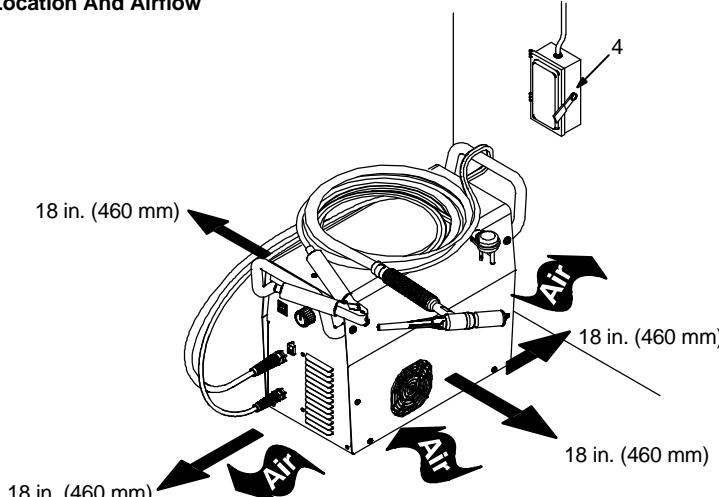
## 5-1. Selecting A Location (All Models)



**Movement**



**Location And Airflow**



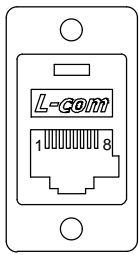


- 1 Handles  
Use Handles to lift welder; get help if necessary.
- 2 Cart  
Place welder on cart to move unit.
- 3 Tipping  
**⚠ Do not move or operate unit where it could tip.**
- 4 Line Disconnect Device  
Locate unit near correct input power supply.  
Position unit so air can circulate.  
For information about sources of high-frequency see Section 9.  
For carts and caster kits see back of book or contact your distributor.

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

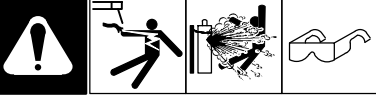
805 468-C

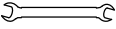
## 5-2. Remote Receptacle For Optional Foot Control

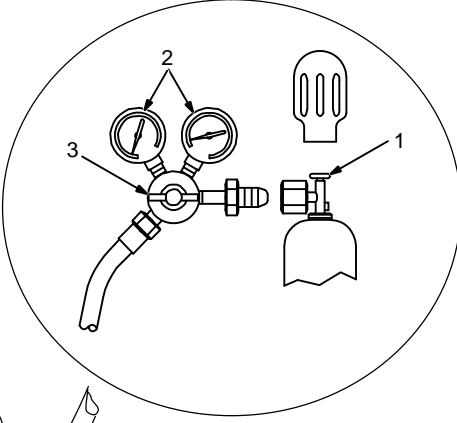
**NOTICE** – Use this receptacle to connect the dedicated optional foot control only. Connecting other types of equipment to this receptacle may damage your machine.

 805 113-A		<b>Socket*</b>	<b>Socket Information</b>
	<b>A</b>	1	Command reference; +10 volts DC output to remote control.
		2	0 to +10 volts DC input command signal from remote control.
		3	Remote control circuit common.
		4	15 volts DC.
		6	Contact closure to 4 completes 15 volts DC contactor control circuit.
		<b>Foot Select</b>	5
		7	Chassis common.
	8	Not Used	

### 5-3. Shielding Gas Connections

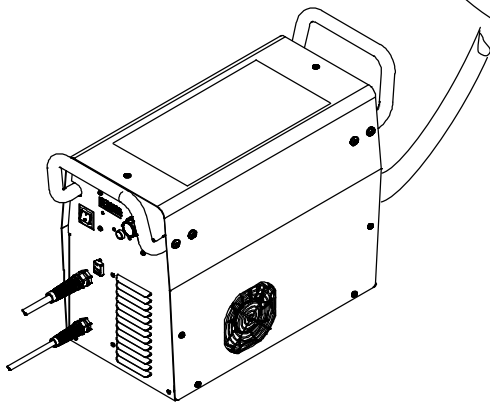


**Tools Needed:**  
 5/8, 1-1/8 in.



☞ Use argon shielding gas for best performance.

- 1 Cylinder Valve  
Open valve slightly so gas flow blows dirt from valve. Close valve.
- 2 Regulator/Flow Gauge  
Connect regulator/flow gauge to gas cylinder. Do not over tighten. Connect gas hose to gas in fitting.
- 3 Flow Adjust  
Typical flow rate is 20 cfh (cubic feet per hour).



Ref. 805 527 A

### 5-4. Electrical Service Guide

☞ All values calculated at 10% duty cycle.

☞ Actual input voltage cannot exceed  $\pm 10\%$  of indicated required input voltage shown in table. If actual input voltage is outside of this range, damage to unit may occur.

**⚠ Failure to follow these electrical service guide recommendations could create an electric shock or fire hazard. These recommendations are for a dedicated circuit sized for the rated output and duty cycle of the welding power source.**

In dedicated circuit installations, the National Electrical Code (NEC) allows the receptacle or conductor rating to be less than the rating of the circuit protection device. All components of the circuit must be physically compatible. See NEC articles 210.21, 630.11, and 630.12.

60 Hz Single Phase	Diversion 165	Diversion 180	
<b>Input Voltage</b>	230 Volts AC	230 Volts AC	115 Volts AC
<b>Input Amperes At Rated Output</b>	23	20	A 15 or 20 ampere individual branch circuit protected by time-delay fuses or circuit breaker is required.
<b>Max Recommended Standard Fuse or circuit breaker Rating In Amperes <sup>1</sup></b>			
<b>Time-Delay <sup>2</sup></b>	30	25	
<b>Normal Operating <sup>3</sup></b>	35	30	
<b>Min Input Conductor Size In AWG <sup>4</sup></b>	14	14	See Section 5-7
<b>Max Recommended Input Conductor Length In Feet (Meters)</b>	64 (20)	55 (17)	
<b>Min Grounding Conductor Size In AWG <sup>4</sup></b>	14	14	

Reference: 2011 National Electrical Code (NEC) (including article 630)

1 If a circuit breaker is used in place of a fuse, choose a circuit breaker with time-current curves comparable to the recommended fuse.

2 "Time-Delay" fuses are UL class "RK5". See UL 248.

3 "Normal Operating" (general purpose - no intentional delay) fuses are UL class "K5" (up to and including 60 amps), and UL class "H" (65 amps 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 310.15(B)(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.

## 5-5. Selecting Extension Cord (Use Shortest Cord Possible)

Single Phase AC Input Voltage	Conductor Size – AWG (mm <sup>2</sup> )*				
	4 (21.2)	6 (13.3)	8 (8.4)	10 (5.3)	12 (3.3)
	Maximum Allowable Cord Length in ft (m)				
115	160 (49)	107 (33)	71 (22)	47 (14)	29 (9)
230	471 (144)	321 (98)	215 (66)	146 (45)	90 (27)

\*Conductor size is based on maximum 3% voltage drop

## 5-6. Connecting 230 Volts Input Power For Diversion 165 Models

=GND/PE Earth Ground

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

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

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

See rating label on unit and check input voltage available at site.

- Rating Label
- Black And White Input Conductor (L1 And L2)
- Green Or Green/Yellow Grounding Conductor
- Input Power Cord.
- Disconnect Device (switch shown in the OFF position)
- Disconnect Device Grounding Terminal
- 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.

8 Over-Current Protection

Select type and size of over-current protection using Section 5-4 (fused disconnect switch shown).

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

- Plug (NEMA 6-50P)
- Receptacle (NEMA 6-50R) (Customer Supplied)

Connect plug to receptacle.

**Tools Needed:**

Ref. 805 467-C

## 5-7. Connecting 115 Volts Input Power For Diversion 180 Models



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

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

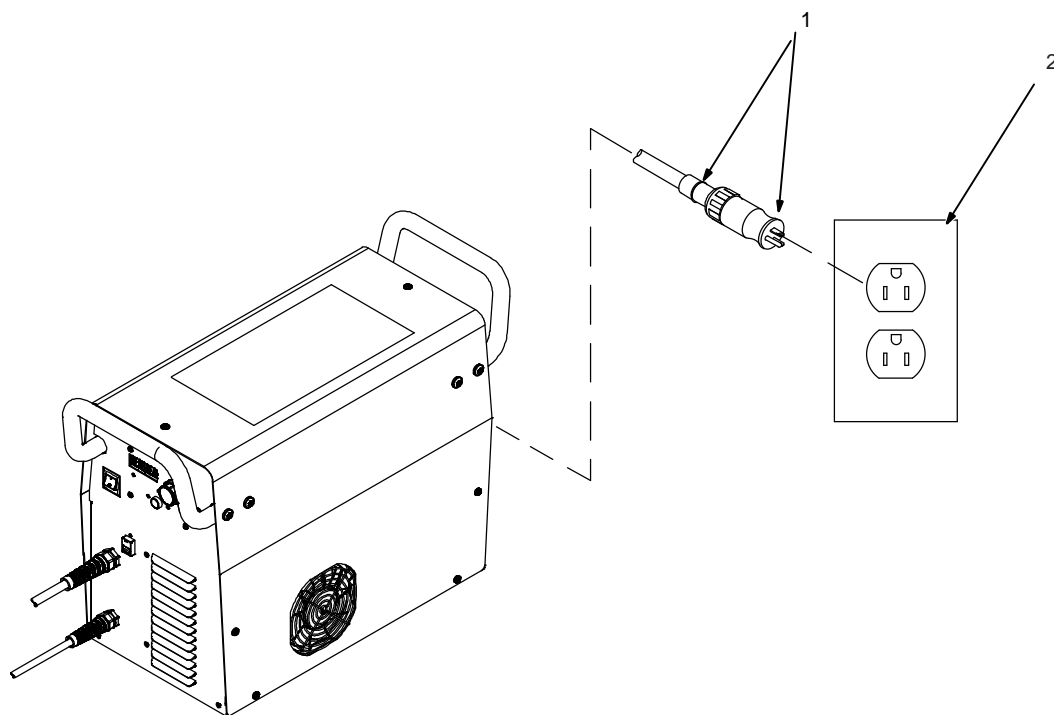
☞ *The Auto-Line circuitry in this unit automatically links the power source to the primary voltage being applied, either 115 or 230 VAC.*

For 115 volts AC input power, a 15 or 20 ampere individual branch circuit protected by time-delay fuses or circuit breaker is required.

1 Multi-Voltage Plug And Power Cord Connector (NEMA Type 5-15P Plug Shown)

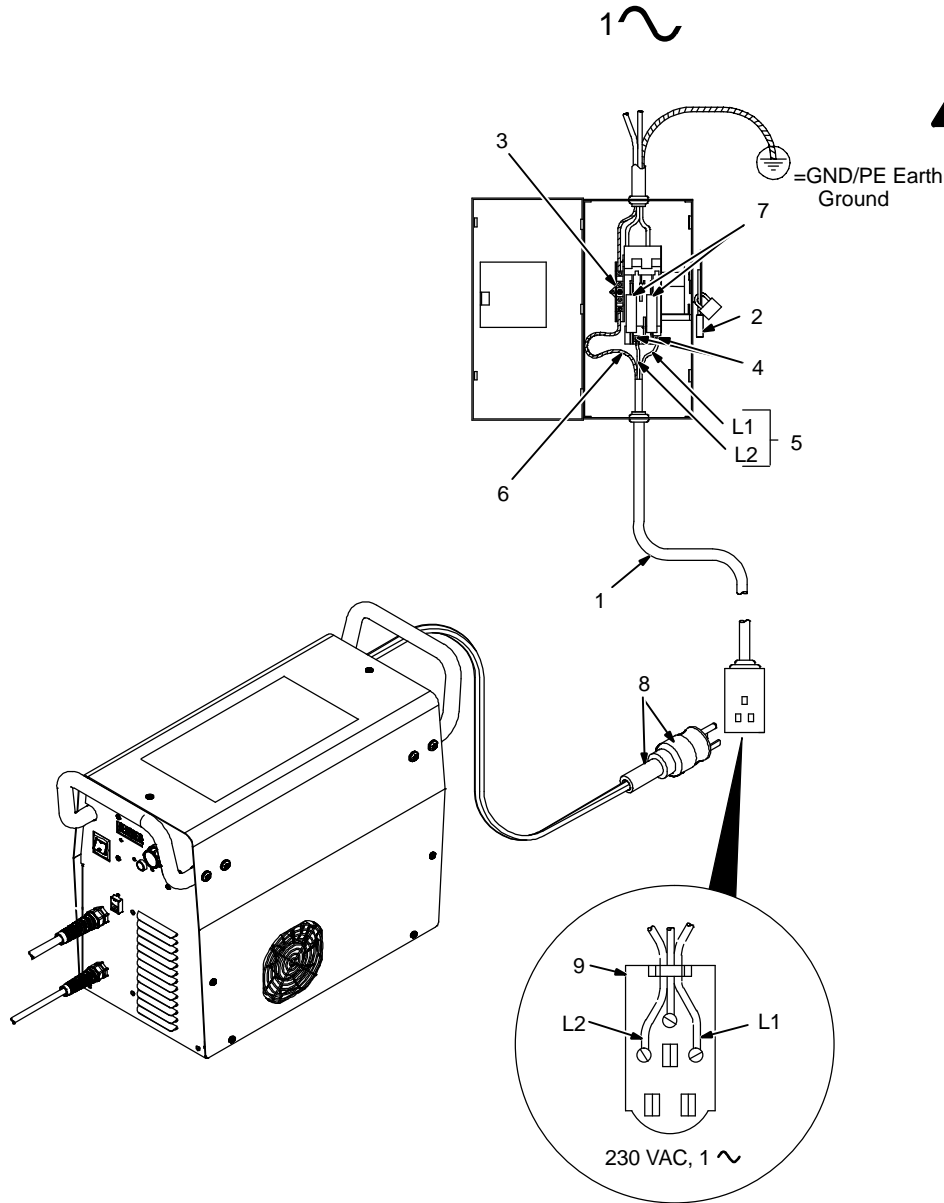
For multi-voltage plug connections, see Section 5-9.

2 Receptacle – NEMA Type 5-15R (Customer Supplied)



Input 6 2011-03 Ref. 805 474-B

## 5-8. Connecting 230 Volts Input Power For Diversion 180 Models



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

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

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

☞ The Auto-Line circuitry in this unit automatically links the power source to the primary voltage being applied, either 115 or 230 VAC.

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

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 5-4 (fused disconnect switch shown).

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

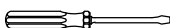
8 Multi-Voltage Plug And Power Cord Connector (NEMA 6-50P Plug Shown)

For multi-voltage plug connections, see Section 5-9.

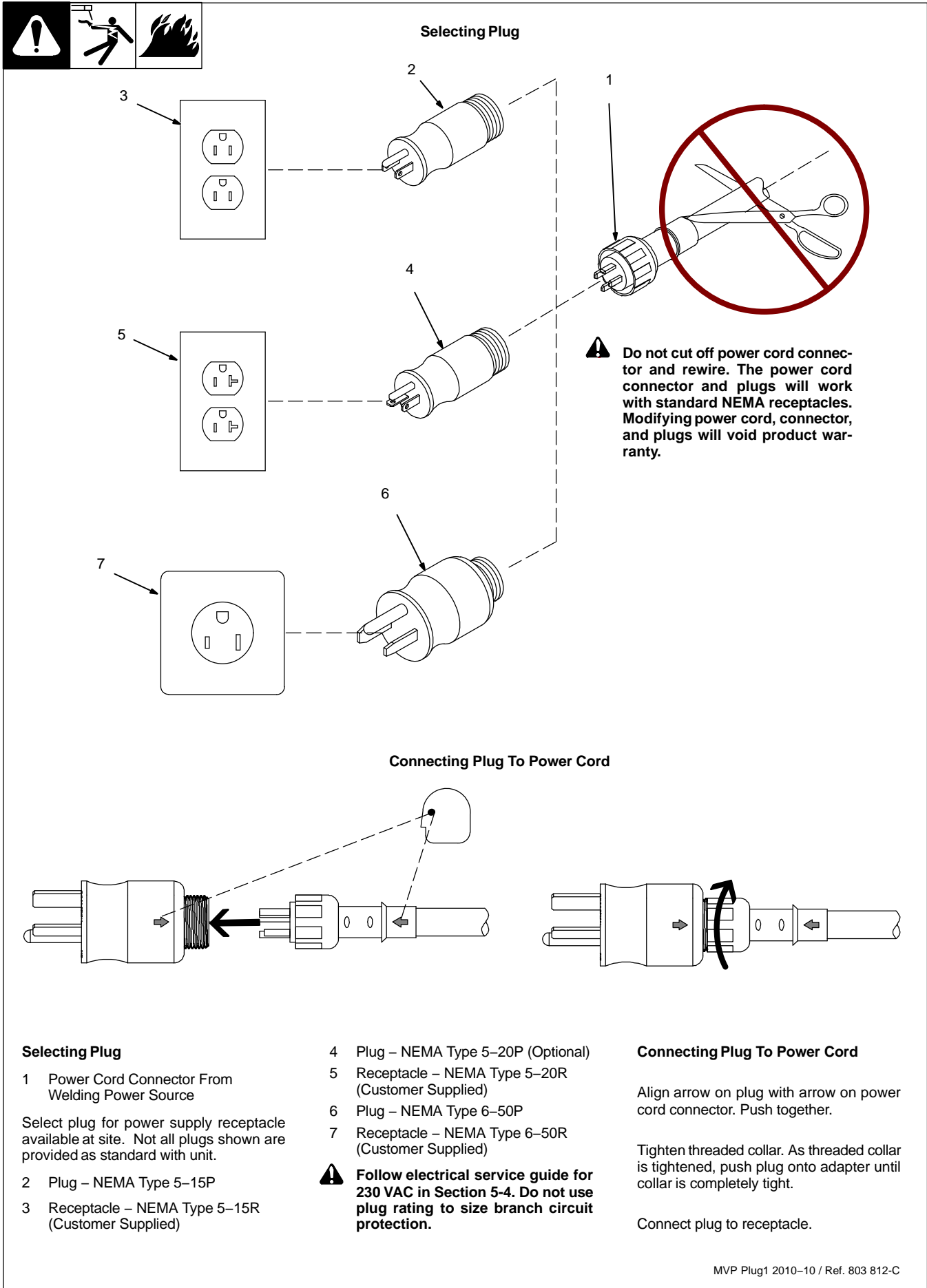
9 Receptacle (NEMA 6-50R) (Customer Supplied)

Connect plug to receptacle.

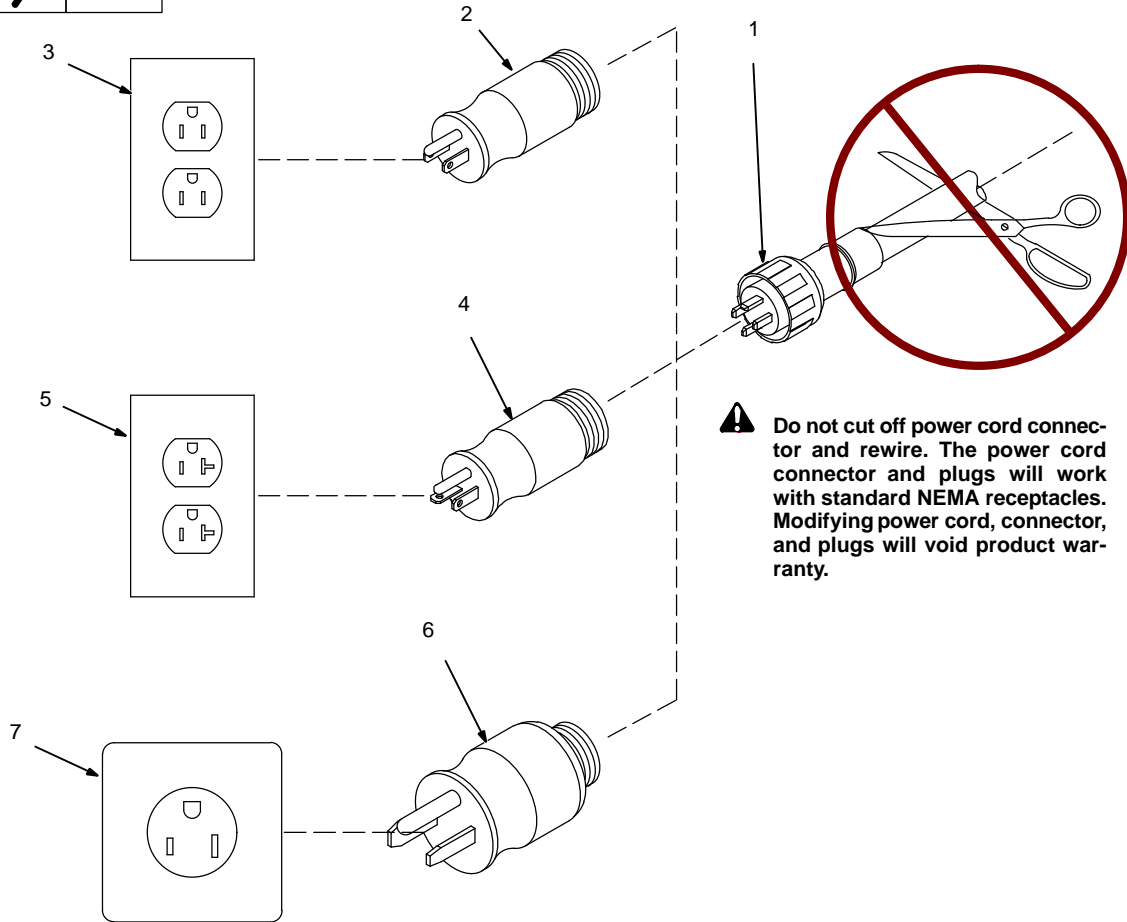
Tools Needed:



## 5-9. Multi-Voltage Plug (MVP) Connection

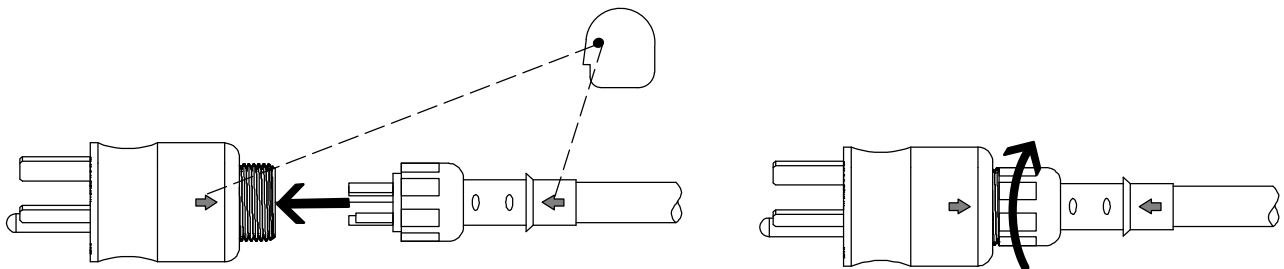


### Selecting Plug



**⚠** Do not cut off power cord connector and rewire. The power cord connector and plugs will work with standard NEMA receptacles. Modifying power cord, connector, and plugs will void product warranty.

### Connecting Plug To Power Cord



#### Selecting Plug

- 1 Power Cord Connector From Welding Power Source

Select plug for power supply receptacle available at site. Not all plugs shown are provided as standard with unit.

- 2 Plug - NEMA Type 5-15P
- 3 Receptacle - NEMA Type 5-15R (Customer Supplied)

- 4 Plug - NEMA Type 5-20P (Optional)
- 5 Receptacle - NEMA Type 5-20R (Customer Supplied)
- 6 Plug - NEMA Type 6-50P
- 7 Receptacle - NEMA Type 6-50R (Customer Supplied)

**⚠** Follow electrical service guide for 230 VAC in Section 5-4. Do not use plug rating to size branch circuit protection.

#### Connecting Plug To Power Cord

Align arrow on plug with arrow on power cord connector. Push together.

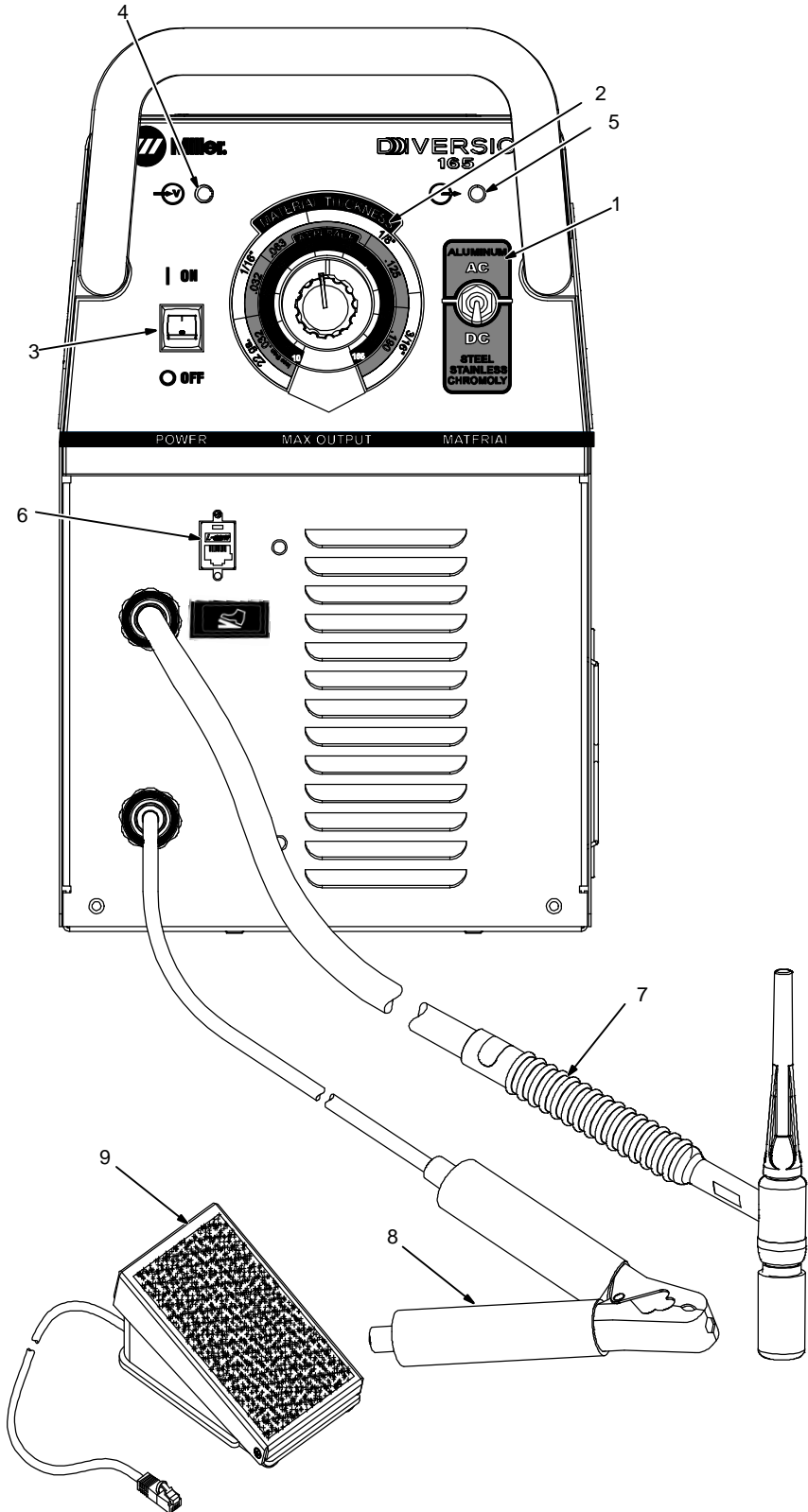
Tighten threaded collar. As threaded collar is tightened, push plug onto adapter until collar is completely tight.

Connect plug to receptacle.



# SECTION 6 – OPERATION

## 6-1. Controls For Diversion 165 Models



1 Material Switch

**⚠ Do not use AC output in damp areas, if movement is confined, or if there is danger of falling. Use AC output ONLY if required for the welding process, and then use a remote control.**

**⚠ Do not change position of switch while welding or while under load.**

*Unit is equipped with Fan-On-Demand™. Fan only runs when output is on or cooling is required.*

Use switch to select DC for steel, stainless steel, and chrome-moly, or AC for aluminum applications.

2 Material Thickness/Amperage Control

Use control to select material thickness and corresponding amperage.

When Material switch is in the DC position, use the blue scale to select the appropriate material thickness and corresponding amperage from the white scale. When Material switch is in the AC position, use the gray scale to select the appropriate material thickness and corresponding amperage from the white scale.

AC parameters have been optimized and automatically set as follows:

- Preflow is preset at .4 seconds for DC or AC
- Postflow is preset for one second for every ten amps of output, with a minimum of eight seconds for DC or AC.
- Balance is 72% EN (electrode negative)
- Frequency is 120 Hz

3 Power Switch

Use switch to turn unit On and Off.

4 Power On LED

Power is on when LED is lit. LED flashes when input power is more than  $\pm 10\%$  of 230 volts. No output available when LED is flashing.

5 Output Indicator LED

Output is On when LED is lit. LED flashes when unit is overheated (see Section 4-6). LED stops flashing when unit has cooled.

6 Remote Receptacle

Receptacle for dedicated remote control.

7 Torch (See Section 11)

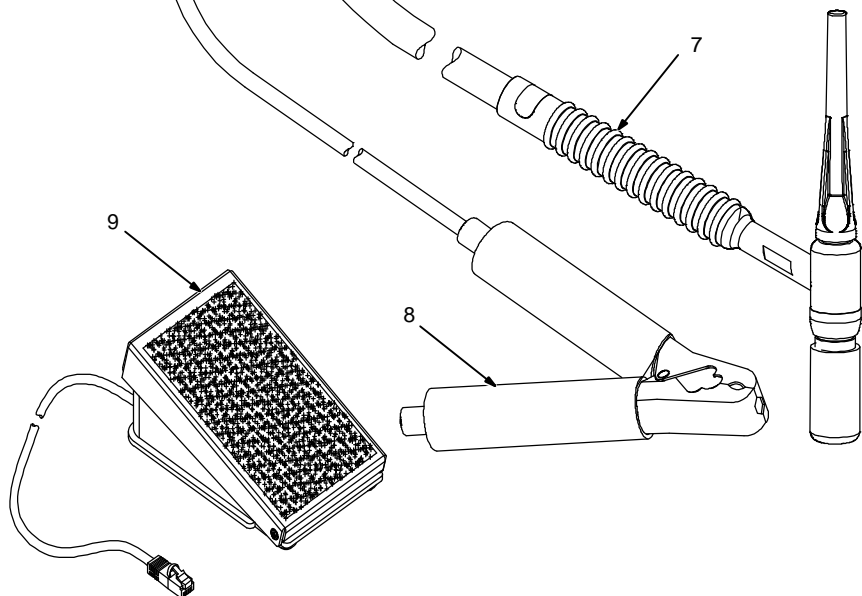
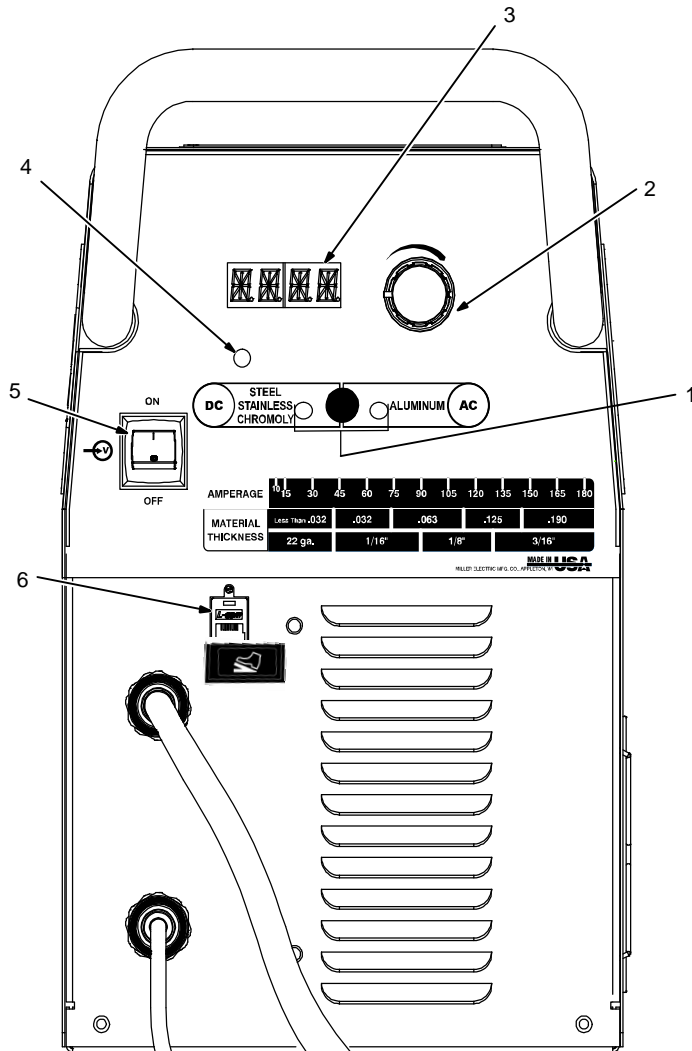
8 Work Clamp (See Section 11)

9 Remote Control

This is a dedicated remote control. Plug remote control into remote receptacle (see Section 5-2).

Depress pedal to start arc and increase amperage from 10 amps to maximum value set on the machine's Material Thickness/Amperage control. Release pedal to extinguish arc.

## 6-2. Controls For Diversion 180 Models



1 Material Button And AC/DC LEDs

**⚠ Do not use AC output in damp areas, if movement is confined, or if there is danger of falling. Use AC output ONLY if required for the welding process, and then use a remote control.**

**⚠ Do not change position of switch while welding or while under load.**

*Unit is equipped with Fan-On-Demand™. Fan only runs when output is on or cooling is required.*

Use button to select DC for steel, stainless steel, and chrome-moly, or AC for aluminum applications. Corresponding LED lights to verify selection of AC or DC.

2 Material Thickness/Amperage Control

Check chart to find correct material thickness and use control to select corresponding amperage.

With DC selected and DC LED lit, use the blue scale to select the appropriate material thickness and corresponding amperage from the white scale. When AC is selected and AC LED is lit, use the gray scale to select the appropriate material thickness and corresponding amperage from the white scale.

AC parameters have been optimized and automatically set as follows:

- Preflow is preset at .4 seconds for DC or AC
- Postflow is preset for one second for every ten amps of output, with a minimum of eight seconds for DC or AC.
- Balance is 72% EN (electrode negative)
- Frequency is 120 Hz

3 Amps Meter

Select preset amps with Material Thickness/Amperage Control. Preset amperage range for 115 volts is 10–125 amps, and 10–180 amps for 230 volts. When output is on, meter displays output amps.

4 Output Indicator LED

Output is On when LED is lit.

5 Power Switch

Use switch to turn unit On and Off.

6 Remote Receptacle

Receptacle for dedicated remote control.

7 Torch (See Section 11)

8 Work Clamp (See Section 11)

9 Remote Control

This is a dedicated remote control. Plug remote control into remote receptacle (see Section 5-2).

Depress pedal to start arc and increase amperage from 10 amps to maximum value set on the machine's Material Thickness/Amperage control. Release pedal to extinguish arc.

# SECTION 7 – MAINTENANCE AND TROUBLESHOOTING

## 7-1. Routine Maintenance

				<p><b>⚠ Disconnect power before maintaining.</b></p> <p><i>☞ Maintain more often during severe conditions.</i></p>
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⌚	✓ = Check * To be done by Factory Authorized Service Agent	◇ = Change	● = Clean	Δ = Repair	☆ = Replace
Every 3 Months	 ✓☆ Labels	 ✓☆ Labels	 ✓☆ Gas Hoses		
Every 3 Months	 ✓Δ ☆Cables And Cords				
Every 6 Months	 ●: During heavy service, clean monthly.				

## 7-2. Circuit Breaker CB1

			<p>1 Supplementary Protector CB1</p> <p>If CB1 opens, unit will be completely inoperative.</p> <p>If CB1 opens repeatedly, have a Factory Authorized Service Agent check unit..</p>

### 7-3. Meter Troubleshooting Displays For Diversion 180 Models



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

1 **Typical meter display may be in several segments. Each segment is shown for two seconds, and then scrolls to the remaining segments of the display. The message then repeats itself.**

- [TEMP] [FAIL] [MAG]

Indicates a short or open in the thermal protection circuitry located in the transformer of the unit. Contact a Factory Authorized Service Agent if this display is shown.

- [TEMP] [FAIL] [SEC]

Indicates a short or open in the thermal protection circuitry located in the secondary of the unit. Contact a Factory Authorized

Service Agent if this display is shown.

- [TEMP] [FAIL] [PRI]

Indicates a short or open in the thermal protection circuitry located in the primary of the unit. Contact a Factory Authorized Service Agent if this display is shown.

- [SEC] [CLMP] [ERR]

Secondary clamp voltage too high. Straighten out or shorten weld cables. If this does not correct the problem, contact a Factory Authorized Service Agent.

- [Over][Temp]

On for two seconds then flashes:

[SEC] – Indicates the secondary of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section

4-6). Operation will continue when the unit has cooled.

[PRI] – Indicates the primary of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 4-6). Operation will continue when the unit has cooled.

[MAG] – Indicates that the transformer has overheated. The unit has shut down to allow the fan to cool it (see Section 4-6). Operation will continue when the unit has cooled.

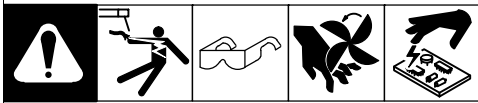
- [REL][TRIG]

Indicates that the torch trigger is depressed. Release trigger to continue.

- [NOT][VALD]

Indicates a non-allowable set-up on the front panel.

### 7-4. Troubleshooting



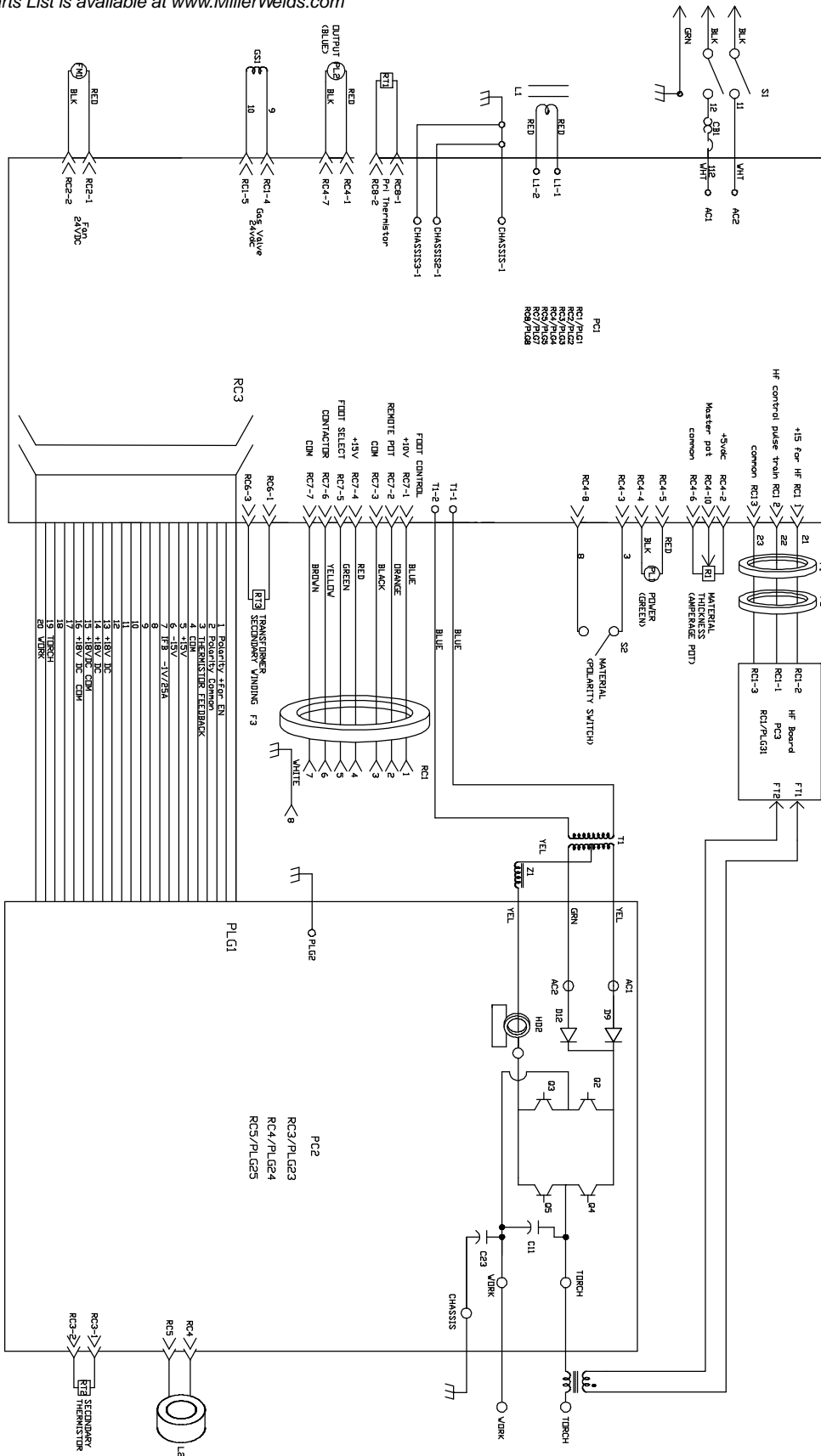
☞ The remedies listed below are recommendations only. If these remedies do not fix the trouble with your unit, have a Factory Authorized Service Agent check unit. **There are no user serviceable parts inside unit.**

Trouble	Remedy
No weld output; unit completely inoperative.	Place machine power switch in On position (see Section 6-1 or 6-2).
	Place line disconnect switch in On position (see Section 5-6).
	Check and replace line fuse(s), if necessary (see Section 5-6).
	Check for proper input power connections (see Section 5-6).
No weld output; unit on.	Check, repair, or replace remote control.
	Have Factory Authorized Service Agent check unit.
Unit provides only maximum or minimum weld output.	Make sure Material Thickness/amperage control is in proper position (see Section 6-1 or 6-2).
	Have Factory Authorized Service Agent check unit.
Erratic or improper weld output.	Lay weld cables out straight, do not leave weld cables coiled.
	Check position of Material Selector switch (see Section Figure 6-1 or 6-2).
	Check position of Material Thickness/amperage control (see Section 6-1 or 6-2).
No control of weld output.	Make sure Material Thickness/amperage control is in proper position (see Section 6-1 or 6-2).
Lack of high frequency; difficulty in starting GTAW arc.	Select proper size tungsten (see Section 10-1).
	Be sure torch cable is not close to any grounded metal.
	Check cables and torch for cracked insulation or bad connections. Repair or replace.
Wandering arc – poor control of direction of arc.	Reduce gas flow rate (see Section 5-3).
	Select proper size tungsten (see Section 10-1).

Trouble	Remedy
	Properly prepare tungsten (see Section 10-2).
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Shield weld zone from drafts.
	Check and tighten all gas fittings.
	Properly prepare tungsten (see Section 10-2).
Fan not operating.	Unit equipped with Fan-On-Demand™. Fans run only when necessary. Unit equipped with circuitry to protect against overheating.
No weld output; fan does not run.	Place line disconnect switch in On position (see Section 5-6).
	Check and replace line fuse(s), if necessary, or reset circuit breaker (see Section 5-6).
	Check for proper input power connections (see Section 5-6).
No weld output; fan on.	For Diversion 165 models, be sure Material Selector switch is set in position (see Section 6-1).
	Check connection to remote control receptacle (see Section 5-2).
	Check remote control (see remote control Owner's Manual).
	Unit overheated. Allow unit to cool (see Section 4-6).
Fan not operating; weld output available.	Check for and remove anything blocking fan movement.
	Have Factory Authorized Service Agent check fan motor.
Power LED flashes (Diversion 165 Models).	Input voltage out of usual range of 230 volts ±10%.
Output On LED flashes (Diversion 165 Models).	Unit has overheated. Do not use until LED stops flashing (see Sections 4-6 and 6-1 or 6-2).

# SECTION 8 – ELECTRICAL DIAGRAMS

A complete Parts List is available at [www.MillerWelds.com](http://www.MillerWelds.com)



**WARNING**

**ELECTRIC SHOCK HAZARD**

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

Figure 8-1. Circuit Diagram For Diversion 165 Models

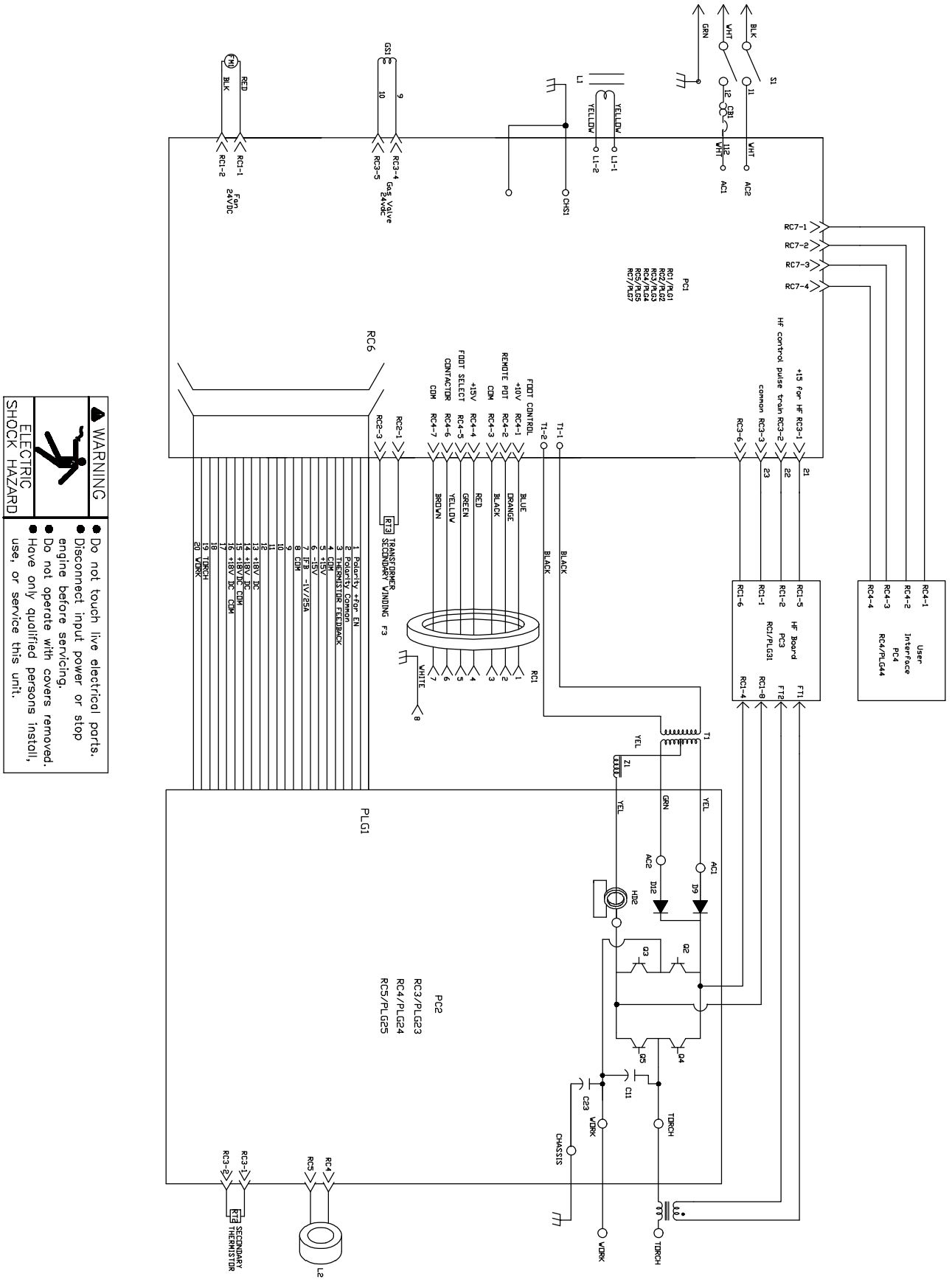

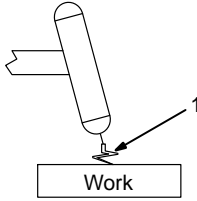


Figure 8-2. Circuit Diagram For Diversion 180 Models

# SECTION 9 – HIGH FREQUENCY

## 9-1. Welding Processes Requiring High Frequency






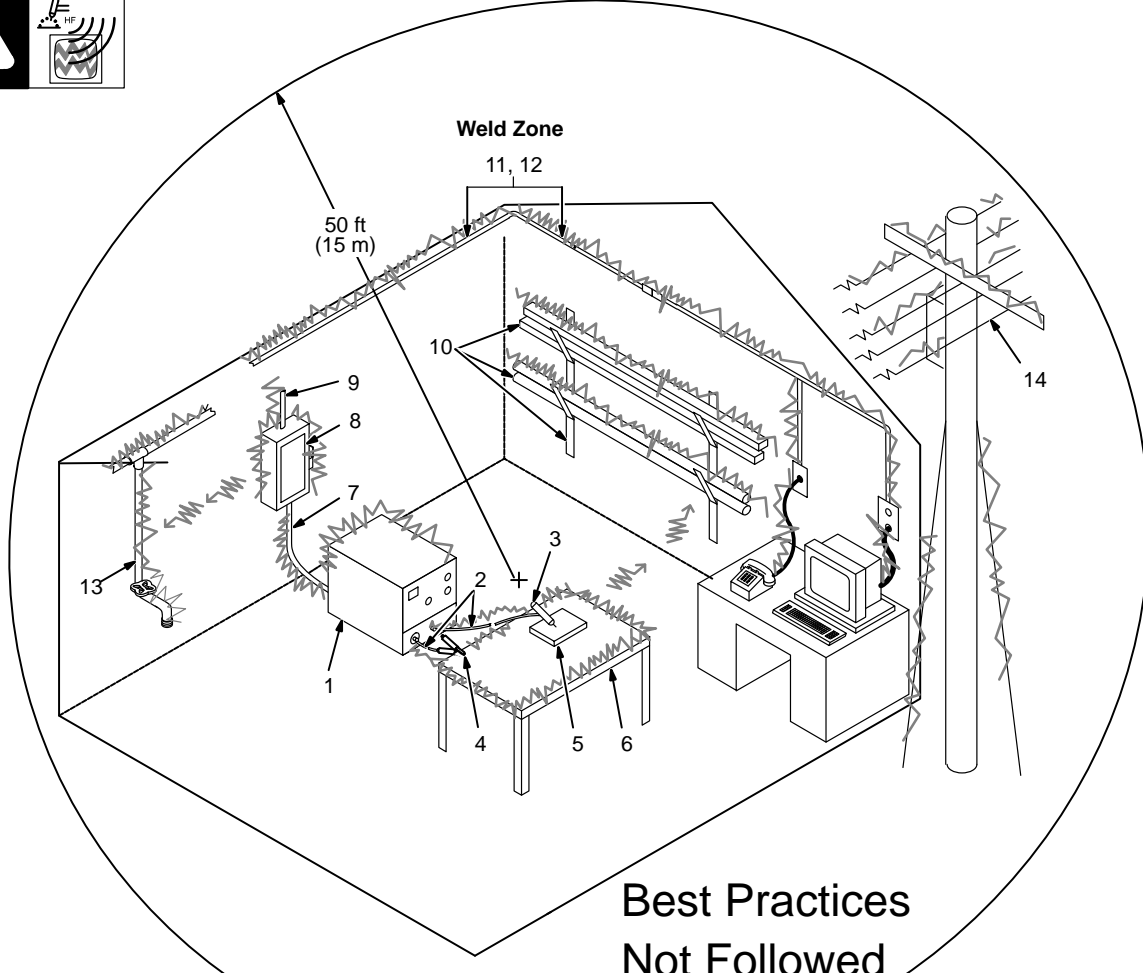
TIG

1 High-Frequency Voltage  
TIG – helps arc jump air gap between torch and workpiece and/or stabilize the arc.

high\_freq 5/10 – S-0693

## 9-2. Installation Showing Possible Sources Of HF Interference





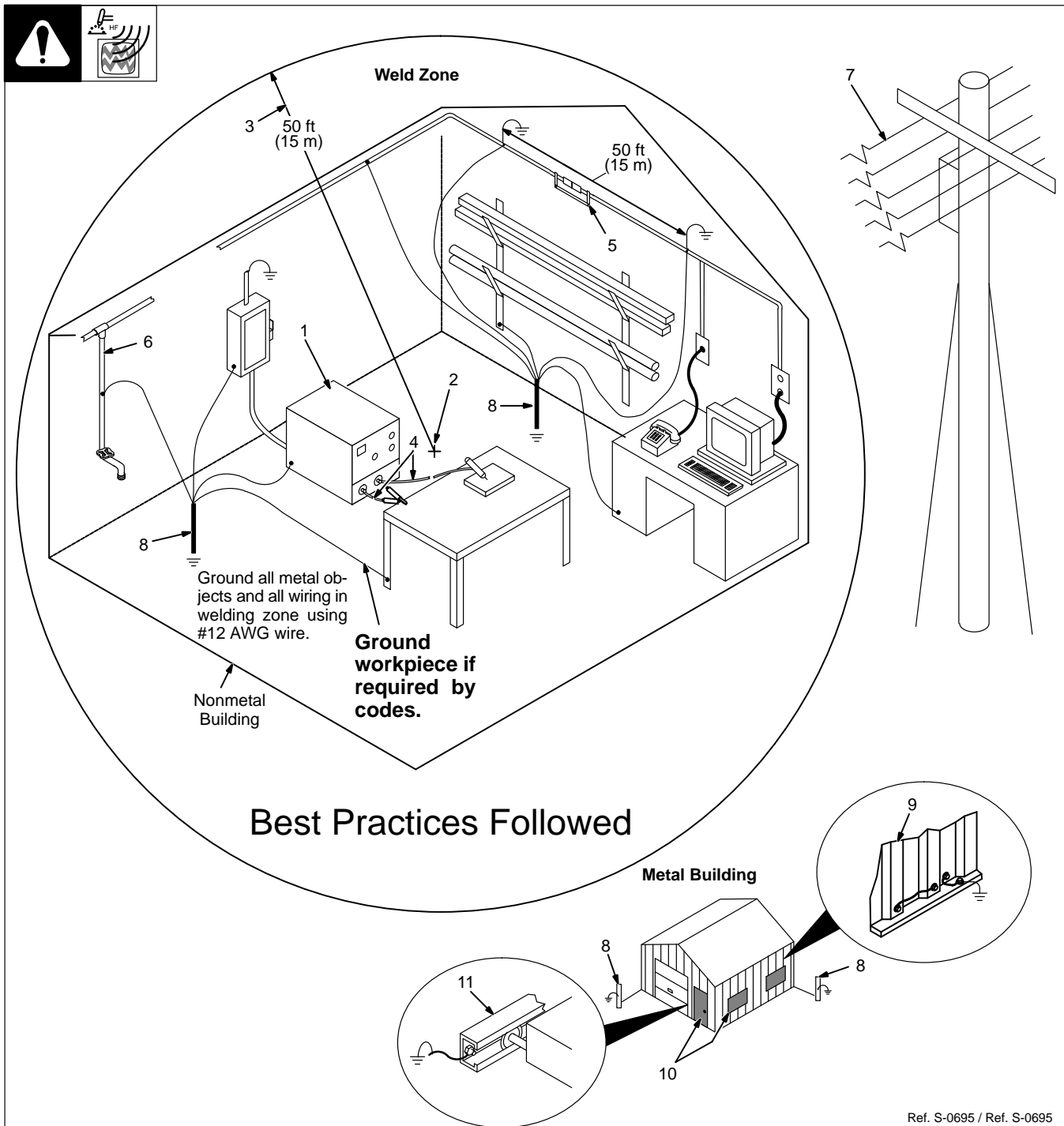
Best Practices  
Not Followed

Sources of Direct High-Frequency Radiation	Sources of Conduction of High Frequency	Sources of Reradiation of High Frequency
1 High-Frequency Source (welding power source with built-in HF or separate HF unit)	7 Input Power Cable	10 Ungrounded Metal Objects
2 Weld Cables	8 Line Disconnect Device	11 Lighting
3 Torch	9 Input Supply Wiring	12 Wiring
4 Work Clamp		13 Water Pipes and Fixtures
5 Workpiece		14 External Phone and Power Lines
6 Work Table		

S-0694



### 9-3. Recommended Installation To Reduce HF Interference



### Best Practices Followed

- 1 High-Frequency Source (welding power source with built-in HF or separate HF unit)  
Ground metal machine case (clean paint from around hole in case, and use case screw), work output terminal, line disconnect device, input supply, and worktable.
- 2 Center Point of Welding Zone  
Midpoint between high-frequency source and welding torch.
- 3 Welding Zone  
A circle 50 ft (15 m) from center point in all directions.
- 4 Weld Output Cables  
Keep cables short and close together.

- 5 Conduit Joint Bonding and Grounding  
Electrically join (bond) all conduit sections using copper straps or braided wire. Ground conduit every 50 ft (15 m).
- 6 Water Pipes and Fixtures  
Ground water pipes every 50 ft (15 m).
- 7 External Power or Telephone Lines  
Locate high-frequency source at least 50 ft (15 m) away from power and phone lines.
- 8 Grounding Rod  
Consult the National Electrical Code for specifications.




#### Metal Building Requirements

- 9 Metal Building Panel Bonding Methods  
Bolt or weld building panels together, install copper straps or braided wire across seams, and ground frame.
- 10 Windows and Doorways  
Cover all windows and doorways with grounded copper screen of not more than 1/4 in (6.4 mm) mesh.
- 11 Overhead Door Track  
Ground the track.

Ref. S-0695 / Ref. S-0695

# SECTION 10 – SELECTING AND PREPARING A TUNGSTEN FOR DC OR AC WELDING WITH INVERTER MACHINES

gtaw\_Inverter\_2011-06

Whenever possible and practical, use DC weld output instead of AC weld output.

## 10-1. Selecting Tungsten Electrode (Wear Clean Gloves To Prevent Contamination Of Tungsten)




☞ Not all tungsten electrode manufacturers use the same colors to identify tungsten type. Contact the tungsten electrode manufacturer or reference the product packaging to identify the tungsten you are using.

Electrode Diameter	Amperage Range - Gas Type♦ - Polarity	
	(DCEN) – Argon Direct Current Electrode Negative (For Use With Mild Or Stainless Steel)	AC – Argon Balance Control @ 65% Electrode Negative (For Use With Aluminum)
<b>2% Ceria, 1.5% Lanthanum, Or 2% Thorium Alloy Tungstens</b>		
.010 in. (1 mm)	Up to 25	Up to 20
.020 in. (1 mm)	15-40	15-35
.040 in. (1 mm)	25-85	20-80
1/16 in. (1.6 mm)	50-160	50-150
3/32 in. (2.4 mm)	130-250	135-235
1/8 in. (3.2 mm)	250-400	225-360
5/32 in. (4.0 mm)	400-500	300-450
3/16 in (4.8 mm)	500-750	400-500
1/4 in. (6.4 mm)	750-1000	600-800

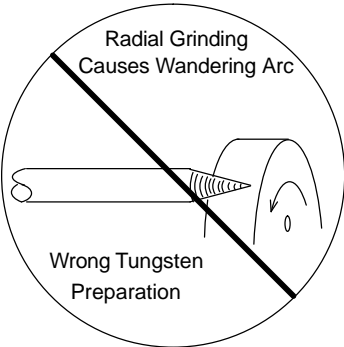
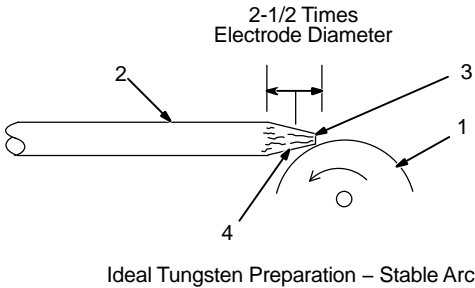
♦ Typical argon shielding gas flow rates are 11 to 35 CFH (cubic feet per hour).

Figures listed are a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.

## 10-2. Preparing Tungsten Electrode For DC Electrode Negative (DCEN) Welding Or AC Welding With Inverter Machines

Grinding the tungsten electrode produces dust and flying sparks which can cause injury and start fires. Use local exhaust (forced ventilation) at the grinder or wear an approved respirator. Read MSDS for safety information. Consider using tungsten containing ceria, lanthana, or yttria instead of thoria. Grinding dust from thoriated electrodes contains low-level radioactive material. Properly dispose of grinder dust in an environmentally safe way. Wear proper face, hand, and body protection. Keep flammables away.

1 Grinding Wheel  
Grind end of tungsten on fine grit, hard abrasive wheel before welding. Do not use wheel for other jobs or tungsten can become contaminated causing lower weld quality.

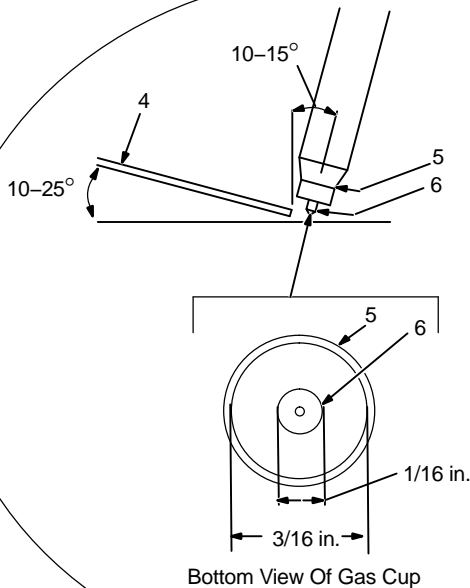
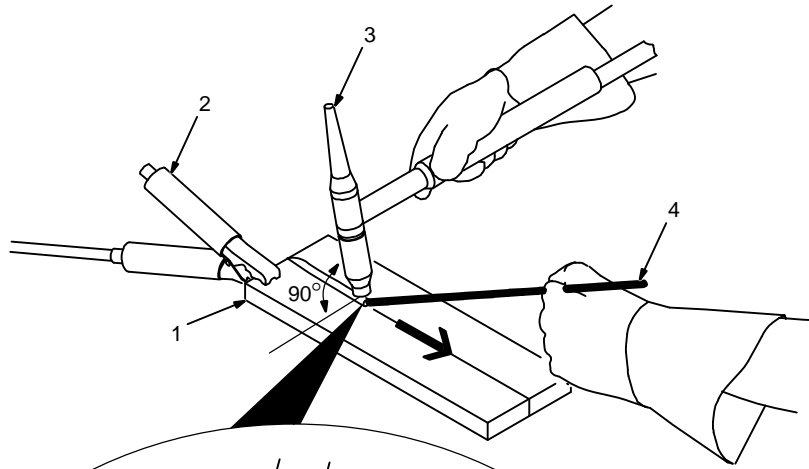
2 Tungsten Electrode  
A 2% ceriated tungsten is recommended.

3 Flat  
Diameter of this flat determines amperage capacity.

4 Straight Ground  
Grind lengthwise, **not radial**.

# SECTION 11 – GUIDELINES FOR TIG WELDING (GTAW)

## 11-1. Positioning The Torch



Bottom View Of Gas Cup

**⚠** Grinding the tungsten electrode produces dust and flying sparks which can cause injury and start fires. Use local exhaust (forced ventilation) at the grinder or wear an approved respirator. Read MSDS for safety information. Consider using cerium or lanthanum based tungsten instead of thoriated. Thorium dust contains low-level radioactive material. Properly dispose of grinder dust in an environmentally safe way. Wear proper face, hand, and body protection. Keep flammables away.

- 1 Workpiece  
Make sure workpiece is clean before welding.
- 2 Work Clamp  
Place as close to the weld as possible.
- 3 Torch
- 4 Filler Rod (If Applicable)
- 5 Gas Cup
- 6 Tungsten Electrode

Select and prepare tungsten according to Section 10.

### Guidelines:

The inside diameter of the gas cup should be at least three times the tungsten diameter to provide adequate shielding gas coverage. (For example, if tungsten is 1/16 in. diameter, gas cup should be a minimum of 3/16 in. diameter.)

Tungsten extension is the distance the tungsten extends out gas cup of torch.

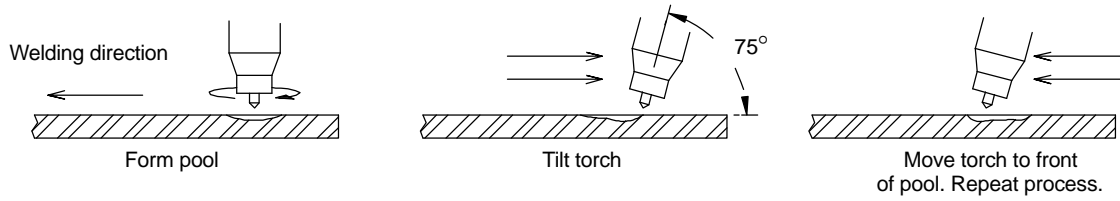
The tungsten extension should be no greater than the inside diameter of the gas cup.

Arc length is the distance from the tungsten to the workpiece.

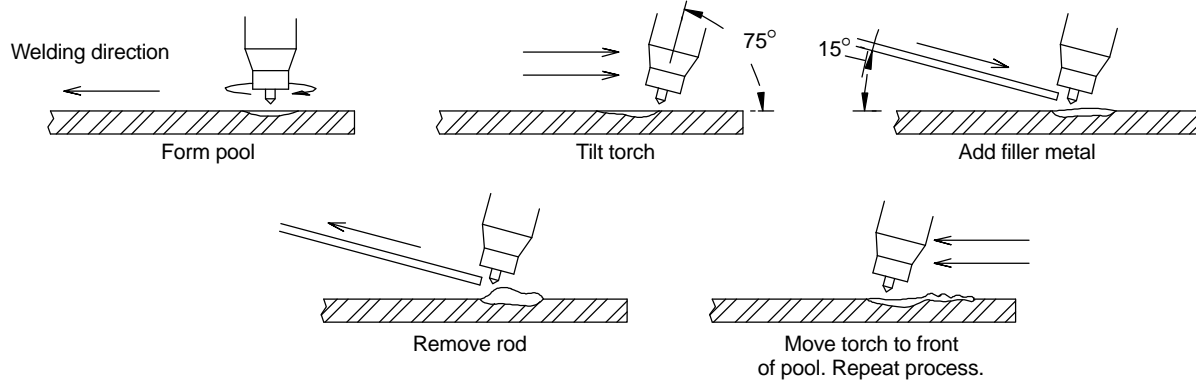
Ref. ST-161 892

## 11-2. Torch Movement During Welding

### Tungsten Without Filler Rod



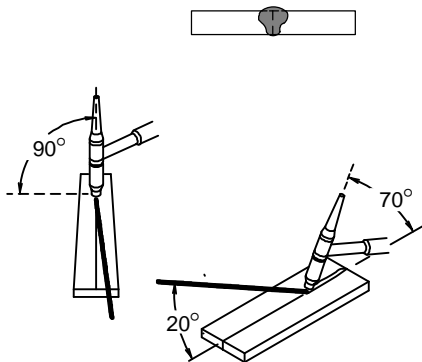
### Tungsten With Filler Rod



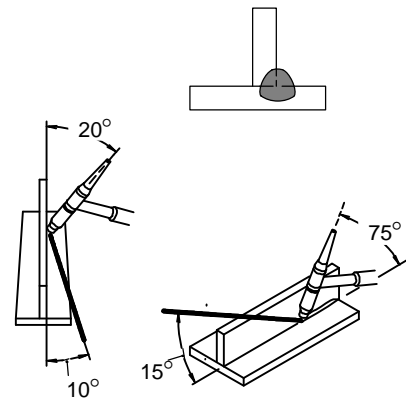
ST-162 002-B

## 11-3. Positioning Torch Tungsten For Various Weld Joints

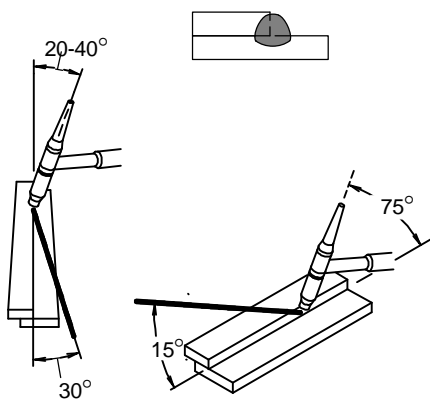
### Butt Weld And Stringer Bead



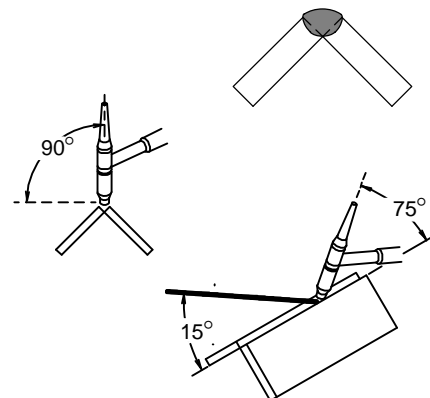
### "T" Joint



### Lap Joint



### Corner Joint



ST-162 003 / S-0792





# TRUE BLUE<sup>®</sup>

## WARRANTY

Effective January 1, 2013

(Equipment with a serial number preface of MD or newer)

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

### Warranty Questions?

Call  
1-800-4-A-MILLER  
for your local  
Miller distributor.

Your distributor also gives  
you ...

### Service

You always get the fast,  
reliable response you  
need. Most replacement  
parts can be in your  
hands in 24 hours.

### Support

Need fast answers to the  
tough welding questions?  
Contact your distributor.  
The expertise of the  
distributor and Miller is  
there to help you, every  
step of the way.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, 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 delivery date of the equipment to the original end-user purchaser, and not to exceed one year after the equipment is shipped to a North American distributor or eighteen months after the equipment is shipped to an International distributor.

1. 5 Years Parts — 3 Years Labor
  - \* Original Main Power Rectifiers Only to Include SCRs, Diodes, and Discrete Rectifier Modules
2. 3 Years — Parts and Labor
  - \* Auto-Darkening Helmet Lenses (Except Classic Series) (No Labor)
  - \* Engine Driven Welding Generators  
**(NOTE: Engines are Warranted Separately by the Engine Manufacturer.)**
  - \* Inverter Power Sources (Unless Otherwise Stated)
  - \* Oxy-Fuel Cutting Torches (No Labor)
  - \* Plasma Arc Cutting Power Sources
  - \* Process Controllers
  - \* Semi-Automatic and Automatic Wire Feeders
  - \* Smith Series 30 Flowgauge, Flowmeter, and Pressure Regulators (No Labor)
  - \* Transformer/Rectifier Power Sources
  - \* Water Coolant Systems (Integrated)
3. 2 Years — Parts and Labor
  - \* Auto-Darkening Helmet Lenses – Classic Series Only (No Labor)
  - \* Fume Extractors – Filtair 400 and Industrial Collector Series
4. 1 Year — Parts and Labor Unless Specified
  - \* Automatic Motion Devices
  - \* CoolBelt and CoolBand Blower Unit (No Labor)
  - \* External Monitoring Equipment and Sensors
  - \* Field Options  
(NOTE: Field options are covered for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
  - \* Flowgauge and Flowmeter Regulators (No Labor)
  - \* RFCS Foot Controls (Except RFCS-RJ45)
  - \* Fume Extractors – Filtair 130, MWX and SWX Series
  - \* HF Units
  - \* ICE/XT Plasma Cutting Torches (No Labor)
  - \* Induction Heating Power Sources, Coolers  
**(NOTE: Digital Recorders are Warranted Separately by the Manufacturer.)**
  - \* Load Banks
  - \* Motor Driven Guns (except Spoolmate Spoolguns)
  - \* PAPR Blower Unit (No Labor)
  - \* Positioners and Controllers
  - \* Racks
  - \* Running Gear/Trailers
  - \* Spot Welders
  - \* Subarc Wire Drive Assemblies
  - \* Water Coolant Systems (Non-Integrated)
  - \* Weldcraft-Branded TIG Torches (No Labor)
  - \* Wireless Remote Foot/Hand Controls and Receivers
  - \* Work Stations/Weld Tables (No Labor)

5. 6 Months — Parts
  - \* Batteries
  - \* Bernard Guns (No Labor)
  - \* Tregaskiss Guns (No Labor)
6. 90 Days — Parts
  - \* Accessory (Kits)
  - \* Canvas Covers
  - \* Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
  - \* M-Guns
  - \* MIG Guns and Subarc (SAW) Guns
  - \* Remote Controls and RFCS-RJ45
  - \* Replacement Parts (No labor)
  - \* Roughneck Guns
  - \* Spoolmate Spoolguns

Miller's True Blue<sup>®</sup> Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, relays, work station table tops and welding curtains, or parts that fail due to normal wear. (Exception: brushes and relays are covered on all engine-driven products.)**
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 Appleton, Wisconsin, 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.

miller\_warr 2013-01





# 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

City

State

Zip



## 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

Personal Safety Equipment

Service and Repair

Replacement Parts

Training (Schools, Videos, Books)

Technical Manuals (Servicing Information and Parts)

Circuit Diagrams

Welding Process Handbooks

To locate a Distributor or Service Agency visit [www.millerwelds.com](http://www.millerwelds.com) or call 1-800-4-A-Miller

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.

### Miller Electric Mfg. Co.

An Illinois Tool Works Company  
1635 West Spencer Street  
Appleton, WI 54914 USA

### International Headquarters—USA

USA Phone: 920-735-4505 Auto-Attended  
USA & Canada FAX: 920-735-4134  
International FAX: 920-735-4125

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