OM-217 655T 2013–06

Processes

Stick (SMAW) Welding

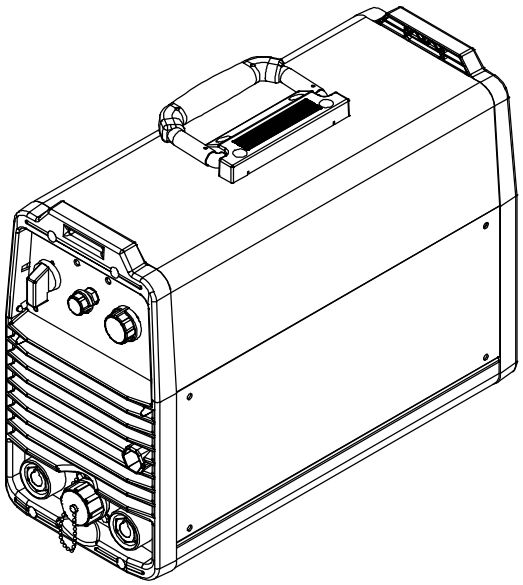
TIG (GTAW) Welding

Description

1 Phase 3 Phase DC CC

Arc Welding Power Source

CST 280 And CST 280 VRD



OWNER'S MANUAL

File: Stick (SMAW)

Visit our website at

www.MillerWelds.com

From Miller to You

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

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

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

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

ISO 9001 REGISTERED QUALITY SYSTEM

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 on the web.**

TRUE BLUE® WARRANTY

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

Miller®

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SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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.

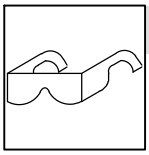
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- 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 by-pass 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.

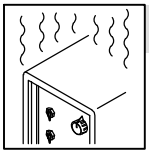
1-3. Additional Symbols For Installation, Operation, And Maintenance

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.

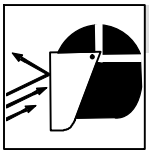
FALLING EQUIPMENT can injure.

- 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.



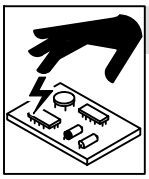
OVERUSE can cause OVERHEATING

- 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.

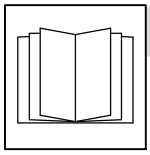
- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

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.

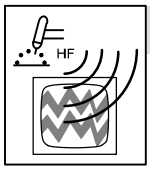
MOVING PARTS can injure.

- 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).

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).

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).

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

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).

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).

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.

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).

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).

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

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.*

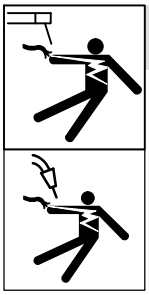
Ce groupe de symboles veut dire Avertissement! Attention! DANGER DE CHOC ELECTRIQUE, PIECES EN MOUVEMENT, et PIECES CHAUDES. Consulter les symboles et les instructions ci-dessous y afférant pour les actions nécessaires afin d'éviter le danger.

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 dégraisseurs.
- 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.

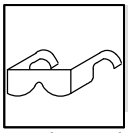
Le rayonnement de l'arc du procédé de soudag génère des rayons visibles et invisibles intense (ultraviolets et infrarouges) susceptibles de provoquer des brûlure dans les yeux et sur la peau. Des étincelles sont projetées pendant l soudage.

- Porter un casque de soudage approuvé muni de verres filtrants approprié 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 là 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 le 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 PIECES DE METAL ou DES SALETES peuvent provoquer des blessures dans les yeux.

- Le soudage, l'écaillement, 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.

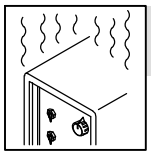
2-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

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.

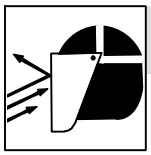
LA CHUTE DE L'ÉQUIPEMENT peut provoquer des blessures.

- 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 Nº94–110) lors du levage manuelle de pièces ou équipements lourds.



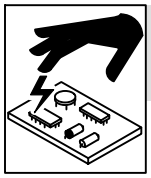
L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- 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.



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 imprimes.

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.

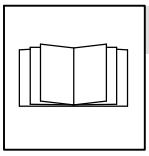
- Ne pas appuyer sur la gâchette avant d'en avoir reçu l'instruction.
- Ne pas diriger le pistolet vers soi, d'autres personnes ou toute pièce mécanique en engageant le fil de soudage.

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.

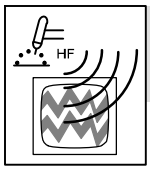
Les PIÈCES MOBILES peuvent causer des blessures.

- 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.



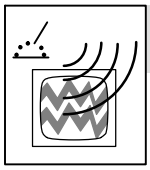
LIRE LES INSTRUCTIONS.

- 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).

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).

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).

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

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).

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).

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.

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).

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).

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.

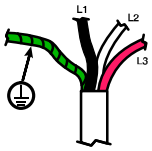
En ce qui concerne les implants médicaux :

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

☞ *Some symbols are found only on CE products.*

	Warning! Watch Out! There are possible hazards as shown by the symbols. Safe1 2012–05
	Always connect green wire to supply grounding terminal, never to a line terminal. Connect black, white, and red wires (L1, L2, L3) to line terminals. Read manual. Safe115 2013–06

3-2. Miscellaneous Symbols And Definitions

☞ *Some symbols are found only on CE products.*

1~	Single Phase	3~	Three Phase	Hz	Hertz	%	Percent
O	Off	I	On		Output		Temperature

SECTION 4 – SPECIFICATIONS

4-1. Serial Number And Rating Label Location

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

4-2. Unit Specifications

A. 220-230/460-575 Volts Model*

Welding Mode	Input Power	Rated Output	Welding Amperage Range	Maximum Open-Circuit Voltage	Amperes Input At Rated Load Output, 50/60 Hz				KVA	KW	Dimensions	Net Weight
					220	230	460	575				
Stick (SMAW)	3-Phase	280 A @ 31.2 VDC, 35 % Duty Cycle	5-280 A	77 VDC	35.0	34.2	17.8	14.7	14.6	10.2	H: 13-1/2 in. (343 mm) W: 7-1/2 in. (191 mm) D: 18 in. (457 mm)	41 lb (18.6 kg)
		200 A @ 28 VDC, 100 % Duty Cycle			23.3	22.5	11.7	9.7	9.6	6.4		
	1-Phase	200 A @ 28 VDC, 50 % Duty Cycle	5-200 A		43.9	43.0	n/a	n/a	10.1	6.6		
		150 A @ 26 VDC, 100 % Duty Cycle			32.7	32.0	n/a	n/a	7.3	4.6		
*Unit can be ordered with Dinse or Tweco weld output receptacles.												

B. 208-230/400-460 Volts Model*

Welding Mode	Input Power	Rated Output	Welding Amperage Range	Maximum Open-Circuit Voltage	Amperes Input At Rated Load Output, 50/60 Hz				KVA	KW	Dimensions	Net Weight
					208	230	400	460				
Stick (SMAW)	3-Phase	280 A @ 31.2 VDC, 35 % Duty Cycle	5-280 A	67 VDC	36.0	34.0	19.8	17.5	14.0	10.2	H: 13-1/2 in. (343 mm) W: 7-1/2 in. (191 mm) D: 18 in. (457 mm)	41 lb (18.6 kg)
		200 A @ 28 VDC, 100 % Duty Cycle			23.5	22.8	13.5	12.7	10.2	6.9		
	1-Phase	200 A @ 28 VDC, 50 % Duty Cycle	5-200 A		43.9	43.0	n/a	n/a	9.9	6.5		
		150 A @ 26 VDC, 100 % Duty Cycle			35.0	32.9	n/a	n/a	7.6	4.8		
*Unit can be ordered with Dinse or Tweco weld output receptacles.												

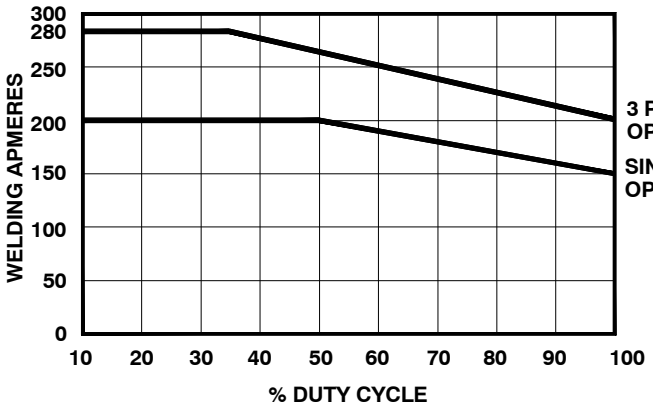
C. 208-230/400-460 Volts VRD Model*

Welding Mode	Input Power	Rated Output	Welding Amperage Range	Maximum Open-Circuit Voltage	Amperes Input At Rated Load Output, 50/60 Hz				KVA	KW	Dimensions	Net Weight
					208	230	400	460				
Stick (SMAW)	3-Phase	280 A @ 31.2 VDC, 35 % Duty Cycle	5-280 A	30 VDC	36.0	34.0	19.8	17.5	14.0	10.2	H: 13-1/2 in. (343 mm) W: 7-1/2 in. (191 mm) D: 18 in. (457 mm)	41 lb (18.6 kg)
		200 A @ 28 VDC, 100 % Duty Cycle			23.5	22.8	13.5	12.7	10.2	6.9		
	1-Phase	200 A @ 28 VDC, 50 % Duty Cycle	5-200 A		43.9	43.0	n/a	n/a	9.9	6.5		
		150 A @ 26 VDC, 100 % Duty Cycle			35.0	32.9	n/a	n/a	7.6	4.8		
*Unit comes with Dinse weld output receptacles.												

D. 220-230/460-575 Volts VRD Model*

Welding Mode	Input Power	Rated Output	Welding Amperage Range	Maximum Open-Circuit Voltage	Amperes Input At Rated Load Output, 50/60 Hz				KVA	KW	Dimensions	Net Weight
					220	230	460	575				
Stick (SMAW)	3-Phase	280 A @ 31.2 VDC, 35 % Duty Cycle	5-280 A	77 VDC	35.0	34.2	17.8	14.7	14.6	10.2	H: 13-1/2 in. (343 mm) W: 7-1/2 in. (191 mm) D: 18 in. (457 mm)	41 lb (18.6 kg)
		200 A @ 28 VDC, 100 % Duty Cycle			23.3	22.5	11.7	9.7	9.6	6.4		
	1-Phase	200 A @ 28 VDC, 50 % Duty Cycle	5-200 A		43.9	43.0	n/a	n/a	10.1	6.6		
		150 A @ 26 VDC, 100 % Duty Cycle			32.7	32.0	n/a	n/a	7.3	4.6		
*Unit comes with Tweco weld output receptacles.												

4-3. Duty Cycle And Overheating



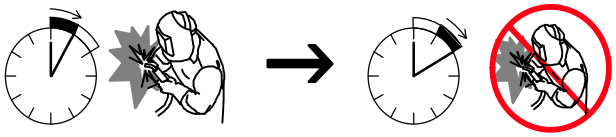
Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

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

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

221 587-A

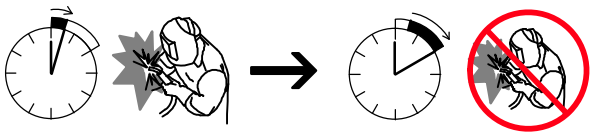
200 A @ 50% Duty Cycle For Single Phase Operation



5 Minutes Welding

5 Minutes Resting

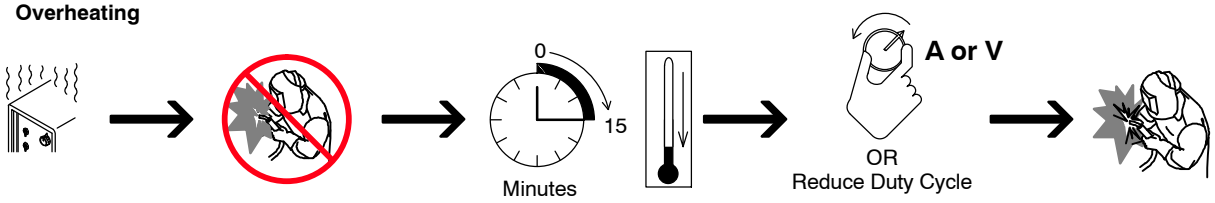
280 A @ 35% Duty Cycle For 3 Phase Operation



3-1/2 Minutes Welding

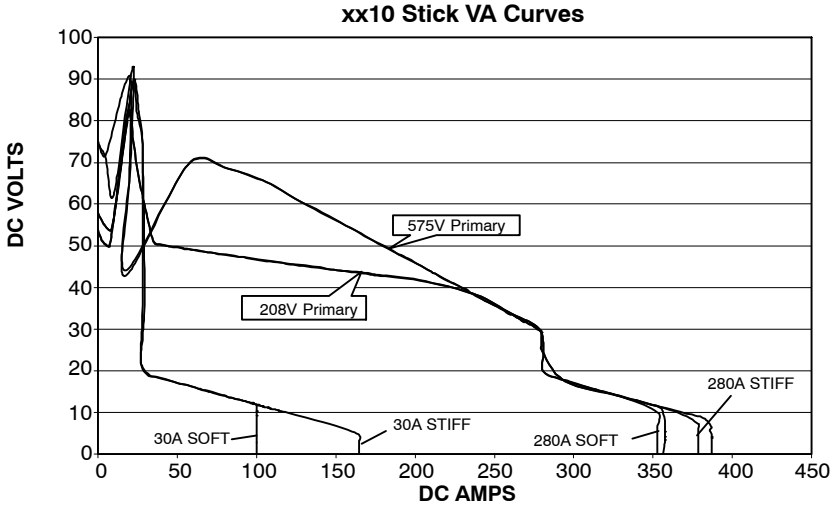
6-1/2 Minutes Resting

Overheating

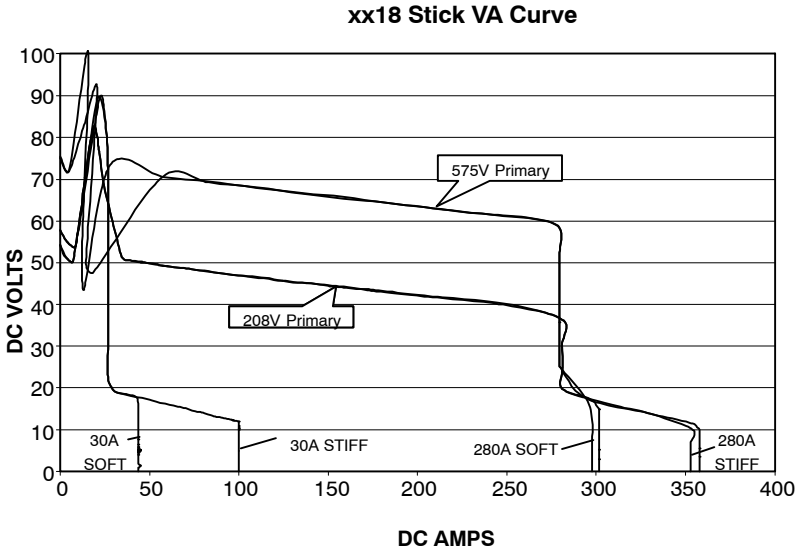


Notes

4-4. Stick (SMAW) Volt-Ampere Curves CST 280 Model

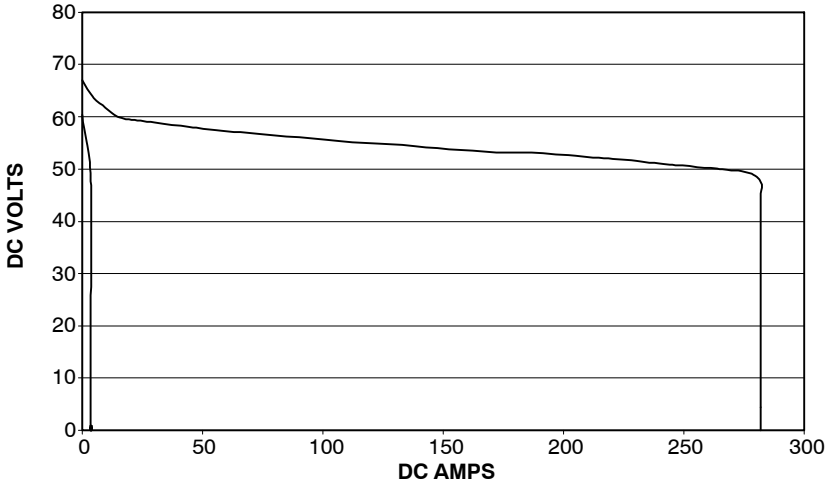


Volt-ampere curves show minimum and maximum voltage and amperage output capabilities of welding power source. Curves of other settings fall between curves shown.



Ref. 221 588-A

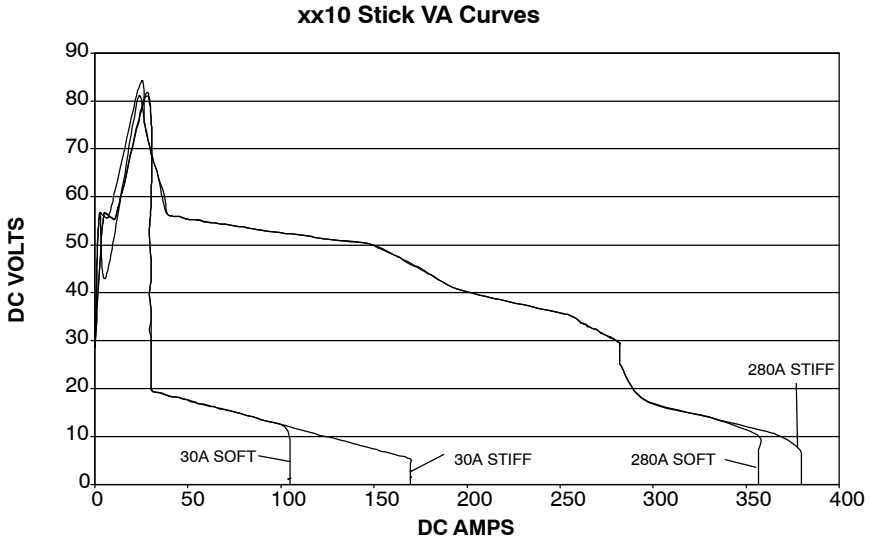
4-5. TIG (GTAW) Volt-Ampere Curve CST 280 Model



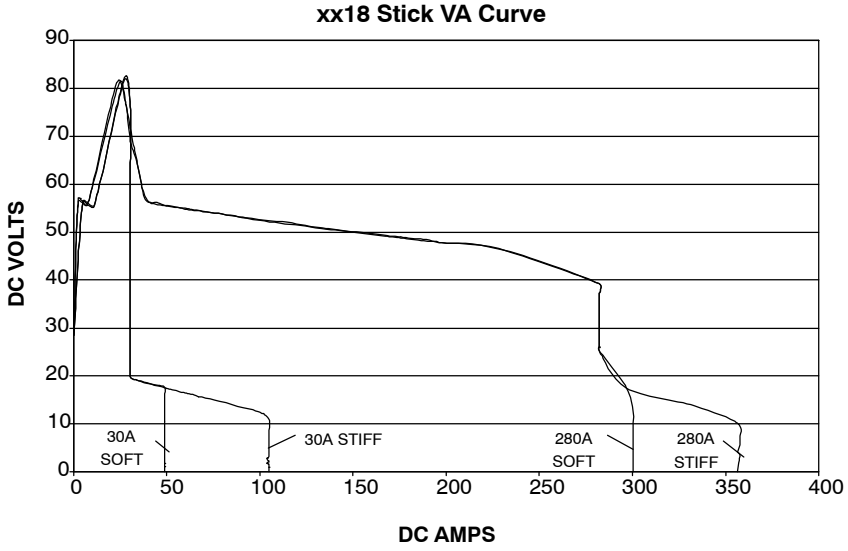
Volt-ampere curves show minimum and maximum voltage and amperage output capabilities of welding power source. Curves of other settings fall between curves shown.

Ref. 221 588-A

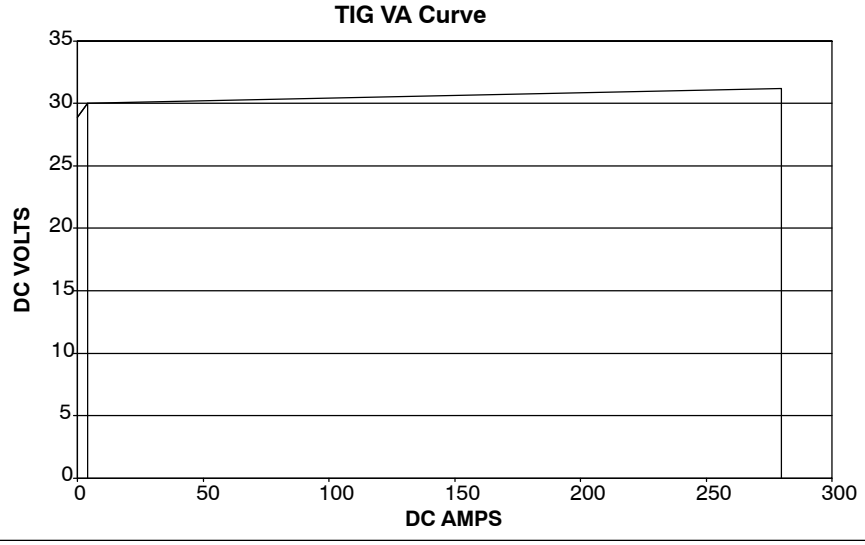
4-6. Stick (SMAW) Volt-Ampere Curves CST 280 VRD Model



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



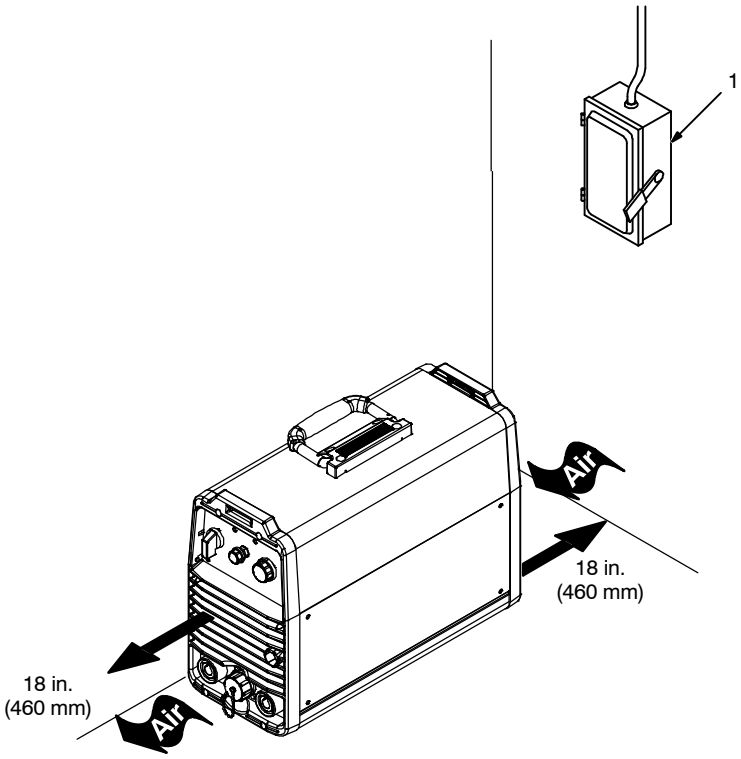
4-7. TIG (GTAW) Volt-Ampere Curve CST 280 VRD Model



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

SECTION 5 – INSTALLATION

5-1. Selecting A Location



1 Line Disconnect Device

Locate unit near correct input power supply.

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

803 942-A

Notes

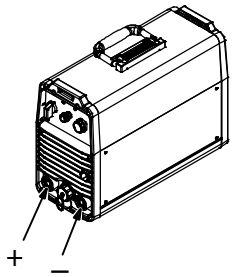
5-2. Weld Output Terminals And Selecting Cable Sizes*

NOTICE – *The Total Cable Length in Weld Circuit (see table below) is the combined length of both weld cables. For example, if the power source is 100 ft (30 m) from the workpiece, the total cable length in the weld circuit is 200 ft (2 cables x 100 ft). Use the 200 ft (60 m) column to determine cable size.*

Weld Output Terminals

Turn off power before connecting to weld output terminals.

Do not use worn, damaged, undersized, or poorly spliced cables.



Output Receptacles

Welding Amperes***	Weld Cable Size** and Total Cable (Copper) Length in Weld Circuit Not Exceeding****							
	100 ft (30 m) or Less		150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
	10 – 60% Duty Cycle AWG (mm^2)	60 – 100% Duty Cycle AWG (mm^2)	10 – 100% Duty Cycle AWG (mm^2)					
100	4 (20)	4 (20)	4 (20)	3 (30)	2 (35)	1 (50)	1/0 (60)	1/0 (60)
150	3 (30)	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	3/0 (95)
200	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	4/0 (120)
250	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 2/0 (2x70)
300	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)
350	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)

* This chart is a general guideline and may not suit all applications. If cable overheats, use next size larger cable.

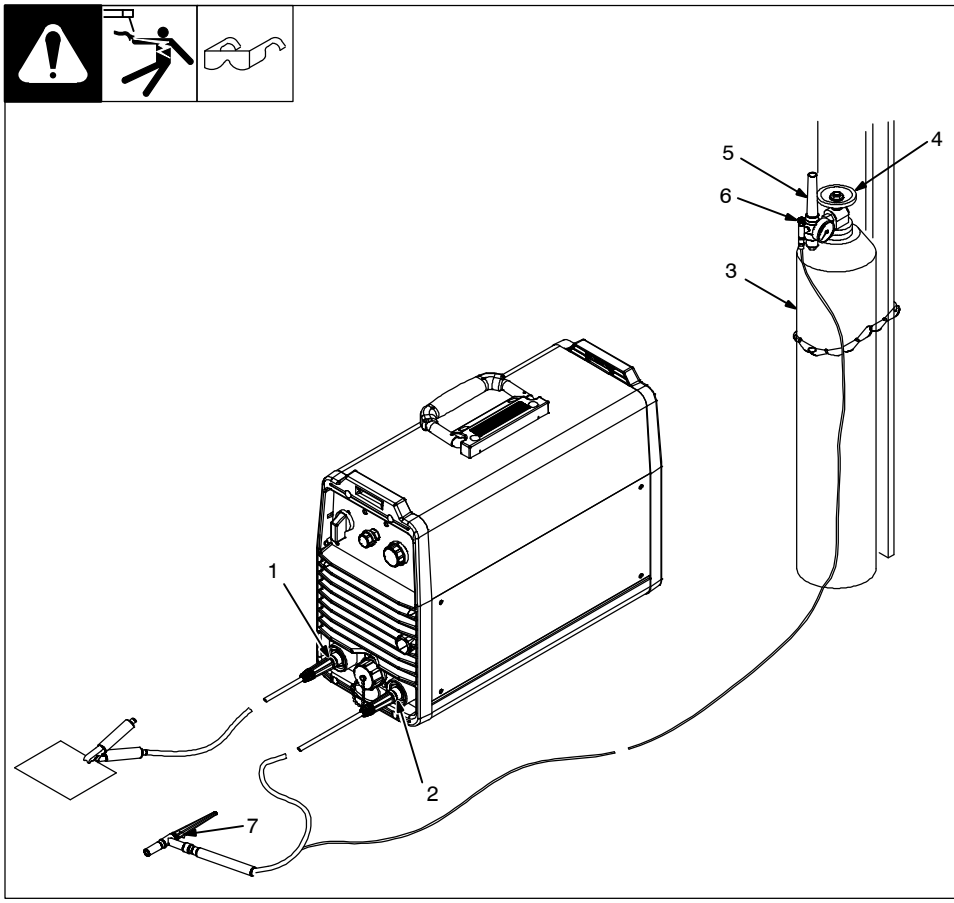
**Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere.
( ) = mm^2 for metric use

***Select weld cable size for pulsing application at peak amperage value.

****For distances longer than those shown in this guide, call a factory applications rep. at 920-735-4505 (Miller) or 1-800-332-3281 (Hobart).

Ref. S-0007-G 2009–08

5-3. TIG Lift-Arc™ DCEN (Direct Current Electrode Negative) Connections



1 Positive (+) Weld Output Terminal

Connect work lead to positive weld output terminal.

2 Negative (–) Weld Output Terminal

Connect TIG torch to negative weld output terminal.

3 Gas Cylinder

4 Cylinder Valve

Open valve slightly so gas flow blows dirt from valve. Close valve.

5 Regulator/Flowmeter

6 Flow Adjust

Typical flow rate is 15 cubic feet per hour (7.1 liters per minute).

Connect torch gas hose to regulator/flowmeter

7 Gas Valve

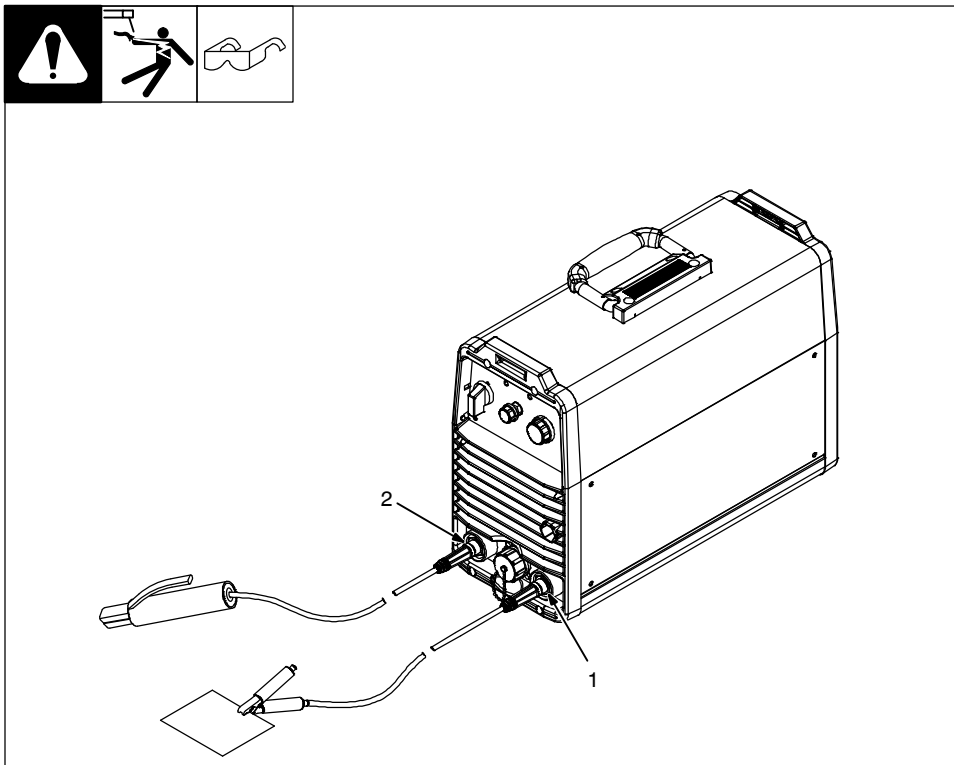
Valve controls gas preflow and postflow. Open valve on torch just before welding.

Tools Needed:

11/16 in., 1-1/8 in., (21 mm)

803 943-A

5-4. Stick DCEP (Direct Current Electrode Positive) Connections



1 Negative (–) Weld Output Terminal

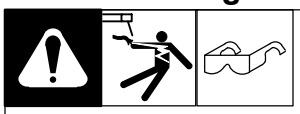
Connect work lead to negative weld output terminal.

2 Positive (+) Weld Output Terminal

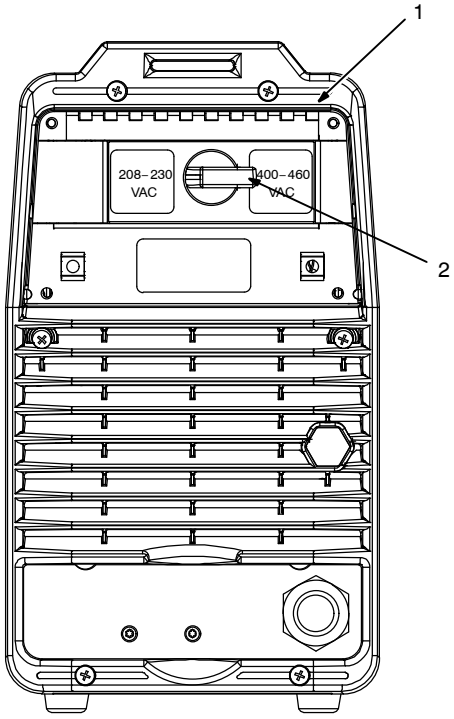
Connect electrode holder to positive weld output terminal.

803 944-A

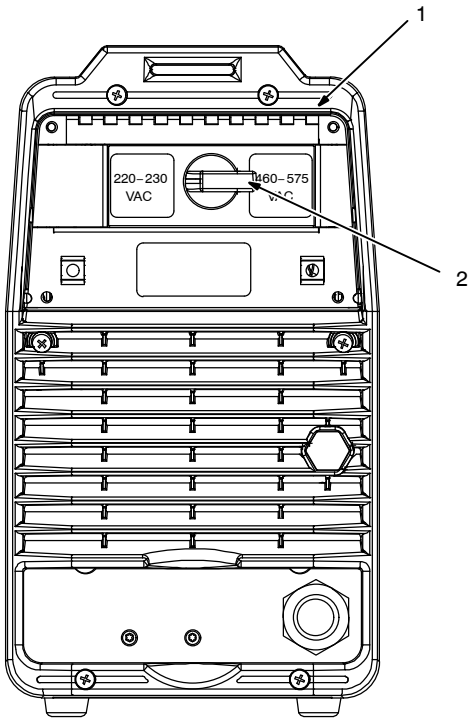
5-5. Selecting 208 - 230 Volts AC Single/Three Phase Input Voltage



208-230/400-460 Volts Model



220-230/460-575 Volts Model



Tools Needed:

Turn Off welding power source, and disconnect input power before proceeding.

Check input voltage available at site.

1 Switch Cover

2 Voltage Selection Switch

The input voltage that the power source is linked for is labeled next to the switch.

Check voltage selected on unit. Changing selection is only necessary if selected value does not match available input voltage.

Do not switch under load.

To change selection switch position, open switch cover and turn switch to the required voltage range.

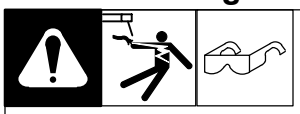
☞ *The main power circuit board is protected at power up from voltage surges or over voltage conditions that can occur if plugged into improper line voltages (such as when linked for 220-230 or 208-230 and powered with 460-575 or 400-460). If this situation does happen, turn off welding power source, open rear switch cover, and turn Voltage Selection switch to the correct input voltage. Wait 10 minutes before turning welding power source back on again to allow the protection to reset.*

☞ *The switch has an off position at 90° straight up.*

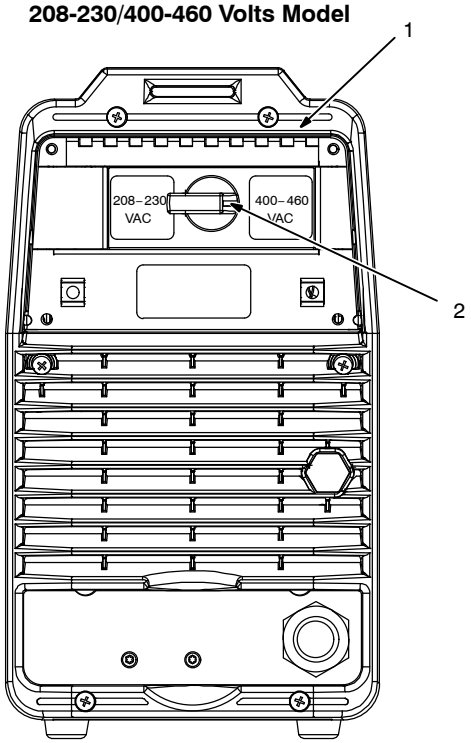
Be sure that switch is turned completely to its detent position.

Ref. 803 945-A / Ref. 803 946-A

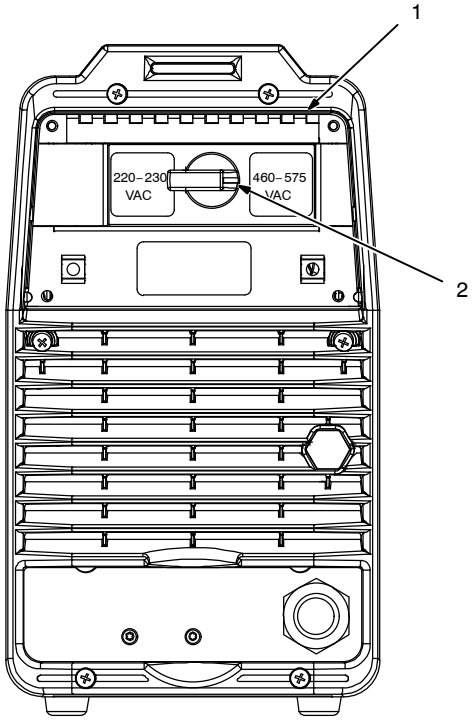
5-6. Selecting 400 - 575 Volts AC Three Phase Input Voltage



208-230/400-460 Volts Model



220-230/460-575 Volts Model



Turn Off welding power source, and disconnect input power before proceeding.

Check input voltage available at site.

1 Switch Cover

2 Voltage Selection Switch

The input voltage that the power source is linked for is labeled next to the switch.

Check voltage selected on unit. Changing selection is only necessary if selected value does not match available input voltage.

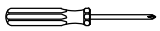
Do not switch under load.

To change selection switch position, open switch cover and turn switch to the required voltage range.

☞ *The switch has an off position at 90 ° straight up.*

Be sure that switch is turned completely to its detent position.

Tools Needed:



Ref. 803 945-A / Ref. 803 946-A

Notes

5-7. Electrical Service Guide

Elec Serv 2011–08

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.

NOTICE *– INCORRECT INPUT POWER can damage this welding power source. This welding power source requires a CONTINUOUS supply of input power at rated frequency (±10%) and voltage (±10%). Phase to ground voltage shall not exceed +10% of rated input voltage. Do not use a generator with automatic idle device (that idles engine when no load is sensed) to supply input power to this welding power source.*

NOTICE *– Actual input voltage should not be 10% less than minimum and/or 10% more than maximum input voltages listed in table. If actual input voltage is outside this range, output may not be be available.*

	50/60 Hz Single-Phase, 50% Duty Cycle			**50/60 Hz Three-Phase, 35% Duty Cycle**					
Input Voltage (V)	208	220	230	208	220	230	400	460	575
Input Amperes (A) At Rated Output	43.9	43.9	43.0	36.0	35.0	34.2	19.8	17.8	14.7
Max Recommended Standard Fuse Rating In Amperes									
Circuit Breaker [1], Time-Delay Fuses [2]	50	50	50	45	45	45	25	20	15
Normal Operating Fuses [3]	70	70	70	60	60	50	30	25	20
Min Input Conductor Size In AWG[4]	8	8	8	10	10	10	14	14	14
Max Recommended Input Conductor Length In Feet (Meters)	117 (36)	129 (39)	141 (43)	101 (31)	113 (34)	123 (38)	149 (45)	196 (60)	306 (93)
Min Grounding Conductor Size In AWG[4]	8	8	8	10	10	10	14	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.

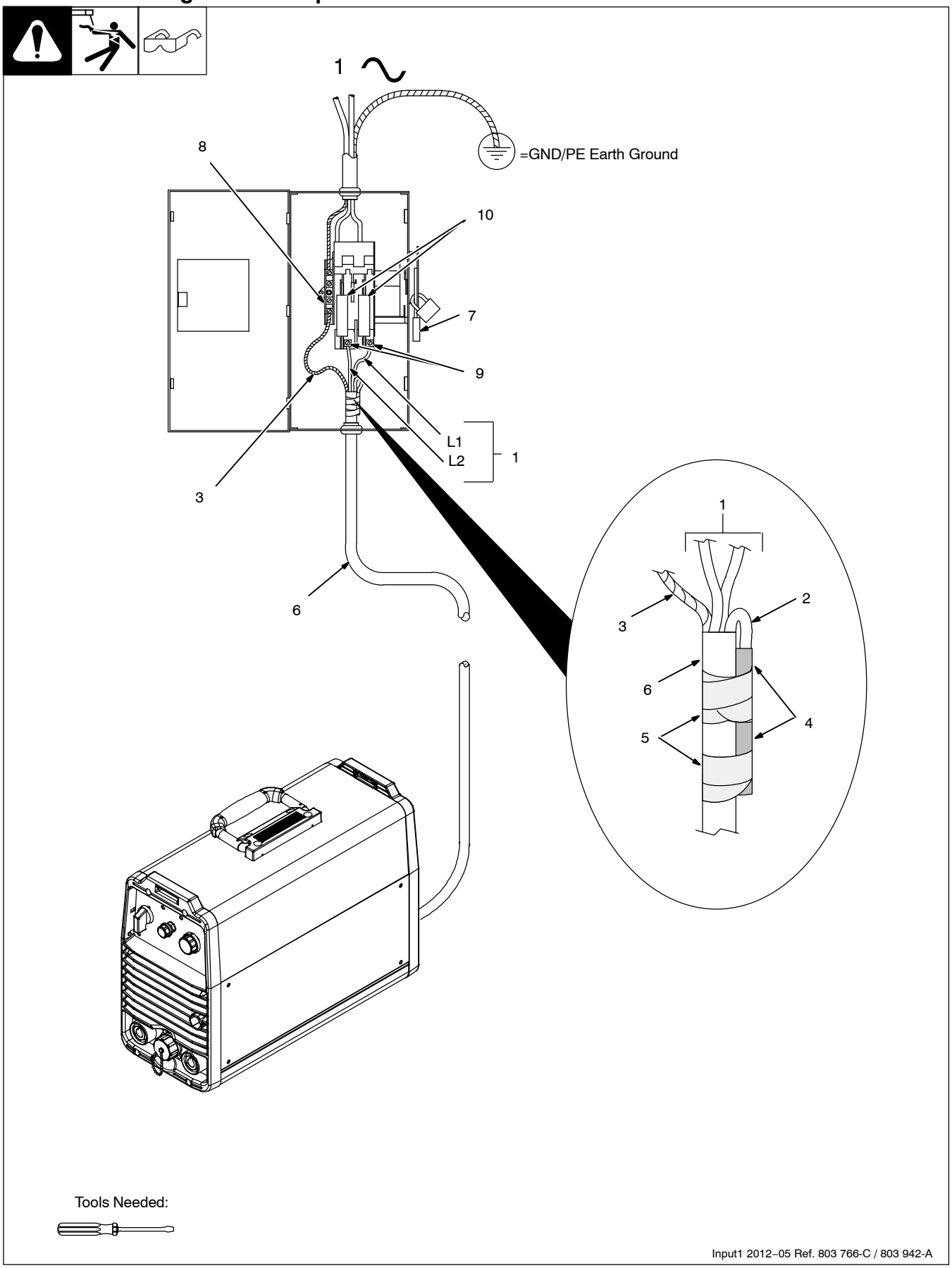
2 “Time-Delay” fuses are UL class “RK5” . See UL 248.

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.

Notes

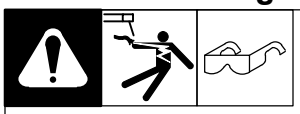
5-8. Connecting 1-Phase Input Power



Tools Needed:

Input1 2012–05 Ref. 803 766-C / 803 942-A

5-8. Connecting 1-Phase Input Power (Continued)



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

Disconnect and lockout/tagout input power before connecting input conductors from unit. Follow established procedures regarding the installation and removal of lockout/tagout devices.

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

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

1 Black And White Input Conductor (L1 And L2)

2 Red Input Conductor

3 Green Or Green/Yellow Grounding Conductor

4 Insulation Sleeving

5 Electrical Tape

Insulate and isolate red conductor as shown.

6 Input Power Cord.

7 Disconnect Device (switch shown in the OFF position)

8 Disconnect Device Grounding Terminal

9 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.

10 Over-Current Protection

Select type and size of over-current protection using Section 5-7 (fused disconnect switch shown).

Close and secure door on disconnect device. Follow established lockout/tagout procedures to put unit in service.

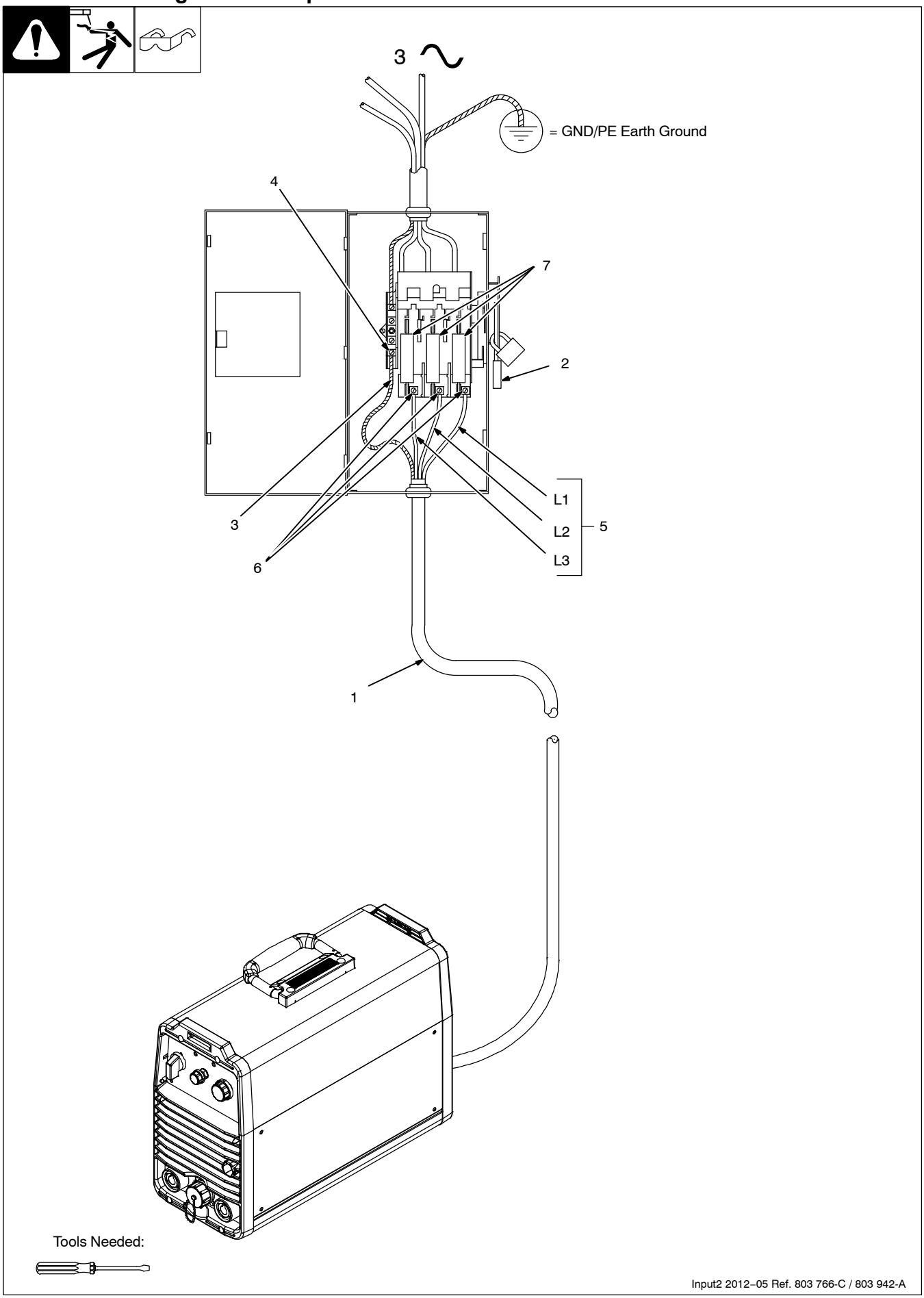
Input1 2012–05

Notes

Work like a Pro!

Pros weld and cut safely. Read the safety rules at the beginning of this manual.

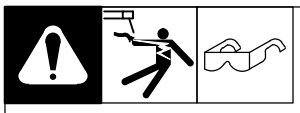
5-9. Connecting 3-Phase Input Power



Tools Needed:

Input2 2012–05 Ref. 803 766-C / 803 942-A

5-9. Connecting 3-Phase Input Power (Continued)



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

Disconnect and lockout/tagout input power before connecting input conductors from unit. Follow established procedures regarding the installation and removal of lockout/tagout devices.

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

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

For Three-Phase Operation

1 Input Power Cord.

2 Disconnect Device (switch shown in the OFF position)

3 Green Or Green/Yellow Grounding Conductor

4 Disconnect Device Grounding Terminal

5 Input Conductors (L1, L2 And L3)

6 Disconnect Device Line Terminals

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

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

7 Over-Current Protection

Select type and size of over-current protection using Section 5-7 (fused disconnect switch shown).

Close and secure door on disconnect device. Follow established lockout/tagout procedures to put unit in service.

Input2 2012–05

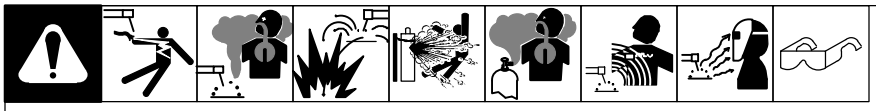
Notes

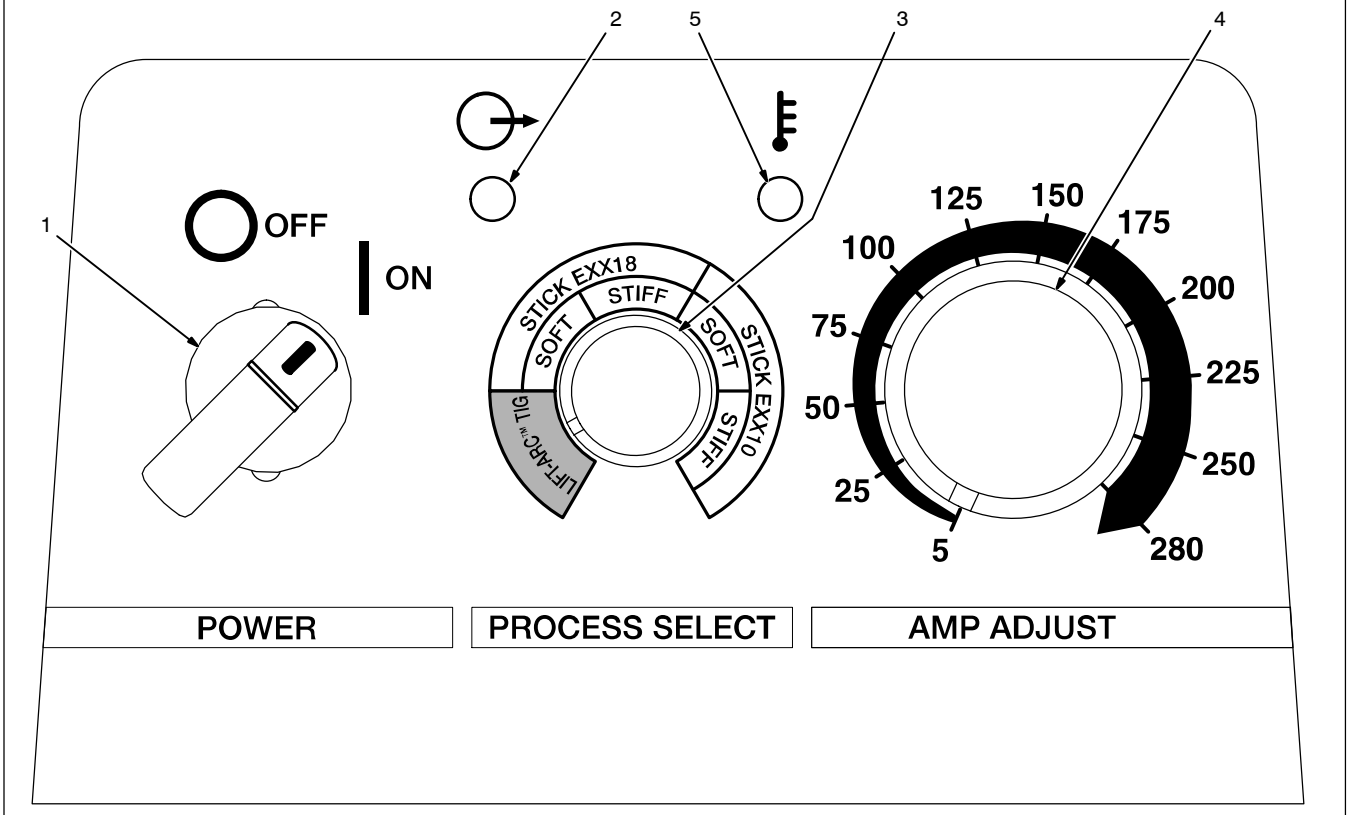
Work like a Pro!

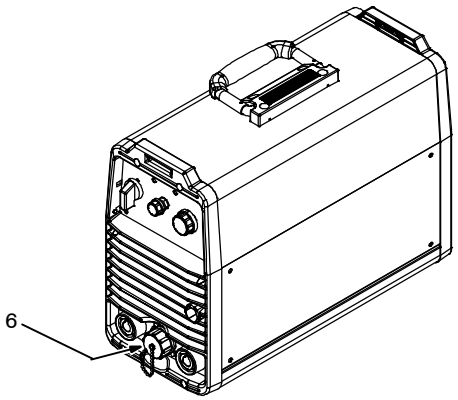
Pros weld and cut safely. Read the safety rules at the beginning of this manual.

SECTION 6 – OPERATION

6-1. Controls







☞ *Green on nameplate indicates a TIG function and Gray indicates a Stick function.*

1 Power Switch

Use switch to turn unit and indicator light On/Off.

2 Output Indicator Light

When unit is first energized this indicator light flashes several times and then illuminates continuously. When unit is shut down, the indicator light flashes several times and the cooling fan will run briefly, then both will turn off completely.

3 Process Control

See Section 6-2.

4 AMP ADJUST (Amperage Control)

Rotate knob clockwise to increase amperage (5-280 amps).

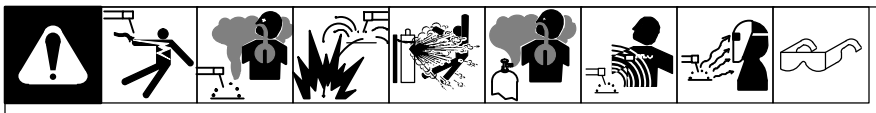
5 High Temperature Shutdown Light

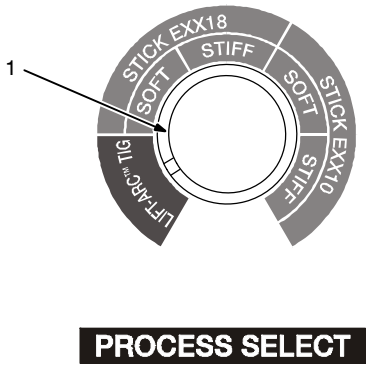
When unit is first energized this indicator light illuminates for approximately 1 second to provide visual confirmation that the light is functioning properly (see Section 4-3).

6 Remote 14 Receptacle

Ref. 217 192-C / 803 942-A

6-2. Process Select Control





RECOMMENDED PROCESS SELECTIONS VS ELECTRODE TYPE	
ELECTRODE TYPE	**SUGGESTED PROCESS SETTING**
EXXX1	EXX10
EXXX2	EXX10
EXXX3	EXX18
EXXX4	EXX18
EXXX5	EXX18
EXXX6	EXX18
EXXX7	EXX18
EXXX8	EXX18
STAINLESS	EXX18

1 Process Select Control

Rotate knob to select desired process.

Lift-Arc™ TIG - Normal open-circuit voltage is not present between the electrode and workpiece. A solid-state contactor does not energize until after the electrode touches the workpiece, preventing overheating, sticking, or contaminating the electrode (see Section 6-4). Make connections according to Section 5-3.

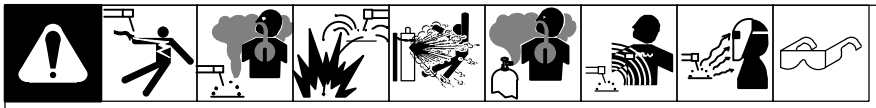
Stick E XX18 Soft - This setting provides a lower dig/arc force setting for smooth weld performance. A stable weld puddle with little arc "snap" gives excellent weld bead appearance with minimal spatter. Make connections according to Section 5-4.

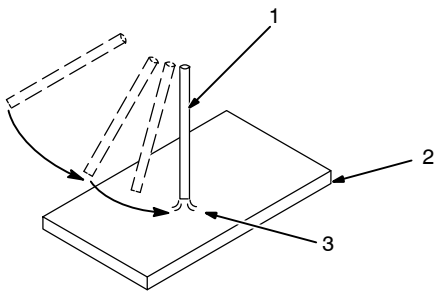
Stick E XX18 Stiff - This setting provides a higher dig/arc force that gives a slightly more fluid weld puddle, more arc "snap", and reduces the potential for electrode sticking at shorter arc lengths. Make connections according to Section 5-4.

Stick E XX10 Soft - This setting provides lower dig/arc force for open root vertical up joints or joints that do not require additional current for fit up inconsistencies. Make connections according to Section 5-4.

Stick E XX10 Stiff - This setting provides a higher dig/arc force for open root vertical down joints where additional current is needed to compensate for tight joint fit up without the need to increase overall welding current. Make connections according to Section 5-4.

6-3. Stick Start Procedure – Scratch Start Technique





With Stick selected, start arc as follows:

1 Electrode

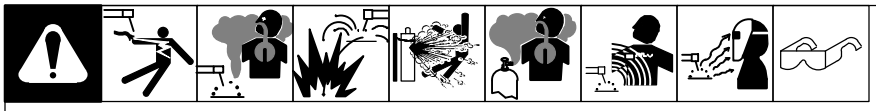
2 Workpiece

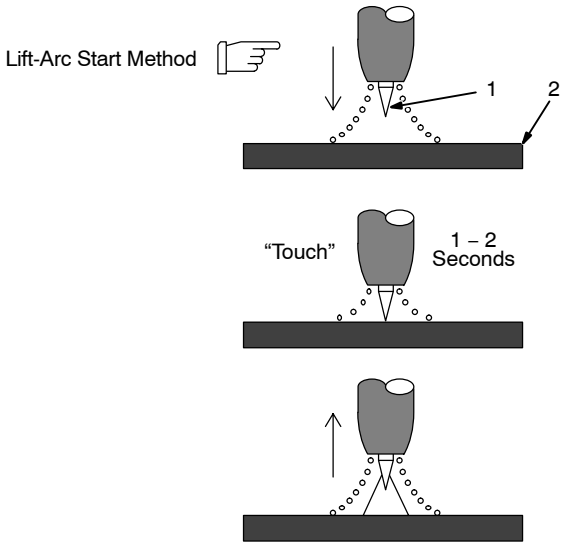
3 Arc

Drag electrode across workpiece like striking a match; lift electrode slightly after touching work. If arc goes out electrode was lifted to high. If electrode sticks to workpiece, use a quick twist to free it.

VRD Model Only: Normal open-circuit voltage is not present before electrode touches workpiece; only a low sensing voltage is present between electrode and workpiece. This allows electrode to touch workpiece without overheating, sticking, or getting contaminated.

6-4. Lift-Arc™ Start Procedure





Lift-Arc Start

With Lift-Arc™ selected, start arc as follows:

1 TIG Electrode

2 Workpiece

Turn gas on. Touch tungsten electrode to workpiece at weld start point. **Hold electrode to workpiece for 1-2 seconds**, and slowly lift electrode. Arc is formed when electrode is lifted.

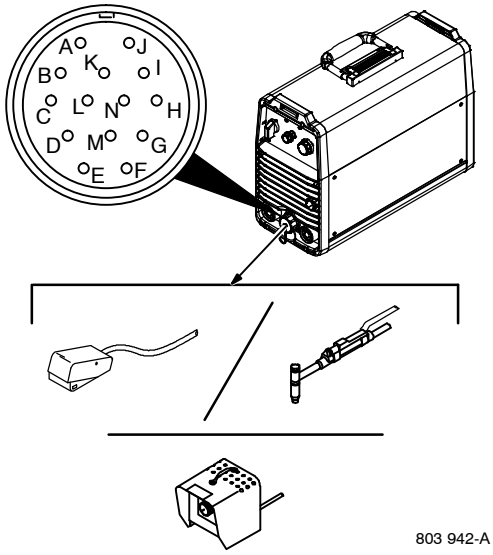
Normal open-circuit voltage is not present before tungsten electrode touches workpiece; only a low sensing voltage is present between electrode and workpiece. The solid-state output contactor does not energize until after electrode is touching workpiece. This allows electrode to touch workpiece without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

Application:

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

6-5. Remote 14 Receptacle Information

This unit automatically senses when a remote control is connected to the remote 14 receptacle. After connecting a remote control, the unit will automatically adjust output control to a primary/secondary configuration. In this configuration, the AMP ADJUST control on the unit becomes the primary and sets the maximum amperage output of the unit. The remote control becomes the secondary and provides an amperage range adjustment of 0 to 100% based on the AMP ADJUST control setting.



REMOTE 14	Socket*	Socket Information
15 VOLTS DC OUTPUT (CONTACTOR)	A	15 volts dc (not functional).
	B	Contact closure to A completes 15 volts dc contactor control circuit (not functional).
REMOTE OUTPUT CONTROL	C	Output to remote control; 0 to +10 volts dc.
	D	Remote control circuit common.
	E	0 to +10 volts dc input command signal from remote control.
GND	K	Chassis common.

*The remaining sockets are not used.

6-6. Fan-On-Demand

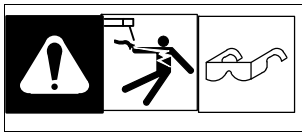
This unit is equipped with Fan-On-Demand. The fan operates only when necessary to cool internal components. At power down, the fan will operate for a short period of time while the output indicator light is flashing.

6-7. Rack Mounting

This unit is capable of being rack mounted see rack Owner's Manual, OM-221 611.

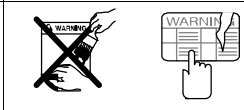
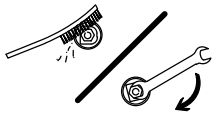
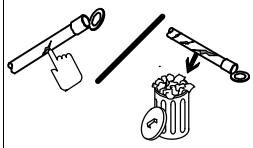
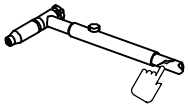
SECTION 7 – MAINTENANCE AND TROUBLESHOOTING

7-1. Routine Maintenance



Disconnect power before maintaining.

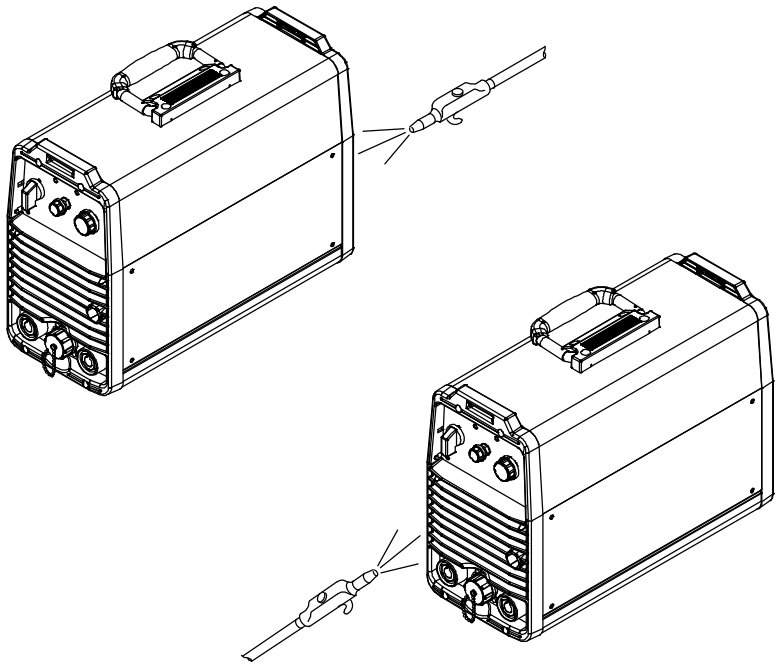
☞ *Maintain more often during severe conditions.*

	✓ = Check ◇ = Change ◍ = Clean ☆ = Replace * To be done by Factory Authorized Service Agent				Reference
Every 3 Months	 ☆ Unreadable Labels	 ◍ Weld Terminals	 ☆ Damaged Gas Hose		
	 ☆ Damaged Weld Cables	 ☆ Damaged Cords	 ☆ Damaged Torch Cable		
Every 6 Months	 ◍ Inside Unit	**Do not remove case when blowing out inside of unit (see Section 7-2) .**			

7-2. Blowing Out Inside Of Unit

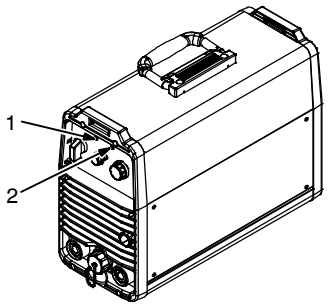
Do not remove case when blowing out inside of unit.

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



803 942-A

7-3. Troubleshooting



1 Output LED (Blue)
2 High Temperature LED (Yellow)

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Repeated LED Flashes Indicate Status

Blue	Yellow	Red (LED1 On PC13)	Trouble	Possible Causes		Remedy
None (Prior to MA050280G)	None (Prior to MA050 280G)	None	No weld output; unit completely inoperative.	Line Disconnect open.		Place line disconnect switch in on position (see Section 5-8 or 5-9).
				Blown fuses.		Check and replace line fuses, if necessary, or reset circuit breaker (see Section 5-8 or 5-9).
				Improper input connections.		Check for proper input connections (see Section 5-5 or 5-6).
				Fuse F1 on PC2 blown.		Check and replace F1, if applicable.
				Incorrect input voltage depending on Voltage Selection Switch position. PTC1 and PTC2 on PC2 overheated due to when unit was turned on.		Turn off welding power source, open rear switch cover, and turn Voltage Selection Switch to correct input voltage. Allow a 10 minute cooling down period before turning welding power source back on again.
				Process Select switch is between positions.		Verify Process Select switch is not between positions.
Alternating Blue And Yellow (Eff w/MA050280G)	Alternating Blue And Yellow (Eff w/MA050 280G)	12	No weld output; unit completely inoperative.	Process Select switch is between positions.		Verify Process Select switch is not between positions.
Flashes Continuously	0	7	No weld output.	Not ready.	Line voltage too high or too low.	Line voltage must be ±10%.
					Unit is linked incorrectly.	Check line voltage and link accordingly.
					Buss voltage imbalance.	Check DC buss caps and PC2, and replace if necessary.
6	0	1	No weld output.	Over-current fault.	No primary Ifb.	Check CT1 and wiring for an open condition.
					Faulty output diode(s) D1 or D2.	Check for shorts or opens in wiring.
					Faulty boost inductor L3.	Replace boost inductor L3 if necessary.
					Faulty HD1.	Replace HD1 if necessary.
					Open connection between HD1 and PC13.	Inspect all wiring and connections.
					Faulty PC13.	Replace PC13.
					Faulty PC13.	Replace PC13.
					Faulty PC2 (239001 or 245857)	Replace PC2.
4	0	8	No weld output.	Over-voltage latch.	Shorted boost relay CR1.	Check for a shorted relay CR1 or wiring.
					Boost relay CR1 does not deenergize after termination of weld.	Check PC13.
					Voltage in excess of 100V from another source applied across output studs.	Check for external voltage sources.

Repeated LED Flashes Indicate Status						
Blue	**Yellow**	**Red (LED1 On PC13)**	**Trouble**	**Possible Causes**		**Remedy**
5	0	11	No weld output.	Voltage loss.	Vfb leads not connected or reversed.	Check Vfb leads for proper wiring and connection to output studs and PC13.
					Short circuit across output studs.	Check for shorts.
					Faulty IGBT PM1 or PM2 on PC2.	Check PC2 and replace if necessary.
					Faulty PC13.	Replace PC13.
			Low OCv initially, but when load is applied LEDs begin to flash.		Faulty PM1 or PM2 on PC2 .	Replace PC2.
					Faulty C3.	Replace C3.
2	0	6	Reduced weld output.	Output foldback due to excessive input current.	Single phase rating exceeded.	Reduce output to 200 amperes or less.
					High output VA coupled with a low 230V line.	Check line voltage and weld settings.
3	0	10	No weld output.	Remote trigger has been left on.		Remove trigger, wait approximately 5 seconds, and restart.
0	On continuously	3		Unit overheated.	Primary (IGBT) thermistor over temperature in PM1 or PM2 on PC2.	Allow unit to cool down. Retorque PM1, PM2, and PM3 mounting hardware to 25 in. lbs (2.8 N•m).
		5			Secondary thermistor over temperature on output diode heatsink.	
0	Flashes continuously	0	No weld output.	Thermistor failure.	Shorted primary (IGBT) thermistor in PM1 or PM2 on PC2.	Check IGBT PM1 and PM2 thermistors on PC2 for shorts.
		2			Open primary (IGBT) thermistor in PM1 or PM2 on PC2.	Check IGBT PM1 and PM2 thermistors on PC2 and associated wiring for opens.
		4			Open secondary thermistor on output diode heatsink.	Check thermistor on output heatsink and associated wiring for opens.
		9			Shorted secondary thermistor on output diode heatsink.	Check thermistor on output heatsink and associated wiring for shorts.
N/A	N/A	N/A	Fan not operating.	Blocked fan.		Check for and remove anything blocking fan movement.
				Fan failure.		Have factory authorized service agent check fan motor.
				Faulty PC13.		Replace PC13.
N/A	N/A	N/A	Fan cycles on and off.	Over voltage condition.		Check primary voltage and Voltage Selection switch.
				Faulty voltage sense circuit on PC2.		Replace PC2.
N/A	N/A	N/A	Erratic or improper weld output.	Weld cables too small or defective.		Use proper size and type of weld cables (see Section 5-2).
				Dirty or loose connections.		Clean and tighten all weld cable connections (see Section 5-3 or 5-4).
N/A	N/A	N/A	Wandering arc.	Improper tungsten.		Use proper size tungsten (see Section 9-1).
				Worn or defective tungsten.		Use properly prepared tungsten (see Section 9).
				Gas flow too high.		Reduce gas flow rate (see Section 5-3).
N/A	N/A	N/A	Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Gas is blown away from weld zone.		Shield weld zone from drafts.
				Inadequate postflow time.		Allow adequate postflow time to shield tungsten while it is cooling after welding stops.
				Loose or leaking gas fittings.		Check and tighten all gas fittings (see Section 5-3).
				Water in torch.		Refer to torch manual.

PC2 LED Diagnosis (For PC Board 239 001 Or 245 857)		
LED	**Status**	**Remedy**
D2 (Secondary Power)	Transformer T3 secondary voltage is up when lit.	If not lit, contact factory authorized service agent.
D42 (Ready)	Status of precharge bus voltage and line voltage. Precharge should be completed when lit.	If not lit, contact factory authorized service agent.
D43 (Capacitor Over-voltage)	490 VDC or greater on one or both bus capacitors when lit.	If lit, contact factory authorized service agent.
D44 (Primary Power)	Transformer T3 primary control voltage is up when lit.	If not lit, contact factory authorized service agent.

Notes

SECTION 8 – ELECTRICAL DIAGRAMS

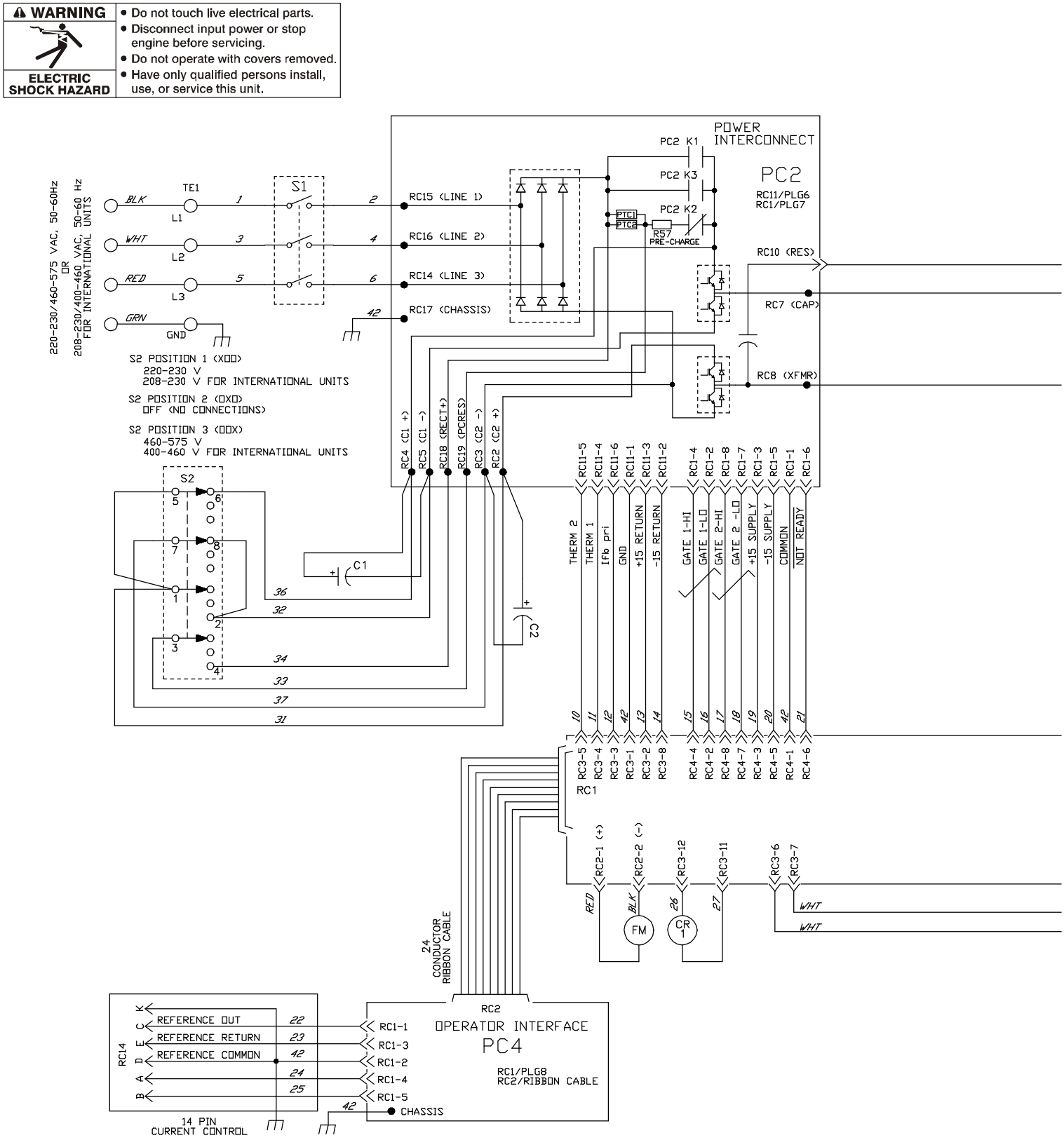
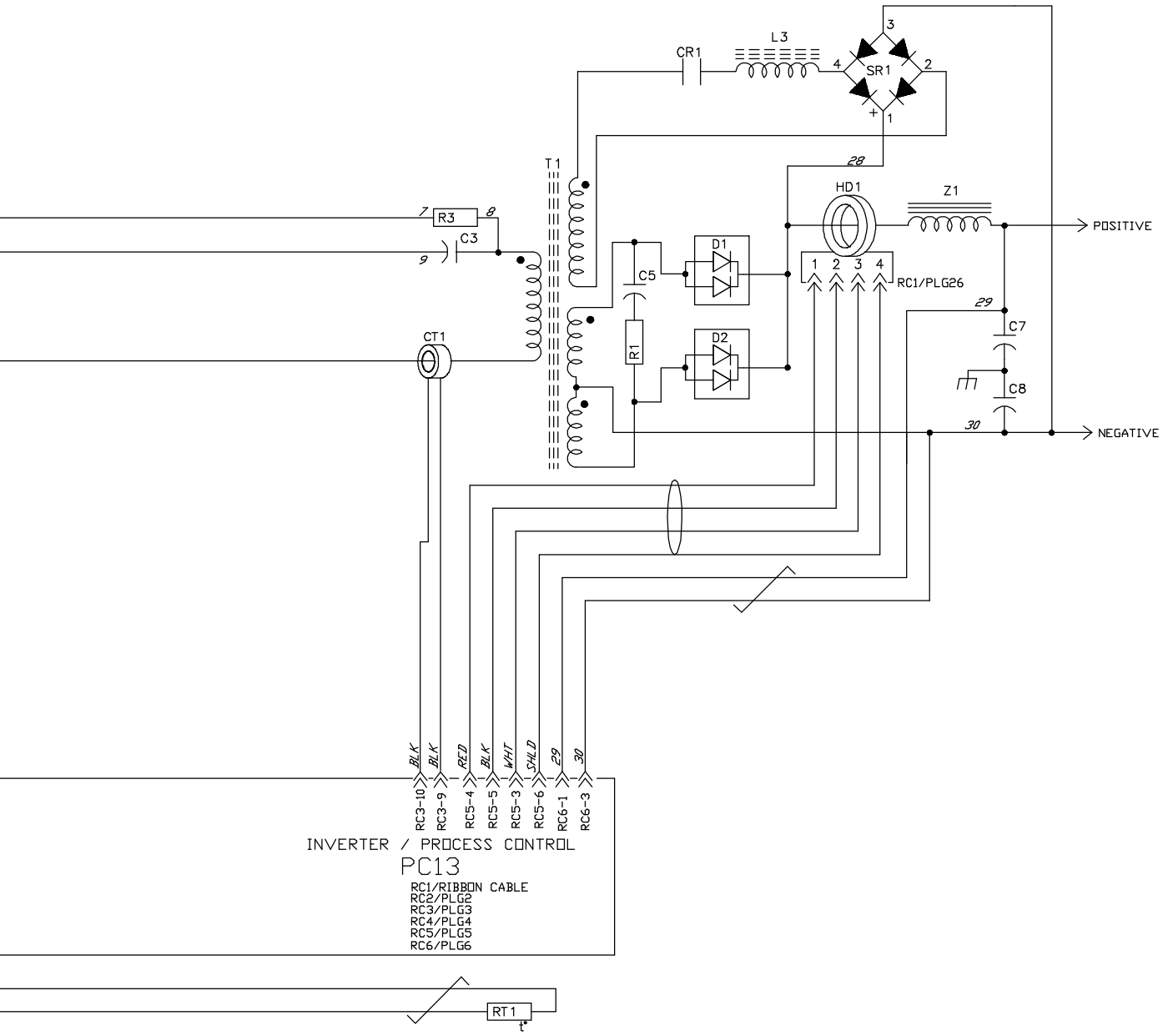


Figure 8-1. Circuit Diagram


CR1
L3
SR1
3
4
2
+
1
28
T1
HD1
Z1
POSITIVE
7
R3
8
C3
9
D1
C5
1 2 3 4
RC1/PLG26
29
C7
CT1
R1
D2
C8
30
NEGATIVE
BLK
BLK
RED
BLK
WHT
SHLD
29
30
RC3-10
RC3-9
RC5-4
RC5-5
RC5-3
RC5-6
RC6-1
RC6-3
INVERTER / PROCESS CONTROL
PC13
RC1/RIBBON CABLE
RC2/PLG2
RC3/PLG3
RC4/PLG4
RC5/PLG5
RC6/PLG6
RT1
t°

217 589-J

SECTION 9 – SELECTING AND PREPARING A TUNGSTEN FOR DC OR AC WELDING WITH INVERTER MACHINES

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

9-1. Selecting Tungsten Electrode (Wear Clean gloves To Prevent Contamination Of Tungsten)

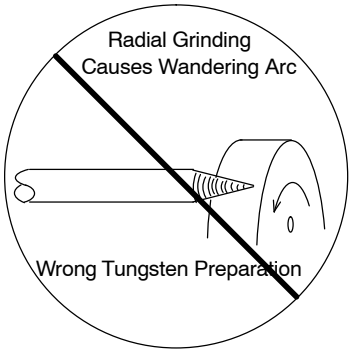
Electrode Diameter	Amperage Range - Gas Type♦ - Polarity	
	(DCEN) – Argon Direct Current Electrode Negative (For Use With Mild Or Stainless Steel)	AC – Argon Balance Control @ 65% Electrode Negative (For Use With Aluminum)
2% Ceria (Orange Band), 1.5% Lanthanum (Gray Band), Or 2% Thorium (Red Band) Alloy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

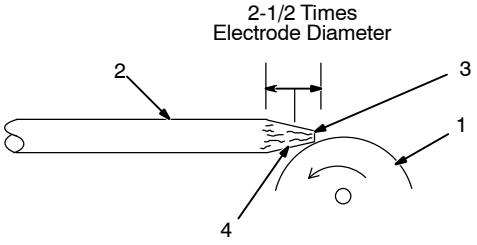
♦Typical argon shielding gas flow rates are 11 to 35 cfh (cubic feet per hour).

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

9-2. 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.





Ideal Tungsten Preparation – Stable Arc

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

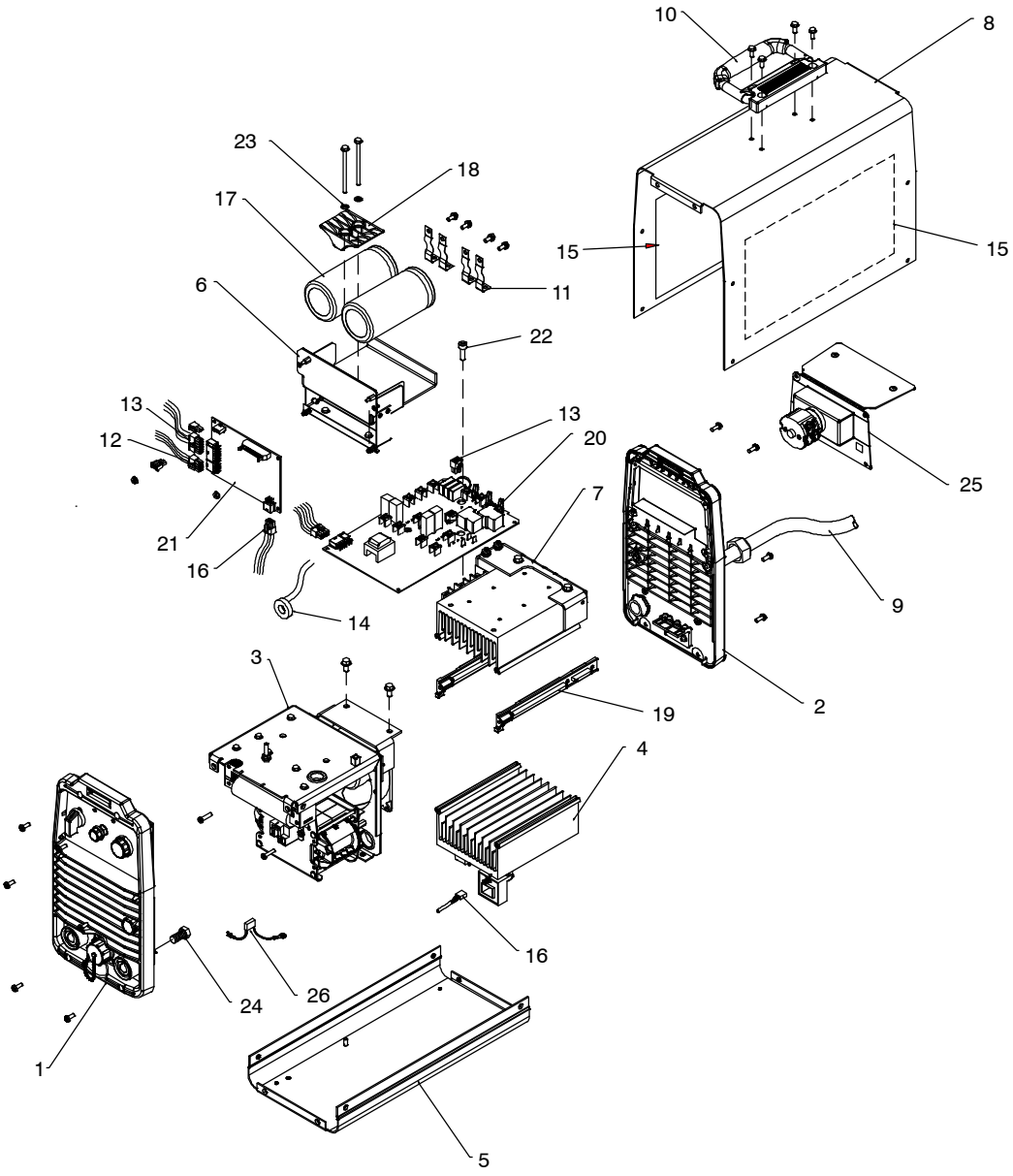
Diameter of this flat determines amperage capacity.

4 Straight Ground

Grind lengthwise, **not radial**.

Notes

☞ *Hardware is common and not available unless listed.*



Ref. 803 947-F

Figure 10-1. Main Assembly

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

Figure 10-1. Main Assembly

1		Fig 10-2	Panel, Front W/Cmpnt	1
2		Fig 10-3	Panel, Rear W/Cmpnt	1
3		Fig 10-4	Magnetics Subassembly	1
4		Fig 10-6	Heat Sink Assembly, Output Diode	1
5		238999	Base Assy,	1
6		206093	Bracket, Mtg Capacitors	1
7		206038	Heat Sink Assembly, Input	1
8		+217216	Wrapper	1
		203990	Label, Warning General Precautionary Static	1
9		+207437	Cable, Power 6 ft 10ga 4c Blk/Red/Wht/Grnyel	1
		182826	Label, Warning Electric Shock Power Cord	1
10		206108	Handle, Rubberized Carrying	1
11		206289	Link, Connecting	4
12	PLG3,6	206247	Plugs, W/Leads	2
13	PLG4,7	206254	Plugs, W/Leads	2
14		196231	Xfmr, Current Sensing 200/1	1
15		206270	Insulator, Side	2
16	PLG5	206276	Cable, LEM W/Plugs	1
17	C1,C2	+203912	Capacitor, Elctlt 2400 uf 500 VDC Can 2.5 Dia	2
		126026	Label, Warning Electric Shock Can Kill Significant	2
18		205908	Clamp, Capacitor 2.500 Dia Horizontal Mtg Nylon	1
19		232856	Rail, Heat Sink	2
20	PC2	244500	Kit, Circuit Card Assy Interconnect	1
21	PC13	243436	Circuit Card Assy, Control W/Program	1
21	PC13	246930	Circuit Card Assy, Control W/Program VRD Model	1
22		229337	Screw, M 5− .8x 12 Soc Hd−Torx Stl Pld Sems	6
23		252661	Washer, Spring 5 mm Din 137B Stl Zc Plated	2
24		200550	Screw, M10−1.5 x 20 Hex Hd−pln 8.8 Pld Sems	2
25		Fig 10-5	Switch Assy, Relinking	1
26	C7,C8	222488	Capacitor Assy	2

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

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

☞ *Hardware is common and not available unless listed.*

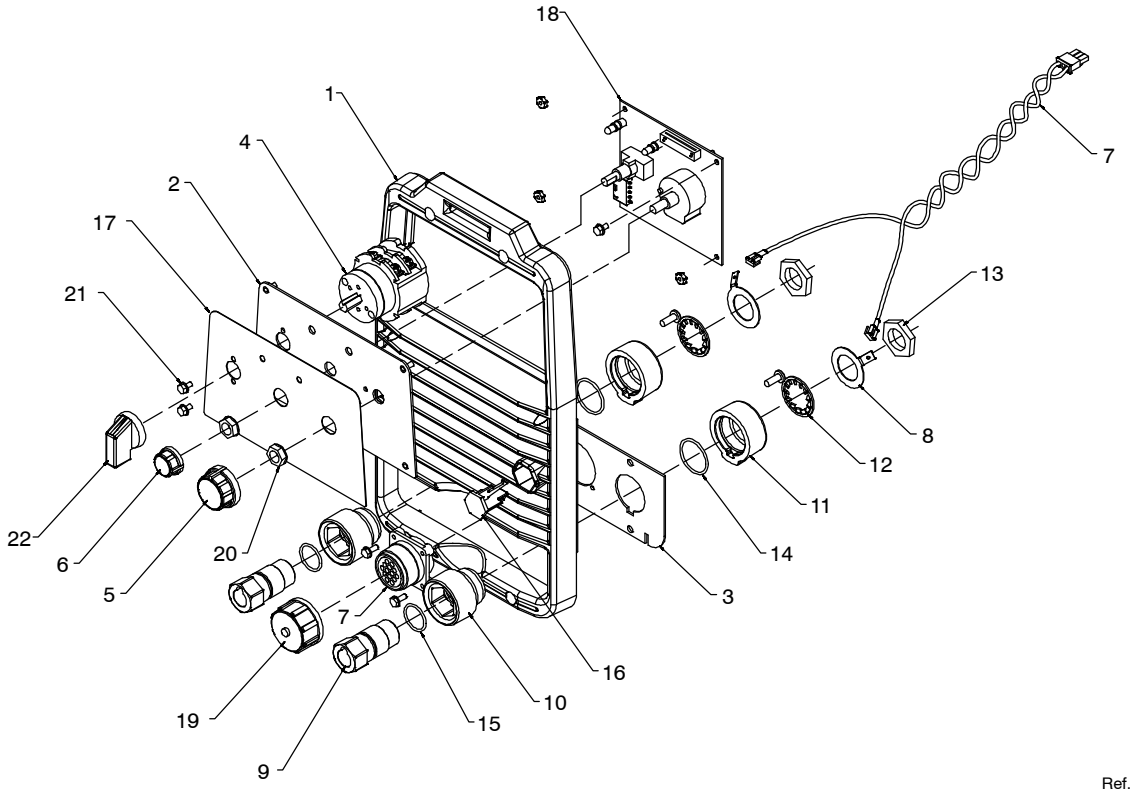


Figure 10-2. Panel, Front w/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity / Model 907244013	907244011 907251011	907244 907251	907251012	907244001
			10-2. Panel, Front w/Components					
1		194242	Panel, Front/Rear	1	1	1	1	1
2		205759	Panel, Front Upper	1	1	1	1	1
3		195647	Panel, Front Lower	1	1	1	1	1
4	S1	207165	Switch, W/Leads	1	1	1	1	1
5		174991	Knob, Pointer 1.250 Dia x .250 ID W/Spring Clip–.21	1	1	1	1	1
6		174992	Knob, Pointer .840 Dia X .250 ID W/Spring Clip–.21	1	1	1	1	1
7	RC14	207144	Receptacle W/Leads & Plug(14 Pin)	1	1	1	1	1
8		178548	Terminal, Connector Friction	2	2	2	2	2
		218183	Rcpt Assy, Tw Lk Insul Fem (Tweco Type) (Including)	2	2			2
		202813	Receptacle, Twist Lock Power					
8			Assy (Dinse Type) (Including)			2	2	
		209473	Receptacle, Twist Lock Tweco(Female)	2	2			2
9		202553	Receptacle, Twist Lock Dinse(Female)			2	2	
10		185712	Insulator, Bulkhead Front	2	2	2	2	2
11		185713	Insulator, Bulkhead Rear	2	2	2	2	2
12		185714	Washer, Tooth 22mmid X 31.5mmod 1.310–1mmt Intern	2	2	2	2	2
13		185717	Nut, M20–1.5 1.06 Hex .19h Brs Locking	2	2	2	2	2
14		185718	O–ring, 0.989 ID x 0.070 H	2	2	2	2	2
15		186228	O–ring, 0.739 ID x 0.070 H	2	2	2	2	2

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 907244011 907244013	907244 907251011	907251	907251012	907244001
			10-2. Panel, Front w/Components (Continued)					
.. 16		207253	Blank, Hex Hole Black	1	1	1	1	1
.. 17		217192	Nameplate, Miller CST 280	1	1	1		
.. 17		221618	Nameplate, Miller CST 280 VRD			1	1	1
.. 17		220880	Nameplate,Miller CST 280 (French)	1				
.. 18	PC4	243447	Circuit Card Assy, Operator Interface1 1	1	1			
.. 19		170391	Connector, Circ Ms Protective Cap	1	1	1	1	1
.. 20		178355	Nut, 375–32 .54 Hex .25h Nyl Flange .62D	2	2	2	2	2
.. 21		209554	Screw, KA 35x 8 Pan Hd–phL	2	2	2	2	2
.. 22		230485	Knob, Switch	1	1	1	1	1

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

☞ *Hardware is common and not available unless listed.*

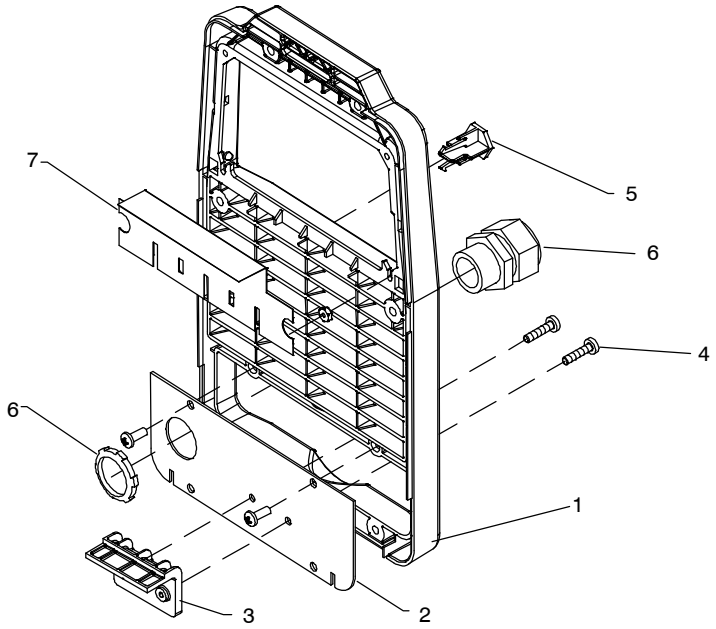


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Figure 10-3. Panel, Rear w/Components

Item No.	Part No.	Description	Quantity
		Figure 10-3. Panel, Rear w/Components	
... 1	194242	.. Panel, Front/Rear	1
... 2	206053	.. Panel, Rear Lower	1
	287132	.. Label, Notice Cst If Front Panel Lamps Do Not Light	1
... 3	210128	.. Bracket, Heatsink	1
... 4	145217	.. Screw, K40x 12 Pan HD–PHL	2
... 5	207253	.. Blank, Hex Hole Black	1
... 6	264099	.. Bushing, Strain Relief .450/.709 ID X1.068 Mtg Hole	1
... 7	246319	.. Insulator, Switch Rear Panel CST–280 (Not Shown)	1

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

☞ *Hardware is common and not available unless listed.*

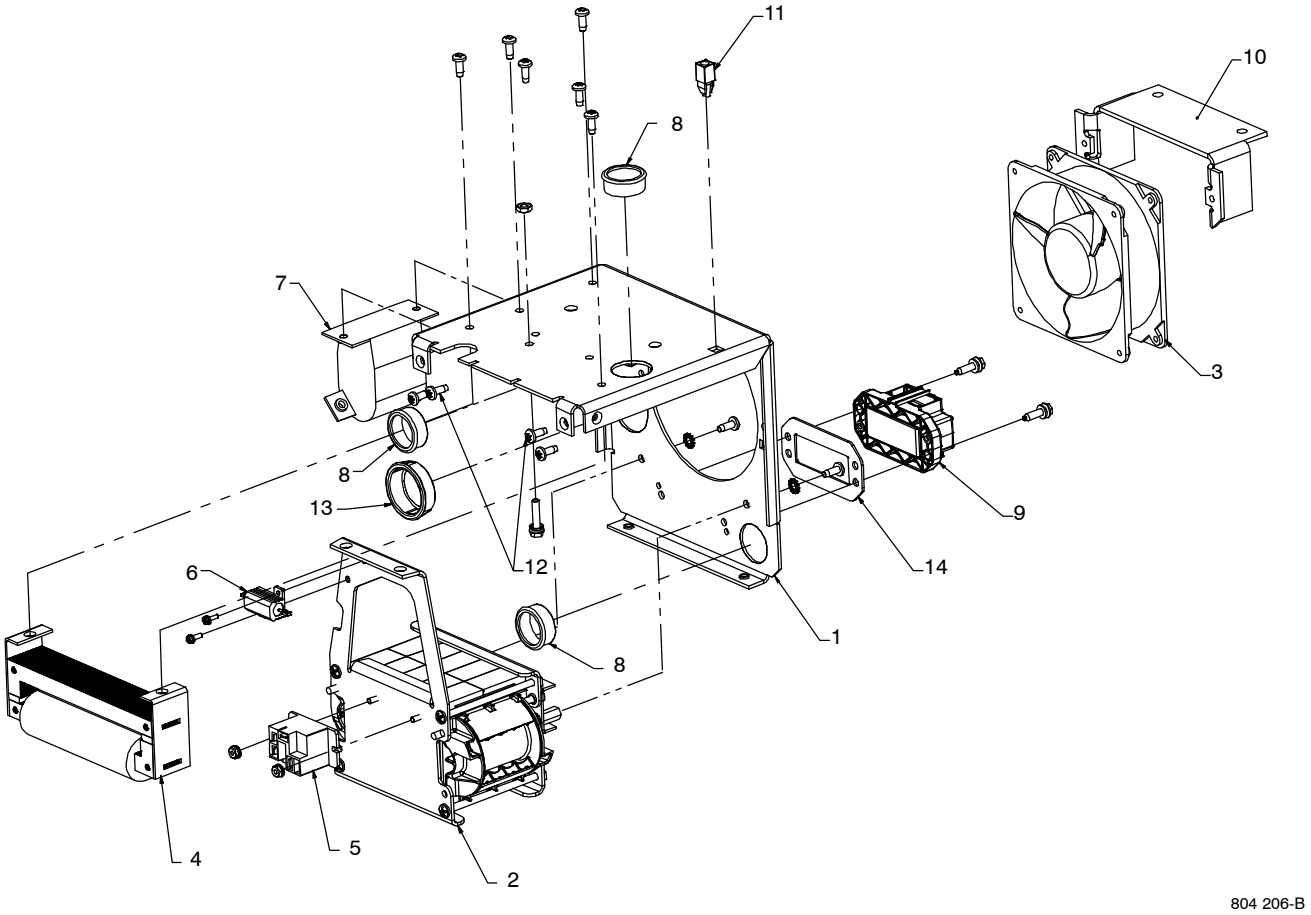

Figure 10-4. Magnetics Subassembly

Item No.	Diagram Marking	Part No.	Description	Quantity Model 907 251	Quantity Model 907 244
1		206063	Panel, Plenum		1
2	T1	212812	Xfmr, HF Litz/Litz W/Boost	1	
2	T1	206065	Xfmr, HF Litz/Litz W/Boost		1
3	FM	236263	Fan, Muffin 24VDC 3000 RPM 130 CFM 4.125 Mtg Holes	1	1
4	Z1	206064	Inductor, Output	1	1
5	CR1	206258	Relay, Encl 24VDC SPST 30A/240VAC 4 pin Flange Mtg	1	1
6	R3	206281	Resistor, W/Leads	1	1
7	C3	196143	Capacitor, Polyp Met Film 16. uf 400 Vac 10%	1	1
8		057357	Bushing, Snap−in Nyl .937 ID X 1.125 Mtg Hole	3	3
9	L3	225189	Coil, Inductor (Boost)	1	1
10		198634	Bracket, Front Heatsink Mtg	1	1
11		083147	Grommet, SCR No 8/10 Panel Hole .312 Sq .500 High	1	1
12		136343	Screw, K50x 20 Pan Hd−phl	2	2
13		170647	Bushing, Snap−in Nyl 1.312 ID X 1.500 Mtg Hole	1	1
14		227746	Gasket, Inductor Mounting	1	1

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

☞ *Hardware is common and not available unless listed.*

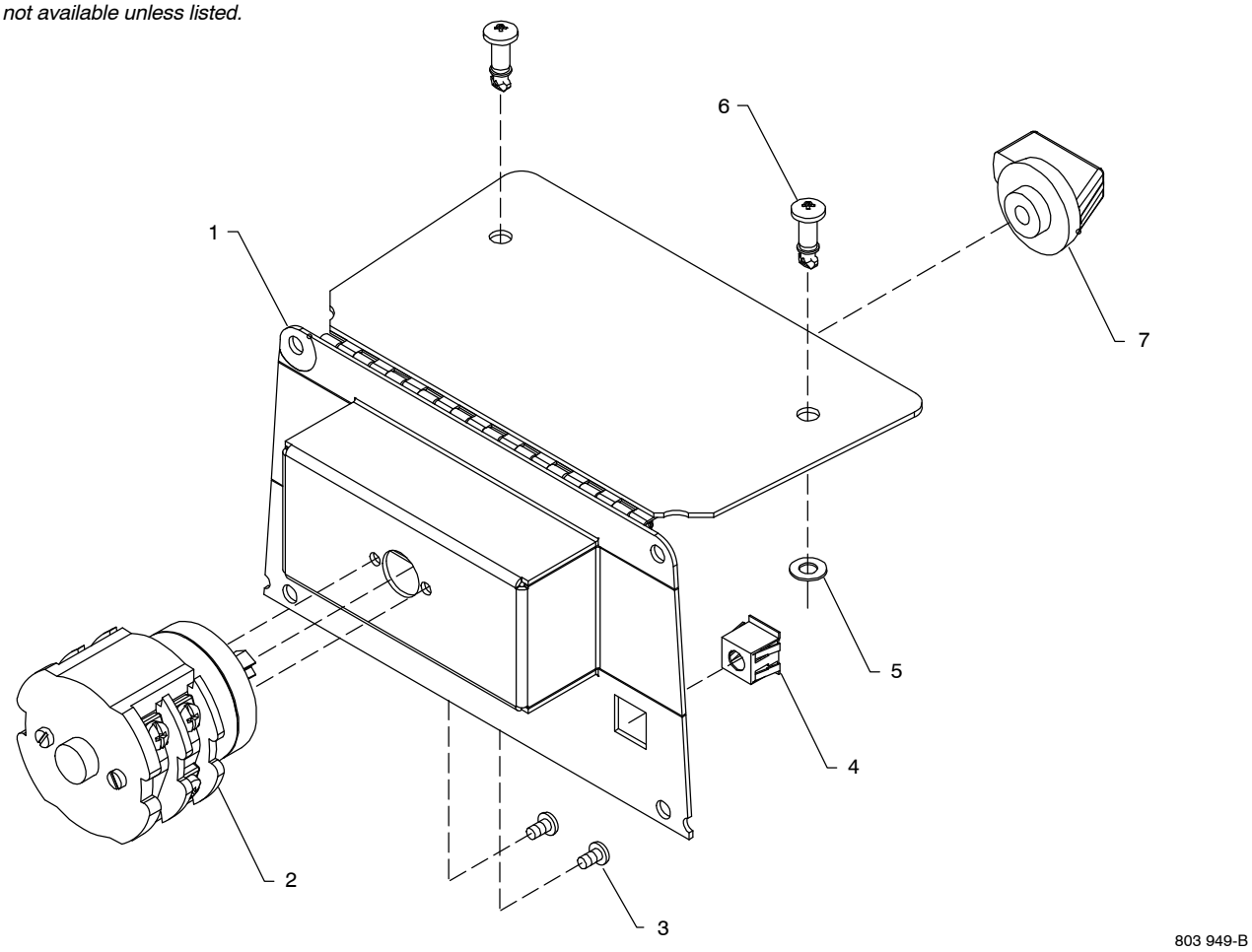

Figure 10-5. Relinking Switch And Door Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 907 251	Quantity Model 907 244
Figure 10-5. Relinking Switch And Door Assembly					
1		+217252	Door Assy, Relinking	1	1
		221460	Label, 220–230 VAC		1
		221461	Label, 460–575 VAC		1
		221458	Label, 208–230 VAC	1	
		221459	Label, 400–460 VAC	1	
		221462	Label, Caution Operating Link Switch Etc	1	1
2		217647	Switch, Rotary 3 Posn 4P 32A 600V 180 Deg (Spl)	1	1
3		209554	Screw, KA 35 x 8 Pan Hd–phl	2	2
4		221573	Nut, Speed Snap–in 1/4 Turn	2	2
5		221575	Retainer, Nylon Push–on	2	2
6		221574	Screw, 1/4 Turn Oval Hd–phl	2	2
7		230485	Knob, Switch	1	1

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

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

☞ *Hardware is common and not available unless listed.*

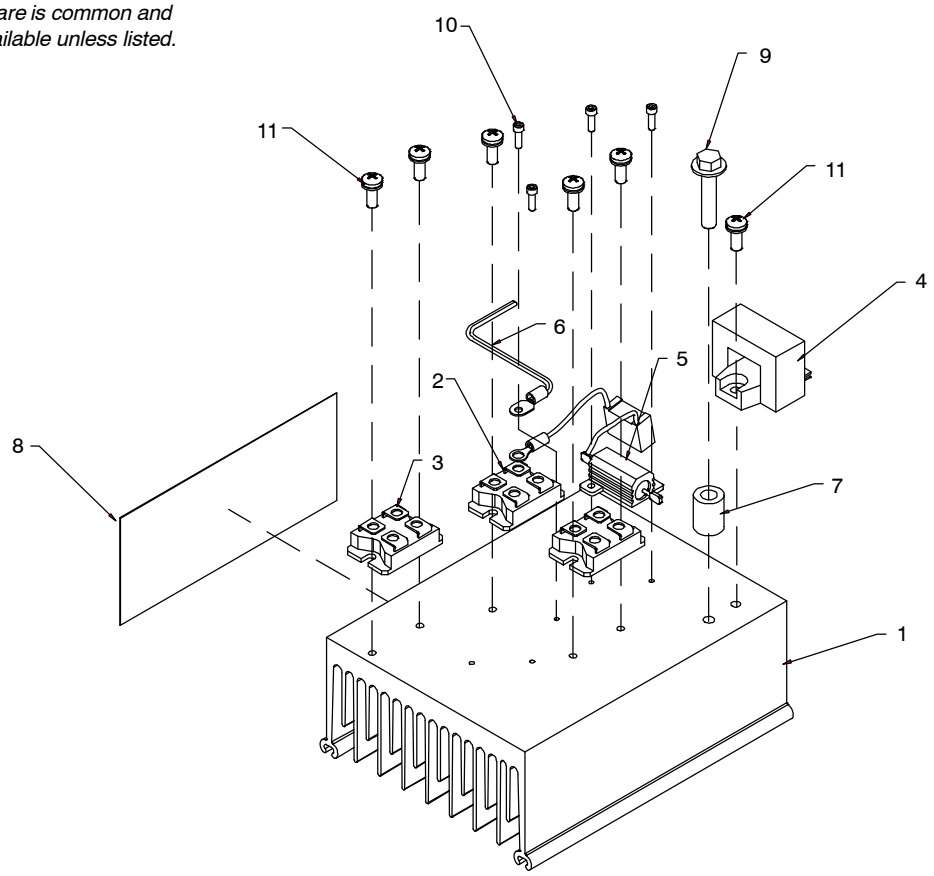

Figure 10-6. Heat Sink Assembly, Output Diode

Item No.	Diagram marking	Part No.	Description	Quantity
Figure 10-6. Heat Sink Assembly, Output Diode				
1		205916	Heat Sink, Diode Output	1
2	D1,D2	223422	Kit, Diode Ultra–fast Recovery	2
3	SR1	201530	Kit, Diode Fast Recovery Bridge	1
4	HD1	191941	Transducer, Current	1
5	R1,C5	207384	Resistor/Capacitor,	1
6	RT1	209223	Thermistor, NTC 30k Ohm @ 25 Deg C 18in Lead	1
7		049611	Tubing, Cop .540 OD x .123 Wall x .687	1
8		207932	Insulator, Heatsink	1
9		108942	Screw, 250–20x1.25 Hexwhd .61D Gr5 Pld	1
10		602 062	Screw, 004–40x .37 Pan Hd–phl Stl Pld Cone Sems	5
11		207451	Screw, 008–32x .50 Pan Hd–phl Stl Pld Sems	7

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

☞ *Hardware is common and not available unless listed.*

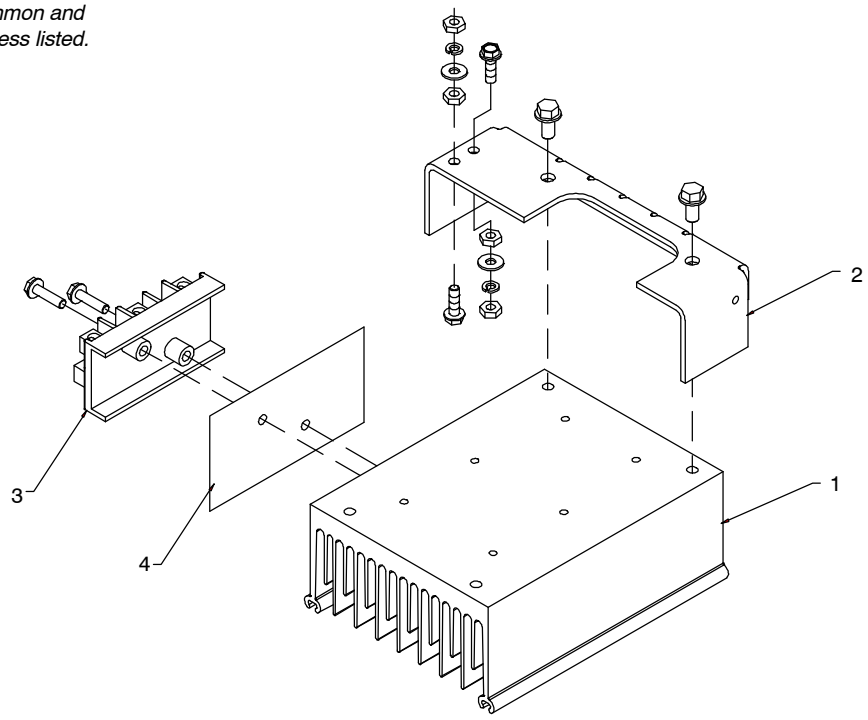

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Figure 10-7. Heat Sink Assembly, Input

Item No.	Diagram marking	Part No.	Description	Quantity
1		205915	Heat Sink, IGBT/Input Rectifier Module	1
2		206091	Bracket, Heatsink Rear	1
3	TE1	206328	Block, Term 70 Amp 3 Pole Screw Term 4–14 Wire	1
4		244674	Insulator, Terminal Block	1

Figure 10-7. Heat Sink Assembly, Input

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

Notes

Notes

Notes

Warranty Questions?

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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.

Miller

TRUE BLUE® 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.

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® 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.

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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

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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 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.

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