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Processes



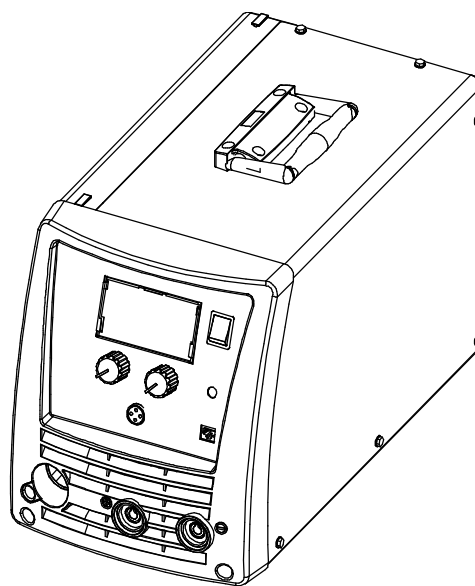
Multiprocess Welding

Description



Arc Welding Power Source And Wire Feeder

Multi-Handler™ 200



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OWNER'S MANUAL

From Hobart to You

Thank you and congratulations on choosing Hobart. 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.

This Owner's Manual is designed to help you get the most out of your Hobart 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 Hobart, 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.

Hobart Welders manufactures a full line of welders and welding-related equipment. For information on other quality Hobart products, contact your local Hobart distributor to receive the latest full line catalog or individual specification sheets. **To locate your nearest distributor or service agency call 1-800-332-3281, or visit us at www.HobartWelders.com on the web.**



For Technical Help call 1-800-332-3281.

Register your product at www.HobartWelders.com



Hobart is registered to the ISO 9001 Quality System Standard.



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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 these 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 Principal Safety Standards. Read and follow all Safety Standards.

 Only qualified persons should install, operate, maintain, and repair this equipment. A qualified person is defined as one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project and has received safety training to recognize and avoid the hazards involved.

 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 weld output in damp, wet, or confined spaces, or if there is a danger of falling.
- Do not store or use equipment in standing water.
- 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) welding power source,

2) a DC manual (stick) welding power source, or 3) an AC welding power source with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welding power source is recommended. And, do not work alone!

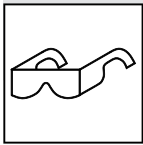
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install, ground, and operate this equipment according to its Owner's Manual and national, state, and local codes.
- Always 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 and ground conductor for damage or bare wiring—replace immediately if damaged—bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or repaired 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.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Do not touch electrode holders connected to two welding machines at the same time because double open-circuit voltage can be present.
- 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.
- Use GFCI protection when operating auxiliary equipment in damp or wet locations.



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.



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.



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.
- Ventilate the work area and/or use local forced ventilation at the arc to remove welding fumes and gases. The recommended way to determine adequate ventilation is to sample for the composition and quantity of fumes and gases to which personnel are exposed.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson 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 the operator is wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



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.



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.

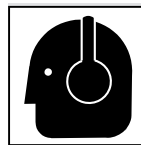
- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare, and sparks; warn others not to watch the arc.
- Wear body protection made from leather or flame-resistant clothing (FRC). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.



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 cut or weld on tire rims or wheels. Tires can explode if heated. Repaired rims and wheels can fail. See OSHA 29 CFR 1910.177 listed in Safety Standards.
- 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 (see Safety Standards).
- Do not weld where the atmosphere can 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.
- Do not use welding power source to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear body protection made from leather or flame-resistant clothing (FRC). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or bypass them.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals.



NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Check for noise level limits exceeding those specified by OSHA.
- Wear appropriate ear protection if noise level is high.
- Warn others nearby about noise hazard.



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, arc gouging, plasma arc cutting, or induction heating operations.



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. Do not stand in front of or behind the regulator when opening the valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the proper equipment, correct procedures, and sufficient number of persons to lift, move, and transport 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 Hazards For Installation, Operation, And Maintenance



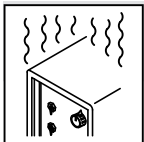
FIRE OR EXPLOSION hazard.

- 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.



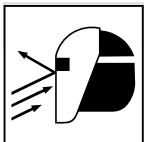
FALLING EQUIPMENT can injure.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use correct procedures and 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 output 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 while wearing proper face, hand, and body protection.
- Sparks can cause fires—keep flammables away.



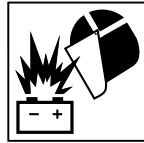
MOVING PARTS can injure.

- 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.



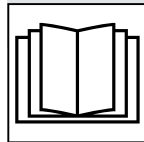
BATTERY EXPLOSION can injure.

- Do not use welding power source 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, 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 installation, maintenance, and service according to the Owner's Manuals, industry standards, and national, state, and local codes.



HF RADIATION can cause interference.

- High-frequency (HF) 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 microprocessors, 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 equipment is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding equipment, using shielded cables, using line filters, or shielding the work area.

1-4. California Proposition 65 Warnings



WARNING – This product can expose you to chemicals including lead, which are known to the state of California to cause cancer and birth defects or other reproductive harm.

For more information, go to www.P65Warnings.ca.gov.

1-5. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, American Welding Society standard ANSI Standard Z49.1. Website: www.aws.org.

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute. Website: safetyequipment.org.

Safe Practices for the Preparation of Containers and Piping for Welding and Cutting, American Welding Society Standard AWS F4.1. Website: www.aws.org.

National Electrical Code, NFPA Standard 70 from National Fire Protection Association. Website: www.nfpa.org.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1 from Compressed Gas Association. Website: www.cganet.com.

Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2 from Canadian Standards Association. Website: www.csagroup.org.

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B from National Fire Protection Association. Website: www.nfpa.org.

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910.177 Subpart N, Part 1910 Subpart Q, and Part 1926, Subpart J. Website: www.osha.gov.

OSHA *Important Note Regarding the ACGIH TLV, Policy Statement on the Uses of TLVs and BEIs*. Website: www.osha.gov.

Applications Manual for the Revised NIOSH Lifting Equation from the National Institute for Occupational Safety and Health (NIOSH). Website: www.cdc.gov/NIOSH.

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1-6. EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). The current from arc welding (and allied processes including spot welding, arc gouging, plasma arc cutting, and induction heating operations) creates EMF around the welding circuit. EMF can interfere with some medical implants, e.g. pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, restrict access for passersby or conduct individual risk assessment for operators. All operators should use the following procedures in order to minimize exposure to EMF fields:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between 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 output circuit as possible.
5. Connect work clamp to workpiece as close to the arc as possible.
6. Do not work next to, sit or lean on, or carry the power source or other equipment while operating.

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, arc gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, follow the procedures above.

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.

AVIS – 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. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout 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 ce symbole, prendre garde et suivre les instructions afférentes pour éviter tout risque. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les Normes de sécurité principales. Lire et suivre toutes les Normes de sécurité.

 L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées. Une personne qualifiée est définie comme celle qui, par la possession d'un diplôme reconnu, d'un certificat ou d'un statut professionnel, ou qui, par une connaissance, une formation et une expérience approfondies, a démontré avec succès sa capacité à résoudre les problèmes liés à la tâche, le travail ou le projet et a reçu une formation en sécurité afin de reconnaître et d'éviter les risques inhérents.

 Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.



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 utiliser de sortie de soudage CA dans des zones humides ou confinées ou s'il y a un risque de chute.
- Ne stockez pas et n'utilisez pas l'équipement dans de l'eau stagnante.
- 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.

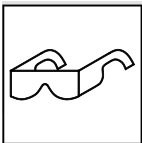
- D'autres consignes de sécurité sont nécessaires dans les conditions suivantes : risques électriques dans un environnement humide ou si l'on porte des vêtements mouillés ; sur des structures métalliques telles que sols, grilles ou échafaudages ; en position coincée comme assise, à genoux ou couchée ; 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 source d'alimentation de soudage DC à tension constante (à fil), 2) un source d'alimentation de soudage DC manuel (électrode) ou 3) un source d'alimentation de soudage AC à tension à vide réduite. Dans la plupart des situations, l'utilisation d'un source d'alimentation de soudage 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).
- Brancher correctement la mise à la terre et utiliser cet appareil conformément à son manuel d'utilisateur et aux codes nationaux, provinciaux et municipaux.
- Toujours vérifier la mise à la terre — vérifier et assurez-vous que le conducteur de mise à la terre du cordon d'alimentation est bien raccordé à la borne de mise à la terre dans le boîtier de déconnexion 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 et le conducteur de mise à la terre afin de s'assurer qu'il n'est pas altéré ou dénudé -, le remplacer immédiatement s'il l'est -. Un fil dénudé 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.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.

- Ne pas toucher des porte électrodes connectés à deux machines en même temps à cause de la présence d'une tension à vide doublée.
- 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 à 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.
- Utiliser une protection différentielle lors de l'utilisation d'un équipement auxiliaire dans des endroits humides ou mouillés.



LES PIÈCES CHAUDES peuvent provoquer des brûlures.

- Ne pas toucher des parties chaudes à mains nues.
- 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.



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

Le soudage, l'écaillage, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.

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



LES FUMÉES ET LES GAZ peuvent être dangereux.

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

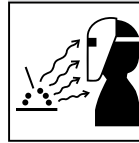
- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- Ventiler la zone et/ou utiliser une ventilation forcée au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage. Pour déterminer la bonne ventilation, il est recommandé de procéder à un prélèvement pour la composition et la quantité de fumées et de gaz auxquelles est exposé le personnel.
- Si la ventilation est médiocre, porter un respirateur anti-vapeurs approuvé.
- Lire et comprendre les fiches de données de sécurité et les instructions du fabricant concernant les adhésifs, les revêtements, les nettoyants, les consommables, les produits de refroidissement, les dégraissants, les flux et les métaux.
- 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 de l'opérateur est 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 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 RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

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

- Portez un casque de soudage approuvé muni de verres filtrants appropriés pour protéger visage et yeux contre les rayons et les étincelles d'arc pendant le soudage ou la surveillance (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 une protection corporelle en cuir ou des vêtements ignifuges (FRC). La protection du corps comporte des vêtements sans huile, comme des gants de cuir, une chemise solide, des pantalons sans revers, des chaussures hautes et une casquette.

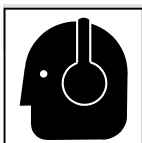


LE SOUDAGE peut provoquer un incendie ou une explosion.

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 homologuées.
- Ne pas souder dans un endroit où des étincelles peuvent tomber sur des substances inflammables.
- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas couper ou souder des jantes ou des roues. Les pneus peuvent exploser s'ils sont chauffés. Les jantes et les roues réparées peuvent défailir. Voir OSHA 29 CFR 1910.177 énuméré dans les normes de sécurité.

- 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 (voir les Normes de Sécurité).
- Ne pas souder là où l'air ambiant pourrait contenir des poussières, gaz ou émanations inflammables (vapeur d'essence, par exemple).
- Brancher le câble de masse sur la pièce la plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels.
- Ne pas utiliser le poste de soudage pour dégelier 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 une protection corporelle en cuir ou des vêtements ignifuges (FRC). La protection du corps comporte des vêtements sans huile, comme des gants de cuir, une chemise solide, des pantalons sans revers, des chaussures hautes et une casquette.
- 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.
- Suivre les recommandations dans OSHA 1910.252 (a) (2) (iv) et NFPA 51B pour les travaux à chaud et assurez-vous qu'un observateur d'incendie et un extincteur à proximité.
- Lire et comprendre les fiches de données de sécurité et les instructions du fabricant concernant les adhésifs, les revêtements, les nettoyeurs, les consommables, les produits de refroidissement, les dégraisseurs, les flux et les métaux.



Le BRUIT peut endommager l'ouïe.

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

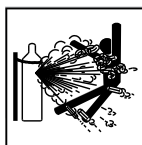
- Vérifier si les niveaux de bruit excèdent les limites spécifiées par l'OSHA.
- Porter des protections appropriée pour les oreilles si le niveau sonore est trop élevé.
- Prévenez toute personne sur les lieux du danger relié au bruit.



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 le soudage à l'arc, du soudage par points, gouge à l'arc, de la découpe plasma ou une opération de chauffage par induction.



Si des BOUTEILLES sont endommagées, elles pourront exploser.

Des bouteilles de gaz comprimé protecteur 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.
- Tourner le dos à la sortie de vanne lors de l'ouverture de la vanne de la bouteille. Ne pas se tenir devant ou derrière le régulateur lors de l'ouverture de la vanne.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- Utilisez les équipements corrects, les bonnes procédures et suffisamment de personnes pour soulever, déplacer et transporter 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. Symboles de dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance



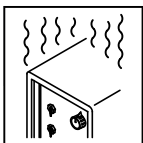
Risque D'INCENDIE OU D'EXPLOSION.

- Ne pas installer ou 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.



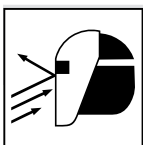
LA CHUTE DE L'ÉQUIPEMENT peut provoquer des blessures.

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



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Laisser l'équipement refroidir ; respecter le facteur de marche nominal.
- Réduire le courant de sortie ou le cycle opératoire avant de recommencer le soudage.
- Ne pas obstruer les passages d'air du poste.



LES ÉTINCELLES PROJÉTÉES peuvent provoquer des blessures.

- Porter un écran facial pour protéger le visage et les yeux.
- Former l'électrode au tungstène uniquement à la meuleuse dotée de protecteurs cette manoeuvre 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 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 gachette 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.



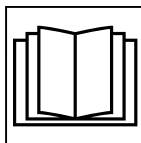
L'EXPLOSION DE LA BATTERIE peut provoquer des blessures.

- Ne pas utiliser source d'alimentation 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.

- Rester à l'écart des organes mobiles comme le ventilateur.
- 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 des pièces de remplacement provenant du fabricant.
- Effectuer l'installation, l'entretien et toute intervention selon les manuels d'utilisateurs, les normes nationales, provinciales et de l'industrie, ainsi que les codes municipaux.



LE RAYONNEMENT HAUTE FRÉQUENCE (HF) risque de provoquer des interférences.

- Le rayonnement haute fréquence (HF) 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 peut gêner le fonctionnement d'appareils électroniques sensibles tels que les microprocesseurs, les ordinateurs et les équipements informatisés comme 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 l'équipement 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



AVERTISSEMENT – Ce produit peut vous exposer à des produits chimiques tels que le plomb, reconnus par l'État de Californie comme cancérigènes et sources de malformations ou d'autres troubles de la reproduction.

Pour plus d'informations, consulter www.P65Warnings.ca.gov.

2-5. Principales normes de sécurité

Safety in Welding, Cutting, and Allied Processes, American Welding Society standard ANSI Standard Z49.1. Website: www.aws.org.

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute. Website: safetyequipment.org.

Safe Practices for the Preparation of Containers and Piping for Welding and Cutting, American Welding Society Standard AWS F4.1. Website: www.aws.org.

National Electrical Code, NFPA Standard 70 from National Fire Protection Association. Website: www.nfpa.org.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1 from Compressed Gas Association. Website: www.cganet.com.

Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2 from Canadian Standards Association. Website: www.csa-group.org.

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B from National Fire Protection Association. Website: www.nfpa.org.

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910.177 Subpart N, Part 1910 Subpart Q, and Part 1926, Subpart J. Website: www.osha.gov.

OSHA *Important Note Regarding the ACGIH TLV, Policy Statement on the Uses of TLVs and BEIs*. Website: www.osha.gov.

Applications Manual for the Revised NIOSH Lifting Equation from the National Institute for Occupational Safety and Health (NIOSH). Website: www.cdc.gov/NIOSH.

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2-6. Informations relatives aux CEM

Le courant électrique qui traverse tout conducteur génère des champs électromagnétiques (CEM) à certains endroits. Le courant issu d'un soudage à l'arc (et de procédés connexes, y compris le soudage par points, gouge à l'arc, le découpage plasma et les opérations de chauffage par induction) crée un CEM autour du circuit de soudage. CEM produits peuvent causer interférence à certains implants médicaux, p. ex. les stimulateurs cardiaques. Des mesures de protection pour les porteurs d'implants médicaux doivent être prises. Par exemple, des restrictions d'accès pour les passants ou une évaluation individuelle des risques pour les opérateurs. Tous les opérateurs 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. 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 sortie.
5. Connecter la pince sur la pièce aussi près que possible à l'arc.
6. Ne travaillez pas à côté, ne vous asseyez pas ou ne vous appuyez pas sur, et ne transportez pas le générateur ou d'autres équipements pendant l'opération.

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 gouge à l'arc, du coupage plasma ou de chauffage par induction. Si votre médecin l'a autorisé, suivez les procédures ci-dessus.

SECTION 3 – SPECIFICATIONS

3-1. Serial Number And Rating Label Location

The serial number and rating information for this product is located on the back of unit. 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.

3-2. Unit Specifications For MIG (GMAW)

 Do not use information in unit specifications table to determine electrical service requirements. See Sections [4-3](#), [4-5](#), and [4-6](#) for information on connecting input power.

Input Voltage	Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input at Rated Load Output, 50/60 Hz, Single-Phase	Wire Type And Diameter		Wire Feed Speed Range
					Solid/Stainless	Flux Cored	
120 VAC	100 A at 19.0 Volts DC, 40% Duty Cycle	30–120	63	20.9	.024 - .035 in. (0.6 - 0.9 mm)	.030 - .035 in. (0.8 - 0.9 mm)	60 - 650 IPM (1.5 - 16.5 m/min)
240 VAC	200 A at 24.0 Volts DC, 15% Duty Cycle	30–200	63	25.0	.024 - .035 in. (0.6 - 0.9 mm)	.030 - .045 in. (0.8 - 1.2 mm)	60 - 650 IPM (1.5 - 16.5 m/min)
	140 A at 21.0 Volts DC, 40% Duty Cycle			25.1			

3-3. Unit Specifications For TIG (GTAW)

 Do not use information in unit specifications table to determine electrical service requirements. See Sections [4-3](#), [4-5](#), and [4-6](#) for information on connecting input power.

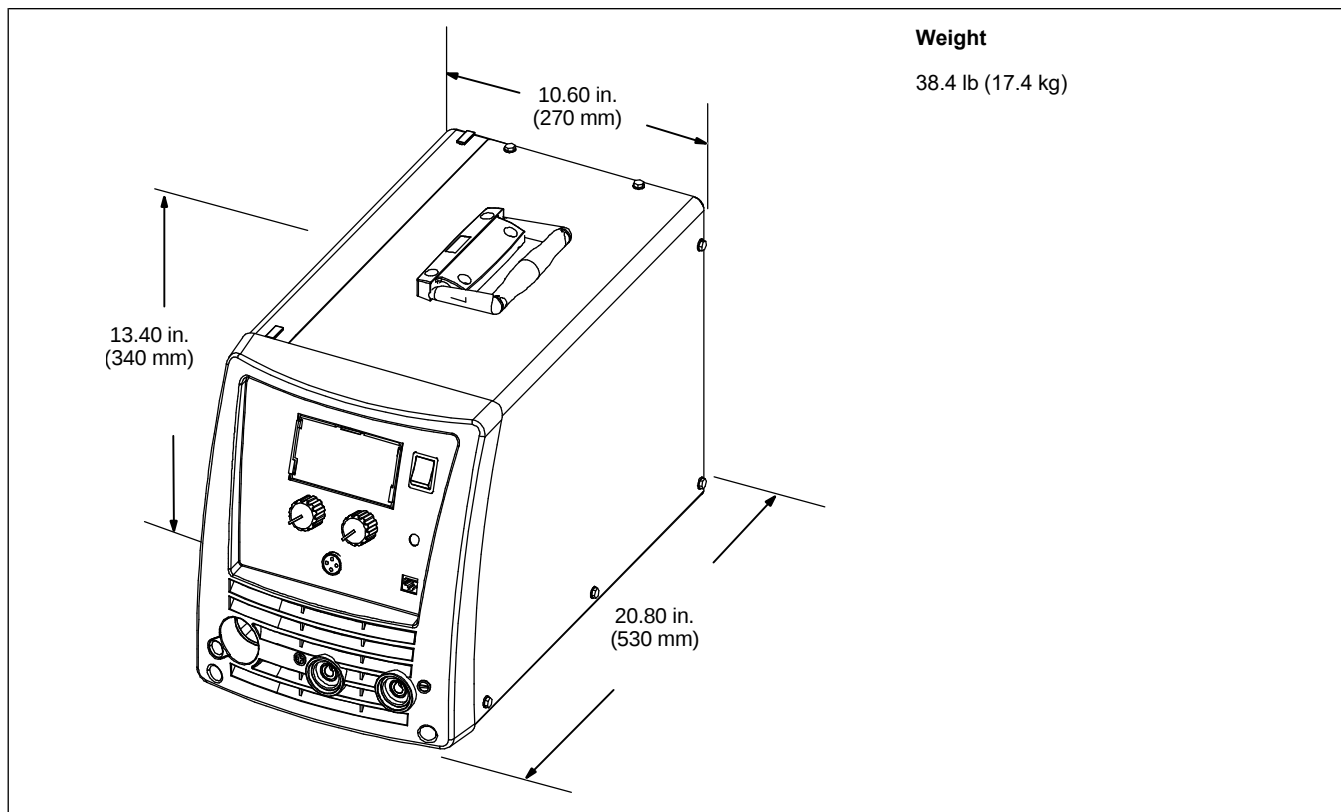
Input Voltage	Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input at Rated Load Output, 50/60 Hz, Single-Phase
120 VAC	140 A at 15.6 Volts AC/DC, 20% Duty Cycle	20–140	63	25.0
240 VAC	200 A at 18.0 Volts AC/DC, 20% Duty Cycle	20–200	63	20.0

3-4. Unit Specifications For Stick (SMAW)

 Do not use information in unit specifications table to determine electrical service requirements. See Sections [4-3](#), [4-5](#), and [4-6](#) for information on connecting input power.

Input Voltage	Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input at Rated Load Output, 50/60 Hz, Single-Phase
120 VAC	80 A at 23.2 Volts AC/DC, 40% Duty Cycle	30–100	63	19.2
240 VAC	200 A at 28.0 Volts AC/DC, 15% Duty Cycle	30–200	63	23.5

3-5. Dimensions And Weight



3-6. Static Characteristics

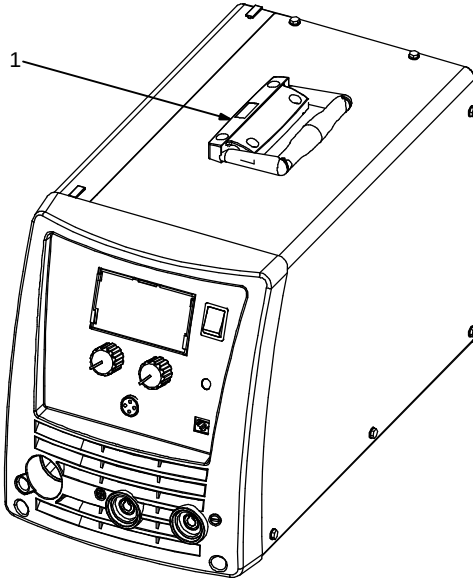
The static (output) characteristics of the welding power source can be described as *flat* during the GMAW process and *drooping* during the SMAW and GTAW processes. Static characteristics are also affected by control settings (including software), electrode, shielding gas, weldment material, and other factors. Contact the factory for specific information on the static characteristics of the welding power source.

SECTION 4 – INSTALLATION

4-1. Selecting A Location



Movement



Do not move or operate unit where it could tip.

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

1 Lifting Handles

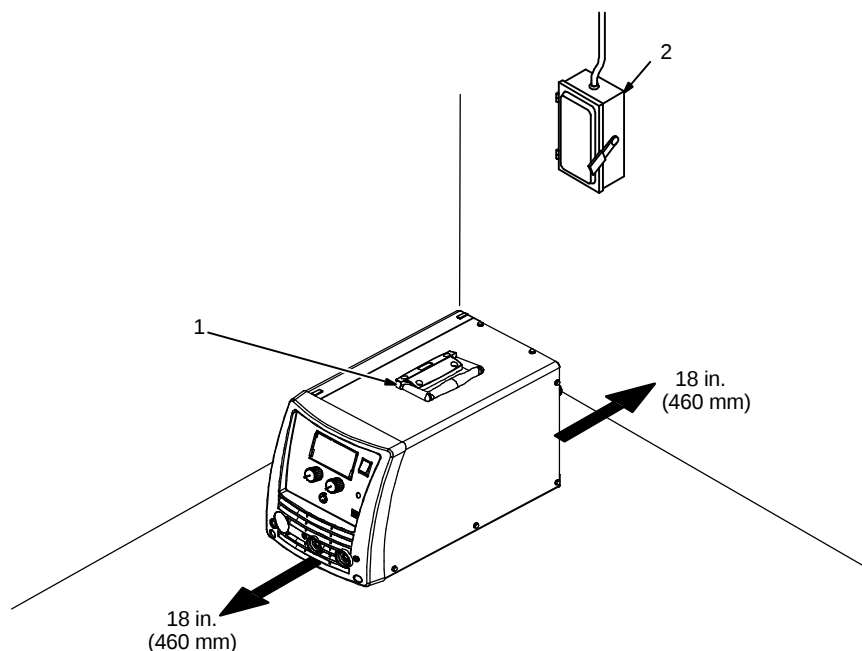
Use handles to lift unit.

2 Line Disconnect Device

Locate unit near correct input power supply.



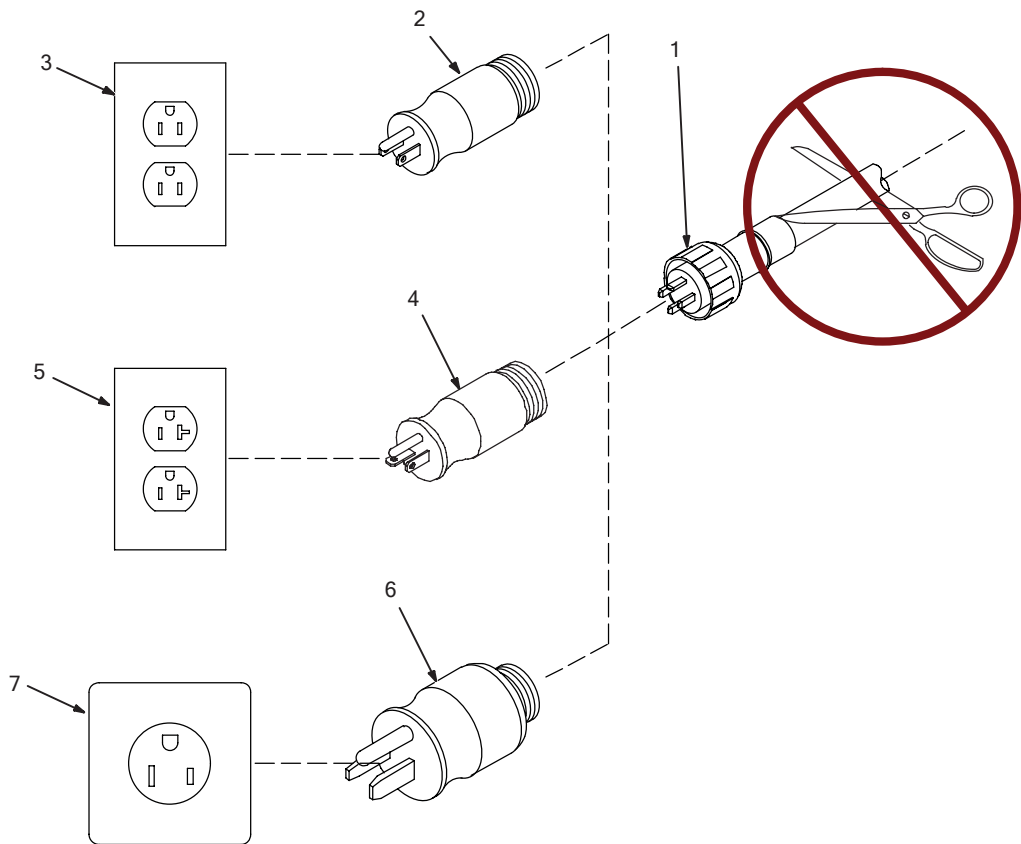
Location And Airflow



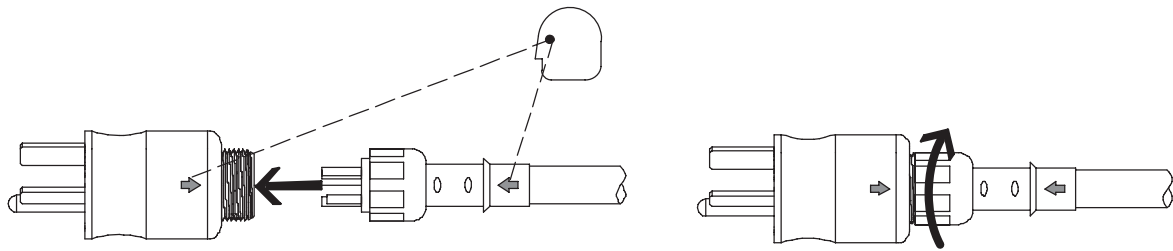
4-2. Multi-Voltage Plug (MVP) Connection



Selecting Plug



Connecting Plug To Power Cord



Ref. 803812C

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

Selecting Plug

- 1 Power Cord Connector From Welding Power Source

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

- 2 Plug – NEMA Type 5–15P
3 Receptacle – NEMA Type 5–15R (Customer Supplied)
4 Plug – NEMA Type 5–20P (Optional)
5 Receptacle – NEMA Type 5–20R (Customer Supplied)
6 Plug – NEMA Type 6–50P
7 Receptacle – NEMA Type 6–50R (Customer Supplied)

⚠ Follow electrical service guide for 240 VAC. Do not use plug rating to size branch circuit protection.

Connecting Plug To Power Cord

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

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

Connect plug to receptacle.

4-3. Electrical Service Guide

⚠ Failure to follow these electrical service guide recommendations could create an electric shock or fire hazard. These recommendations are for an individual branch circuit sized for the rated output and duty cycle of one welding power source. In individual branch 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. Actual supply voltage should not be 10% less than minimum or 10% greater than rated maximum supply voltages listed in table. If actual supply voltage is outside this range, output may not be available.

	50/60 Hz 1-Phase	
Rated Supply Voltage (V)	120	240
Rated Maximum Supply Current I_{max} (A)	A 15 or 20 ampere individual branch circuit protected by time-delay fuses or circuit breaker is required. See Section 4-5 .	32
Rated Effective Supply Current I_{eff} (A)		15
Maximum Recommended Standard Fuse Rating In Amperes ¹		40
Time Delay Fuses ²		
Normal Operating Fuses ³		45
Maximum Recommended Supply Conductor Length In Feet (Meters) ⁴		34 (10)
Raceway Installation		
Minimum Supply Conductor Size In AWG (mm ²) ⁵		12 (4)
Minimum Grounding Conductor Size In AWG (mm ²) ⁵		12 (4)

Reference: 2026 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). See UL 248.

4 Maximum total length of copper supply conductors in entire installation (raceway and/or flexible cord).

5 Raceway conductor size is determined per NEC Table 310.16 for insulated copper conductors having a temperature rating of 75°C (167°F) with not more than three single current-carrying conductors in the raceway, corrected for an ambient temperature of 40°C per Table 310.15(B)(1) (1).

4-4. Input Power Extension Cord Data

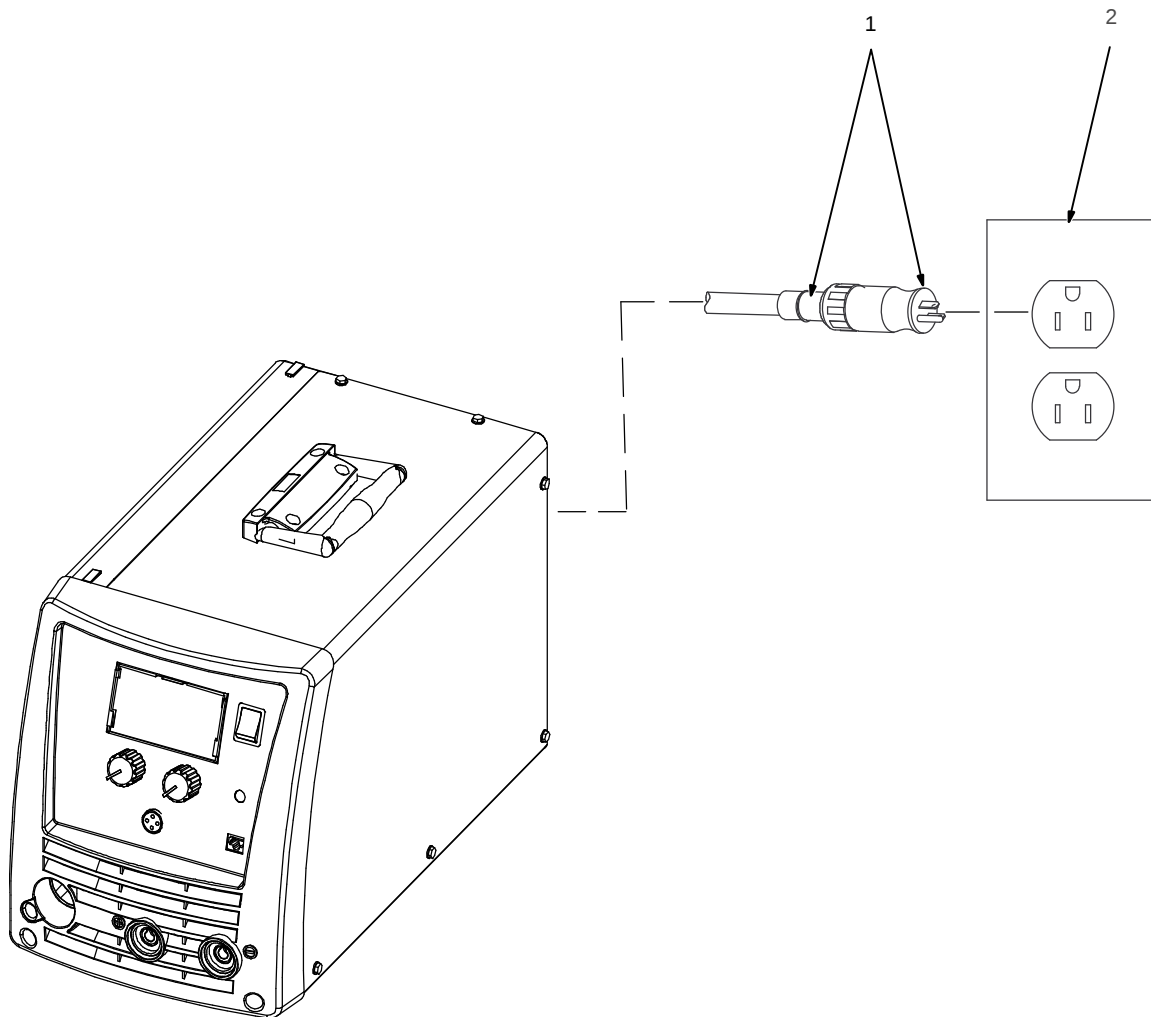
⚠ Extension cord must contain an equipment grounding conductor. Use extension cord only for temporary wiring. Remove extension cord immediately after completing the project.

Cord Type	Minimum Conductor Size	Number Of Conductors	Maximum Cord Length
Heavy Duty (Hard Usage)	12 AWG (4 mm ²)	3	50 ft (15 m)

 Read OSHA Standard 1910.334 for more information on the use of cord and plug connected equipment.

Read National Electrical Code (NEC) Article 590 for more information on temporary wiring.

4-5. Connecting 120 Volt Input Power



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

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

NOTICE – The Auto-Line circuitry in this unit automatically links the power source to the primary voltage being applied, either 120 or 240 VAC.

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

For 120 volts AC input power, a 15 or 20 ampere individual branch circuit protected by

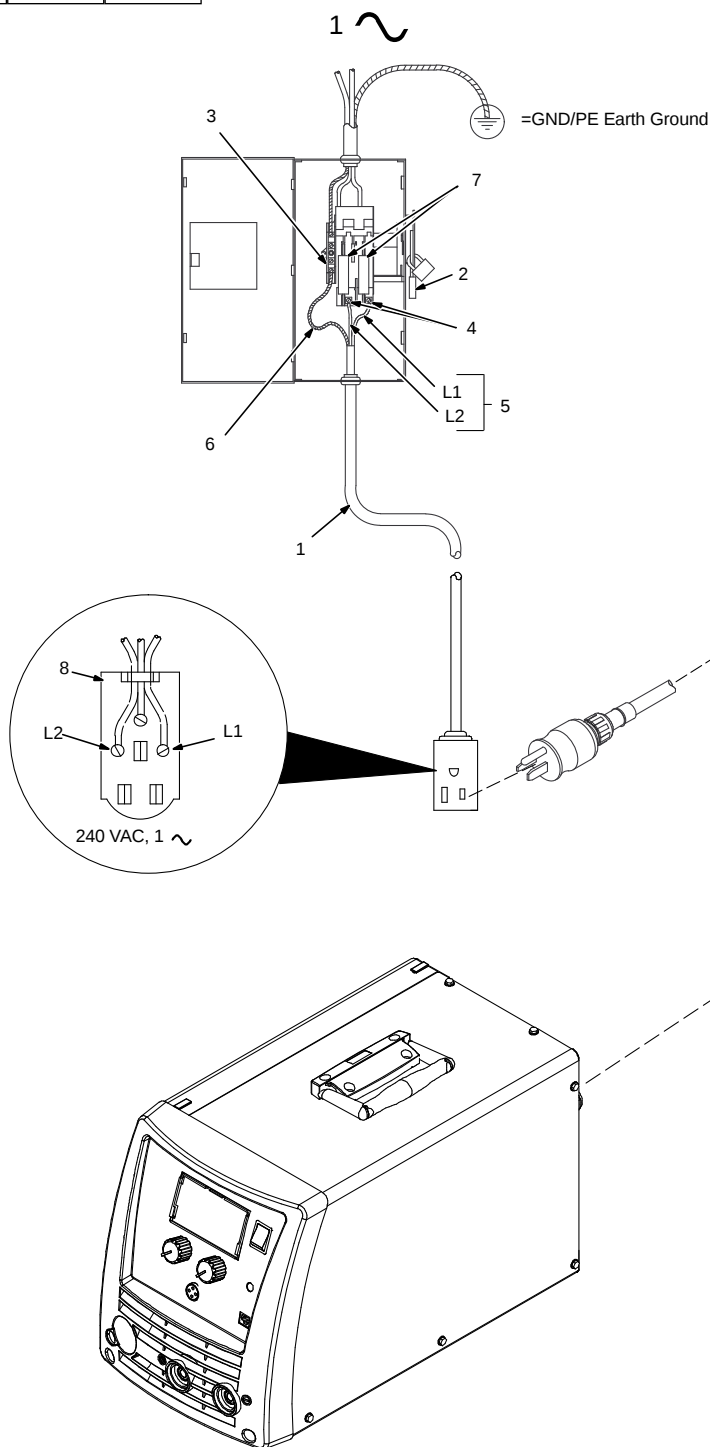
time-delay fuses or circuit breaker is required.

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

For multi-voltage plug connections, see Section [4-2](#).

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

4-6. Connecting 1-Phase Input Power For 240 VAC



⚠ 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.

NOTICE – The Auto-Line circuitry in this unit automatically links the power source to the primary voltage being applied, either 120 or 240 VAC.

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

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

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

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

7 Over-Current Protection

Select type and size of over-current protection using Electrical Service Guide (fused disconnect switch shown).

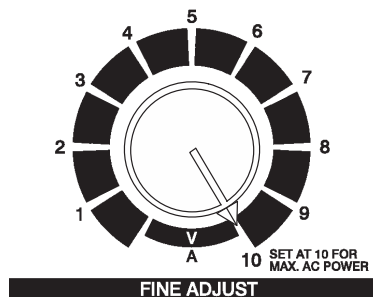
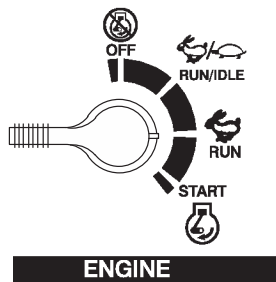
8 Receptacle (NEMA 6– 50R) Customer Supplied

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

4-7. Generator Requirements



Generator settings, if applicable

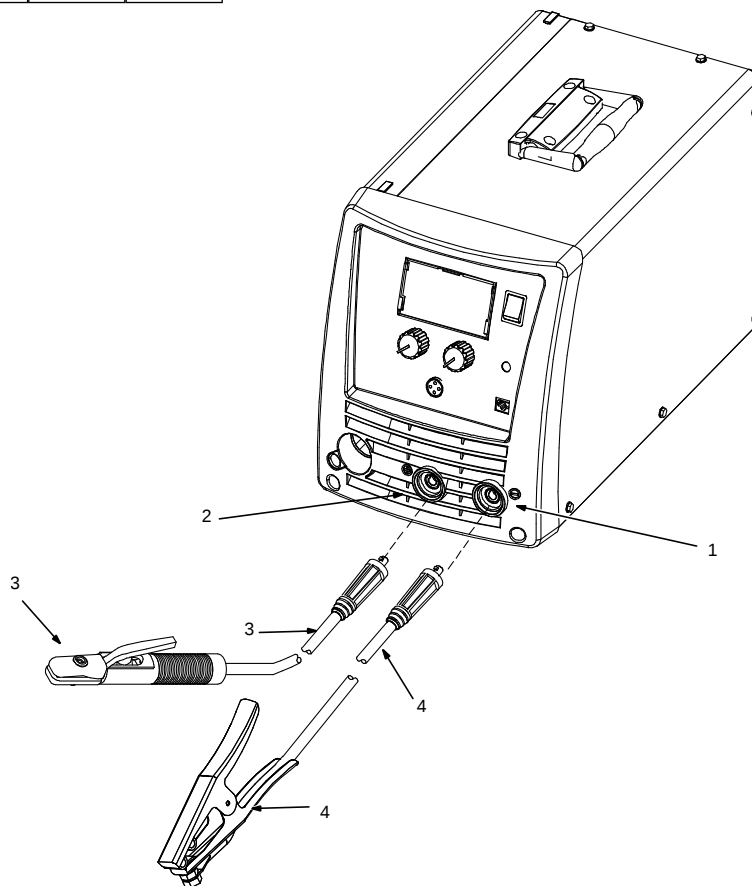


⚠ Engine Control Switch must be set at "RUN" position - not "RUN/IDLE".

⚠ Set generator Fine Adjustment Control to 10 for maximum auxiliary power.

Minimum auxiliary power requirement at rated load is 10 KW continuous/12.5 KW peak at 240 volts AC for full output. Smaller generators will reduce output capability.

4-8. Stick Welding Connections



⚠ Turn off unit and disconnect input power before making connections.

⚠ Do not use worn, damaged, under-sized, or repaired cables.

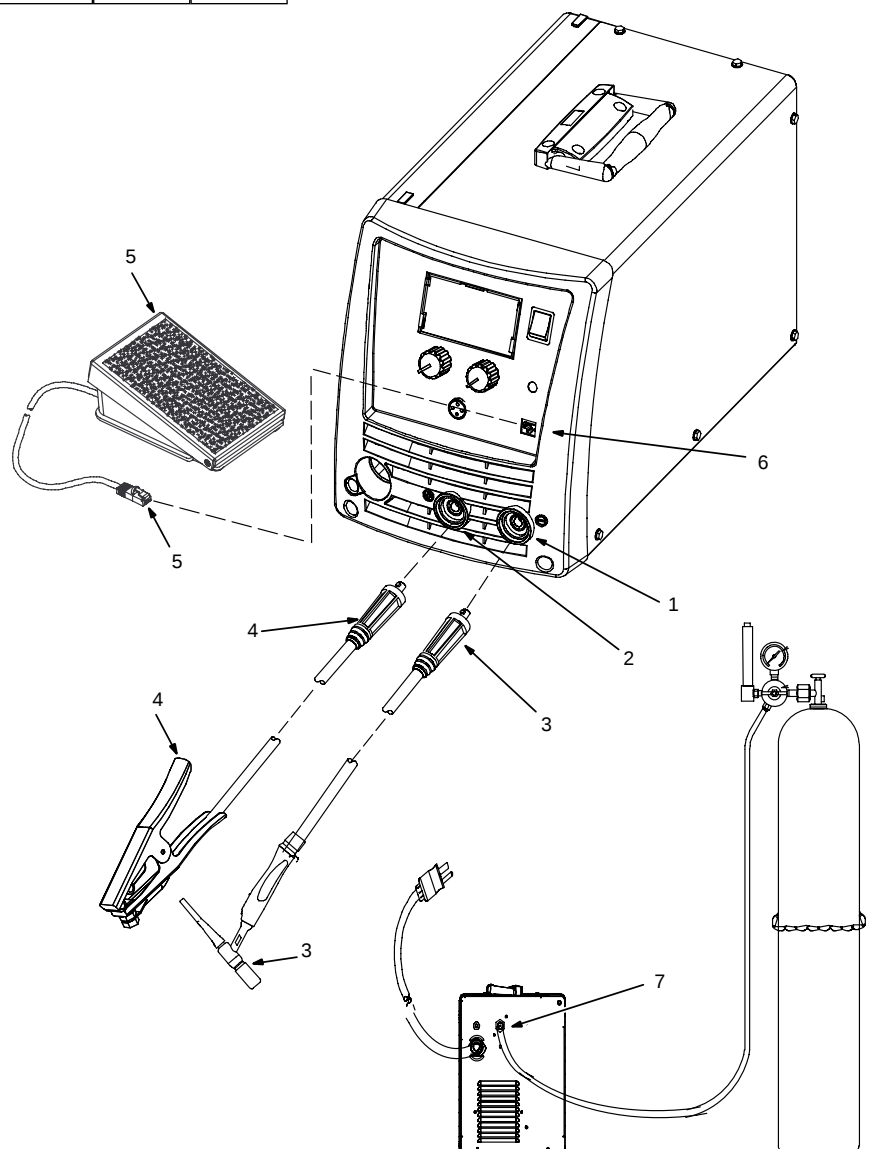
- 1 Negative (-) Weld Output Terminal
- 2 Positive (+) Weld Output Terminal
- 3 Stick Electrode Holder And Cable
- 4 Work Clamp And Cable

Insert connectors fully into terminals. Rotate connectors clockwise to lock in position.

Consult stick electrode manufacturer's guidelines for proper polarity and best results.

Ensure all connections are tight.

4-9. TIG Welding Connections



- Turn off unit and disconnect input power before making connections.
- Do not use worn, damaged, undersized, or repaired cables.

- 1 Negative (-) Weld Output Terminal
- 2 Positive (+) Weld Output Terminal
- 3 TIG Torch And Cable
- 4 Work Clamp And Cable

Connect TIG torch cable to the negative receptacle and connect work cable to the positive receptacle. Turn connectors clockwise.

Ensure all connections are tight.

- 5 Optional Foot Control 300432 With RJ-45 connector
- 6 RJ-45 Remote Control Receptacle

Connect foot control to remote control receptacle.

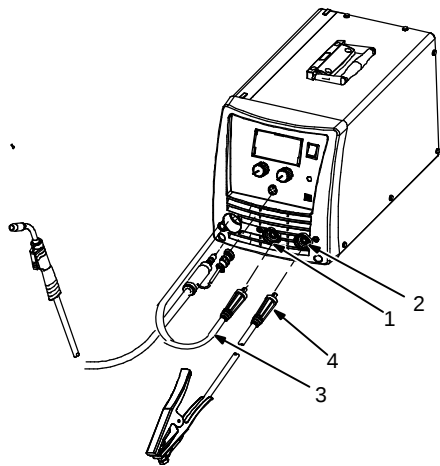
- 7 TIG Shielding Gas Connection

Use Argon gas for TIG welding (see Section [4-13](#)).

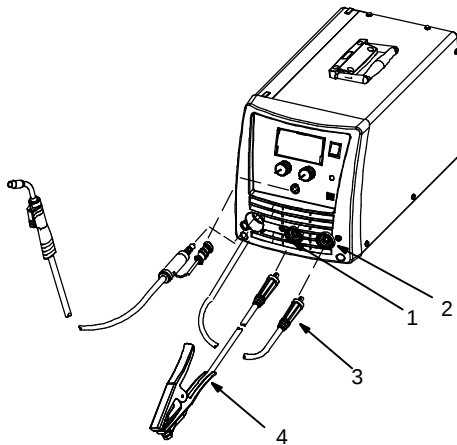
4-10. Process/Polarity Table

Process	Polarity	Cable Connections	
		Wire Drive Assembly Cable	Work Cable
GMAW — Solid wire with shielding gas	DCEP — Reverse Polarity	Connect to positive (+) output receptacle	Connect to negative (-) output receptacle
FCAW—S — Self-shielding wire-no shielding gas	DCEN — Straight Polarity	Connect to negative (-) output receptacle	Connect to positive (+) output receptacle
FCAW—G — Flux-cored wire with shielding gas	DCEP — Reverse Polarity	Connect to positive (+) output receptacle	Connect to negative (-) output receptacle

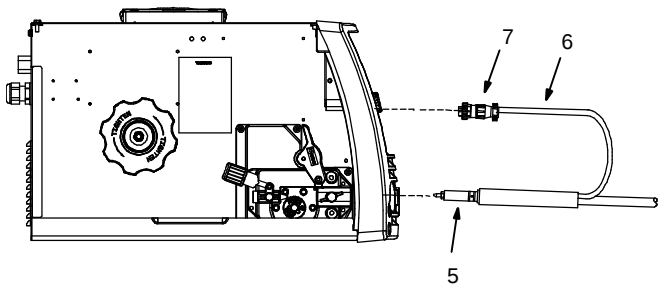
4-11. MIG Welding Connections



MIG – DCEP
(Direct Current Electrode Positive)



Flux-Cored – DCEN
(Direct Current Electrode Negative)



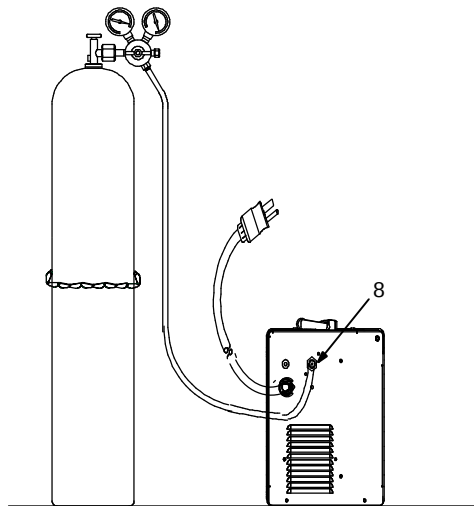
5 Gun End

Connect gun end to drive assembly (see Section [4-12](#)).

6 Trigger Control Cable

7 Four Pin Trigger Control Cable Receptacle

Connect plug on end of cable to four pin receptacle on front of unit.



8 MIG Shielding Gas Connection

Use 75/25 mix or CO₂ shielding gas for solid wire. Use Argon shielding gas for aluminum wire with spool gun (see Section [4-13](#)).

⚠ Turn off unit and disconnect input power before making connections.

⚠ Do not use worn, damaged, undersized, or repaired cables.

1 Positive Weld Output Receptacle

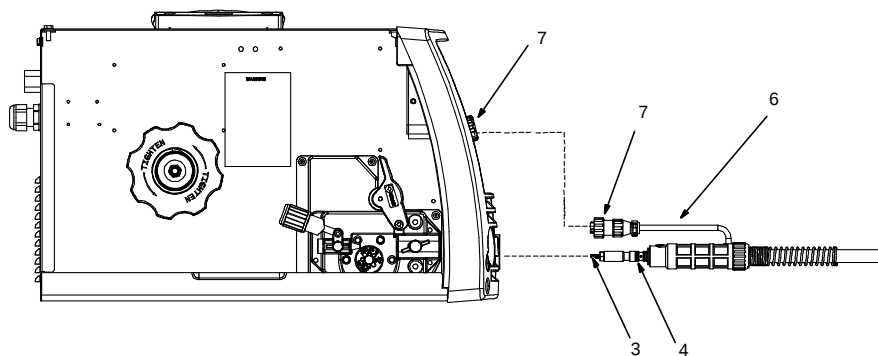
2 Negative Weld Output Receptacle

3 Wire Drive Assembly Cable

4 Work Clamp And Cable

Ensure all connections are tight.

4-12. MIG Gun Connection Inside Unit



- 1 Gun Securing Knob
- 2 Gun Block
- 3 Gun Inlet Wire Guide
- 4 Gun End

Loosen knob. Insert end of gun through opening in front panel until gun end bottoms against gun block. Tighten knob.

- 5 O Ring

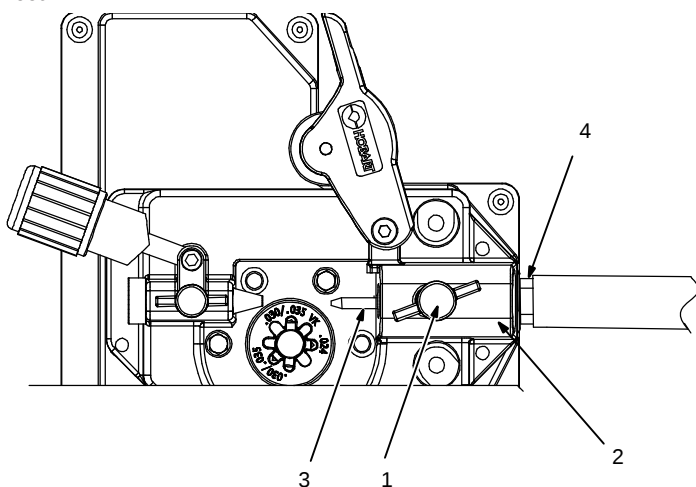
If o-ring is visible, the MIG gun is not inserted fully

- 6 Trigger Control Cable
- 7 Four Pin Trigger Control Cable Connection

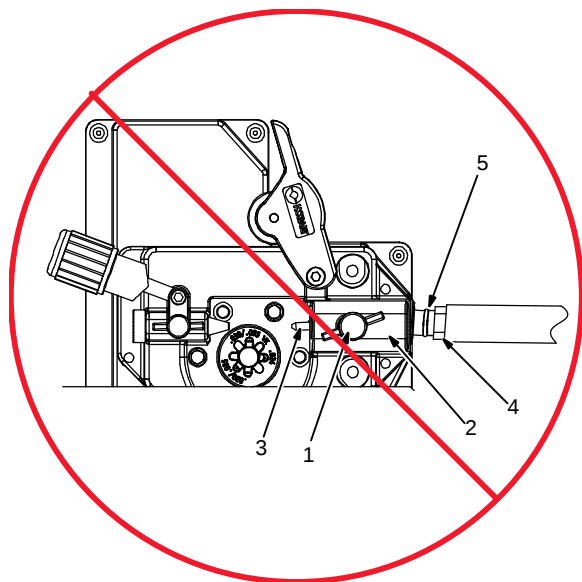
Connect plug on end of cable to four pin receptacle on front of unit.

 Be sure that gun end is tight against drive assembly.

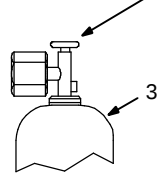
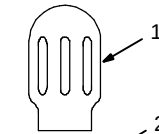
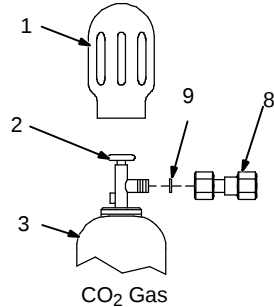
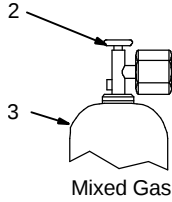
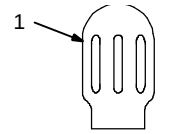
Correct



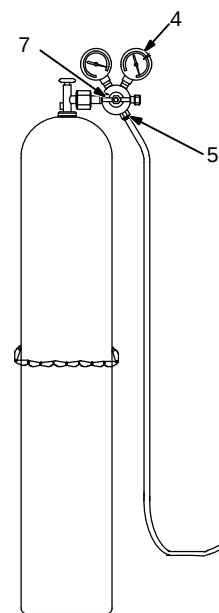
Incorrect



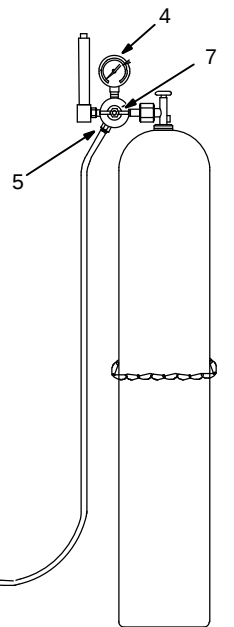
4-13. Connecting Shielding Gas Supply



Argon Gas



MIG



TIG



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

1 Cap

2 Cylinder Valve

Remove cap, stand to side of valve, and open valve slightly. Gas flow blows dust and dirt from valve. Close valve.

3 Cylinder

4 Regulator/Flowmeter

Install Regulator/Flowmeter so face is vertical.

5 Regulator/Flowmeter Gas Hose Connection

6 Welding Power Source CO₂ And Mixed Gas Hose Connection Or Argon (TIG) Or Spoolgun Hose Connection

Connect gas hose between regulator/flowmeter gas hose connection, and the fitting on rear of welding power source. Only one gas hose can be attached at a time.

7 Flow Adjust

Typical flow rate for CO₂ shielding gas and MIG (GMAW) welding is 20 to 30 CFH (cubic feet per hour) and (7.05 - 14.1 LPM) and mixed gas is 25 to 45 CFH (11.75 - 21.15LPM).

Typical flow rate for Argon shielding gas and TIG (GTAW) welding is 15 to 25 CFH (7.05 - 11.75 LPM) and aluminum MIG (GMAW) welding is 35 to 45 CFH (16.45 - 21.15 LPM). Check wire manufacturer's recommended flow rate.

8 CO₂ Adapter (Customer Supplied)

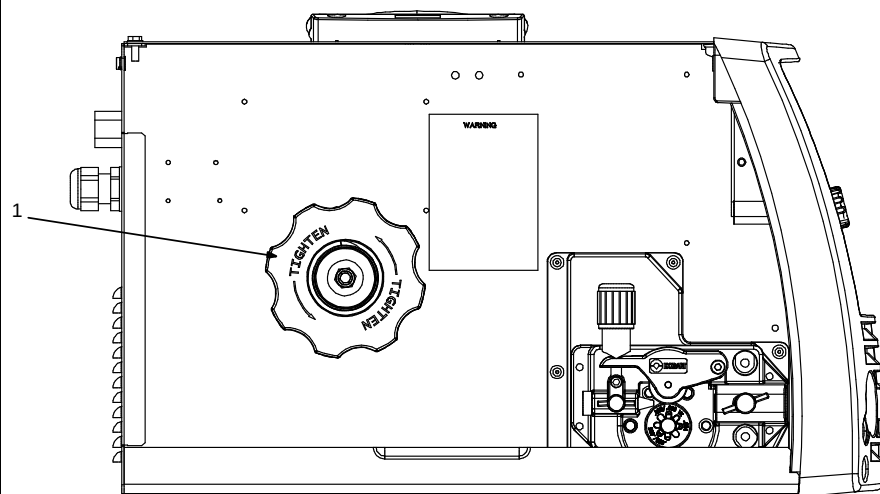
9 O-Ring (Customer Supplied)

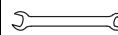
Install adapter with O-ring between regulator/flowmeter and CO₂ cylinder.

4-14. Installing Wire Spool And Adjusting Hub Tension

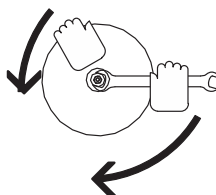
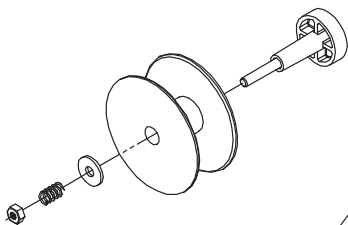


- 1 Retaining Nut for 8 in. (203 mm) Spool Only



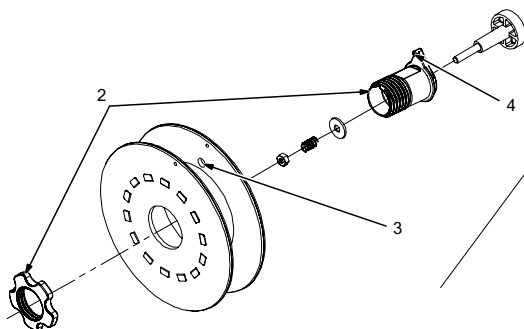
 1/2 in.

Installing 4 in. (102 mm) Wire Spool



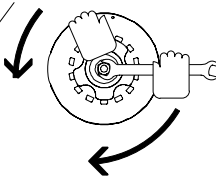
When a slight force is needed to turn spool, tension is set.

Installing 8 in. (203 mm) Wire Spool



- 2 Adapter And Retaining Ring
3 Locking Hole In Spool
4 Locking Pin On Spool Hub

Align locking hole in spool with locking pin on spool hub.

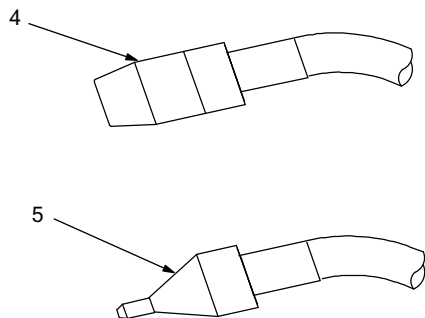
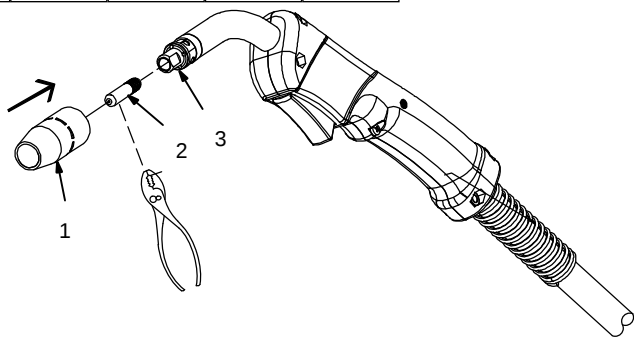


When a slight force is needed to turn spool, tension is set.

Ref. 282721A / 803 012 / 803 013 -B / Ref. 802 444-C

4-15. Installing Contact Tip And Nozzle







 **Turn off welding power source.**

1 Nozzle

Remove nozzle.

2 Contact Tip

3 Tip Adapter

Thread welding wire through gun (see Section [4-17](#)).

Slide contact tip over wire and tighten tip into tip adapter.

Install nozzle.

4 MIG Nozzle (Standard)

Use with solid or flux cored wire.

Push nozzle over contact tip and adapter until it is seated onto adapter. End of contact tip will be flush with end of nozzle when installed properly.

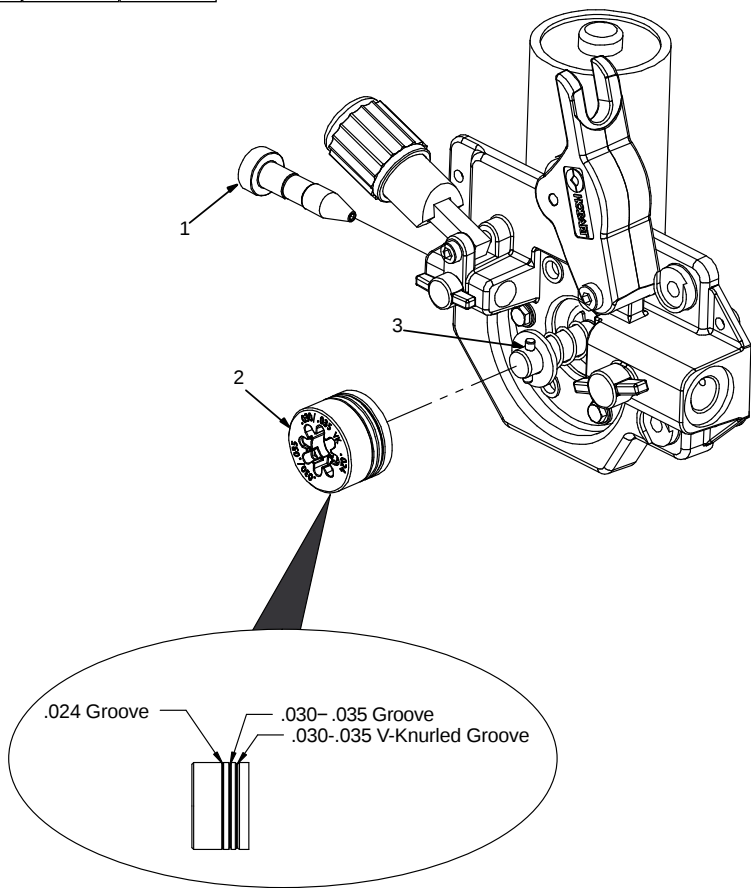
5 Flux Nozzle (Optional)

Use with flux cored wire only. Narrow design allows access in tight spaces and provides better visibility of puddle during welding.

Push nozzle over contact tip and adapter until it is seated onto adapter. Contact tip will be exposed approximately 7/16 in. (11 mm) when installed properly.

Ref. 246669-A

4-16. Changing Drive Roll Or Wire Inlet Guide



1 Inlet Wire Guide

Remove inlet wire guide by unscrewing T-handle knob and pulling the guide from the rear of the drive casting. Push new guide into the drive casting and secure it by tightening the T-handle knob finger-tight.

2 Drive Roll

The drive roll includes three different sized grooves. The text aligned with the drive roll retaining pin indicates the selected groove.

3 Retaining Pin

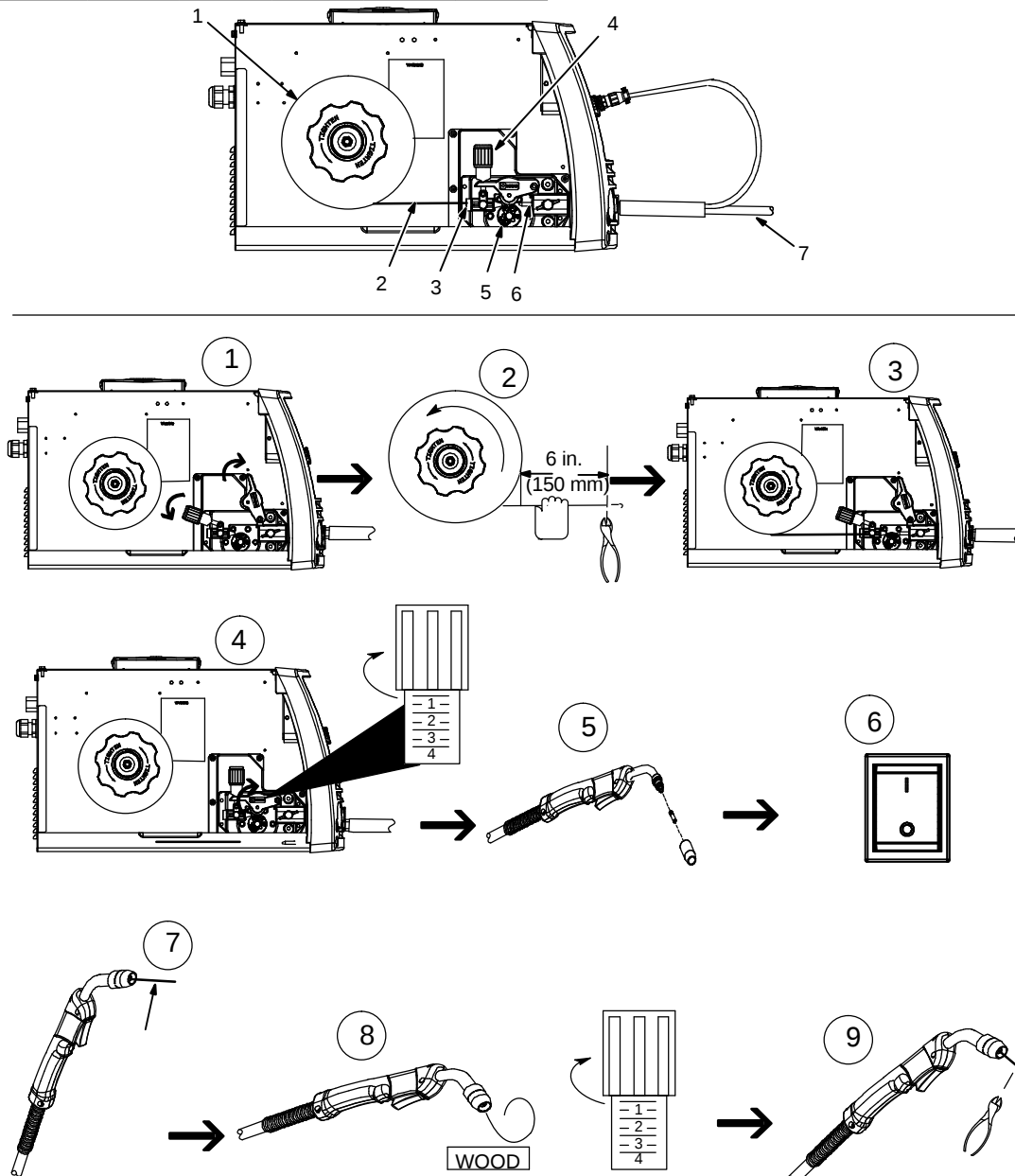
To secure drive roll, locate open slot and push drive roll completely over retaining pin, then rotate drive roll to desired slot.

See Section 7-3 for optional drive rolls.

Table 4–1. Drive Roll Grooves And Wire Type Compatibility

Groove	Compatible Wire
0.024	0.024 Solid Wire
0.030–0.035	0.030–0.035 Solid Wire
0.030–0.035 V-Knurled	0.030–0.035 Flux-Core

4-17. Threading Welding Wire



- 1 Wire Spool
- 2 Welding Wire
- 3 Inlet Wire Guide
- 4 Pressure Adjustment Knob
- 5 Drive Roll
- 6 Gun Inlet Wire Guide
- 7 Gun Conduit Cable

Lay gun cable out straight.

Step 1. Open pressure assembly.

Step 2. Pull and hold wire; cut off end.

Hold wire tightly to keep it from unraveling.

Step 3. Push wire through guides into gun; continue to hold wire.

Step 4. Close and tighten pressure assembly, and let go of wire.

Use pressure indicator scale to set a desired drive roll pressure. Begin with a setting of 2. If necessary, make additional adjustments after trying this initial setting.

Step 5. Remove gun nozzle and contact tip.

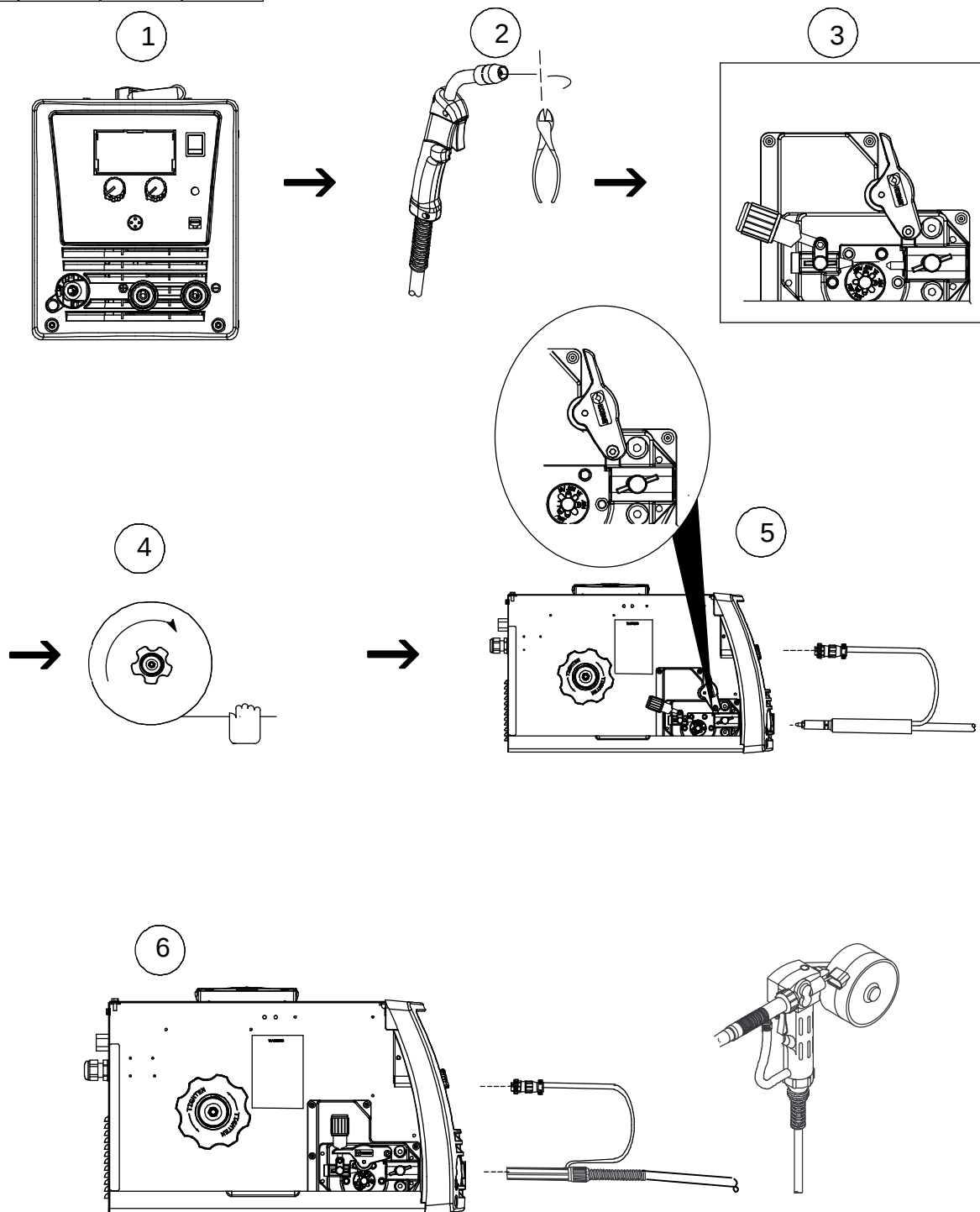
Step 6. Turn On.

Step 7. Press gun trigger until wire comes out of gun. Reinstall contact tip and nozzle.

Step 8. Feed wire to check drive roll pressure. Tighten knob enough to prevent slipping.

Step 9. Cut off wire. Close and latch door.

4-18. Removing MIG Gun To Replace With Optional Spoolrunner 100 (300796)



Step 1. Turn Off power.

Step 2. Cut off end of wire.

Step 3. Open pressure assembly.

Step 4. Rewind wire onto spool. Fasten end of wire to spool.

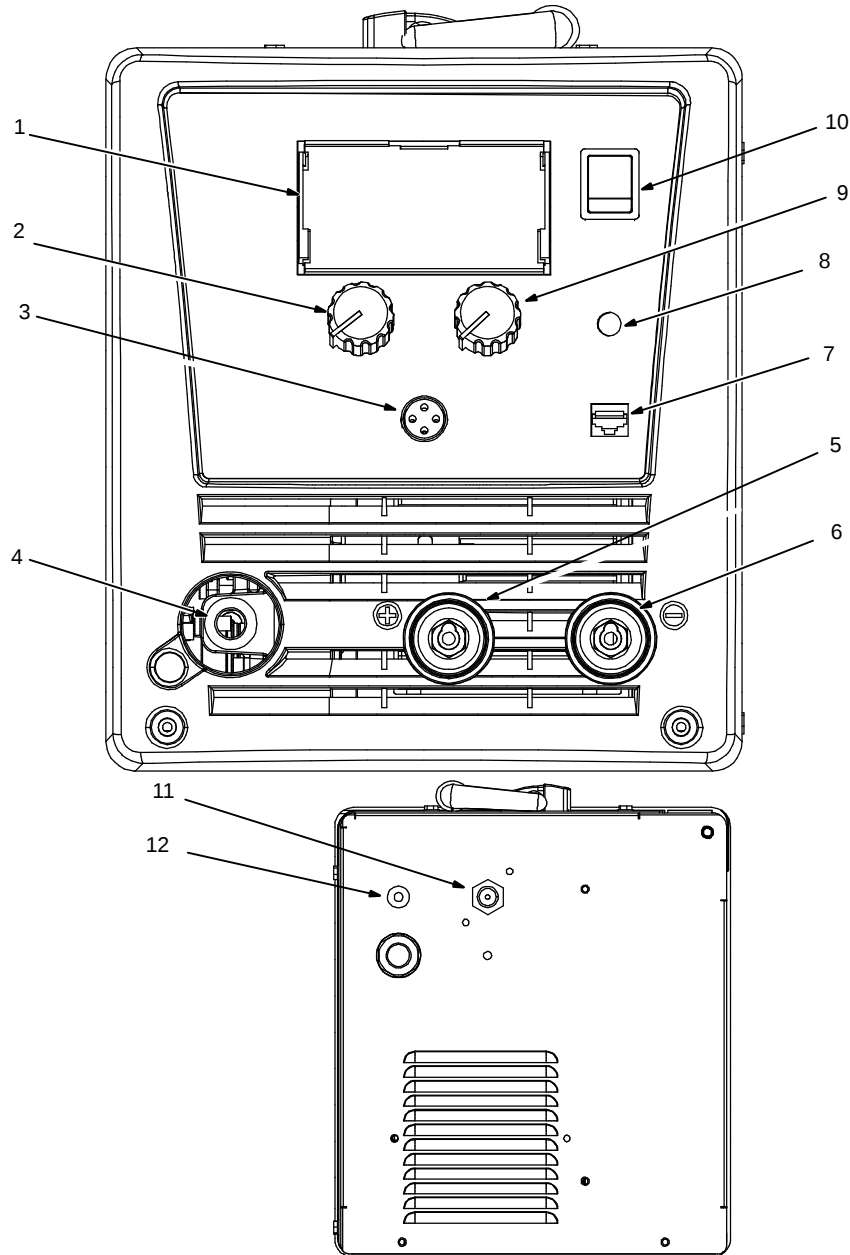
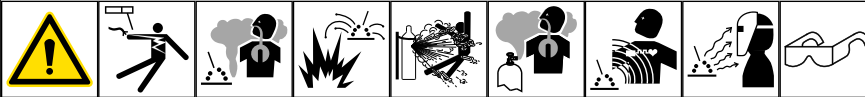
 *Hold wire tightly to keep it from unraveling.*

Step 5. Loosen knob, disconnect gun trigger plug, and remove gun from unit.

Step 6. Insert power pin, connect spool gun trigger plug, and tighten knob.

SECTION 5 – OPERATION

5-1. Controls



1 Display

2 Voltage Control Knob

Controls voltage in MIG process. See weld parameter chart for initial setting.

3 MIG Gun And Spool Gun Trigger Receptacle

4 MIG Gun And Spool Gun Power Receptacle

5 Positive Output Receptacle

6 Negative Output Receptacle

7 TIG Remote Receptacle

Connect optional foot control to unit.

8 Process Select Button

Press the button to select the desired process.

9 Wire Feed/Amperage Knob

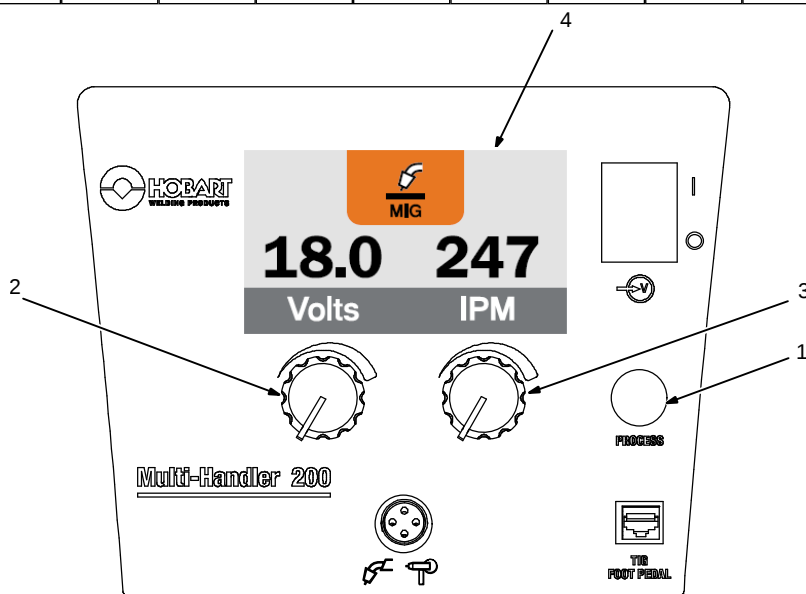
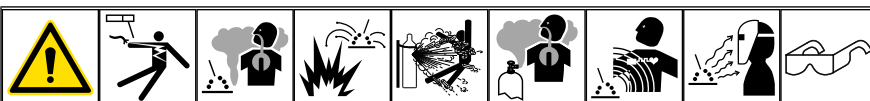
Controls wire feed speed in the MIG process and amperage in the Stick or TIG process. See weld parameter chart for initial settings.

10 Power Switch

11 Shielding Gas Fitting

12 Circuit Breaker CB1

5-2. Controls, MIG Mode (Menu 1 Of 5)



1 Process Select Button

Push button to enter MIG process. Check weld parameter chart for correct polarity at positive (+) and negative (-) receptacles.

See Section [4-11](#) for proper cable placement.

2 Voltage Knob

Adjust voltage knob per weld parameter chart for initial setting.

3 Wire Feed Knob

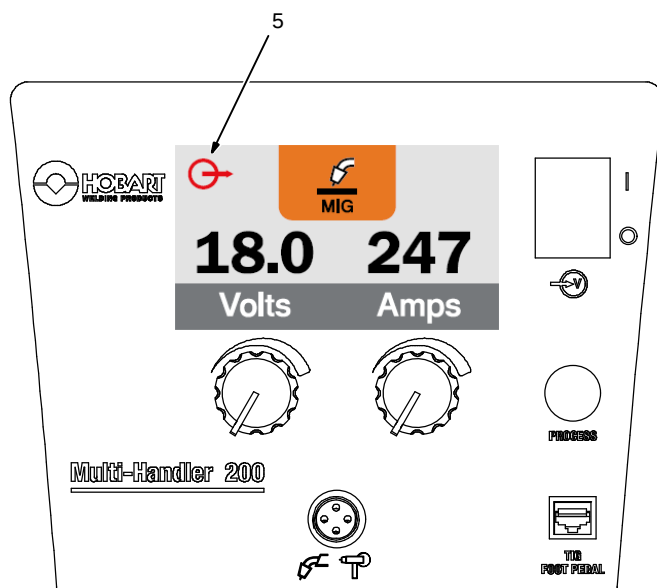
Adjust wire feed knob per weld parameter chart for initial setting.

4 Display

5 Output Enabled Symbol

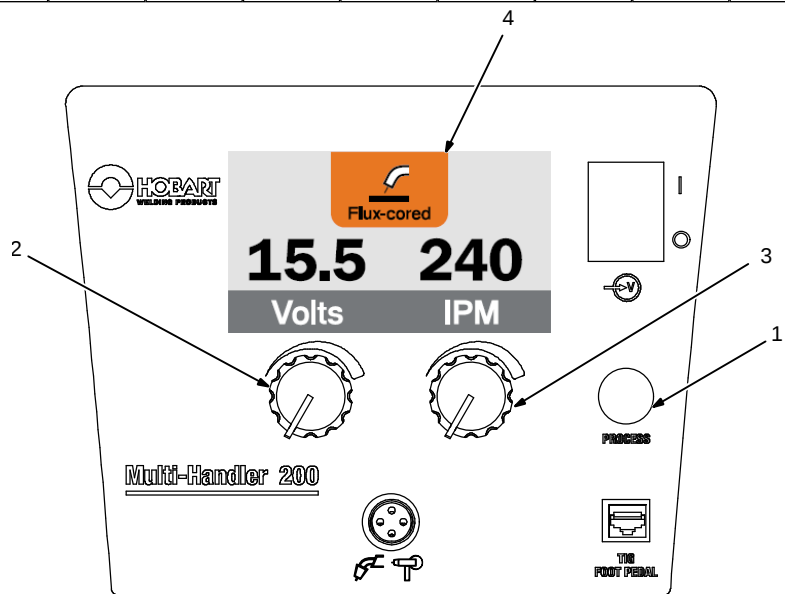
When this symbol is displayed, weld output is on.

The output is on in the MIG process when the trigger on the MIG gun or spoolgun is activated.



Ref. 287758-A

5-3. Controls, Flux Cored Mode (Menu 2 Of 5)



1 Process Select Button

Push button to enter Flux Cored process. Check weld parameter chart for correct polarity at positive (+) and negative (-) receptacles.

See Section [4-11](#) for proper cable placement.

2 Voltage Knob

Adjust voltage knob per weld parameter chart for initial setting.

3 Wire Feed Knob

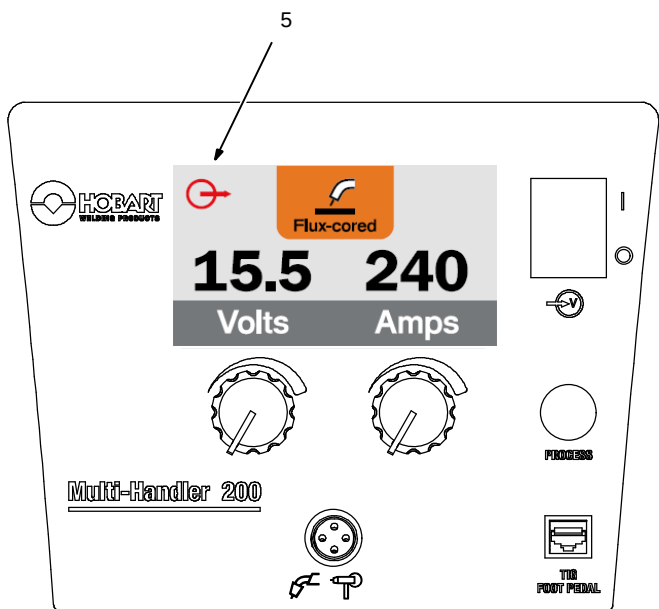
Adjust wire feed knob per weld parameter chart for initial setting.

4 Display

5 Output Enabled Symbol

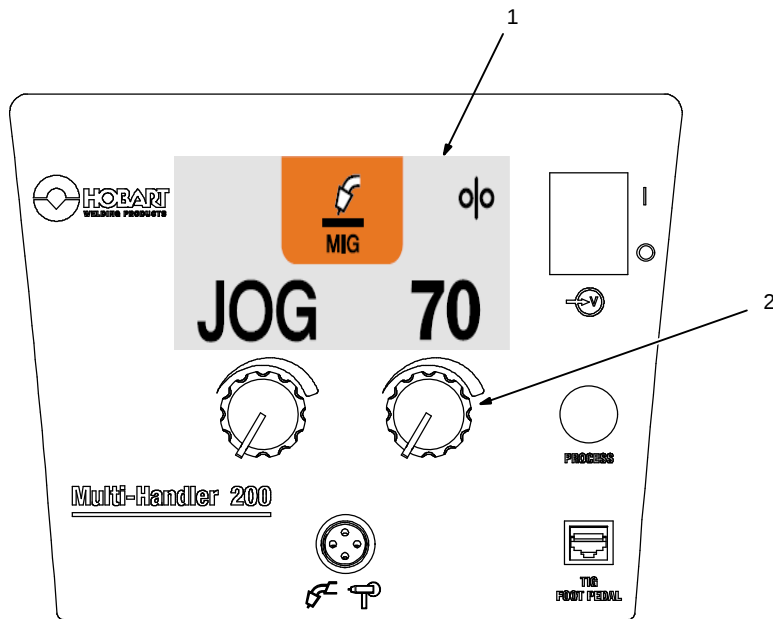
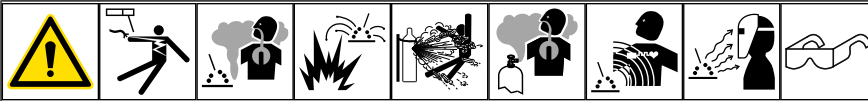
 When this symbol is displayed, weld output is on.

The output is on in the Flux Cored process when the trigger on the MIG gun is activated.



Ref. 287758-A

5-4. Screen, Wire Jog Mode



Ref. 287758-A

1 Display

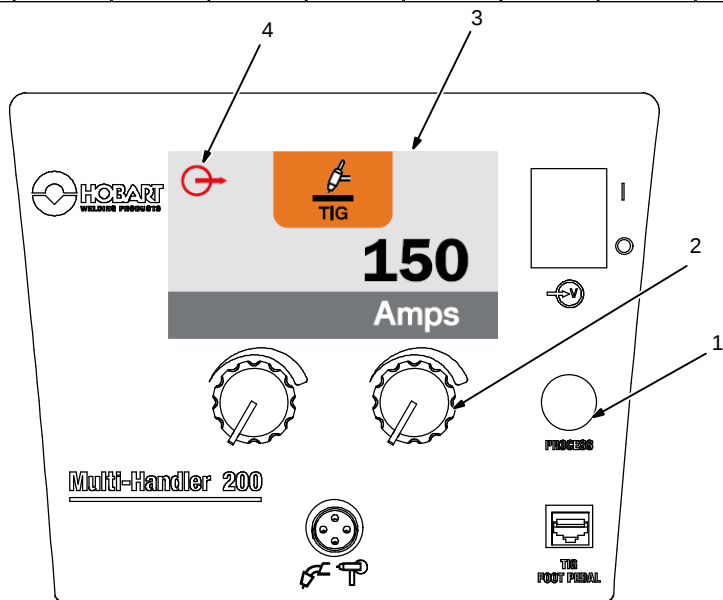
If the trigger on the MIG gun is held for more than 3 seconds without striking an arc, the unit will automatically shut off weld power and shielding gas, but will feed wire continuously at the preset wire feed speed until trigger is released.

2 Wire Feed Knob

Jog speed can be adjusted using the wire feed knob while in Jog mode.

Jog mode is reached when an arc is not struck within 3 seconds of depressing the trigger (MIG).

5-5. Controls, TIG Mode Without Foot Pedal (Menu 3 Of 5)



1 Process Select Button

In the TIG process when the optional foot pedal is not being used, the output is on when the TIG process is selected.

Push button to enter TIG process. Check weld parameter chart for correct polarity at positive (+) and negative (-) receptacles.

See Section [4-9](#) for proper cable placement.

2 Amperage Knob

Adjust amperage knob per weld parameter chart for initial setting.

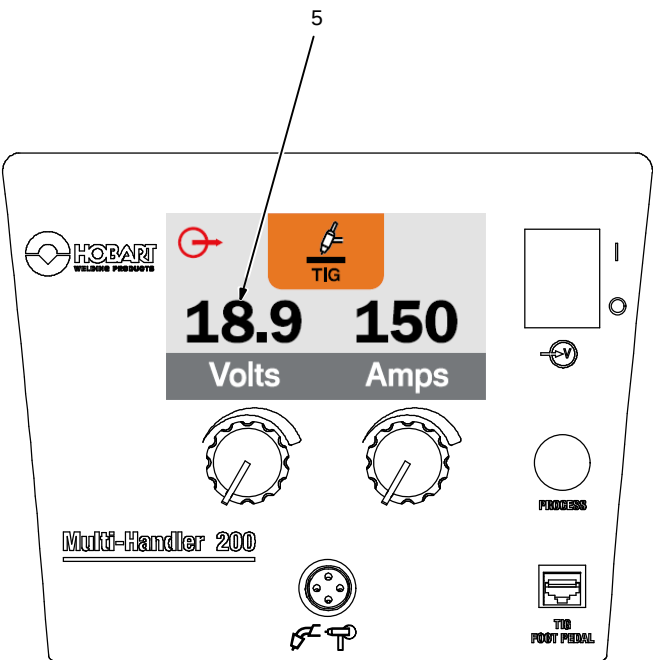
3 Display

4 Output Enabled Symbol

When this symbol is displayed, weld output is on.

5 Voltage Display

The voltage is displayed only during welding.

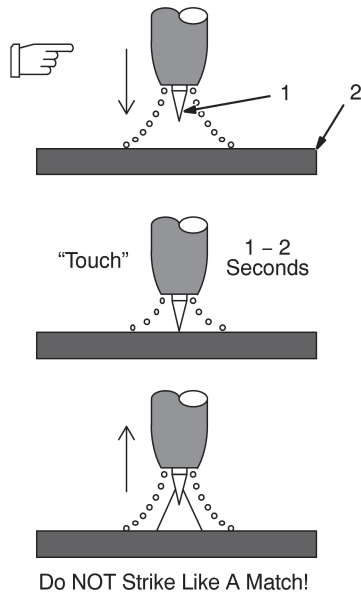


Ref. 287758-A

5-6. Lift-Arc TIG Start Procedures



Lift-Arc Start Method



Lift-Arc Start

- 1 TIG Electrode
- 2 Workpiece

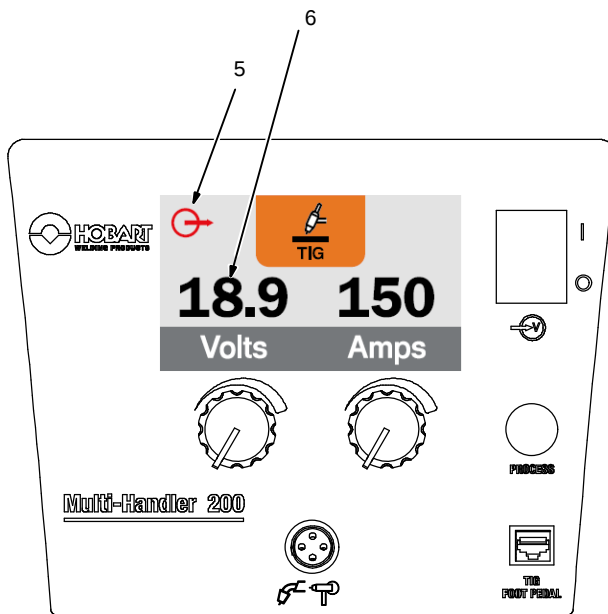
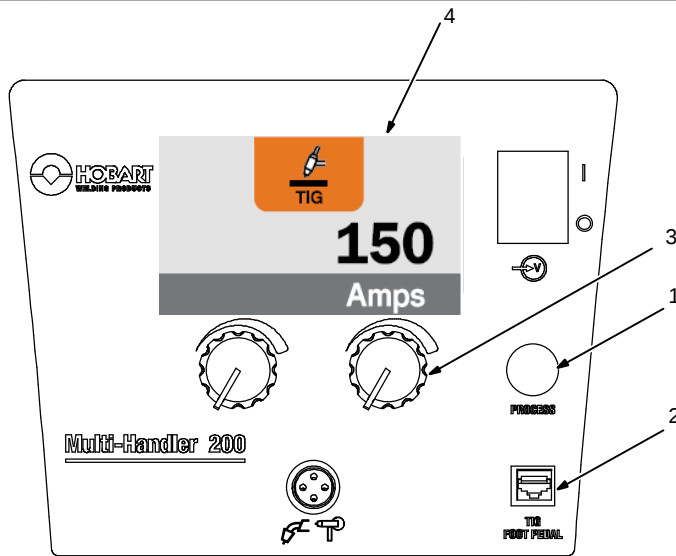
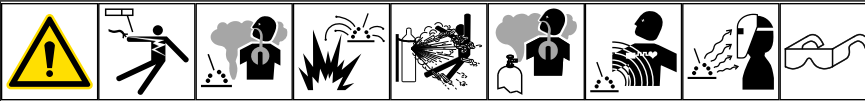
Touch tungsten electrode to workpiece at weld start point, enable output and shielding gas with torch trigger, foot control, or hand control. **Hold electrode to workpiece for 1–2 seconds**, and slowly lift electrode. Arc is formed when electrode is lifted.

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

Application:

Lift-Arc is used for the DCEN process.

5-7. Controls, TIG Mode With Foot Pedal (Menu 4 Of 5)



Ref. 287758-A

1 Process Select Button

In the TIG process when the optional foot pedal is being used, the output is controlled by the foot pedal.

Push button to enter TIG process. Check weld parameter chart for correct polarity at positive (+) and negative (-) receptacles.

See Section [4-9](#) for proper cable placement.

2 TIG Foot Pedal Connection

3 Amperage Knob

When a foot pedal is connected, adjust the amperage knob on the welder to set the maximum output of the foot pedal control.

4 Display

5 Output Enabled Symbol

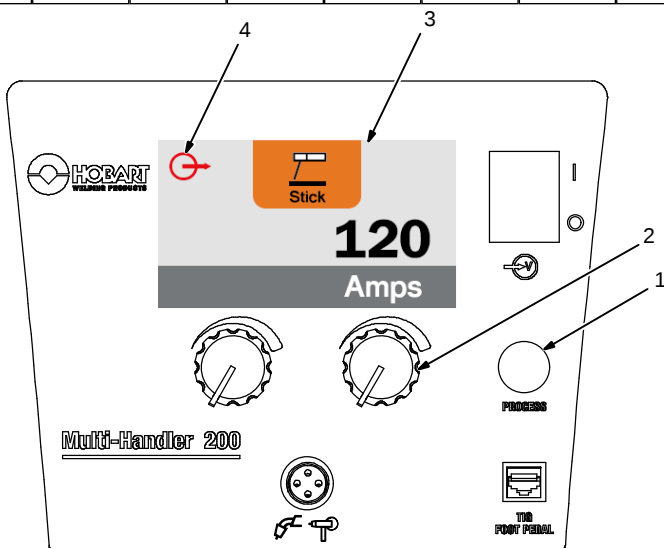
When this symbol is displayed, weld output is on.

6 Voltage Display

The voltage is displayed only during welding.

NOTICE – Use only Hobart foot pedal. See Section [7-3](#).

5-8. Controls, Stick Mode (Menu 5 Of 5)



1 Process Select Button

Push button to enter Stick process. Check weld parameter chart for correct polarity at positive (+) and negative (-) receptacles.

See Section [4-8](#) for proper cable placement.

2 Amperage Knob

Adjust amperage knob per weld parameter chart for initial setting.

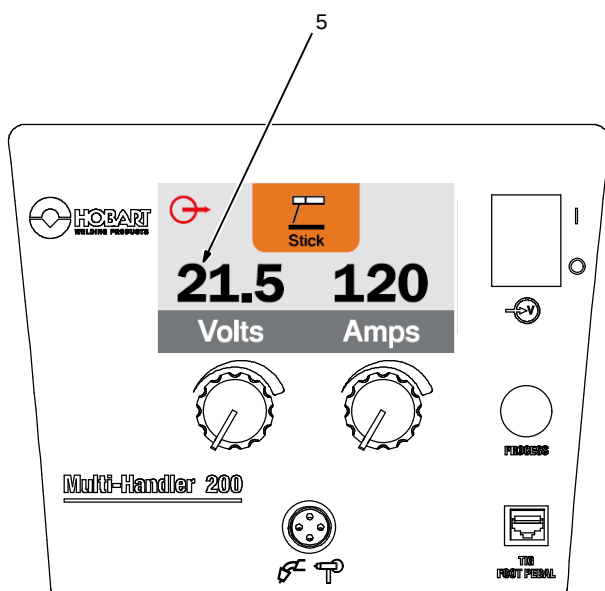
3 Display

4 Output Enabled Symbol

When this symbol is displayed, weld output is on.

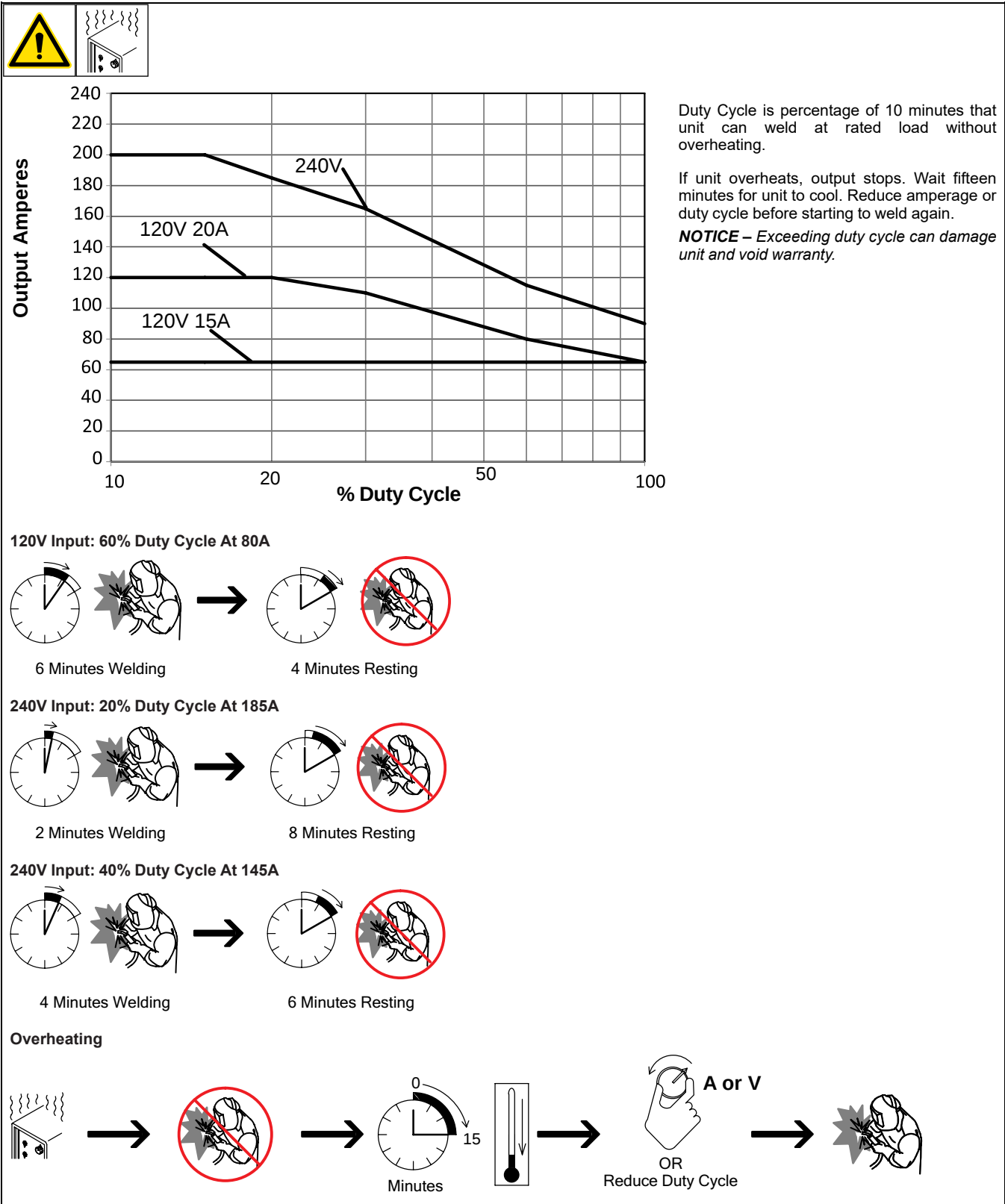
5 Voltage Display

The voltage is displayed only during welding.

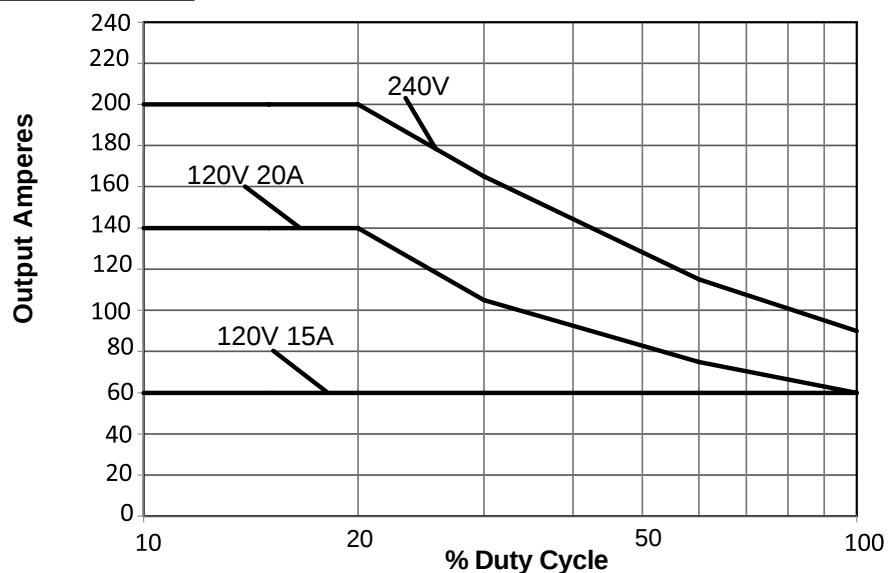


Ref. 287758-A

5-9. Duty Cycle And Overheating For MIG (GMAW)



5-10. Duty Cycle And Overheating For TIG (GTAW)

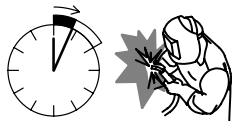


Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

If unit overheats, output stops. Wait fifteen minutes for unit to cool. Reduce amperage or duty cycle before starting to weld again.

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

120V Input: 40% Duty Cycle At 80A

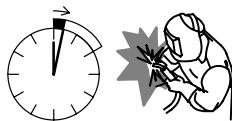


4 Minutes Welding



6 Minutes Resting

240V Input: 20% Duty Cycle At 170A

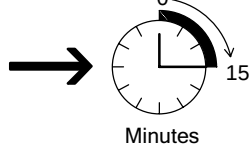


2 Minutes Welding

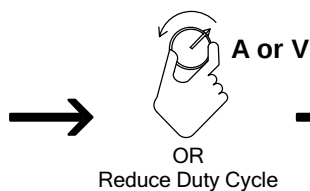


8 Minutes Resting

Overheating



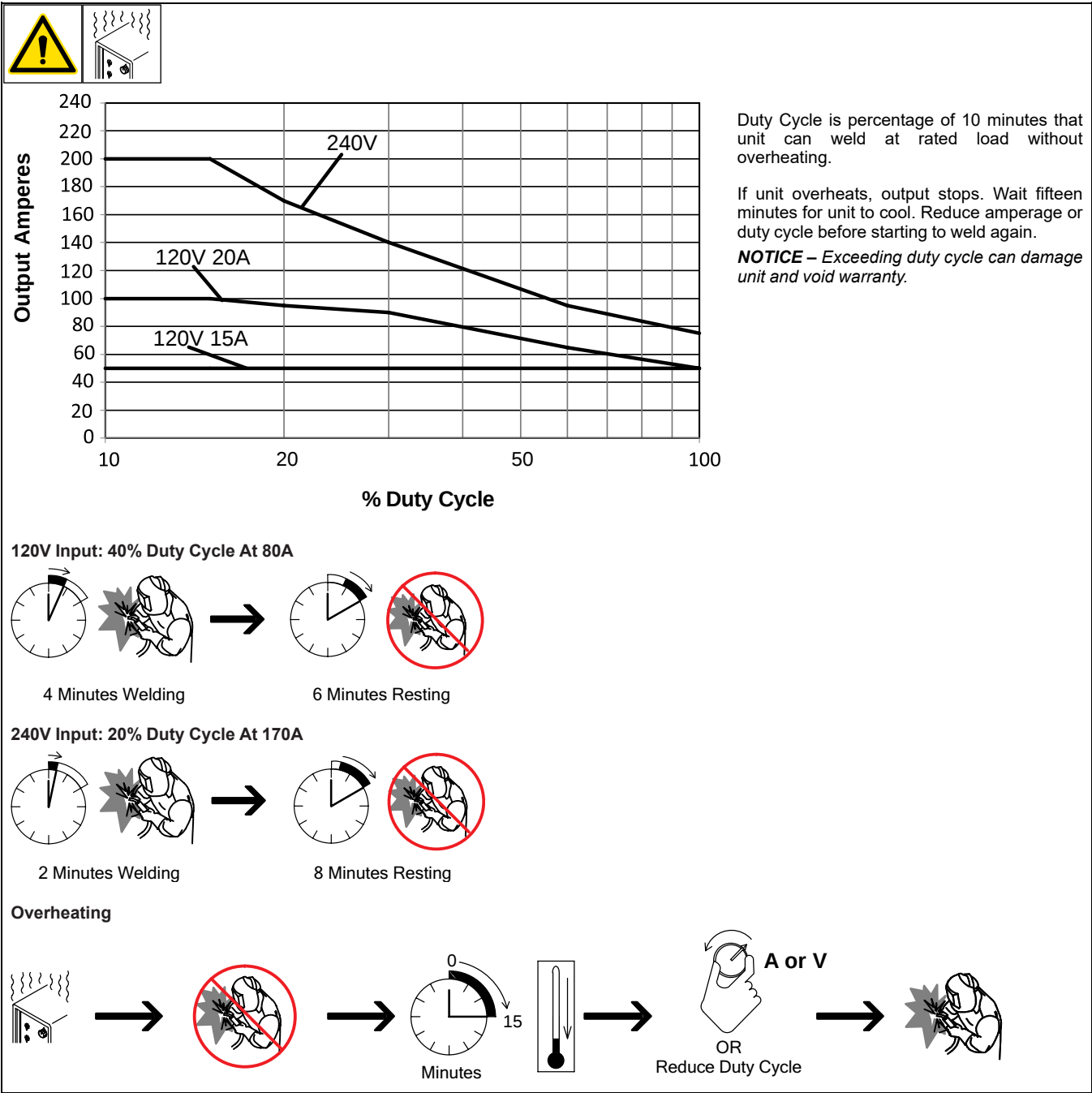
Minutes



OR
Reduce Duty Cycle



5-11. Duty Cycle And Overheating For Stick (SMAW)



5-12. Welding Parameter Chart – 120V

Settings are approximate. Adjust as required.
Thicker materials can be welded using proper technique, joint preparation and multiple passes.
"---" means not recommended.

Match feedroll groove to diameter of wire being used.
Set Tension Knob Setting to 3 at start.
Adjust tension per instructions in the manual.

MIG/Flux-Cored Welding Parameters

Recommended Voltage and Wire Speed Settings for thickness of metal being welded.
Number on left of slash is Voltage Setting / Number on right of slash is Wire Feed Setting.

Material Being Welded	Wire Type and Polarity Setting	Suggested Shielding Gas 20-30 cfh Flow Rate	Diameter of Wire Being Used	120 V								
				24 ga. .024 in. (0.6 mm)	22 ga. .030 in. (0.8 mm)	20 ga. .036 in. (0.9 mm)	18 ga. .048 in. (1.2 mm)	16 ga. .060 in. (1.6 mm)	14 ga. .075 in. (1.9 mm)	1/8 in. (3.2 mm)	3/16 in. (4.8 mm)	1/4 in. (6.4 mm)
Steel	Solid Wire ER70S-6 DCEP	C25 Gas Mixture 75% Argon/25% CO ₂	.024"	14.4/130	14.6/150	15.2/185	16.5/250	17.8/350	19.0/405	21.0/584	---	---
			.030"	14.0/94	14.1/109	15.2/120	16.1/157	17.0/174	17.4/248	19.0/352	---	---
			.035"	---	---	---	15.7/135	15.7/155	16.6/180	18.3/270	---	---
		100% CO ₂	.024"	---	---	---	18.0/230	19.5/349	20.2/440	20.7/480	---	---
			.030"	---	---	---	---	17.7/183	19.3/215	21.0/260	---	---
			.035"	---	---	---	---	17.4/142	18.4/185	19.8/226	---	---
Stainless Steel	Stainless Steel 308L DCEP	98% Ar/2% CO ₂	.030"	---	---	---	15.2/242	16.0/264	18.0/334	19.2/400	---	---
			.035"	---	---	---	---	---	---	---	---	---
Steel	Flux Core E71T-11 DCEN	No Shielding Gas Required	.030"	---	---	---	13.1/140	14.2/160	17.5/264	19.8/311	21.0/356	---
			.035"	---	---	---	13.3/108	13.5/114	16.3/175	18.5/189	19.3/210	---
			.045"	---	---	---	---	---	---	---	---	---
Aluminum* with Optional SpoolRunner™ 100 Spool Gun	4043 AL DCEP	100% Argon	.030"	---	---	---	14.2/304	14.9/309	15.6/345	19.3/405	---	---
			.035"	---	---	---	---	---	---	---	---	---
	5356 AL DCEP	100% Argon	.030"	---	---	---	13.6/330	14.3/350	17.4/463	20.2/650	---	---
			.035"	---	---	---	---	---	---	---	---	---

TIG Welding Parameters

Recommended Amperage for thickness of metal being welded.

Material Being Welded	Polarity Setting	Suggested Shielding Gas 20-30 cfh Flow Rate	Diameter of Tungsten Being Used	120 V								
				24 ga. (Amps)	22 ga. (Amps)	20 ga. (Amps)	18 ga. (Amps)	16 ga. (Amps)	14 ga. (Amps)	1/8 in. (Amps)	3/16 in. (Amps)	1/4 in. (Amps)
Steel, Stainless Steel	DCEN	100% Argon	1/16"	27	30	35	50	60	75	125	137	---
			3/32"	27	30	35	50	60	75	125	137	---

Stick Welding Parameters

Recommended Amperage for thickness of metal being welded.

Material Being Welded	Polarity Setting	Electrode Type	Diameter of Electrode Being Used	120 V								
				24 ga. (Amps)	22 ga. (Amps)	20 ga. (Amps)	18 ga. (Amps)	16 ga. (Amps)	14 ga. (Amps)	1/8 in. (Amps)	3/16 in. (Amps)	1/4 in. (Amps)
Steel	DCEP	6011	3/32"	---	---	---	---	40	45	60	85	---
			1/8"	---	---	---	---	---	60	75	85	95
			5/32"	---	---	---	---	---	---	---	---	---
		6013	3/32"	---	---	---	---	45	65	70	85	---
			1/8"	---	---	---	---	---	60	85	90	95
			5/32"	---	---	---	---	---	---	---	---	---
		7014	3/32"	---	---	---	---	60	70	85	90	---
			1/8"	---	---	---	---	60	70	85	90	100
			5/32"	---	---	---	---	---	---	---	---	---
		7018	3/32"	---	---	---	---	60	70	85	90	---
			1/8"	---	---	---	---	---	---	90	95	---
			5/32"	---	---	---	---	---	---	---	---	---

* Aluminum wire settings are with the SpoolRunner™ 100 Spool Gun attached. A spool gun eliminates many feedability issues associated with the soft aluminum wire. A "push angle" for the torch is normally recommended for aluminum.

5-13. Welding Parameter Chart – 240V

Settings are approximate. Adjust as required. Thicker materials can be welded using proper technique, joint preparation and multiple passes. "---" means not recommended.				Match feedroll groove to diameter of wire being used. Set Tension Knob Setting to 3 at start. Adjust tension per instructions in the manual.																			
MIG/Flux-Cored Welding Parameters												Recommended Voltage and Wire Speed Settings for thickness of metal being welded. Number on left of slash is Voltage Setting / Number on right of slash is Wire Feed Setting.											
Material Being Welded	Wire Type and Polarity Setting	Suggested Shielding Gas 20-30 cfh Flow Rate	Diameter of Wire Being Used	240 V																			
				24 ga. .024 in. (0.6 mm)	22 ga. .030 in. (0.8 mm)	20 ga. .036 in. (0.9 mm)	18 ga. .048 in. (1.2 mm)	16 ga. .060 in. (1.6 mm)	14 ga. .075 in. (1.9 mm)	1/8 in. (3.2 mm)	3/16 in. (4.8 mm)	1/4 in. (6.4 mm)	5/16 in. (7.9 mm)	3/8 in. (9.5 mm)									
Steel	Solid Wire ER70S-6 DCEP	C25 Gas Mixture 75% Argon/25% CO ₂	.024"	14.3/137	14.6/165	15.2/210	16.3/300	18.0/400	19.3/460	20.3/494	22.0/650	22.3/650	---	---									
			.030"	14.0/100	14.1/105	15.2/120	16.1/157	17.0/174	17.4/248	18.5/318	20.8/420	21.7/486	23.0/535	23.7/600									
			.035"	---	---	---	15.1/130	15.3/154	16.4/160	17.5/246	18.5/280	19.0/305	20.0/360	20.5/375									
		100% CO ₂	.024"	---	---	---	17.3/230	17.6/239	18.2/378	22.3/555	24.7/650	---	---	---									
			.030"	---	---	---	17.2/149	17.7/183	19.3/215	20.2/290	21.9/368	22.6/381	23.0/475	25.7/530									
			.035"	---	---	---	17.0/113	17.2/146	18.4/170	19.3/241	21.0/290	21.7/330	24.0/412	24.0/418									
Stainless Steel	Stainless Steel 308L DCEP	98% Ar/2% CO ₂	.030"	---	---	---	15.3/242	16.6/295	17.3/370	18.3/410	20.2/505	24.0/505	24.8/560	25.6/580									
Steel	Flux Core E71T-11 DCEN	No Shielding Gas Required	.035"	---	---	---	---	15.5/235	16.2/265	18.8/355	19.5/415	24.6/440	25.0/450	25.1/455									
			.030"	---	---	---	13.1/140	16.5/235	17.5/306	19.8/362	20.7/395	21.1/404	---	---									
			.035"	---	---	---	14.0/94	15.0/110	16.0/130	18.5/189	20.4/238	21.7/275	23.2/300	23.4/370									
Aluminum* with Optional SpoolRunner™ 100 Spool Gun	4043 AL DCEP	100% Argon	.030"	---	---	---	13.0/230	14.9/309	16.0/355	19.3/422	23.0/525	---	---	---									
	5356 AL DCEP	100% Argon	.035"	---	---	---	---	---	---	19.4/346	22.2/414	---	---	---									
			.030"	---	---	---	13.6/330	14.3/350	17.4/463	20.2/650	---	---	---	---									
			.035"	---	---	---	---	---	---	19.5/485	21.0/650	---	---	---									
TIG Welding Parameters																		Recommended Amperage for thickness of metal being welded.					
Material Being Welded	Polarity Setting	Suggested Shielding Gas 20-30 cfh Flow Rate	Diameter of Tungsten Being Used	240 V																			
				24 ga. (Amps)	22 ga. (Amps)	20 ga. (Amps)	18 ga. (Amps)	16 ga. (Amps)	14 ga. (Amps)	1/8 in. (Amps)	3/16 in. (Amps)	1/4 in. (Amps)	5/16 in. (Amps)	3/8 in. (Amps)									
Steel	DCEN	100% Argon	1/16"	27	30	35	50	60	75	125	137	---	---	---	---								
Stainless Steel			3/32"	27	30	35	50	60	75	125	137	175	---	---	---								
Stick Welding Parameters																		Recommended Amperage for thickness of metal being welded.					
Material Being Welded	Polarity Setting	Electrode Type	Diameter of Electrode Being Used	240 V																			
				24 ga. (Amps)	22 ga. (Amps)	20 ga. (Amps)	18 ga. (Amps)	16 ga. (Amps)	14 ga. (Amps)	1/8 in. (Amps)	3/16 in. (Amps)	1/4 in. (Amps)	5/16 in. (Amps)	3/8 in. (Amps)									
Steel	DCEP	6011	3/32"	---	---	---	---	42	45	60	85	---	---	---	---								
			1/8"	---	---	---	---	---	60	80	90	100	110	---									
			5/32"	---	---	---	---	---	---	125	130	145	150	---									
		6013	3/32"	---	---	---	---	45	65	70	90	---	---	---	---								
			1/8"	---	---	---	---	---	60	80	95	115	130	155	---								
			5/32"	---	---	---	---	---	---	120	130	150	155	160	---								
		7014	3/32"	---	---	---	---	50	70	85	95	---	---	---	---								
			1/8"	---	---	---	---	---	---	100	110	125	135	140	---								
			5/32"	---	---	---	---	---	---	115	120	145	150	155	---								
		7018	3/32"	---	---	---	---	65	70	85	95	---	---	---	---								
			1/8"	---	---	---	---	---	---	105	115	120	130	135	---								
			5/32"	---	---	---	---	---	---	115	120	140	145	160	---								
* Aluminum wire settings are with the SpoolRunner™ 100 Spool Gun attached. A spool gun eliminates many feedability issues associated with the soft aluminum wire. A "push angle" for the torch is normally recommended for aluminum.																							

SECTION 6 – MAINTENANCE AND TROUBLESHOOTING

6-1. Routine Maintenance

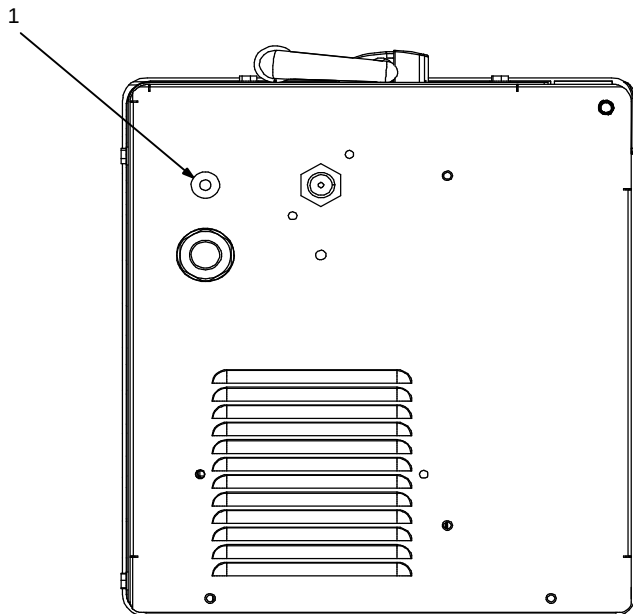


 **Disconnect power before maintaining.**

 *Service equipment more often if used in severe conditions.*

Maintenance Schedule		Every 3 Months	Every 6 Months
Cords and Cables	Visually check condition of cords and cables. Replace damaged cords and cables.	•	
Gas Hoses	Visually check condition of gas hoses. Replace damaged hoses.	•	
Labels	Check and replace labels if damaged.	•	
Weld Terminals	Clean weld terminals.	•	
Drive Rolls	Clean drive rolls.		•
Inside Unit	Clean inside unit with vacuum or blow out with compressed air.		•

6-2. Overload Protection



500578A

1 Supplementary Protector CB1

CB1 protects unit from overload. If CB1 opens, unit shuts down.

Reset supplementary protector.

6-3. Error Messages



Message	Error	Remedy
Overtemp—Please wait while the welder cools down	Internal temperature of welder has exceeded the maximum limit.	Wait for the fan to cool the welder to reset the thermal protection (see Section 5-9 , 5-10 , or 5-11).
	The control board is damaged.	Contact a Factory Authorized Service Agent for repair.
	The primary thermistor is damaged.	Contact a Factory Authorized Service Agent for repair.
	The secondary thermistor is damaged.	Contact a Factory Authorized Service Agent for repair.
Motor Error—Motor has drawn too much current	Too much pressure on pressure adjustment knob.	Reduce the pressure on the pressure adjustment knob (see Section 4-17).
	The gun liner is obstructed.	Clear obstruction or replace gun liner (see MIG Gun Owner's Manual 243862).
	The gun contact tip is obstructed.	Clear obstruction or replace contact tip (see Section 4-15).
	The welding wire is entangled.	Untangle welding wire.
	The spool hub tension is too tight.	Reduce the tension on the spool hub (see Section 4-14).
	The control board is damaged.	Contact a Factory Authorized Service Agent for repair.
	The wire drive motor is damaged.	Contact a Factory Authorized Service Agent for repair.
Fan Error—The fan is running too slow or is damaged	The fan blades are obstructed.	Clear obstruction from fan.
	The fan is damaged.	Contact a Factory Authorized Service Agent for repair.
	The control board is damaged.	Contact a Factory Authorized Service Agent for repair.
Shorted Trigger—Release 4-pin trigger to clear error	MIG gun or spool gun is engaged on power up.	Release MIG gun or spool gun trigger.
	MIG gun or spool gun trigger is engaged for more than 1 second after the arc is broken.	Release MIG gun or spool gun trigger.
	MIG gun or spool gun trigger leads are shorted together.	Fix or replace damaged MIG gun.
	The control board is damaged.	Contact a Factory Authorized Service Agent for repair.
Stuck Electrode—Free stuck electrode to clear error	Stick welding electrode has become stuck in the weld puddle and output has been turned off.	Remove stick welding electrode from workpiece and output will turn back on after 1 second.
Stuck Electrode—Free tungsten to clear error	Tungsten has become stuck in the weld puddle and output has been turned off.	Remove tungsten from workpiece and output will turn back on after 1 second.
	Tungsten has contacted workpiece for more than 5 seconds without starting an arc.	Remove tungsten from workpiece and output will turn back on after 1 second.
	The foot pedal is engaged on power up.	Release the foot pedal.
	The foot pedal is engaged while the process is changed to TIG Lift-Arc Remote.	Release the foot pedal.

6-4. Troubleshooting



Trouble	Remedy
No weld output; unit completely inoperative.	Place line disconnect switch in On position.
	Check and replace line fuse(s), if necessary, or reset supplementary protector.
	Be sure power cord is plugged in and that receptacle is receiving input power.
Low weld output or erratic weld output.	Connect work clamp to get good metal-to-metal contact.
	Refer to parameter chart on machine to ensure proper weld parameter settings (see Section 5-12 and 5-13).
	Straighten gun cable and/or replace damaged parts
	Adjust drive roll pressure
	Change to proper drive roll groove (see Section 4-16).
	Be sure that wire is positioned in proper drive roll groove and wire is laying in the groove.
	Replace contact tip if blocked (See MIG Gun Owner's Manual 243862).
	Clean or replace wire inlet guide or liner if dirty or plugged.
	Replace drive roll or pressure bearing if worn or slipping.
	Secure gun trigger plug.
	Check and clear and restrictions at drive assembly and liner.
	Release gun trigger and allow gun and motor protection circuitry to reset.
Stick welding problems: hard starts; poor welding characteristics; unusual spattering.	Have a Factory Authorized Service Agent check drive motor.
	Use proper type and size of electrode.
	Verify electrode polarity; check and correct poor connections.
TIG welding problems: wandering arc; hard starts; poor welding characteristics; spattering problems.	Make sure a remote control is not connected.
	Use proper type and size of tungsten
	Use properly prepared tungsten.
TIG welding problems: tungsten electrode oxidizing and not remaining bright after welding.	Verify electrode polarity.
	Shield weld zone from drafts.
	Check for correct type shielding gas.
	Check and tighten gas fittings.
	Verify electrode polarity.

SECTION 7 – PARTS LIST

7-1. Parts List

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
1	PC2	287968	Circuit Card Assy, Power	1
2	PC3	287970	Circuit Card Assy, Motor Control	1
3	PC4	287967	Circuit Card Assy, Control	1
4	PC5	287965	Circuit Card Assy, Encoder	1
5	PC6	287964	Circuit Card Assy, LCD	1
6	PC10	287966	Circuit Card Assy, RJ45	1
7		287972	Valve, Gas w/Clamps	1
8		287973	Bezel, Front w/Nameplate	1
9		287974	Wrapper, Cover w/Labels	1
10		287975	Door, Access w/Labels	1
11		287976	Motor, Gear	1
12		287977	Fan, Muffin	1
13		287981	Switch, Rocker Spst	1
14		287983	Foot, Mtg	4
15		261157	Roll, Drive .024, .030-.035V Wire, .035VK Wire	1
16		287978	Lens Cover, Replaceable	1
17		219261	Adapter, Power Cable 5-15P (115V/15A)	1
18		219258	Adapter, Power Cable 6-50P (230V/50A)	1
19		288004	Rcpt, TW LK Brass Power Female	1
20		048282	Rcpt w/Skts, Service Kit	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.

7-2. Recommended Spare Parts

Recommended Spare Parts

Item No.	Part No.	Retail Part No.	Description	Quantity
1	087299	770174	Contact Tips, .023/.025 in. (0.6 mm)	10(5)
2	000067	770177	Contact Tips, .030 in. (0.8 mm)	10(5)
3	000068	770180	Contact Tips, .035 in. (0.9 mm)	10(5)
4	000069	770183	Contact Tips, .045 in. (1.2 mm)	10(5)
5	226190	770487	Gasless Flux-cored Nozzle	1
6	169715	770404	MIG Nozzle	1
7	169716	770402	Tip Adapter / Gas Diffuser	1
8	194010	196139	Liners, .023/.025 in. (0.6 mm)	1
9	194011	196139	Liners, .030/.035 in. (0.8/0.9 mm)	1
10	194012	196140	Liners, .035/.045 in. (0.9/1.2 mm)	1
11	WP1712RDI25		Replacement TIG Torch	1
12	284546		HR100 4-Pin Mig Gun Replacement, 100-Amp, 10 Ft	1
13	257796	770770	200 Amp Ground Clamp	1
14	PA532	770026	200 Amp Electrode Holder	1
15	250663	770971	Regulator/Flowgauge, 0-50 CFH ARGON/CO2	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.

7-3. Optional Accessories

Part No.	Description	Quantity
300432	RFCS-RJ45 (Foot Control)	1
202926	Roll, Drive VK .030—.035/.045 Wire	1
195186	Protective Cover	1
194776	Running Gear/Cylinder Rack	1
300796	SpoolRunner 100 Spool Gun	1
219259	Adapter, Power Cable 5-20P (115V/20A)	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.

SECTION 8 – ELECTRICAL DIAGRAMS

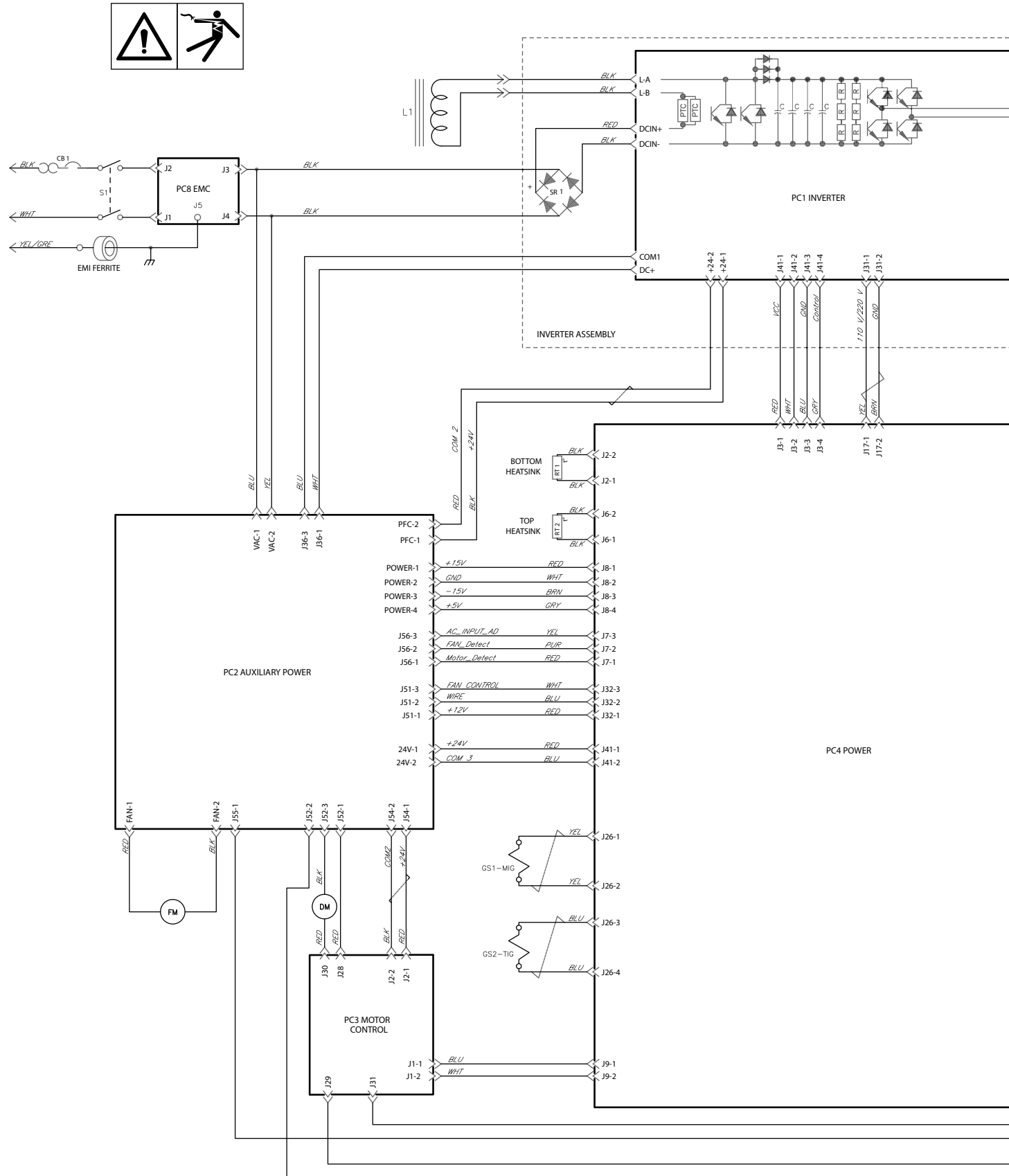
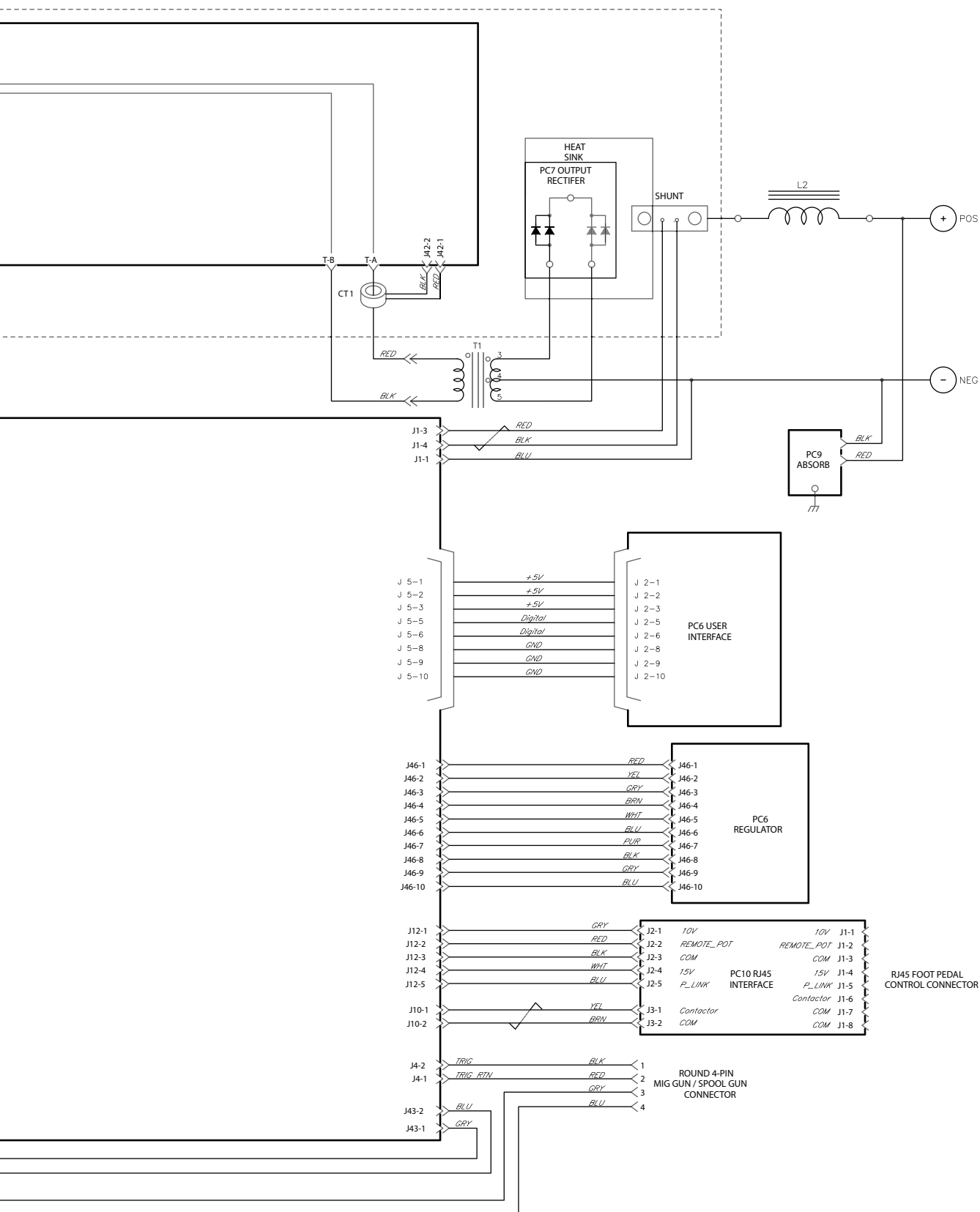


Figure 8-1. Circuit Diagram



287757-B

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

9-1. Selecting Tungsten Electrode



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

NOTICE – Wear clean gloves to prevent contamination of tungsten.

A. Select Tungsten Electrode

Amperage Range By Gas Type* And Polarity		
Electrode Diameter (2% Ceriated or 1.5% Lanthanum Alloy Tungstens)	DCEN – Argon Direct Current Electrode Negative (For Use With Mild Or Stainless Steel)	AC – Argon Unbalanced Wave (75% EN Balance) (For Use With Aluminum)
0.010 in. (0.25 mm)	Up to 15	Up to 15
0.020 in. (0.50 mm)	5–20	5–20
0.040 in. (1 mm)	15–80	15–80
1/16 in. (1.6 mm)	70–150	70–150
3/32 in. (2.4 mm)	150–200	140–235
1/8 in. (3.2 mm)	250–400	225–325
5/32 in. (4.0 mm)	400–500	300–400
3/16 in. (4.8 mm)	500–750	400–500
1/4 in. (6.4 mm)	750–1000	500–630

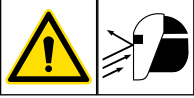
*Typical argon shielding gas flow rates are 10 to 25 CFH (cubic feet per hour).
 Figures listed are a guide and are a composite of recommendations from American Welding Society (AWS).

B. Electrode Composition

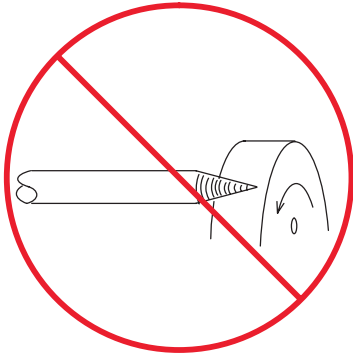
Tungsten Type	Application Notes
2% Cerium (Gray)	Good all-around tungsten for both AC and DC welding.
1.5–2% Lanthanum (Yellow/Blue)	Excellent low amp starts for AC and DC welding.
Pure Tungsten (Green)	Not recommended for inverters! For best results in most applications, use a sharpened cerium or lanthanum electrode for AC or DC welding.

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

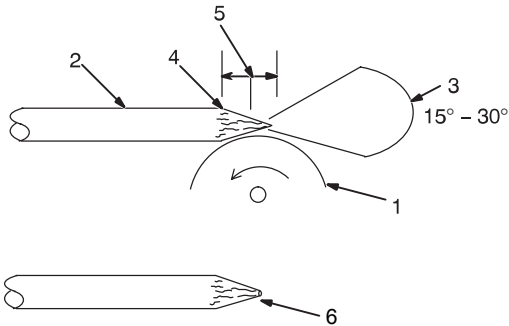
9-2. Preparing Tungsten Electrode For DC Electrode Negative (DCEN) Welding Or AC Welding With Inverter Machines



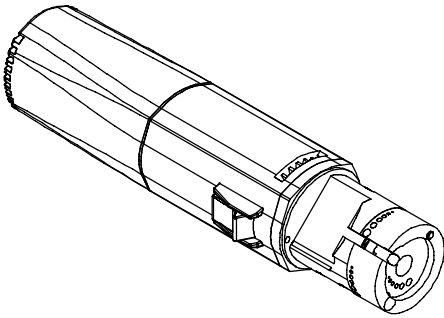
Wrong Tungsten Preparation — Radial Grinding Causes Wandering Arc



Better Tungsten Preparation — Stable Arc



Best Tungsten Preparation — Dedicated Tungsten Grinder



⚠ Grinding the tungsten electrode produces dust and flying sparks which can cause injury and start fires. Use appropriate local exhaust (forced ventilation) at the grinder or wear an approved respirator. Read SDS for safety information. Properly dispose of grinder dust in an environmentally safe way. Wear proper face, hand, and body protection. Keep flammables away.

⚠ Do not use thoriated tungsten. Use tungsten containing ceria, lanthana, or yttria instead of thoria. Grinding dust from thoriated electrodes contains low-level radioactive material.

👉 It is recommended to prepare tungsten with a tungsten grinder designed for that purpose whenever possible.

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 Ideal Grind Angle Range: 15° to 30°

👉 30 degrees is the recommended electrode grind angle.

4 Straight Ground

Grind lengthwise, not radial.

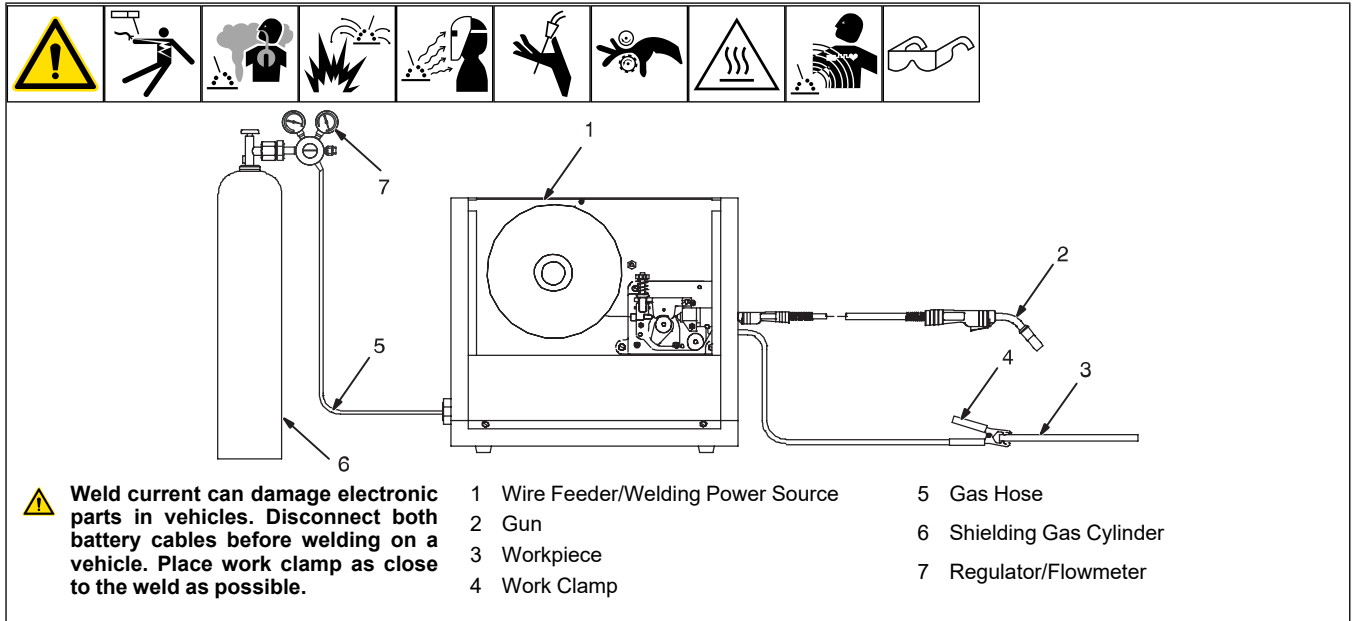
5 1-1/2 to 4 Times Electrode Diameter

6 Straight Ground Tip

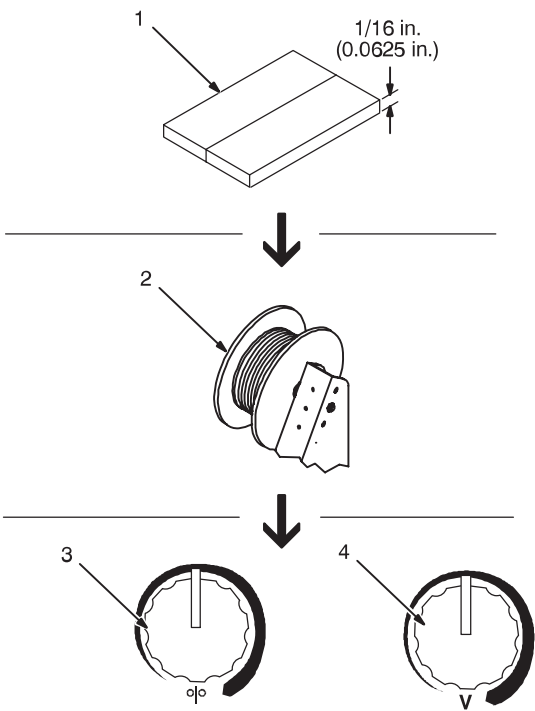
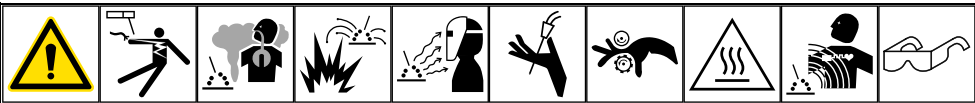
👉 Blunting the tip of the electrode is sometimes done to help maintain consistent geometry and resist tungsten erosion. This is especially helpful in AC when melt-back of the tungsten electrode is common.

SECTION 10 – GMAW WELDING (MIG) GUIDELINES

10-1. Typical GMAW (MIG) Process Connections



10-2. Typical GMAW (MIG) Process Control Settings

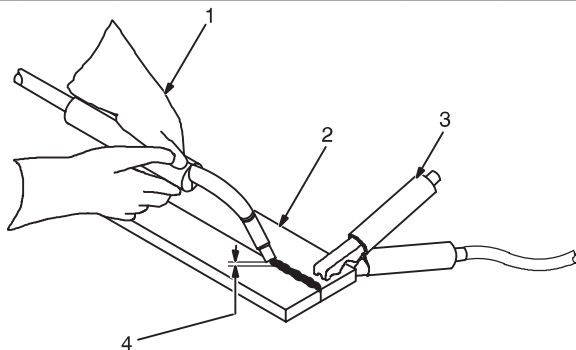


☞ These settings are guidelines only. Material and wire type, joint design, fitup, position, shielding gas, etc. affect settings. Test welds to be sure they comply to specifications.

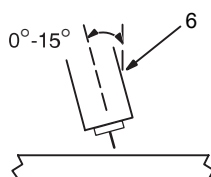
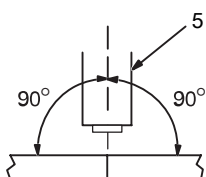
- 1 Material Thickness
Material thickness determines weld parameters.
Convert material thickness to amperage (A):
0.001 in. (0.025 mm) = 1 ampere
0.125 in. (3.17 mm) ÷ 0.001 = 125 A
- 2 Select Wire Size
See table below.
- 3 Select Wire Feed Speed (Amperage)
Wire feed speed (amperage) controls weld penetration. See table below.
- 4 Select Voltage
Voltage controls height and width of weld bead.
Low Voltage: wire stubs into work
High Voltage: arc is unstable (spatter)
Set voltage midway between high and low voltage and adjust as needed for the weld.

Wire Size	Amperage Range	Recommended Wire Feed Speed	Wire Feed Speed *
0.023 in. (0.58 mm)	30-90 A	3.5 ipm (89 mmpm) per amp	3.5 x 125 A = 437 ipm (11.11 mpm)
0.030 in. (0.76 mm)	40-145 A	2 ipm (51 mmpm) per amp	2 x 125 A = 250 ipm (6.35 mpm)
0.035 in. (0.89 mm)	50-180 A	1.6 ipm (41 mmpm) per amp	1.6 x 125 A = 200 ipm (5.08 mpm)
0.045 in. (1.14 mm)	75-250 A	1 ipm (25 mmpm) per amp	1 x 125 A = 125 ipm (3.17 mpm)
*125 A based on 1/8 in. (3.17 mm) material thickness.		ipm = inches per minute; mmpm = millimeters per minute; mpm = meters per minute	

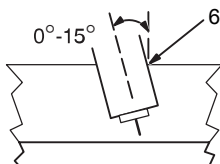
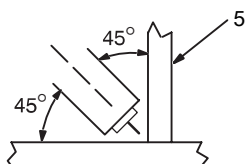
10-3. Holding And Positioning Welding Gun



Groove Welds



Fillet Welds



Wire is energized when gun trigger is pressed. Before lowering helmet and pressing trigger, be sure wire is no more than 1/2 in. (13 mm) past end of contact tip, and tip of wire is positioned correctly on seam.

1 Hold Gun and Control Gun Trigger

Use both hands to stabilize the gun.

2 Workpiece

3 Work Clamp

4 Contact Tip To Work Distance (Stickout)

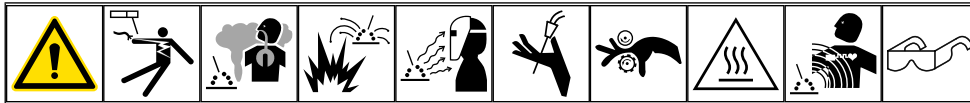
Short Circuit: 1/4 to 1/2 in. (6 to 13 mm)

Spray Transfer: 1/2 to 3/4 in. (13 to 14 mm)

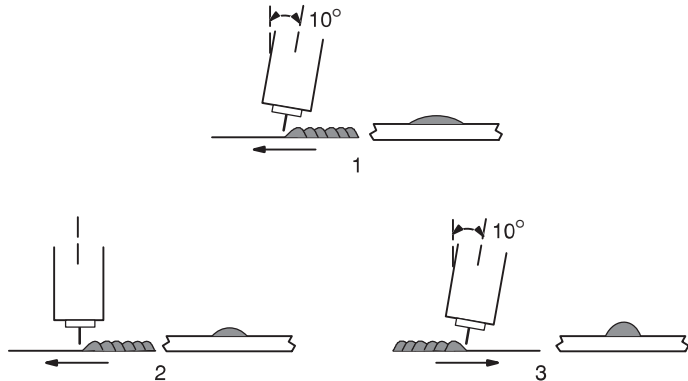
5 End View Of Work Angle

6 Side View Of Travel Angle

10-4. Conditions That Affect Weld Bead Shape



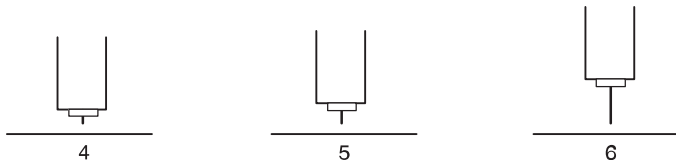
Gun Angles and Weld Bead Profiles



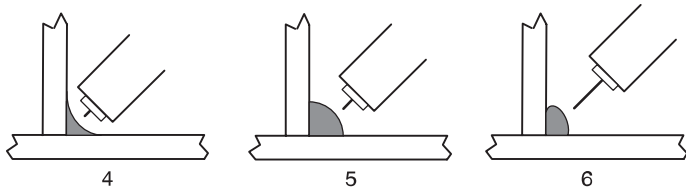
Weld bead shape depends on gun angle, direction of travel, contact to work distance (stickout), travel speed, thickness of base metal, wire feed speed (weld current), and voltage.

- 1 Push
- 2 Perpendicular
- 3 Drag
- 4 Short
- 5 Normal
- 6 Long
- 7 Slow
- 8 Normal
- 9 Fast

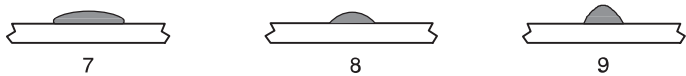
Contact Tip To Work Distance (Stickout)



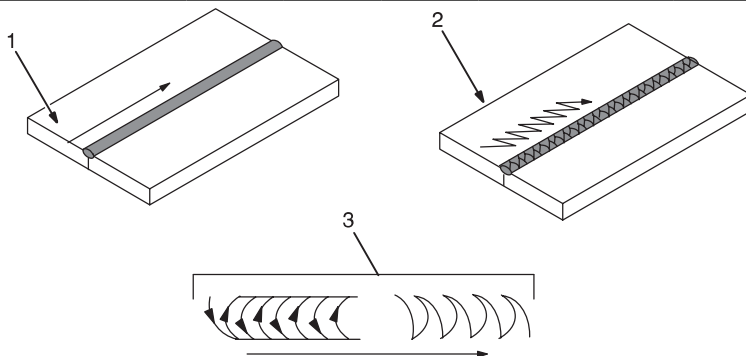
Fillet Weld Contact Tip To Work Distance (Stickout)



Travel Speed



10-5. Gun Movement During Welding

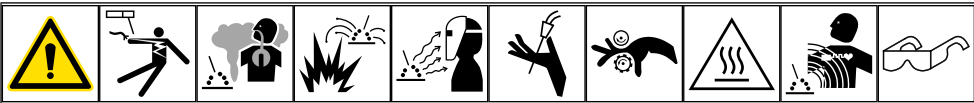


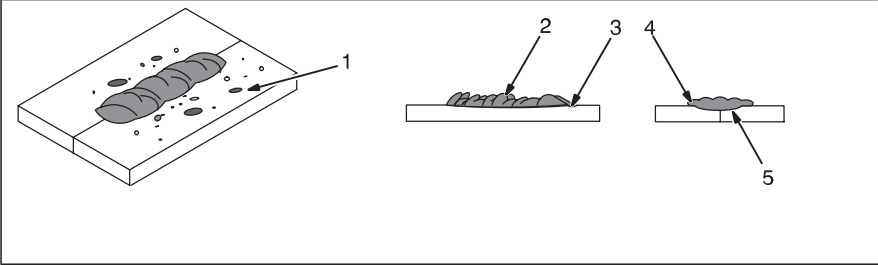
Normally, a single stringer bead is satisfactory for most narrow groove weld joints; however, for wide groove weld joints or bridging across gaps, a weave bead or multiple stringer beads works better.

- 1 Stringer Bead - Steady Forward Movement Along Weld Joint
- 2 Weave Bead - Side To Side Movement Along Weld Joint
- 3 Weave Patterns

Use weave patterns to cover a wide area in one pass of the electrode.

10-6. Poor Weld Bead Characteristics

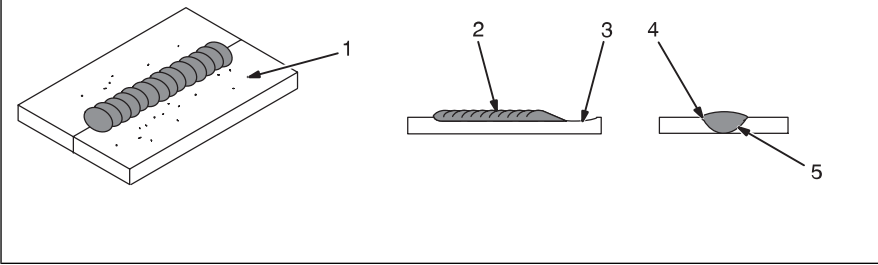




1 Large Spatter Deposits
2 Rough, Uneven Bead
3 Large Crater At End of Weld
4 Overlap Present
5 Little To No Penetration

10-7. Good Weld Bead Characteristics

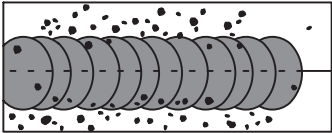




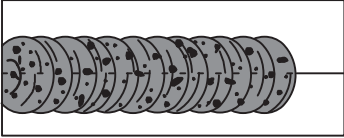
1 Little To No Micro Spatter
2 Uniform Bead
3 Little To No Crater At End Of Weld
4 No Overlap
5 Adequate Penetration Into Base Metal

10-8. Troubleshooting

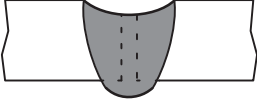
A. Excessive Spatter

	Excessive Spatter - scattering of molten metal particles that cool to solid form near weld bead.
Possible Causes	Corrective Actions
Wire feed speed too high.	Select lower wire feed speed.
Voltage too high.	Select lower voltage range.
Electrode extension (stickout) too long.	Use shorter electrode extension (stickout).
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, undercoating, and dirt from work surface before welding.
Insufficient shielding gas at welding arc.	Increase flow of shielding gas at regulator/flowmeter and/or prevent drafts near welding arc.
Dirty welding wire.	Use clean, dry welding wire.
	Eliminate pickup of oil or lubricant on welding wire from feeder or liner.

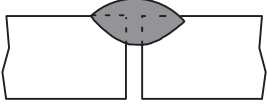
B. Porosity

	Porosity - small cavities or holes resulting from gas pockets in weld metal.
Possible Causes	Corrective Actions
Insufficient shielding gas at welding arc.	Increase flow of shielding gas at regulator/flowmeter and/or prevent drafts near welding arc.
	Remove spatter from gun nozzle.
	Check gas hoses for leaks.
	Ensure proper contact tip to work distance.
	Hold gun near bead at end of weld until molten metal solidifies.
Wrong gas.	Use welding grade shielding gas; change to different gas.
Dirty wire.	Use clean, dry wire.
	Eliminate pick up of oil or lubricant on wire from feeder or liner.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, and dirt from work surface before welding.
	Use a more highly deoxidizing wire (contact supplier).
Excessive contact tip to work distance	Ensure proper contact tip to work distance

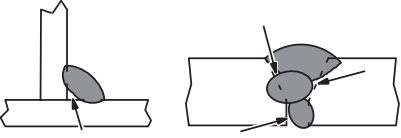
C. Excessive Penetration

	Excessive Penetration - weld metal melting through base metal.
Possible Causes	Corrective Actions
Excessive heat input.	Select lower voltage and reduce wire feed speed.
	Increase travel speed.

D. Incomplete Joint Penetration

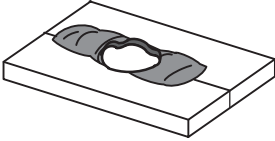
	Incomplete Joint Penetration - weld metal does not extend through the joint thickness.
Possible Causes	Corrective Actions
Improper joint preparation.	Joint preparation and design must provide access to bottom of groove while maintaining proper contact tip to work distance.
Improper weld technique.	Maintain proper work and travel angles.
	Keep arc on leading edge of weld puddle.
	Maintain proper contact tip to work distance.
Insufficient heat input.	Select higher wire feed speed and/or select higher voltage range.
	Reduce travel speed.

E. Incomplete Fusion

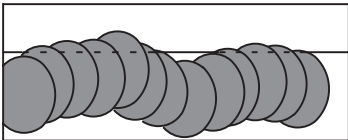
	Incomplete Fusion - failure of weld metal to fuse completely with base metal or a preceding weld bead.
Possible Causes	Corrective Actions
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, undercoating, and dirt from work surface before welding.
Insufficient heat input.	Select higher voltage and/or adjust wire feed speed.
Improper welding technique.	Place bead in proper location(s) in joint during welding.

	Pause on groove side walls when using weaving technique.
	Keep wire on leading edge of weld puddle.
	Maintain proper work and travel angles.

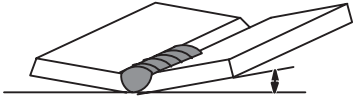
F. Burn-Through

	Burn-Through - a hole caused by excessive penetration.
Possible Causes	Corrective Actions
Excessive heat input.	Select lower voltage and reduce wire feed speed.
	Increase and/or maintain steady travel speed.

G. Waviness Of Bead

	Waviness Of Bead - weld metal that is not parallel and does not cover joint formed by base metal.
Possible Causes	Corrective Actions
Excessive contact tip to work distance.	Ensure proper contact tip to work distance.
Unsteady hand.	Support hand on solid surface or use two hands.

H. Distortion

	Distortion - contraction of weld metal during welding that forces base metal to move. Illustration: Base metal moves in the direction of the weld bead.
Possible Causes	Corrective Actions
Excessive heat input.	Use restraint (clamp) to hold base metal in position.
	Make tack welds along joint before starting welding operation.
	Select lower voltage range and/or reduce wire feed speed.
	Increase travel speed.
	Weld in small segments and allow cooling between welds.

10-9. Common MIG Shielding Gases

This is a general chart for common gases and where they are used. Many different combinations (mixtures) of shielding gases have been developed over the years. The most commonly used shielding gases are listed in the following table.

Gas	Application								
	Spray Arc Steel	Short Cir-cuiting Steel	GMAW-P Steel	Spray Arc Stainless Steel	Short Cir-cuiting Stainless Steel	GMAW-P Stainless Steel	Spray Arc Aluminum	Short Cir-cuiting Aluminum	GMAW-P Aluminum
Argon							All Positions	All Positions	All Positions
Argon + 2% O ₂	Flat & Horizontal Fillet		All Positions	Flat & Horizontal Fillet					
Argon + 2% CO ₂				Flat & Horizontal Fillet	All Positions	All Positions			
Argon + 5% CO ₂	Flat & Horizontal Fillet		All Positions						
Argon + 10% CO ₂	Flat & Horizontal Fillet	All Positions	All Positions						
Argon + 25% CO ₂		All Positions							
CO ₂		All Positions							
Helium							All Positions*		
Argon + Helium							All Positions*		
90% HE + 7-1/2% AR + 2-1/2% CO ₂					All Positions				
65% AR + 33% HE + 2% CO ₂						All Positions			

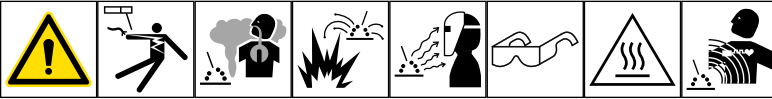
* Heavy Thicknesses

10-10. Troubleshooting Guide For Semiautomatic Welding Equipment

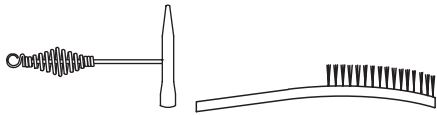
Problem	Probable Cause	Remedy
Wire feed motor operates, but wire does not feed.	Too little pressure on drive rolls.	Increase pressure setting on drive rolls.
	Incorrect drive rolls.	Check size stamped on drive rolls, replace to match wire size and type if necessary.
	Spool hub tension too high.	Decrease brake pressure on wire spool.
	Restriction in the gun and/or assembly.	Check and replace cable, gun, and contact tip if damaged. Check size of contact tip and cable liner, replace if necessary.
Wire curling up in front of the wire feed rolls (bird nesting).	Too much pressure on drive rolls.	Decrease spool hub tension.
	Incorrect liner or gun contact tip size.	Check size of contact tip and check liner length and diameter, replace if necessary.
	Gun end not inserted into drive housing properly.	Loosen gun securing bolt in drive housing and push gun end into housing just enough so it does not touch drive rolls.
	Dirty or damaged (kinked) liner.	Replace liner.
Wire feeds, but no gas flows (GMAW).	Gas cylinder empty.	Replace empty gas cylinder.
	Gas nozzle plugged.	Clean or replace gas nozzle.
	Gas cylinder valve not open or flowmeter not adjusted.	Open gas valve at cylinder and adjust flow rate.
	Restriction in gas line.	Check gas hose between flowmeter and wire feeder, and gas hose in gun and cable assembly.
	Loose or broken wires to gas solenoid.	Have Factory Authorized Service Agent repair wiring.
	Gas solenoid valve not operating.	Have Factory Authorized Service Agent replace gas solenoid valve.
	Incorrect primary voltage connected to welding power source.	Check primary voltage and relink welding power source for correct voltage.
Welding arc not stable.	Wire slipping in drive rolls.	Adjust pressure setting on drive rolls. Replace worn drive rolls if necessary.
	Wrong size gun liner.	Match liner to wire size and type.
	Incorrect voltage setting for selected wire feed speed on welding power source.	Readjust welding parameters.
	Loose connections at the gun weld cable or work cable.	Check and tighten all connections.
	Gun in poor shape or loose connection inside gun.	Repair or replace gun as necessary.
	Wrong size contact tip or worn out contact tip.	Match contact tip to wire size and type. Replace contact tip as necessary.

SECTION 11 – STICK WELDING (SMAW) GUIDELINES

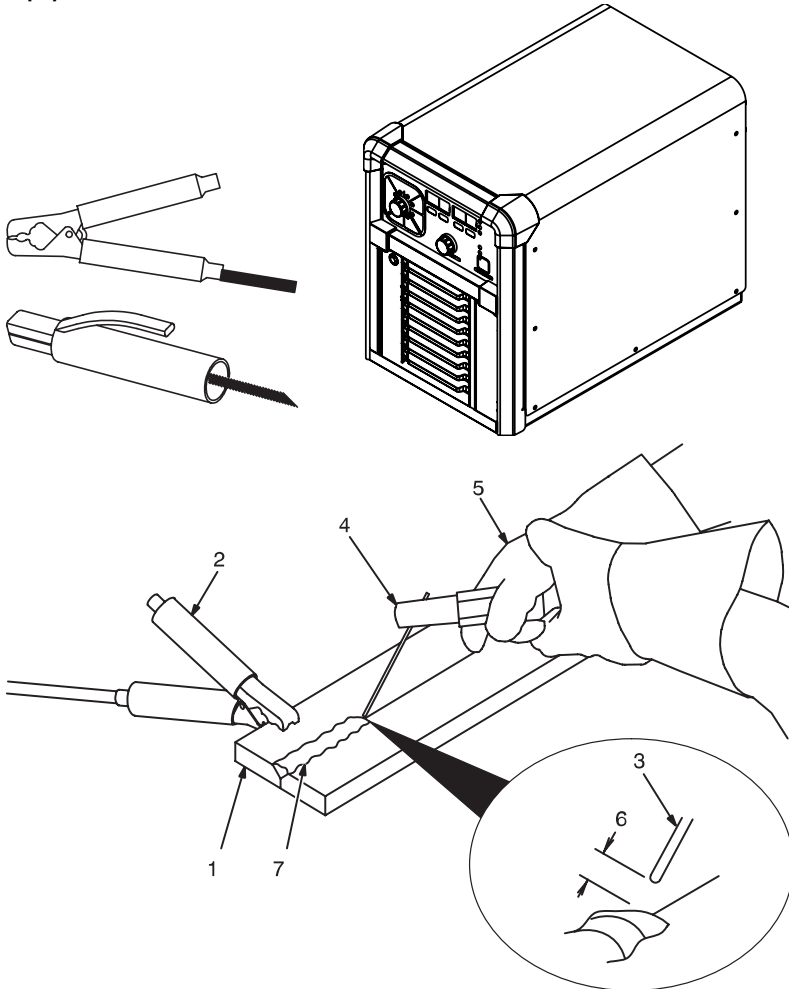
11-1. Stick Welding Procedure



Tools Needed:



Equipment Needed:



 Weld current starts when electrode touches workpiece.

 Weld current can damage electronic parts in vehicles. Disconnect both battery cables before welding on a vehicle. Place work clamp as close to the weld as possible.

 Always wear appropriate personal protective clothing.

1 Workpiece

Make sure workpiece is clean before welding.

2 Work Clamp

Place as close to the weld as possible.

3 Electrode

Before striking an arc, insert an electrode in the electrode holder. A small diameter electrode requires less current than a large one. Follow recommendations of the electrode manufacturer when setting weld amperage (see Section [11-2](#)).

4 Insulated Electrode Holder

5 Electrode Holder Position

6 Arc Length

Arc length is the distance from the electrode to the workpiece. A short arc with correct amperage will give a sharp, crackling sound. Correct arc length is related to electrode diameter. Examine the weld bead to determine if the arc length is correct.

Arc length for 1/16 and 3/32 in. diameter electrodes should be about 1/16 in. (1.6 mm); arc length for 1/8 and 5/32 in. electrodes should be about 1/8 in. (3 mm).

7 Slag

Use a chipping hammer and wire brush to remove slag. Remove slag and check weld bead before making another weld pass.

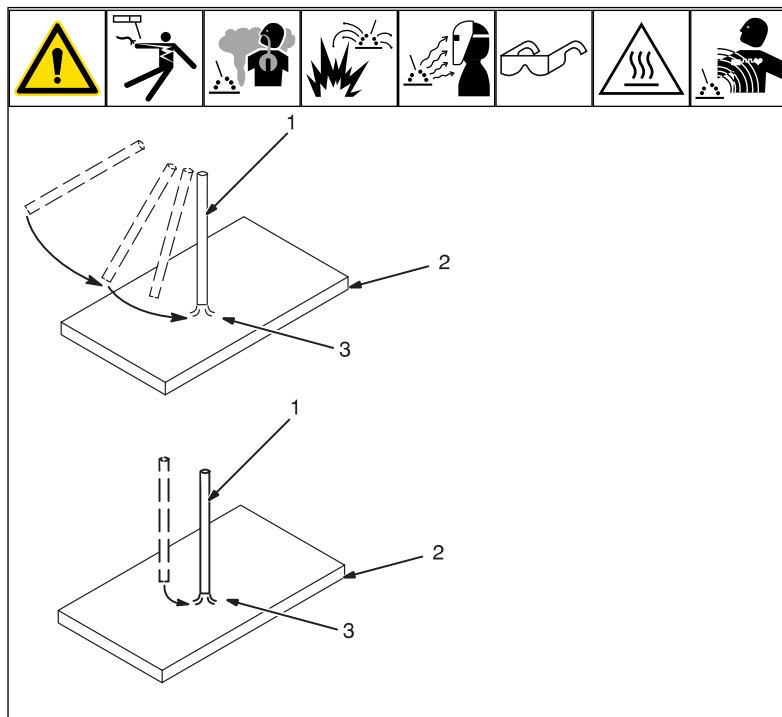
11-2. Electrode And Amperage Selection Chart

ELECTRODE	DIAMETER	AMPERAGE RANGE								
		50	100	150	200	250	300	350	400	450
6010 & 6011	3/32									
	1/8									
	5/32									
	3/16									
	7/32									
6013	1/4									
	1/16									
	5/64									
	3/32									
	1/8									
	5/32									
	3/16									
	7/32									
7014	1/4									
	3/32									
	1/8									
	5/32									
	3/16									
7018	7/32									
	1/4									
	3/32									
	1/8									
	5/32									
7024	3/16									
	7/32									
	1/4									
	3/32									
	1/8									
Ni-CI	5/32									
	3/16									
	3/32									
308L	1/8									
	5/32									

ELECTRODE	DC*	AC	POSITION	PENETRATION	USAGE
6010	EP		ALL	DEEP	MIN. PREP, ROUGH HIGH SPATTER
6011	EP	✓	ALL	DEEP	
6013	EP,EN	✓	ALL	LOW	GENERAL
7014	EP,EN	✓	ALL	MED	SMOOTH, EASY, FAST
7018	EP	✓	ALL	MED	LOW HYDROGEN, STRONG
7024	EP,EN	✓	FLAT HORIZ*	LOW	SMOOTH, EASY, FASTER
NI-CL	EP	✓	ALL	LOW	CAST IRON
308L	EP	✓	ALL	LOW	STAINLESS

*EP = ELECTRODE POSITIVE (REVERSE POLARITY)
EN = ELECTRODE NEGATIVE (STRAIGHT POLARITY)

11-3. Striking An Arc



Weld current starts when electrode touches workpiece.

- 1 Electrode
- 2 Workpiece
- 3 Arc

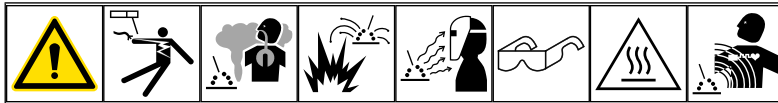
Scratch Technique

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

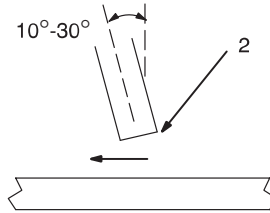
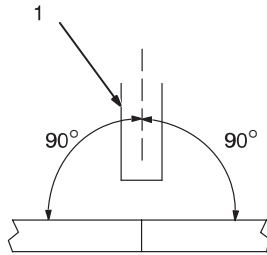
Tapping Technique

Bring electrode straight down to workpiece; then lift slightly to start arc. If arc goes out, electrode was lifted too high. If electrode sticks to workpiece, use a quick twist to free it.

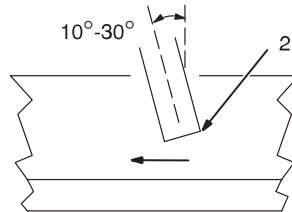
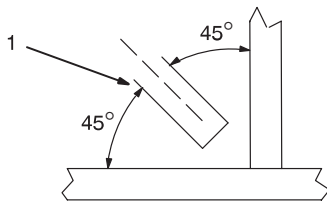
11-4. Positioning Electrode Holder



Groove Welds



Fillet Welds



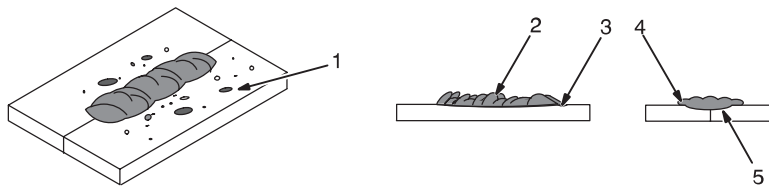
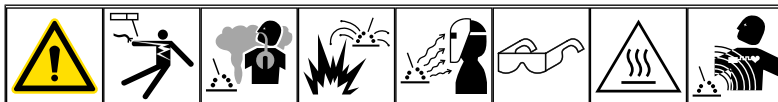
- 1 End View Of Work Angle
- 2 Side View Of Electrode Angle

After learning to start and hold an arc, practice running beads of weld metal on flat plates using a full electrode.

Hold the electrode nearly perpendicular to the work, although tilting it ahead (in the direction of travel) will be helpful.

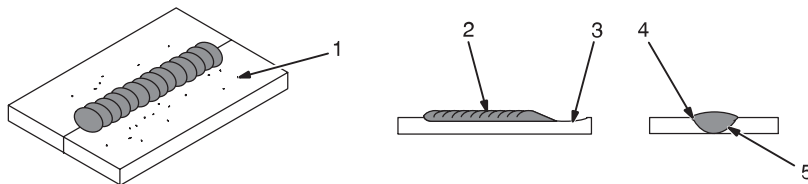
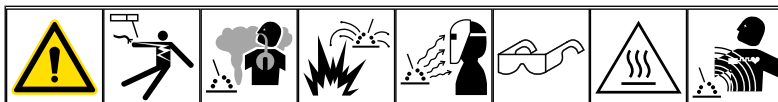
To produce the best results, hold a short arc, travel at a uniform speed, and feed the electrode downward at a constant rate as it melts.

11-5. Poor Weld Bead Characteristics



- 1 Large Spatter Deposits
- 2 Rough, Uneven Bead
- 3 Slight Crater During Welding
- 4 Bad Overlap
- 5 Poor Penetration

11-6. Good Weld Bead Characteristics

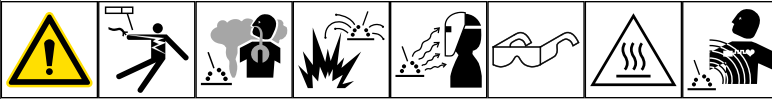


- 1 Fine Spatter
- 2 Uniform Bead
- 3 Moderate Crater During Welding
- 4 No Overlap
- 5 Good Penetration into Base Metal

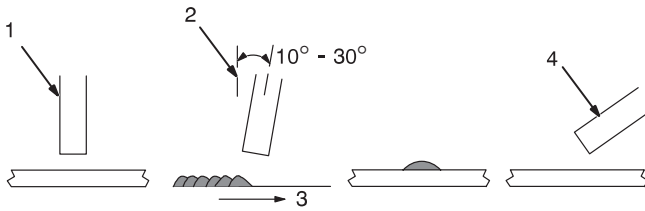
Weld a new bead or layer for each 1/8 in. (3.2 mm) thickness in metals being welded.

- 4 No Overlap
- 5 Good Penetration into Base Metal

11-7. Conditions That Affect Weld Bead Shape



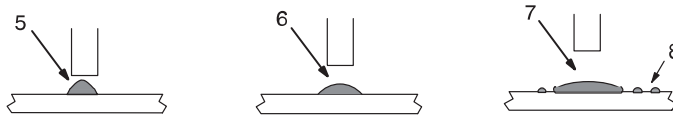
Electrode Angle



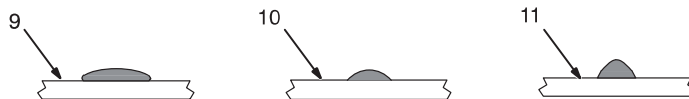
☞ Weld bead shape is affected by electrode angle, arc length, travel speed, and thickness of base metal.

- 1 Angle Too Small
- 2 Correct Angle
- 3 Drag
- 4 Angle Too Large
- 5 Too Short
- 6 Normal
- 7 Too Long
- 8 Spatter
- 9 Slow
- 10 Normal
- 11 Fast

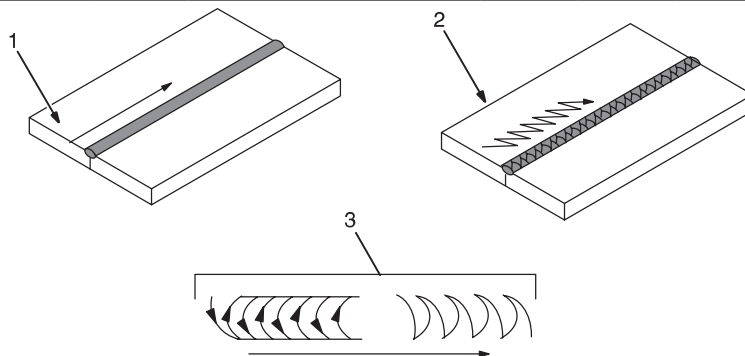
Arc Length



Travel Speed



11-8. Electrode Movement During Welding

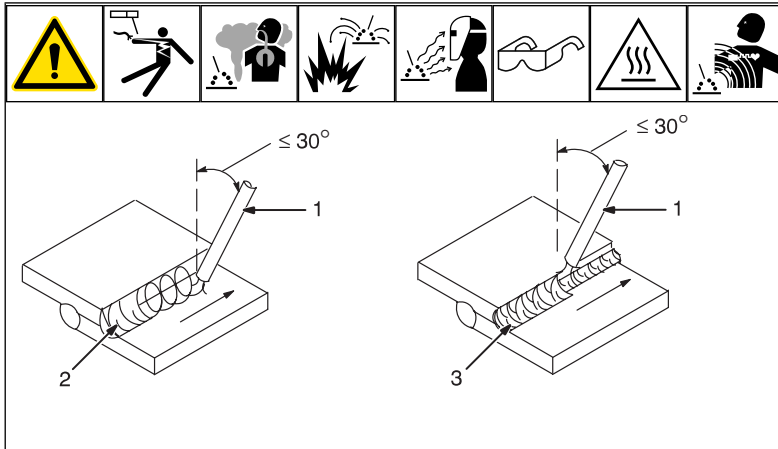


☞ Normally, a single stringer bead is satisfactory for most narrow groove weld joints; however, for wide groove weld joints or bridging across gaps, a weave bead or multiple stringer beads works better.

- 1 Stringer Bead - Steady Movement Along Seam
- 2 Weave Bead - Side To Side Movement Along Seam
- 3 Weave Patterns

Use weave patterns to cover a wide area in one pass of the electrode. Do not let weave width exceed 2-1/2 times diameter of electrode.

11-9. Welding Lap Joints



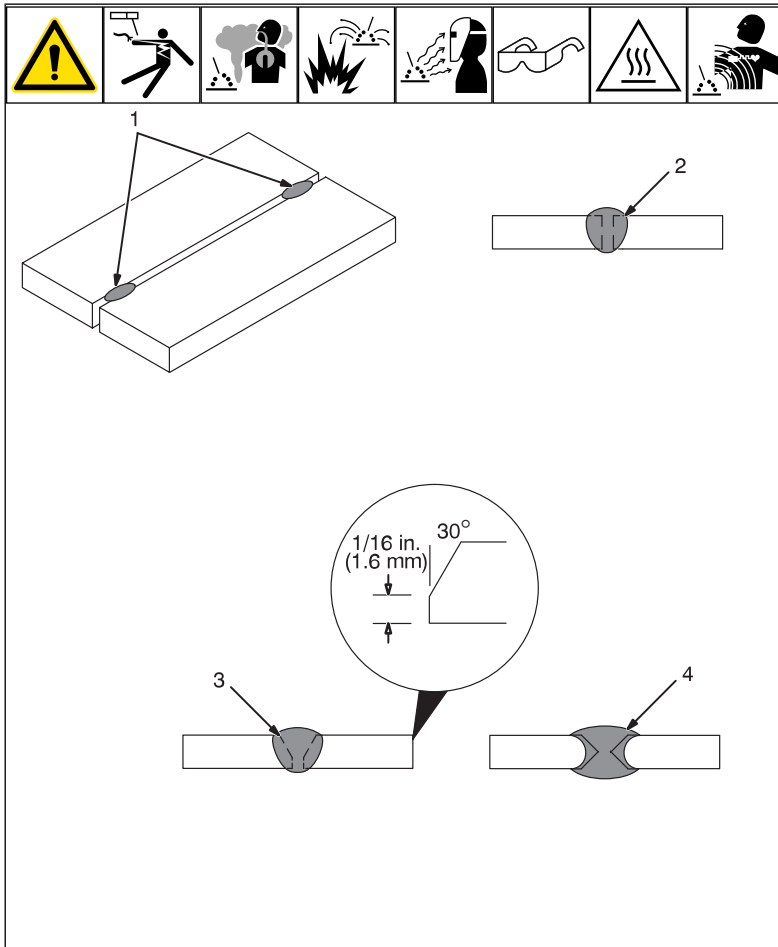
- 1 Electrode
- 2 Single-Layer Fillet Weld

Move electrode in circular motion.

- 3 Multi-Layer Fillet Weld

Weld a second layer when a heavier fillet is needed. Remove slag before making another weld pass. Weld both sides of joint for maximum strength.

11-10. Welding Groove (Butt) Joints



- 1 Tack Welds

Prevent butt joint distortion by tack welding the materials in position before final weld.

Workpiece distortion occurs when heat is applied locally to a joint. One side of a metal plate will curl up toward the weld. Distortion will also cause the edges of a butt joint to pull together ahead of the electrode as the weld cools.

- 2 Square Groove Weld
- 3 Single V-Groove Weld
- 4 Double V-Groove Weld

Materials up to 3/16 in. (5 mm) thick can often be welded without special preparation using the square groove weld. However, when welding thicker materials it may be necessary to prepare the edges (V-groove) of butt joints to ensure good welds.

The single or double V-groove weld is good for materials 3/16 - 3/4 in. (5-19 mm) thick. Generally, the single V-groove is used on materials up to 3/4 in. (19 mm) thick and when, regardless of thickness, you can weld from one side only. Create a 30 degree bevel with oxyacetylene or plasma cutting equipment. Remove scale from material after cutting. A grinder can also be used to prepare bevels.

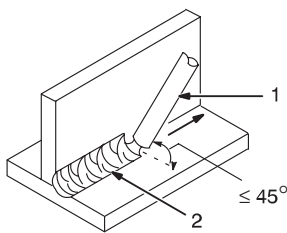
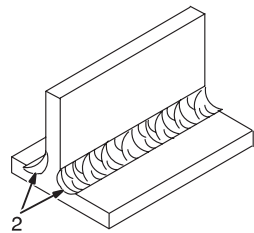
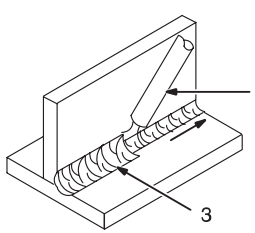
11-11. Welding T-Joints









1 Electrode
2 Fillet Weld

1 Keep arc short and move at definite rate of speed. Hold electrode as shown to provide fusion into the corner. Square edge of the weld surface.

For maximum strength weld both sides of upright section.

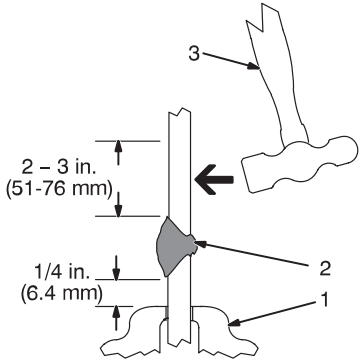
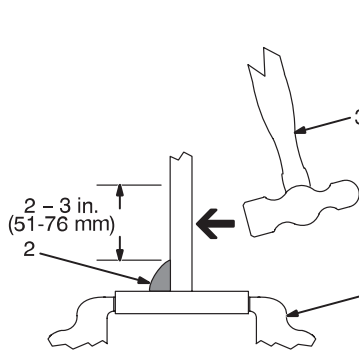
3 Multi-Layer Deposits

Weld a second layer when a heavier fillet is needed. Use any of the weaving patterns shown in Section [11-8](#). Remove slag before making another weld pass.

11-12. Weld Test





1 Vise
2 Weld Joint
3 Hammer

Strike the weld joint in the direction shown. A good weld bends over but does not break.

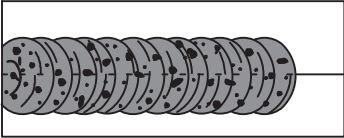
If the weld breaks, examine it to determine the cause.

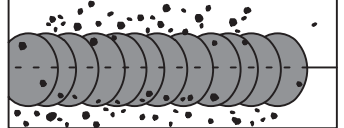
If the weld is porous (many holes), the arc length was probably too long.

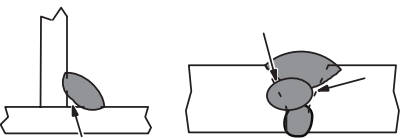
If the weld contains bits of slag, the arc may have been too long or the electrode was moved incorrectly which allowed molten slag to be trapped in the weld. This may happen on a V-groove joint made in several layers and calls for additional cleaning between layers.

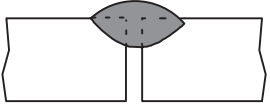
If the original beveled surface is visible the material was not fully melted which is often caused by insufficient heat or too fast a travel speed.

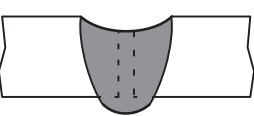
11-13. Troubleshooting

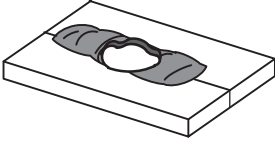
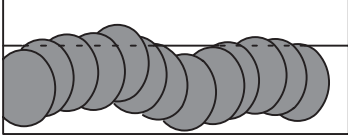
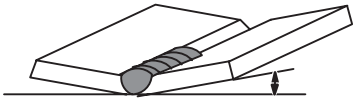
	Porosity - small cavities or holes resulting from gas pockets in weld metal.
Possible Causes	Corrective Actions
Arc length too long.	Reduce arc length.
Damp electrode.	Use dry electrode.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.

	Excessive Spatter - scattering of molten metal particles that cool to solid form near weld bead.
Possible Causes	Corrective Actions
Amperage too high for electrode.	Decrease amperage or select larger electrode.
Arc length too long or voltage too high.	Reduce arc length or voltage.

	Incomplete Fusion - failure of weld metal to fuse completely with base metal or a preceding weld bead.
Possible Causes	Corrective Actions
Insufficient heat input.	Increase amperage. Select larger electrode and increase amperage.
Improper welding technique.	Place stringer bead in proper location(s) at joint during welding.
	Adjust work angle or widen groove to access bottom during welding.
	Momentarily hold arc on groove side walls when using weaving technique.
Workpiece dirty.	Keep arc on leading edge of weld puddle. Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.

	Lack Of Penetration - shallow fusion between weld metal and base metal.
Possible Causes	Corrective Actions
Improper joint preparation.	Material too thick. Joint preparation and design must provide access to bottom of groove.
Improper weld technique.	Keep arc on leading edge of weld puddle.
Insufficient heat input.	Increase amperage. Select larger electrode and increase amperage.
	Reduce travel speed.

	Excessive Penetration - weld metal melting through base metal and hanging underneath weld.
Possible Causes	Corrective Actions
Excessive heat input.	Select lower amperage. Use smaller electrode.
	Increase and/or maintain steady travel speed.

	Burn-Through - weld metal melting completely through base metal resulting in holes where no metal remains.
Possible Causes	Corrective Actions
Excessive heat input.	Select lower amperage. Use smaller electrode.
	Increase and/or maintain steady travel speed.
	Waviness Of Bead - weld metal that is not parallel and does not cover joint formed by base metal.
Possible Causes	Corrective Actions
Unsteady hand.	Use two hands. Practice technique.
	Distortion - contraction of weld metal during welding that forces base metal to move. Illustration: Base metal moves in the direction of the weld bead.
Possible Causes	Corrective Actions
Excessive heat input.	Use restraint (clamp) to hold base metal in position.
	Make tack welds along joint before starting welding operation.
	Select lower amperage for electrode.
	Increase travel speed.
	Weld in small segments and allow cooling between welds.

SECTION 12 – DEFINITIONS

12-1. Additional Safety Symbol Definitions

	Warning! Watch Out! There are possible hazards as shown by the symbols.
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12-2. Miscellaneous Symbols And Definitions

A	Amperage	—	Negative		Wire Feed Spool Gun
V	Voltage	X	Duty Cycle		Gas Tungsten Arc Welding (GTAW) / Tungsten Inert Gas (TIG) Welding
U₀	Rated No Load Voltage (OCV)		Line Connection		Output
	Direct Current (DC)		Increase	I	On
U₁	Primary Voltage	Hz	Hertz	O	Off
U₂	Conventional Load Voltage		Single Phase Static Frequency Converter-Transformer-Rectifier	I_{1eff}	Maximum Effective Supply Current
I₂	Rated Welding Current		Wire Feed/Jog	I_{1max}	Rated Maximum Supply Current
	Input Power or Input Voltage		Shielded Metal Arc Welding (SMAW)	U_r	Reduced Rated No Load Voltage
IP	Internal Protection Rating		Gas Metal Arc Welding (GMAW)		
1~	Single Phase		Gas Metal Arc Welding (GMAW) MIG / Gun Control		
+	Positive		Self-Shielded Flux Cored Arc Welding (FCAW)		

SECTION 13 – REGULATORY AND COMPLIANCE INFORMATION

13-1. Software Licensing Agreement

The End User License Agreement and any third-party notices and terms and conditions pertaining to third-party software can be found at <https://www.hobartwelders.com/eula> and are incorporated by reference herein.

13-2. Information About Default Weld Parameters And Settings

NOTICE – Each welding application is unique. Although certain Miller Electric products are designed to determine and default to certain typical welding parameters and settings based upon specific and relatively limited application variables input by the end user, such default settings are for reference purposes only; and final weld results can be affected by other variables and application-specific circumstances. The appropriateness of all parameters and settings should be evaluated and modified by the end user as necessary based upon application-specific requirements. The end user is solely responsible for selection and coordination of appropriate equipment, adoption or adjustment of default weld parameters and settings, and ultimate quality and durability of all resultant welds. Miller Electric expressly disclaims any and all implied warranties including any implied warranty of fitness for a particular purpose.

13-3. Environmental Specifications

A. IP Rating

IP Rating
IP21S
This equipment is designed for indoor use and is not intended to be used or stored outside.

B. Temperature Specifications

Operating Temperature Range*	Storage/Transportation Temperature Range
14 to 104°F (-10 to 40°C)	-4 to 131°F (-20 to 55°C)

*Output is derated at temperatures above 104°F (40°C).

This image shows a full page of blank, lined paper. It features approximately 28 horizontal grey lines spaced evenly apart, typical of notebook paper. The lines extend across the entire width of the page, leaving small margins at the top and bottom. There are no vertical lines, text, or other markings present.

Notes

5/3/1 WARRANTY



Effective January 1, 2026

5/3/1 WARRANTY applies to all Hobart welding equipment, plasma cutters and spot welders with a serial number preface of NG or newer.

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

Hobart products are serviced by Hobart or Miller Authorized Service Agencies.

LIMITED WARRANTY - Subject to the terms and conditions below, Miller Electric Mfg. LLC, dba Hobart Welding Products, Appleton, Wisconsin, warrants to its original retail purchaser that new Hobart equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped. 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, Hobart/Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Notifications submitted as online warranty claims must provide detailed descriptions of the fault and troubleshooting steps taken to diagnose failed parts. Warranty claims that lack the required information as defined in the Miller Service Operation Guide (SOG) may be denied by Miller.

Hobart/Miller shall honor warranty claims on warranted equipment listed below in the event of a defect within the warranty coverage time periods listed below. Warranty time periods start on the delivery date of the equipment to the original retail purchaser.

1 5 Years — Parts and Labor

- Original Main Power Rectifiers only to include SCRs, diodes, and discrete rectifier modules in non-inverter products
- Capacitors
- Stabilizers
- Transformers

2 3 Years — Parts and Labor Unless Specified

- Drive Systems
- Idle Module
- Inverter Power Sources
- PC Boards
- Rotors, Stators and Brushes
- Solenoid Valves
- Switches and Controls
- Transformer/Rectifier Power Sources

3 1 Year — Parts and Labor Unless Specified (90 days for industrial use)

- Accessories (Kits)
- MIG Flowgauge Regulators (No Labor)

- MIG Guns/TIG Torches
- Plasma Cutting Torches
- Remote Controls
- Running Gear
- Spoolguns

4 6 Months — Parts

- 12 Volt Automotive-Style Batteries

5 90 Days — Parts (No Labor)

- Replacement Parts

6 Engines and tires are warranted separately by the manufacturer.

Hobart's 5/3/1 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 Hobart/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 Hobart/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.
4. Defects caused by accident, unauthorized repair, or improper testing.

HOBBART PRODUCTS ARE INTENDED FOR COMMERCIAL AND INDUSTRIAL USERS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

The exclusive remedies for warranty claims are, at Hobart's/Miller's option, either: (1) repair; or (2) replacement; or, if approved in writing by Hobart/Miller, (3) the pre-approved cost of repair or replacement at an authorized Hobart/Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon use). Products may not be returned without Hobart's/Miller's written approval. Return shipment shall be at customer's risk and expense.

The above remedies are F.O.B. Appleton, WI, or Hobart's/Miller's authorized service facility. Transportation and freight are the customer's responsibility. TO THE EXTENT PERMITTED BY LAW, THE REMEDIES HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES REGARDLESS OF THE LEGAL THEORY. IN NO EVENT SHALL HOBART/MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT) REGARDLESS OF THE LEGAL THEORY. ANY WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY, OR REPRESENTATION, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, ARE EXCLUDED AND DISCLAIMED BY HOBART/MILLER.

Some US states do not allow limiting the duration of an implied warranty or the exclusion of certain damages, so the above limitations may not apply to you. This warranty provides specific legal rights, and other rights may be available depending on your state. In Canada, some provinces provide additional warranties or remedies, and to the extent the law prohibits their waiver, the limitations set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary by province.

Warranty Questions?

Call 1-800-332-3281
8 AM – 5 PM EST

Service

You always get the fast, reliable response you need. Most replacement parts can be processed and shipped in 24 hours.

Support

Need fast answers to the tough welding questions? Contact your distributor or call 1-800-332-3281. The expertise of the distributor and Hobart is there to help you, every step of the way.

Assistance

Visit the Hobart website:
www.HobartWelders.com

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



Thank you for purchasing Hobart. Our trained technical support team is dedicated to your satisfaction. For questions regarding performance, operation, or service, contact us!

Resources Available

To locate a Service Center:

Visit our website at <https://www.HobartWelders.com/where-to-buy>

Or call 1-800-332-3281

For Technical Assistance:

Always provide Model Name and Serial/Style Number.

Call 1-800-332-3281

8 AM to 5 PM EST – Monday through Friday

Miller Electric Mfg. LLC

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

