OM-279299E 2020–07

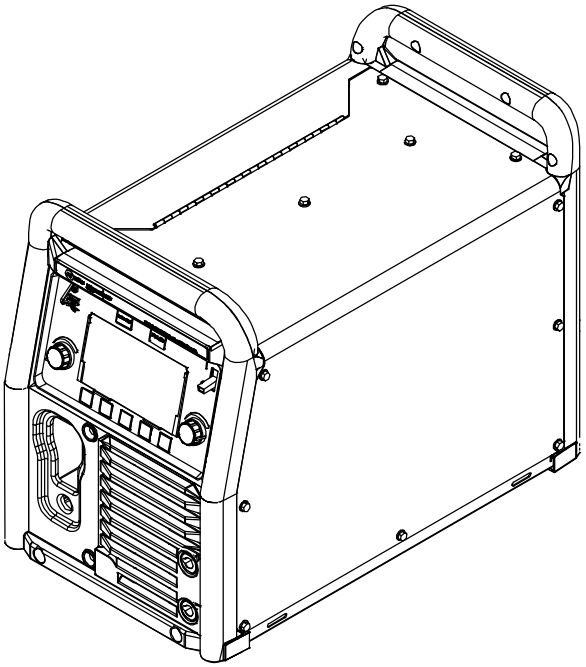
Processes

MIG (GMAW) Welding
Pulsed MIG (GMAW-P)

Description

Arc Welding Power Source
Wire Feeder

Millermatic® 255



OWNER'S MANUAL

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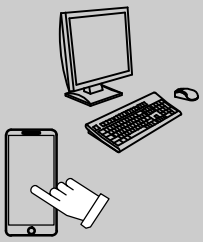

For product information,
Owner's Manual translations,
and more, visit

www.MillerWelds.com

From Miller to You

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

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

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

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety Precautions. They will help you protect yourself against potential hazards on the worksite.

We've made installation and operation quick and easy. With Miller, you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is, and our extensive service network is there to help fix the problem. Warranty and maintenance information for your particular model are also provided.

Certified System™

ISO 9001 Quality

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

Miller Electric manufactures a full line of welders and welding-related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual specification sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**

TRUE BLUE® WARRANTY

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

Miller®

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COMPLETE PARTS LIST – Available at www.MillerWelds.com
WARRANTY

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 listed in Section 1-5. 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.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a semiautomatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder, or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install, ground, and operate this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- Frequently inspect input power cord 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.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal. Disconnect cable for process not in use.
- Use GFCI protection when operating auxiliary equipment in damp or wet locations.

SIGNIFICANT DC VOLTAGE exists in inverter welding power sources AFTER removal of input power.

- Turn off unit, disconnect input power, and discharge input capacitors according to instructions in Manual before touching any parts.

HOT PARTS can burn.

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

FUMES AND GASES can be hazardous.

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

- Keep your head out of the fumes. Do not breathe the fumes.
- 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 watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

ARC RAYS can burn eyes and skin.

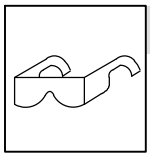
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear body protection made from durable, flame–resistant material (leather, heavy cotton, wool). 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 and AWS A6.0 (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 and causing electric shock, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear body protection made from durable, flame–resistant material (leather, heavy cotton, wool). 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.



FLYING METAL or DIRT can injure eyes.

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

BUILDUP OF GAS can injure or kill.

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

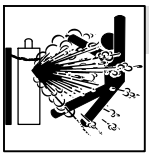
ELECTRIC AND MAGNETIC FIELDS (EMF) can affect Implanted Medical Devices.

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

NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



CYLINDERS can explode if damaged.

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

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct compressed gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve. 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.

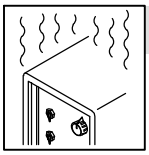
1-3. Additional Hazards For Installation, Operation, And Maintenance

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.

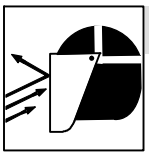
FALLING EQUIPMENT can injure.

- 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.



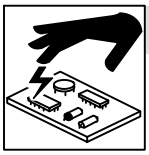
OVERUSE can cause OVERHEATING

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



FLYING SPARKS can injure.

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



STATIC (ESD) can damage PC boards.

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

MOVING PARTS can injure.

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

WELDING WIRE can injure.

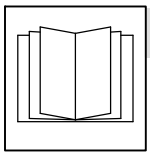
- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

BATTERY EXPLOSION can injure.

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

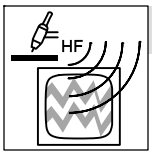
MOVING PARTS can injure.

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



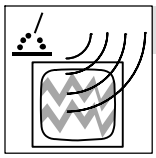
READ INSTRUCTIONS.

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



H.F. RADIATION can cause interference.

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



ARC WELDING can cause interference.

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

1-4. California Proposition 65 Warnings

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: www.ansi.org.

Safe Practices for the Preparation of Containers and Piping for Welding and Cutting, American Welding Society Standard AWS F4.1 from Global Engineering Documents. Website: www.global.ihs.com.

Safe Practices for Welding and Cutting Containers that have Held Combustibles, American Welding Society Standard AWS A6.0 from Global Engineering Documents. Website: www.global.ihs.com.

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

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, gouging, plasma arc cutting, and induction heating operations) creates an EMF field around the welding circuit. EMF fields 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 passers–by or conduct individual risk assessment for welders. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep head and trunk as far away from the equipment in the welding circuit as possible.
5. Connect work clamp to workpiece as close to the weld as possible.
6. Do not work next to, sit or lean on the welding power source.
7. Do not weld whilst carrying the welding power source or wire feeder.

About Implanted Medical Devices:

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

SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

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

2-1. Symboles utilisés

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

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

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 l'un de ces symboles, prendre garde et suivre les instructions afférentes pour éviter tout risque. Les consignes de sécurité présentées ci−après ne font que résumer les informations contenues dans les principales normes de sécurité énumérées à la section 2-5. Lire et observer 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.

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

UNE DÉCHARGE ÉLECTRIQUE peut entraîner la mort.

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

- Ne pas toucher aux pièces électriques sous tension.
- Porter des gants isolants et des vêtements de protection secs et sans trous.
- S'isoler de la pièce à couper et du sol en utilisant des housses ou des tapis assez grands afin d'éviter tout contact physique avec la pièce à couper ou le sol.
- Ne pas utiliser de sortie de soudage CA dans des zones humides ou confinées ou s'il y a un risque de chute.
- Se servir d'une source électrique à courant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique à courant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- D'autres consignes de sécurité sont nécessaires dans les conditions suivantes : risques électriques dans un environnement humide ou si l'on porte des vêtements mouillés ; sur des structures métalliques telles que sols, grilles ou échafaudages ; en position coincée comme assise, à genoux ou couchée ; ou s'il y a un risque élevé de contact inévitable ou accidentel avec la pièce à souder ou le sol. Dans ces conditions, utiliser les équipements suivants, dans l'ordre indiqué : 1) un poste à souder DC à tension constante (à fil), 2) un poste à souder DC manuel (électrode) ou 3) un poste à souder AC à tension à vide réduite. Dans la plupart des situations, l'utilisation d'un poste à souder DC à fil à tension constante est recommandée. En outre, ne pas travailler seul !
- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installez, mettez à la terre et utilisez correctement cet équipement conformément à son Manuel d'Utilisation et aux réglementations nationales, gouvernementales et locales.
- Toujours vérifier la terre du cordon d'alimentation. Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée, fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Les câbles doivent être exempts d'humidité, d'huile et de graisse; protégez−les contre les étincelles et les pièces métalliques chaudes.
- Vérifier fréquemment le cordon d'alimentation 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.
- Ne pas toucher des porte électrodes connectés à deux machines en même temps à cause de la présence d'une tension à vide doublée.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité si l'on doit travailler au-dessus du sol.
- S'assurer que tous les panneaux et couvercles sont correctement en place.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.
- Ne pas raccorder plus d'une électrode ou plus d'un câble de masse à une même borne de sortie de soudage. Débrancher le câble pour le procédé non utilisé.
- Utiliser une protection différentielle lors de l'utilisation d'un équipement auxiliaire dans des endroits humides ou mouillés.

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

- Éteignez l'unité, débranchez le courant électrique, et déchargez les condensateurs d'alimentation selon les instructions indiquées dans le manuel avant de toucher les pièces.

LES PIÈCES CHAUDES peuvent provoquer des brûlures.

- Ne pas toucher à mains nues les parties chaudes.
- Prévoir une période de refroidissement avant de travailler à l'équipement.

- Ne pas toucher aux pièces chaudes, utiliser les outils recommandés et porter des gants de soudage et des vêtements épais pour éviter les brûlures.

LES FUMÉES ET LES GAZ peuvent être dangereux.

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

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- À l'intérieur, ventiler la zone et/ou utiliser une ventilation forcée au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage. 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 dégraisseurs, 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 en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.

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

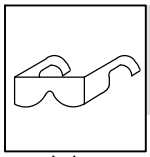
Le rayonnement de l'arc du procédé de soudage génèr des rayons visibles et invisibles intenses (ultraviolets e infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur l peau. Des étincelles sont projetées pendant le soudage.

- Porter un casque de soudage approuvé muni de verres filtrants approprié pour protéger visage et yeux pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des lunettes de sécurité avec écrans latéraux même sous votre casque.
- Avoir recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements les éblouissements et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l'arc.
- Porter un équipement de protection pour le corps fait d'un matériau résistant et ignifuge (cuir, coton robuste, laine). La protection du corps comporte des vêtements sans huile comme par ex. 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 homologués.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur des substances inflammables.
- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas couper ou souder des jantes ou des roues. Les pneus peuvent exploser s'ils sont chauffés. Les jantes et les roues réparées peuvent défaillir. 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 et AWS A6.0 (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 le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution, d'étincelles et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter un équipement de protection pour le corps fait d'un matériau résistant et ignifuge (cuir, coton robuste, laine). La protection du corps comporte des vêtements sans huile comme par ex. 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 avoir de la surveillance 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 nettoyants, les consommables, les produits de refroidissement, les dégraisseurs, les flux et les métaux.



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

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

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

- Fermer l'alimentation du gaz comprimé en cas de non utilisation.

- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.

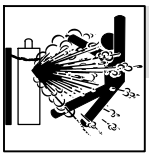
Les CHAMPS ÉLECTROMAGNÉTIQUES (CEM) peuvent affecter les implants médicaux.

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

LE BRUIT peut endommager l'ouïe.

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

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



LES BOUTEILLES peuvent exploser si elles sont endommagées.

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

- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, des dommages physiques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d'explosion.
- Utiliser seulement des bouteilles de gaz comprimé, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- 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.
- Le couvercle du détendeur doit toujours être en place, sauf lorsque la bouteille est utilisée ou qu'elle est reliée pour usage ultérieur.
- 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.

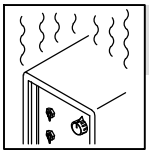
2-3. Symboles de dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

Risque D'INCENDIE OU D'EXPLOSION.

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

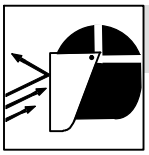
LA CHUTE DE L'ÉQUIPEMENT peut provoquer des blessures.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariots, les bouteilles de gaz ou tout autre accessoire.
- 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 Nº94–110) lors du levage manuelle de pièces ou équipements lourds.



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

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

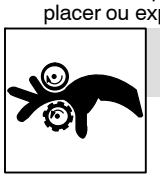


LES ÉTINCELLES PROJETÉES peuvent provoquer des blessures.

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

LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

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



Les PIÈCES MOBILES peuvent causer des blessures.

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

LES FILS DE SOUDAGE peuvent provoquer des blessures.

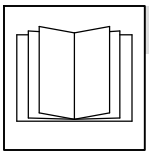
- Ne pas appuyer sur la gâchette avant d'en avoir reçu l'instruction.
- Ne pas diriger le pistolet vers soi, d'autres personnes ou toute pièce mécanique en engageant le fil de soudage.

L'EXPLOSION DE LA BATTERIE peut provoquer des blessures.

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

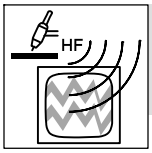
Les PIÈCES MOBILES peuvent causer des blessures.

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



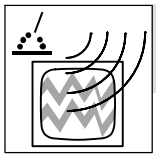
LIRE LES INSTRUCTIONS.

- Lire et appliquer les instructions sur les étiquettes et le Mode d'emploi avant l'installation, l'utilisation ou l'entretien de l'appareil. Lire les informations de sécurité au début du manuel et dans chaque section.
- N'utiliser que les pièces de rechange recommandées par le constructeur.
- Effectuer l'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 (H.F.) risque de provoquer des interférences.

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



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

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

2-4. Proposition californienne 65 Avertissements

⚠ **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: www.ansi.org.

Safe Practices for the Preparation of Containers and Piping for Welding and Cutting, American Welding Society Standard AWS F4.1 from Global Engineering Documents. Website: www.global.ihs.com.

Safe Practices for Welding and Cutting Containers that have Held Combustibles, American Welding Society Standard AWS A6.0 from Global Engineering Documents. Website: www.global.ihs.com.

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

2-6. Informations relatives aux CEM

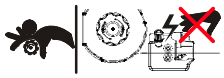
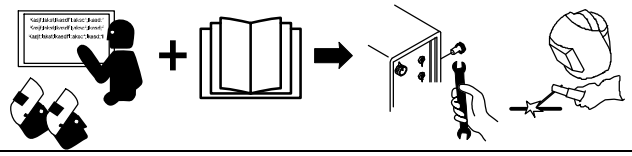
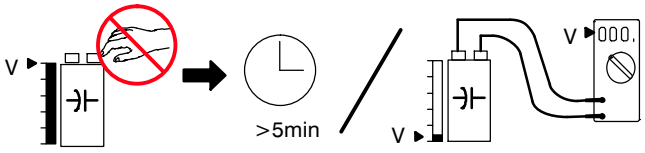
Le courant électrique qui traverse tout conducteur génère des champs électromagnétiques (CEM) à certains endroits. Le courant issu d'un soudage à l'arc (et de procédés connexes, y compris le soudage par points, le gougeage, le découpage plasma et les opérations de chauffage par induction) crée un champ électromagnétique (CEM) autour du circuit de soudage. Les champs électromagnétiques 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: Limiter par exemple tout accès aux passants ou procéder à une évaluation des risques individuels pour les soudeurs. Tous les soudeurs doivent appliquer les procédures suivantes pour minimiser l'exposition aux CEM provenant du circuit de soudage:

1. Rassembler les câbles en les torsadant ou en les attachant avec du ruban adhésif ou avec une housse.
2. Ne pas se tenir au milieu des câbles de soudage. Disposer les câbles d'un côté et à distance de l'opérateur.
3. Ne pas courber et ne pas entourer les câbles autour de votre corps.
4. Maintenir la tête et le torse aussi loin que possible du matériel du circuit de soudage.
5. Connecter la pince sur la pièce aussi près que possible de la soudure.
6. Ne pas travailler à proximité d'une source de soudage, ni s'asseoir ou se pencher dessus.
7. Ne pas souder tout en portant la source de soudage ou le dévidoir.

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

SECTION 3 – DEFINITIONS

3-1. Additional Safety Symbols And Definitions

	Warning! Watch Out! There are possible hazards as shown by the symbols. Safe1 2012-05
	Drive rolls can injure fingers. Welding wire and drive parts are at welding voltage during operation – keep hands and metal objects away. Safe95 2012-05
	Beware of electric shock from wiring. Safe94 2012-08
	When power is applied failed parts can explode or cause other parts to explode. Safe26 2012-05
	Become trained and read the instructions before working on the machine or welding. Safe40 2012-05
	Hazardous voltage remains on input capacitors after power is turned off. Do not touch fully charged capacitors. Always wait 5 minutes after power is turned off before working on unit, OR check input capacitor voltage, and be sure it is near 0 before touching any parts. Safe43 2017-04

Notes

3-2. Miscellaneous Symbols And Definitions

A	Amperage
V	Voltage
U_0	Rated No Load Voltage (OCV)
⎓	Direct Current (DC)
∿	Alternating Current (AC)
U_1	Primary Voltage
U_2	Conventional Load Voltage
I_2	Rated Welding Current
V	Input Power Or Input Voltage
	Gas Input
IP	Internal Protection Rating
1∿	Single Phase
	Unlocked

	Locked
	Remote
	Circuit Breaker
+	Positive
—	Negative
X	Duty Cycle
	Line Connection
S	Suitable for Some Hazardous Locations
	Increase
Hz	Hertz
	Single Phase Static Frequency Converter-Transformer-Rectifier

	Wire Feed Slow Run-In
	Gas Metal Arc Welding (GMAW)
	Gas Metal Arc Welding (GMAW) MIG / Gun Control
	Self-Shielded Flux Cored Arc Welding (FCAW)
	Wire Feed Spool Gun
t2	Gas Postflow
t1	Gas Preflow
	Cold Jog (Inch) Toward Workpiece
	Output Enabled
	Reverse Polarity

Notes

SECTION 4 – SPECIFICATIONS

4-1. Serial Number And Rating Label Location

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

4-2. 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.millerwelds.com/eula and are incorporated by reference herein.

4-3. 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.*

4-4. Unit Specifications

☞ *Do not use information in unit specifications table to determine electrical service requirements. See Sections 5-2 and 5-3 for information on connecting input power.*

☞ *This equipment will deliver rated output at an ambient air temperature up to 104°F (40°C).*

Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input At Rated Load Output, 50/60 Hz, Single Phase	
			208 VAC	240 VAC
260 A, 27 volts DC, 40% Duty Cycle	20–350 A	87	47.8	41.1
230 A, 25.5 volts DC, 60% Duty Cycle	20–350 A	87	40.6	35

Wire Type And Diameter				Wire Feed Speed
Solid Steel	Flux Cored	Aluminum	Dual Shield	50–800 IPM
0.024 – 0.045	0.035 – 0.045	0.035 – 3/64	0.045	(13–17.8 mpm)

4-5. Environmental Specifications

A. IP Rating

IP Rating
IP21
This equipment is designed for indoor use and is not intended to be used or stored outside.
IP21 2014–06

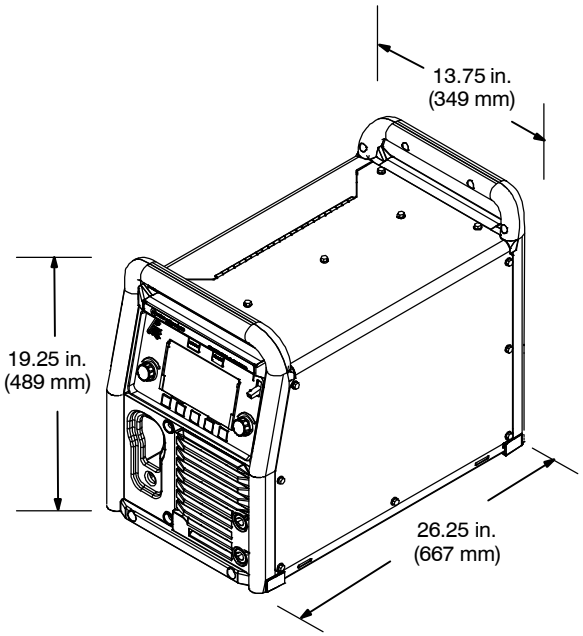
B. Temperature Specifications

Operating Temperature Range*	Storage/Transportation Temperature Range
–22 to 122°F (–30 to 50°C)	–40 to 149°F (–40 to 65°C)
*Output is derated at temperatures above 104°F (40°C).	Temp_2016-07

4-6. Dimensions And Weight

Weight

84 lb (38.1 kg)



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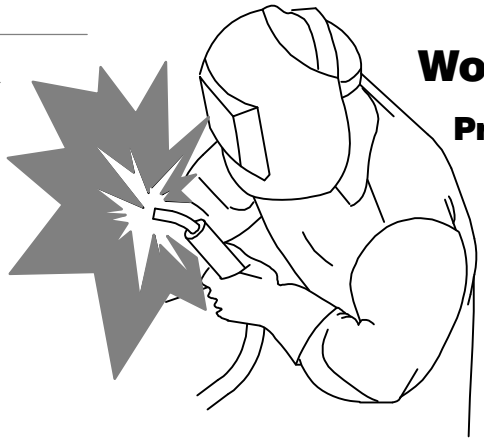
Notes



Work like a Pro!

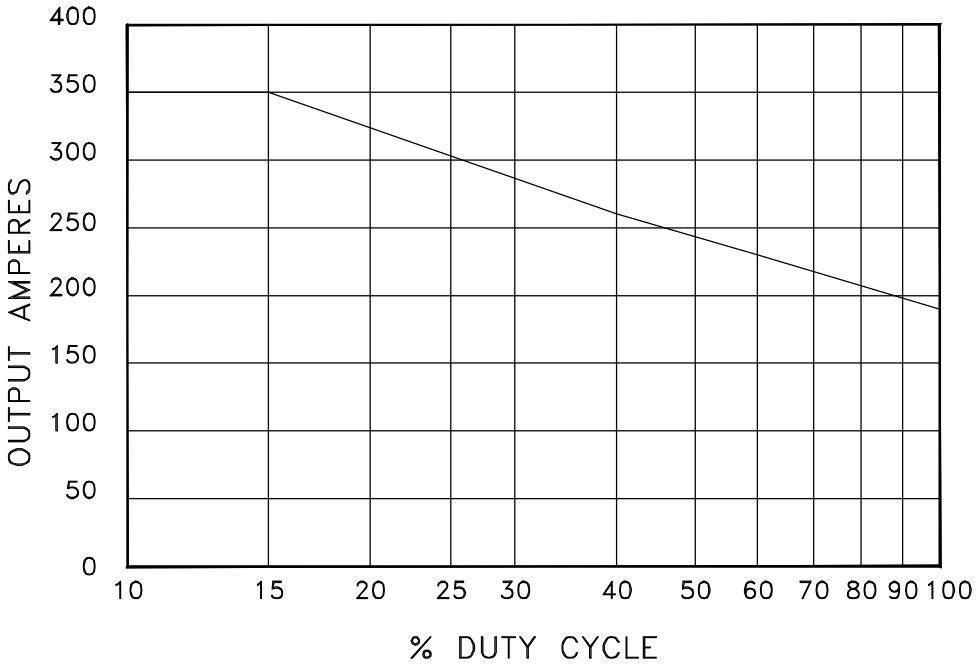
Pros weld and cut safely. Read the safety rules at the beginning of this manual.

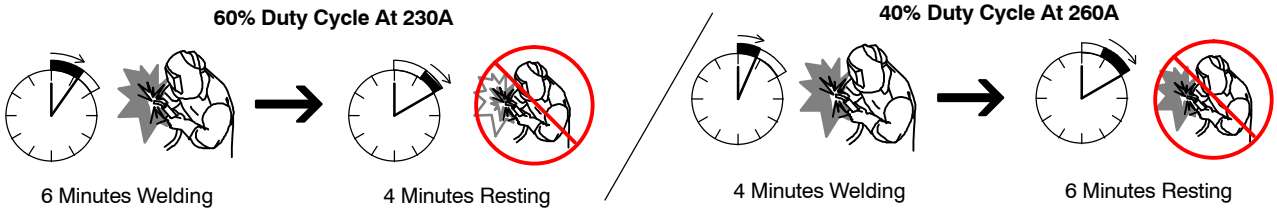
4-7. Duty Cycle And Overheating

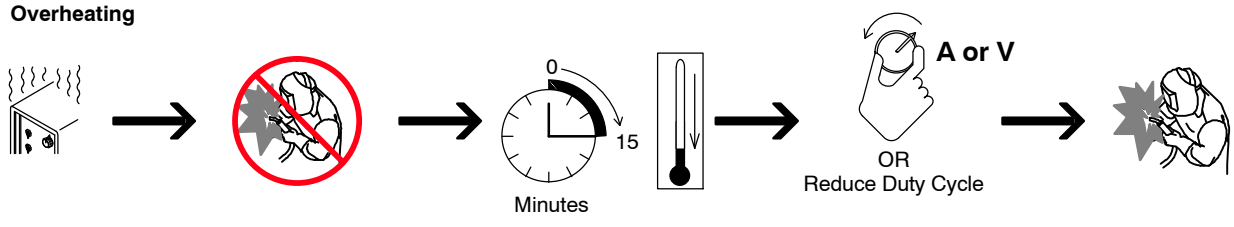
Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

If unit overheats, output stops. Wait 10 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.*







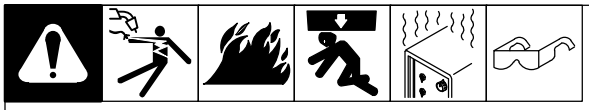
duty1 4/95 / 279044-B

4-8. Static Characteristics

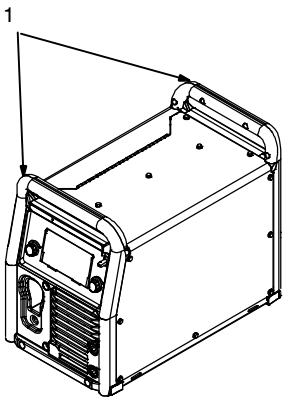
The static (output) characteristics of the welding power source can be described as *flat* during the GMAW process. Static characteristics are also affected by control settings (including software), electrode, shielding gas, weldment material, and other factors. Contact the factory for specific information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

SECTION 5 – INSTALLATION

5-1. Selecting A Location

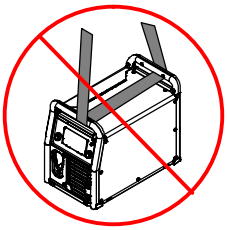


Movement



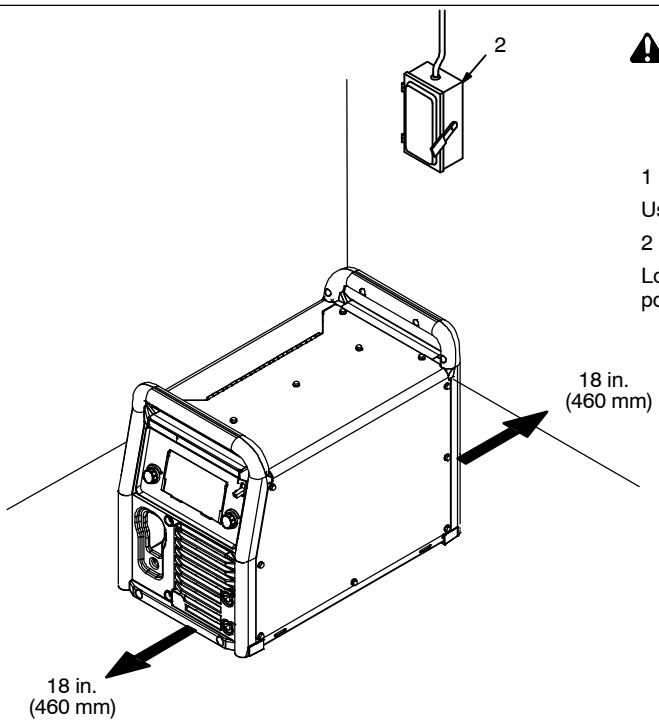
Do not move or operate unit where it could tip.

Do not lift unit by strap threaded through both handles.



Do not lift unit with cart attached.

Location And Airflow



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.

loc_smallmig2 2018-09 161-122

5-2. Electrical Service Guide

Elec Serv 2017–01

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

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

	50/60 Hz 1-Phase	
Input Voltage (V)	208	240
Rated Maximum Supply Current I_{1max} (A)	86.9	74.6
Maximum Effective Supply Current I_{1eff} (A)	34.1	30.8
Max Recommended Standard Fuse Rating In Amperes[1]		
Time-Delay Fuses[2]	90	80
Normal Operating Fuses [3]	100	90
Min Input Conductor Size In AWG (mm^2) [4]	8 (10)	8 (10)
Max Recommended Input Conductor Length In Feet (Meters)	54 (17)	73 (22)
Min Grounding Conductor Size In AWG (mm^2) [4]	8 (10)	8 (10)

Reference: 2017 National Electrical Code (NEC) (including article 630)

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

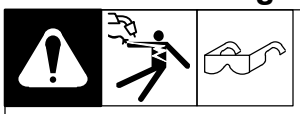
2 “Time-Delay” fuses are UL class “RK5” . See UL 248.

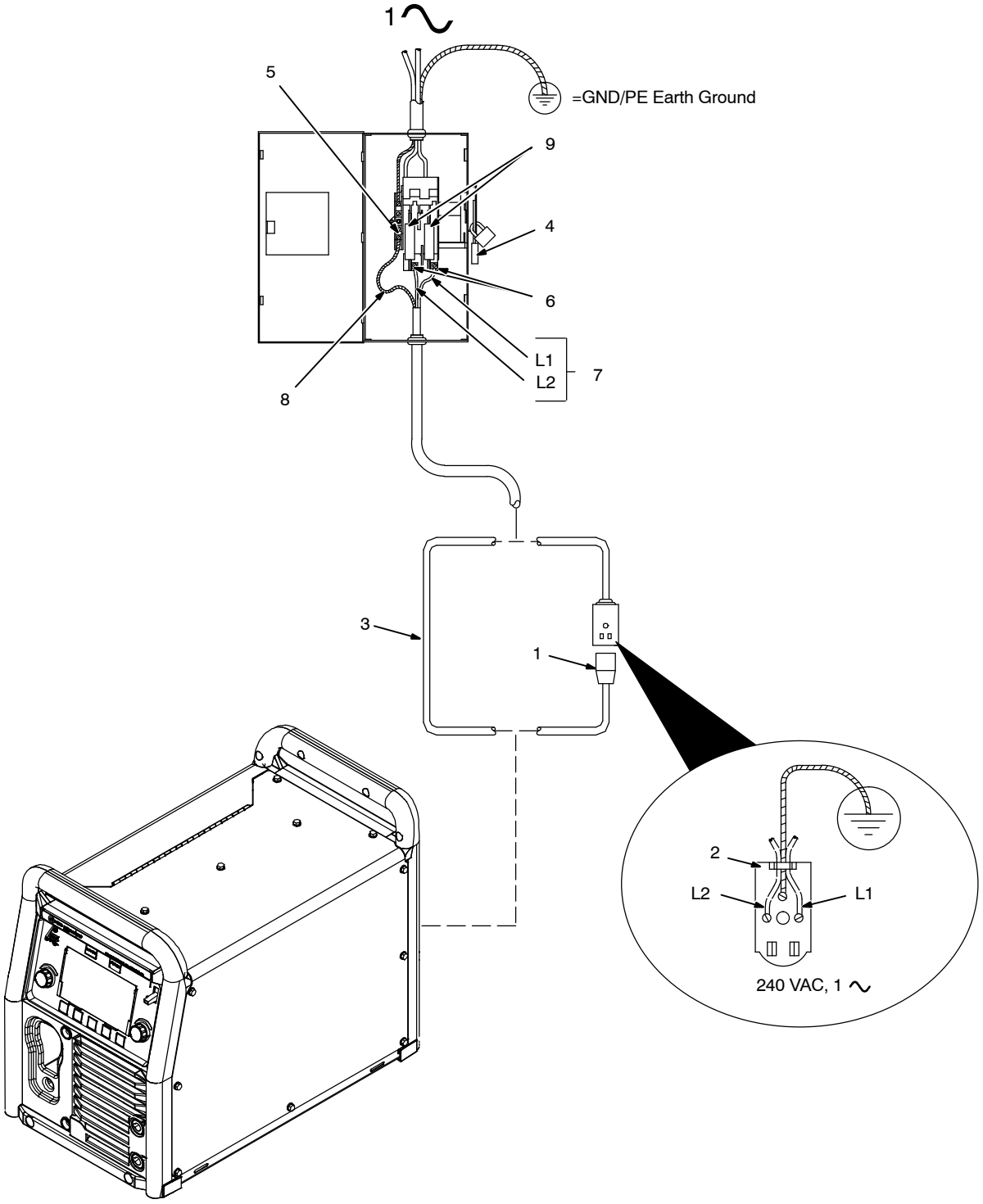
3 “Normal Operating” (general purpose - no intentional delay) fuses are UL class “K5” (up to and including 60 amps), and UL class “H” (65 amps and above).

4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.15(B)(16) and is based on allowable ampacities of insulated copper conductors having a temperature rating of 167°F (75°C) with not more than three single current–carrying conductors in a raceway. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

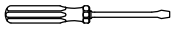
Notes

5-3. Connecting 1-Phase Input Power





Tools Needed:



Ref. Input13 2015–08

5-3. Connecting 1-Phase Input Power (Continued)

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

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

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

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

1 Plug (NEMA Type 6-50P)

2 Receptacle (NEMA Type 6-50R) Customer Supplied

Wire receptacle according to the direct connection method stated below and as shown, and connect plug to receptacle or direct connect input power as follows:

3 Input Power Cord

4 Disconnect Device (switch shown in the OFF position)

5 Disconnect Device Grounding Terminal

6 Disconnect Device Line Terminals

7 Black And White Input Conductor (L1 And L2)

8 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.

9 Over-Current Protection

Select type and size of over-current protection using Section 5-2 (fused disconnect switch shown).

Connect plug to receptacle if hard wiring method is not used.

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

Ref. Input13 2015–08

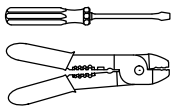
Notes

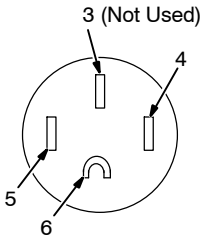
Work like a Pro!

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

5-4. Wiring Optional 240 Volt Plug (119172) For Connection To Miller Welder/Generator With Split-Phase 240 Volt Auxiliary Power

Tools Needed:





Plug Front View

1 Input And Grounding Conductors

2 Plug Wired for 240 V, 2-Wire Load

3 Neutral (Brass) Terminal And Prong **(Not Used)**

4 Load 1 (Brass)Terminal And Prong

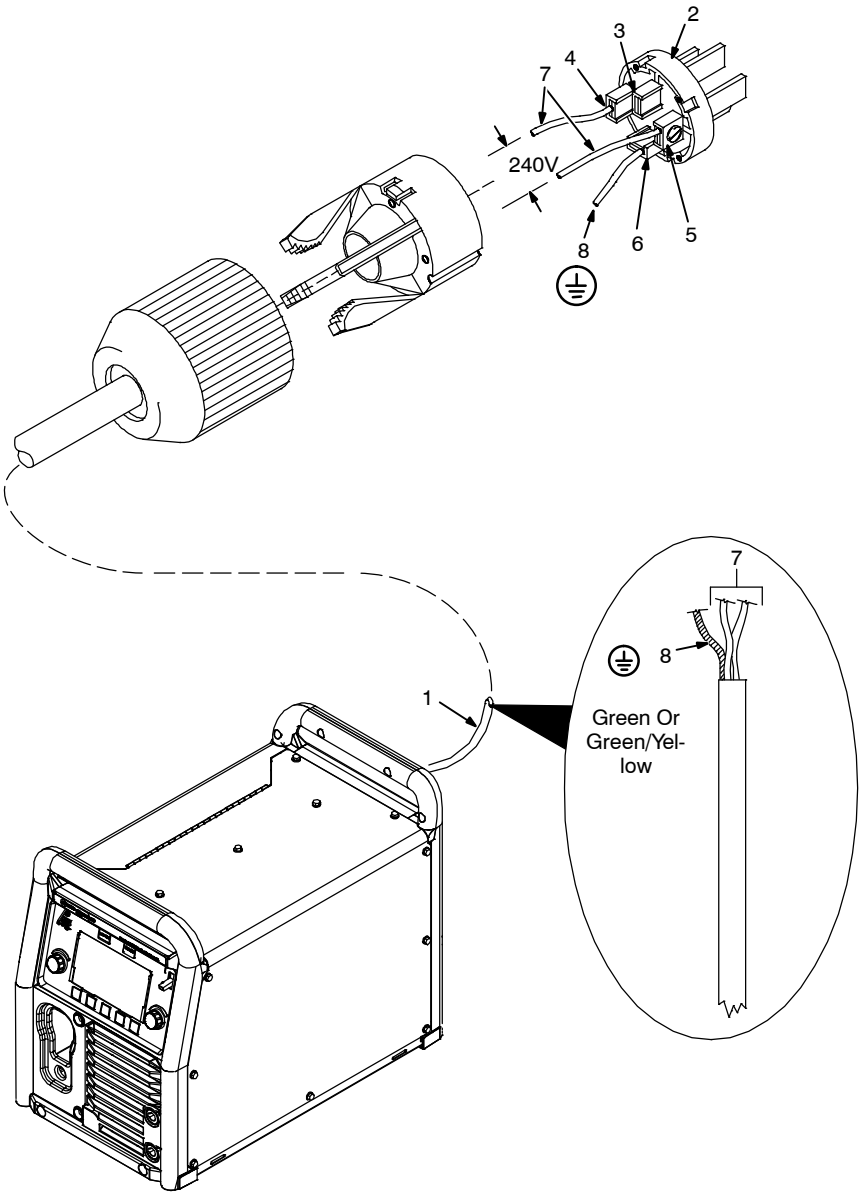
5 Load 2 (Brass) Terminal And Prong

6 Ground (Brass) Terminal And Prong

7 Black And White Input Conductors

8 Green Or Green/Yellow Ground Conductor

Always connect green or green/yellow wire to ground terminal, never to a load terminal. Connect black (L1) and white (L2) wires to load terminals.



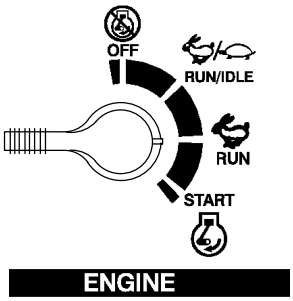
Ref. 120 813-D / 907734

5-5. Generator Or Inverter Requirements

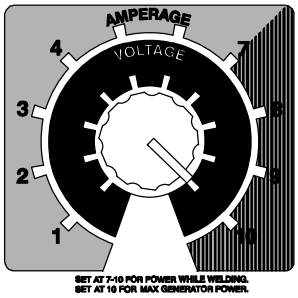
For maximum output Miller recommends 12kW or greater generator.

Generator settings, if applicable.

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



⚠ **Set generator Voltage/Amperage Control to 10 (or max) for maximum auxiliary power.**



Notes

5-6. Selecting Cable Sizes*

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

Welding Amperes	Weld Cable Size** and Total Cable (Copper) Length in Weld Circuit Not Exceeding***							
	100 ft (30 m) or Less		150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
	10 – 60% Duty Cycle AWG (mm^2)	60 – 100% Duty Cycle AWG (mm^2)	10 – 100% Duty Cycle AWG (mm^2)					
100	4 (20)	4 (20)	4 (20)	3 (30)	2 (35)	1 (50)	1/0 (60)	1/0 (60)
150	3 (30)	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	3/0 (95)
200	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	4/0 (120)
250	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x2/0 (2x70)
300	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x3/0 (2x95)
350	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x3/0 (2x95)	2x4/0 (2x120)
400	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x4/0 (2x120)	2x4/0 (2x120)

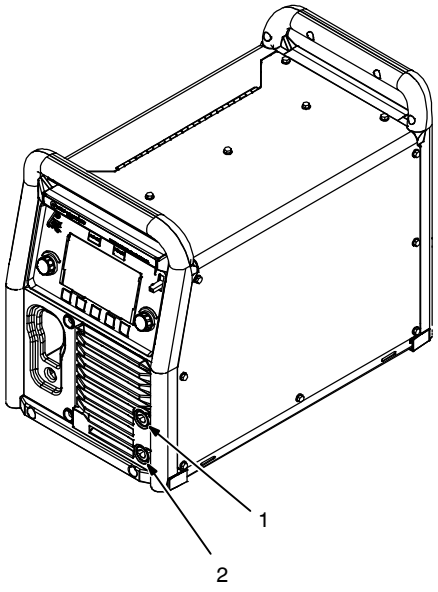
* This chart is a general guideline and may not suit all applications. If cable overheats, use next size larger cable.

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

***For distances longer than those shown in this guide, see AWS Fact Sheet No. 39, Welding Cables, available from the American Welding Society at http://www.aws.org.

Ref. S-0007-M 2017–08

5-7. Weld Output Terminals



Turn off power before connecting to weld output terminals.

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

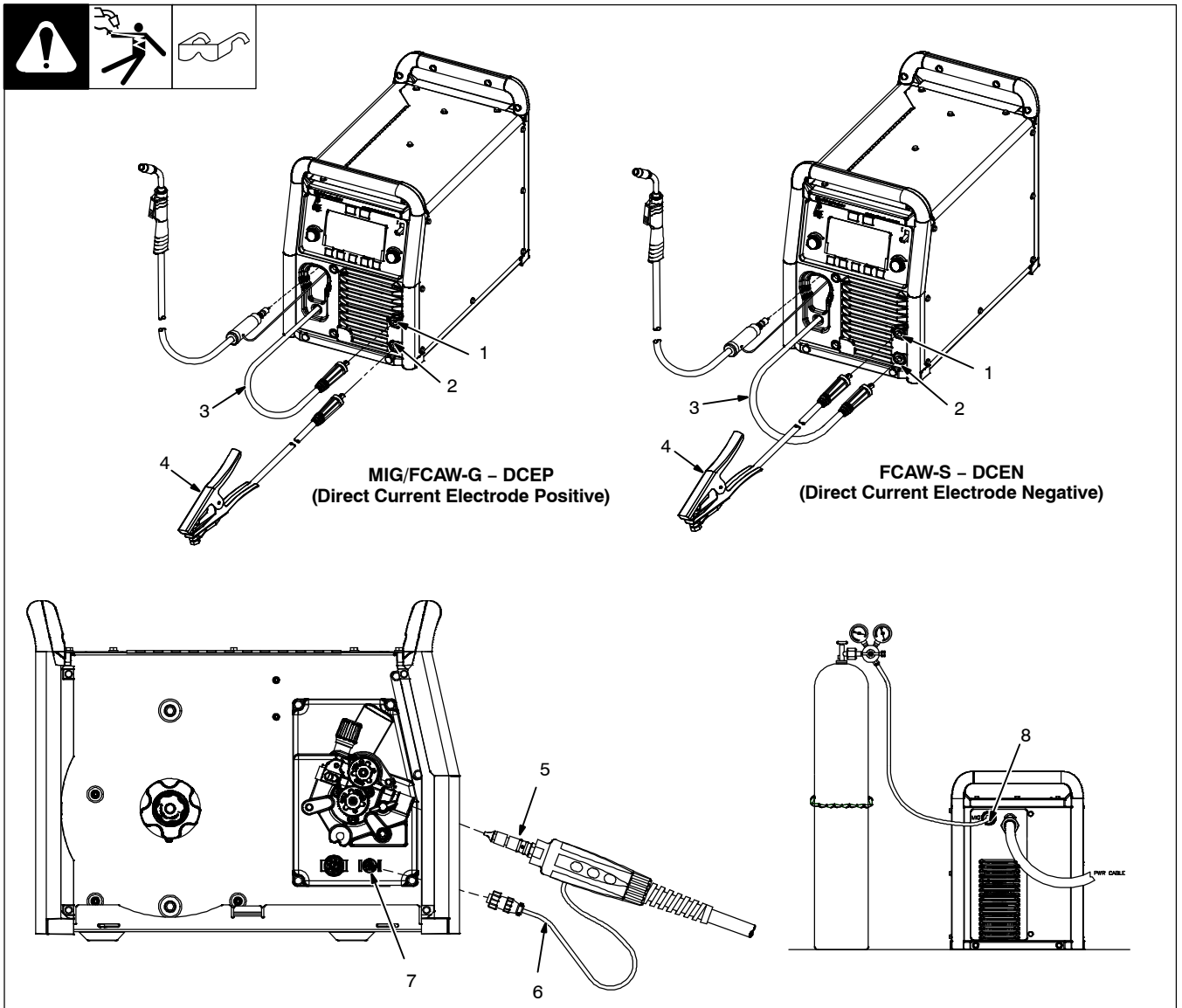
1 Positive (+) Weld Output Terminal

2 Negative (–) Weld Output Terminal

☞ *See Section 5-8 for information on connecting to weld output terminals and standard connection diagrams.*

output term1 2015–02

5-8. MIG Welding Connections



280401B / Ref. 275167A / 282987A

Turn off unit and disconnect input power before making connections.

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.

5 Gun End

Connect gun end to drive assembly (see Section 5-10).

6 Trigger Control Cable

7 Four Pin Trigger Control Cable Receptacle

Route trigger control cable through MIG gun hole.

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

8 MIG Shielding Gas Connection

Connect supplied gas hose between regulator/flowmeter gas hose connection and fitting on rear of welding power source.

See Section 11-16 for gas selection.

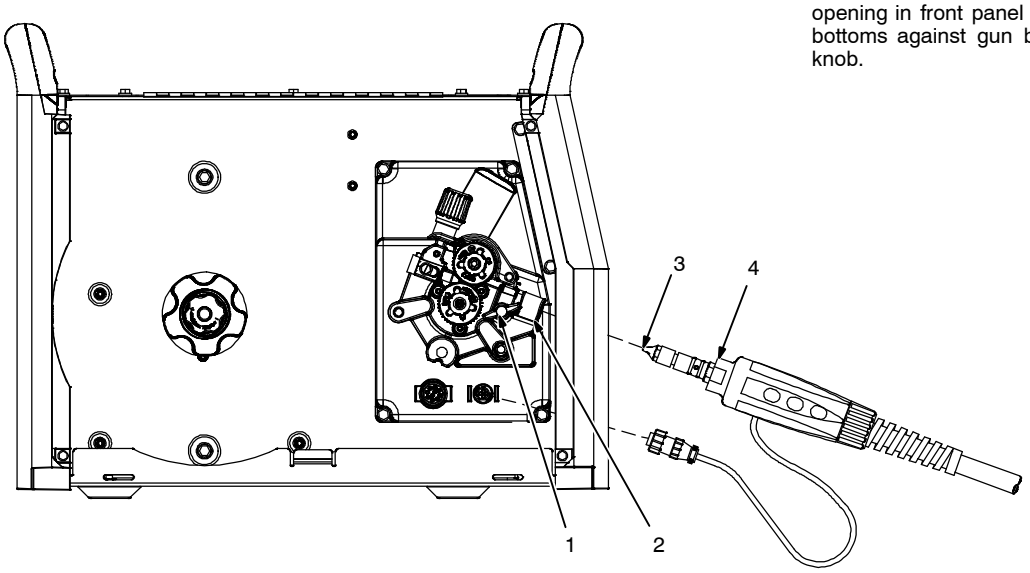
5-9. Process/Polarity Table

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

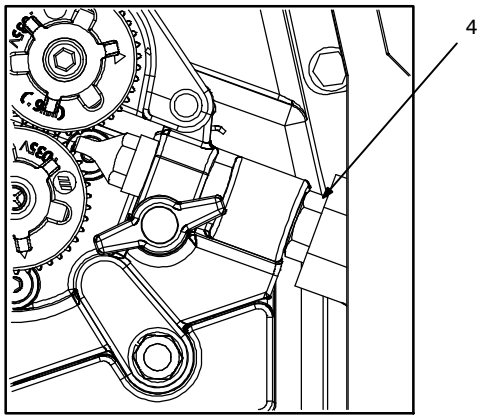
5-10. MIG Gun Connection Inside Unit

1 Gun Securing Knob
2 Gun Block
3 Gun Outlet Wire Guide
4 Gun End

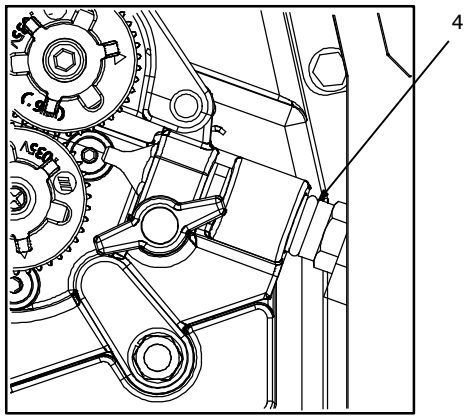
Loosen knob. Insert end of gun through opening in front panel until gun end bottoms against gun block. Tighten knob.



☞ *Be sure that gun end is tight against drive assembly.*



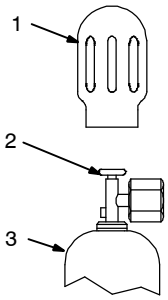
Correct



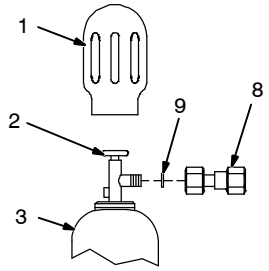
Incorrect

282950A

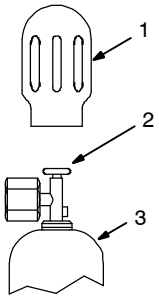
5-11. Connecting Shielding Gas Supply



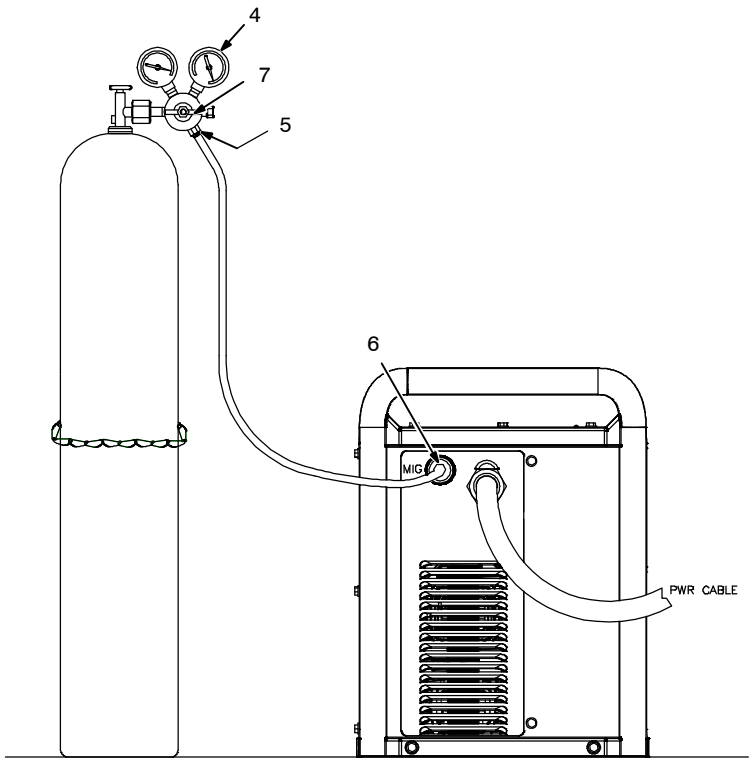
Mixed Gas



CO_2 Gas



Argon Gas



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 so face is vertical.

5 Regulator/Flowmeter Gas Hose Connection

6 Welding Power Source Gas Hose Connection

7 Flow Adjust

Typical flow rate for shielding gas is 20 to 30 CFH (cubic feet per hour). Check wire manufacturer's recommended flow rate.

8 CO_2 Adapter (Customer Supplied)

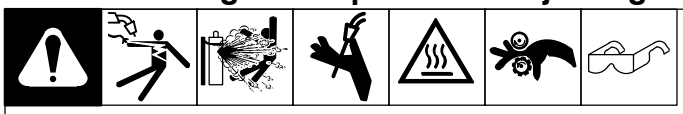
9 O-Ring (Customer Supplied)

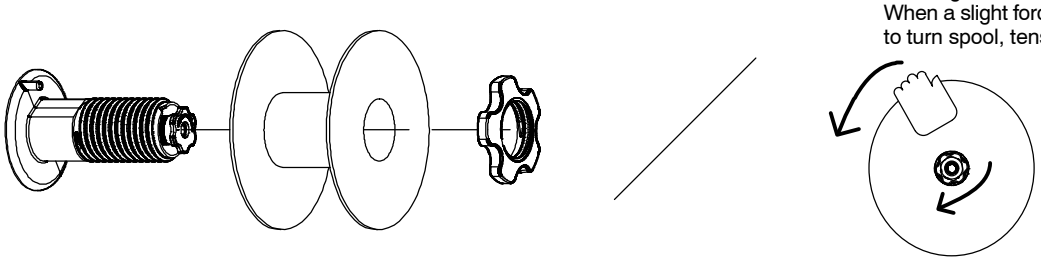
Install adapter with O-ring between regulator/flowmeter and CO_2 cylinder.

Tools Needed:

Ref. 804 654-A / 282987A

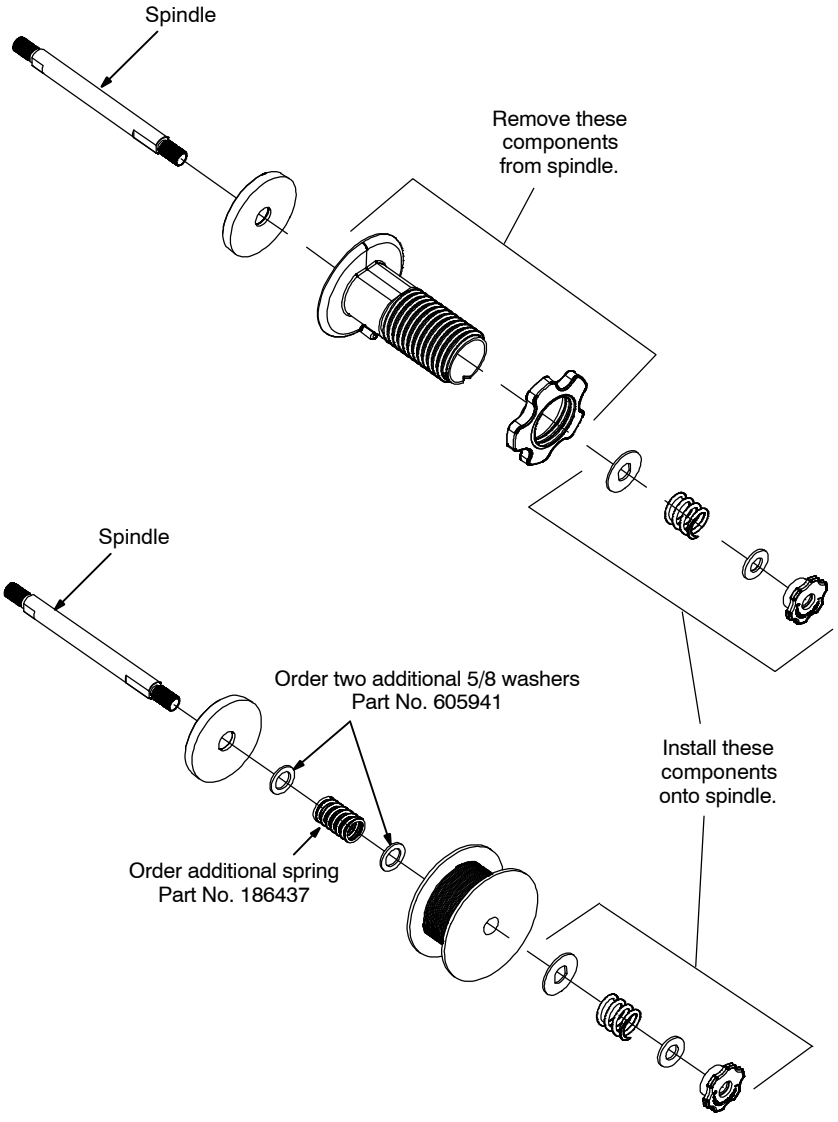
5-12. Installing Wire Spool And Adjusting Hub Tension





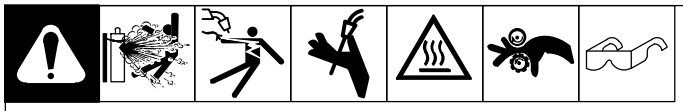
Installing 1 Or 2 lb Wire Spool

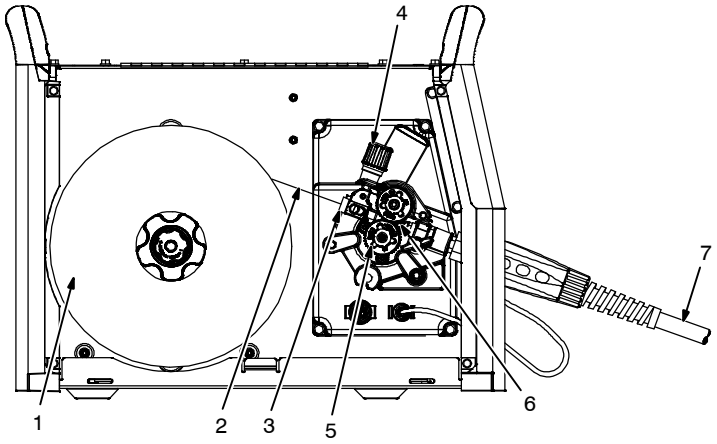
To install either a 1 lb or 2 lb wire spool, follow the procedure as shown in the illustration.



282945A

5-13. Threading Welding Wire For MIG Gun

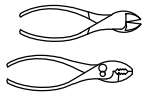




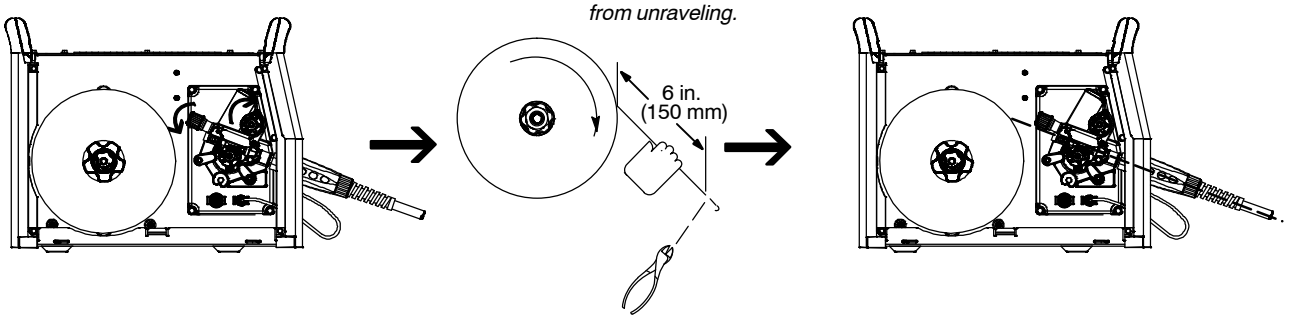
1 Wire Spool
2 Welding Wire
3 Inlet Wire Guide
4 Pressure Adjustment Knob
5 Drive Roll
6 Outlet Wire Guide
7 Gun Conduit Cable

Lay gun cable out straight.

Tools Needed:



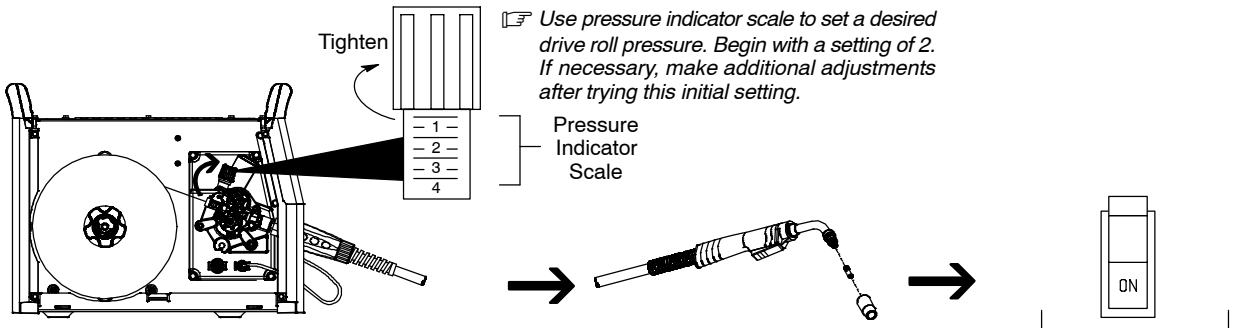
☞ *Hold wire tightly to keep it from unraveling.*



Open pressure assembly.

Pull and hold wire; cut off end.

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

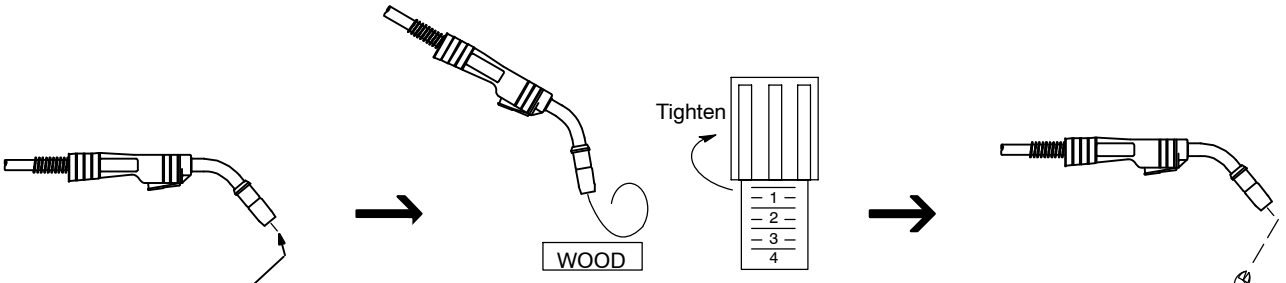


☞ *Use pressure indicator scale to set a desired drive roll pressure. Begin with a setting of 2. If necessary, make additional adjustments after trying this initial setting.*

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

Remove gun nozzle and contact tip.

Turn On.



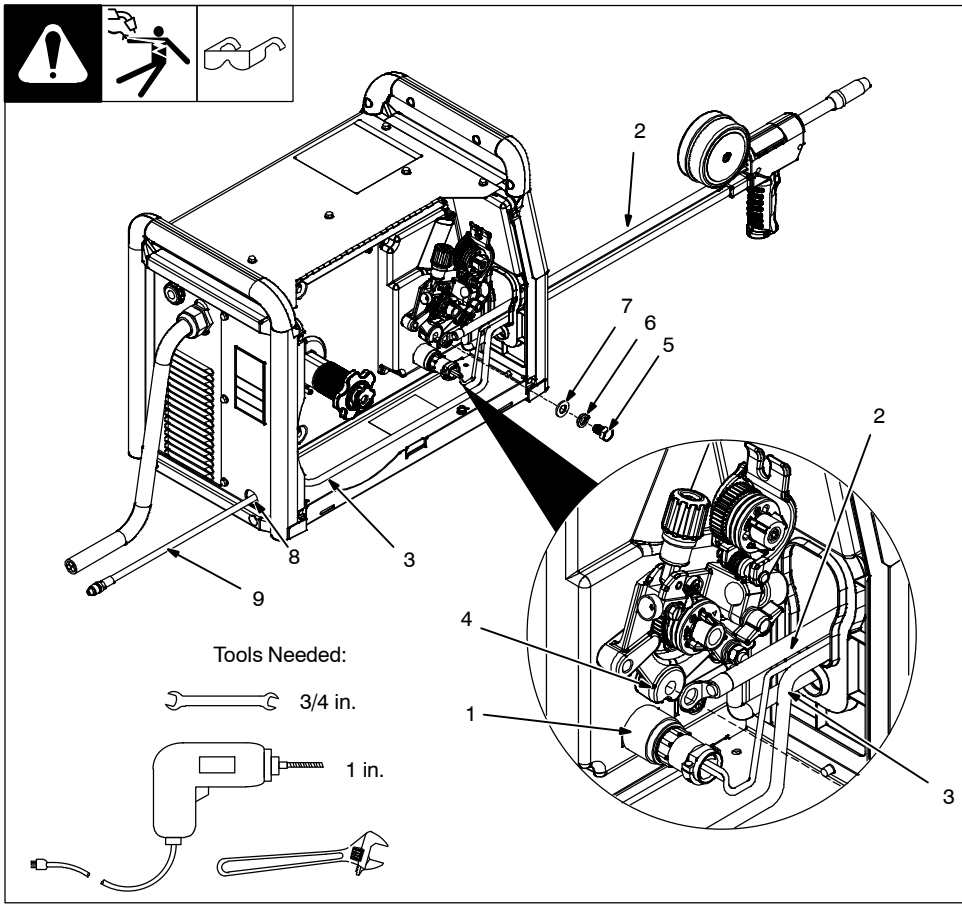
Press gun trigger or jog button until wire comes out of gun. Reinstall contact tip and nozzle

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

Cut off wire. Close and latch door.

801083 / Ref. 800924-D / 282950-A

5-14. Connecting Spoolmatic® 15A Or 30A Or Spoolmate 200 Gun



Tools Needed:

1 Gun Trigger Plug

Insert plug into receptacle, and tighten threaded collar.

2 Weld Cable

3 Shielding Gas Hose

Route weld cable and gas hose through opening in panel.

4 Drive Casting

Remove the 3/4 in. bolt from the drive casting. Use bolt to connect spoolgun weld cable to drive casting.

5 1/2-13 x 3/4 in. Bolt (282942)

6 Lock Washer (602216)

7 Washer (602247)

8 Gas Hose Routing Hole

To route gas hose through rear panel, drill 1 in. hole through bottom of rear plastic bezel. Align drill with pilot dimple in plastic bezel visible from inside wire drive compartment.

9 Gas Hose Fitting

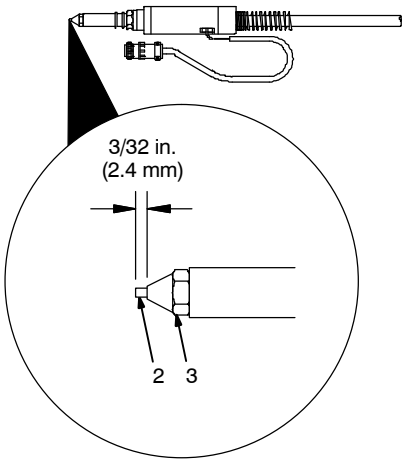
Route shielding gas hose through wire drive compartment, out opening in rear panel, and up to regulator/flowmeter. Connect gas hose fitting to regulator/flowmeter.

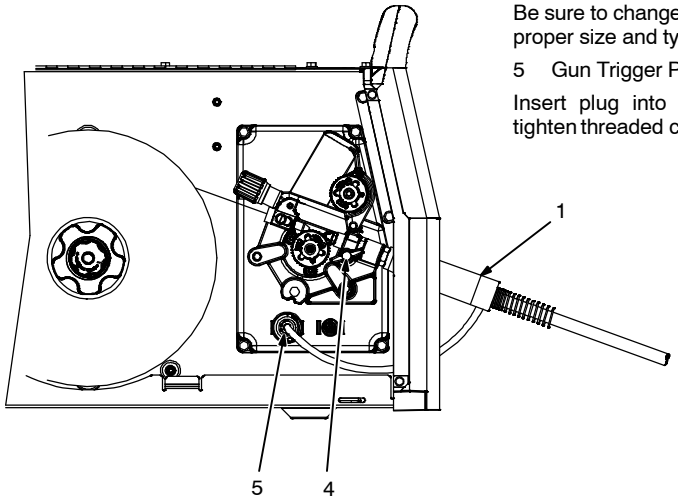
282999

5-15. Connecting XR-Aluma-Pro Or XR-Aluma-Pro Lite

Tools Needed:

☞ *Be sure to trim liner to proper extension.*





1 Gun End

2 Gun Liner

3 Wire Outlet Guide

Trim excess liner from end of gun so no more than 3/32 in. (2.4 mm) of liner extends past wire outlet guide.

4 Gun Securing Knob

Loosen securing knob. Insert gun end through opening until it bottoms against drive assembly (make sure gun end does not touch drive rolls). Tighten knob.

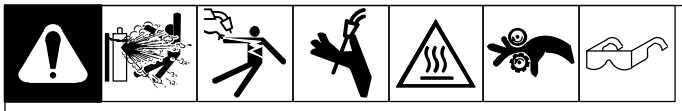
Be sure to change drive rolls to the proper size and type.

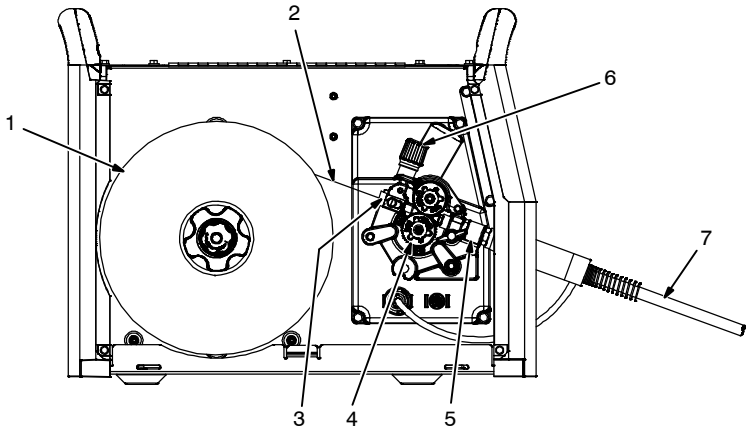
5 Gun Trigger Plug

Insert plug into receptacle, and tighten threaded collar.

803463 / 282952A

5-16. Threading Welding Wire For XR-Aluma-Pro Or XR-Aluma-Pro Lite

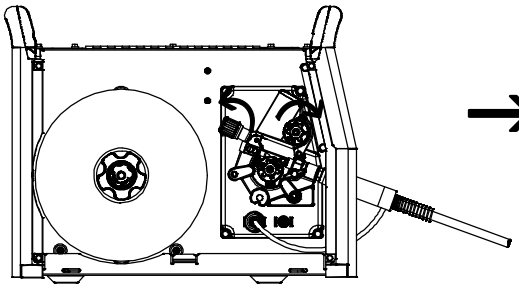




1 Wire Spool
2 Welding Wire
3 Inlet Wire Guide
4 Drive Roll
5 Outlet Wire Guide
6 Pressure Adjustment Knob
7 Gun Conduit Cable

Lay gun cable out straight.

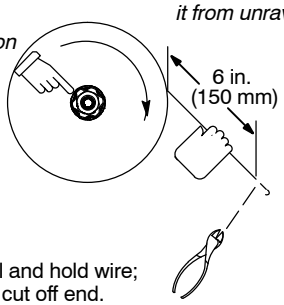
Tools Needed:



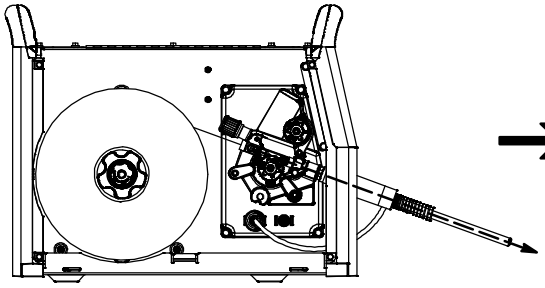
Open pressure assembly.

☞ *Hold wire tightly to keep it from unraveling.*

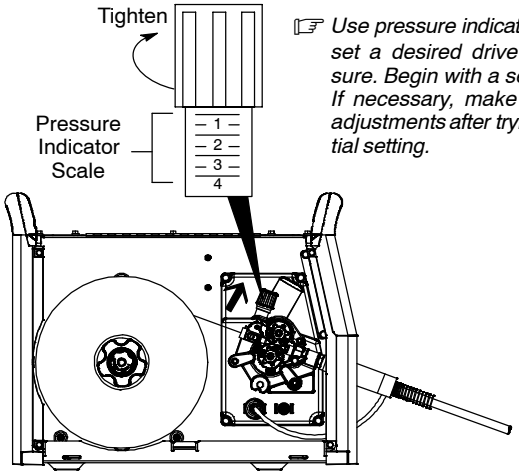
Thread hub tension nut loosely.



Pull and hold wire; cut off end.



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



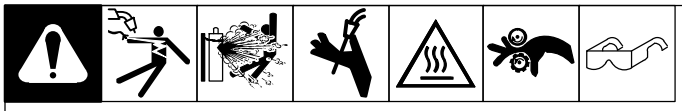
☞ *Use pressure indicator scale to set a desired drive roll pressure. Begin with a setting of 2. If necessary, make additional adjustments after trying this initial setting.*

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

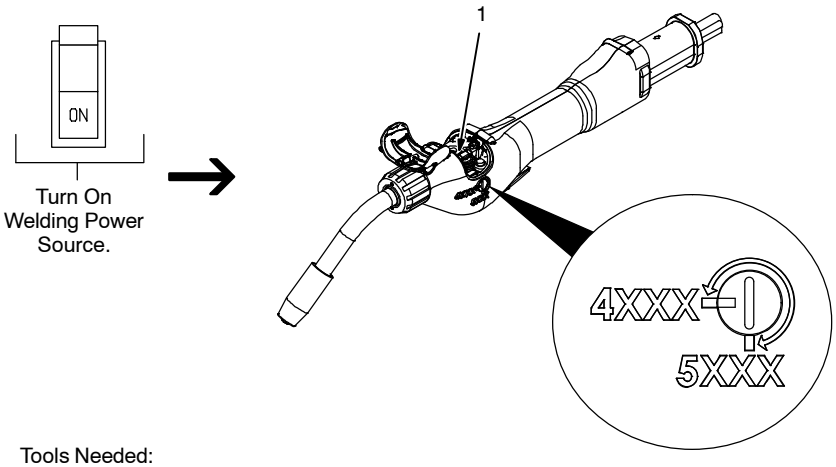
→ See Section 5-17 for threading welding wire through XR guns.

282952-A / S-0627-A

5-17. Threading Welding Wire Through XR Guns



For XR-Aluma-Pro Gun:



Tools Needed:

⚠ **Welding wire is electrically live when gun trigger is used to jog wire.**

☞ *Refer to Section 5-16 for instructions on feeding wire through welding power source.*

1 Pressure Roll Assembly

Lay gun cable out straight.

Open top cover, and open pressure roll assembly. Remove nozzle and contact tip.

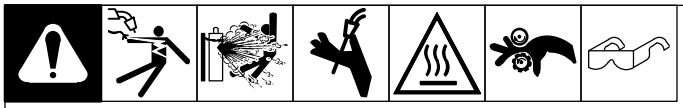
Press gun trigger until about 4 in. (102 mm) of wire is sticking out front of gun. Install nozzle and contact tip.

Close top cover on gun. Press trigger switch until about 6 in. (152 mm) of wire is sticking out end of contact tip. Cut off wire. Close and latch door.

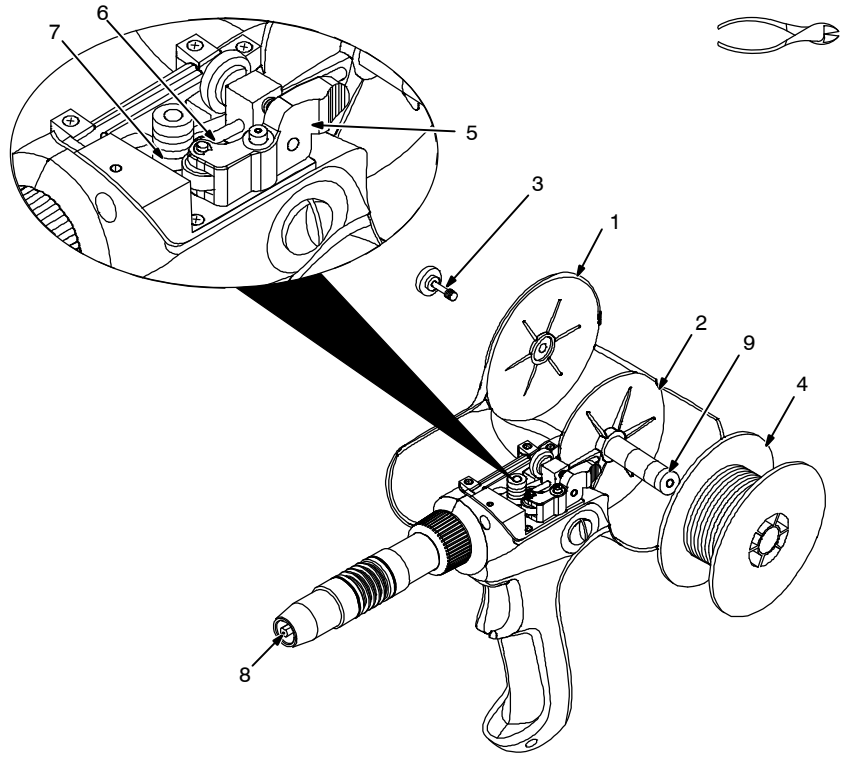
☞ *XR-Aluma-Pro and XR-Aluma-Pro Lite gun drive roll pressure should be set to match the alloy being used.*

801 556 / Ref. 804 544-B

5-18. Threading Welding Wire For Spoolmate 200



Tools Needed:



1 Cover

2 Canister

3 Thumbscrew (Cover)

Loosen thumbscrew, and rotate cover open.

4 Wire Spool

Loosen wire from spool, cut off bent wire, and pull 6 in (150 mm) of wire off spool.

5 Pressure Roll Assembly

Press arm inward to open pressure roll assembly.

6 Wire Inlet Guide

7 Drive Roll Groove

8 Contact Tip

Thread wire through wire inlet guide, along drive roll groove, and out contact tip.

Install spool so wire feeds off top.

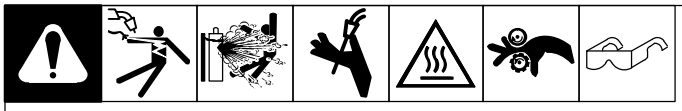
9 Spool Brake Thumbnut

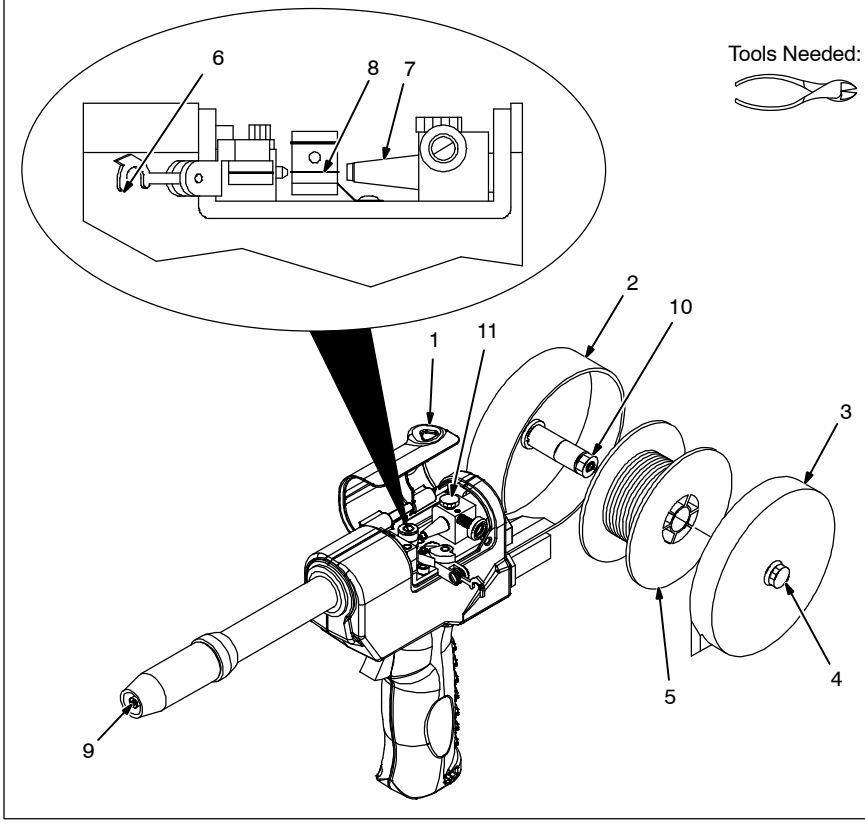
If necessary, turn thumbnut counterclockwise slightly to install spool.

Close cover and secure with thumbscrew.

Ref. 243 740-C

5-19. Threading Welding Wire For Spoolmatic 15/30A





Tools Needed:

1 Top Cover

2 Canister

3 Canister Cover

4 Thumbscrew (Canister Cover)

Loosen thumbscrew and remove cover.

5 Wire Spool

Loosen wire from spool, cut off bent wire, and pull 6 in. (150 mm) of wire off spool.

6 Pressure Roll Assembly

Lift arm and open pressure roll assembly.

7 Canister Inlet Guide

8 Drive Roll Groove

☞ *For wire sizes .035 in. (0.9 mm) and smaller use small groove, and .047 in. (1.2 mm) and 1/16 in (1.6 mm) use large groove.*

9 Contact Tip

Thread wire through canister inlet guide, along drive roll groove, and out contact tip.

Install spool so wire feeds off bottom.

10 Spool Brake Thumbnut

If necessary, turn thumbnut counter-clockwise slightly to install spool.

11 Thumbscrew (Canister Rotation)

Loosen thumbscrew to rotate canister.

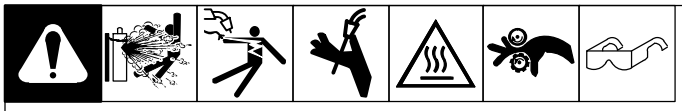
Close and secure pressure roll assembly.

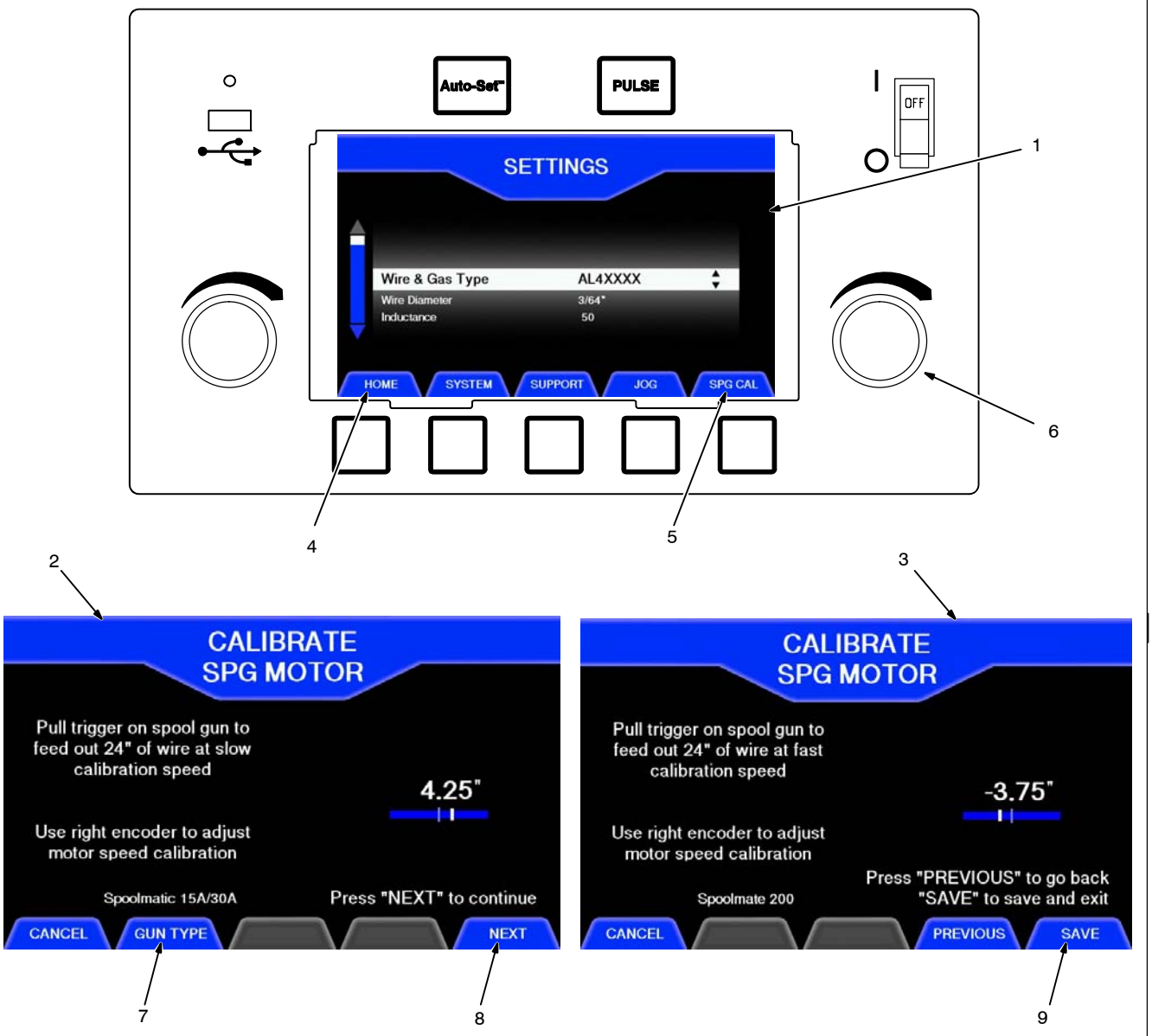
Reinstall top cover and canister cover.

150 436-F

Notes

5-20. Calibrating Spoolgun





297061-D

☞ *Spoolmatic 15/30A and Spoolmate 200 motors are unique to this welding power source. Motor calibration is necessary any time a different Spoolmatic 15/30A or Spoolmate 200 is connected to the Multimatic 255.*

1 Settings Menu
2 Slow Speed Calibration Menu
3 Fast Speed Calibration Menu
4 Home
5 Spg Cal (Spoolgun Cal)
6 Right Knob
7 Gun Type
8 Next
9 Save

Connect spoolgun to unit. Cut wire flush at nozzle.

Follow instructions in Section 6-5 to enter the setup menu.

☞ *SPG CAL will only be displayed as the fifth tab when a spoolgun is connected.*

Press **SPG CAL** to access slow speed calibration menu.

Press **Gun Type** to select the spoolgun being used.

To begin the slow speed calibration, pull the spoolgun trigger. The wire will feed and automatically stop.

Cut wire flush at nozzle and measure run-out. If wire length is not 24 in., use right knob to enter the amount that the wire was short/long.

Pull spoolgun trigger again to verify the adjustment. Repeat these steps until satisfied with accuracy.

Press **Next** to access fast speed calibration.

To begin the fast speed calibration, pull the spoolgun trigger. The wire will feed wire and automatically stop.

Cut wire flush at nozzle and measure run-out. If wire length is not 24 in., use right knob to enter the amount that the wire was short/long.

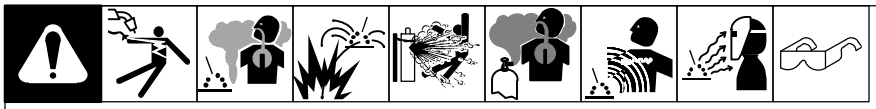
Pull spoolgun trigger again to verify the adjustment. Repeat these steps until satisfied with accuracy.

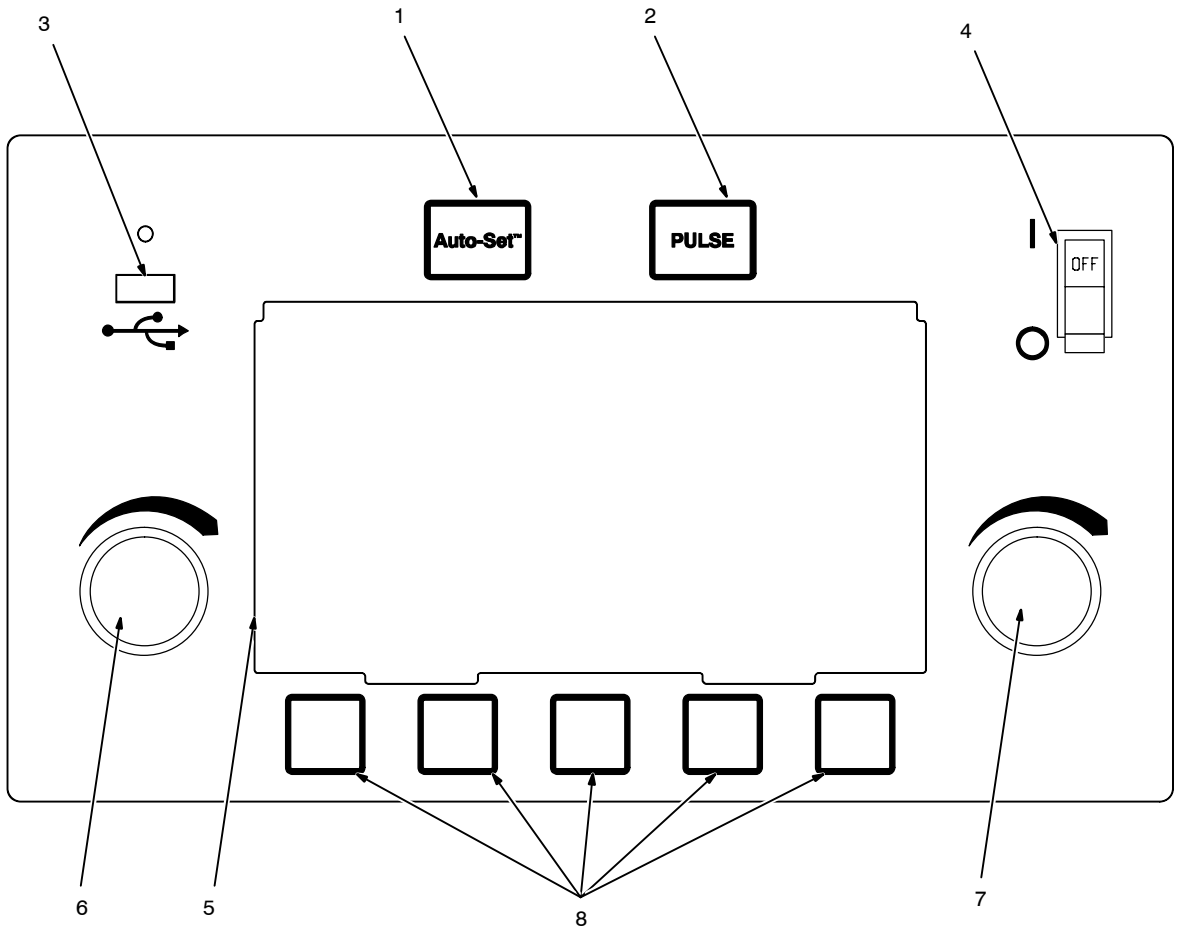
Press **Save** to complete the calibration procedure and be returned back to the settings menu.

Press **Home** to return to weld mode.

SECTION 6 – OPERATION

6-1. Controls





297061-D

1 Auto-Set Button

Press to turn Auto-Set On or Off.

2 Pulse Button

Press to turn Pulse On or Off in MIG process.

3 USB Port

Use for software upgrade and collecting error codes.

☞ *The USB port can also be used to charge cell phones and similar devices.*

4 Power Switch

Use switch to turn unit On or Off.

5 Color LCD Display

6 Left Knob

Use left knob to adjust voltage in MIG mode, arc length in Pulsed MIG mode, or change parameter values in Setup Mode.

7 Right Knob

Use right knob to adjust wire feed speed or change parameter values in Setup Mode.

8 Soft Keys

Multiple functions depending on which screen is being displayed.

6-2. Special Features

A. MIG Mode

In MIG mode, the left knob is used to adjust welding voltage within a range of 12 to 32 volts. The right knob is used to adjust wire feed speed within a range of 50 to 800 IPM. Refer to weld chart inside the wire drive compartment for proper parameter settings according to wire type, shielding gas, and material type and thickness.

B. Jog Mode

If gun trigger is pressed and held for more than 3 seconds without striking an arc, unit will automatically shut off weld power and shielding gas. Trigger error will be displayed after preset length of wire is fed, dependent on MIG gun selected. See Section 8-5.

C. Weld Status

When trigger is released on a MIG gun, spool gun, or push-pull gun, the last actual amperage and voltage are shown on the display for 5 seconds. If a programmed value requires adjustment after the arc is extinguished and during the 5-second display of actual values, turning either knob will cause actual values in the displays to be replaced by programmed values for adjustment purposes.

D. MIG Gun-On-Demand

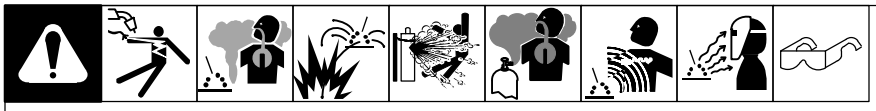
MIG guns, spool guns, and push-pull guns can be used with this unit. To switch from one gun to another, momentarily press the trigger on the desired unused gun to make it the active gun. Once the trigger is pressed, the unit will recall stored data and both displays will show the last programmed values for that particular gun. If the unit is powered down and back on again, the gun last used will become the current active gun.

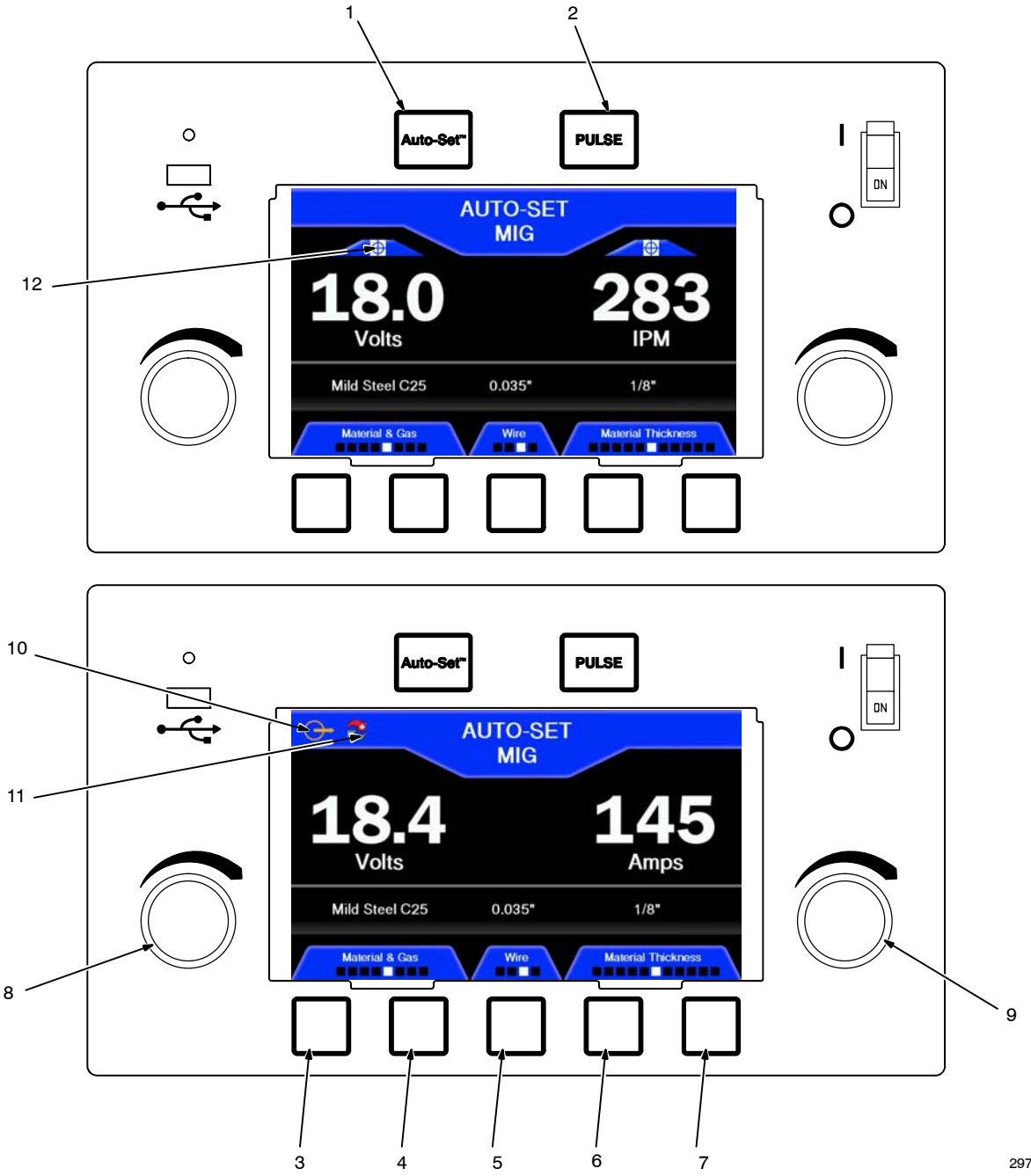
E. Pulsed MIG Mode Voltage Adjustment

In Pulsed MIG mode there is no manual voltage adjustment; instead, voltage is synergically aligned with the proper wire feed speed. Arc Length adjustment is used to adjust actual arc length, which automatically adjusts the voltage. See weld chart in front compartment for proper wire feed speed adjustment according to wire size and type.

Notes

6-3. Using Auto-Set™ Elite





1 Auto-Set Button

Press to turn Auto-Set On or Off.

2 Pulse Button

Press to turn Pulse On or Off.

3 Material/Gas Left Button

4 Material/Gas Right Button

Press to select material and gas. Left button moves cursor to the left, right button moves cursor to the right.

5 Diameter Button

Selects the size of the wire.

6 Material Thickness Left Button

7 Material Thickness Right Button

Use to select material thickness. Left button moves cursor to the left, right button moves cursor to the right.

8 Left Knob

Use left knob to fine tune voltage in MIG mode or arc length in Pulsed MIG mode.

9 Right Knob

Use right knob to fine tune wire feed speed.

☞ *When using a spoolgun or push-pull gun in Auto-Set, the potentiometer on the gun is deactivated. Wire feed speed is controlled on the front panel.*

10 Welding Output Icon

When visible, indicates weld output is on.

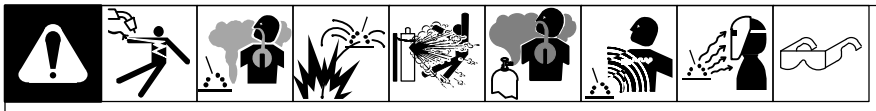
11 Improper Weld Polarity Icon

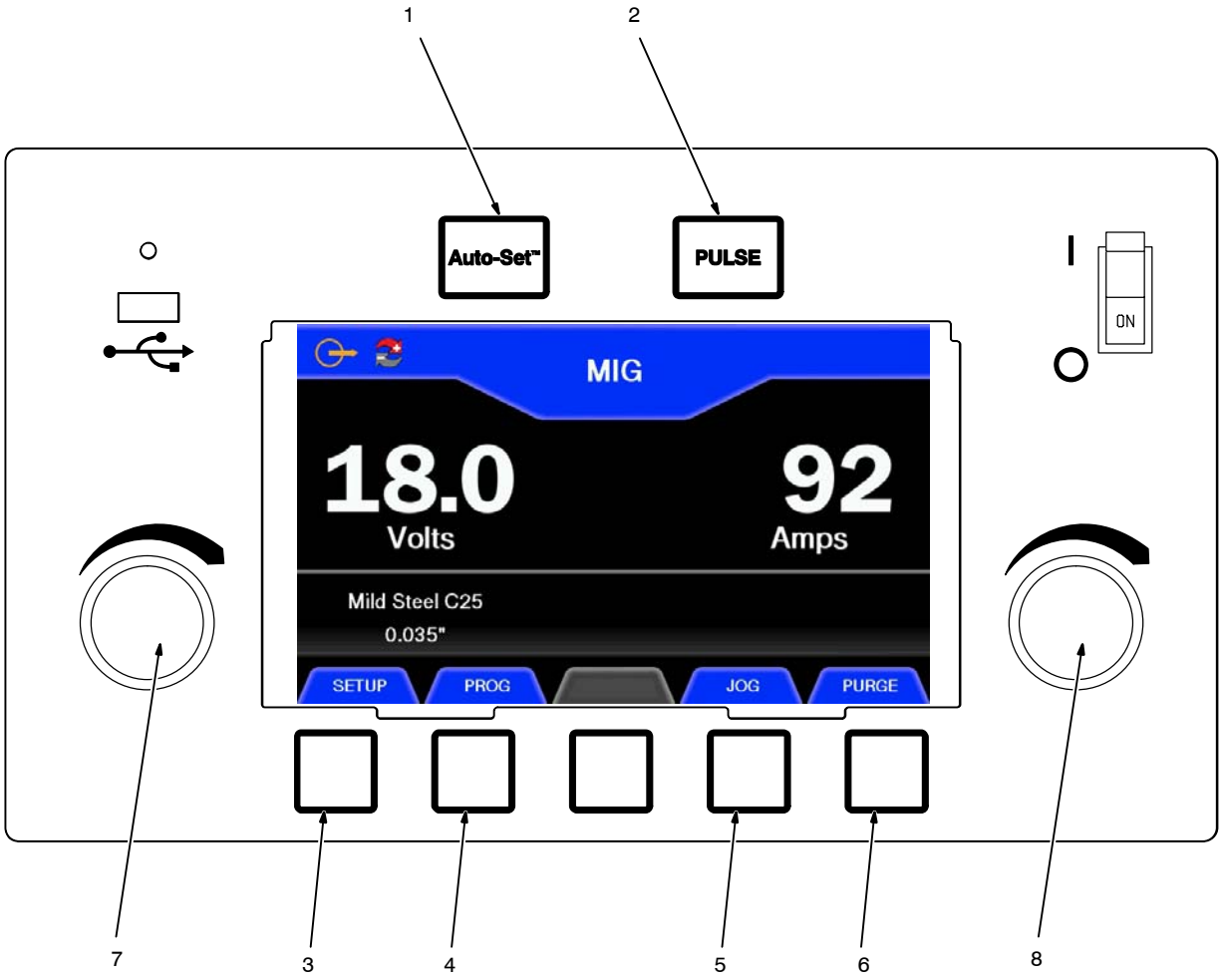
When visible, indicates electrode and work cables need to be switched.

12 Bullseye Indicator

Represents factory default settings.

6-4. Using Manual Mode





297061-D

1 Auto-Set Button

Press Auto-Set to turn Auto-Set Off.

2 Pulse Button

Press to turn Pulse On or Off.

3 Setup Button

Press Setup to optimize arc performance or to add timers to weld sequence. See Section 6-5.

4 Program Button

Press Program to save favorite weld programs, up to four programs per weld process. See Section 6-7.

5 Jog Button

Feed wire without turning on weld output and energizing gas solenoid. See Section 6-2.

6 Purge Button

Energizes gas solenoid without turning on weld output or feeding wire.

7 Left Knob

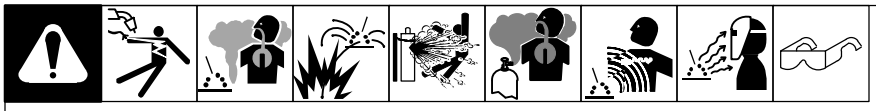
Use left knob to adjust voltage in MIG mode or arc length in Pulsed MIG mode.

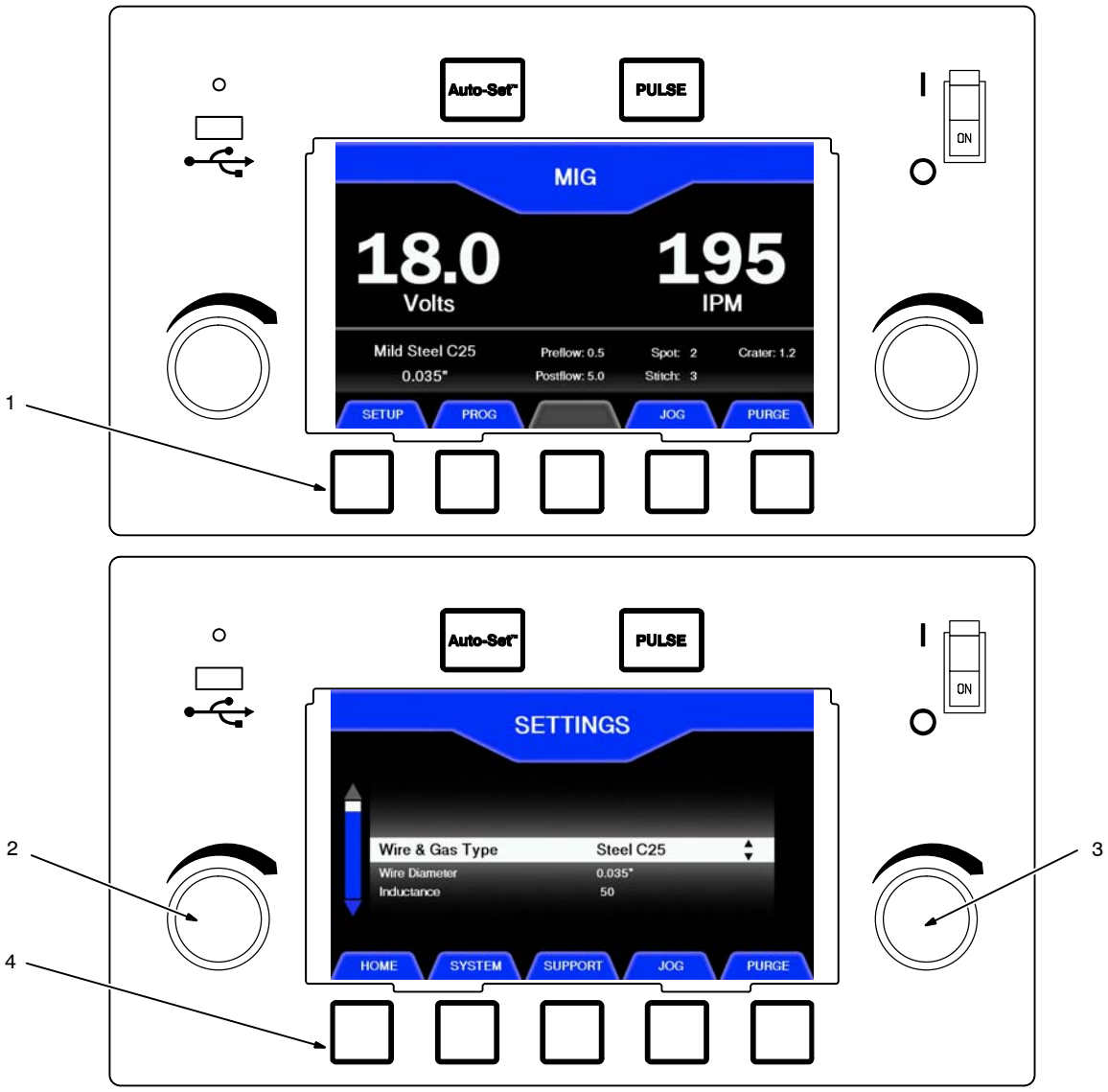
8 Right Knob

Use right knob to adjust wire feed speed.

☞ *When using spoolgun or push-pull gun, wire feed speed is controlled at the gun and the right knob is deactivated.*

6-5. Manual MIG Setup Mode





297061-D

1 Setup Button
2 Left Knob
3 Right Knob
4 Home Button

To enter the Setup menu from the Manual Mode home screen, press Setup.

Once in the Setup menu, rotate the left knob to find a particular item, and rotate the right knob to change setting or status.

Press Home to save settings and return to welding mode.

Items that can be adjusted from this menu are:

Wire and Gas Type: Optimize arc starts and weld performance by selecting the wire type and gas being used.

Wire Diameter: Optimize arc starts and weld performance by selecting the wire diameter that matches the wire being used.

Inductance: Changes the fluidity of the weld puddle. Increasing inductance produces a more fluid, softer arc. Decreasing inductance produces a stiffer arc. Inductance settings range from 0 to 99. The default setting is 50.

Preflow: The amount of time that the shielding gas will flow after the trigger is depressed and before the welding arc can start. Preflow settings range from Disabled to 5 seconds.

Postflow: The amount of time that the shielding gas will flow after the arc has been shut off. Postflow settings range from Disabled to 5 seconds.

Run-In: The speed of the wire prior to the welding arc being struck. Auto is the default setting. The other options are Disabled or Manual. Manual settings range from 5 to 150% of the welding wire feed speed.

FasTack™: Enabling FasTack reduces arc start time by automatically increasing the run-in speed when doing repetitive arc starts. FasTack automatically uses a slower wire feed speed when the wire is cool and a faster wire feed speed when the wire is hot. Default setting is Disabled.

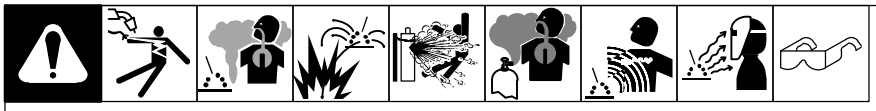
Crater: The amount of time the welding arc stays on after the welding gun trigger is released. This feature is used to fill the void or crater at the end of the weld. Crater settings range from 0.1 to 5 seconds. See Section 6-6.

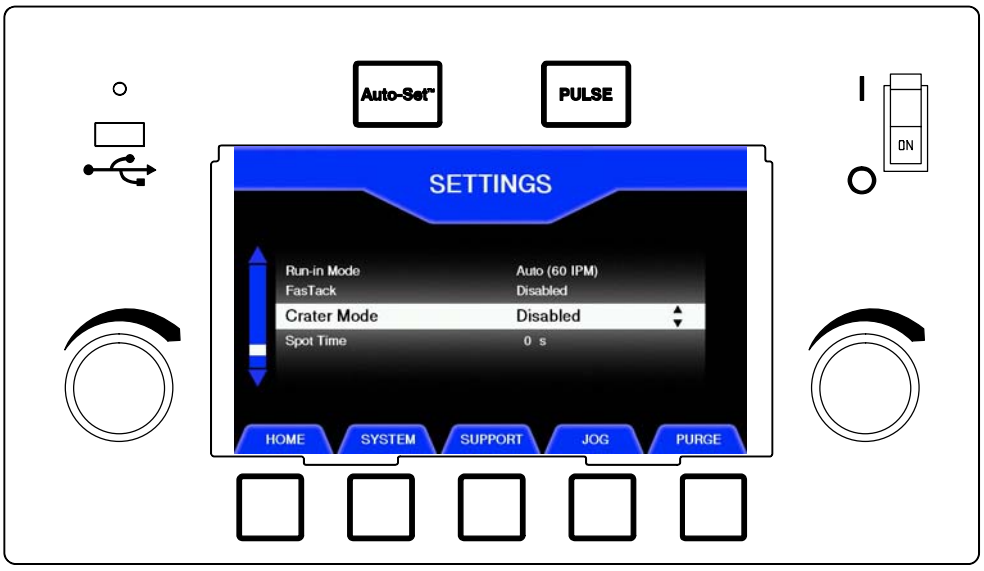
Spot Timer: The amount of time that the arc can be active before it shuts off automatically. Spot timer setting range is from Disabled to 120 seconds. Spot timer is reset upon release of welding gun trigger.

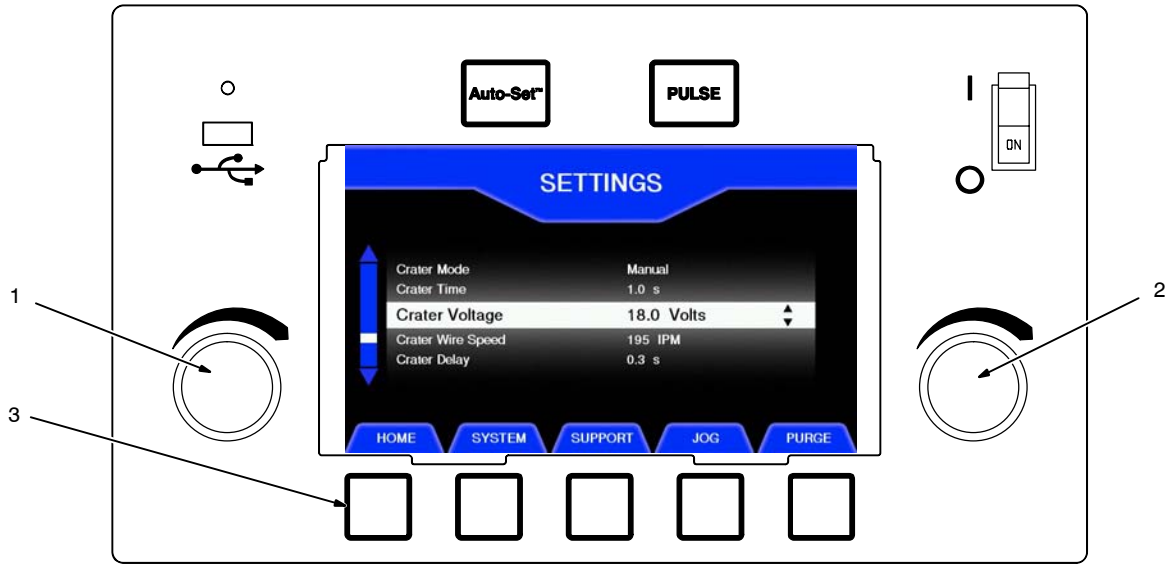
Stitch Timer: Used in conjunction with the spot timer and while the trigger is continuously depressed. Controls the amount of time that the arc will be inactive after the spot timer times out. Stitch time setting range is from 1 to 120 seconds.

Set Up Push Motor Torque (SUP): This feature is only displayed when an AlumaPro Lite gun is connected to the welding power source. The SUP setting adjusts the over torque limit of the push motor inside the welding power source. The range is 0 to 250, and the default value is 130. The AlumaPro Lite SUP value can be found on the back end of the gun. Set the SUP value on the machine to match the value on the gun.

6-6. Setting Crater Time







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1 Left Knob

2 Right Knob

3 Home Button

The crater setting is the amount of time the welding arc stays on after the welding gun trigger is released. This feature is used to fill the void or “crater” at the end of the weld.

In the Setup menu, rotate the left knob to highlight **Crater**, and rotate the right knob to select **Manual**.

The following Crater variables can be adjusted:

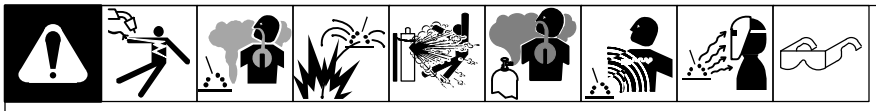
Crater Time: Time range is 0.1 to 5 seconds.

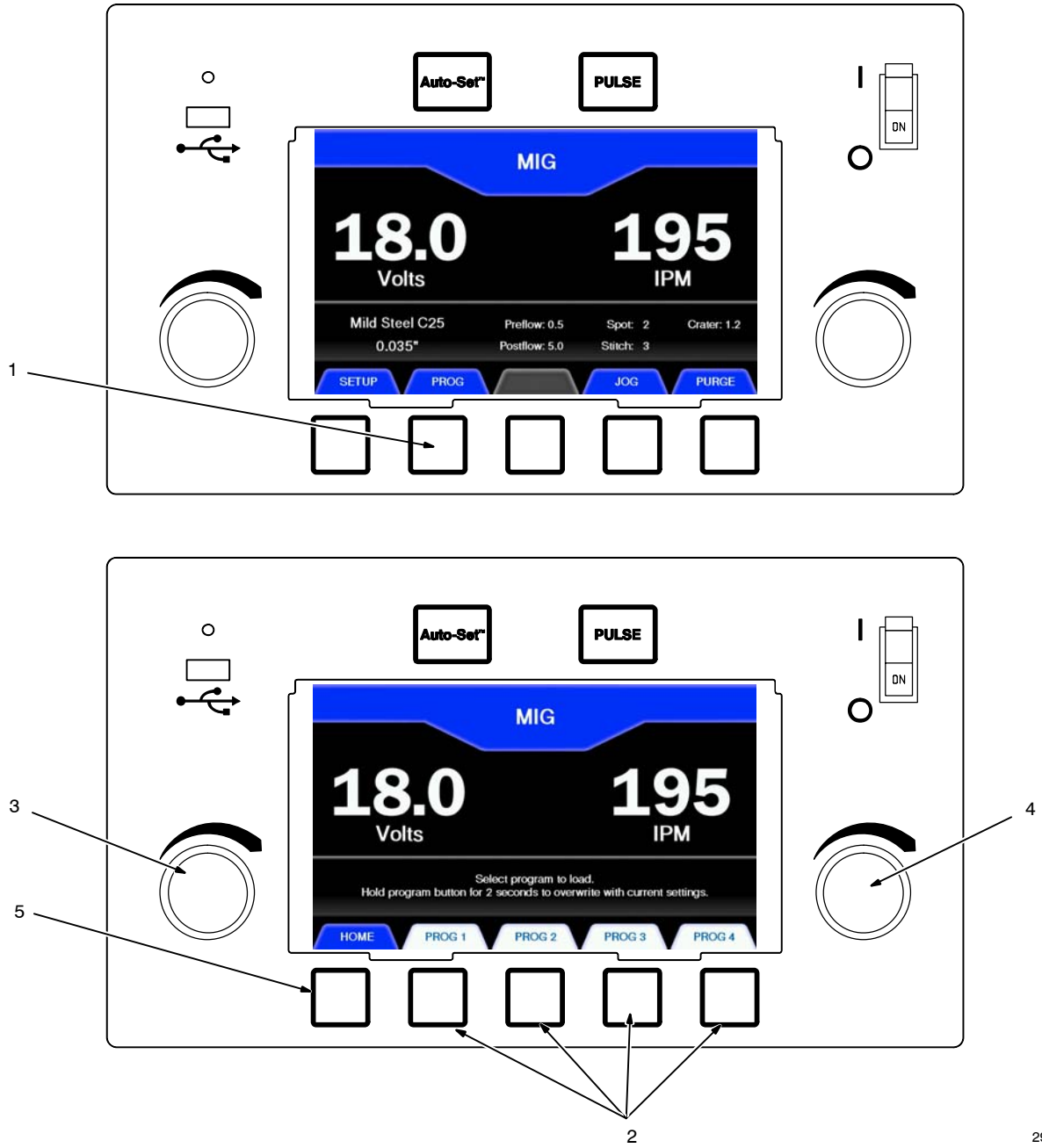
Crater Voltage (MIG settings) or **Arc Length** (Pulse settings): Voltage range is 10 to 32 volts. Arc length range is 0 to 99.

Crater Wire Feed Speed: Wire feed speed range is 50 to 800 ipm.

Crater Delay: This setting is for spot or stitch welding without crater fill if the arc time is less than the set time. Time range is 0 to 5 seconds. (If crater delay is set for 2 seconds, weld operation will not go into crater if gun trigger is released before 2 seconds.)

6-7. Manual Program Mode





297061-D

1 Program Button
2 Program Soft Keys
3 Left Knob
4 Right Knob
5 Home Button

The unit can store four programs. The programs have default setting saved when the machines come from the factory.

Saving Programs In Manual Mode

To enter the Program menu from the Manual Mode home screen, press the Program button.

White Program tabs will appear above four of the soft keys.

Determine where you would like to save the settings. Push and hold that Program soft key for two seconds. The display will show “Saved” when the program has been successfully saved.

Saving Programs From Auto-Set Mode

Program mode cannot be accessed from Auto-Set mode. To save settings, note the weld parameters and return to Manual mode to access Program mode.

Recalling Programs

Push the Program button to select desired program. The selected Program tab will turn blue and the proper setting will be displayed.

Weld parameters may be changed while using the program with the left and right knobs. If the settings are changed, the program tab will turn white and the lettering will turn black. To save the new settings, press and hold the Program button again for two seconds.

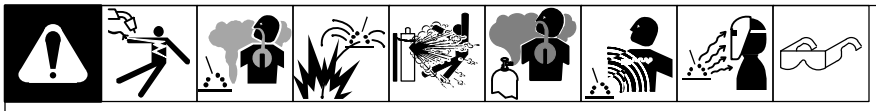
If you change the setting but do not wish to save it, press the Program button again to recall the original settings.

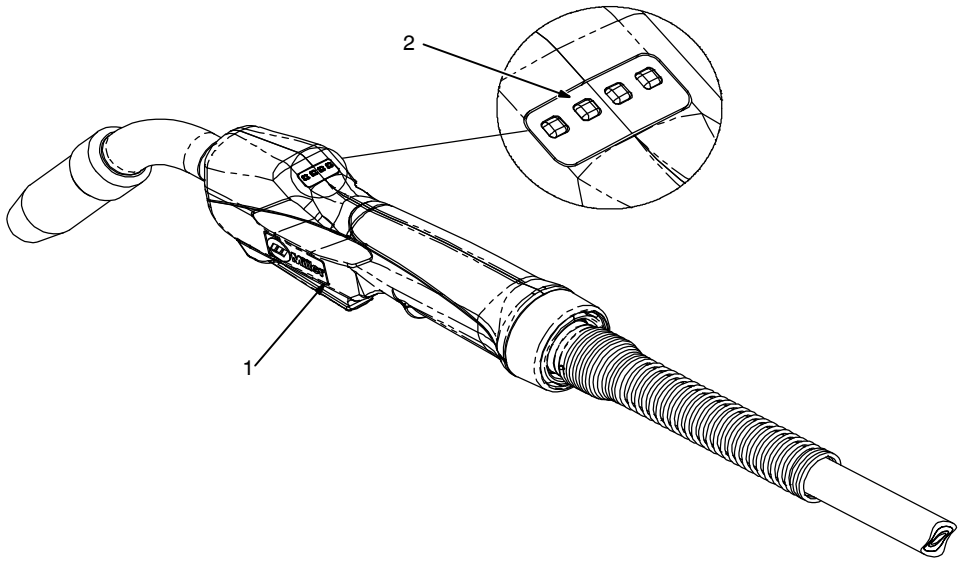
Exiting Program Mode

Press the Home button to exit Program mode and return to Manual mode.

☞ *To use optional MDX-250 EZ-Select MIG gun with Program mode, see Section 6-8.*

6-8. Using Optional MDX-250 EZ-Select™ Gun In Program Mode





Ref. 800797-A

1 Trigger Switch

2 Program LEDs

The optional MDX−250 EZ-Select gun gives the operator the ability to change weld programs at the gun. When the MDX−250 is connected, “EZ Select” is displayed in the last tab. Push the soft key below the EZ Select tab to enable.

When this feature is enabled, the 4 LEDs on the MDX−250 gun handle indicate which program is active. Tap the gun trigger to select the program. The number of lit LEDs on the gun indicates the selected program and allows the operator to know which program is being used without going back to or seeing the machine.

Tap the trigger once. LED 1 on the gun illuminates. Program 1 is selected.

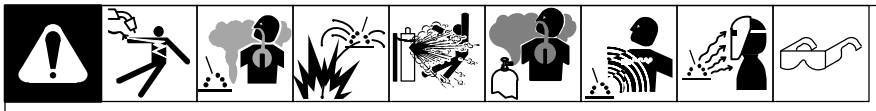
Tap the trigger twice. LEDs 1 and 2 on the gun illuminate. Program 2 is selected.

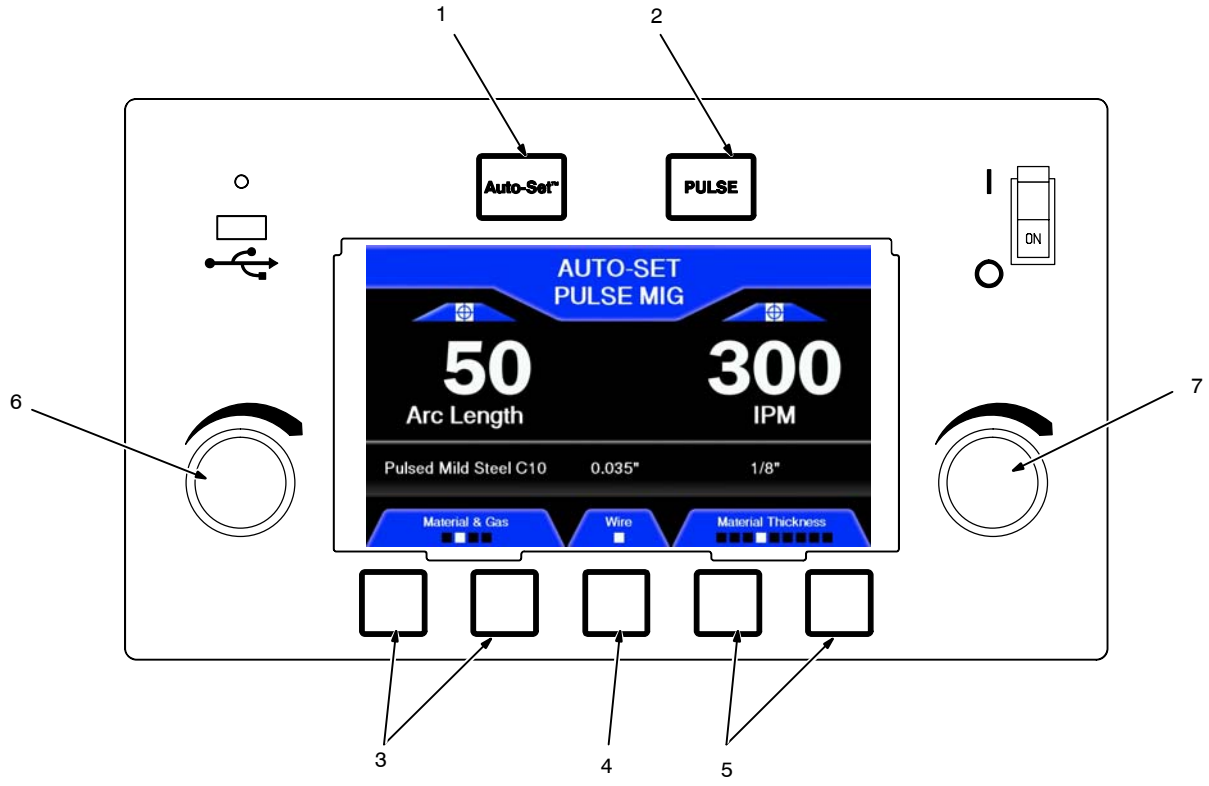
Tap the trigger three times. LEDs 1, 2, and 3 on the gun illuminate. Program 3 is selected.

Tap the trigger 4 times. LEDs 1, 2, 3, and 4 on the gun illuminate. Program 4 is selected.

When the EZ-Select feature is disabled on the welder, LEDs 1 and 4 on the gun are illuminated.

6-9. Pulsed MIG Auto-Set™ Mode





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Pulsed MIG is a spray transfer that produces less heat input than conventional spray transfer, resulting in less warping, distortion, and spatter. Pulsed MIG is often used for MIG welding aluminum.

1 Auto-Set Button

2 Pulse Button

Press Auto-Set and Pulse buttons.

3 Wire And Gas Buttons

Use soft keys to select wire and gas for Pulsed MIG.

4 Wire Diameter

Use soft key to select wire diameter.

5 Material Thickness

Use soft keys to move cursor to left or right to select material thickness.

6 Left Knob

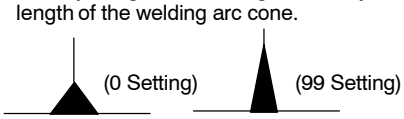
Use left knob to fine tune arc length. Arc length defaults to 50.

7 Right Knob

Use right knob to fine tune wire feed speed.

Arc Length

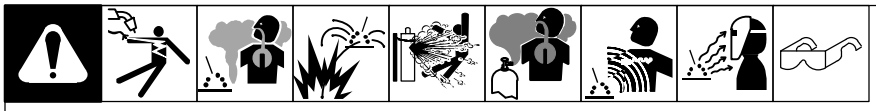
Arc length can be adjusted from 0-99. All Pulse MIG programs are set with a value of 50. Adjusting the Arc Length will vary the length of the welding arc cone.

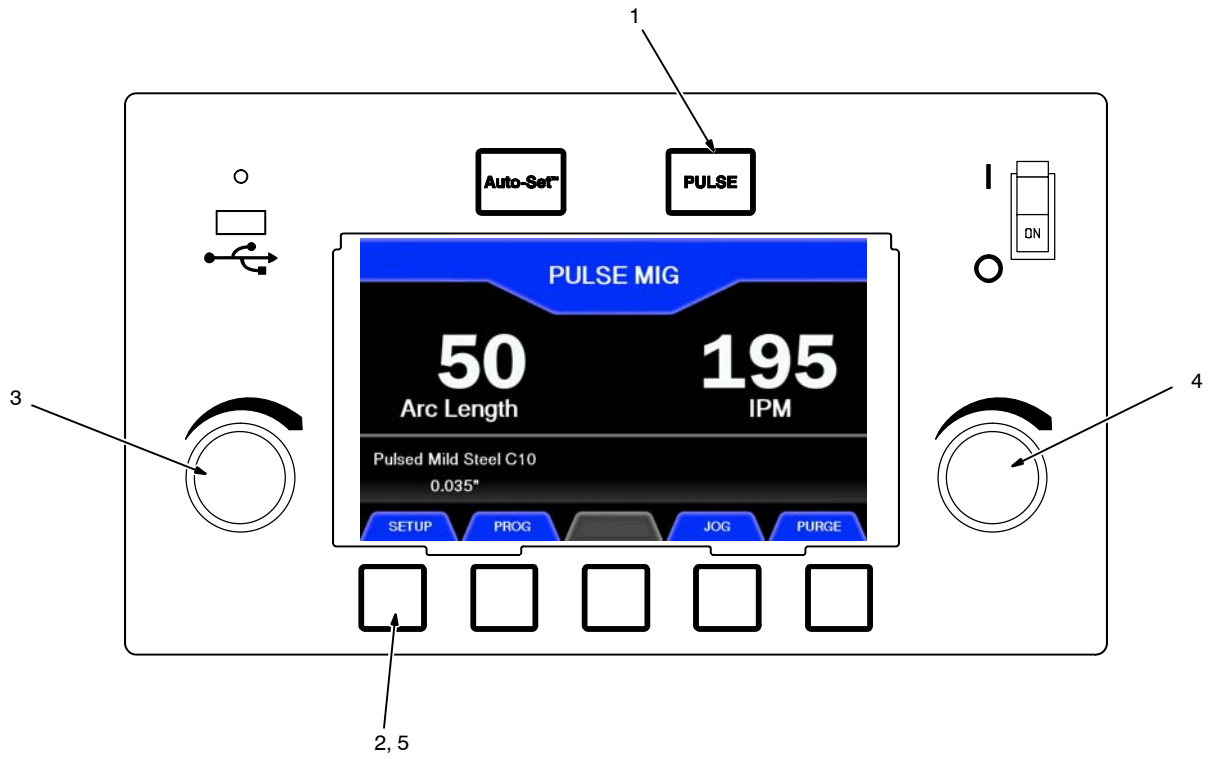


Low Setting High Setting

If a gas is used other than what is listed on the Pulse MIG welding program chart, the Arc Length can be adjusted to help customize your arc to the gas being used.

6-10. Pulsed MIG Manual Mode





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1 Pulse Button
2 Set Up Button
3 Left Knob
4 Right Knob
5 Home Button

Press Pulse and Set Up buttons.

In the Setup menu, rotate left knob to highlight material and gas. Rotate right knob to select material and gas being used.

Rotate left knob to highlight wire diameter. Rotate right knob to select wire diameter being used.

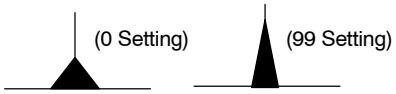
Press Home to return to welding mode.

Operation

Adjust right knob for proper wire feed speed and adjust left knob to change arc length if required. Arc length will default to 50. Refer to Pulse MIG welding chart for proper Wire Speed setting for metal and metal thickness being welded. All Pulse MIG programs are set up with the gases listed in the Pulse MIG welding chart. If alternate gases are used, adjust arc length and/or arc control to adjust arc characteristics.

Arc Length

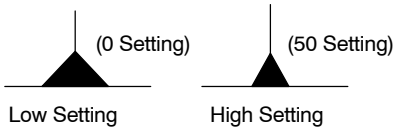
Arc length can be adjusted from 0-99. All Pulse MIG programs are set with a value of 50. Adjusting the arc length will vary the length of the welding arc cone.



If a gas is used other than what is listed on the Pulse MIG welding program chart, the Arc Length can be adjusted to help customize your arc to the gas being used.

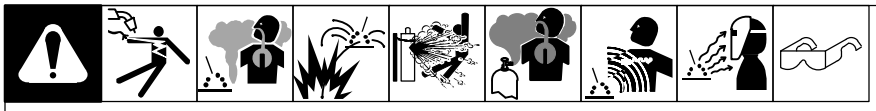
Arc Control

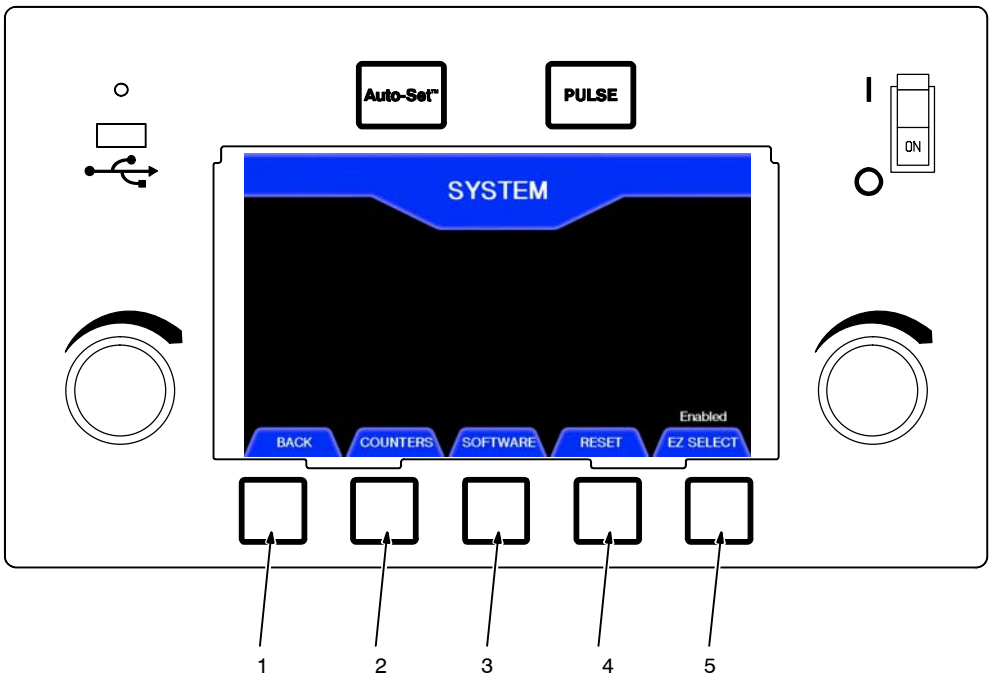
Press Setup button to enter Setup menu. Rotate left knob to select Arc Control. The setting can be adjusted from 0 to 50. All Pulse MIG welding programs are designed with a setting of 25. Using the right knob to adjust the Arc Control setting will vary the width of the welding arc cone.



If a gas is used other than what is listed on the Pulse MIG welding program chart, the Arc Control can be adjusted to help customize your arc to the gas being used.

6-11. System





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From the System Setting screen, the operator can monitor how the unit is being used, view system software information, restore the unit to factory default settings, and select optional welding guns.

Access the System information screen from the manual MIG home screen by pressing Setup, then System. See Section 6-5.

System Screen

The System screen displays four or five tabs above the soft keys, depending on which welding gun is connected.

1 Back

Press soft key to return to Setup screen.

2 Counters

Press soft key to access timer logs with a USB thumb drive. In the counters menu, there are two options:

Reset Log: Press soft key to reset all system timers.

Save Log: Insert USB thumb drive into USB port on front of welder. Press soft key to download all system timers to the drive. This system information can then be loaded into an Excel spreadsheet.

3 Software

Press soft key to display the system software versions. This information is used by factory authorized service agents.

License: Press soft key to display Miller Licensing Agreement.

4 Reset

Press soft key to reset unit to original factory settings

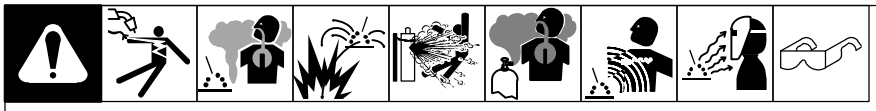
5 EZ Select

This tab is only present when using the optional EZ Select MIG gun or an AlumaPro or AlumaPro Lite push pull gun.

EZ Select™: The system detects that the optional EZ Select MIG gun is connected to the system. Press soft key to enable or disable the trigger tap program select feature of the EZ Select gun.

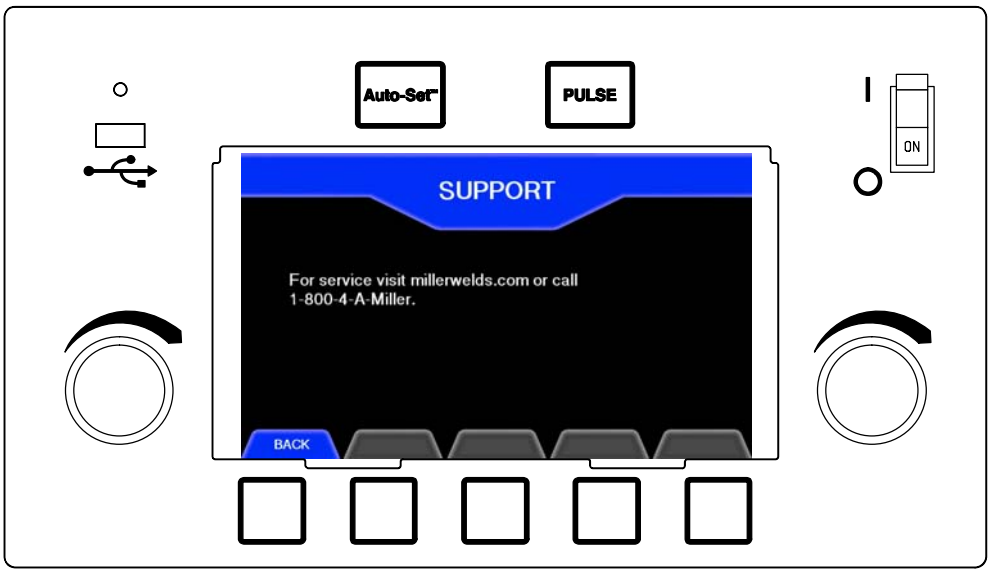
PPG: Press soft key to match the push-pull gun being used. The selected gun, AlumaPro or AlumaPro Lite, appears above the blue tab.

6-12. Support



The Support screen allows the operator to quickly access the Miller website and phone number to obtain more product information or get service support.

Access the Support screen from the manual MIG home screen by pressing Setup, then Support. See Section 6-5.



297061-D

SECTION 7 – WELD PARAMETER CHARTS

7-1. MIG And Flux Core Parameters

Steel & Stainless Steel Wire Welding (MIG/Flux-Cored) Parameters

					MIG - GMAW								Pulsed MIG - GMAW-P							
Material	Polarity	Shielding Gas*	Wire Type	Wire Size	24 ga (V/WFS)	20 ga (V/WFS)	18 ga (V/WFS)	14 ga (V/WFS)	1/8" (V/WFS)	3/16" (V/WFS)	1/4" (V/WFS)	3/8" (V/WFS)	1/2" (V/WFS)	24 ga (WFS)	20 ga (WFS)	18 ga (WFS)	14 ga (WFS)	1/8" (WFS)	3/16" (WFS)	1/4" (WFS)	3/8" (WFS)	1/2" (WFS)
Steel	DCEP	C25	Solid Wire ER70S-6	0.024"	14.4/125	15.9/211	16.8/271	17.2/415	19.2/533	21.0/600	-	-	-	-	-	-	-	-	-	-	-	-
				0.030"	-	15.5/130	16.2/195	17.6/295	18.0/355	19.8/390	20.5/452	21.8/545	-	-	-	-	-	-	-	-	-	-	-
				0.035"	-	14.3/113	15.9/170	16.7/240	18.3/293	19.0/351	20.5/374	22.3/442	25.8/524	-	-	-	-	-	-	-	-	-	-
				0.045"	-	-	15.0/100	16.9/162	17.4/194	19.2/230	20.6/249	29.0/400	29.4/431	-	-	-	-	-	-	-	-	-	-
		C10		0.030"	-	15.0/113	16.0/195	17.0/277	18.6/363	19.1/453	26.6/502	27.6/570	-	-	-	-	-	-	-	-	-	-	-
				0.035"	-	14.5/146	14.7/149	16.5/221	18.0/304	18.2/360	26.6/443	28.0/490	28.9/520	-	-	130	215	270	330	435	600	700
				0.045"	-	-	14.7/117	15.7/135	17.6/181	18.6/224	27.3/332	28.5/363	29.5/412	-	-	-	125	150	200	250	300	400
		C100		0.030"	-	17.0/121	17.2/168	17.8/220	19.5/249	20.5/376	21.5/420	23.1/480	-	-	-	-	-	-	-	-	-	-	-
				0.035"	-	15.9/92	16.6/153	17.6/217	18.6/244	19.9/305	21.5/342	21.7/371	23.3/387	-	-	-	-	-	-	-	-	-	-
				0.045"	-	-	-	18.4/101	18.5/128	19.7/160	20.4/177	21.7/224	23.2/232	-	-	-	-	-	-	-	-	-	-
		Argon	Silicon Bronze	0.030"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				0.035"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				0.045"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		C25	Flux-Cored Gas Shielded	0.045"	-	-	-	-	21.4/213	21.8/247	22.9/263	25.5/401	27.5/500	-	-	-	-	-	-	-	-	-	-
	DCEN	None	Flux-Cored Self Shielded E71T-11	0.035"	-	-	13.0/82	16.8/133	18.8/272	21.3/330	22.3/356	23.1/388	-	-	-	-	-	-	-	-	-	-	-
				0.045"	-	-	-	14.7/86	17.6/130	18.6/175	20.3/207	21.6/223	-	-	-	-	-	-	-	-	-	-	-
Stainless Steel	DCEP	Tri-Mix 90% He/7.5% Ar/ 2.5% CO_2	Stainless Steel 308L	0.024"	-	18.6/255	19.3/293	20.1/443	22.0/520	23.7/640	-	-	-	-	-	-	-	-	-	-	-	-	-
				0.030"	-	18.3/208	19.2/242	20.1/370	21.3/472	21.9/550	24.3/600	25.4/630	-	-	-	-	-	-	-	-	-	-	-
				0.035"	-	16.9/121	18.5/180	19.4/230	20.5/282	21.7/418	23.4/450	25.6/485	-	-	-	-	-	-	-	-	-	-	-
				0.045"	-	-	-	18.5/170	20.4/226	21.0/260	22.8/283	24.7/300	25.7/310	-	-	-	-	-	-	-	-	-	-
Stainless Steel	DCEP	Tri-Mix 65% Ar/33% He/ 2% CO_2	Stainless Steel 308L	0.035"	-	-	-	-	-	-	-	-	-	-	-	100	150	235	300	400	500	-
				0.045"	-	-	-	-	-	-	-	-	-	-	-	-	90	125	140	175	250	300	

Aluminum Wire Welding (MIG) Parameters

					MIG - GMAW								Pulsed MIG - GMAW-P							
Material	Polarity	Shielding Gas*	Wire Type	Wire Size	24 ga (V/WFS)	20 ga (V/WFS)	18 ga (V/WFS)	14 ga (V/WFS)	1/8" (V/WFS)	3/16" (V/WFS)	1/4" (V/WFS)	3/8" (V/WFS)	1/2" (V/WFS)	24 ga (WFS)	20 ga (WFS)	18 ga (WFS)	14 ga (WFS)	1/8" (WFS)	3/16" (WFS)	1/4" (WFS)	3/8" (WFS)	1/2" (WFS)
Aluminum	DCEP	Argon	ER4043	0.035"	-	-	-	15.7/386	21.3/429	23.3/468	25.0/590	25.3/630	-	-	-	125	235	350	500	600	800	-
				0.047"	-	-	-	-	20.6/255	22.0/260	24.0/340	25.3/419	26.3/467	-	-	75	130	225	300	360	400	450
Aluminum			ER5356	0.035"	-	-	-	15.0/438	20.5/530	22.3/639	24.0/800	-	-	-	-	150	327	480	600	700	-	-
				0.047"	-	-	-	-	20.8/324	22.2/354	24.2/449	26.1/529	-	-	-	85	165	300	375	500	550	600

*Please see Owner's Manual for detailed information on welding gas selection and mixtures.

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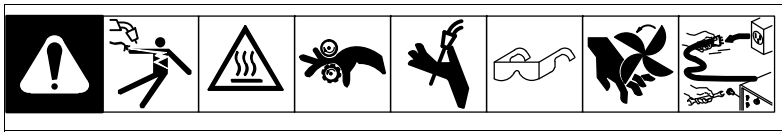
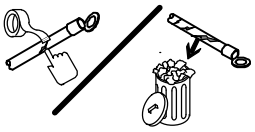
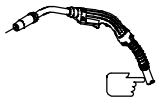
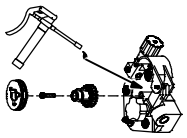
SECTION 8 – MAINTENANCE &TROUBLESHOOTING

8-1. Routine Maintenance

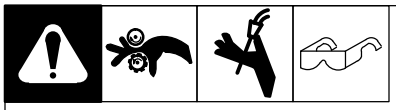


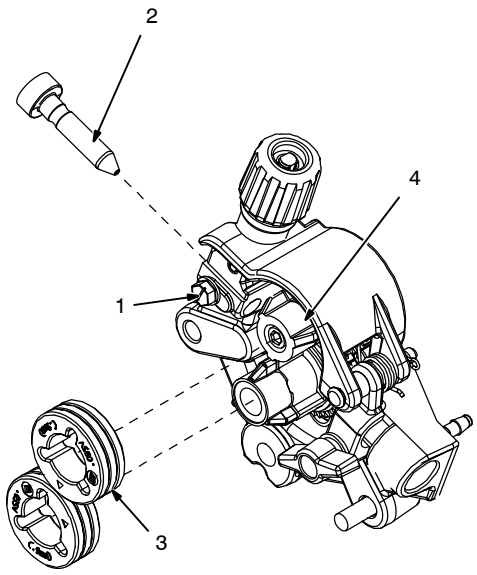
Disconnect power before maintaining.

☞ *Maintain more often during severe conditions.*

	✓ = Check ◇ = Change ● = Clean ☆ = Replace * To be done by Factory Authorized Service Agent			
Every 3 Months	 ☆ Damaged Or Unreadable Labels	 ☆ Repair Or Replace Cracked Weld Cable	 ● Clean And Tighten Weld Terminals	 ✓ Check Gun Cable
Every 6 Months	 ● Inside Unit	 ● Clean Drive Rolls	 ✓ Apply Light Coat Of Oil Or Grease To Drive Motor Shaft	

8-2. Changing Drive Roll and Wire Inlet Guide





1 Securing Screw

2 Inlet Wire Guide

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

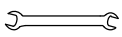
3 Drive Roll

The drive roll consists of two different sized grooves. The stamped markings on the end surface of the drive roll refers to the groove on the opposite side of the drive roll. The groove closest to the motor shaft is the proper groove to thread (see Section 5-13).

4 Drive Roll Securing Nut

Turn nut one click to secure drive roll.

Tools Needed:

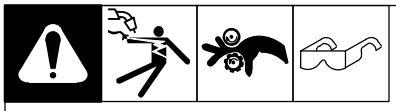
 7/16 in.

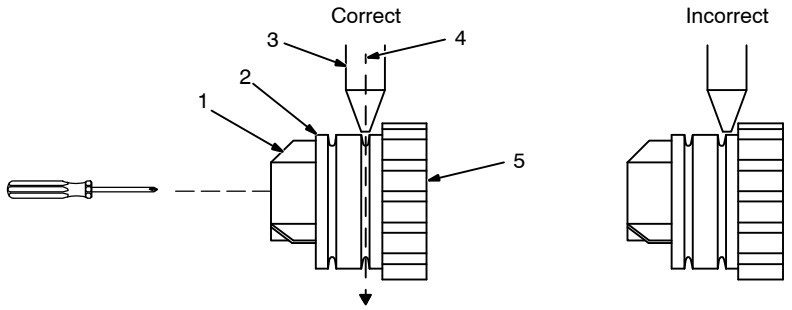
907728

8-3. Overheating

Thermistors RT1, RT2, and the thermistors contained within the inverter module PM1 protect the unit from damage due to overheating. If the output diode heatsink, output inductor L2, and/or inverter module PM1 get too hot, they command the weld controller to disable the output. The fan keeps running to cool the unit. Wait several minutes before trying to weld.

8-4. Aligning Drive Rolls and Wire Guide





Turn Off power.

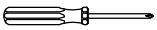
View is from top of drive rolls looking down with pressure assembly open.

1 Drive Roll Securing Nut
2 Drive Roll
3 Wire Guide
4 Welding Wire
5 Drive Gear

Insert screwdriver, and turn screw in or out until drive roll groove lines up with wire guide.

Close pressure roll assembly.

Tools Needed:



Ref. 800 412-A

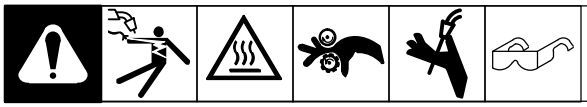
8-5. Error Messages

Message	Error	Remedy
Overtemp Please wait while the welder cools down • Inverter Module • Output Rectifier • Secondary Magnetics	Internal temperature of welder has exceeded the maximum limit.	Wait for unit to cool down. If the fan is not running, contact authorized Miller service center.
Trigger Error Release MIG gun trigger	MIG gun trigger is engaged on power up.	Release 4-pin trigger to clear error.
	MIG gun is held during jog for more than 17 feet of wire.	
	MIG gun trigger is engaged for more than 1 second after the arc is broken.	
	After an overtemp error, the MIG gun trigger is held after the welder has completed cooling.	
	MIG gun trigger is engaged while another process is selected.	
	MIG gun trigger leads are shorted together.	

Message	Error	Remedy
Trigger Error Release Spool Gun Trigger / Release Push-Pull Gun Trigger	Trigger is engaged on power up.	Release 10-pin trigger to clear error.
	Trigger held too long during jog mode. Spool gun for more than 10 seconds. Push-pull gun for more than 37 feet of wire.	
	Trigger is engaged for more than 1 second after the arc is broken.	
	After an overtemp error, the trigger is held after the welder has completed cooling.	
	Trigger is engaged while another process is selected.	
	Trigger leads are shorted.	
Gun Error • XR-A Python • XR Edge • XR A • XR-A AlumaPro Plus	System parameters do not support this equipment.	Replace with compatible MIG gun.
Shorted Output First remove short then pull trigger to clear error	The welding wire came into contact with the workpiece while jogging wire.	Remove short and pull trigger, or wait 30 seconds to clear error.
	MIG gun or spool gun contact tip came into contact with the workpiece while welding.	
	The weld voltage is less than 10 volts for more than 0.2 seconds while welding.	
	Output rectifier is damaged.	Contact authorized Miller service center.
	Control board is damaged.	
Motor or Motor Tach Error • Internal motor has stalled • Internal motor has drawn too much current • Remote motor has stalled • Motor tach is running too slow or is damaged	Too much pressure on pressure adjust knob.	Reduce pressure on the pressure adjust knob.
	The gun liner is obstructed.	Clear obstruction or replace gun liner.
	The gun contact tip is obstructed.	Clear obstruction or replace contact tip.
	The welding wire is entangled.	Untangle welding wire.
	The control board is damaged.	Contact authorized Miller service center.
Fan Error Either the top fan or the bottom fan is running too slow or is damaged	The fan blades are obstructed.	Clear obstruction from fan.
	The fan wiring harness is disconnected.	Contact authorized Miller service center.
	The fan is damaged.	
	The control board is damaged.	
Thermal Error Inverter module thermistor shorted	The inverter module thermistor is reading too high for a valid temperature.	Contact authorized Miller service center.
	The control board is damaged.	
Thermal Error Inverter module thermistor open	Ambient temperature is too cold for valid reading.	Place unit in environment warmer than –30°F (–22°C).
	The inverter module thermistor is reading too low for a valid temperature.	Contact authorized Miller service center.
	The control board is damaged.	
Thermal Error Secondary magnetics thermistor shorted	The secondary magnetics thermistor is reading too high for a valid temperature.	Contact authorized Miller service center.
	The control board is damaged.	

Message	Error	Remedy
Thermal Error Secondary magnetics thermistor open	Ambient temperature is too cold for valid reading.	Place unit in environment warmer than –30°F (–22°C).
	The secondary magnetics thermistor is unplugged.	Contact authorized Miller service center.
	The secondary magnetics thermistor is reading too low for a valid temperature.	
	The control board is damaged.	
Thermal Error Output rectifier thermistor shorted	The output rectifier thermistor is reading too high for a valid temperature.	Contact authorized Miller service center.
	The control board is damaged.	
Thermal Error Output rectifier thermistor open	Ambient temperature is too cold for valid reading.	Place unit in environment warmer than –30°F (–22°C).
	The output rectifier thermistor is unplugged.	Contact authorized Miller service center.
	The output rectifier thermistor is reading too low for a valid temperature.	
	The control board is damaged.	
Cycle power to clear error +15V or –15V • Primary Error	The primary boost has not successfully been established.	Cycle power to clear error. If error persists after a power cycle, contact authorized Miller service center.
Over Voltage Cycle power to clear error	Primary voltage is above 288 volts.	Reduce primary voltage below 288 volts.
Under Voltage Cycle power to clear error	The primary voltage is below 150 volts.	Increase primary voltage above 150 volts.
Network Error Inverter communications down	The two microcontrollers on the control board are no longer communicating.	Cycle power to clear error. If this error persists after a power cycle, contact authorized Miller service center.
Network Error Primary communications down		
Network Error UI-Control communications down	The wiring harness between the control board and interface board is damaged.	Contact authorized Miller service center.
	The control board is damaged.	Cycle power to clear error. If this error persists after a power cycle, contact authorized Miller service center.
	The interface board is damaged.	
Cable Error Connect wire feed housing cable to clear error	The wire feed housing cable is not attached to either the positive stud or negative stud of the power source.	Connect wire drive assembly cable to either the positive or negative stud.
	The control board is damaged.	Contact authorized Miller service center.
Transformer Saturation Error Release trigger to clear OR Cycle power to clear	Main transformer has detected an overcurrent condition.	If problem persists, contact authorized Miller service center.
Missing UI Membrane Switch Overlay	UI membrane is not detected as plugged in.	Contact authorized Miller service center.
UI Membrane Switch Overlay Doesn't match arc controller program	Detected UI membrane is not detected as matching the type reported by the main control board.	Contact authorized Miller service center.
CAN Data Version Incompatible	The UI and the Control are not compatible, perhaps due to a partial firmware upgrade.	Restart the firmware upgrade process.
		Contact authorized Miller service center.

8-6. 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.
No weld output; unit is on.	Check and secure loose weld cable(s) into receptacle(s).
	Check and correct poor connection of work clamp to workpiece.
Erratic or improper welding arc or output.	Use proper size and type of weld cable (see your Distributor).
	Clean and tighten weld connections.
	Verify electrode polarity; check and correct poor connections to workpiece.
Fan not operating.	Unit not warmed up enough to require fan cooling.
	Check for and remove anything blocking fan movement.
	Have Factory Authorized Service Agent check fan motor and control circuitry.

Notes

SECTION 9 – PARTS LIST

9-1. MDX-250 MIG Gun Consumables And Recommended Spare Parts

See OM-282976 (shipped with this product) for information on replacement consumables for the MDX welding gun.

9-2. Drive Roll And Wire Guide Kits

☞ *Base selection of drive rolls upon the following recommended usages:*

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

Wire Diameter			Kit No.	Drive Roll		Inlet Wire Guide
Fraction	Decimal	Metric		Part No.	Type	
0.023/0.025 in.	0.023/0.025 in.	0.6 mm	087131	087130	V-Grooved	056192
0.030/0.035 in.	0.030/0.035 in.	0.8/0.9 mm	204579	203526	V-Grooved	056192
0.030 in.	0.030 in.	0.8 mm	079594	053695	V-Grooved	056192
0.035 in.	0.035 in.	0.9 mm	079595	053700	V-Grooved	056192
0.045 in.	0.045 in.	1.2 mm	079596	053697	V-Grooved	056193

SECTION 10 – ELECTRICAL DIAGRAM

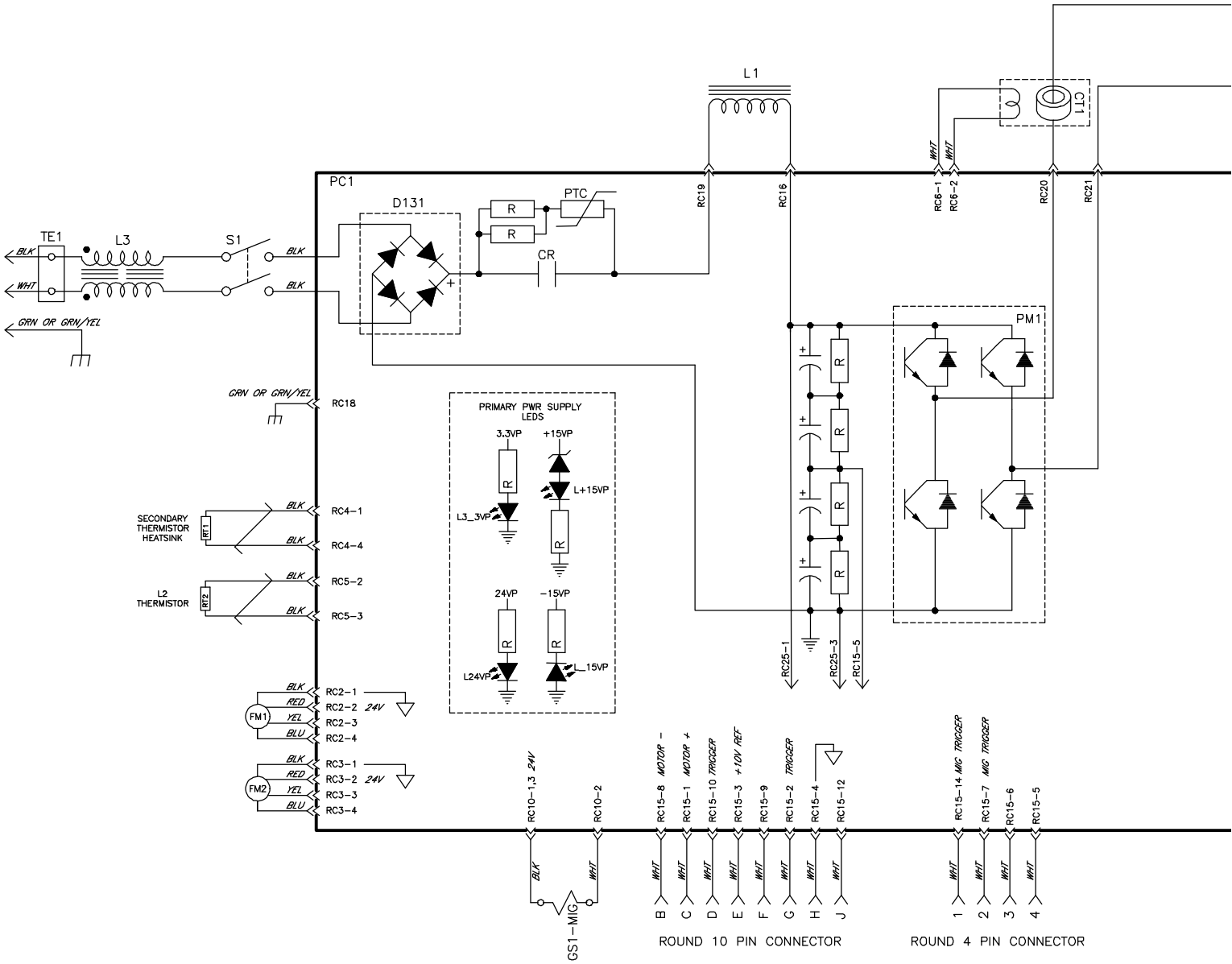
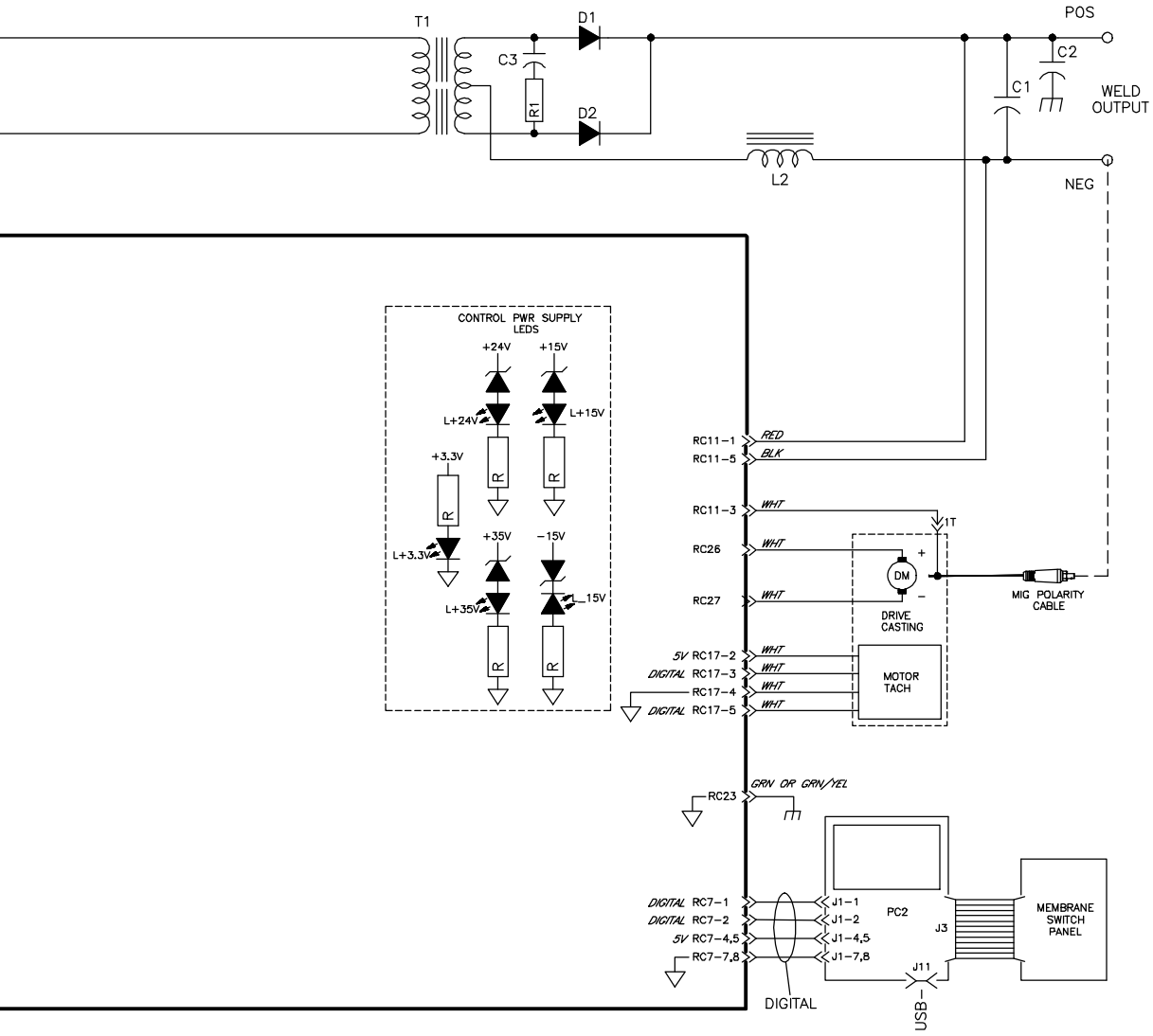


Figure 10-1. Circuit Diagram

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



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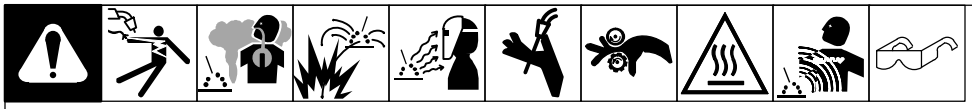
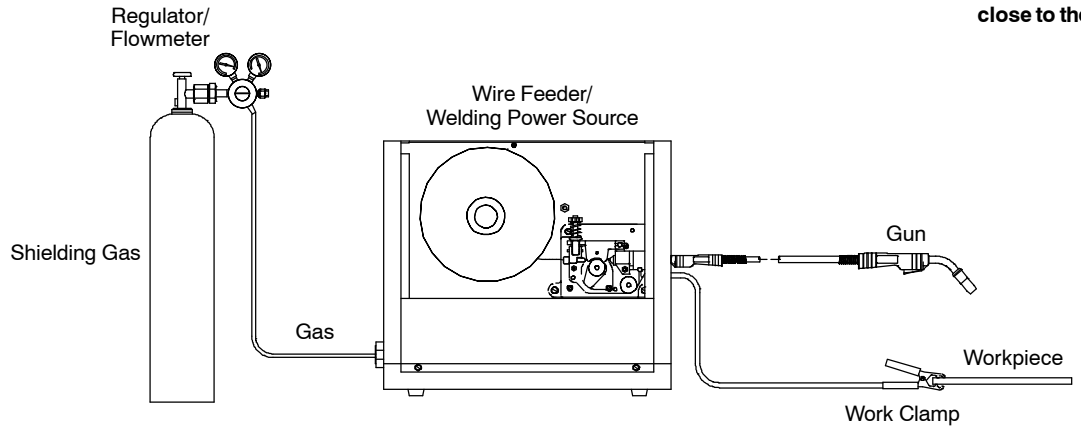
SECTION 11 – GMAW WELDING (MIG) GUIDELINES

11-1. Typical GMAW (MIG) Process Connections

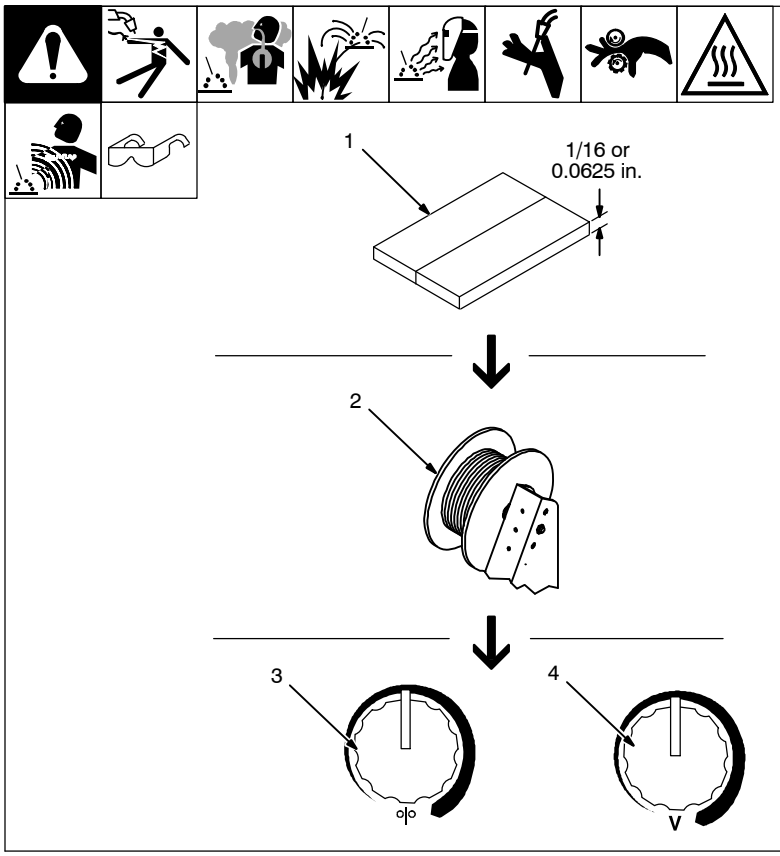


Weld current can damage electronic parts in vehicles. Disconnect both battery cables before welding on a vehicle. Place work clamp as close to the weld as possible.



GMAW1 2018–12 (GMAW Only) – Ref. 801909-A

11-2. 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
0.0625 in. (1.59 mm) ÷ 0.001 = 62.5 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

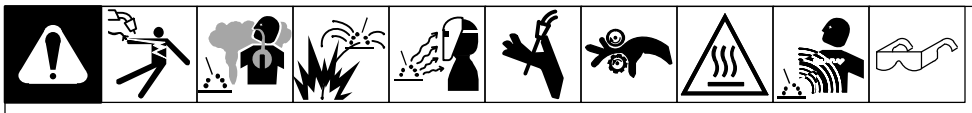
Voltage controls height and width of weld bead.

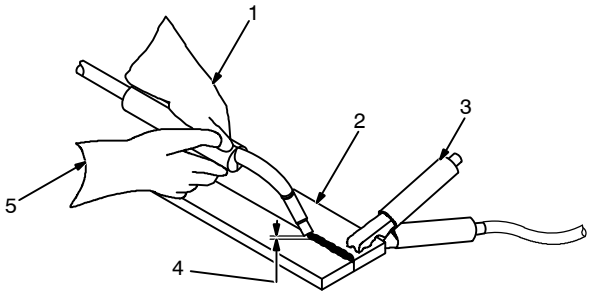
Low Voltage: wire stubs into work
High Voltage: arc is unstable (spatter)

Set voltage midway between high and low voltage.

Wire Size	Amperage Range	Recommended Wire Feed Speed	Wire Feed Speed*
0.023 in. (0.58 mm)	30–90 A	3.5 in. (89 mm) per amp	3.5 x 62.5 A = 219 ipm (5.56 mpm)
0.030 in. (0.76 mm)	40–145 A	2 in. (51 mm) per amp	2 x 62.5 A = 125 ipm (3.19 mpm)
0.035 in. (0.89 mm)	50–180 A	1.6 in. (41 mm) per amp	1.6 x 62.5 A = 100 ipm (2.56 mpm)
*62.5 A based on 1/16 in. (1.6 mm) material thickness.		ipm = inches per minute; mpm = meters per minute	

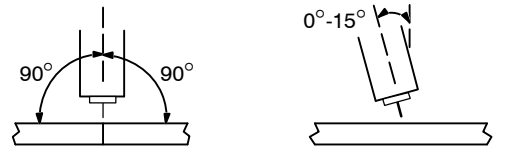
11-3. Holding And Positioning Welding Gun





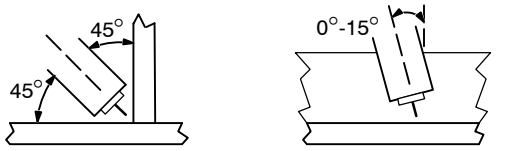
☞ *Welding wire is energized when gun trigger is pressed. Before lowering helmet and pressing trigger, be sure wire is no more than 1/2 in. (13 mm) past end of nozzle, and tip of wire is positioned correctly on seam.*

1 Hold Gun and Control Gun Trigger
2 Workpiece
3 Work Clamp
4 Electrode Extension (Stickout) Solid Wire – 3/8 to 1/2 in. (9 to 13 mm)
5 Cradle Gun and Rest Hand on Workpiece



End View of Work Angle — Side View of Gun Angle

Groove Welds

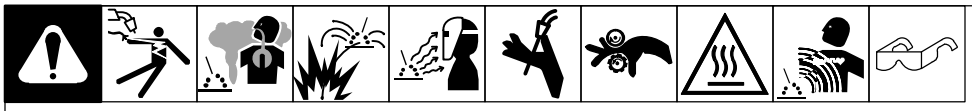


End View of Work Angle — Side View of Gun Angle

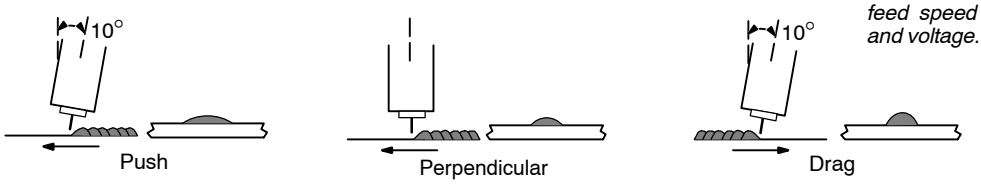
Fillet Welds

S-0421-A

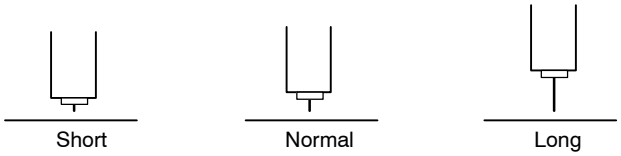
11-4. Conditions That Affect Weld Bead Shape



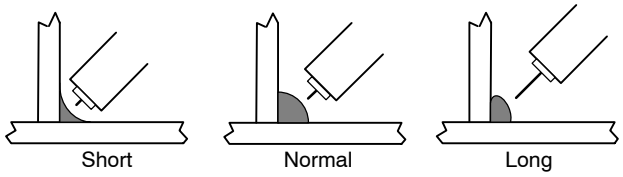
☞ *Weld bead shape depends on gun angle, direction of travel, electrode extension (stickout), travel speed, thickness of base metal, wire feed speed (weld current), and voltage.*



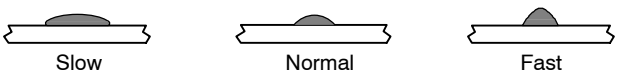
Gun Angles And Weld Bead Profiles



Electrode Extensions (Stickout)



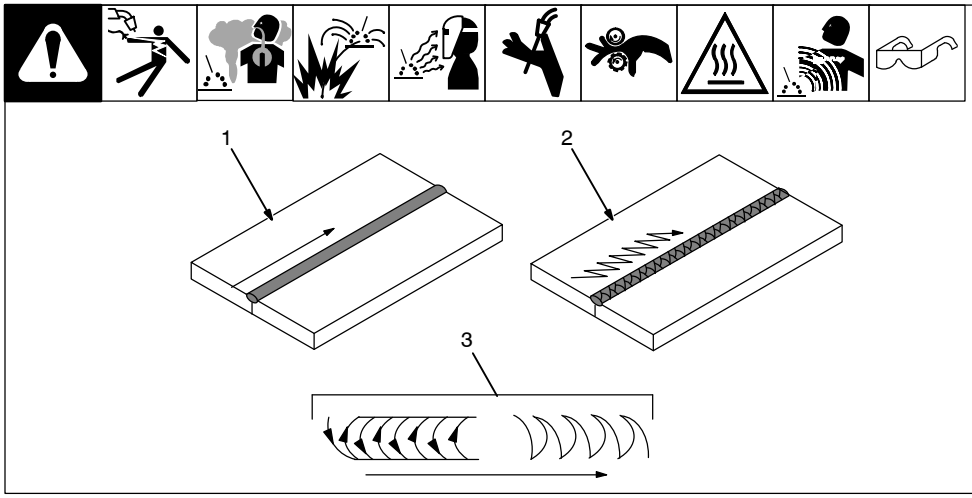
Fillet Weld Electode Extensions (Stickout)



Gun Travel Speed

S-0634

11-5. 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 Movement Along Seam

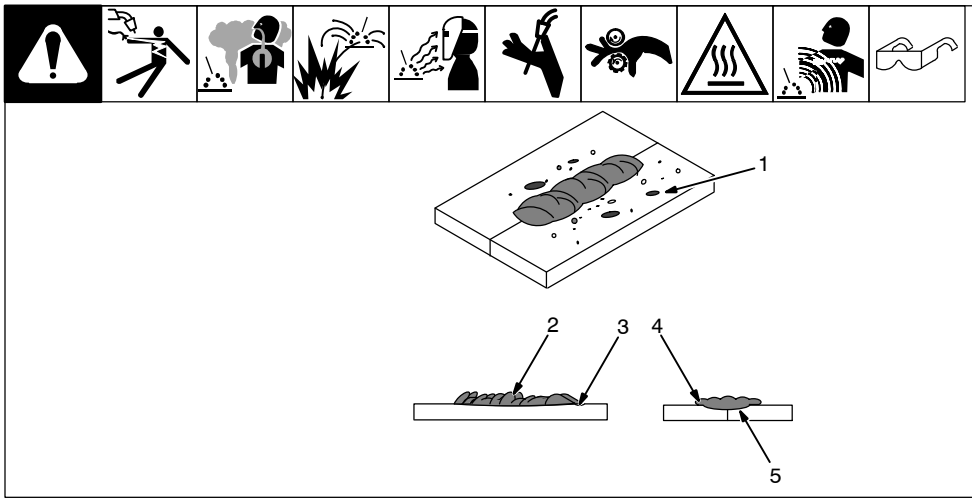
2 Weave Bead – Side To Side Movement Along Seam

3 Weave Patterns

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

S-0054-A

11-6. Poor Weld Bead Characteristics



1 Large Spatter Deposits

2 Rough, Uneven Bead

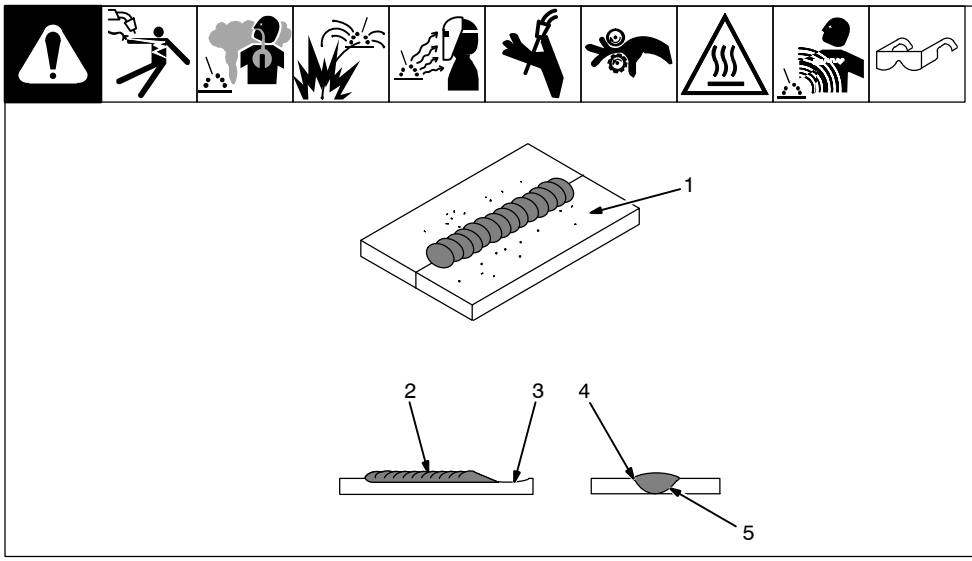
3 Slight Crater During Welding

4 Bad Overlap

5 Poor Penetration

S-0053-A

11-7. Good Weld Bead Characteristics



1 Fine Spatter

2 Uniform Bead

3 Moderate Crater During Welding

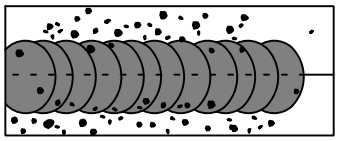
Weld a new bead or layer for each 1/8 in. (3.2 mm) thickness in metals being welded.

4 No Overlap

5 Good Penetration into Base Metal

S-0052-B

11-8. Troubleshooting – Excessive Spatter

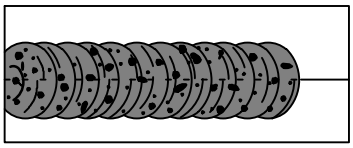


Excessive Spatter – scattering of molten metal particles that cool to solid form near weld bead.

S-0636

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.
Incorrect polarity.	Check polarity required by welding wire, and change to correct polarity at welding power source.

11-9. Troubleshooting – Porosity

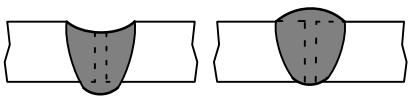


Porosity – small cavities or holes resulting from gas pockets in weld metal.

S-0635

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.
	Place nozzle 1/4 to 1/2 in. (6-13 mm) from workpiece.
	Hold gun near bead at end of weld until molten metal solidifies.
Wrong gas.	Use welding grade shielding gas; change to different gas.
Dirty welding wire.	Use clean, dry welding wire.
	Eliminate pick up of oil or lubricant on welding 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 welding wire (contact supplier).
Welding wire extends too far out of nozzle.	Be sure welding wire extends not more than 1/2 in. (13 mm) beyond nozzle.

11-10. Troubleshooting – Excessive Penetration



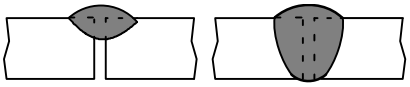
Excessive Penetration Good Penetration

Excessive Penetration – weld metal melting through base metal and hanging underneath weld.

S-0639

Possible Causes	Corrective Actions
Excessive heat input.	Select lower voltage range and reduce wire feed speed.
	Increase travel speed.

11-11. Troubleshooting – Lack Of Penetration

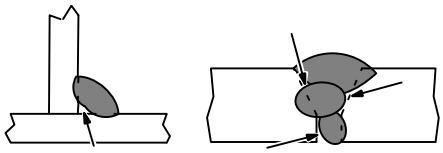


Lack Of Penetration – shallow fusion between weld metal and base metal.

S-0638

Possible Causes	Corrective Actions
Improper joint preparation.	Material too thick. Joint preparation and design must provide access to bottom of groove while maintaining proper welding wire extension and arc characteristics.
Improper weld technique.	Maintain normal gun angle of 0 to 15 degrees to achieve maximum penetration.
	Keep arc on leading edge of weld puddle.
	Be sure welding wire extends not more than 1/2 in. (13 mm) beyond nozzle.
Insufficient heat input.	Select higher wire feed speed and/or select higher voltage range.
	Reduce travel speed.
Incorrect polarity.	Check polarity required by welding wire, and change to correct polarity at welding power source.

11-12. Troubleshooting – Incomplete Fusion

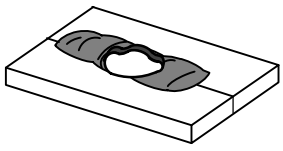


Incomplete Fusion – failure of weld metal to fuse completely with base metal or a preceeding weld bead.

S-0637

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 range and/or adjust wire feed speed.
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.
	Keep arc on leading edge of weld puddle.
	Use correct gun angle of 0 to 15 degrees.

11-13. Troubleshooting – Burn-Through

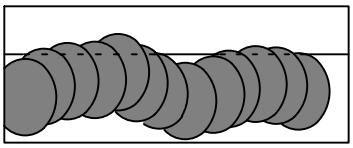


Burn-Through – weld metal melting completely through base metal resulting in holes where no metal remains.

S-0640

Possible Causes	Corrective Actions
Excessive heat input.	Select lower voltage range and reduce wire feed speed.
	Increase and/or maintain steady travel speed.

11-14. Troubleshooting – Waviness Of Bead

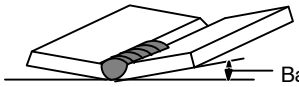


Waviness Of Bead – weld metal that is not parallel and does not cover joint formed by base metal.

S-0641

Possible Causes	Corrective Actions
Welding wire extends too far out of nozzle.	Be sure welding wire extends not more than 1/2 in. (13 mm) beyond nozzle.
Unsteady hand.	Support hand on solid surface or use two hands.

11-15. Troubleshooting – Distortion



Distortion – contraction of weld metal during welding that forces base metal to move.

S-0642

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.

Notes

11-16. Common GMAW (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 Circuiting Steel**	**GMAW-P Steel**	**Spray Arc Stainless Steel**	**Short Circuiting Stainless Steel**	**GMAW-P Stainless Steel**	**Spray Arc Aluminum**	**Short Circuiting Aluminum**	**GMAW-P Aluminum**
Argon			All Positions				All Positions	All Positions	All Positions
Argon + 1% O_2	Flat & Horizontal Fillet		All Positions	Flat & Horizontal Fillet					
Argon + 2% O_2	Flat & Horizontal Fillet		All Positions	Flat & Horizontal Fillet					
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							
Argon + 50% CO_2		All Positions							
CO_2		All Positions							
Helium							All Positions[1]		
Argon + Helium							All Positions[1]		
90% HE + 7-1/2% AR + 2-1/2% CO_2					All Positions				
65% AR + 33% HE + 2% CO_2						All Positions			

1 Heavy Thicknesses

11-17. Troubleshooting Guide For Semiautomatic Welding Equipment

Problem	Probable Cause	Remedy
Wire feed motor operates, but wire does not feed.	Too little pressure on wire feed rolls.	Increase pressure setting on wire feed rolls.
	Incorrect wire feed rolls.	Check size stamped on wire feed rolls, replace to match wire size and type if necessary.
	Wire spool brake pressure 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 wire feed rolls.	Decrease pressure setting on wire feed rolls.
	Incorrect cable liner or gun contact tip size.	Check size of contact tip and check cable 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 wire feed rolls.
	Dirty or damaged (kinked) liner.	Replace liner.
Wire feeds, but no gas flows.	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 wire feed rolls. Replace worn drive rolls if necessary.
	Wrong size gun liner or contact tip.	Match liner and contact tip 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.

Notes

Notes

Notes

Warranty Questions?

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

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TRUE BLUE® WARRANTY

Effective January 1, 2020
(Equipment with a serial number preface of NA or newer)

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

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. LLC, Appleton, Wisconsin, warrants to authorized distributors that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

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

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 end-user purchaser, or 12 months after the equipment is shipped to a North American distributor, or 18 months after the equipment is shipped to an international distributor, whichever occurs first.

1. 5 Years Parts — 3 Years Labor
   * Original Main Power Rectifiers Only to Include SCRs, Diodes, and Discrete Rectifier Modules
2. 3 Years — Parts and Labor Unless Specified
   * Auto-Darkening Helmet Lenses (No Labor) (See Classic Series Exception Below)
   * Engine Driven Welder/Generators **(NOTE: Engines are Warranted Separately by the Engine Manufacturer.)**
   * Insight Welding Intelligence Products (Except External Sensors)
   * Inverter Power Sources
   * Plasma Arc Cutting Power Sources
   * Process Controllers
   * Semi-Automatic and Automatic Wire Feeders
   * Transformer/Rectifier Power Sources
3. 2 Years — Parts and Labor
   * Auto-Darkening Helmet Lenses – Classic Series Only (No Labor)
   * Auto-Darkening Weld Masks (No Labor)
   * Fume Extractors – Capture 5, Filtair 400 and Industrial Collector Series
4. 1 Year — Parts and Labor Unless Specified
   * ArcReach Heater
   * AugmentedArc and LiveArc Welding Systems
   * Automatic Motion Devices
   * Bernard BTB Air-Cooled MIG Guns (No Labor)
   * CoolBelt (No Labor)
   * Desiccant Air Dryer System
   * Field Options **(NOTE: Field options are covered for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)**
   * RFCS Foot Controls (Except RFCS-RJ45)
   * Fume Extractors – Filtair 130, MWX and SWX Series, ZoneFlow Extraction Arms and Motor Control Box
   * HF Units
   * ICE/XT Plasma Cutting Torches (No Labor)
   * Induction Heating Power Sources, Coolers **(NOTE: Digital Recorders are Warranted Separately by the Manufacturer.)**
   * Load Banks
   * Motor-Driven Guns (except Spoolmate Spoolguns)
   * PAPR Blower Unit (No Labor)
   * Positioners and Controllers
   * Racks (For Housing Multiple Power Sources)
   * Running Gear/Trailers
   * Subarc Wire Drive Assemblies
   * Supplied Air Respirator (SAR) Boxes and Panels
   * TIG Torches (No Labor)
   * Tregaskiss Guns (No Labor)
   * Water Cooling Systems
   * Wireless Remote Foot/Hand Controls and Receivers
   * Work Stations/Weld Tables (No Labor)
5. 6 Months — Parts
   * Batteries
6. 90 Days — Parts
   * Accessories (Kits)
   * ArcReach Heater Quick Wrap and Air Cooled Cables
   * Canvas Covers
   * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
   * MDX Series MIG Guns
   * M-Guns
   * MIG Guns, Subarc (SAW) Torches, and External Cladding Heads
   * Remote Controls and RFCS-RJ45
   * Replacement Parts (No labor)
   * Spoolmate Spoolguns

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

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, relays, work station table tops and welding curtains, or parts that fail due to normal wear. (Exception: brushes and relays are covered on all engine-driven products.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.
4. Defects caused by accident, unauthorized repair, or improper testing.

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

The above remedies are F.O.B. Appleton, WI, or 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 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 MILLER.

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Owner's Record

Please complete and retain with your personal records.

Model Name	Serial/Style Number
Purchase Date	(Date which equipment was delivered to original customer.)
Distributor	
Address	
City	
State	Zip

Register your product at www.millerwelds.com/support/product–registration

For Service

Contact a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables Options and Accessories Personal Protective Equipment (PPE) Service and Repair Replacement Parts Training (Schools, Videos, Books) Welding Process Handbooks To locate a Distributor or Service Agency visit www.millerwelds.com or call 1-800-4-A-Miller
Contact the Delivering Carrier to:	File a claim for loss or damage during shipment. For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

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