Millermatic® 252

OWNER’S MANUAL

File: MIG (GMAW)

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From Miller to You

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

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

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

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

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.
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SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

Protect yourself and others from injury — read and follow these precautions.

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.

This group of symbols means Warning! Watch Out! ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Arc Welding Hazards

The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.

Only qualified persons should install, operate, maintain, and repair this unit.

During operation, keep everybody, especially children, away.

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

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

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.

HOT PARTS can burn.

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.
FUMES AND GASES can be hazardous.
Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove welding fumes and gases.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Material Safety Data Sheets (MSDSs) and the manufacturer’s instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

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

- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather, heavy cotton, or wool) and foot protection.

WELDING can cause fire or explosion.
Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Do not weld where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Do not weld where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.

- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or bypass them.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.

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

BUILDUP OF GAS can injure or kill.
- Shut off compressed gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.

ELECTRIC AND MAGNETIC FIELDS (EMF) can affect Implanted Medical Devices.
- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.

NOISE can damage hearing.
Noise from some processes or equipment can damage hearing.
- Wear approved ear protection if noise level is high.

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

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct compressed gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.
1-3. Additional Symbols For Installation, Operation, And Maintenance

FIRE OR EXPLOSION hazard.
- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.

FALLING EQUIPMENT can injure.
- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.
- Keep equipment (cables and cords) away from moving vehicles when working from an aerial location.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94–110) when manually lifting heavy parts or equipment.

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

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

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

MOVING PARTS can injure.
- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

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

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

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

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

ARC WELDING can cause interference.
- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.
1-4. California Proposition 65 Warnings

⚠️ Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

⚠️ Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.

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

For Gasoline Engines:

⚠️ Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

For Diesel Engines:

⚠️ Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

1-5. Principal Safety Standards


Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 4221 Walney Road, 5th Floor, Chantilly, VA 20151 (phone: 703-788-2700, website: www.cganet.com).


1-6. EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). Welding current creates an EMF field around the welding circuit and welding equipment. EMF fields may interfere with some medical implants, e.g. pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, access restrictions for passers-by or 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

⚠️ Se protéger et protéger les autres contre le risque de blessure — lire et respecter ces consignes.

2-1. Symboles utilisés

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

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

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

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

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

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

UNE DÉCHARGE ÉLECTRIQUE peut entraîner la mort.

Le contact d’organes élec triques 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 servir de source électrique à courant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
– Se servir d’une source électrique à courant électrique UNIQUEMENT si le procédé de soudage le demande.
– Si l’utilisation d’une source électrique à courant électrique s’avère nécessaire, se servir de la fonction de télécommande si l’appareil en est équipé.
– D’autres consignes de sécurité sont nécessaires dans les conditions suivantes : risques électriques dans un environnement humide ou si l’on porte des vêtements mouillés ; sur des structures métalliques telles que sols, grilles ou échauffadages ; en position coincée comme asisse, à genoux ou couchée ; où s’il y a un risque élevé de contact inévit able 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 !
– Installer le poste correctement et le mettre à la terre convenablement selon les consignes du manuel de l’opérateur et les normes nationales, provinciales et locales.
– Toujours vérifier la terre du cordon d’alimentation. Vérifier et s’assurer que le fil de terre du cordon d’alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
– En effectuant les raccordements d’entrée, fixer d’abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
– Les câbles doivent être exempts d’humidité, d’huile et de graisse ; protégez-les contre les étincelles et les pièces métalliques chaudes.
– Vérifier fréquemment le cordon d’alimentation afin de s’assurer qu’il n’est pas altéré ou à nu, le remplacer immédiatement s’il l’est. Un fil à nu peut entraîner la mort.
– L’équipement doit être hors tension lorsqu’il n’est pas utilisé.
– Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
– Ne pas enrouler les câbles autour du corps.
– Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct.
– Ne pas toucher l’électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d’une autre machine.
– Ne pas toucher des porte électrodes connectés à deux machines en même temps à cause de la présence d’une tension à vide doublée.
– N’utiliser qu’un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l’appareil conformément à ce manuel.
– Porter un harnais de sécurité si l’on doit travailler au-dessus du sol.
– S’assurer que tous les panneaux et couvercles sont correctement en place.
– Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
– Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.
– Ne pas raccorder plus d’une électrode ou plus d’un câble de masse à une même borne de sortie de soudage.
Il reste une TENSION DC NON NÉGLIGENCEABLE dans les sources de soudage onduleur UNE FOIS l’alimentation coupée.

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

**LES PIÈCES CHAUDES peuvent provoquer des brûlures.**

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

**LE SOUTAGE 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 soudage. La projection d’étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l’électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s’assurer que l’endroit ne présente pas de danger.

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

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

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

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- À l’intérieur, ventiler la zone et/ou utiliser une ventilation forcée au niveau de l’arc pour l’évacuation des fumées et des gaz de soudage.
- Si la ventilation est médiocre, porter un respirateur anti-vapeurs approuvé.
- Lire et comprendre les spécifications de sécurité des matériaux consommables, les revêtements, les nettoyants et les dégraissants.
- Travailler dans un espace fermé seulement si l’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 fumées 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.
- Ne pas souder dans des endroits proches des opérations de coupe par feuille d’oxygène provoquant des blessures ou des accidents mortels.
- Ne pas augmenter leur puissance; ne pas les porter.

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

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

- Porter un casque de soudage approuvé muni de verres filtrants 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 éblouissants et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l’arc.
- Porter des vêtements confectionnés avec des matières résistantes et ignifuges (cuir, coton lourd ou laine) et des bottes de protection.

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

- Le soudage, l’écaillage, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.
LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.
- Fermer l’alimentation du gaz comprimé en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d’un respirateur d’adduction d’air homologué.

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

Les CHAMPS ÉLECTROMAGNÉTIQUES (CEM) peuvent affecter les implants médicaux.
- Les porteurs de stimulateurs cardiaques et autres 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.

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

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

LA CHUTE DE L’ÉQUIPEMENT peut provoquer des blessures.
- Utiliser l’anneau de levage uniquement pour soulever l’appareil, NON PAS les chariots, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un équipement de levage de capacité suffisante pour lever l’appareil.
- En utilisant des fourches de levage pour déplacer l’unité, s’assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l’appareil.
- Tenir l’équipement (câbles et cordons) à distance des véhicules mobiles lors de toute opération en hauteur.
- Suivre les consignes du Manuel des applications pour l’équation de levage NIOSH révisée (Publication N°94–110) lors du levage manuel 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 spectre de la source avant de poursuivre le soudage.

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

LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.
- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimés.
Les PIÈCES MOBILES peuvent causer des blessures.
- Ne pas s’approcher des organes mobiles.
- Ne pas s’approcher des points de coinement 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.

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.
- N’utiliser que les pièces de rechange recommandées par le constructeur.
- Effectuer l’entretien en respectant les manuels d’utilisation, les normes industrielles et les codes nationaux, d’état et locaux.

2-4. Proposition californienne 65 Avertissements

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

⚠️ Les batteries, les bornes et autres accessoires contiennent du plomb et des composés à base de plomb, produits chimiques dont l’État de Californie reconnaît qu’ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation. Se laver les mains après manipulation.

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

Pour les moteurs à essence :

⚠️ Les gaz d’échappement des moteurs contiennent des produits chimiques dont l’État de Californie reconnaît qu’ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation.

Pour les moteurs diesel :

⚠️ Les gaz d’échappement des moteurs diesel et certains de leurs composants sont reconnus par l’État de Californie comme provoquant des cancers et des malformations congénitales ou autres problèmes de procréation.
2-5. Principales normes de sécurité


Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, de Compressed Gas Association, 4221 Walney Road, 5th Floor, Chantilly, VA 20151 (téléphone : 703-788-2700, site Internet : www.cganet.com).


Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, de American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (téléphone : 212-642-4900, site Internet : www.ansi.org).


2-6. Informations relatives aux CEM

Le courant électrique qui traverse tout conducteur génère des champs électromagnétiques (CEM) à certains endroits. Le courant de soudage crée un CEM autour du circuit et du matériel de soudage. Les CEM peuvent créer des interférences avec certains implants médicaux comme des stimulateurs cardiaques. Des mesures de protection pour les porteurs d’implants médicaux doivent être prises: par exemple, des restrictions d’accès pour les passants ou une évaluation individuelle des risques 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. Symbols And Definitions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire Feed</td>
<td>Output</td>
</tr>
<tr>
<td>X</td>
<td>Duty Cycle</td>
</tr>
<tr>
<td>Do Not Switch While Welding</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Volts</td>
</tr>
<tr>
<td>Increase</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>On</td>
</tr>
<tr>
<td>Off</td>
<td></td>
</tr>
<tr>
<td>Gas Metal Arc Welding (GMAW) Gun</td>
<td></td>
</tr>
<tr>
<td>Wire Feed Spool Gun</td>
<td></td>
</tr>
<tr>
<td>Gas Input</td>
<td></td>
</tr>
<tr>
<td>Gas Output</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Voltage Input</td>
</tr>
<tr>
<td>Press To Reset</td>
<td></td>
</tr>
<tr>
<td>U₀</td>
<td>Rated No-Load Voltage (Average)</td>
</tr>
</tbody>
</table>

SECTION 4 – SPECIFICATIONS

4-1. Power Source Specifications

<table>
<thead>
<tr>
<th>Rated Output</th>
<th>Max. Open Circuit Voltage</th>
<th>Amps Input at Rated Output (60% Duty Cycle), 60 Hz, Single-Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 A at 28 VDC, 40% Duty Cycle</td>
<td>38</td>
<td>2.3*</td>
</tr>
<tr>
<td>200 A at 28 VDC, 60% Duty Cycle</td>
<td>48</td>
<td>2*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wire Type and Diameter</th>
<th>Wire Feed Speed</th>
<th>Dimensions</th>
<th>Net Weight Without Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Steel</td>
<td>.023 – .045 in. (0.6 – 1.2 mm)</td>
<td>50–700 IPM (1.3–17.8 m/min)</td>
<td>H: 30 in. (762 mm) W: 19 in. (483 mm) D: 40 in. (1016 mm)</td>
</tr>
<tr>
<td>Stainless Steel</td>
<td>.023 – .045 in. (0.6 – 1.2 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flux Cored</td>
<td>.030 – .045 in. (0.8 – 1.2 mm)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* While idling

Operating Temperature Range – –20C to +40C

Storage Temperature Range – -30C to + 50C
### 4-2. Welding Power Source Duty Cycle And Overheating

Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating. If unit overheats, Thermistor (RT1) opens, output stops, and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or voltage, or duty cycle before welding.

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

#### Overheating

- **60% Duty Cycle At 200 Amperes**
  - 6 Minutes Welding
  - 4 Minutes Resting

- **40% Duty Cycle At 250 Amperes**
  - 4 Minutes Welding
  - 6 Minutes Resting

#### Volt-Ampere Curves

1 Normal Volt-Ampere Curves

The volt-ampere curves show the normal minimum and maximum voltage and amperage output capabilities of the welding power source. Curves of other settings fall between the curves shown.
SECTION 5 – INSTALLATION

5-1. Serial Number And Rating Label Location

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

5-2. Selecting A Location

 loc_2 3/96 - Ref. 804 912-A

1 Line Disconnect Device
Locate unit near correct input power supply.

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

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

![Diagram of selecting a location with labels and arrows indicating 18 in. (460 mm) clearance on all sides.]

⚠️ Tipping

18 in.
(460 mm)

18 in.
(460 mm)
### 5-3. Weld Output Terminals And Selecting Cable Sizes

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

- Turn off power before connecting to weld output terminals.
- Do not use worn, damaged, undersized, or poorly spliced cables.

#### Weld Output Terminals

<table>
<thead>
<tr>
<th>Welding Amperes</th>
<th>10 – 60% Duty Cycle AWG (mm²)</th>
<th>60 – 100% Duty Cycle AWG (mm²)</th>
<th>10 – 100% Duty Cycle AWG (mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100 ft (30 m) or Less</td>
<td>150 ft (45 m)</td>
<td>200 ft (60 m)</td>
</tr>
<tr>
<td>100</td>
<td>4 (20)</td>
<td>4 (20)</td>
<td>3 (30)</td>
</tr>
<tr>
<td>150</td>
<td>3 (30)</td>
<td>3 (30)</td>
<td>2 (35)</td>
</tr>
<tr>
<td>200</td>
<td>3 (30)</td>
<td>2 (35)</td>
<td>1 (50)</td>
</tr>
<tr>
<td>250</td>
<td>2 (35)</td>
<td>1 (50)</td>
<td>1/0 (60)</td>
</tr>
<tr>
<td>300</td>
<td>1 (50)</td>
<td>1/0 (60)</td>
<td>2/0 (70)</td>
</tr>
<tr>
<td>350</td>
<td>1/0 (60)</td>
<td>2/0 (70)</td>
<td>3/0 (95)</td>
</tr>
</tbody>
</table>

*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.

( ) = mm² for metric use

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

Ref. S-0007-G 2009–08
5-4. Connecting To Weld Output Terminals

- **Warning:** Turn off power before connecting to weld output terminals.
- **Warning:** Failure to properly connect weld cables may cause excessive heat and start a fire, or damage your machine.

| 1 | Weld Output Terminal |
| 2 | Supplied Weld Output Terminal Nut |
| 3 | Weld Cable Terminal |
| 4 | Copper Bar |

Remove supplied nut from weld output terminal. Slide weld cable terminal onto weld output terminal and secure with nut so that weld cable terminal is tight against copper bar. Do not place anything between weld cable terminal and copper bar. Make sure that the surfaces of the weld cable terminal and copper bar are clean.

**Tools Needed:** 3/4 in. (19 mm)

![Correct Installation](image1)

![Incorrect Installation](image2)

5-5. Installing Work Cable And Clamp

- **Warning:** Turn off power before connecting to weld output terminals.

| 1 | Work Cable |
| 2 | Boot |
| 3 | Negative (−) Output Terminal |

Route cable through front panel opening. Slide boot onto work cable. Connect cable to terminal and cover connection with boot. Close door.

**Tools Needed:** 3/4 in.
5-6. Connecting Spoolmatic® 15A Or 30A Gun

1. Gun Trigger Plug
   Insert plug into receptacle, and tighten threaded collar.

2. Weld Cable

3. Shielding Gas Hose
   Route weld cable through opening in front panel.
   Route gas hose along side panel.

4. Positive Weld Output Terminal
   Connect weld cable to weld output terminal.

5. Regulator/Flowmeter
   Route shielding gas hose up to regulator/flowmeter. Connect gas hose to fitting on regulator/flowmeter.

Two welding guns may be connected to the welding power source at the same time, but only one welding gun may be in use at any one time. If the triggers of both welding guns are pulled at the same time, the weld output and wirefeed motor are disabled.

Tools Needed:
3/4, 5/8 in.
5-7. Connecting XR Aluma-Pro, XR Edge, XR-A Gun, Or XR-A Python

- XR Edge guns prior to serial no. LE079101 require an adapter cord (part no. 195 498).

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.

- If Aluma-Pro push/pull gun has a listed SUP value, set the power source to match the SUP value (see Section 6-5).

Be sure to trim liner to proper extension.
5-8. Setting Gun Polarity For Wire Type

**Changing Polarity**

Wire Drive Assembly Lead

Work Clamp Lead

+ Positive Terminal  − Negative Terminal

Shown as shipped – **Electrode Positive** (DCEP): For solid steel, stainless steel, aluminum, or flux core with gas wires (GMAW).

**Electrode Negative** (DCEN): Reverse lead connections at terminals from that shown above for gasless flux core wires (FCAW). Drive assembly becomes negative.

5-9. Installing Gas Supply

**Tools Needed:**

1. Cap
2. Cylinder Valve
3. Cylinder
4. Regulator/Flowmeter
5. Regulator/Flowmeter Gas Hose Connection
6. Welding Power Source Gas Hose Connection
7. Flow Adjust
8. CO2 Adapter (Customer Supplied)
9. O-Ring (Customer Supplied)

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
3. Cylinder
4. Regulator/Flowmeter
5. Regulator/Flowmeter Gas Hose Connection
6. Welding Power Source Gas Hose Connection
7. Flow Adjust
8. CO2 Adapter (Customer Supplied)
9. O-Ring (Customer Supplied)

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

Typical flow rate is 20 cfh (cubic feet per hour). Check wire manufacturer's recommended flow rate.

8. CO2 Adapter (Customer Supplied)
9. O-Ring (Customer Supplied)

Install adapter with O-ring between regulator/flowmeter and CO2 cylinder.
5-10. Installing Wire Spool And Adjusting Hub Tension

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

Use compression spring with 8 in. (200 mm) spools.

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.

Order extra spring Part No. 186 437

Tools Needed:
- 15/16 in.

5-11. Positioning Jumper Links

Check input voltage available at site.
1 Jumper Links Access Door
Open door.
2 Jumper Link Label
Check label – only one is on unit.
3 Input Voltage Jumper Links
Move jumper links to match input voltage.
Close and secure access door.
## 5-12. Electrical Service Guide

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

<table>
<thead>
<tr>
<th></th>
<th>200</th>
<th>230</th>
<th>400</th>
<th>460</th>
<th>575</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Voltage (V)</strong></td>
<td>200</td>
<td>230</td>
<td>400</td>
<td>460</td>
<td>575</td>
</tr>
<tr>
<td><strong>Input Amperes (A) At Rated Output</strong></td>
<td>48</td>
<td>46</td>
<td>24</td>
<td>23</td>
<td>18</td>
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<tr>
<td><strong>Max Recommended Standard Fuse Rating In Amperes</strong></td>
<td>60</td>
<td>50</td>
<td>30</td>
<td>25</td>
<td>20</td>
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<tr>
<td><strong>Time-Delay Fuses</strong></td>
<td>60</td>
<td>50</td>
<td>30</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td><strong>Normal Operating Fuses</strong></td>
<td>70</td>
<td>60</td>
<td>35</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td><strong>Min Input Conductor Size In AWG</strong></td>
<td>8</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td><strong>Max Recommended Input Conductor Length In Feet (Meters)</strong></td>
<td>96</td>
<td>127</td>
<td>156</td>
<td>206</td>
<td>209</td>
</tr>
<tr>
<td></td>
<td>(29)</td>
<td>(39)</td>
<td>(47)</td>
<td>(63)</td>
<td>(64)</td>
</tr>
<tr>
<td><strong>Min Grounding Conductor Size In AWG</strong></td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>12</td>
<td>14</td>
</tr>
</tbody>
</table>

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

1. If a circuit breaker is used in place of a fuse, choose a circuit breaker with time-current curves comparable to the recommended fuse.
2. “Time-Delay” fuses are UL class “RK5”. See UL 248.
3. “Normal Operating” (general purpose - no intentional delay) fuses are UL class “K5” (up to and including 60 amp), and UL class “H” (65 amp and above).
4. Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.15(B)(16). If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.
5-13. Connecting Input Power

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.

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)]
3 Input Power Cord. Connect directly to line disconnect device if hard wiring is required.
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 5-12 (fused disconnect switch shown).
Connect plug to receptacle if hard wiring method is not used.
Close and secure door on disconnect device. Remove lockout/tagout device, and place switch in the On position.
5-14. Threading Welding Wire

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:

- 6 in. (150 mm)

Hold wire tightly to keep it from unraveling.

Open pressure assembly. 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.

Close and tighten pressure assembly, and let go of wire. Remove gun nozzle and contact tip. Turn On.

Press gun trigger 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.

Ref. 804 913-A
5-15. Weld Parameters

## Selecting Wire, Gas and Control Settings

<table>
<thead>
<tr>
<th>Material</th>
<th>Suggested Wire Types</th>
<th>Suggested Shielding Gases And Flow Rate</th>
<th>Wire Sizes (Diameters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEEL</td>
<td>Solid(or hard) ER70s-6</td>
<td>75% Ar/25% CO₂, 25 cfm (Ar/CO₂ produces less spatter-better overall appearance)</td>
<td>0.023” (0.6mm)</td>
</tr>
<tr>
<td></td>
<td>Solid(or hard) ER70s-6</td>
<td>100% CO₂, 25 cfm</td>
<td>0.030” (0.8mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.035” (0.9mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.045” (1.1mm)</td>
</tr>
<tr>
<td>STEEL</td>
<td>Flux core E71T-1</td>
<td>100% CO₂, 25 cfm</td>
<td>0.035” (0.9mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.045” (1.1mm)</td>
</tr>
<tr>
<td>STAINLESS STEEL</td>
<td>Stainless Steel ER 308, ER 308L, ER 308LSi</td>
<td>Tri-Mix, 35 cfm (90% He/7.5% Ar/2.5% CO₂)</td>
<td>0.023” (0.6mm)</td>
</tr>
<tr>
<td></td>
<td>Aluminum 4043 ER</td>
<td>100% Ar, 25 cfm</td>
<td>0.030” (0.8mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.035” (0.9mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.047” (1.2mm)</td>
</tr>
</tbody>
</table>

*A complete Parts List is available at www.MillerWelds.com*
<table>
<thead>
<tr>
<th>1/2&quot; (12.7 mm)</th>
<th>3/8&quot; (9.5 mm)</th>
<th>1/4&quot; (6.4 mm)</th>
<th>3/16&quot; (4.8 mm)</th>
<th>1/8&quot; (3.2 mm)</th>
<th>14 ga. (2.0 mm)</th>
<th>18 ga. (1.2 mm)</th>
<th>22 ga. (0.8 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>—</td>
<td>—</td>
<td>—</td>
<td>20.0/480</td>
<td>18.3/350</td>
<td>18.0/240</td>
<td>17.0/190</td>
<td>15.8/125</td>
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<tr>
<td>—</td>
<td>24.3/500</td>
<td>21.0/400</td>
<td>19.0/290</td>
<td>18.0/250</td>
<td>17.3/200</td>
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<td>29.5/515</td>
<td>26.0/475</td>
<td>21.0/375</td>
<td>18.4/265</td>
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<td>16.5/190</td>
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<td>28.0/300</td>
<td>20.0/225</td>
<td>17.5/195</td>
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<td>16.5/165</td>
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<td>21.5/330</td>
<td>20.0/235</td>
<td>19.0/180</td>
<td>18.7/140</td>
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<tr>
<td>—</td>
<td>23.8/325</td>
<td>22.4/290</td>
<td>20.8/245</td>
<td>20.1/190</td>
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<td>18.6/100</td>
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<tr>
<td>—</td>
<td>23.6/325</td>
<td>22.2/290</td>
<td>20.6/245</td>
<td>19.9/190</td>
<td>19.2/145</td>
<td>18.5/100</td>
<td>18.0/88</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>1/4&quot; (6.4 mm)</th>
<th>3/16&quot; (4.8 mm)</th>
<th>1/8&quot; (3.2 mm)</th>
<th>14 ga. (2.0 mm)</th>
<th>18 ga. (1.2 mm)</th>
<th>22 ga. (0.8 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>—</td>
<td>26.0/500</td>
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<td>23.0/325</td>
<td>21.5/270</td>
<td>20.0/235</td>
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<td>—</td>
</tr>
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<td>24.3/380</td>
<td>23.8/350</td>
<td>23.5/300</td>
<td>23.0/275</td>
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<td>—</td>
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</tr>
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<td>—</td>
<td>—</td>
<td>—</td>
<td>21.2/500</td>
<td>20.1/350</td>
<td>19.0/210</td>
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<tr>
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<tr>
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<td>25.0/455</td>
<td>23.5/390</td>
<td>21.7/320</td>
<td>19.5/270</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
6-1. Controls

This unit has three automatic timers included in its operation to help save contact tips, gas, and wire:

Tip Saver – Weld output shuts off if tip is shorted to work surface.
Safety shut-off – Weld output will shut off if no arc is detected within 3 seconds after gun trigger is depressed.
Jog mode – When loading a new roll of wire or if the gun trigger is accidentally pressed, gas will shut off after 1 minute and wire will shut off after 2 minutes saving wire and gas.
**JOG Mode**

If the trigger on either gun is held for more than 3 seconds without striking an arc, the unit will automatically shut off weld power (and shielding gas output on MIG gun only), but will feed wire continuously at the preset wire feed speed (which may be faster or slower than Run−in Speed) until trigger is released.

**Run−in Wire Feed Speed Settings**

Run−in settings for the MIG and Spool Guns are independently set and stored in unit memory. The settings are in percent of the welding wire feed speed preset. Both settings are adjustable from 25 to 150 percent.

MIG Gun Run−in is factory set at 100% which is recommended for most wire sizes and types.

Spool Gun Run−in is factory set at 50% which is recommended for .030 & .035 wire. A Run−in setting of 25% is recommended for .047 wire.

To check Run−in settings, start with the power switch OFF. Press and hold the MIG or Spool Gun Trigger while turning the power switch ON. The unit will power up with both the displays reading 888, then the voltage display will read Run and the wire feed display will read the preset Run−in percentage from memory for the gun selected. To return to the weld mode without making a change, simply release trigger and pull the trigger again momentarily (one second).

To change Run−in settings, start with the power switch OFF. Press and hold the MIG or Spool Gun Trigger while turning the power switch ON. The unit will power up with both the displays reading 888, then the voltage display will read Run and the wire feed display will read the preset Run−in percentage from memory for the gun selected. To change the Run−in value, release the trigger and turn the wire feed control knob (or the wire feed adjustment knob located on the bottom handle of the spool gun) to the desired setting for the selected gun. To return to weld mode after the Run−in speed change, pull the trigger momentarily (one second).
6-2. Voltmeter And Wire Feed Speed Meter Operation

1 Voltmeter
2 Wire Feed Speed Meter

Power Up Status

Both meters display 888 at unit power up. After 0.5 seconds, preset values appear on both meters. The settings for the last active gun used will be the default at initial power up of the unit. If the power is reset to quickly, characters other than 888 may appear. To reset, turn power off for at least 3 seconds, then turn power back on.

Welding Status

When either a MIG gun or spool gun trigger is pressed and a welding arc is established, the voltmeter displays actual weld voltage. When the gun trigger is released and welding arc extinguished, the voltmeter displays the last actual voltage for 5 seconds and then returns to preset voltage. If welding resumes before unit displays preset voltage, actual welding voltage will appear on the voltmeter.

The wire feed speed meter always displays preset wire feed speed (IPM).

Gun Selection

The wire feed speed meter will display preset wire feed speed (IPM) for the appropriate gun selection either MIG, Spool or Push/Pull gun. To preset desired wire feed speed, connect desired gun, press gun trigger for one second, and release trigger. The meter preset will be retained by the meter board until a different gun is connected and preset is performed or the unit is turned off and back on. The settings for the last active gun used will be the default at initial power up of the unit.

6-3. Jog Mode

If the trigger on either gun is held for more than 3 seconds without striking an arc, the unit will automatically shut off weld power (and shielding gas output on MIG or push/pull gun), but will feed wire continuously at the preset wire feed speed (which may be faster or slower than Run−in Speed) until trigger is released. Jog wire feed speed is the same as weld wire feed speed, so any time jog speed is changed, be sure to change back to weld wire feed speed before welding. Jog wire feed speed for the spool gun and push/pull gun is limited to 300 ipm (7.6 m/min).
6-4. Timers

1 Voltage Control
2 Wire Speed Control
3 Voltmeter
4 Wire Feed Speed Meter

To enter the TIMERS menu press and hold the gun trigger while turning on the power switch until the left meter displays (run), then release trigger.

Once in the TIMERS menu, rotate the left knob clockwise (CW) to find the particular item, and rotate the right knob to change the setting.

The following items can be adjusted by rotating the left knob clockwise (CW):

- **Run-in speed** (run) – The speed of the wire prior to the welding arc being struck. The range is from 25 to 150% of wire feed speed (WFS).
- **Preflow** (PrE) – The amount of time that the shielding gas will flow after the trigger is depressed and before the welding arc will be allowed to be active. The range is from 0.0 to 5.0 seconds.
- **Postflow** (POS) – The amount of time that the shielding gas will flow after the arc has been shut off. The range is from 0.0 to 10.0 seconds.
- **Burnback** (Bur) – The amount of time that the welding wire remains electrically energized after the wire feeding has stopped. The range is from 0.01 to 0.25 seconds.
- **Spot Timer** (SPO) – The amount of time that the arc will be active before it shuts off automatically. The range is from 0 to 120 seconds. Spot timer is reset upon release of welding gun trigger.
- **“Stitch” Timer** (dLY) – 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. The range is from 0 to 120 seconds.

To save settings and exit the TIMERS menu, depress the gun trigger.
Welding wire birdnesting at the welding power source drive rolls may occur if this value is set too high.

6-5. Set Up Push Motor Torque (SUP) Or Reset (rES)

The following items can be adjusted by rotating the left knob counterclockwise (CCW):

**Set up Push Motor Torque (SUP)** – This feature is only active when a push/pull gun is connected to the welding power source. The (SUP) setting will adjust the over-torque limit of the push motor inside the welding power source. The range is 0-250 and the default value is 130. Increasing this setting will increase the over-torque limit and speed up the remote wire feed speed motor.

**Reset (rES)** – Rotate the right knob to select ON. Press and release gun trigger to reset system to factory default values.

1. Voltage Control
2. Wire Speed Control
3. Voltmeter
4. Wire Feed Speed Meter

Depress the gun trigger while turning on the power switch until the left meter displays (Run).

Rotate the left knob counterclockwise (CCW) to find the particular item, and rotate the right knob to change the setting.

If Aluma-Pro push/pull gun has a listed SUP value, set the power source to match the SUP value.
SECTION 7 – MAINTENANCE & TROUBLESHOOTING

7-1. Routine Maintenance

Disconnect power before maintaining. Maintain more often during severe conditions.

<table>
<thead>
<tr>
<th>Task</th>
<th>Frequency</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check Unreadable Labels</td>
<td>Every 3 Months</td>
<td></td>
</tr>
<tr>
<td>Change Weld Terminals</td>
<td>Every 3 Months</td>
<td></td>
</tr>
<tr>
<td>Clean Weld Cables</td>
<td>Every 3 Months</td>
<td></td>
</tr>
<tr>
<td>Replace Inside Unit</td>
<td>Every 6 Months</td>
<td>Replace Inside Unit only if necessary</td>
</tr>
<tr>
<td>Apply Light Coat Of Oil Or Grease To Drive Motor Shaft</td>
<td>Every 6 Months</td>
<td>Clean Drive Rolls if necessary</td>
</tr>
<tr>
<td>Clean Drive Rolls</td>
<td>Every 6 Months</td>
<td></td>
</tr>
</tbody>
</table>

7-2. Unit Overload

Thermistor RT1 in SCR1 protects the unit from damage due to overheating. If HL.P 002 is displayed on the meters, wait for unit to cool allowing fan motor to run before trying to weld. If unit is cool and no weld output continues, contact Factory Authorized Service Agent.

7-3. Changing Drive Roll and Wire Inlet Guide

Tools Needed: 7/16 in.

1. Securing Screw
2. Inlet Wire Guide
3. Drive Roll
4. Drive Roll Securing Nut

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

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 5-14).
7-4. 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
### 7-5. Troubleshooting

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No weld output; wire does not feed.</td>
<td>Be sure line disconnect switch is On (see Section 5-13). Replacing building line fuse or reset circuit breaker if open (see Section 5-13).</td>
</tr>
<tr>
<td></td>
<td>Secure gun trigger connections (see welding gun Owner's Manual). HL.P 001 appears on meters. Turn power switch off and back on, if HL.P 001 appears on meters again, have Factory Authorized Service Agent check unit.</td>
</tr>
<tr>
<td></td>
<td>HL.P 002 appears on meters. Thermistor RT1 is detecting an overheating condition. Wait for unit to cool allowing the fan to run. After unit is cool, if HL.P 002 message remains, have Factory Authorized Service Agent check for open Thermistor RT1 (see Section 7-2).</td>
</tr>
<tr>
<td></td>
<td>HL.P 004 appears on meters. Reset message by releasing the trigger or removing stuck wire causing short circuit (see Section 6-2). If message remains, have Factory Authorized Service Agent check for shorted trigger leads.</td>
</tr>
<tr>
<td></td>
<td>Have Factory Authorized Service Agent check Power switch. Have Factory Authorized Service Agent check all board connections and main control board.</td>
</tr>
<tr>
<td>No Weld Output; wire feeds.</td>
<td>Connect work clamp to get good metal to metal contact. Replace contact tip (see welding gun Owner's Manual).</td>
</tr>
<tr>
<td></td>
<td>HL.P 003 appears on meters, have Factory Authorized Service Agent check main control board and main rectifier.</td>
</tr>
<tr>
<td>Low weld output.</td>
<td>Connect unit to proper input voltage or check for low line voltage (see Section 5-13). Check input voltage jumper links and correct position if necessary (see Section 5-11).</td>
</tr>
<tr>
<td></td>
<td>Have Factory Authorized Service Agent check main control board.</td>
</tr>
<tr>
<td>Fan motor does not run.</td>
<td>Have Factory Authorized Service Agent check fan-on-demand circuit.</td>
</tr>
<tr>
<td>Low, high, or erratic wire speed.</td>
<td>Readjust front panel settings (see Section 6-1). Change to correct size drive rolls (see Section 7-3).</td>
</tr>
<tr>
<td></td>
<td>Readjust drive roll pressure (see Section 5-14). Replace inlet guide, contact tip, and/or liner if necessary (see welding gun Owner's Manual).</td>
</tr>
<tr>
<td></td>
<td>Check position of input jumper links (see Section 5-11). Have Factory Authorized Service Agent check main control board.</td>
</tr>
<tr>
<td>Trouble</td>
<td>Remedy</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>No wire feed.</td>
<td>Turn Wire Speed control to higher setting (see Section 6-1).</td>
</tr>
<tr>
<td></td>
<td>Clear obstruction in gun contact tip or liner (see welding gun Owner’s Manual).</td>
</tr>
<tr>
<td></td>
<td>Readjust drive roll pressure (see Section 5-14).</td>
</tr>
<tr>
<td></td>
<td>Change to correct size drive rolls (see Section 7-3).</td>
</tr>
<tr>
<td></td>
<td>Rethread welding wire (see Section 5-14).</td>
</tr>
<tr>
<td>HL.P 002 appears on meters. Thermistor T is detecting an overheating condition. Wait for unit to cool allowing the fan to run. After unit is cool, If HL.P 002 message remains, contact Factory Authorized Service Agent (see Section 7-2).</td>
<td></td>
</tr>
<tr>
<td>HL.P 004 appears on meters. Reset message by releasing the trigger or removing stuck wire causing short circuit (see Section 6-2) . If message remains, have Factory Authorized Service Agent check for shorted trigger leads.</td>
<td></td>
</tr>
<tr>
<td>HL.P 005 appears on meters. Wire feed malfunction. Check wire feed delivery system.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check gun trigger and leads. Repair or replace gun if necessary.</td>
</tr>
<tr>
<td></td>
<td>Have Factory Authorized Service Agent check main control board.</td>
</tr>
</tbody>
</table>
All directions are in reference to the front of the unit. All circuitry referred to is located inside the unit.

- **HLP 1**
  Turn off primary input power and check input voltage per primary voltage rating of welder, and correct if necessary. If HELP 1 persists, this indicates a communication error between control board PC1 and user interface board PC2. Contact a Service Distributor or Factory Service Department.

- **HLP 2**
  Indicates overheating of unit. Unit will shutdown until internal temperature drops within operational range.

- **HLP 3**
  Indicates no open circuit voltage detected when gun trigger is pulled and no arc detected after 3 seconds. Turn off primary input power and contact a Service Distributor or Factory Service Department.

  - **HLP 4**
    Indicates gun trigger was pulled and held for 2 minutes without a welding arc established or there is a direct short between contact tip or wire and the workpiece. Release gun trigger and clear fault condition.

  - **HLP 5**
    Indicates a malfunction in wire feed system and/or drive motor overcurrent condition. Check for proper spool brake adjustment or obstructions in wire feed system. Clean or replace liner, wire guides, or contact tip.

  - **HLP 6**
    Indicates a malfunction in wire feed system and/or external drive motor overcurrent condition (spool gun or push-pull gun). Check for proper spool brake adjustment or obstructions in wire feed system. Clean or replace liner, wire guides, or contact tip.

  - **HLP 7**
    Indicates spool gun trigger was pulled and held for 2 minutes without a welding arc established.

  - **HLP 8**
    Indicates XR Edge gun trigger was pulled and held for 2 minutes without a welding arc established.

  - **HLP 9**
    Indicates XR-A gun trigger was pulled and held for 2 minutes without a welding arc established.

  - **HLP 10**
    Indicates Python gun trigger was pulled and held for 2 minutes without a welding arc established.

  - **HLP 11**
    Indicates a communication error between control board PC1 and user interface board PC2. Contact Factory Service Department.

  - **HLP 12**
    Indicates Aluma-Pro gun trigger was pulled and held for 2 minutes without a welding arc established.
Figure 8-1. Circuit Diagram
9-1. Typical MIG Process Connections

**Warning:** 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.

Ref. 801 909-A
9-2. Typical 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.

Material thickness determines weld parameters.

Convert Material Thickness to Amperage (A)

(0.001 in. = 1 ampere)

0.125 in. = 125 A

<table>
<thead>
<tr>
<th>Wire Size</th>
<th>Amperage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.023 in.</td>
<td>30 – 90 A</td>
</tr>
<tr>
<td>0.030 in.</td>
<td>40 – 145 A</td>
</tr>
<tr>
<td>0.035 in.</td>
<td>50 – 180 A</td>
</tr>
</tbody>
</table>

Select Wire Size

Select Wire Speed (Amperage)

125 A based on 1/8 in. material thickness

ipm = inches per minute

Select Voltage

Voltage controls height and width of weld bead.

Wire speed (amperage) controls weld penetration (wire speed = burn-off rate)

Low voltage: wire stubs into work
High voltage: arc is unstable (spatter)
Set voltage midway between high/low voltage

<table>
<thead>
<tr>
<th>Wire Size</th>
<th>Recommendation</th>
<th>Wire Speed (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.023 in.</td>
<td>3.5 in. per ampere</td>
<td>3.5 x 125 A = 437 ipm</td>
</tr>
<tr>
<td>0.030 in.</td>
<td>2 in. per ampere</td>
<td>2 x 125 A = 250 ipm</td>
</tr>
<tr>
<td>0.035 in.</td>
<td>1.6 in. per ampere</td>
<td>1.6 x 125 A = 200 ipm</td>
</tr>
</tbody>
</table>
9-3. 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) 1/4 to 1/2 in. (6 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
9-4. 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.
9-5. **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.

9-6. **Poor Weld Bead Characteristics**

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

9-7. **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
9-8. Troubleshooting – Excessive Spatter

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

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire feed speed too high.</td>
<td>Select lower wire feed speed.</td>
</tr>
<tr>
<td>Voltage too high.</td>
<td>Select lower voltage range.</td>
</tr>
<tr>
<td>Electrode extension (stickout) too long.</td>
<td>Use shorter electrode extension (stickout).</td>
</tr>
<tr>
<td>Workpiece dirty.</td>
<td>Remove all grease, oil, moisture, rust, paint, undercoating, and dirt from work surface before welding.</td>
</tr>
<tr>
<td>Insufficient shielding gas at welding arc.</td>
<td>Increase flow of shielding gas at regulator/flowmeter and/or prevent drafts near welding arc.</td>
</tr>
<tr>
<td>Dirty welding wire.</td>
<td>Use clean, dry welding wire.</td>
</tr>
<tr>
<td></td>
<td>Eliminate pickup of oil or lubricant on welding wire from feeder or liner.</td>
</tr>
<tr>
<td>Incorrect polarity.</td>
<td>Check polarity required by welding wire, and change to correct polarity at welding power source.</td>
</tr>
</tbody>
</table>

9-9. Troubleshooting – Porosity

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

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient shielding gas at welding arc.</td>
<td>Increase flow of shielding gas at regulator/flowmeter and/or prevent drafts near welding arc.</td>
</tr>
<tr>
<td></td>
<td>Remove spatter from gun nozzle.</td>
</tr>
<tr>
<td></td>
<td>Check gas hoses for leaks.</td>
</tr>
<tr>
<td></td>
<td>Place nozzle 1/4 to 1/2 in. (6-13 mm) from workpiece.</td>
</tr>
<tr>
<td></td>
<td>Hold gun near bead at end of weld until molten metal solidifies.</td>
</tr>
<tr>
<td>Wrong gas.</td>
<td>Use welding grade shielding gas; change to different gas.</td>
</tr>
<tr>
<td>Dirty welding wire.</td>
<td>Use clean, dry welding wire.</td>
</tr>
<tr>
<td></td>
<td>Eliminate pick up of oil or lubricant on welding wire from feeder or liner.</td>
</tr>
<tr>
<td>Workpiece dirty.</td>
<td>Remove all grease, oil, moisture, rust, paint, coatings, and dirt from work surface before welding.</td>
</tr>
<tr>
<td></td>
<td>Use a more highly deoxidizing welding wire (contact supplier).</td>
</tr>
<tr>
<td>Welding wire extends too far out of nozzle.</td>
<td>Be sure welding wire extends not more than 1/2 in. (13 mm) beyond nozzle.</td>
</tr>
</tbody>
</table>

9-10. Troubleshooting – Excessive Penetration

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

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive heat input.</td>
<td>Select lower voltage range and reduce wire feed speed.</td>
</tr>
<tr>
<td></td>
<td>Increase travel speed.</td>
</tr>
</tbody>
</table>
9-11. Troubleshooting – Lack Of Penetration

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

9-12. Troubleshooting – Incomplete Fusion

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workpiece dirty.</td>
<td>Remove all grease, oil, moisture, rust, paint, undercoating, and dirt from work surface before welding.</td>
</tr>
<tr>
<td>Insufficient heat input.</td>
<td>Select higher voltage range and/or adjust wire feed speed.</td>
</tr>
<tr>
<td>Improper welding technique.</td>
<td>Place stringer bead in proper location(s) at joint during welding.</td>
</tr>
<tr>
<td></td>
<td>Adjust work angle or widen groove to access bottom during welding.</td>
</tr>
<tr>
<td></td>
<td>Momentarily hold arc on groove side walls when using weaving technique.</td>
</tr>
<tr>
<td></td>
<td>Keep arc on leading edge of weld puddle.</td>
</tr>
<tr>
<td></td>
<td>Use correct gun angle of 0 to 15 degrees.</td>
</tr>
</tbody>
</table>

9-13. Troubleshooting – Burn-Through

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive heat input.</td>
<td>Select lower voltage range and reduce wire feed speed.</td>
</tr>
<tr>
<td></td>
<td>Increase and/or maintain steady travel speed.</td>
</tr>
</tbody>
</table>
### 9-14. Troubleshooting – Waviness Of Bead

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

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

### 9-15. Troubleshooting – Distortion

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive heat input.</td>
<td>Use restraint (clamp) to hold base metal in position.</td>
</tr>
<tr>
<td></td>
<td>Make tack welds along joint before starting welding operation.</td>
</tr>
<tr>
<td></td>
<td>Select lower voltage range and/or reduce wire feed speed.</td>
</tr>
<tr>
<td></td>
<td>Increase travel speed.</td>
</tr>
<tr>
<td></td>
<td>Weld in small segments and allow cooling between welds.</td>
</tr>
</tbody>
</table>

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

Base metal moves in the direction of the weld bead.
### 9.16. Common MIG Shielding Gases

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

<table>
<thead>
<tr>
<th>Gas</th>
<th>Spray Arc Steel</th>
<th>Short Circuiting Steel</th>
<th>Short Circuiting Stainless Steel</th>
<th>Aluminum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argon</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Argon + 25% CO₂</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>80% or greater Argon + balance CO₂ or Oxygen</td>
<td>X</td>
<td></td>
<td>X¹</td>
<td></td>
</tr>
<tr>
<td>100% CO₂</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Tri-Mix²</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Limited short circuiting use

2. 90% HE + 7-1/2% AR + 2-1/2% CO₂

### 9.17. Troubleshooting Guide For Semiautomatic Welding Equipment

<table>
<thead>
<tr>
<th>Problem</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire feed motor operates, but wire does not feed.</td>
<td>Too little pressure on wire feed rolls.</td>
<td>Increase pressure setting on wire feed rolls.</td>
</tr>
<tr>
<td></td>
<td>Incorrect wire feed rolls.</td>
<td>Check size stamped on wire feed rolls, replace to match wire size and type if necessary.</td>
</tr>
<tr>
<td></td>
<td>Wire spool brake pressure too high.</td>
<td>Decrease brake pressure on wire spool.</td>
</tr>
<tr>
<td></td>
<td>Restriction in the gun and/or assembly.</td>
<td>Check and replace cable, gun, and contact tip if damaged. Check size of contact tip and cable liner, replace if necessary.</td>
</tr>
<tr>
<td>Wire curling up in front of the wire feed rolls (bird nesting).</td>
<td>Too much pressure on wire feed rolls.</td>
<td>Decrease pressure setting on wire feed rolls.</td>
</tr>
<tr>
<td></td>
<td>Incorrect cable liner or gun contact tip size.</td>
<td>Check size of contact tip and check cable liner length and diameter, replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>Gun end not inserted into drive housing properly.</td>
<td>Loosen gun securing bolt in drive housing and push gun end into housing just enough so it does not touch wire feed rolls.</td>
</tr>
<tr>
<td></td>
<td>Dirty or damaged (kinked) liner.</td>
<td>Replace liner.</td>
</tr>
<tr>
<td>Wire feeds, but no gas flows.</td>
<td>Gas cylinder empty.</td>
<td>Replace empty gas cylinder.</td>
</tr>
<tr>
<td></td>
<td>Gas nozzle plugged.</td>
<td>Clean or replace gas nozzle.</td>
</tr>
<tr>
<td></td>
<td>Gas cylinder valve not open or flowmeter not adjusted.</td>
<td>Open gas valve at cylinder and adjust flow rate.</td>
</tr>
<tr>
<td></td>
<td>Restriction in gas line.</td>
<td>Check gas hose between flowmeter and wire feeder, and gas hose in gun and cable assembly.</td>
</tr>
<tr>
<td></td>
<td>Loose or broken wires to gas solenoid.</td>
<td>Have Factory Authorized Service Agent repair wiring.</td>
</tr>
<tr>
<td></td>
<td>Gas solenoid valve not operating.</td>
<td>Have Factory Authorized Service Agent replace gas solenoid valve.</td>
</tr>
<tr>
<td></td>
<td>Incorrect primary voltage connected to welding power source.</td>
<td>Check primary voltage and relink welding power source for correct voltage.</td>
</tr>
<tr>
<td>Problem</td>
<td>Probable Cause</td>
<td>Remedy</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------</td>
<td>---------------------------------------------------------</td>
</tr>
<tr>
<td>Welding arc not stable.</td>
<td>Wire slipping in drive rolls.</td>
<td>Adjust pressure setting on wire feed rolls. Replace worn drive rolls if necessary.</td>
</tr>
<tr>
<td></td>
<td>Wrong size gun liner or contact tip.</td>
<td>Match liner and contact tip to wire size and type.</td>
</tr>
<tr>
<td></td>
<td>Incorrect voltage setting for selected wire feed speed on welding power source.</td>
<td>Readjust welding parameters.</td>
</tr>
<tr>
<td></td>
<td>Loose connections at the gun weld cable or work cable.</td>
<td>Check and tighten all connections.</td>
</tr>
<tr>
<td></td>
<td>Gun in poor shape or loose connection inside gun.</td>
<td>Repair or replace gun as necessary.</td>
</tr>
</tbody>
</table>
SECTION 10 – PARTS LIST

10-1. 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).

<table>
<thead>
<tr>
<th>Wire Diameter</th>
<th>Kit No.</th>
<th>Drive Roll</th>
<th>Inlet Wire Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>.023/.025 in.</td>
<td>087 131</td>
<td>V-Grooved</td>
<td>056 192</td>
</tr>
<tr>
<td>.030/.035 in.</td>
<td>204 579</td>
<td>V-Grooved</td>
<td>056 192</td>
</tr>
<tr>
<td>.030 in.</td>
<td>079 594</td>
<td>V-Grooved</td>
<td>056 192</td>
</tr>
<tr>
<td>.035 in.</td>
<td>079 595</td>
<td>V-Grooved</td>
<td>056 192</td>
</tr>
<tr>
<td>.045 in.</td>
<td>079 596</td>
<td>V-Grooved</td>
<td>056 193</td>
</tr>
</tbody>
</table>

Ref. S-0026-B/7-91

A complete Parts List is available on-line at www.MillerWelds.com
Warranty Questions?

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

Your distributor also gives you... 

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

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

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

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

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the delivery date of the equipment to the original end-user purchaser, and not to exceed one year after the equipment is shipped to a North American distributor or eighteen months after the equipment is shipped to an International distributor.

1. 5 Years Parts — 3 Years Labor
   * Original main power rectifiers only to include SCRs, diodes, and discrete rectifier modules

2. 3 Years — Parts and Labor
   * Engine Driven Welding Generators
     (NOTE: Engines are warranted separately by the engine manufacturer.)
   * Inverter Power Sources (Unless Otherwise Stated)
   * Plasma Arc Cutting Power Sources
   * Process Controllers
   * Semi-Automatic and Automatic Wire Feeders
   * Smith 30 Series Flowgauge and Flowmeter Regulators (No Labor)
   * Transformer/Rectifier Power Sources
   * Water Coolant Systems (Integrated)

3. 2 Years — Parts
   * Auto-Darkening Helmet Lenses (No Labor)

4. 1 Year — Parts and Labor Unless Specified
   * Automatic Motion Devices
   * FanBelt and CoolBand Blower Unit (No Labor)
   * External Monitoring Equipment and Sensors
   * Field Options
     (NOTE: Field options are covered for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
   * Flowgauge and Flowmeter Regulators (No Labor)
   * RFCS Foot Controls (Except RFCS-RJ45)
   * Fume Extractors
   * HF Units
   * ICE Plasma Cutting Torches (No Labor)
   * Induction Heating Power Sources, Coolers, and Electronic Controls/Recorders
   * Load Banks
   * Motor Driven Guns (with exception of Spoolmate Spoolguns)
   * PAPR Blower Unit (No Labor)
   * Positioners and Controllers
   * Racks
   * Running Gear/Trailers
   * Spot Welders
   * Subarc Wire Drive Assemblies
   * Water Coolant Systems (Non-Integrated)
   * Weldcraft-Branded TIG Torches (No Labor)
   * Wireless Remote Foot/Hand Controls and Receivers
   * Work Stations/Weld Tables (No Labor)

5. 6 Months — Parts
   * Batteries
   * Bernard Guns (No Labor)
   * Tregaskiss Guns (No Labor)

6. 90 Days — Parts
   * Adjustable Millers
   * Canvas Covers
   * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
   * M-Guns
   * MIG Guns and Subarc (SAW) Guns
   * Remote Controls and RFCS-RJ45
   * Replacement Parts (No labor)
   * Roughneck Guns
   * Spoolmate Spoolguns

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

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

2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer’s warranty, if any.

3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards; or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller’s option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer’s risk and expense. Miller’s option of repair or replacement will be F.O.B. Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore, no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

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

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.
Owner’s Record

Please complete and retain with your personal records.

Model Name

Serial/Style Number

Purchase Date

(Date which equipment was delivered to original customer.)

Distributor

Address

City

State Zip

For Service

Contact a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

Welding Supplies and Consumables
Options and Accessories
Personal Safety Equipment
Service and Repair
Replacement Parts
Training (Schools, Videos, Books)
Technical Manuals (Servicing Information and Parts)
Circuit Diagrams
Welding Process Handbooks

To locate a Distributor or Service Agency visit www.millerwelds.com 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.