Processes

- Stick (SMAW) Welding
- MIG (GMAW) Welding
- Flux Cored (FCAW) Welding
- TIG (GTAW) Welding
- Air Carbon Arc (CAC-A) Cutting and Gouging

With Optional Equipment:
- Battery Charging

Description

Engine Driven Welding Generator And Air Compressor

Big Blue® Air Pak™

OWNER’S MANUAL

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

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

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

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

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

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

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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COMPLETE PARTS LIST – Available at www.MillerWelds.com

WARRANTY
SECTION 1 – SAFETY PRECAUTIONS – READ BEFORE USING

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

1-1. Symbol Usage

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

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

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

**Indicates special instructions.**

This group of symbols means Warning! Watch Out! ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid 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 1-7. 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 and ground conductor for damage or bare wiring – replace immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or repaired cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- 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 any physical contact with the work or ground.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Do not use worn, damaged, undersized, or repaired cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal. Disconnect cable for process not in use.
- Use GFCI protection when operating auxiliary equipment. Do not test or reset GFCI receptacles at idle speed/low voltage or the GFCI will be damaged and not provide protection from electric shock caused by a ground fault.

**SIGNIFICANT DC VOLTAGE exists in inverter power sources AFTER stopping engine.**

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

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

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

**ARC RAYS can burn eyes and skin.**
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.
- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare, and sparks; warn others not to watch the arc.
- Wear body protection made from durable, flame-resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.

**WELDING can cause fire or explosion.**
Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Do not weld where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on containers that have held combustibles, or on closed containers such as tanks, drums, or pipes unless they are properly prepared according to AWS F4.1 and AWS A6.0 (see Safety Standards).
- Do not weld where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear body protection made from durable, flame-resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or bypass them.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer’s instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals.
- Be alert that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on containers that have held combustibles, or on closed containers such as tanks, drums, or pipes unless they are properly prepared according to AWS F4.1 and AWS A6.0 (see Safety Standards).
- Do not weld where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear approved ear protection if noise level is high.

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

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

**CYLINDERS can explode if damaged.**
Compressed gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.
- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder — explosion will result.
- Use only correct compressed gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve. Do not stand in front of or behind the regulator when opening the valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the 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.

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1-3. Engine Hazards

**BATTERY EXPLOSION can injure.**
- Always wear a face shield, rubber gloves, and protective clothing when working on a battery.
- Stop engine before disconnecting or connecting battery cables, battery charging cables (if applicable), or servicing battery.
- Do not allow tools to cause sparks when working on a battery.
- Do not use welder to charge batteries or jump start vehicles unless the unit has a battery charging feature designed for this purpose.
- Observe correct polarity (+ and −) on batteries.
- Disconnect negative (−) cable first and connect it last.
- Keep sparks, flames, cigarettes, and other ignition sources away from batteries. Batteries produce explosive gases during normal operation and when being charged.
- Follow battery manufacturer’s instructions when working on or near a battery.

**FUEL can cause fire or explosion.**
- Stop engine and let it cool off before checking or adding fuel.
- Do not add fuel while smoking or if unit is near any sparks or open flames.
- Do not overfill tank — allow room for fuel to expand.
- Do not spill fuel. If fuel is spilled, clean up before starting engine.
- Dispose of rags in a fireproof container.
- Do not overfill tank — allow room for fuel to expand.
- Always keep nozzle in contact with tank when fueling.

**MOVING PARTS can injure.**
- Keep away from moving parts such as fans, belts, and rotors.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Stop engine before installing or connecting unit.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance and troubleshooting as necessary.
- To prevent accidental starting during servicing, disconnect negative (−) battery cable from battery.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall doors, panels, covers, or guards when servicing is finished and before starting engine.
- Before working on generator, remove spark plugs or injectors to keep engine from kicking back or starting.
- Block flywheel so that it will not turn while working on generator components.

**EXHAUST SPARKS can cause fire.**
- Do not let engine exhaust sparks cause fire.
- Use approved engine exhaust spark arrestor in required areas — see applicable codes.

**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.

**STEAM AND HOT COOLANT can burn.**
- If possible, check coolant level when engine is cold to avoid scalding.
- Always check coolant level at overflow tank, if present on unit, instead of radiator (unless told otherwise in maintenance section or engine manual).
- If the engine is warm, checking is needed, and there is no overflow tank, follow the next two statements.
- Wear safety glasses and gloves and put a rag over radiator cap.
- Turn cap slightly and let pressure escape slowly before completely removing cap.

**Using a generator indoors CAN KILL YOU IN MINUTES.**
- Generator exhaust contains carbon monoxide. This is a poison you cannot see or smell.
- NEVER use inside a home or garage, EVEN IF doors and windows are open.
- Only use OUTSIDE and far away from windows, doors, and vents.

**BATTERY ACID can BURN SKIN and EYES.**
- Do not tip battery.
- Replace damaged battery.
- Flush eyes and skin immediately with water.

**ENGINE HEAT can cause fire.**
- Do not locate unit on, over, or near combustible surfaces or flammables.
- Keep exhaust and exhaust pipes way from flammables.

1-4. Compressed Air Hazards

**COMPRESSED AIR EQUIPMENT can injure or kill.**
- Incorrect installation or operation of this unit could result in equipment failure and personal injury. Only qualified persons should install, operate, and service this unit according to its Owner’s Manual, industry standards, and national, state, and local codes.
- Do not exceed the rated output or capacity of the compressor or any equipment in the compressed air system. Design compressed air system so failure of any component will not put people or property at risk.
- Before working on compressed air system, turn off and lockout/tagout unit, release pressure, and be sure air pressure cannot be accidentally applied.
- Do not work on compressed air system with unit running unless you are a qualified person and following the manufacturer’s instructions.
- Do not modify or alter compressor or manufacturer-supplied equipment. Do not disconnect, disable, or override any safety equipment in the compressed air system.
- Use only components and accessories approved by the manufacturer.
- Keep away from potential pinch points or crush points created by equipment connected to the compressed air system.
- Do not work under or around any equipment that is supported only by air pressure. Properly support equipment by mechanical means.
HOT METAL from air arc cutting and gouging can cause fire or explosion.

- Do not cut or gouge near flammables.
- Watch for fire; keep extinguisher nearby.

COMPRESSED AIR can injure or kill.

- Before working on compressed air system, turn off and lockout/tagout unit, release pressure, and be sure air pressure cannot be accidentally applied.
- Relieve pressure before disconnecting or connecting air lines.
- Check compressed air system components and all connections and hoses for damage, leaks, and wear before operating unit.
- Do not direct air stream toward self or others.
- Wear protective equipment such as safety glasses, hearing protection, leather gloves, heavy shirt and trousers, high shoes, and a cap when working on compressed air system.
- Use soapy water or an ultrasonic detector to search for leaks—never use bare hands. Do not use equipment if leaks are found.
- Reinstall doors, panels, covers, or guards when servicing is finished and before starting unit.
- If ANY air is injected into the skin or body seek medical help immediately.

BREATHING COMPRESSED AIR can injure or kill.

- Do not use compressed air for breathing.
- Use only for cutting, gouging, and tools.

TRAPPED AIR PRESSURE AND WHIPPING HOSES can injure.

- Release air pressure from tools and system before servicing, adding or changing attachments, or opening compressor oil drain or oil fill cap.

1-5. 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 and properly installed accessories only, NOT gas cylinders. Do not exceed maximum lift eye weight rating (see Specifications).
- 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.

MOVING PARTS can injure.

- Keep away from moving parts such as fans, belts and rotors.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Before working on compressed air system, turn off and lockout/tagout unit, release pressure, and be sure air pressure cannot be accidentally applied.
- Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
- Reinstall doors, panels, covers, or guards when servicing is finished and before starting engine.

HOT PARTS can burn.

- Do not touch hot compressor or air system parts.
- 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.

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.

OVERHEATING can damage motors.

- Turn off or unplug equipment before starting or stopping engine.
- Do not let low voltage and frequency caused by low engine speed damage electric motors.
- Do not connect 50 or 60 Hertz motors to the 100 Hertz receptacle where applicable.

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.

MOVING PARTS can injure.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.
Battery charging not present on all models.

- Always wear a face shield, rubber gloves, and protective clothing when working on a battery.
- Stop engine before disconnecting or connecting battery cables, battery charging cables (if applicable), or servicing battery.
- Do not allow tools to cause sparks when working on a battery.
- Do not use welder to charge batteries or jump start vehicles unless it has a battery charging feature designed for this purpose.
- Observe correct polarity (+ and −) on batteries.
- Disconnect negative (−) cable first and connect it last.
- Keep sparks, flames, cigarettes, and other ignition sources away from batteries. Batteries produce explosive gases during normal operation and when being charged.
- Have only qualified persons do battery charging work.
- If battery is being removed from a vehicle for charging, disconnect negative (−) cable first and connect it last. To prevent an arc, make sure all accessories are off.
- Charge lead-acid batteries only. Do not use battery charger to supply power to an extra-low-voltage electrical system or to charge dry cell batteries.
- Do not charge a frozen battery.
- Do not use damaged charging cables.
- Do not charge batteries in a closed area or where ventilation is restricted.
- Do not charge a battery that has loose terminals or one showing damage such as a cracked case or cover.
- Before charging battery, select correct charger voltage to match battery voltage.
- Set battery charging controls to the Off position before connecting to battery. Do not allow battery charging clips to touch each other.
- Keep charging cables away from vehicle hood, door, or moving parts.

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.

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.

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 microprocessors, computers, and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding 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.

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.

TILTING OF TRAILER can injure.

- Use tongue jack or blocks to support weight.
- Properly install welding generator onto trailer according to instructions supplied with trailer.

OVERUSE can cause INTERFERENCE.
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.

1-7. Principal Safety Standards


1-8. EMF Information

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

1. Keep cables close together by twisting or taping them, or using a cable cover.

2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.

3. Do not coil or drape cables around your body.

4. Keep head and trunk as far away from the equipment in the welding circuit as possible.

5. Connect work clamp to workpiece as close to the weld as possible.

6. Do not work next to, sit or lean on the welding power source.

7. Do not weld whilst carrying the welding power source or wire feeder.

About Implanted Medical Devices:

Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.
SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

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

2-1. Signification des symboles

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.

2-2. Dangers relatifs au soudage à l’arc

Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d’éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l’information contenue dans les normes de sécurité énumérées à la section 2-7. Veuillez lire et respecter toutes ces normes de sécurité.

L’installation, l’utilisation, l’entretien et les réparations ne doivent être confiés qu’à des personnes qualifiées.

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

Un simple contact avec des pièces électriques peut provoquer une électrocution ou des blessures graves. L’électrode et le circuit de soudage sont sous tension dès que l’appareil est sur ON. Le circuit d’entrée et les circuits internes de l’appareil sont également sous tension à ce moment-là. En souduge semi-automatique ou automatique, le fil, le dévidoir, le logement des galets d’entraînement et les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre présentent un danger.

Ne jamais toucher les pièces électriques sous tension.

Porter des gants et des vêtements de protection secs ne comportant pas de trous.

S’isoler de la pièce et de la terre au moyen de tapis ou d’autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.

Ne pas se servir de source électrique à courant électrique dans les zones humides, dans les endroits confinés, ou là où on risque de tomber.

Se servir d’une source électrique à courant électrique UNIQUEMENT si le procédé de soudage le demande.

Si l’utilisation d’une source électrique à courant électrique s’avère nécessaire, se servir de la fonction de télécommande si l’appareil en est équipé.

Des précautions de sécurité supplémentaires sont requises dans des environnements à risque comme: les endroits humides ou lorsqu’on porte des vêtements mouillés; sur des structures métalliques au sol, grillages et échafaudages; dans des positions assises, à genoux et allongées; ou quand il y a un risque important de contact accidentel avec la pièce ou le sol. Dans ces cas utiliser les appareils suivants dans l’ordre de préférence: 1) un poste à souder DC semi-automatique de type CV (MIG/MAG), 2) un poste à souder manuel (électrode enrobée) DC, 3) un poste à souder AC avec tension à vide réduite. Dans la plupart des cas, un poste courant continu de type CV est recommandé. Et, ne pas travailler seul!

Couper l’alimentation avant de procéder à l’installation, à la réparation ou à l’entretien de l’appareil. Dénervonner l’alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité). Installez, mettez à la terre et utilisez correctement cet équipement conformément à son Manuel d’Utilisation et aux réglementations nationales, gouvernementales et locales. Installer et mettre à la terre correctement cet appareil conformément à son manuel d’utilisation et aux codes nationaux, provinciaux et municipaux. Toujours vérifier la terre du cordon d’alimentation – Vérifier et s’assurer que le fil de terre du cordon d’alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre. En effectuant les raccordements d’entrée fixer d’abord le conducteur de mise à la terre approprié et contre-vérifier les connexions. Les câbles doivent être exempts d’humidité, d’huile et de graisse; protégez−les contre les étincelles et les pièces métalliques chaudes. Vérifier fréquemment le cordon d’alimentation et le conducteur de mise à la terre afin de s’assurer qu’il n’est pas altéré ou dénudé –, le remplacer immédiatement s’il l’est –. Un fil dénudé peut entraîner la mort. Mettre l’appareil hors tension quand on ne l’utilise pas. Ne pas utiliser des câbles usés, endommagés, sous dimensionnés ou réparés. 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 utiliser le connecteur de pièce ou le câble de retour. 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. Ne 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 quand on travaille en hauteur. Maintenir solide en place tous les panneaux et capots. Fixer le câble de retour de façon à obtenir un bon contact métallique avec la pièce à souder ou la table de travail, le plus près possible de la soudure. Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique. Ne pas raccorder plus d’une électrode ou plus d’un câble de masse à une même borne de sortie de soudage. Débrancher le câble pour le procédé non utilisé.
Il reste une TENSION DC NON NÉGLIGEABLE dans les sources de soudage onduleur UNE FOIS le moteur coupé.

Couper l’alimentation du poste et décharger les condensateurs d’entrée comme indiqué dans la Section Maintenance avant de toucher des composants.

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.

DES PIECES DE METAL ou DES DEBRIS peuvent provoquer des blessures dans les yeux.
- Le soudage, l’éclatement, 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 FUMÉES ET LES GAZ peuvent être dangereux.
- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- À l’intérieur, ventilier la zone et/ou utiliser une ventilation forcée au régime de ralenti/en basse tension.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur le plancher ou même la mort.

- Portez toujours une source de ventilation comme indiqué dans la Section Maintenance avant de toucher des composants.

LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.
- Fermer l’alimentation du gaz comprimé en cas de non utilisation.

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 éblouissements et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l’arc.
- Porter un équipement de protection pour le corps fait d’un matériau résistant et ignifuge (cuir, coton robuste, laine). La protection du corps comporte des vêtements sans huile comme par ex. des gants de cuir, une chemise solide, des pantalons sans revers, des chaussures hautes et une casquette.

LE Soudage peut provoquer un incendie ou une explosion.
Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l’arc de soudure. 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 chaudiens de 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 planfond, plancher, paroi ou séparation peut déclencher un incendie de l’autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu’ils n’aient été préparés correctement conformément à AWS F4.1 et AWS A6.0 (voir les Normes de Sécurité).
- Ne soudez pas si l’air ambiant est chargé de particules, gaz, ou vapeurs inflammables (vapeur d’essence, par exemple).
- Brancher le câble de masse sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des défauts d’électroécoulement, 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.

LIRE ET COMPRENDRE LES FICHES DE DONNÉES DE SÉCURITÉ ET LES INSTRUCTIONS APPRUVÉES.

- 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 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 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 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.
• Porter un équipement de protection pour le corps fait d’un matériau résistant et ignifuge (cuir, coton robuste, lainé). La protection du corps comporte des vêtements sans huile comme par ex. des gants de cuir, une chemise solide, des pantalons sans revers, des chaussures hautes et une casquette.
• Avant de souder, retirer toute substance combustible de vos poches telles qu’un allumette 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.
• 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.

### LE BRUIT peut affecter l’ouïe.

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

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

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

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

### 2-3. Dangers existant en relation avec le moteur

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

- Toujours porter une protection faciale, des gants en caoutchouc et vêtements de protection lors d’une intervention sur la batterie.
- Arrêter le moteur avant de débrancher ou de brancher des câbles de batterie, des câbles de chargeur de batterie (le cas échéant) ou de batterie d’entretien.
- Éviter de provoquer des étincelles avec les outils en travaillant sur la batterie.
- Ne pas utiliser l’appareil de soudage pour charger des batteries ou faire démarrer des véhicules à l’aide de câbles de démarrage, sauf si l’appareil dispose d’une fonctionnalité de charge de batterie destinée à cet usage.
- Observer la polarité correcte (+ et −) sur les batteries.
- Débrancher le câble négatif (−) en premier lieu. Le rebrancher en dernier lieu.
- Respecter les consignes du fabricant de la batterie pour travailler sur une batterie ou à proximité.

#### LE CARBURANT MOTEUR peut provoquer un incendie ou une explosion.

- Arrêter le moteur avant de vérifier le niveau de carburant ou de faire le plein.
- Ne pas faire le plein en fumant ou proche d’une source d’étincelles ou d’une flamme nue.
- Ne pas faire le plein de carburant à ras bord; prévoir de l’espace pour son expansion.
- Faire attention de ne pas renverser de carburant. Nettoyer tout carburant renversé avant de faire démarrer le moteur.
- Jeter les chiffons dans un récipient ignifuge.
- Toujours garder le pistolet en contact avec le réservoir lors du remplissage.

#### Les PIÈCES MOBILES peuvent causer des blessures.

- S’abstenir de toucher des parties mobiles telles que des ventilateurs, courroies et rotors.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.
- Arrêter le moteur avant d’installer ou brancher l’appareil.
- 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.
2-4. Dangers liés à l’air comprimé

**Un ÉQUIPEMENT PNEUMATIQUE risque de provoquer des blessures ou même la mort.**

- Une installation ou une utilisation incorrecte de cet appareil pourrait conduire à des dégâts matériels ou corporels. Seul un personnel qualifié est autorisé à installer, utiliser et entretenir cet appareil conformément à son manuel d’utilisation, aux normes industrielles et aux codes nationaux, d’état ou locaux.
- Ne pas dépasser le débit nominal ou la capacité du compresseur ou de tout équipement du circuit d’air comprimé. Concevoir le circuit d’air comprimé de telle sorte que la défaillance d’un composant ne risque pas de provoquer un accident matériel ou corporel.
- Avant d’intervenir sur le circuit d’air comprimé, couper l’alimentation électrique, verrouiller et étiqueter l’appareil, détendre la pression et s’assurer que le circuit d’air ne peut être mis sous pression par inadvertance.
- Ne pas intervenir sur le circuit d’air comprimé lorsque l’appareil fonctionne. Seul un personnel qualifié est autorisé, et appliquant les consignes du fabricant.
- Ne pas modifier ou altérer le compresseur ou les équipements fournis par le fabricant. Ne pas débrancher, désactiver ou neutraliser les équipements de sécurité du circuit d’air comprimé.
- Utiliser uniquement des composants et accessoires homologués par le fabricant.
- Se tenir à l’écart de tout point présentant un danger de pincement ou d’écrasement créé par l’équipement raccordé au circuit d’air comprimé.

**Toujours vérifier le niveau de liquide de refroidissement dans le vase d’expansion (si présent), et non dans le radiateur (sauf si précisé autrement dans la section maintenance du manuel du moteur).**

- Si le moteur est chaud et que le liquide doit être vérifié, opérer comme suivant.
- Mettre des lunettes de sécurité et des gants, placer un torchon sur le bouchon du radiateur.
- Dévisser le bouchon légèrement et laisser la vapeur s’échapper avant d’enlever le bouchon.

**L’utilisation d’un groupe autonome à l’intérieur PEUT VOUS TUER EN QUELQUES MINUTES.**

- Les fumées d’un groupe autonome contiennent le monoxyde de carbone. C’est un poison invisible et inodore.
- JAMAIS utiliser dans une maison ou garage, même avec les portes et fenêtres ouvertes.
- Uniquement utiliser à l’EXTERIEUR, loin des portes, fenêtres et bouches aération.

**L’ACIDE DE LA BATTERIE peut provoquer des brûlures dans les YEUX et sur la PEAU.**

- Ne pas renverser la batterie.
- Remplacer une batterie endommagée.
- Rincer immédiatement les yeux et la peau à l’eau.

**LA VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT CHAUD peuvent provoquer des brûlures.**

- Il est préférable de vérifier le liquide de refroidissement une fois le moteur refroidi pour éviter de se brûler.

**LA CHALEUR DU MOTEUR peut provoquer un incendie.**

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

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

- Ne pas diriger un jet d’air vers soi-même ou vers autrui.
- Ne pas interacter sur le circuit d’air comprimé lorsque l’appareil fonctionne. Seul un personnel qualifié est autorisé, et appliquant les consignes du fabricant.
- Avant d’intervenir sur le circuit d’air comprimé, couper l’alimentation électrique, verrouiller et étiqueter l’appareil, détendre la pression et s’assurer que le circuit d’air ne peut être mis sous pression par inadvertance.
- Ne pas intervenir sur le circuit d’air comprimé lorsque l’appareil fonctionne. Seul un personnel qualifié est autorisé, et appliquant les consignes du fabricant.
- Ne pas modifier ou altérer le compresseur ou les équipements fournis par le fabricant. Ne pas débrancher, désactiver ou neutraliser les équipements de sécurité du circuit d’air comprimé.
- Utiliser uniquement des composants et accessoires homologués par le fabricant.
- Se tenir à l’écart de tout point présentant un danger de pincement ou d’écrasement créé par l’équipement raccordé au circuit d’air comprimé.

**LES ÉTINCELLES À L’ÉCHAPPEMENT peuvent provoquer un incendie.**

- Empêcher les étincelles d’échappement du moteur de provoquer un incendie.
- Utiliser uniquement un pare-étincelles approuvé – voir codes en vigueur.

**MÉTAL CHAUD provenant du découpage ou du gougeage à l’arc risque de provoquer un incendie ou une explosion.**

- Ne pas découper ou gouger à proximité de produits inflammables.
- Attention aux risques d’incendie: tenir un extincteur à proximité.

**L’AIR COMPRIMÉ risque de provoquer des blessures ou même la mort.**

- Toujours vérifier le niveau de liquide de refroidissement dans le vase d’expansion (si présent), et non dans le radiateur (sauf si précisé autrement dans la section maintenance du manuel du moteur).
- Si le moteur est chaud et que le liquide doit être vérifié, opérer comme suivant.
- Mettre des lunettes de sécurité et des gants, placer un torchon sur le bouchon du radiateur.
- Dévisser le bouchon légèrement et laisser la vapeur s’échapper avant d’enlever le bouchon.

- Ne pas intervenir sous ou autour d’un équipement qui n’est soutenu que par la pression pneumatique. Soutenir l’équipement de façon appropriée par un moyen mécanique.

- Ne pas découper ou gouger à proximité de produits inflammables.
- Attention aux risques d’incendie: tenir un extincteur à proximité.

- Avant d’intervenir sur le circuit d’air comprimé, couper l’alimentation électrique, verrouiller et étiqueter l’appareil, détendre la pression et s’assurer que le circuit d’air ne peut être mis sous pression par inadvertance.
- Détendre la pression avant de débrancher ou de brancher des canalisations d’air.

- Avant d’utiliser l’appareil, contrôler les composants du circuit d’air comprimé, les branchements et les flexibles en recherchant tout signe de détérioration, de fuite et d’usure.
- Ne pas diriger un jet d’air vers soi-même ou vers autrui.
- Pour intervenir sur un circuit d’air comprimé, porter un équipement de protection tel que des lunettes de sécurité, des gants de cuir, une chemise et un pantalon en tissu résistant, des chaussures montantes et une coiffe.
2-5. Dangers supplémentaires en relation avec l’installation, le fonctionnement et la maintenance

**L’INHALATION D’AIR COMPRIMÉ risque de provoquer des blessures ou même la mort.**
- Ne pas吸入d’air comprimé.
- Utiliser l’air comprimé uniquement pour découper ou gouger ainsi que pour l’outil pneumatique.

**UNE PRESSION D’AIR RÉSIDUELLE ET DES FLEXIBLES QUI FOUETTENT risquent de provoquer des blessures.**
- Détendre la pression pneumatique des outils et circuits avant d’entretenir, ajouter ou changer des accessoires et avant d’ouvrir le bouchon de vidange ou de remplissage d’huile du compresseur.

**Les PIÈCES MOBILES peuvent causer des blessures.**
- S’abstenir de toucher des parties mobiles telles que des ventilateurs, courroies et rotors.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.

**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 pour lever l’appareil et les accessoires correctement installées seuls, PAS les bouteilles de gaz. Ne pas dépasser le poids nominal maximal de l’œillette (voir les spécifications).
- 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 manuelle de pièces ou équipements lourds.

**DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.**
- Ne pas toucher de pièces chaudes du compresseur ou du circuit d’air.
- Prévoir une période de refroidissement avant d’intervenir sur 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.

**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.

**LE SURCHAUFFEMENT peut endommager le moteur électrique.**
- Arrêter ou déconnecter l’équipement avant de démarrer ou d’arrêter le moteur.
- Ne pas laisser tourner le moteur trop lentement sous risque d’endommager le moteur électrique à cause d’une tension et d’une fréquence trop faibles.
- Ne pas brancher de moteur de 50 ou de 60 Hz à la prise de 100 Hz, s’il y a lieu.

**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 meilleure dotée de protecteurs. Cette manoeuvre est à exécuter dans un endroit sûr lors que l’on porte l’équipement homologué de protection du visage, des mains et du corps.
- Les étincelles risquent de causer un incendie – éloigner toute substance inflammable.

**Les PIÈCES MOBILES peuvent causer des blessures.**
- Ne pas s’approcher des organes mobiles.
- Ne pas s’approcher des points de coinement tels que des rouleaux de commande.

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LA SORTIE DE RECHARGE et L’EXPLOSION DE LA BATTERIE peuvent provoquer des blessures.

La recharge de batterie n’existe pas sur tous les modèles.

- Toujours porter une protection faciale, des gants en caoutchouc et vêtements de protection lors d’une intervention sur la batterie.
- Arrêter le moteur avant de débrancher ou de brancher des câbles de batterie, des câbles de chargeur de batterie (le cas échéant) ou de batterie d’entretien.
- Eviter de provoquer des étincelles avec les outils en travaillant sur la batterie.
- Ne pas utiliser l’appareil de soudage pour charger des batteries ou faire démarrer des véhicules à l’aide de câbles de démarrage, sauf si l’appareil dispose d’une fonctionnalité de charge de batterie destinée à cet usage.
- Observer la polarité correcte (+ et −) sur les batteries.
- Débrancher le câble négatif (−) en premier lieu. Le rebrancher en dernier lieu.
- Respecter les consignes du fabricant de la batterie pour travailler sur une batterie ou à proximité.
- Les opérations de charge de batterie ne doivent être effectuées que par des personnes qualifiées.
- Pour enlever la batterie d’un véhicule pour la recharge, débrancher tout d’abord le câble négatif (−) et le rebrancher en dernier lieu. Pour éviter un arc, s’assurer que tous les accessoires sont débranchés.
- Ne charger que des batteries plomb–acide. Ne pas utiliser le chargeur de batterie pour alimenter un autre circuit électrique basse tension ou pour charger des batteries sèches.
- Ne pas charger une batterie gelée.
- Ne pas utiliser de câbles de charge endommagées.
- Ne pas charger des batteries dans un espace fermé ou en l’absence d’une ventilation.
- Ne pas charger une batterie dont les bornes sont desserrées ou présentant une détérioration comme par exemple un boîtier ou un couvercle fissuré.
- Avant de charger une batterie, sélectionner la tension de charge correspondant à la tension de la batterie.
- Régler les commandes de charge de batterie sur la position d’arrêt avant de brancher la batterie. Veiller à ce que les pinces de charge ne se touchent pas.
- Ranger les câbles de charge à distance du capot, des portes et des pièces mobiles du véhicule.

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.

UNE REMORQUE QUI BASCULE peut provoquer des blessures.

- Utiliser les supports de la remorque ou des blocs pour soutenir le poids.
- Installer convenablement le poste sur la remorque comme indiqué dans le manuel s’y rapportant.

LIRE LES INSTRUCTIONS.

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

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

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

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

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

Les Films de soudage peuvent provoquer des blessures.

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

L’emploi excessif peut surchauffer l’équipement.

- Laisser l’équipement refroidir ; respecter le factor de marche nominal.
- Réduire le courant ou le factor de marche avant de poursuivre le soudage.
- Ne pas obstruer les passages d’air du poste.
Les équipements de soudage et de coupe 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.

2-7. Principales normes de sécurité


2-8. Informations relatives aux CEM

Le courant électrique qui traverse tout conducteur génère des champs électromagnétiques (CEM) à certains endroits. Le courant issu d’un soudage à l’arc (et de procédés connexes, y compris le soudage par points, le gougeage, le découpage plasma ou de chauffage par induction) crée un champ électromagnétique (CEM) autour du circuit de soudage. 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 découpage plasma ou de chauffage par induction. Si le médecin approuve, il est recommandé de suivre les procédures précédentes.
3-1. Additional Safety Symbols And Definitions

Some symbols are found only on CE products.

Remove unit from shipping crate. Remove Owner’s Manual from unit. Follow instructions to install muffler.

Read Owner’s Manual. Read labels on unit.

Read Owner’s Manual. Follow instructions to activate battery.

During the first 50 hours of operation keep welding load above 200 amperes. Do not weld below 200 amperes of output.

After the first 50 hours of operation, change the engine oil and filter.

Notes

Work like a Pro!
Pros weld and cut safely. Read the safety rules at the beginning of this manual.
### 3-2. Miscellaneous Symbols And Definitions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Stop Engine" /></td>
<td>Stop Engine</td>
</tr>
<tr>
<td><img src="image" alt="Fast (Run, Weld/Power)" /></td>
<td>Fast (Run, Weld/Power)</td>
</tr>
<tr>
<td><img src="image" alt="Slow (Idle)" /></td>
<td>Slow (Idle)</td>
</tr>
<tr>
<td><img src="image" alt="Start Engine" /></td>
<td>Start Engine</td>
</tr>
<tr>
<td><img src="image" alt="Check Engine Belt" /></td>
<td>Check Engine Belt</td>
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<tr>
<td><img src="image" alt="Check Air Cleaner" /></td>
<td>Check Air Cleaner</td>
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<tr>
<td><img src="image" alt="Starting Aid" /></td>
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</tr>
<tr>
<td><img src="image" alt="Engine" /></td>
<td>Engine</td>
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<tr>
<td><img src="image" alt="Battery (Engine)" /></td>
<td>Battery (Engine)</td>
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<tr>
<td><img src="image" alt="Jump Start/Battery Charge" /></td>
<td>Jump Start/Battery Charge</td>
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<tr>
<td><img src="image" alt="Battery Charge" /></td>
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<tr>
<td><img src="image" alt="Jump Start" /></td>
<td>Jump Start</td>
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<tr>
<td><img src="image" alt="Do Not Switch Under Load" /></td>
<td>Do Not Switch Under Load</td>
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<tr>
<td><img src="image" alt="Read Operator’s Manual" /></td>
<td>Read Operator’s Manual</td>
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<tr>
<td><img src="image" alt="Certified/Trained Mechanic" /></td>
<td>Certified/Trained Mechanic</td>
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<td>Engine Oil</td>
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<td><img src="image" alt="Check Injectors/Pump" /></td>
<td>Check Injectors/Pump</td>
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<tr>
<td><img src="image" alt="Check Valve Clearance" /></td>
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<tr>
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<td><img src="image" alt="Engine Coolant Temperature" /></td>
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<td><img src="image" alt="Air Pressure" /></td>
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<td><img src="image" alt="Temperature" /></td>
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<td><img src="image" alt="Air Compressor" /></td>
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<td><img src="image" alt="Positive" /></td>
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<tr>
<td><img src="image" alt="Negative" /></td>
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<tr>
<td><img src="image" alt="Wire Feed" /></td>
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<tr>
<td><img src="image" alt="Remote" /></td>
<td>Remote</td>
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<tr>
<td><img src="image" alt="Panel/Local" /></td>
<td>Panel/Local</td>
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<td><img src="image" alt="Output" /></td>
<td>Output</td>
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<td><img src="image" alt="Direct Current (DC)" /></td>
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<td><img src="image" alt="Alternating Current (AC)" /></td>
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<td>Gas Tungsten Arc Welding (TIG)</td>
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<td><img src="image" alt="Stick (SMAW) Welding" /></td>
<td>Stick (SMAW) Welding</td>
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<tr>
<td><img src="image" alt="Constant Current (CC)" /></td>
<td>Constant Current (CC)</td>
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<tr>
<td><img src="image" alt="MIG (GMAW) Welding" /></td>
<td>MIG (GMAW) Welding</td>
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<tr>
<td><img src="image" alt="Constant Voltage (CV)" /></td>
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<tr>
<td><img src="image" alt="Three Phase" /></td>
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</tr>
<tr>
<td><img src="image" alt="Single Phase" /></td>
<td>Single Phase</td>
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<td><img src="image" alt="Air Carbon Arc Cutting (CAC-A)" /></td>
<td>Air Carbon Arc Cutting (CAC-A)</td>
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<td><img src="image" alt="Protective Earth (Ground)" /></td>
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</tr>
<tr>
<td><img src="image" alt="Work Connection" /></td>
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<tr>
<td><img src="image" alt="Electrode Connection" /></td>
<td>Electrode Connection</td>
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<tr>
<td><img src="image" alt="Circuit Protector" /></td>
<td>Circuit Protector</td>
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<tr>
<td><img src="image" alt="Time" /></td>
<td>Time</td>
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<td><img src="image" alt="h" /></td>
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<tr>
<td><img src="image" alt="Off" /></td>
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</tbody>
</table>
SECTION 4 – SPECIFICATIONS

4-1. Serial Number And Rating Label Location
The serial number and rating information for this product is located on the front. Use rating label to determine input power requirements and/or rated output. For future reference, write serial number in space provided on back cover of this manual.

4-2. Weld, Power, And Engine Specifications

<table>
<thead>
<tr>
<th>Welding Mode</th>
<th>Weld Output Range</th>
<th>Rated Welding Output</th>
<th>Maximum Open-Circuit Voltage (Nominal)</th>
<th>Generator Power Rating</th>
<th>Engine</th>
<th>Engine Oil Capacity</th>
<th>Fuel Tank Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC/DC</td>
<td>20 – 750 A</td>
<td>500 A, 40 Volts DC, 100% Duty Cycle</td>
<td>95</td>
<td>Standard</td>
<td>Deutz TD2011L04w Oil-Cooled, Four-Cylinder, Turbo-Charged 63.4 HP Diesel Engine</td>
<td>11 qt (10.4 L) At Oil Change</td>
<td>18 qt (17.0 L) Total Capacity (Including Oil Cooler)</td>
</tr>
<tr>
<td>CV/DC</td>
<td>14 – 40 V</td>
<td>600 A, 44 Volts DC, 40% Duty Cycle</td>
<td>56</td>
<td>3-Phase Generator Option*</td>
<td>Deutz TDC15011W Oil-Cooled, Four-Cylinder, Turbo-Charged 63.4 HP Diesel Engine</td>
<td>11 qt (10.4 L) At Oil Change</td>
<td>18 qt (17.0 L) Total Capacity (Including Oil Cooler)</td>
</tr>
<tr>
<td>CC/AC (Optional)</td>
<td>20 - 575 A</td>
<td>750 A, 12 Volt Jump Start</td>
<td>64</td>
<td>4-Phase Generator Option*</td>
<td>Deutz TDC15011W Oil-Cooled, Four-Cylinder, Turbo-Charged 63.4 HP Diesel Engine</td>
<td>11 qt (10.4 L) At Oil Change</td>
<td>18 qt (17.0 L) Total Capacity (Including Oil Cooler)</td>
</tr>
<tr>
<td>Battery Charge/ Jump Start</td>
<td>12/24 V</td>
<td>750 A, 12 Volt Jump Start</td>
<td>125 psi (862 kPa)</td>
<td>150 psi (1034 kPa)</td>
<td>4 qt (3.8 L)</td>
<td></td>
<td></td>
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</table>

4-3. Air Compressor Specifications

<table>
<thead>
<tr>
<th>Compressor Model And Type</th>
<th>Air Output At Effective Working Pressure</th>
<th>Factory Pressure Setting</th>
<th>Safety Relief Valve Rating</th>
<th>Air Compressor Oil Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingersoll Rand CE55 G Rotary Screw</td>
<td>60 scfm (1.7 m³ min⁻¹), 100 psi (690 kPa), 100% Duty Cycle</td>
<td>125 psi (862 kPa)</td>
<td>150 psi (1034 kPa)</td>
<td>4 qt (3.8 L)</td>
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4-4. Sound Level Table

<table>
<thead>
<tr>
<th></th>
<th>Idle Speed (1250 rpm)</th>
<th>Weld/Power Speed (1800 rpm)</th>
<th>40 Volts DC At 500 Amps</th>
<th>44 Volts DC At 600 Amps</th>
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</thead>
<tbody>
<tr>
<td>Air Compressor On</td>
<td>96.0 Lwa sound power</td>
<td>100.9 Lwa sound power</td>
<td>105.3 Lwa sound power</td>
<td>107.3 Lwa sound power</td>
</tr>
<tr>
<td></td>
<td>68.6 dBA at 23 ft (7 m)</td>
<td>73.1 dBA at 23 ft (7 m)</td>
<td>76.0 dBA at 23 ft (7 m)</td>
<td>78.0 dBA at 23 ft (7 m)</td>
</tr>
<tr>
<td></td>
<td>74.5 dBA 3.3 ft (1 m) from front panel</td>
<td>79.5 dBA 3.3 ft (1 m) from front panel</td>
<td>84.5 dBA 3.3 ft (1 m) from front panel</td>
<td>87.4 dBA 3.3 ft (1 m) from front panel</td>
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<tr>
<td>Air Compressor Off</td>
<td>93.5 Lwa sound power</td>
<td>100.1 Lwa sound power</td>
<td>102.2 Lwa sound power</td>
<td>104.8 Lwa sound power</td>
</tr>
<tr>
<td></td>
<td>66.8 dBA at 23 ft (7 m)</td>
<td>72.0 dBA at 23 ft (7 m)</td>
<td>74.1 dBA at 23 ft (7 m)</td>
<td>76.0 dBA at 23 ft (7 m)</td>
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<tr>
<td></td>
<td>72.2 dBA 3.3 ft (1 m) from front panel</td>
<td>78.5 dBA 3.3 ft (1 m) from front panel</td>
<td>81.9 dBA 3.3 ft (1 m) from front panel</td>
<td>85.2 dBA 3.3 ft (1 m) from front panel</td>
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4-5. Dimensions, Weights, And Operating Angles

<table>
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<th>Dimensions</th>
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<tbody>
<tr>
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<td>F</td>
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<tr>
<td>G</td>
</tr>
<tr>
<td>H</td>
</tr>
</tbody>
</table>

* With mounting brackets in center position. Dimensions vary with location of mounting brackets.

Weight

- No fuel: 2015 lb (914 kg)
- w/fuel: 2190 lb (993 kg)

Lifting Eye Weight Rating
2380 lb (1079 kg) Maximum
Meets IEC Standard 60−974−1

4-6. Environmental Specifications

<table>
<thead>
<tr>
<th>IP Rating</th>
<th>Operating Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP23S</td>
<td>−40 to 104°F (−40 to +40°C)</td>
</tr>
</tbody>
</table>

This equipment is designed for outdoor use. It may be stored, but is not intended to be used outside during precipitation unless sheltered.
4-7. Duty Cycle And Overheating

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

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

### 100% Duty Cycle At 500 Amperes

Continuous Welding

### 40% Duty Cycle At 600 Amperes

4 Minutes Welding 6 Minutes Resting

![Graph showing weld amperes vs. duty cycle percentage](image)

4-8. Generator AC Power Curve

The AC power curve shows the generator power in amperes available at the 120 and 240 volt receptacles.
4-9. Stick And MIG Volt-Ampere Curves

The volt-ampere curve shows the minimum and maximum voltage and amperage output capabilities of the welding generator. Curves of all other settings fall between the curves shown.

A. DC Stick Mode

B. AC Stick Mode (Optional)

C. MIG Mode
4-10. TIG Volt-Ampere Curves

A. DC TIG Mode

The volt-ampere curve shows the minimum and maximum voltage and amperage output capabilities of the welding generator. Curves of all other settings fall between the curves shown.

B. AC TIG Mode (Optional)
4-11. Optional 3-Phase Generator Power Curves

The AC power curves show the generator power available in amperes at the single-phase 120/240 volt receptacle or three-phase 240 volt terminals.

A. 12 kVA/kW Single-Phase AC Output (No Weld Load)

B. 20 kVA/kW Three-Phase AC Output (No Weld Load)
4-12. Fuel Consumption

The curve shows typical fuel use under weld, air, or generator power loads.

4-13. Air Compressor Output Curve

The air output curve shows the volume and pressure of air available from the air compressor.
4-14. Optional Battery Charging Output Curve

The battery charging curves show the charging amperage and voltage output of the welding generator. As battery voltage nears the charging voltage, charging current decreases.

![Battery Charging Curve Diagram]

**Notes**

---

**WELD POSITION: FLAT**

- BUTT 1G
- T-JOINT 1F

---

**HORIZONTAL**

- BUTT 2G
- T-JOINT 2F

---

**VERTICAL**

- BUTT 3G
- T-JOINT 3F

---

**OVERHEAD**

- BUTT 4G
- T-JOINT 4F

Ref. AWS/ANSI D1.1

Ref. 804 248-A
5-1. Installing Welding Generator

- **Movement**
  - Do not move or operate unit where it could tip.
  - See Section 4-5 for lifting eye rating.

- **Airflow Clearance**
  - Do not install unit where air flow is restricted or engine may overheat.

- **Location/Mounting**
  - Always securely fasten welding generator onto transport vehicle or trailer and comply with all DOT and other applicable codes.

- **Tools Needed:**
  - 9/16 in.

- **Welding Unit In Place**
  - 3 1/2 in Bolt And Washer (Minimum – Not Supplied)
  - 4 3/8-16 x 1 in. Screws (Supplied)

- **Bolting Unit In Place**
  - 1 Cross-Supports
  - 2 Mounting Brackets (Supplied)

- **To Bolt Unit In Place:**
  - Remove hardware securing the four mounting brackets to the base. Reverse brackets and reattach to base with original hardware.
  - Mount unit to truck or trailer with 1/2 in. (12 mm) or larger hardware (not supplied).

- **To Weld Unit In Place:**
  - Weld unit to truck or trailer only at the four mounting brackets.
5-2. Grounding Generator To Truck Or Trailer Frame

Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.

Also see AWS Safety & Health Fact Sheet No. 29, Grounding of Portable And Vehicle Mounted Welding Generators.

Bed liners, shipping skids, and some running gear insulate the welding generator from the vehicle frame. Always connect a ground wire from the generator equipment grounding terminal to bare metal on the vehicle frame as shown.

Use GFCI protection when operating auxiliary equipment. If unit does not have GFCI receptacles, use GFCI-protected extension cord. Do not use GFCI receptacles to power life support equipment.

1 Equipment Grounding Terminal (On Front Panel)
2 Grounding Cable (Not Supplied)
3 Metal Vehicle Frame

Connect cable from equipment ground terminal to metal vehicle frame. Use #8 AWG or larger insulated copper wire.

Electrically bond generator frame to vehicle frame by metal-to-metal contact.

5-3. Installing Exhaust Pipe

Stop engine and let cool.

Point exhaust pipe in desired direction but always away from front panel and direction of travel.
5-4. Connecting The Battery

⚠️ Connect negative (−) cable last.

NOTICE – Wait two minutes after engine shutdown before disconnecting battery or engine controller may be damaged.

Battery is most easily accessed through the rear panel. Remove battery access panel from rear panel. Connect battery, negative cable last. Reinstall battery access panel.

- Do not allow the battery cables to touch opposing terminals. When connecting the battery cables attach the positive (+) cable to the positive (+) battery terminal first, followed by negative (−) cable to negative (−) battery terminal.
- Never start the engine when the cables are loose or poorly connected to the battery terminals.
- Never disconnect the battery while the engine is running.
- Never use a quick battery charger to start the engine.
- Do not charge battery with Engine Control switch On.
- Always disconnect the negative (−) battery cable before charging battery.

Tools Needed:

1/2 in

5-5. Using The Optional Battery Disconnect Switch

⚠️ Stop engine.

1 Battery Disconnect Switch

The battery disconnect switch disconnects battery voltage from the circuit. When the switch is turned Off, the front panel controls do not work.

To run unit, turn switch to On position. To prevent unit from running, turn switch to Off position.

The switch may be locked using a customer-supplied padlock.
5-6. Engine/Compressor Prestart Checks

Check all engine/compressor fluids daily.

Engine must be cold and on a level surface. The automatic shutdown system stops engine if oil pressure is too low or coolant temperature is too high.

This unit has a low oil pressure shutdown switch. However, some conditions may cause engine damage before the engine shuts down. Check oil level often and do not use the oil pressure shutdown system to monitor oil level.

NOTICE – Diesel engines in MILLER equipment are meant to operate optimally at moderate to rated load. Using light or no load for extended periods of time may cause wet-stacking or engine damage. Follow run-in procedure in engine manual. If unburned fuel and oil collect in exhaust pipe, see Section 15.

NOTICE – Do not use gasoline. Gasoline will damage engine.

Add fresh diesel fuel before starting to prevent air from entering the fuel system (see engine maintenance label for fuel specifications). Leave filler neck empty to allow room for expansion.

Engine stops if fuel level is low.

Engine Oil

After fueling, check oil with unit on level surface. Oil level on a cold engine should be between cold low and cold high indicators on dipstick. Oil level on a warm engine should be between warm high and warm low indicators on dipstick. Add oil if necessary (see maintenance label for engine oil specifications).

Compressor Oil

1 Compressor Oil Level Indicator (On Tank)

Check oil with engine off. Check oil with unit on level surface. Add oil if oil is not up to full mark on indicator (see maintenance label for oil specifications).

Cold Weather Starting

To improve cold weather starting: Use Starting Aid switch (see Section 6-1).

Keep battery in good condition. Store battery in warm area.

Use fuel formulated for cold weather (diesel fuel can gel in cold weather). Contact local fuel supplier for fuel information.

Use correct grade oil for cold weather (see Section 9-1).

Engine Oil Fill

Compressor Oil Fill
5-7. Connecting To Weld Output Terminals

**Stop engine.**
1. Positive (+) Weld Output Terminal
2. Negative (−) Weld Output Terminal

**Stick and TIG Welding**
For Stick and TIG welding Direct Current Electrode Positive (DCEP), connect electrode holder cable to Positive (+) terminal on left and work cable to Negative (−) terminal on right.
For Direct Current Electrode Negative (DCEN), reverse cable connections.
If equipped with optional Polarity switch or optional Polarity/AC switch, connect electrode holder cable to Electrode (+) terminal on left and work cable to Work (−) terminal on right.

**MIG and FCAW Welding**
For MIG and FCAW welding Direct Current Electrode Positive (DCEP) on CC/CV models, connect wire feeder cable to Positive (+) terminal on left and work cable to Negative (−) terminal on right. Use Process/Contactor switch to select type of weld output (see Section 6-3).
For Direct Current Electrode Negative (DCEN), reverse cable connections.
If equipped with optional Polarity switch or optional Polarity/AC switch, connect wire feeder cable to Electrode (+) terminal on left and work cable to Work (−) terminal on right.

5-8. Connecting Weld Output Cables

**Tools Needed:**
3/4 in.

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

**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.**

1. Correct Weld Cable Connection
2. Incorrect weld Cable Connection
3. Weld Output Terminal
4. Supplied Weld Output Terminal Nut
5. Weld Cable Terminal
6. 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.
5-9. Selecting Weld 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.

<table>
<thead>
<tr>
<th>Welding Amperes</th>
<th>100 ft (30 m) or Less</th>
<th>200 ft (60 m)</th>
<th>300 ft (90 m)</th>
<th>400 ft (120 m)</th>
<th>500 ft (150 m)</th>
<th>600 ft (180 m)</th>
<th>700 ft (210 m)</th>
<th>800 ft (240 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>4 (20)</td>
<td>4 (20)</td>
<td>1 (50)</td>
<td>3 (30)</td>
<td>1/0 (60)</td>
<td>2/0 (70)</td>
<td>4/0 (120)</td>
<td>2x2/0 (2x70)</td>
</tr>
<tr>
<td>150</td>
<td>3 (30)</td>
<td>3 (30)</td>
<td>2 (35)</td>
<td>1 (50)</td>
<td>3/0 (95)</td>
<td>2/0 (70)</td>
<td>4/0 (120)</td>
<td>2x2/0 (2x70)</td>
</tr>
<tr>
<td>200</td>
<td>3 (30)</td>
<td>2 (35)</td>
<td>1 (50)</td>
<td>1/0 (60)</td>
<td>1/0 (60)</td>
<td>4/0 (120)</td>
<td>2x3/0 (2x95)</td>
<td>2x3/0 (2x95)</td>
</tr>
<tr>
<td>250</td>
<td>2 (35)</td>
<td>1 (50)</td>
<td>1/0 (60)</td>
<td>2/0 (70)</td>
<td>3/0 (95)</td>
<td>3/0 (95)</td>
<td>2x3/0 (2x95)</td>
<td>2x3/0 (2x95)</td>
</tr>
<tr>
<td>300</td>
<td>1 (50)</td>
<td>1/0 (60)</td>
<td>2/0 (70)</td>
<td>3/0 (95)</td>
<td>4/0 (120)</td>
<td>4/0 (120)</td>
<td>2x3/0 (2x95)</td>
<td>2x3/0 (2x95)</td>
</tr>
<tr>
<td>350</td>
<td>1/0 (60)</td>
<td>2/0 (70)</td>
<td>3/0 (95)</td>
<td>4/0 (120)</td>
<td>2x2/0 (2x70)</td>
<td>2x3/0 (2x95)</td>
<td>2x3/0 (2x95)</td>
<td>2x3/0 (2x95)</td>
</tr>
<tr>
<td>400</td>
<td>1/0 (60)</td>
<td>2/0 (70)</td>
<td>3/0 (95)</td>
<td>4/0 (120)</td>
<td>2x2/0 (2x70)</td>
<td>2x3/0 (2x95)</td>
<td>2x3/0 (2x95)</td>
<td>2x3/0 (2x95)</td>
</tr>
<tr>
<td>500</td>
<td>2/0 (70)</td>
<td>3/0 (95)</td>
<td>4/0 (120)</td>
<td>2x2/0 (2x70)</td>
<td>2x3/0 (2x70)</td>
<td>2x3/0 (2x95)</td>
<td>3x3/0 (3x95)</td>
<td>3x3/0 (3x95)</td>
</tr>
<tr>
<td>600</td>
<td>3/0 (95)</td>
<td>4/0 (120)</td>
<td>2x2/0 (2x70)</td>
<td>2x3/0 (2x95)</td>
<td>2x3/0 (2x70)</td>
<td>2x3/0 (2x95)</td>
<td>3x3/0 (3x95)</td>
<td>3x3/0 (3x95)</td>
</tr>
<tr>
<td>700</td>
<td>4/0 (120)</td>
<td>2x2/0 (2x70)</td>
<td>2x3/0 (2x95)</td>
<td>2x4/0 (2x120)</td>
<td>3x3/0 (3x95)</td>
<td>3x3/0 (3x95)</td>
<td>3x4/0 (3x120)</td>
<td>4x4/0 (4x120)</td>
</tr>
<tr>
<td>800</td>
<td>4/0 (120)</td>
<td>2x2/0 (2x70)</td>
<td>2x3/0 (2x95)</td>
<td>2x4/0 (2x120)</td>
<td>3x3/0 (3x95)</td>
<td>3x4/0 (3x120)</td>
<td>4x4/0 (4x120)</td>
<td>4x4/0 (4x120)</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-K 2013-09

Notes
5-10. Connecting To Remote 14 Receptacle RC14

<table>
<thead>
<tr>
<th>REMOTE 14 Socket*</th>
<th>Socket Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 24 volts AC. Protected by supplementary protector.</td>
<td></td>
</tr>
<tr>
<td>B Contact closure to A completes 24 volt AC contactor control circuit.</td>
<td></td>
</tr>
<tr>
<td>C Output to remote control: 10 volts DC in MIG mode; 0 to +10 volts DC in Stick or TIG mode.</td>
<td></td>
</tr>
<tr>
<td>D Remote control circuit common.</td>
<td></td>
</tr>
<tr>
<td>E DC input command signal: 0 to +10 volts from min. to max. of remote control with Voltage/Amperage Adjust control at maximum.</td>
<td></td>
</tr>
<tr>
<td>F Current feedback: 1 volt per 100 amperes.</td>
<td></td>
</tr>
<tr>
<td>G Voltage feedback: 1 volt per 10 arc volts.</td>
<td></td>
</tr>
<tr>
<td>H Chassis common.</td>
<td></td>
</tr>
<tr>
<td>I Circuit common for 24 and 115 volt AC circuit.</td>
<td></td>
</tr>
<tr>
<td>J Contact closure to I completes 115 volt AC contactor control circuit.</td>
<td></td>
</tr>
</tbody>
</table>

Accessories depend on unit capabilities.

The remaining sockets are not used.

5-11. Connecting To The Air Compressor

Stop engine and release air pressure before servicing compressor.

Air pressure is present at air shut-off valve whenever Air Pressure Gauge on front panel indicates air pressure.

1 3/4 in. NPT Air Pressure Fitting
2 Air Shutoff Valve

Connect air hose with 3/4 in. NPT fitting (not supplied) to air shutoff valve.

Be sure valve is in open position when using air compressor.

The compressor runs and air pressure is available whenever the engine is running and the front panel Compressor switch is moved to the On position (see Section 6-1).

Run engine at weld/power speed for maximum air compressor output. Compressor output is reduced when engine is running at idle speed.

The air compressor will not start if still under pressure. If air compressor is turned off, wait for air pressure to bleed off (about 20 seconds) before turning air compressor on again.

Using the air compressor does not significantly affect weld or generator power output.
SECTION 6 – OPERATING THE WELDING GENERATOR

6-1. Controls (See Section 6-2)
6-2. Description Of Controls (See Section 6-1)

Engine Starting Controls
1 Starting Aid Switch
Use switch to energize starting aid for cold weather starting.
Push switch up for 60 seconds to operate the starting aid (intake air heater) before cranking engine (see starting instructions following).
2 Engine Control Switch
Use switch to start engine, select engine speed, and stop engine.
In Run position, engine runs at weld/power speed. In Run/Idle position, engine runs at idle speed with no generator power or weld load, and weld/power speed with load applied.
NOTICE – Diesel engine in MILLER equipment are meant to operate optimally at moderate to rated load. Using light or no load for extended periods of time may cause wet-stacking or engine damage.
The air compressor load does not affect engine speed. Run engine at weld/power speed for maximum air compressor output.
To Start:
   If engine does not start, let engine come to a complete stop before attempting restart.
Above 32° F (0° C): turn Engine Control switch to Start. Release Engine Control switch when engine starts.
Below 32° F (0° C) using starting aid switch:
Turn Engine Control switch to Run/Idle position. Push Starting Aid switch up for 60 seconds. While still holding Starting Aid switch, turn Engine Control switch to Start. Release Engine Control switch and Starting Aid switch when engine starts.
To Stop: turn Engine Control switch to Off position.
Engine/Compressor Gauges
3 Engine Fuel/Hour Gauge
Use gauge to monitor engine running time for scheduling maintenance and to determine cause of engine shutdowns.
Use gauge to check fuel level. Engine stops if fuel level is low.
To check fuel level when engine is not running, turn Engine Control switch to Run or Run/Idle position.
See Section 6-5 for complete fuel/hour gauge information.
4 Air Pressure Gauge
Use gauge to check compressor air pressure.
5 Engine Oil Pressure Gauge
Normal pressure is 30 – 60 psi (206 – 414 kPa). Engine stops if pressure is below 20 psi (138 kPa).
6 Engine Temperature Gauge
Normal temperature is 212 – 239° F (100 – 115° C). Engine stops if temperature exceeds 270° F (132° C).
7 Battery Voltmeter
Use gauge to check battery voltage and monitor the engine charging system. The meter should read about 14 volts DC when the engine is running, and about 12 volts DC when the engine is stopped.
Weld Controls
8 Process/Contactor Switch
See Section 6-3 for Process/Contactor switch information.
9 Ampere Range Switch
NOTICE – Do not switch under load.
Use switch to select weld amperage range. Use all five ranges for Stick welding, and the lowest four ranges for TIG welding. Read the upper set of numbers at each range for Stick welding and the lower set at each range for TIG welding.
Use the highest range for MIG welding and for cutting and gouging (CAC-A).
For most welding applications, use lowest amperage range possible to help prevent arc outages.
10 Voltage/Ammeter Adjust Control
With Process/Contactor switch in any Stick or TIG setting, use control to adjust amperage within range selected by Ampere Range switch. With Process/Contactor switch in any MIG position, use control to adjust voltage. With Panel/Remote Switch in Remote position, control limits the remote amperage in TIG mode, but has no effect in Stick and MIG modes.
Weld output would be about 263 A DC with controls set as shown (50% of 125 to 400 A).
The numbers around the Voltage/Ammeter Adjust control are for reference only and do not represent an actual percentage value.
11 Panel/Remote Switch And Remote 14 Receptacle
Use switch to select front panel or remote voltage/amperage control. For remote control, place switch in Remote position and connect remote control to Remote 14 receptacle RC14 (see Sections 5-10 and 6-4).
12 Polarity/AC Selector Switch (Optional)
Or Output Selector Switch (Optional)
NOTICE – Do not switch under load.
Use Polarity/AC selector switch to select AC or DC weld output and DC weld output polarity.
Use Output Selector switch to select AC Weld, DC Weld, or battery charge output (see Section 8-5).
Weld Meters
13 AC/DC Ammeter (Optional)
Voltmeter displays voltage at the weld output terminals, but not necessarily the welding arc due to resistance of cable and connections.
14 AC/DC Voltmeter (Optional)
Ammeter displays amperage output of the unit.
Air Compressor Controls
15 Air Compressor Switch
Use switch to turn air compressor on and off. Air pressure is present at the compressor air shutoff valve whenever the compressor is running. The compressor shuts off when the engine stops. To use air, the compressor must be turned on each time the engine is started.
The air compressor will not start if still under pressure. If air compressor is turned off, wait for air pressure to bleed off (about 20 seconds) before turning air compressor on again.
16 Air Shutoff Valve
Air pressure is present at valve whenever Air Pressure Gauge (item 4) indicates air pressure.
Close valve to stop air flow when connecting or changing tools or air hoses (see Section 5-11).
6-3. Process/Contactor Switch

1. Process/Contactor Switch

- Weld output terminals are energized when Process/Contactor switch is in a Weld Terminals Always On position and the engine is running.
- DC voltage is still present at the weld terminals when Process/Contactor switch is in the Remote On/Off Switch Required – Stick position and the engine is running.

Use switch to select weld process and weld output on/off control (see table below and Section 6-4).

Place switch in Remote On/Off Switch Required positions to turn weld output on and off with a device connected to the remote 14 receptacle.

Place switch in Weld Terminals Always On positions for weld output to be on whenever the engine is running.

Use Stick position for air carbon arc (CAC-A) cutting and gouging.

When switch is in a Stick position, the arc drive (dig) circuit provides additional amperage during low voltage (short arc length conditions) to prevent “sticking” electrodes.

The arc drive (dig) circuit is disabled when switch is in MIG or TIG positions.

💡 The engine auto idle option does not work in the Remote On/Off Switch Required-TIG mode.

### Process/Contactor Switch Settings

<table>
<thead>
<tr>
<th>Switch Setting</th>
<th>Process</th>
<th>Output On/Off Control</th>
<th>Engine Auto Idle (Optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote On/Off Switch Required – TIG, HF Required Or Scratch Start TIG</td>
<td>GTAW With HF Unit, Pulsing Device, Or Remote Control</td>
<td>At Remote 14 Receptacle</td>
<td>Not Active</td>
</tr>
<tr>
<td>Remote On/Off Switch Required – Stick</td>
<td>Stick (SMAW) With Remote On/Off</td>
<td>At Remote 14 Receptacle</td>
<td>Active</td>
</tr>
<tr>
<td>Remote On/Off Switch Required – CV Feeder Using Remote</td>
<td>MIG (GMAW)</td>
<td>At Remote 14 Receptacle</td>
<td>Active</td>
</tr>
<tr>
<td>Weld Terminals Always On – Wire</td>
<td>MIG (GMAW)</td>
<td>Electrode Hot</td>
<td>Active</td>
</tr>
<tr>
<td>Weld Terminals Always On – Stick</td>
<td>Stick (SMAW), Air Carbon Arc (CAC-A) Cutting And Gouging</td>
<td>Electrode Hot</td>
<td>Active</td>
</tr>
<tr>
<td>Weld Terminals Always On – TIG, Scratch Start</td>
<td>TIG Scratch Start (GTAW)</td>
<td>Electrode Hot</td>
<td>Active</td>
</tr>
</tbody>
</table>
6-4. Using Remote Voltage/Amperage Control

Example: Combination Remote Amperage Control (Stick)

In Example:
- Process = Stick (Using Remote On/Off)
- Range = 125 to 400 A DC
- Min = 125 A DC
- Max = 400 A DC

Set Panel/Remote Switch → Set Remote Process → Set Range → Control Not Used In Remote On/Off Switch Required – Stick Mode → Adjust Optional Remote Control

Example: Combination Remote Amperage Control (TIG)

In Example:
- Process = TIG (Using Remote On/Off)
- Range = 40 to 330 A DC
- Percentage Of Range = 50%
- Min = 40 A DC
- Max = About 185 A DC (50% of 40 to 330)

Set Panel/Remote Switch → Set Remote Process → Set Range → Set Control → Adjust Optional Remote Control
# 6-5. Fuel/Hour Gauge Descriptions

<table>
<thead>
<tr>
<th>Gauge Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENGINE HOURS</strong></td>
<td>Gauge will display engine hours while engine is running.</td>
</tr>
<tr>
<td></td>
<td>To display engine hours while the engine is off, place Engine Control switch in position “3”.</td>
</tr>
<tr>
<td><strong>OIL CHANGE INTERVAL</strong></td>
<td>Gauge will display hours remaining before oil change is due with Engine Control switch in position “2” (with engine off).</td>
</tr>
<tr>
<td><strong>OIL CHANGE DUE</strong></td>
<td>Gauge will display blinking wrench when oil change is due (0 to - 99 hours).</td>
</tr>
<tr>
<td></td>
<td>To Reset: Toggle Engine Control switch between position “2” and “3” three times within 5 seconds (engine off).</td>
</tr>
<tr>
<td><strong>LOW FUEL PREWARNING</strong></td>
<td>Fault indicator flashes when fuel level reaches 2 bars. Flashing rate increases as fuel level drops.</td>
</tr>
<tr>
<td></td>
<td>LOW FUEL: Fuel level low when fuel icon and last bar in fuel gauge blink.</td>
</tr>
<tr>
<td></td>
<td>To Reset: Refuel.</td>
</tr>
<tr>
<td><strong>NO FUEL</strong></td>
<td>Engine shuts down before fuel runs out. Display shows “noFuel”, and fuel icon and fault indicator flash.</td>
</tr>
<tr>
<td></td>
<td>To Reset: Refuel.</td>
</tr>
<tr>
<td><strong>LOW OIL PRESSURE</strong></td>
<td>Engine shuts down when oil pressure is low. Display shows “LO OIL”, fault indicator flashes and wrench is displayed.</td>
</tr>
<tr>
<td></td>
<td>To Reset: Place Engine Control switch in OFF position.</td>
</tr>
<tr>
<td><strong>HIGH COOLANT TEMP</strong></td>
<td>Engine shuts down when coolant temperature is high. Display shows “HI H2O” and fault indicator flashes.</td>
</tr>
<tr>
<td></td>
<td>To Reset: Place Engine Control switch in OFF position.</td>
</tr>
</tbody>
</table>

---

Note: Switch positions are numbered to illustrate that there are four switch positions. Actual graphics on front panel will vary.
6-6. Optional Air Dryer Operation

The air dryers blow out (purge) moisture and debris when the air compressor is being used. The air dryer heaters operate whenever the welding generator is running.

See the supplied air dryer Owner's Manual for air dryer maintenance and service information.

When battery access is required, disconnect and remove the air dryer assembly as described in Section 9-10.

1 Circuit Breaker CB8
CB8 protects the dryer heaters from damage due to overload. If CB8 opens, the heaters do not work and the dryer does not discharge moisture in cold weather.

Press button to reset circuit breaker CB8.

When a circuit breaker opens, it usually indicates a more serious problem exists. Contact a Factory Authorized Service Agent.

Start engine, and turn on air compressor. Check fittings for air leaks and tighten fittings if necessary.

2 Timer Control LED
Verify dryer solenoid is functioning by listening for dryer canisters to purge, or by checking solenoid LED. LED lights at start-up and every two minutes when the canisters automatically purge.
SECTION 7 – OPERATING AUXILIARY EQUIPMENT

7-1. Domestic Auxiliary Power Receptacles

⚠️ Use GFCI protection when operating auxiliary equipment. If unit does not have GFCI receptacles, use GFCI-protected extension cord. Do not use GFCI receptacles to power life support equipment.

⚠️ Unplug power cord before attempting to service accessories or tools.

1. 120 V 20 A AC GFCI Receptacle GFCI1
2. 240 V 30 A AC Twistlock Receptacle RC1

Receptacles supply 60 Hz single-phase power at weld/power speed.

Test GFCI monthly. See Section 7-4 for GFCI information and for resetting and testing procedures.

3. Supplementary Protector CB1
4. Supplementary Protector CB2

CB1 protects RC1 and the generator winding from overload. If CB1 opens, RC1 and GFCI1 do not work. Place switch in On position to reset.

CB2 protects GFCI1 from overload. If CB2 opens, GFCI1 does not work. Press button to reset.

If a supplementary protector continues to open, contact Factory Authorized Service Agent.

Generator power is not affected by weld output.

Maximum output is 2.4 kVA/kW from GFCI1 and 4 kVA/kW from RC1. Maximum output from all receptacles is 4 kVA/kW.

EXAMPLE: If 13 A is drawn from RC1, only 7 A is available at GFCI1:

\[
(240 \text{ V} \times 13 \text{ A}) + (120 \text{ V} \times 7 \text{ A}) = 4.0 \text{ kVA/kW}
\]
7-2. Connecting To Optional AC Power Plant

**Single-Phase Generator Power**

1. 120/240 V 50 A Receptacle RC5

   RC5 is connected to the optional AC power plant and supplies 60 Hz single-phase power at weld/power speed. Maximum output from RC5 is 12 kVA/kW. Power available at RC5 is reduced when welding.

2. Supplementary Protector CB7

   Supplementary protector CB7 protects single-phase receptacle RC5 and the load wires from overload. If CB7 opens, all generator AC output stops and the receptacle does not work.

**Three-Phase Generator Power**

Stop engine.

Power and weld outputs are live at the same time. Disconnect or insulate unused cables.

Have qualified person install according to circuit diagram and Generator Power Guidelines (see Section 17).

Remove power panel mounting screws. Tilt panel forward.

- 3. Lead 93
- 4. Lead 92
- 5. Lead 91
- 6. Lead 42 (Circuit Grounding Lead)
- 7. Lead 90 (Neutral)
- 8. Isolated Neutral Terminal
- 9. Jumper Lead 42
- 10. Grounding Terminal

Jumper 42 is connected to lead 90 at factory. Jumper 42 may be disconnected from neutral to meet applicable electrical codes.

Lead 42 connects to front panel ground stud.

- 11. User-Supplied Leads
- 12. Supplementary Protector CB7 User Terminals

Connect user-supplied leads to terminals on CB7 and to the isolated neutral terminal and grounding terminal as necessary.

Supplementary protector CB7 protects single-phase receptacle RC5 and the load wires from overload. If CB7 opens, all AC power plant output stops and the receptacle does not work.

Reinstall power panel.

---

Do not weld while using optional AC power plant.

Place Process/Contactor switch in Weld Terminals Always On - Stick position when using optional AC power plant (see Section 6-3).

---

**Tools Needed:**

- [ ]

---

**Connection Points:**

- 1. AC Output
- 2. Single Phase
- 3. Three Phase

<table>
<thead>
<tr>
<th>AC Output</th>
<th>Single Phase 1</th>
<th>Three Phase 3</th>
</tr>
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<tbody>
<tr>
<td>Volts</td>
<td>120/240</td>
<td>240</td>
</tr>
<tr>
<td>Amps</td>
<td>50</td>
<td>48</td>
</tr>
<tr>
<td>KVA/KW</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Frequency</td>
<td>60 Hz</td>
<td></td>
</tr>
<tr>
<td>Engine Speed</td>
<td>1850 RPM</td>
<td></td>
</tr>
</tbody>
</table>

Lead 42 connects to GROUND stud on front of unit.

Jumper 42 is connected to 90 at factory.

---

**Rear Of Panel:**

- 1. 1-Phase
- 2. 120V
- 3. 240V
- 4. 240V
- 5. 1-Phase
- 6. 240V
- 7. 120V
- 8. 240V
- 9. 120V
- 10. 240V
- 11. 240V
- 12. 240V

---

**Notes:**

- Close panel opening if no connections are made to power plant.
- Remove plug before inserting leads. Reinstall bushing.

---

**Ref. 197 399 / 802 332-B**
7-3. Export Auxiliary Power Receptacles

Use GFCI protection when operating auxiliary equipment. If unit does not have GFCI receptacles, use GFCI-protected extension cord. Do not use GFCI receptacles to power life support equipment.

Unplug power cord before attempting to service accessories or tools.

1. 120V 15/20A AC Receptacle GFCI1
   Receptacle supplies 60 Hz single-phase power at weld/power speed.
   Maximum output is 2.4 kVA/kW from GFCI1.

2. Circuit Breaker CB2
   CB2 protects GFCI1 from overload. If a circuit breaker opens, the receptacle does not work. Press CB2 to reset breaker.

3. Earth Leakage Circuit Breaker ELCB1
   ELCB1 protects RC1 from Earth leakage fault. If circuit breaker opens the receptacle does not work. Place circuit breaker switch in the On position to reset breaker.
   At least once a month, press test button. If ELCB is working properly, power will be disconnected. Reset breaker.

4. 220V 16A AC European Receptacle RC1
   Maximum output is 4 kVA/kW from RC1.
   If a circuit breaker continues to open, contact Factory Authorized Service Agent.

Test GFCI monthly. See Section 7-4 for GFCI information and for resetting and testing procedures.

Maximum combined output of all receptacles is 4 kVA/kW.
EXAMPLE: If 13 A is drawn from RC1, only 7 A is available at GFCI1:

\[
\text{Maximum output} = (240 \text{ V} \times 13 \text{ A}) + (120 \text{ V} \times 7 \text{ A}) = 4.0 \text{ kVA/kW}
\]

European Receptacle
Use GFCI protection when operating auxiliary equipment. If unit does not have GFCI receptacles, use GFCI-protected extension cord. Do not use GFCI receptacle to power life support equipment.

Unplug power cord before attempting to service accessories or tools.

1 120 V 20 A AC GFCI Receptacle
2 GFCI Receptacle Test Button
3 GFCI Receptacle Reset Button
4 GFCI Indicator Light (LED)

GFCI Receptacles

GFCI receptacles protect the user from electric shock if a ground fault occurs in equipment connected to the receptacle. A ground fault occurs when electrical current takes the shortest path to ground (which could be through a person) rather than follow its intended safe path.

If a ground fault is detected, the GFCI Reset button pops out, and the circuit opens to disconnect power to the faulty equipment. A GFCI receptacle does not protect against circuit overloads, short circuits, or shocks not related to ground faults. Reset and test GFCI receptacle according to the following procedures.

Resetting/Testing GFCI Receptacle

Test GFCI monthly. See Testing GFCI Receptacle.

Do not test or reset GFCI receptacles at idle speed/low voltage or the GFCI will be damaged and not provide protection from electric shock caused by a ground fault.

If LED blinks, stop using GFCI receptacle and have it replaced by a Factory Authorized Service Agent.

Resetting GFCI Receptacles

If a GFCI fault occurs, stop engine and disconnect equipment from GFCI receptacle.

Check for damaged or wet tools, cords, plugs, etc. connected to the receptacle. Start engine and operate at Run (weld/power) speed. Press GFCI Reset button. Reconnect equipment to GFCI receptacle. If GFCI Reset button pops out again, check the equipment and repair or replace if faulty.

Testing GFCI Receptacles

GFCI testing must be done with engine running at Run (weld/power) speed.

Start engine and operate at Run (weld/power) speed.

Press the GFCI Test button. The GFCI Reset button should pop out.

Press the GFCI Reset button.

Have GFCI replaced by a Factory Authorized Service Agent if any of the following occur:

- GFCI does not trip when tested
- LED blinks
- GFCI does not reset.
SECTION 8 – OPERATING OPTIONAL BATTERY CHARGER

8-1. Battery Charging Guidelines

⚠️ Stop welding generator engine. Place Output Selector switch in position matching voltage of battery being charged.

⚠️ When charging battery, the charging voltage is also present at weld output terminals.

⚠️ Before charging battery, read supplied BCI Battery Service Manual and the Safety Precautions at the beginning of this manual.

⚠️ Have only qualified persons do battery charging work.

⚠️ Do not charge a defective battery, a battery with loose terminals or one having evidence of damage such as a cracked case or cover.

⚠️ Keep battery charging cables away from vehicle hood, door, and moving parts.

⚠️ Do not use damaged battery charging cables.

⚠️ Be sure charger output voltage matches battery voltage.

⚠️ Do not jump-start a vehicle without a battery.

⚠️ Disconnect weld cables from weld terminals before charging a battery. Weld terminals are electrically live during battery charging.

8-2. Determining Battery Charging Current

1 Battery Charging Current Chart

Find battery cold crank amp (CCA) rating on battery. Use CCA rating on chart to find charge current setting for battery.

EXAMPLE: If battery CCA rating is 500, charging current from chart is 100 amperes.

Do not exceed charging current found on chart. For longer battery life, use lowest charge rate possible.
8-3. Connecting Uninstalled Battery To Battery Charge Output Terminals

**Warning:**
Stop welding generator engine. Before connecting charging cables, place Output Selector switch in position matching voltage of battery being charged.

Before charging battery, check polarity of battery posts. Attach a 24 in. (60 cm) AWG 6 insulated battery cable to Negative (−) battery post. Connect charger Positive (+) cable to Positive (+) post of battery. Standing as far from battery as practical and looking away from battery, connect charger Negative (−) cable to the cable connected to the Negative (−) battery post.

**Diagram:**
- Battery located outside of vehicle
- Battery Positive (+) Terminal
- Battery Negative (−) Terminal
- Battery Charging Cables
- Use less than 20 ft (6.1 m) of AWG #1 or larger cable.
- Terminal Lugs
- Use lugs of proper amperage capacity and hole size for connecting to charge output terminals.
- Install suitable connectors on remaining ends of battery cables.
- Battery Charge Positive (+) Output Terminal
- Battery Charge Negative (−) Output Terminal
- Insulated Battery Cable (Customer-Supplied)
  - Connect a 24 in. (60 cm) or longer insulated battery cable (AWG 6) to negative (−) battery post.
- Connect positive (+) battery charging cable to positive (+) battery charging terminal.
- Connect negative (−) battery charging cable to negative (−) battery charging terminal.
- Connect positive (+) battery charging cable to battery positive (+) post. Connect negative (−) battery charging cable to insulated battery cable.
8-4. Connecting Installed Battery To Battery Charge Output Terminals

Stop welding generator engine. Before connecting charging cables, place Output Selector switch in position matching voltage of battery being charged.

Before charging battery, check polarity of battery posts. If battery Negative (−) post is grounded to chassis (most vehicles), connect charger Positive (+) cable to Positive (+) ungrounded post of battery. Connect charger Negative (−) cable to vehicle engine block or heavy gauge metal part of frame (and away from battery). If Positive (+) post is grounded to chassis, connect charger Negative (−) cable to Negative (−) ungrounded post of battery. Connect charger Positive (+) cable to vehicle chassis or engine block (and away from battery).

Install suitable connectors on remaining ends of battery cables.

1 Battery Positive (+) Terminal
2 Battery Negative (−) Terminal
3 Battery Charging Cables
4 Terminal Lugs
5 Battery Charge Positive (+) Output Terminal
6 Battery Charge Negative (−) Output Terminal

If battery Negative (−) post is grounded to chassis, connect Positive (+) battery charging cable to battery Positive (+) post. Connect Negative (−) battery charging cable to engine block or heavy gauge metal part of frame (and away from battery).

If battery Positive (+) post is grounded to chassis, connect Negative (−) battery charging cable to battery ungrounded Negative (−) post. Connect Positive (+) battery charging cable to engine block or heavy gauge metal part of frame (and away from battery).

Battery located in vehicle
(Negative post grounded to chassis)

See information below regarding vehicles with battery Positive (+) grounded to chassis.

Connect black (Negative) charging cable to chassis or engine block (and away from battery).
8-5. Battery Charge Controls

1 Output Selector Switch

**NOTICE** – Do not switch under load. Stop engine or set Process/Contactor switch to any Remote position before switching.

Use switch to select weld or battery charge output. Output automatically decreases (but does not stop) when terminal voltage is 15 to 25 percent above required battery voltage.

Before connecting charging cables, place Output Selector switch in position matching voltage of battery being charged.

When done charging, stop engine or set Process/Contactor switch to any Remote On/Off Switch Required position. Move Output Selector switch to AC Weld or DC Weld position.
8-6. Battery Charging Procedure

Stop Engine.

Set Process/Contactor Switch To Any Remote On/Off Switch Required Position.

Set Output Selector Switch To Voltage Of Battery Being Charged (12 Or 24 Volt).

NOTICE – Do not switch under load.

Determine Charge Current From Battery CCA Rating And Chart (See Section 8-2).

Set Ampere Range Switch And Voltage/Amperage Adjust Control To Lowest Setting That Exceeds Charge Current.

NOTICE – Do not switch under load.

Start Engine.

Set Process/Contactor Switch To Any Weld Terminals Always On Position To Begin Charging.

Charge 10 minutes. Check Battery Voltage. Continue Charging If Necessary.

To control battery charging output using a remote device connected to the Remote 14 receptacle, keep Process/Contactor switch in Remote On/Off Switch Required position and use remote device to turn charging output on and off.

Stop engine when finished Charging. Stand as far from battery as practical and disconnect cables from welding generator. Remove cables from battery, negative (−) cable first.

In Example:
Battery Voltage = 12 Volts
Battery CCA Rating = 500
Charge Current = 100 A (See Section 8-2)
Ampere Range Setting = 55 to 125 A
V/A Control Setting = Any Position

This battery charging procedure uses the front panel controls to turn charging output on and off.

Have only qualified persons charge batteries.
8-7. Jump Starting Procedure

**Notice**
Do not switch under load.

- **Step 1**: Charge battery for 10 minutes before jump starting battery.
- **Step 2**: Have only qualified persons jump batteries.

1. **Stop Engine.**
2. **Set Output Selector Switch To Voltage Of Battery Being Charged (12 Or 24 Volt).**
3. **NOTICE** — Do not switch under load.
4. **Start Engine.**
5. **Set Process/Contactor Switch To Any Remote On/Off Switch Required Position.**
6. **Set Ampere Range Switch To 300-Max Position.**
7. **NOTICE** — Do not switch under load.
8. **Connect Cables. Observe Correct Polarity (See Sections 8-3 And 8-4).**
9. **Connect Remote Control Device (Momentary-On Switch).**
11. **Press (Close) switch only while cranking engine of equipment being started.**
12. **Stop engine when finished jumping. Stand as far from battery as practical and disconnect cables from welding generator. Remove cables from battery, negative (−) cable first.**

**Warning**
- Have only qualified persons jump batteries.
9-1. Engine Maintenance Label

DEUTZ Service:
http://www.deutzamericas.com
To ensure rapid, efficient service support, you should initially contact your nearest DEUTZ service distributor or dealer: http://www.deutzamericas.com/deutznew/distributors/index.htm.
They are staffed with highly qualified parts, service and engine specialists to handle your different needs.
The DEUTZ Service Desk enhances this support and can be contacted by completing and submitting the Service Support Form. Customer in the US and CANADA can also contact the service desk by calling our toll free number, 1-800-241-9886.
Our normal hours of operation are from 8:00 AM to 6:00 PM Monday through Friday EST. You may contact our on call service 24 hours, 7 days a week. We ask that when you contact us, please have available or provide specific engine information (serial number, model number etc.) as shown on the Service Support Form.

NOTICE – Engine oil capacity is 11 qt (10.4 L) at oil change and 18 qt (17.0 L) total (including oil cooler).
9-2. Routine Engine/Generator Maintenance

- See Section 10 for air compressor maintenance information.
- Stop engine before maintaining. See Engine Manual and Maintenance Label for important start-up, service, and storage information. Service engine more often if used in severe conditions.
- Recycle engine fluids.

<table>
<thead>
<tr>
<th>Maintenance Interval</th>
<th>Task Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every 8 Hours</td>
<td>Fuel/Water Separator</td>
<td>Section 5-6, 9-1</td>
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<tr>
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<td>Fuel Level</td>
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<td></td>
<td>Oil Level</td>
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</tr>
<tr>
<td></td>
<td>Oil, Fuel Spills</td>
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</tr>
<tr>
<td>Every 50 Hours</td>
<td>Weld Terminals</td>
<td></td>
</tr>
<tr>
<td>Every 100 Hours</td>
<td>Battery Terminals</td>
<td>Section 9-5</td>
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<td>Air Cleaner Hoses</td>
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<td>Air Cleaner Element</td>
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<tr>
<td>Every 250 Hours</td>
<td>Unreadable Labels</td>
<td>Engine Manual, Section 9-6</td>
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<td>Spark Arrestor</td>
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<tr>
<td>Every 500 Hours</td>
<td>Weld Cables</td>
<td>Section 9-1</td>
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<td>Oil</td>
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<td>Oil Filter</td>
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<tr>
<td>Every 1000 Hours</td>
<td>Fuel Filter</td>
<td>Section 9-1, 9-4, 9-8, and Engine Manual</td>
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<td>Brushes*</td>
<td></td>
</tr>
<tr>
<td>Every 3000 Hours</td>
<td>Injectors*</td>
<td></td>
</tr>
<tr>
<td>Every 6000 Hours or 5 Years</td>
<td>Engine Timing Belt</td>
<td></td>
</tr>
</tbody>
</table>
9-3. Operating Optional Oil Pan Heater

1 Optional Oil Heater Plug
Use heater to maintain a constant engine oil temperature.
To turn on heater, connect heater plug to 120 volts AC receptacle. Heater is rated at 300 watts.

⚠️ Do not run engine while oil pan heater is on.

NOTICE – In extremely cold weather, heater should be connected to power source when engine oil is warm to eliminate possibility of oil coking on heater. Severe coking on heater element may cause damage to engine, engine oil, and oil pan heater.

⚠️ The area near the oil pan heater gets hot.
Disconnect plug to turn off heater.

9-4. Checking Generator Brushes

⚠️ Stop engine and let cool.
1 Generator Brush
Mark and disconnect leads at brush holder cap. Remove brushes. Replace brushes if damaged or if brush material is at or near minimum length.

New Length:
1-1/4 in. (32 mm)
Minimum Length:
5/8 in. (16 mm)

Replace Damaged Brushes
9-5. Servicing Engine Air Cleaner

Stop engine.

NOTICE – Do not run engine without air cleaner or with dirty element. Engine damage caused by using a damaged element is not covered by the warranty.

1 Engine Air Cleaner

The air cleaner primary element can be cleaned but the dirt holding capacity of the filter is reduced with each cleaning. The chance of dirt reaching the clean side of the filter while cleaning and the possibility of filter damage makes cleaning a risk. Consider the risk of unwarrantable equipment damage when determining whether to clean or replace the primary element.

If you decide to clean the primary element, we strongly recommend installing an optional safety element to provide additional engine protection. **Never clean a safety element. Replace the safety element after servicing the primary element three times.**

Clean or replace primary element if dirty (see note above before cleaning). Replace primary element if damaged. Replace primary element yearly or after six cleanings.

2 Housing

3 Safety Element (Optional)

4 Primary Element

5 Dust Cap

6 Dust Ejector

To clean air filter:

Wipe off cap and housing. Remove cap and dump out dust. Remove element(s). Wipe dust from inside cap and housing with damp cloth. Reinstall safety element (if present). Reinstall cap.

**NOTICE** – Do not clean housing with air hose.

Clean primary element with compressed air only.

Air pressure must not exceed 100 psi (690 kPa). Use 1/8 in. (3 mm) nozzle and keep nozzle at least 2 in. (51 mm) from inside of element. Replace primary element if it has holes or damaged gaskets. Reinstall primary element and cap (dust ejector down).
9-6. Inspecting/Cleaning Optional Spark Arrestor Muffler

![Diagram of Spark Arrestor Muffler]

Stop engine and let cool.
1. Spark Arrestor Muffler
2. Cleanout Plug

Remove plug and remove any dirt covering cleanout hole.
Start engine and run at idle speed to blow out cleanout hole. If nothing blows out of hole, briefly cover end of exhaust pipe with fireproof material.

Stop engine and let cool.
Reinstall cleanout plug.

Tools Needed:
- 3/8 in.

9-7. Engine Speed Adjustment

The engine is electronically governed and does not require engine speed adjustment. If adjustment is necessary, contact engine manufacturer's Factory Authorized Service Agent.

For operation at high altitude (above 10,000 ft or 3,000 m), engine may require adjustment. If adjustment is necessary, contact engine manufacturer's Factory Authorized Service Agent.
Stop engine and let cool.

After servicing, start engine and check for fuel leaks. Stop engine, tighten connections as necessary, and wipe up spilled fuel.

1 Oil Filter
2 Oil Drain Hose And Valve
3 Oil Fill Cap
4 Primary Fuel Filter (Fuel/Water Separator)
5 Petcock
6 Secondary Fuel Filter
7 Fuel Tank Sludge Drain Valve

To change oil and filter:

The engine oil drain and compressor oil drain hoses are located together in the base. Be sure to select the correct hose when draining engine oil.

Route engine oil drain hose through hole in base. See engine manual and engine maintenance label for oil specifications. Oil change requires 11 qt (10.4 L). Total system capacity is 18 qt (17.0 L).

To drain water from fuel system:
Open primary fuel filter petcock and drain water into metal container. Close petcock when water-free fuel flows.

To replace primary fuel filter:
Turn filter counterclockwise. Remove filter. Apply thin coat of fuel to gasket on new filter. Fill filter with fuel. Install filter and turn clockwise until tight. Bleed air from fuel system according to engine manual.

Inspect fuel lines, and replace if cracked or worn.

To replace secondary fuel filter:
See engine manual.

Close doors.

To drain sludge from fuel tank:

Beware of fire. Do not smoke and keep sparks and flames away from drained fuel. Dispose of drained fuel in an environmentally-safe manner. Do not leave unit unattended while draining fuel tank.

Properly lift unit and secure in a level position. Use adequate blocks or stands to support unit while draining fuel tank.

Attach 1/2 ID hose to drain valve. Put metal container under drain, and use screwdriver to open sludge drain valve. Close valve when sludge has drained. Remove hose.
9-9. Engine/Generator Overload Protection

Stop engine.

When a supplementary protector, circuit breaker or fuse opens, it usually indicates a more serious problem exists. Contact Factory Authorized Service Agent.

See Section 10-4 for air compressor overload protection.

1 Fuse F1
2 Fuse F2
F1 and F2 protect the stator exciter winding from overload. If F1 opens, weld and generator power is low or stops entirely. If F2 opens, weld output is low or stops entirely. 4 kVA/kW generator power is still available.

3 Circuit Breaker CB4 (Not Shown)
4 Supplementary Protector CB5
5 Supplementary Protector CB6

6 Circuit Breaker CB10 (Not Shown)
7 Supplementary Protector CB11
8 Supplementary Protector CB12
9 Supplementary Protector CB13
10 Circuit Breaker CB16 (Not Shown)

CB4 protects the welding arc drive (dig) circuit. If CB4 opens, electrode may stick to the workpiece more frequently during low voltage (short arc length) conditions. CB4 automatically resets when the fault is corrected.

CB5 protects the 24 volt AC output to remote receptacle RC14, and 24 volt output to field current regulator board PC1. If CB5 opens, weld output and 24 volt output to RC14 stops. On units with optional power plant, power at receptacle RCS also stops if CB5 opens.

CB6 protects the 115 volt AC output to remote receptacle RC14. If CB6 opens, 115 volt output to RC14 stops.

CB10 protects the engine battery circuit. If CB10 opens, the engine will not crank. CB10 automatically resets when the fault is corrected.

CB11 protects the engine wiring harness. If CB11 opens, weld output stops (generator power is still available).

CB12 protects the field flashing circuit. If CB12 opens, the generator may not excite at start-up and weld and generator power output may not be available.

CB13 protects the engine shutdown circuit. If CB13 opens, the engine cranks but does not start.

Press button to reset.

CB16 protects the glow plug circuit. If CB16 opens, the glow plug will not operate. CB16 automatically resets when the fault is corrected.
9-10. Removing Optional Air Dryer For Service

Follow this procedure whenever the air dryer must be removed to gain access to the battery.

1 Air Line
2 Timer Control Cable
3 Air Dryer Heater Plug
4 Solenoid LED

Disconnect air line from dryer assembly bottom inlet.
Disconnect heater cable from bottom of air dryer assembly.
Loosen hardware securing battery access panel to rear panel. Carefully pull access panel/air dryer assembly away from unit rear panel. Support dryer assembly to relieve strain on timer control cable.
Disconnect battery negative (−) cable. When service is complete, reconnect battery negative (−) cable.
Reinstall battery access panel/air dryer assembly. Reconnect air dryer heater cable.
Reconnect air line to dryer bottom inlet.

Final-tighten all hardware, and air line and air dryer fittings.

Start engine, and turn on air compressor. Check fittings for air leaks and tighten fittings if necessary.
Verify dryer solenoid is functioning by listening for dryer canisters to purge, or by checking solenoid LED. LED lights at start-up and every two minutes when the canisters automatically purge.
The air compressor normally requires service at the intervals listed in the maintenance schedule if used in a clean, dry environment. The compressor will require service more often if used in dirty, humid conditions.

10-1. Air Compressor Maintenance Label
## 10-2. Routine Air Compressor Maintenance

See Section 9 for engine/generator maintenance information.

**Stop engine before maintaining.**

See Compressor Maintenance Label for important start-up, service, and storage information. Service air compressor more often if used in severe conditions.

Recycle air compressor fluids.

### Maintenance Schedule

<table>
<thead>
<tr>
<th>Interval</th>
<th>Tasks</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every 8 Hours</td>
<td>![Spills] ![Oil Level]</td>
<td>Section 5-6</td>
</tr>
<tr>
<td>Every 100 Hours</td>
<td>![Air Cleaner Hoses]</td>
<td></td>
</tr>
<tr>
<td>Every 250 Hours</td>
<td>![Unreadable Labels] ![Belt Tension] ![Cooling System] ![Air Filter Element] ![Worn or Damaged Air/Oil Hoses]</td>
<td>Section 10-3</td>
</tr>
<tr>
<td>Every 500 Hours</td>
<td>![Oil] ![Oil Filter]</td>
<td>Section 10-5</td>
</tr>
<tr>
<td>Every 1000 Hours</td>
<td>![Air/Oil Separator]</td>
<td>Section 10-5</td>
</tr>
</tbody>
</table>

* = To be done by Factory Authorized Service Agent

= Check
○ = Change
○ = Clean
☆ = Replace
10-3. Servicing Compressor Air Cleaner

Stop engine.

NOTICE – Do not run air compressor without air cleaner or with dirty element. Compressor damage caused by using a damaged element is not covered by the warranty.

1 Compressor Air Cleaner
2 Remove engine air cleaner cover and element to access compressor air cleaner (see Section 9-5)
3 The air cleaner primary element can be cleaned but the dirt holding capacity of the filter is reduced with each cleaning. The chance of dirt reaching the clean side of the filter while cleaning and the possibility of filter damage makes cleaning a risk. Consider the risk of unwarrantable equipment damage when determining whether to clean or replace the primary element.

If you decide to clean the primary element, we strongly recommend installing an optional safety element to provide additional air compressor protection. **Never clean a safety element.** Replace the safety element after servicing the primary element three times.

Clean or replace primary element if dirty (see note above before cleaning). Replace primary element if damaged. Replace primary element yearly or after six cleanings.

2 Housing
3 Safety Element
4 Primary Element
5 Cover
6 Dust Ejector

To clean air filter:

Wipe off cover and housing. Remove cover and dump out dust. Remove element(s). Wipe dust from inside cover and housing with damp cloth. Reinstall safety element (if present). Reinstall cover.

**NOTICE** – **Do not clean housing with air hose.**

Clean primary element with compressed air only.

Air pressure must not exceed 100 psi (690 kPa). Use 1/8 in. (3 mm) nozzle and keep nozzle at least 2 in. (51 mm) from inside of element. Replace primary element if it has holes or damaged gaskets. Reinstall primary element and cover (dust ejector down).
10-4. Compressor Overload Protection

Stop engine.

- When a circuit breaker or fuse opens, it usually indicates a more serious problem exists. Contact Factory Authorized Service Agent.

- See Section 9-9 for engine/generator overload protection.

1 Circuit Breaker CB15

Circuit breaker CB15 protects the air compressor clutch. If CB15 opens, the compressor does not run and air output stops.

Press button to reset breaker.
10-5. Servicing Air Compressor

Stop engine and let cool. Wait 20 seconds for system pressure to drop before changing oil.

1 Air Compressor Oil Filter
2 Secondary Air Compressor Air/Oil Separator
3 Air Compressor Oil Drain Hose w/Removable Cap
4 Air Compressor Oil Fill Cap
5 Air Compressor Oil Level Indicator
6 Air Compressor Primary Air/Oil Separator Tank
7 Oil Scavenge Tube

To change compressor oil and filter:
- The engine oil drain and compressor oil drain hoses are located together in the base. Be sure to select the correct hose when draining compressor oil.
- Be sure o-rings at oil drain and oil fill fittings are in place before reinstalling caps.
- Drain compressor oil while compressor is still warm.
- Route compressor oil drain hose through hole in base. Remove compressor oil fill cap. Remove cap from oil drain hose and drain oil into a suitable container. Reinstall oil drain hose cap. Tighten cap with wrench.
- Remove filter by turning filter counterclockwise. Remove filter. Apply thin coat of oil to gasket on new filter. Install new filter and turn clockwise until tight.
- Add recommended oil until oil level indicator shows system is full (see compressor maintenance label for oil specifications). Reinstall oil fill cap. Tighten cap with wrench.

To replace secondary air/oil separator:
- Loosen nut securing tube on separator base. Lift oil scavenge tube from separator. Turn filter counterclockwise. Remove filter.
- Apply thin coat of oil to gasket on new filter. Install filter and turn clockwise. Reinstall oil scavenge tube.
- Start engine, run air compressor, and check for oil leaks.

Stop engine.
10-6. Adjusting Compressor Air Pressure

Check compressor air pressure using air pressure gauge known to be accurate. If necessary, adjust air pressure as follows:

1. Screw
   Loosen jam nut securing screw. Turn screw clockwise (increase pressure) or counterclockwise (decrease) until pressure is 125 psi (862 kPa).

   Maximum weld output is reduced if compressor air pressure is set above 125 psi (862 kPa).

   Tighten nut.

2. Pressure Relief Valve
   Pressure relief valve opens and releases pressure at 150 psi (1034 kPa). The pressure relief valve is not adjustable.

Tools Needed:

5/16, 3/8 in.
## SECTION 11 – TROUBLESHOOTING

### 11-1. Troubleshooting Tables

#### A. Welding

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No weld output; generator power output okay at AC receptacles.</td>
<td>Place Process/Contactor switch in a Weld Terminals Always On position, or place switch in a Remote On/Off Switch Required position and connect remote contactor to Remote 14 receptacle RC14 (see Sections 5-10 and 6-1).</td>
</tr>
<tr>
<td></td>
<td>Check position of Ampere Range switch.</td>
</tr>
<tr>
<td></td>
<td>Check position of optional Output Selector switch (see Section 8-5).</td>
</tr>
<tr>
<td></td>
<td>Reset supplementary protector CB11 (see Section 9-9).</td>
</tr>
<tr>
<td></td>
<td>Reset supplementary protector CB5 (see Section 9-9). Check for faulty remote device connected to RC14.</td>
</tr>
<tr>
<td></td>
<td>Check and secure connections to Remote 14 receptacle RC14 (see Section 5-10).</td>
</tr>
<tr>
<td></td>
<td>Have Factory Authorized Service Agent check connector board PC6 and connections.</td>
</tr>
<tr>
<td></td>
<td>Check fuse F2, and replace if open (see Section 9-9). Have Factory Authorized Service Agent check brushes and slip rings, field excitation circuit, field current regulator board PC1, and the rotor.</td>
</tr>
<tr>
<td>No weld output or generator power output.</td>
<td>Disconnect equipment from generator power receptacles during start-up.</td>
</tr>
<tr>
<td></td>
<td>Check fuses F1 and F2, and replace if open (see Section 9-9). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, field current regulator board PC1, and the rotor.</td>
</tr>
<tr>
<td></td>
<td>Reset supplementary protector CB12 (see Section 9-9).</td>
</tr>
<tr>
<td></td>
<td>Have Factory Authorized Service Agent check brushes and slip rings, and field excitation circuit.</td>
</tr>
<tr>
<td>Erratic weld output.</td>
<td>Check and tighten connections inside and outside unit.</td>
</tr>
<tr>
<td></td>
<td>Be sure connection to work piece is clean and tight.</td>
</tr>
<tr>
<td></td>
<td>Use dry, properly stored electrodes.</td>
</tr>
<tr>
<td></td>
<td>Remove excessive coils from weld cables.</td>
</tr>
<tr>
<td>High weld output.</td>
<td>Check position of Ampere Range switch and Voltage/Amperage Adjust control.</td>
</tr>
<tr>
<td></td>
<td>Engine speed may need adjustment. Contact engine manufacturer’s Factory Authorized Service Agent.</td>
</tr>
<tr>
<td></td>
<td>Have Factory Authorized Service Agent check field current regulator board PC1.</td>
</tr>
<tr>
<td>Voltage/Amperage control does not work when welding in Stick mode.</td>
<td>Place Ampere Range switch in lower range. Voltage/Amperage control does not work with Ampere Range switch in highest range.</td>
</tr>
<tr>
<td>Low weld output.</td>
<td>Engine speed may need adjustment. Contact engine manufacturer’s Factory Authorized Service Agent.</td>
</tr>
<tr>
<td></td>
<td>Check fuses F1 and F2, and replace if open (see Section 9-9). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, field current regulator board PC1, and the rotor.</td>
</tr>
<tr>
<td>Electrode sticks to the workpiece more frequently during low voltage (short arc length) conditions.</td>
<td>Circuit breaker CB4 may be open. CB4 automatically resets when the fault is corrected (see Section 9-9). Have Factory Authorized Service Agent check transformer T1 and integrated rectifiers SR4 and SR5.</td>
</tr>
<tr>
<td>Low open-circuit voltage.</td>
<td>Engine speed may need adjustment. Contact engine manufacturer’s Factory Authorized Service Agent.</td>
</tr>
<tr>
<td>No remote fine amperage or voltage control.</td>
<td>Place Panel/Remote Switch in Remote position.</td>
</tr>
<tr>
<td></td>
<td>Check and secure connections to Remote 14 receptacle RC14 (see Section 5-10).</td>
</tr>
</tbody>
</table>
## B. Standard Generator Power

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No generator power output at AC receptacles; weld output okay.</td>
<td>Reset receptacle supplementary protectors.</td>
</tr>
<tr>
<td>No generator power or weld output.</td>
<td>Disconnect equipment from generator power receptacles during start-up. Check fuses F1 and F2, and replace if open (see Section 9-9). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, diode/capacitor board D1/C1, and the rotor. Reset supplementary protector CB12. Have Factory Authorized Service Agent check field current regulator board PC1 (see Section 10-4). Have Factory Authorized Service Agent check brushes and slip rings, and field excitation circuit.</td>
</tr>
<tr>
<td>High output at generator power receptacles.</td>
<td>Engine speed may need adjustment. Contact engine manufacturer’s Factory Authorized Service Agent. Have Factory Authorized Service Agent adjust field current resistor R3.</td>
</tr>
<tr>
<td>Low output at generator power receptacles.</td>
<td>Engine speed may need adjustment. Contact engine manufacturer’s Factory Authorized Service Agent. Check fuse F1, and replace if open (see Section 9-9). Have Factory Authorized Service Agent check integrated rectifier SR1, resistor R3, and capacitor C9.</td>
</tr>
</tbody>
</table>

## C. Optional AC Power Plant

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No or low output at optional AC power plant/receptacle RC5.</td>
<td>Place Process/Contactor switch in Weld Terminals Always On - Stick position (see Section 6-3). Reset supplementary protector CB7 (see Section 7-2). Reset supplementary protector CB5 (see Section 9-9). Engine speed may need adjustment. Contact engine manufacturer’s Factory Authorized Service Agent. Have Factory Authorized Service Agent check brushes and slip rings, and field current regulator board PC1.</td>
</tr>
<tr>
<td>High output at optional AC power plant/receptacle RC5.</td>
<td>Engine speed may need adjustment. Contact engine manufacturer’s Factory Authorized Service Agent. Have Factory Authorized Service Agent check field current regulator board PC1.</td>
</tr>
<tr>
<td>Erratic output at optional AC power plant/receptacle RC5.</td>
<td>Have Factory Authorized Service Agent check brushes and slip rings, and field current regulator board PC1.</td>
</tr>
</tbody>
</table>
## D. Engine

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine will not crank.</td>
<td>Check battery, and replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>Check battery connections and tighten if necessary.</td>
</tr>
<tr>
<td></td>
<td>Circuit breaker CB10 may be open. CB10 automatically resets when fault is corrected (see Section 9-9). Have Factory Authorized Service Agent check engine wiring harness and components.</td>
</tr>
<tr>
<td></td>
<td>Check engine wiring harness plug connections.</td>
</tr>
<tr>
<td></td>
<td>Turn optional battery disconnect switch to On position (see Section 5-5).</td>
</tr>
<tr>
<td></td>
<td>Have Factory Authorized Service Agent check engine wiring harness and components.</td>
</tr>
<tr>
<td>Engine cranks but does not start.</td>
<td>Check fuel level. Optional low fuel shutdown stops engine if fuel level is low.</td>
</tr>
<tr>
<td></td>
<td>Reset supplementary protector CB13 (see Section 10-4). Have Factory Authorized Service Agent check engine wiring harness and components.</td>
</tr>
<tr>
<td></td>
<td>Check battery and replace if necessary. Check engine charging system according to engine manual.</td>
</tr>
<tr>
<td></td>
<td>Have Factory Authorized Service Agent check fuel/hour gauge, control relay CR5, fuel pump, and fuel solenoid FS1.</td>
</tr>
<tr>
<td>Engine starts, but stops when Engine Control switch is released.</td>
<td>Check oil level. Automatic shutdown system stops engine if oil pressure is too low or engine temperature is too high (see Section 5-6).</td>
</tr>
<tr>
<td></td>
<td>Have Factory Authorized Service Agent check fuel/hour gauge, and control relay CR5.</td>
</tr>
<tr>
<td>Engine hard to start in cold weather.</td>
<td>Use starting aid switch (see Section 6-1). If Starting Aid switch does not work have Factory Authorized Service Agent check Engine Control switch S2, control relay CR8, and circuit breaker CB16.</td>
</tr>
<tr>
<td></td>
<td>Keep battery in good condition. Store battery in warm area off cold surface.</td>
</tr>
<tr>
<td></td>
<td>Use fuel formulated for cold weather (diesel fuel can gel in cold weather). Contact local fuel supplier for fuel information.</td>
</tr>
<tr>
<td></td>
<td>Use correct grade oil for cold weather (see Section 9-1).</td>
</tr>
<tr>
<td>Engine suddenly stops.</td>
<td>Check fuel level. Optional low fuel shutdown stops engine if fuel level is low.</td>
</tr>
<tr>
<td></td>
<td>Check oil level. Automatic shutdown system stops engine if oil pressure is too low or engine temperature is too high (see Section 5-6).</td>
</tr>
<tr>
<td></td>
<td>Have Factory Authorized Service Agent check fuel/hour gauge, control relay CR5, fuel pump, and fuel solenoid FS1.</td>
</tr>
<tr>
<td></td>
<td>See engine manual.</td>
</tr>
<tr>
<td>Engine slowly stopped and cannot be restarted.</td>
<td>Check fuel level.</td>
</tr>
<tr>
<td></td>
<td>Check engine air and fuel filters (see Sections 9-5 and 9-8).</td>
</tr>
<tr>
<td></td>
<td>See engine manual.</td>
</tr>
<tr>
<td>Battery discharges between uses.</td>
<td>Turn Engine Control switch S1 off when unit is not running.</td>
</tr>
<tr>
<td></td>
<td>Clean top of battery with baking soda and water solution; rinse with clear water.</td>
</tr>
<tr>
<td></td>
<td>Recharge or replace battery if necessary.</td>
</tr>
<tr>
<td></td>
<td>Periodically recharge battery (approximately every 3 months).</td>
</tr>
<tr>
<td>Engine idles, but does not come up to weld speed.</td>
<td>Have Factory Authorized Service Agent check idle module PC7.</td>
</tr>
</tbody>
</table>
### Trouble Remedy

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine does not run at idle speed.</td>
<td>Turn Process/Contactor switch to any position but Remote On/Off Switch Required-TIG. Have Factory Authorized Service Agent check idle module PC7, control relays CR3 and CR6, and current transformer CT1.</td>
</tr>
<tr>
<td>Engine uses oil during run-in period; wetstacking occurs.</td>
<td>Dry engine (see Section 15).</td>
</tr>
</tbody>
</table>

### E. Air Compressor

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air compressor does not operate; no air pressure at air shutoff valve.</td>
<td>Place Air Compressor switch in On position. The air compressor will not start if still under pressure. If compressor is turned off, wait for air pressure to bleed off (about 20 seconds) before turning compressor on again. Reset supplementary protector CB15 (see Section 10-4). Check compressor belt tension. Be sure correct belt is used and is properly installed. Verify secondary air/oil filter is not plugged. Replace air/oil separator. Have Factory Authorized Service Agent check Air Compressor switch S10, control relay CR10, air pressure switch S11, temperature switch S12, compressor control circuit, and air compressor clutch.</td>
</tr>
<tr>
<td>Air compressor stops after short period of operation.</td>
<td>Check compressor oil level (see Section 5-6). Automatic shutdown stops compressor if compressor temperature is too high. Clean debris from radiator. Automatic shutdown stops compressor if compressor temperature is too high.</td>
</tr>
<tr>
<td>Low air pressure.</td>
<td>Check for leaks in air lines and hoses. Adjust compressor air pressure (see Section 10-6). Check air compressor air cleaner (see Section 10-3). Have Factory Authorized Service Agent check compressor for rated output.</td>
</tr>
<tr>
<td>High air pressure.</td>
<td>Adjust compressor air pressure (see Section 10-6). Be sure control line is connected at regulator valve and inlet valve.</td>
</tr>
<tr>
<td>Pneumatic tools freeze up because of moisture in compressed air.</td>
<td>Install optional air dryer/filter kit (Part No. 195 117).</td>
</tr>
<tr>
<td>Oil in air from compressor.</td>
<td>Check compressor oil level (see Section 5-6). If oil level is too high, system becomes saturated with oil. Change compressor air/oil separator (see Section 10-5). Check connections of control lines (see air compressor circuit diagram in Section 12). Have Factory Authorized Service Agent check for blocked separator scavenge check valve/filter orifice.</td>
</tr>
<tr>
<td>Oil in compressor air cleaner.</td>
<td>Have Factory Authorized Service Agent verify compressor inlet valve is operating properly.</td>
</tr>
</tbody>
</table>

### F. Optional Battery Charging

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No battery charge output; weld output okay.</td>
<td>Place Output Selector switch in 12 Volt Charge or 24 Volt Charge position. Check and tighten battery connections if necessary. Turn on remote control device or turn Process/Contactor switch to any Weld Terminals Always On position (see Section 6-3).</td>
</tr>
<tr>
<td>No battery charge or weld output.</td>
<td>Disconnect equipment from generator power receptacles during start-up. Check fuses F1 and F2, and replace if open (see Section 9-9). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, field current regulator board PC1, and the rotor. Reset supplementary protector CB12 (see Section 9-9). Have Factory Authorized Service Agent check brushes and slip rings, field current regulator board PC1, and field excitation circuit.</td>
</tr>
</tbody>
</table>
## SECTION 12 – PARTS LIST

### 12-1. Recommended Spare Parts

<table>
<thead>
<tr>
<th>Dia. Mkgs.</th>
<th>Part No.</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1, F2</td>
<td>085874</td>
<td>Fuse, Mintr Cer Slo-blo 10. Amp 250 Volt</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>190823</td>
<td>Brush, Contact Elect .250 X.500 X 1.250 Grd Ay</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>♦ 192939</td>
<td>Filter, Air Element Safety</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>262459</td>
<td>Kit, Filters Deutz (2.9l4) Engine (Includes)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>192938</td>
<td>Filter, Air Element Primary</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>066217</td>
<td>Filter, Fuel Secondary</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>192744</td>
<td>Filter, Fuel Pri</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>067265</td>
<td>Oil Filter</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>246991</td>
<td>Filter Kit, Ingersoll Rand (Ce55 G1) (Includes)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>206745</td>
<td>Filter, Oil</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>197676</td>
<td>Element, Air Cleaner</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>206747</td>
<td>Separator, Oil/Air Filter</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>207808</td>
<td>Belt, V .375 X 45.125 Lg</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>218609</td>
<td>Belt, Micro V 21mm X 1485mm</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Battery, Stor 12v 650 Crk 110 Rsv Gp 24 Maint Free</td>
<td>1</td>
</tr>
</tbody>
</table>

♦ Optional
Figure 13-1. Circuit Diagram For Air Compressor
SECTION 14 − CIRCUIT DIAGRAM

Figure 14-1. Circuit Diagram For Welding Generator

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

OM-239 511 Page 68
NOTICE – Diesel engines in MILLER equipment are meant to operate optimally at moderate to rated load. Using light or no load for extended periods of time may cause wetstacking or other engine damage. Do not idle engine longer than necessary.

15-1. Wetstacking

NOTICE – Do not perform run-in procedure at less than 20 volts weld output and do not exceed duty cycle or equipment damage may occur.

1 Welding Generator
Run diesel engines near rated voltage and current during run-in period to properly seat piston rings and prevent wetstacking. See nameplate, rating label, or specifications section in this manual to find rated voltage and current.

NOTICE – Do not idle engine longer than necessary. Piston rings only seat correctly if engine runs at weld/power rpm, and the welding generator is kept loaded during run-in.

2 Engine Exhaust Pipe
Wetstacking is unburned fuel and oil in the exhaust pipe and occurs during run-in if the engine is run too long at light load or idle rpm.

If exhaust pipe is coated with a wet, black, tar-like substance, dry the engine using one of the following run-in procedures.

See the engine manual for additional engine run-in information.
15-2. Run-In Procedure Using Load Bank Or Resistance Grid

Stop engine.
Do not touch hot exhaust pipe, engine parts, or load bank/grid.
Keep exhaust and pipe away from flammables.

NOTICE – Do not perform run-in procedure at less than 20 volts weld output and do not exceed duty cycle or equipment damage may occur.

1 Load Bank
Turn all load bank switches Off. If needed, connect load bank to 115 volts ac wall receptacle or generator auxiliary power receptacle.

2 Welding Generator
Place A/V range switch in maximum position, A/V control in minimum position, and Output Selector switch (if present) in either DC position.

3 Weld Cables

4 Resistance Grid
Use grid sized for generator rated output.
Turn Off grid.

5 Voltmeter

6 Clamp-On Ammeter
Connect voltmeter and ammeter as shown, if not provided on generator.
Start engine and run for several minutes.

For Load Bank
Set load bank switches and then adjust generator A/V control so load equals rated voltage and current of generator (see nameplate, rating label, or the specifications section in this manual).

For Resistance Grid
Set grid switches and then adjust generator A/V control so load equals rated voltage and current of the generator (see nameplate, rating label, or the specifications section in this manual).

Check generator and meters after first five minutes then every fifteen minutes to be sure generator is loaded properly.

NOTICE – Check oil level frequently during run-in; add oil if needed.

It is recommended to run the welding generator for two hours minimum and up to four hours under load. Place A/V control in minimum position, then shut down load bank or grid to remove load. Run engine several minutes at no load.

Stop engine and let cool.

7 Engine Exhaust Pipe
Repeat procedure if wetstacking is present.
### 16-1. Flow Of Free Air (CFM) Through Orifices Of Various Diameters

<table>
<thead>
<tr>
<th>Gauge Pressure (psi)</th>
<th>Orifice Diameter (in) And Free Air Flow (CFM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/64</td>
</tr>
<tr>
<td>1</td>
<td>0.027</td>
</tr>
<tr>
<td>2</td>
<td>0.038</td>
</tr>
<tr>
<td>3</td>
<td>0.046</td>
</tr>
<tr>
<td>5</td>
<td>0.059</td>
</tr>
<tr>
<td>10</td>
<td>0.084</td>
</tr>
<tr>
<td>15</td>
<td>0.103</td>
</tr>
<tr>
<td>20</td>
<td>0.119</td>
</tr>
<tr>
<td>25</td>
<td>0.133</td>
</tr>
<tr>
<td>30</td>
<td>0.156</td>
</tr>
<tr>
<td>35</td>
<td>0.173</td>
</tr>
<tr>
<td>40</td>
<td>0.19</td>
</tr>
<tr>
<td>45</td>
<td>0.208</td>
</tr>
<tr>
<td>50</td>
<td>0.225</td>
</tr>
<tr>
<td>60</td>
<td>0.26</td>
</tr>
<tr>
<td>70</td>
<td>0.295</td>
</tr>
<tr>
<td>80</td>
<td>0.33</td>
</tr>
<tr>
<td>90</td>
<td>0.364</td>
</tr>
<tr>
<td>100</td>
<td>0.40</td>
</tr>
<tr>
<td>110</td>
<td>0.43</td>
</tr>
<tr>
<td>120</td>
<td>0.47</td>
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<tr>
<td>130</td>
<td>0.50</td>
</tr>
<tr>
<td>140</td>
<td>0.54</td>
</tr>
<tr>
<td>150</td>
<td>0.57</td>
</tr>
<tr>
<td>175</td>
<td>0.66</td>
</tr>
<tr>
<td>200</td>
<td>0.76</td>
</tr>
</tbody>
</table>
### 16-2. Approximate Air Consumption (Cubic Feet) To Operate Pneumatic Equipment At 70-90 P.S.I.G.

<table>
<thead>
<tr>
<th>MISCELLANEOUS PORTABLE TOOLS</th>
<th>Percent Use Factor And Compressed Air Consumption (CF)</th>
<th>MISCELLANEOUS PORTABLE TOOLS</th>
<th>Percent Use Factor And Compressed Air Consumption (CF)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9 sec</td>
<td>15 sec</td>
<td>21 sec</td>
</tr>
<tr>
<td>Drill, 1/18&quot; to 3/8&quot;</td>
<td>3.75</td>
<td>6.25</td>
<td>8.75</td>
</tr>
<tr>
<td>Drill, 3/8&quot; to 5/16&quot;</td>
<td>5.25</td>
<td>8.75</td>
<td>12.25</td>
</tr>
<tr>
<td>Screwdriver, #2 to #6 Screw</td>
<td>1.8</td>
<td>3.0</td>
<td>4.2</td>
</tr>
<tr>
<td>Screwdriver, #6 to 5/16&quot; Screw</td>
<td>3.6</td>
<td>6.0</td>
<td>8.4</td>
</tr>
<tr>
<td>Tapper, to 3/8&quot;</td>
<td>3.0</td>
<td>5.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Nutsetters, to 3/8&quot;</td>
<td>3.6</td>
<td>6.0</td>
<td>8.4</td>
</tr>
<tr>
<td>Nutsetters, to 3/4&quot;</td>
<td>4.5</td>
<td>7.5</td>
<td>10.5</td>
</tr>
<tr>
<td>Impact Wrench, 1/4&quot;</td>
<td>2.25</td>
<td>3.75</td>
<td>5.3</td>
</tr>
<tr>
<td>Impact Wrench, 3/8&quot;</td>
<td>3.0</td>
<td>5.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Impact Wrench, 5/8&quot;</td>
<td>4.5</td>
<td>7.5</td>
<td>10.5</td>
</tr>
<tr>
<td>Impact Wrench, 3/4&quot;</td>
<td>5.25</td>
<td>8.75</td>
<td>12.25</td>
</tr>
<tr>
<td>Impact Wrench, 1&quot;</td>
<td>6.75</td>
<td>11.25</td>
<td>15.75</td>
</tr>
<tr>
<td>Impact Wrench, 1-1/4&quot;</td>
<td>8.25</td>
<td>13.75</td>
<td>19.2</td>
</tr>
<tr>
<td>Die Grinder, Small</td>
<td>2.25</td>
<td>3.75</td>
<td>5.3</td>
</tr>
<tr>
<td>Die Grinder, Medium</td>
<td>3.6</td>
<td>6.0</td>
<td>8.4</td>
</tr>
<tr>
<td>Horizontal Grinder, 2&quot;</td>
<td>3.0</td>
<td>5.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Horizontal Grinder, 4&quot;</td>
<td>9.0</td>
<td>15.0</td>
<td>21.0</td>
</tr>
<tr>
<td>Horizontal Grinder, 6&quot;</td>
<td>9.0</td>
<td>15.0</td>
<td>21.0</td>
</tr>
<tr>
<td>Vertical Grinders and Sanders, 5&quot; Pad</td>
<td>12.0</td>
<td>20.0</td>
<td>28.0</td>
</tr>
<tr>
<td>Vertical Grinders and Sanders, 7&quot; Pad</td>
<td>5.25</td>
<td>8.75</td>
<td>12.25</td>
</tr>
<tr>
<td>Vertical Grinders and Sanders, 9&quot; Pad</td>
<td>9.0</td>
<td>15.0</td>
<td>21.0</td>
</tr>
<tr>
<td>Burring Tool, Small</td>
<td>2.25</td>
<td>3.75</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Always check with tool manufacturers for actual air consumption of tools being used. The above is based on averages and should not be considered accurate for any particular make of tool.

Above tools are rated based upon typical “on-load” performance characteristics.

For other values, adjust the C.F. air consumption on a proportional basis.

The cubic feet (C.F.) air consumption for 1 minute may also be expressed as air consumption in cubic feet per minute (C.F.M.)
SECTION 17 – GENERATOR POWER GUIDELINES

The views in this section are intended to be representative of all engine-driven welding generators. Your unit may differ from those shown.

17-1. Selecting Equipment

- Generator Power Receptacles – Neutral Bonded To Frame
- 3-Prong Plug From Case Grounded Equipment
- 2-Prong Plug From Double Insulated Equipment

Be sure equipment has double insulated symbol and/or wording on it.

Do not use 2-prong plug unless equipment is double insulated.

17-2. Grounding Generator To Truck Or Trailer Frame

Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.

Also see AWS Safety & Health Fact Sheet No. 29, Grounding of Portable And Vehicle Mounted Welding Generators.

- Equipment Grounding Terminal (On Front Panel)
- Grounding Cable (Not Supplied)

3 Metal Vehicle Frame
Connect cable from equipment ground terminal to metal vehicle frame. Use #8 AWG or larger insulated copper wire.

Electrically bond generator frame to vehicle frame by metal-to-metal contact.

Bed liners, shipping skids, and some running gear insulate the welding generator from the vehicle frame. Always connect a ground wire from the generator equipment grounding terminal to bare metal on the vehicle frame as shown.

Use GFCI protection when operating auxiliary equipment. If unit does not have GFCI receptacles, use GFCI-protected extension cord. Do not use GFCI receptacles to power life support equipment.
17-3. Grounding When Supplying Building Systems

1. Equipment Grounding Terminal
2. Grounding Cable
   Use #8 AWG or larger insulated copper wire.
3. Ground Device
   Use ground device as stated in electrical codes.

- Ground generator to system earth ground if supplying power to a premises (home, shop, farm) wiring system.
- Also see AWS Safety & Health Fact Sheet No. 29, Grounding of Portable And Vehicle Mounted Welding Generators.

17-4. How Much Power Does Equipment Require?

1. Resistive Load
   A light bulb is a resistive load and requires a constant amount of power.
2. Non-Resistive Load
   Equipment with a motor is a non-resistive load and requires approximately six times more power while starting the motor than when running (see Section 17-8).
3. Rating Data
   Rating shows volts and amperes, or watts required to run equipment.
   \[
   \text{Amperes} \times \text{Volts} = \text{Watts}
   \]

**Example 1:** If a drill uses 4.5 amperes at 115 volts, calculate its running power requirement in watts.
\[
4.5 \text{ A} \times 115 \text{ V} = 520 \text{ W}
\]
The load applied by the drill is 520 watts.

**Example 2:** If three 200 watt flood lamps are used with the drill from Example 1, add the individual loads to calculate total load.
\[
(3 \times 200\text{W}) + 520 \text{ W} = 1120 \text{ W}
\]
The total load applied by the three flood lamps and drill is 1120 watts.
### 17-5. Approximate Power Requirements For Industrial Motors

<table>
<thead>
<tr>
<th>Industrial Motors</th>
<th>Rating</th>
<th>Starting Watts</th>
<th>Running Watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Split Phase</td>
<td>1/8 HP</td>
<td>800</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>1/6 HP</td>
<td>1225</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>1/4 HP</td>
<td>1600</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>1/3 HP</td>
<td>2100</td>
<td>700</td>
</tr>
<tr>
<td></td>
<td>1/2 HP</td>
<td>3175</td>
<td>875</td>
</tr>
<tr>
<td>Capacitor Start-Induction Run</td>
<td>1/3 HP</td>
<td>2020</td>
<td>720</td>
</tr>
<tr>
<td></td>
<td>1/2 HP</td>
<td>3075</td>
<td>975</td>
</tr>
<tr>
<td></td>
<td>3/4 HP</td>
<td>4500</td>
<td>1400</td>
</tr>
<tr>
<td></td>
<td>1 HP</td>
<td>6100</td>
<td>1600</td>
</tr>
<tr>
<td></td>
<td>1-1/2 HP</td>
<td>8200</td>
<td>2200</td>
</tr>
<tr>
<td></td>
<td>2 HP</td>
<td>10550</td>
<td>2850</td>
</tr>
<tr>
<td></td>
<td>3 HP</td>
<td>15900</td>
<td>3900</td>
</tr>
<tr>
<td></td>
<td>5 HP</td>
<td>23300</td>
<td>6800</td>
</tr>
<tr>
<td>Capacitor Start-Capacitor Run</td>
<td>1-1/2 HP</td>
<td>8100</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>5 HP</td>
<td>23300</td>
<td>6000</td>
</tr>
<tr>
<td></td>
<td>7-1/2 HP</td>
<td>35000</td>
<td>8000</td>
</tr>
<tr>
<td></td>
<td>10 HP</td>
<td>46700</td>
<td>10700</td>
</tr>
<tr>
<td>Fan Duty</td>
<td>1/8 HP</td>
<td>1000</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>1/6 HP</td>
<td>1400</td>
<td>550</td>
</tr>
<tr>
<td></td>
<td>1/4 HP</td>
<td>1850</td>
<td>650</td>
</tr>
<tr>
<td></td>
<td>1/3 HP</td>
<td>2400</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>1/2 HP</td>
<td>3500</td>
<td>1100</td>
</tr>
</tbody>
</table>

### 17-6. Approximate Power Requirements For Farm/Home Equipment

<table>
<thead>
<tr>
<th>Farm/Home Equipment</th>
<th>Rating</th>
<th>Starting Watts</th>
<th>Running Watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock Tank De-Icer</td>
<td></td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Grain Cleaner</td>
<td>1/4 HP</td>
<td>1650</td>
<td>650</td>
</tr>
<tr>
<td>Portable Conveyor</td>
<td>1/2 HP</td>
<td>3400</td>
<td>1000</td>
</tr>
<tr>
<td>Grain Elevator</td>
<td>3/4 HP</td>
<td>4400</td>
<td>1400</td>
</tr>
<tr>
<td>Milk Cooler</td>
<td></td>
<td>2900</td>
<td>1100</td>
</tr>
<tr>
<td>Milker (Vacuum Pump)</td>
<td>2 HP</td>
<td>10500</td>
<td>2800</td>
</tr>
<tr>
<td>FARM DUTY MOTORS</td>
<td>1/3 HP</td>
<td>1720</td>
<td>720</td>
</tr>
<tr>
<td>Std. (e.g. Conveyors, Feed Augers, Air Compressors)</td>
<td>1 HP</td>
<td>6100</td>
<td>1600</td>
</tr>
<tr>
<td></td>
<td>1-1/2 HP</td>
<td>8200</td>
<td>2200</td>
</tr>
<tr>
<td></td>
<td>2 HP</td>
<td>10550</td>
<td>2850</td>
</tr>
<tr>
<td></td>
<td>3 HP</td>
<td>15900</td>
<td>3900</td>
</tr>
<tr>
<td></td>
<td>5 HP</td>
<td>23300</td>
<td>6800</td>
</tr>
<tr>
<td>High Torque (e.g. Barn Cleaners, Silo Unloaders, Silo Hoists, Bunk Feeders)</td>
<td>1-1/2 HP</td>
<td>8100</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>5 HP</td>
<td>23300</td>
<td>6000</td>
</tr>
<tr>
<td></td>
<td>7-1/2 HP</td>
<td>35000</td>
<td>8000</td>
</tr>
<tr>
<td></td>
<td>10 HP</td>
<td>46700</td>
<td>10700</td>
</tr>
<tr>
<td>3-1/2 cu. ft. Mixer</td>
<td>1/2 HP</td>
<td>3300</td>
<td>1000</td>
</tr>
<tr>
<td>High Pressure 1.8 Gal/Min</td>
<td>500 PSI</td>
<td>3150</td>
<td>950</td>
</tr>
<tr>
<td>Washer 2 gal/min</td>
<td>550 PSI</td>
<td>4500</td>
<td>1400</td>
</tr>
<tr>
<td></td>
<td>2 gal/min</td>
<td>700 PSI</td>
<td>1600</td>
</tr>
<tr>
<td>Refrigerator or Freezer</td>
<td></td>
<td>3100</td>
<td>800</td>
</tr>
<tr>
<td>Shallow Well Pump</td>
<td>1/3 HP</td>
<td>2150</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>1/2 HP</td>
<td>3100</td>
<td>1000</td>
</tr>
<tr>
<td>Sump Pump</td>
<td>1/3 HP</td>
<td>2100</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>1/2 HP</td>
<td>3200</td>
<td>1050</td>
</tr>
</tbody>
</table>
17-7. Approximate Power Requirements For Contractor Equipment

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Rating</th>
<th>Starting Watts</th>
<th>Running Watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Drill</td>
<td>1/4 in</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td>3/8 in</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>1/2 in</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>Circular Saw</td>
<td>6-1/2 in</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>7-1/4 in</td>
<td>900</td>
<td>900</td>
</tr>
<tr>
<td></td>
<td>8-1/4 in</td>
<td>1400</td>
<td>1400</td>
</tr>
<tr>
<td>Table Saw</td>
<td>9 in</td>
<td>4500</td>
<td>1500</td>
</tr>
<tr>
<td></td>
<td>10 in</td>
<td>6300</td>
<td>1800</td>
</tr>
<tr>
<td>Band Saw</td>
<td>14 in</td>
<td>2500</td>
<td>1100</td>
</tr>
<tr>
<td>Bench Grinder</td>
<td>6 in</td>
<td>1720</td>
<td>720</td>
</tr>
<tr>
<td></td>
<td>8 in</td>
<td>3900</td>
<td>1400</td>
</tr>
<tr>
<td></td>
<td>10 in</td>
<td>5200</td>
<td>1600</td>
</tr>
<tr>
<td>Air Compressor</td>
<td>1/2 HP</td>
<td>3000</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>1 HP</td>
<td>6000</td>
<td>1500</td>
</tr>
<tr>
<td></td>
<td>1-1/2 HP</td>
<td>8200</td>
<td>2200</td>
</tr>
<tr>
<td></td>
<td>2 HP</td>
<td>10500</td>
<td>2800</td>
</tr>
<tr>
<td>Electric Chain Saw</td>
<td>1-1/2 HP, 12 in</td>
<td>1100</td>
<td>1100</td>
</tr>
<tr>
<td></td>
<td>2 HP, 14 in</td>
<td>1100</td>
<td>1100</td>
</tr>
<tr>
<td>Electric Trimmer</td>
<td>Standard 9 in</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td>Heavy Duty 12 in</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Electric Cultivator</td>
<td>1/3 HP</td>
<td>2100</td>
<td>700</td>
</tr>
<tr>
<td>Elec. Hedge Trimmer</td>
<td>18 in</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Flood Lights</td>
<td>HID</td>
<td>125</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Metal Halide</td>
<td>313</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Mercury</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sodium</td>
<td>1400</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vapor</td>
<td>1250</td>
<td>1000</td>
</tr>
<tr>
<td>Submersible Pump</td>
<td>400 gph</td>
<td>600</td>
<td>200</td>
</tr>
<tr>
<td>Centrifugal Pump</td>
<td>900 gph</td>
<td>900</td>
<td>500</td>
</tr>
<tr>
<td>Floor Polisher</td>
<td>3/4 HP, 16 in</td>
<td>4500</td>
<td>1400</td>
</tr>
<tr>
<td></td>
<td>1 HP, 20 in</td>
<td>6100</td>
<td>1600</td>
</tr>
<tr>
<td>High Pressure Washer</td>
<td>1/2 HP</td>
<td>3150</td>
<td>950</td>
</tr>
<tr>
<td></td>
<td>3/4 HP</td>
<td>4500</td>
<td>1400</td>
</tr>
<tr>
<td></td>
<td>1 HP</td>
<td>6100</td>
<td>1600</td>
</tr>
<tr>
<td>55 gal Drum Mixer</td>
<td>1/4 HP</td>
<td>1900</td>
<td>700</td>
</tr>
<tr>
<td>Wet &amp; Dry Vac</td>
<td>1.7 HP</td>
<td>900</td>
<td>900</td>
</tr>
<tr>
<td></td>
<td>2-1/2 HP</td>
<td>1300</td>
<td>1300</td>
</tr>
</tbody>
</table>
### 17-8. Power Required To Start Motor

#### Single-Phase Induction Motor Starting Requirements

<table>
<thead>
<tr>
<th>Motor Start Code</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>KVA/HP</td>
<td>6.3</td>
<td>7.1</td>
<td>8.0</td>
<td>9.0</td>
<td>10.0</td>
<td>11.2</td>
<td>12.5</td>
<td>14.0</td>
</tr>
</tbody>
</table>

To find starting amperage:

1. Motor Start Code
2. Running Amperage
3. Motor HP
4. Motor Voltage

**Step 1:** Find code and use table to find kVA/HP. If code is not listed, multiply running amperage by six to find starting amperage.

**Step 2:** Find Motor HP and Volts.

**Step 3:** Determine starting amperage (see example).

Welding generator amperage output must be at least twice the motor's running amperage.

\[
\text{Starting Amperage} = \frac{(kVA/HP \times HP \times 1000)}{Volts}
\]

**Example:** Calculate starting amperage required for a 230 V, 1/4 HP motor with a motor start code of M.

Volts = 230, HP = 1/4, kVA/HP = 11.2

\[
\frac{(11.2 \times 1/4 \times 1000)}{230} = 12.2A
\]

Starting the motor requires 12.2 amperes.

---

### 17-9. How Much Power Can Generator Supply?

1. Limit Load To 90% Of Generator Output
   - Always start non-resistive (motor) loads in order from largest to smallest, and add resistive loads last.

2. 5 Second Rule
   - If motor does not start within 5 seconds, turn off power to prevent motor damage. Motor requires more power than generator can supply.

---

Ref. ST-800 396-A / S-0625
17-10. Typical Connections To Supply Standby Power

Have only qualified persons perform these connections according to all applicable codes and safety practices.

Properly install, ground, and operate this equipment according to its Owner’s Manual and national, state, and local codes.

Customer-supplied equipment is required if generator will supply standby power during emergencies or power outages.

1 Utility Electrical Service
2 Transfer Switch (Double-Throw) Switch transfers the electrical load from electric utility service to the generator. Transfer load back to electric utility when service is restored.
Install correct switch (customer-supplied). Switch rating must be same as or greater than the branch overcurrent protection.
3 Fused Disconnect Switch Install correct switch (customer-supplied) if required by electrical code.
4 Welding Generator Output Generator output voltage and wiring must be consistent with regular (utility) system voltage and wiring.
Connect generator with temporary or permanent wiring suitable for the installation.
Turn off or unplug all equipment connected to generator before starting or stopping engine. When starting or stopping, the engine has low speed which causes low voltage and frequency.
5 Essential Loads Generator output may not meet the electrical requirements of the premises. If generator does not produce enough output to meet all requirements, connect only essential loads (pumps, freezers, heaters, etc. – See Section 17-4).
17-11. Selecting Extension Cord (Use Shortest Cord Possible)

**Cord Lengths for 120 Volt Loads**

⚠️ Use GFCI protection when operating auxiliary equipment. If unit does not have GFCI receptacles, use GFCI-protected extension cord. Do not use GFCI receptacles to power life support equipment.

<table>
<thead>
<tr>
<th>Current (Amperes)</th>
<th>Load (Watts)</th>
<th>Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>840</td>
<td>400 (122)</td>
</tr>
<tr>
<td>10</td>
<td>1200</td>
<td>400 (122)</td>
</tr>
<tr>
<td>15</td>
<td>1800</td>
<td>300 (91)</td>
</tr>
<tr>
<td>20</td>
<td>2400</td>
<td>225 (68)</td>
</tr>
<tr>
<td>25</td>
<td>3000</td>
<td>175 (53)</td>
</tr>
<tr>
<td>30</td>
<td>3600</td>
<td>150 (46)</td>
</tr>
<tr>
<td>35</td>
<td>4200</td>
<td>125 (38)</td>
</tr>
<tr>
<td>40</td>
<td>4800</td>
<td>112 (34)</td>
</tr>
<tr>
<td>45</td>
<td>5400</td>
<td>100 (30)</td>
</tr>
<tr>
<td>50</td>
<td>6000</td>
<td>87 (26)</td>
</tr>
</tbody>
</table>

*Conductor size is based on maximum 2% voltage drop

**Cord Lengths for 240 Volt Loads**

⚠️ Use GFCI protection when operating auxiliary equipment. If unit does not have GFCI receptacles, use GFCI-protected extension cord. Do not use GFCI receptacles to power life support equipment.

<table>
<thead>
<tr>
<th>Current (Amperes)</th>
<th>Load (Watts)</th>
<th>Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1680</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2400</td>
<td>800 (244)</td>
</tr>
<tr>
<td>15</td>
<td>3600</td>
<td>600 (183)</td>
</tr>
<tr>
<td>20</td>
<td>4800</td>
<td>450 (137)</td>
</tr>
<tr>
<td>25</td>
<td>6000</td>
<td>350 (107)</td>
</tr>
<tr>
<td>30</td>
<td>7000</td>
<td>300 (91)</td>
</tr>
<tr>
<td>35</td>
<td>8400</td>
<td>250 (76)</td>
</tr>
<tr>
<td>40</td>
<td>9600</td>
<td>225 (69)</td>
</tr>
<tr>
<td>45</td>
<td>10,800</td>
<td>200 (61)</td>
</tr>
<tr>
<td>50</td>
<td>12,000</td>
<td>175 (53)</td>
</tr>
</tbody>
</table>

*Conductor size is based on maximum 2% voltage drop
18-1. Selecting Tungsten Electrode (Wear Clean Gloves To Prevent Contamination Of Tungsten)

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

<table>
<thead>
<tr>
<th>Electrode Diameter</th>
<th>Amperage Range - Gas Type – - Polarity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(DCEN) – Argon</td>
</tr>
<tr>
<td></td>
<td>Direct Current Electrode Negative</td>
</tr>
<tr>
<td></td>
<td>(For Use With Mild Or Stainless Steel)</td>
</tr>
<tr>
<td></td>
<td>AC – Argon</td>
</tr>
<tr>
<td></td>
<td>Balance Control @ 65% Electrode Negative</td>
</tr>
<tr>
<td></td>
<td>(For Use With Aluminum)</td>
</tr>
<tr>
<td>.040” (1 mm)</td>
<td>25-85</td>
</tr>
<tr>
<td>1/16” (1.6 mm)</td>
<td>50-160</td>
</tr>
<tr>
<td>3/32” (2.4 mm)</td>
<td>130-250</td>
</tr>
<tr>
<td>1/8” (3.2 mm)</td>
<td>250-400</td>
</tr>
<tr>
<td>.040” (1 mm)</td>
<td>Pure Tungsten Not Recommended</td>
</tr>
<tr>
<td></td>
<td>For DCEN – Argon</td>
</tr>
<tr>
<td>1/16” (1.6 mm)</td>
<td>50-100</td>
</tr>
<tr>
<td>3/32” (2.4 mm)</td>
<td>100-160</td>
</tr>
<tr>
<td>1/8” (3.2 mm)</td>
<td>150-210</td>
</tr>
</tbody>
</table>

Typical argon shielding gas flow rates are 11 to 35 cfh (cubic feet per hour). Figures listed are a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.

18-2. Preparing Tungsten Electrode For Welding With Phase Control Machines

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

A. Preparing Tungsten For DC Electrode Negative (DCEN) Welding

1. Grinding Wheel
   - Grind end of tungsten on fine grit, hard abrasive wheel before welding. Do not use wheel for other jobs or tungsten can become contaminated causing lower weld quality.
2. Tungsten Electrode
   - A 2% ceriated tungsten is recommended.
3. Flat
   - Diameter of this flat determines amperage capacity.
4. Straight Ground
   - Grind lengthwise, not radial.

B. Preparing Tungsten For AC Welding

1. Tungsten Electrode
   - A pure tungsten is recommended.
2. Ball End
   - Ball end of tungsten by applying AC amperage recommended for a given electrode diameter (see Section 18-1). Let ball on end of the tungsten take its own shape.
SECTION 19 – GUIDELINES FOR TIG WELDING (GTAW)

19-1. Positioning The Torch

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

1 Workpiece
Make sure workpiece is clean before welding.

2 Work Clamp
Place as close to the weld as possible.

3 Torch

4 Filler Rod (If Applicable)

5 Gas Cup

6 Tungsten Electrode
Select and prepare tungsten according to Section 18.

Guidelines:
The inside diameter of the gas cup should be at least three times the tungsten diameter to provide adequate shielding gas coverage. (For example, if tungsten is 1/16 in diameter, gas cup should be a minimum of 3/16 in diameter. Tungsten extension is the distance the tungsten extends out gas cup of torch. The tungsten extension should be no greater than the inside diameter of the gas cup. Arc length is the distance from the tungsten to the workpiece.
19-2. Torch Movement During Welding

**Tungsten Without Filler Rod**

- Welding direction
- Form pool
- Tilt torch
- Move torch to front of pool. Repeat process.

**Tungsten With Filler Rod**

- Welding direction
- Form pool
- Tilt torch
- Add filler metal
- Remove rod
- Move torch to front of pool. Repeat process.

19-3. Positioning Torch Tungsten For Various Weld Joints

- **Butt Weld And Stringer Bead**
- **“T” Joint**
- **Lap Joint**
- **Corner Joint**
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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.

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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 twelve months 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 Rectifier Miter Modules
2. 3 Years Parts and Labor
   * Auto-Darkening Helmet Lenses (Except Classic Series) (No Labor)
   * Engine Driven Welding Generators (NOTE: Engines are Warranted Separately by the Engine Manufacturer.)
   * Inverter Power Sources (Unless Otherwise Stated)
   * Plasma Arc Cutting Power Sources
   * Process Controllers
   * Semi-Automatic and Automatic Wire Feeders
   * Transformer/Rectifier Power Sources

3. 2 Years Parts and Labor
   * Auto-Darkening Helmet Lenses – Classic Series Only (No Labor)
   * Fume Extractors – Capture 5, Filtair 400 and Industrial Collector Series
4. 1 Year Parts and Labor Unless Specified
   * Automatic Motion Devices
   * CoolBelt and CoolBand Blower Unit (No Labor)
   * External Monitoring Equipment and Sensors
   * Field Options
   * RFCS Foot Controls (Except RFCS-RJ45)
   * Fume Extractors – Filtair 130, MWX and SWX Series
   * HF Units
   * ICE/XT Plasma Cutting Torches (No Labor)
   * Induction Heating Power Sources, Coolers
   * Load Banks
   * Motor Driven Guns (except Spoolmate Spoolguns)
   * PAPR Blower Unit (No Labor)
   * Positioners and Controllers
   * Racks
   * Running Gear/Trailers
   * Spot Welders
   * Subarc Wire Drive Assemblies
   * Water Coolant Systems
   * 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
   * Accessories (Kits)
   * Canvas Covers
   * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
   * M-Guns
   * MIG Guns and Subarc (Saw) Guns
   * Remote Controls and RFCS-RJ45
   * Replacement Parts (No labor)
   * Roughneck Guns
   * Spoolmate Spoolguns

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

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

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

3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable 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; (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.

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Owner’s Record

Please complete and retain with your personal records.

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Serial/Style Number</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Purchase Date</th>
<th>(Date which equipment was delivered to original customer)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Distributor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
</tr>
<tr>
<td>City</td>
</tr>
<tr>
<td>State</td>
</tr>
</tbody>
</table>

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.