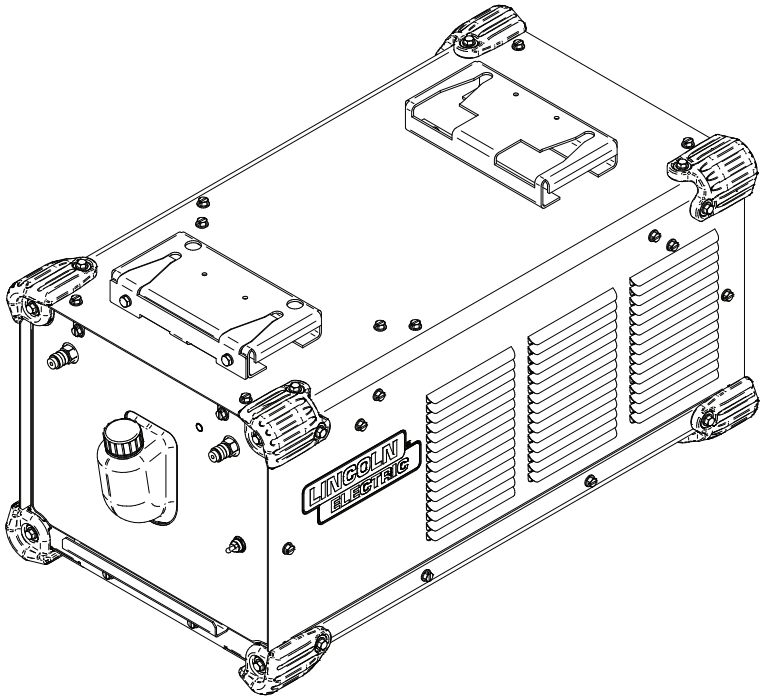
LINCOLN ELECTRIC

Operator's Manual

Cool Wave™ 20S



For use with machines having Code Numbers:
13007

GENUINE LINCOLN PARTS™

Register your machine:
www.lincolnelectric.com/register

Authorized Service and Distributor Locator:
www.lincolnelectric.com/locator

Save for future reference

Date Purchased

Code: (ex: 10859)

Serial: (ex: U1060512345)

IM10554 | Issue Date Jan - 21

THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com

THANK YOU FOR SELECTING A QUALITY PRODUCT BY LINCOLN ELECTRIC.

PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

SAFETY DEPENDS ON YOU

Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.

⚠ WARNING

This statement appears where the information must be followed exactly to avoid serious personal injury or loss of life.

⚠ CAUTION

This statement appears where the information must be followed to avoid minor personal injury or damage to this equipment.

KEEP YOUR HEAD OUT OF THE FUMES.

DON'T get too close to the arc. Use corrective lenses if necessary to stay a reasonable distance away from the arc.

READ and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.

USE ENOUGH VENTILATION or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.

IN A LARGE ROOM OR OUTDOORS, natural ventilation may be adequate if you keep your head out of the fumes (See below).

USE NATURAL DRAFTS or fans to keep the fumes away from your face.

If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.

WEAR CORRECT EYE, EAR & BODY PROTECTION

PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate (See ANSI Z49.1).

PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.

PROTECT others from splatter, flash, and glare with protective screens or barriers.

IN SOME AREAS, protection from noise may be appropriate.

BE SURE protective equipment is in good condition.

Also, wear safety glasses in work area **AT ALL TIMES.**

SPECIAL SITUATIONS

DO NOT WELD OR CUT containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned. This is extremely dangerous.

DO NOT WELD OR CUT painted or plated parts unless special precautions with ventilation have been taken. They can release highly toxic fumes or gases.

Additional precautionary measures

PROTECT compressed gas cylinders from excessive heat, mechanical shocks, and arcs; fasten cylinders so they cannot fall.

BE SURE cylinders are never grounded or part of an electrical circuit.

REMOVE all potential fire hazards from welding area.

ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT.

SECTION A: WARNINGS

CALIFORNIA PROPOSITION 65 WARNINGS

WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects, or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an exposed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65 warnings.ca.gov/diesel

WARNING: This product, when used for welding or cutting, 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 § 25249.5 *et seq.)*

WARNING: Cancer and Reproductive Harm www.P65warnings.ca.gov

ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

FOR ENGINE POWERED EQUIPMENT.

1.a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.

1.b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

1.c. Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

1.d. Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

1.e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

1.g. To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

1.h. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS

2.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines

2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

2.d.1. Route the electrode and work cables together - Secure them with tape when possible.

2.d.2. Never coil the electrode lead around your body.

2.d.3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

2.d.5. Do not work next to welding power source.

ELECTRIC SHOCK CAN KILL.

3.a. The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- Semiautomatic DC Constant Voltage (Wire) Welder.
- DC Manual (Stick) Welder.
- AC Welder with Reduced Voltage Control.

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e. Ground the work or metal to be welded to a good electrical (earth) ground.

3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically “hot” parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

3.j. Also see Items 6.c. and 8.

ARC RAYS CAN BURN.

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.

4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES CAN BE DANGEROUS.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding hardfacing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also be required. Additional precautions are also required when welding on galvanized steel.**

5. b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

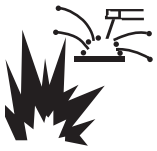
5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.

WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



6.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.

6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).

6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

6.h. Also see item 1.c.

6.I. Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, MA 022690-9101.

6.j. Do not use a welding power source for pipe thawing.

CYLINDER MAY EXPLODE IF DAMAGED.

7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c. Cylinders should be located:

- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.

7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-I, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 14501 George Carter Way Chantilly, VA 20151.

FOR ELECTRICALLY POWERED EQUIPMENT.

8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.

8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.

8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

Refer to http://www.lincolnelectric.com/safety for additional safety information.

TECHNICAL SPECIFICATIONS - K4713-1 COOL WAVE™ 20S

INPUT POWER RATINGS				
FREQUENCY	PHASE	VOLTAGE	CURRENT DRAW @ 60 HZ	CURRENT DRAW @ 50 HZ
50/60 HERTZ	SINGLE	115 VAC	3.8 AMPS	4.0 AMPS

PUMP HYDRAULIC RATING	
NO FLOW - DISCHARGE PRESSURE (GAGE) (RELIEF VALVE SETTING)	70 PSIG (414 KPA) (4.14 BAR) MAX.
NO PRESSURE - FLOW RATE	1.66 GAL/MIN (6.28 LITER/MIN) MAX.
TYPICAL OPERATION - DISCHARGE PRESSURE (GAGE)	53-57 PSIG (365-393 KPA)
TYPICAL OPERATION - FLOW RATE	0.34 GAL/MIN (1.3 LITER/MIN)

RATED COOLING POWER	
PER IEC-60974-2	2.00 KW @ 1.00 LITER/MIN 6824 BTU/HR @ .26 GAL/MIN

*Cooling Power is measured at a 1 L/min. flow rate with a 40°C coolant temperature rise in a 25°C (77ºF) environment.

DEGREE OF ENVIRONMENTAL PROTECTION
IP 23

RESERVOIR CAPACITY
2.375 GALLONS (9.0 LITERS)

AGENCY COMPLIANCE
IEC-60974-2, $_{C}CSA_{US}$,

TEMPERATURE RANGE
9°F to 104°F (-13°C to 40°C)

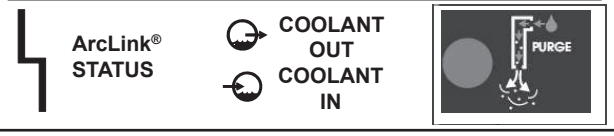
RECOMMENDED COOLANT
DISTILLED OR DE-INOIZED WATER*
DO NOT USE: AUTOMOTIVE ANTI-FREEZE THAT CONTAINS RUST INHIBITORS OR LEAK STOPPERS. THESE COOLANTS WILL DAMAGE THE PUMP AND BLOCK THE SMALL INTERNAL PASSAGEWAYS OF THE HEAT EXCHANGER, AFFECTING COOLING PERFORMANCE.

***FOR SUB FREEZING APPLICATIONS**

KP4159-1 Low Conductivity Coolant
Use 50-50 mix of coolant and water for freezing protection down to 9°F (-13°C)

PHYSICAL DIMENSIONS				
LENGTH	WIDTH	HEIGHT	SHIPPING WEIGHT	WEIGHT W/ RESERVOIR FULL
30.70 IN (78.0 CM)	15.99 IN (40.6 CM)	14.93 IN (37.9 CM)	92 LB (41.7 KG)	114 LB (51.7 KG)

EXPLANATION OF SYMBOLS THAT APPEAR ON THIS EQUIPMENT



INSTALLATION

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn off input power to the power source at the disconnect switch or fuse box before working on this equipment. Turn off the input power to any other equipment connected to the welding system at the disconnect switch or fuse box before working on the equipment.**
- **To not touch electrically hot parts.**

GENERAL DESCRIPTION

The Cool Wave™ 20S is a cooler designed for heavy duty robotic and HDT MIG welding applications. It is specifically designed to integrate with the Power Wave S700 Advanced Process Welder and the Magnum PRO Water-Cooled Robotic Torch. This cooler could be used in the future with other power sources and for other processes. The coolant "IN" and "OUT" connections are 1/4" quick connect fittings for use with the Magnum PRO Water-Cooled Robotic Torch. The Cool Wave™ 20S is a continuous duty cooler.

⚠ CAUTION

DO NOT USE A SOLENOID VALVE with the COOL WAVE™ 20S

RECOMMENDED PROCESSES AND EQUIPMENT

The Cool Wave™ 20S is designed for high deposition rate MIG welding applications. It is designed to work with the Power Wave S700 Advanced Process Welder and the Magnum PRO Water-Cooled Robotic Torch. This entire system is specifically designed to work together to provide high quality reliable MIG welding at high material deposition rates.

DESIGN FEATURES

The Cool Wave™ 20S provides adequate and reliable cooling for the Magnum PRO Water-Cooled Robotic Torch up to 650 Amps of continuous use:

- Industry proven reliable Procon Pump. Pump rating of 60 PSIG and 100 GPH.
- Robust single phase motor. Thermally protected.
- Reliable 115 VAC tubeaxial fans.
- Manufactured by the Lincoln Electric Company in Cleveland, OH.
- 5 micron replaceable cartridge filter to eliminate coolant contaminants.
- Cabinet and drawer design for easy access to internal components
- Quick lock system to securely mount underneath select Lincoln Power Wave welders.
- Arclink enabled to "talk" and integrate with the Power Wave S700 Advanced Process Welder and requires no user interaction.
- NTC thermistor to accurately monitor the coolant temperature and protect the torch
- Coolant level switch in reservoir to protect pump (~0.9 gallons minimum)
- Coolant flow switch to ensure proper flow rate (0.11 gallons/min)
- Designed for use with Lincoln Electric's Low Conductivity Coolant for corrosion and algae resistance for operations below freezing.
- Designed to IEC-60974-2, IP 23 for protection from ingress by finger sized objects, and water spray less than 60 degrees from vertical.
- Pump operates smoothly without vibrations being transferred to the cutting torch.
- Input cord on the 115V cooler has a three-prong plug NEMA type 5-15P.

UNPACKING THE COOL WAVE™ 20S

The packaging of the cooler is designed to withstand shipping abuse. If any shipping damage has occurred, contact your certified Lincoln distributor or service center. When unpacking the unit, avoid thrusting sharp objects through the carton, which may damage the machine. Below is the recommended procedure for unpacking the cooler:

- Cut and remove banding straps around skid and carton
- Remove carton
- Cut and remove banding straps around skid and cooler
- Remove cooler, literature, and other items

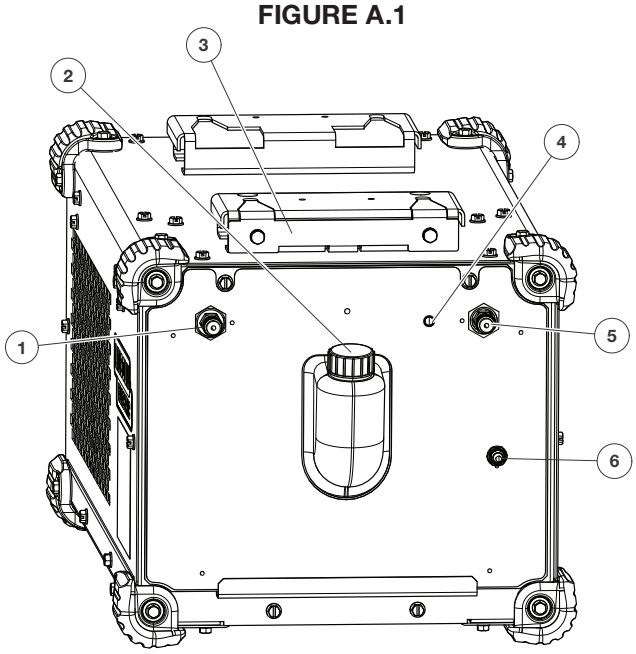
Save the instruction manual and service directory supplied with the Cool Wave™ 20S for parts orders and future maintenance service.

USER CONNECTIONS AND CONTROLS

The fittings located on the front of the Cool Wave™ 20S are 1/4" quick connect fittings. Use only the specified hoses to attach the cooler to the Magnum PRO Water-Cooled Robotic Torch. Refer to Figure A.1

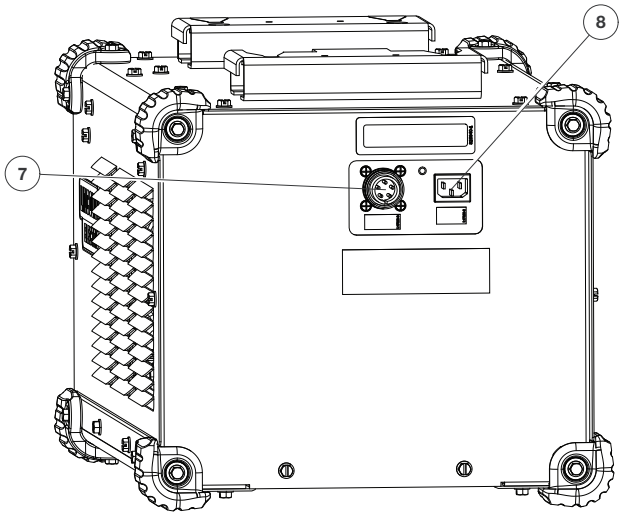
Coolant Line Connections to the Cool Wave™ 20S:

FIGURE A.1



1. **Coolant "In" / "Return" / "Hot" (Red)**
2. **Reservoir Fill Neck**
3. **Front Mounting and Locking Bracket**
4. **Status LED**
5. **Coolant "Out" / "Supply" / "Cold" (Blue)**
6. **System "Purge" momentary switch**

FIGURE A.2



7. **Arclink Connector**
8. **115 VAC C14 Receptacle**

(Reference Figure A.1) The coolant connections are 1/4" quick disconnect fittings. The specified hoses have the mating connections to engage these fittings. Press the hose end securely into the panel fitting to make the connection; it will snap into engagement. To disconnect, push the collar on the panel fitting into the panel to disengage the hose. The red marked hose should be connected to the Coolant 'In' fitting. **BE CERTAIN THAT NO LEAKS EXIST WHEN THE COOLER IS TURNED ON. A LEAK WILL DEPLETE RESERVOIR VOLUME AND POTENTIALLY BE HAZARDOUS.**

⚠ CAUTION

NOTE: BE CERTAIN THAT ONLY THE SPECIFIED HOSES ARE USED AND THAT THE CONNECTORS ARE CLEAN. POOR CONNECTIONS CAN CAUSE COOLANT LEAKS AND WILL DEPLETE THE COOLANT IN THE RESERVOIR.

INPUT POWER AND ARCLINK CONNECTIONS

Attach the supplied input power cord into the rear of the Cool Wave 20S and into the 115V NEMA 5-15 receptacle on the rear of the Power Wave Welder, or to any 115V receptacle.

Unpack the included Arclink Splitter Cable Assembly. Thread one of the female Amphenol connectors on the Splitter Cable into the Arclink connector on the rear panel of the Cool Wave 20S. Thread the other female lead on the Splitter Cable into the Arclink connector on the feeder. Thread the male Amphenol lead on the Splitter Cable to the Arclink connector on the Power Wave welder. An Arclink extension cable may be used if needed to reach any of the components (See the Options/Accessories section for available Arclink cable lengths).

FILLING THE COOLANT RESERVOIR

RECOMMENDED COOLANT

DISTILLED OR DE-IONIZED WATER ONLY*
*FOR SUB-FREEZING APPICATIONS SEE PG A-1

⚠ WARNING

DO NOT USE: Automotive anti-freeze that contains rust inhibitors or leak stoppers. These coolants will damage the pump and block the small internal passageways of the heat exchanger, affecting cooling performance.

To avoid freeze damage and fluid leakage in shipment, the Cool Wave™ 20S unit is delivered with very little coolant in the system. To fill the unit, unscrew the plastic reservoir cap from the front middle of the unit.

The opening of the reservoir neck mates with most coolant containers, but to avoid spillage of coolant, a funnel should be placed into the reservoir hole when filling the Cool Wave™ 20S.

⚠ CAUTION

Pure solutions and mixtures of, or materials (i.e. towels) wetted with ethylene glycol are toxic to humans and animals. They must not be haphazardly discarded, especially by pouring liquids down the drain. Contact the local EPA office for responsible disposal methods or for recycling information. Avoid unnecessary contact.

Filling:

Connect all of the water hoses to the torch to form a complete coolant circuit before filling the reservoir.

Pour 2.375 gallons (9.0 liters) of coolant into the coolant reservoir fill hole through a funnel.

Use the coolant purge switch on the front panel of the cooler to prime the system. The purge switch turns on the coolant pump and the cooling fans when toggled upward or downward. Check for air flow from the side of the cooler, and check for coolant leaks at all hose connections.

While priming, add additional coolant to keep the reservoir full.

The cooler is "FULL" when the coolant lies just below the coolant reservoir opening.

Be certain to replace the reservoir fill cap when the reservoir is full. Operation of the Cool Wave™ 20S without the reservoir cap can cause unnecessary contamination and could be hazardous to others.

OPERATION

SAFETY PRECAUTIONS

Read this entire section of operating instructions before operating the machine.

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Do not touch electrically live parts or electrodes with your skin or wet clothing.**
- **Insulate yourself from the work and ground.**
- **Always wear dry insulating gloves.**

FUMES AND GASES can be dangerous.

- **Keep your head out of fumes.**
- **Use ventilation or exhaust to remove fumes from breathing zone.**

WELDING SPARKS can cause fire or explosion.

- **Keep flammable material away.**
- **Do not weld on containers that have held combustibles.**
- **Do not cut aluminum over water tables**

ARC RAYS can burn.

- **Wear eye, ear, and body protection.**

The following should always be observed when operating the Cool Wave™ 20S

- **Never operate the cooler with any case parts off or removed. The drawer must always be slid all the way into the cabinet and secured with two screws in the front.**
- **Unplug the cooler before removing the drawer or servicing the unit.**
- **High voltage typical of welding operations can kill.**
- **Immersion in water around electrical lines can cause electrical shock.**
- **Moving parts can injure. Never place fingers into openings of Cooler.**
- **Unplug the cooler before filling the reservoir.**
- **Never operate the cooler with the reservoir fill cap off.**
- **Hot coolant can burn skin. Always be sure coolant is NOT HOT before servicing the cooler.**
- **Do not pour used ethylene glycol coolant down the drain.**
- **Do not remove the pump relief valve's 3/4" hex nut or attempt to adjust the relief valve setting.**

Observe additional guidelines detailed in the beginning of this manual.

TURNING THE SYSTEM “ON”

After connecting the Cool Wave™ 20S per the installation instructions above, turn on the Power Wave Welder power source. You should see the LED on the front of the cooler turn green and you will be able to hear the fan running and feel airflow out of the side of the unit when the cooler is operating. The cooler will run when a weld is initiated and for some time afterward.

When first starting the unit, check all of the coolant hoses to ensure that no coolant leaks are present. Coolant leakage causes poor cooling performance, potential health and electrical safety hazards, and will eventually cause the system to shut down.

OPERATING PRECAUTIONS AND WARNINGS

The following should always be observed when operating the Cool Wave™ 20S:

- Check the coolant reservoir level daily
- Keep the reservoir full especially after changing any lines/torches
- Never operate the cooler with the reservoir fill cap removed unless checking coolant flow
- Avoid placing the cooler near areas of extreme heat
- Avoid placing the cooler near a flux hopper or an area where dust build-up is extreme
- Avoid kinking or putting sharp bends in any coolant lines
- Keep all coolant lines clean and free of any blockage
- Do not attempt to operate cooler without coolant in reservoir
- Do not operate the cooler on an inclined surface greater than 15° from horizontal.

COOLING EFFICIENCY

The high cooling efficiency of the Cool Wave™ 20S helps to extend the life of the torch consumables. Heat from the welding arc is transferred into the coolant and removed via the exiting air flow at the side of the cooler.

Ambient air temperature affects the cooling performance of the Cool Wave™ 20S. Maximum coolant temperature is 162°F and controlled by a thermistor mounted to the radiator inlet.

OPTIONS / ACCESSORIES

Field Installed Options/Accessories

Arclink Cables

K1543-8, -25, -50, -100 - An Arclink cable is used to communicate between the Power Wave Welder, the Cool Wave™ 20S and the wire feeder. Available lengths include 8', 25', 50', and 100'.

Coolant Hoses

Only the specified coolant hoses should be used between the Cool Wave™ 20S and the Magnum PRO Water-Cooled Robotic Torch.

K4544-7 M-F Water Hose Kit 7 Ft

K4544-25 M-F Water Hose Kit 25 Ft

These hoses may be daisy-chained to form longer lengths

Coolants

KP4159-1 Low Conductivity Coolant - Sold in 1 gallon containers.
For use only in sub freezing applications.
Use 50-50 mix of coolant and water for freezing protection down to 9°F (-13°C).

MAINTENANCE

Safety Precautions

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Observe all Safety Guidelines detailed throughout this manual. Be sure to disconnect the Cool Wave™ 20S power and communication cables before performing any maintenance procedures.**

General service notes:

Always use a back-up wrench on pump head when loosening or tightening pump fittings.

Never run the pump dry. Always use a recommended coolant, otherwise pump damage may result. Dispose of coolant and any coolant soaked items properly.

See additional warning information throughout this Operator's Manual

ROUTINE MAINTENANCE

The reservoir volume should be checked regularly. The system will indicate a low liquid level because of the float switch, but for maximum cooling it is recommended to keep the reservoir full. Remove the reservoir fill cap and check the coolant level. The reservoir is full when the coolant level is just below the reservoir fill opening.

Remove accumulated dust and dirt from the internal components of the cooler by blowing it out with a low-pressure air hose or removing it with a vacuum hose.

To maintain maximum cooler efficiency, the heat exchanger should be kept free of dust and dirt build-up. Avoid placing the unit near a flux hopper or a flux waste container. A clean heat exchanger offers better cooling performance and longer product life. In extremely dirty environments, it may be necessary to remove the heat exchanger completely from the cooler and clean the fins with soap and water. Use care to avoid damaging the fins.

PUMP MOTOR MAINTENANCE

The Cool Wave™ 20S is rated for continuous operation. It is recommended to re-oil the pump motor bearings once a year as follows:

- Remove the plastic plugs located on the top of both the inboard and outboard bearing end-caps.
- Re-oil each bearing with 30-35 drops of SAE 20 oil then reinstall both plugs.

PERIODIC MAINTENANCE

The torch coolant and particulate filter should be replaced every 6 months. The pump strainer should also be cleaned before refilling the coolant.

Replacing coolant and filter cartridge:

1. Remove power from the system
2. Remove power/communication cables from rear of cooler
3. Remove 2 screws from the front of the cooler and slide the drawer out of the cabinet
4. Remove and dispose of the old coolant out of the reservoir

- Use clean siphoning equipment or carefully tip the drawer forward to remove coolant

5. Remove the coolant supply hose from the front of the cooler and use compressed air to force the coolant through the hoses/welding torch and back into the reservoir
6. Dump and dispose of the remaining coolant from the reservoir
7. Loosen two nuts holding filter housing bracket to rear of drawer
8. Unscrew the filter housing to expose the element
9. Replace filter element, reassemble filter housing, and reattach to drawer
10. Clean pump strainer:

- Hold the pump head firmly and loosen the strainer's 7/8" acorn nut located on the bottom of the pump. Do not confuse with 3/4" acorn nut. Remove nut and slide inlet strainer down and out from the pump head.
- Gently rinse the strainer under running water to thoroughly clean it.
- Reinstall the strainer and 7/8 acorn nut, tightening with 75+/-15 in-lbs. of torque.

11. Wipe dry all areas wetted with coolant. Dispose of coolant soaked towels properly.
12. Slide drawer back into cabinet, secure drawer to cabinet, reattach coolant supply hose, fill reservoir with new coolant, and reattach power/communication cables to the rear of the cooler.
13. Power up the Power Wave system and perform cooler priming procedure while topping off coolant.

⚠ CAUTION

Pure solutions and mixtures of, or materials (i.e. towels) wetted with ethylene glycol are toxic to humans and animals. They must not be haphazardly discarded, especially by pouring liquids down the drain. Contact the local EPA office for responsible disposal methods or for recycling information

DRAWER REMOVAL PROCEDURE

⚠ WARNING

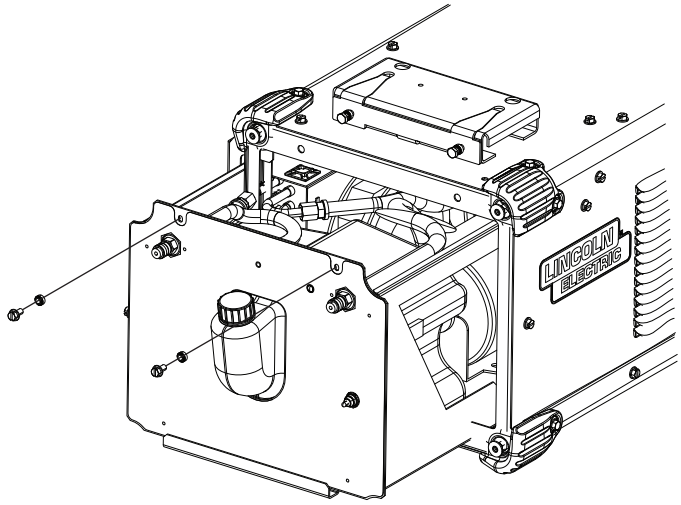
ELECTRIC SHOCK can kill.

- **Disconnect input power before servicing.**
- **Do not operate with covers removed.**
- **Do not touch electrically live parts.**
- **Only qualified persons should install, use or service this equipment.**

See Figure D.1

1. Turn off input power to the power source and any other equipment connected to the cutting system at the disconnect switch or fuse box before working on the equipment.
2. Disconnect the 115VAC and Arclink cables from the rear of the cooler.
3. Remove the two screws from the front of the cooler with a 3/8" bit.
4. Slide the drawer out of the cabinet.

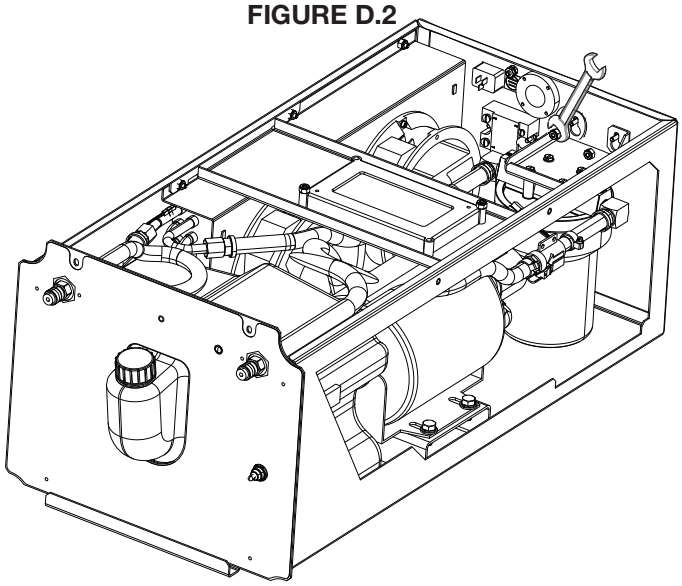
FIGURE D.1



FILTER ELEMENT REPLACEMENT PROCEDURE

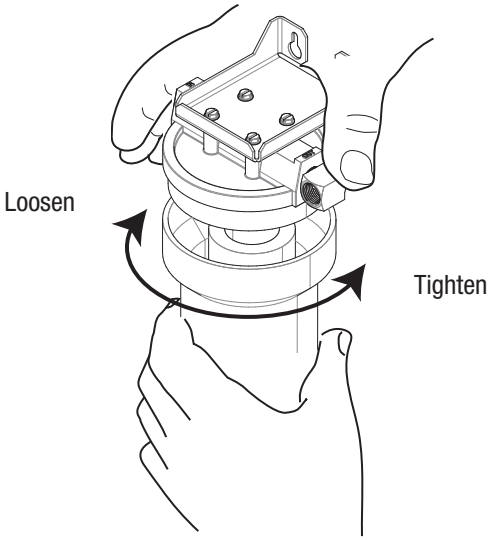
1. Remove the cooler drawer as described earlier.
2. Loosen the two 5/16" nuts securing filter bracket to the drawer back. See figure D.2

FIGURE D.2



3. Hold the top of the filter housing and twist the lower clear section to loosen. See Figure D.3

FIGURE D.3



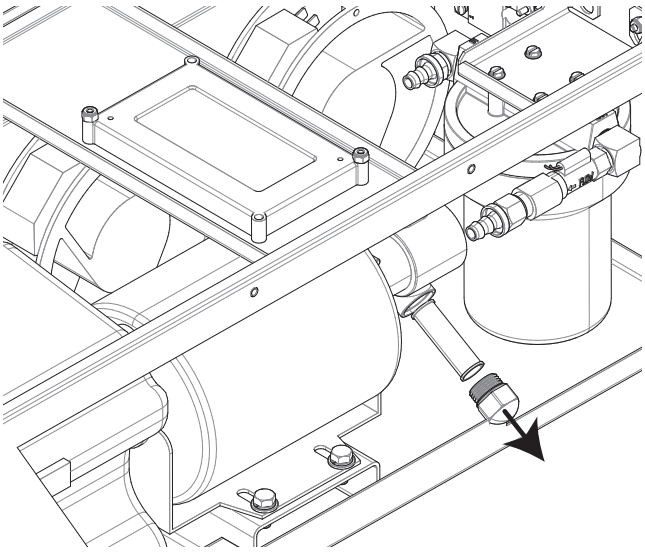
4. Remove the lower half of the filter housing with coolant and element inside.
5. Remove and replace the filter element.
6. Reconnect both halves of the filter housing with the element properly seated.
7. Secure the filter bracket to the drawer back.
8. Insert the cooler drawer back in the cabinet and secure with 2 screws at the front.

Find replacement filter part numbers at **PARTS.LINCOLNELECTRIC.COM**

PUMP STRAINER CLEANSING PROCEDURE

1. Remove the cooler drawer as described earlier.
2. While holding the pump head securely, remove the 15/16" acorn nut from the pump body. be prepared for some coolant to escape from the pump when removing the nut.
3. Gently pull the strainer to remove it from the pump. See Figure D.4

FIGURE D.4



4. Clean and remove any debris from the strainer. Replace the strainer if it is damaged or excessively dirty.
5. Reinsert the strainer into the pump body.
6. Replace the 15/16" nut and torque to 6.25 ft-lbs (8.5 N-m) with the pump head securely.
7. Insert the cooler drawer back in the cabinet and secure with 2 screws at the front.

TROUBLESHOOTING

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

Service and Repair should only be performed by Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

Step 1. LOCATE PROBLEM (SYMPTOM).

Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

Step 2. POSSIBLE CAUSE.

The second column labeled "POSSIBLE CAUSE" lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COURSE OF ACTION

This column provides a course of action for the Possible Cause, generally it states to contact your local Lincoln Authorized Field Service Facility.

If you do not understand or are unable to perform the Recommended Course of Action safely, contact your local Lincoln Authorized Field Service Facility.

USING THE STATUS LED TO TROUBLESHOOT SYSTEM PROBLEMS

The Cool Wave™ 20S is equiped with an externally mounted status light. If a problem occurs it is important to note the condition of the status light. Therefore, prior to cycling power to the system, check the power source status light for error sequences as noted below.

The STATUS LIGHT is a dual-color LED that indicates system errors. Normal operation is steady green. Error conditions are indicated in the following Table E.1.

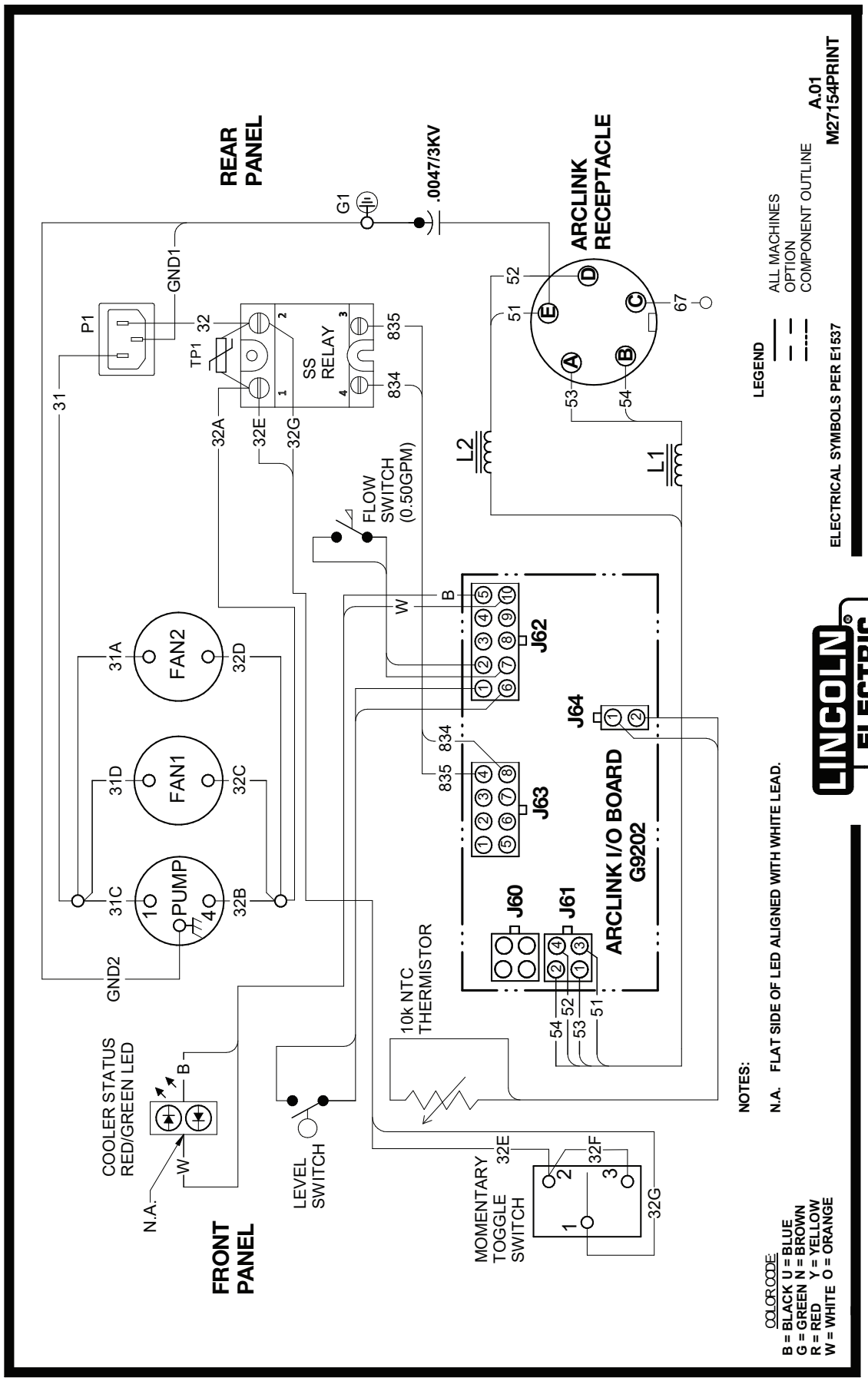
TABLE E.1

LIGHT CONDITION	MEANING
Steady Green	System OK. Cooler is operational, and is communicating normally with all healthy equipment connected to its ArcLink network.
Blinking Green	Occurs during power up or a system reset, and indicates the Cool Wave™ 20S is mapping (identifying) each component in the system. Normal for first 1-10 seconds after power is turned on, or if the system configuration is changed during operation.
Fast Blinking Green	Under normal conditions indicates Auto-mapping has failed. Also used by the Diagnostics Utility to identify the selected machine when connecting to a specific IP address.
Alternating Green and Red	Non-recoverable system fault. If the Status light is flashing any combination of red and green, errors are present. Read the error code(s) before the machine is turned off. Error Code interpretation through the Status light is detailed in the Service Manual. Individual code digits are flashed in red with a long pause between digits. If more than one code is present, the codes will be separated by a green light. Only active error conditions will be accessible through the Status Light. To clear the active error(s), turn power source off, and back on to reset.
Steady Red	Not applicable.
Blinking Red	Not applicable.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Lincoln Authorized Service Facility for technical troubleshooting assistance before you proceed.
WWW.LINCOLNELECTRIC.COM/LOCATOR

Observe all Safety Guidelines detailed throughout this manual		
PROBLEMS (SYMPTOMS)	**POSSIBLE CAUSE**	**RECOMMENDED COURSE OF ACTION**
BASIC MACHINE PROBLEMS		
Error 817 – Coolant Temp Too High	1. Heat exchanger clogged/dirty	If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility.**
	2. Fan(s) disconnected, obstructed, or failed	
	3. Exceeded cooling limit	
Error 814 – Coolant Flow Too Low	1. Power cord not plugged in between machine and cooler	
	2. 15A circuit breaker on machine tripped	
	3. Leak in torch/gun or hoses.	
	4. Torch/gun or hoses partially obstructed	
	5. Internal filter is clogged	
	6. Pump Strainer is dirty	
	7. Damaged pump	
Error 815 – Coolant Level Too Low	1. Heat exchanger clogged/dirty	
	2. Fan(s) disconnected, obstructed, or failed	
	3. Exceeded cooling limit	
Internal Coolant Leak	1. Hose clamp or fitting loose on an internal connection	
	2. Internal hose punctured	
	3. Heat exchanger leaking	
	4. Pump seal is leaking	
	5. Poor seal between level switch and reservoir	
Front LED does not light up	1. LED disconnected from case front lens	
Pump operates, but fan does not.	1. Loose or disconnected fan lead.	
	2. Obstruction in fan blade	
	3. Fan motor failure.	

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Lincoln Authorized Service Facility for technical troubleshooting assistance before you proceed.
WWW.LINCOLNELECTRIC.COM/LOCATOR



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels. If the diagram is illegible, write to the Service Department for a replacement. Give the equipment code number.

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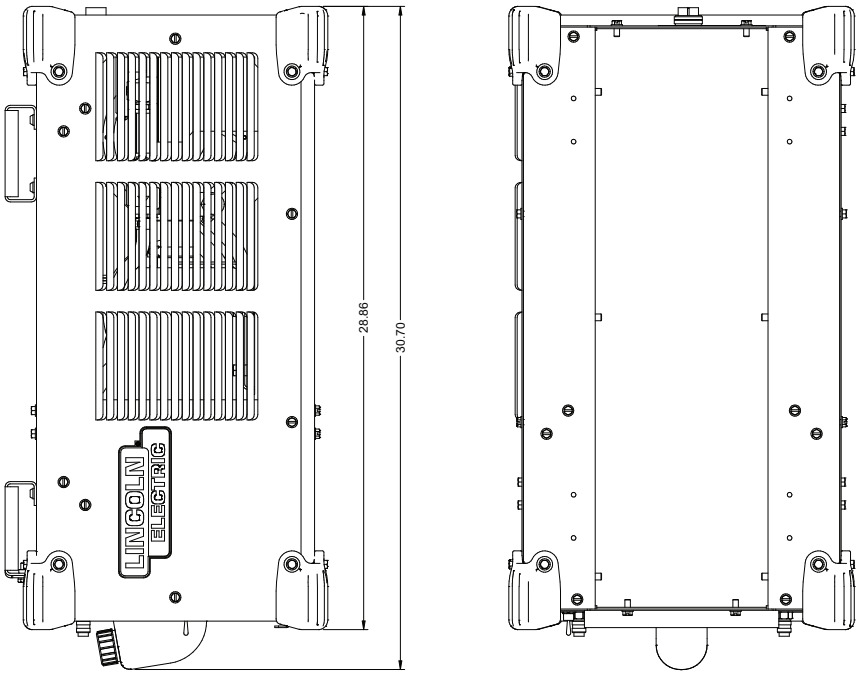

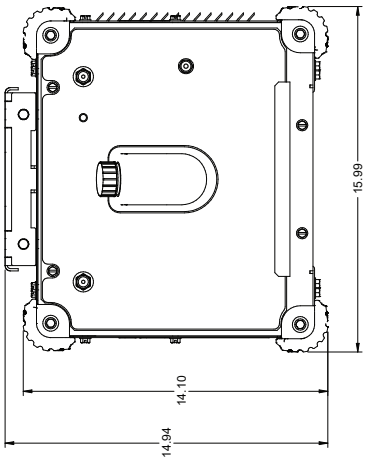

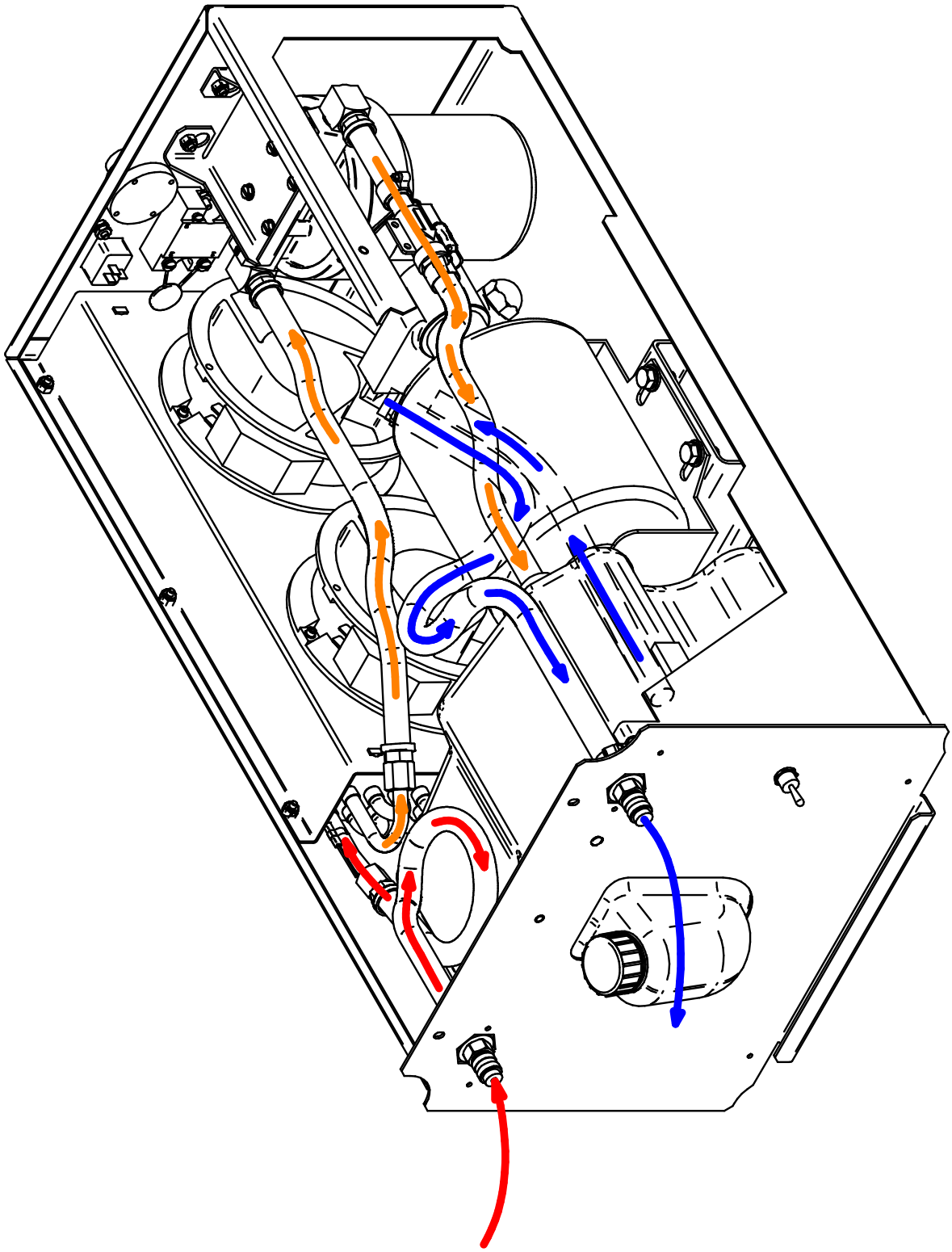

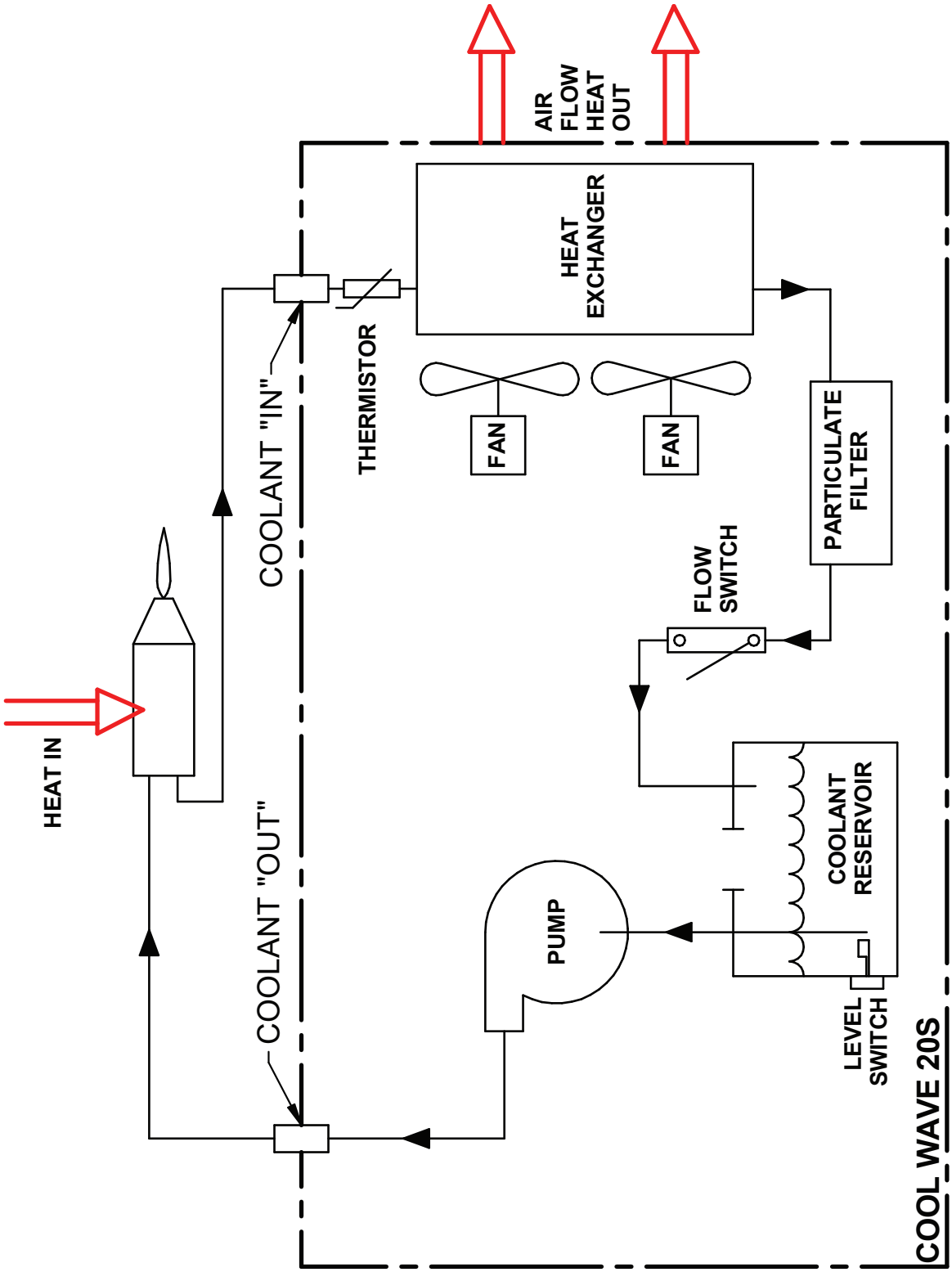
AIR FLOW HEAT OUT
HEAT EXCHANGER
THERMISTOR
FAN
FAN
PARTICULATE FILTER
FLOW SWITCH
COOLANT "IN"
HEAT IN
COOLANT "OUT"
PUMP
COOLANT RESERVOIR
LEVEL SWITCH
COOL WAVE 20S

			
WARNING	● Do not touch electrically live parts or electrode with skin or wet clothing. ● Insulate yourself from work and ground.	● Keep flammable materials away.	● Wear eye, ear and body protection.
Spanish **AVISO DE PRECAUCION**	● No toque las partes o los electrodos bajo carga con la piel o ropa mojada. ● Aislese del trabajo y de la tierra.	● Mantenga el material combustible fuera del área de trabajo.	● Protéjase los ojos, los oídos y el cuerpo.
French **ATTENTION**	● Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension. ● Isolez-vous du travail et de la terre.	● Gardez à l'écart de tout matériel inflammable.	● Protégez vos yeux, vos oreilles et votre corps.
German **WARNUNG**	● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! ● Isolieren Sie sich von den Elektroden und dem Erdboden!	● Entfernen Sie brennbarres Material!	● Tragen Sie Augen-, Ohren- und Körperschutz!
Portuguese **ATENÇÃO**	● Não toque partes elétricas e electrodos com a pele ou roupa molhada. ● Isole-se da peça e terra.	● Mantenha inflamáveis bem guardados.	● Use proteção para a vista, ouvido e corpo.
Japanese **注意事項**	● 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。 ● 施工物やアースから身体が絶縁されている様にして下さい。	● 燃えやすいものの側での溶接作業は絶対にしてはなりません。	● 目、耳及び身体に保護具をして下さい。
Chinese **警 告**	● 皮肤或濕衣物切勿接觸帶電部件及銲條。 ● 使你自己與地面和工件絕緣。	● 把一切易燃物品移離工作場所。	● 佩戴眼、耳及身體勞動保護用具。
Korean **위 험**	● 전도체나 용접봉을 젖은 헝겁 또는 피부로 절대 접촉치 마십시요. ● 모재와 접지를 접촉치 마십시요.	● 인화성 물질을 접근 시키지 마시요.	● 눈, 귀와 몸에 보호장구를 착용하십시요.
Arabic **تحذير**	● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الالكترود بجلد الجسم أو بالملابس المبللة بالماء. ● ضع عازلا على جسمك خلال العمل.	● ضع المواد القابلة للاشتعال في مكان بعيد.	● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.

READ AND UNDERSTAND THE MANUFACTURER'S INSTRUCTION FOR THIS EQUIPMENT AND THE CONSUMABLES TO BE USED AND FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES.

SE RECOMIENDA LEER Y ENTENDER LAS INSTRUCCIONES DEL FABRICANTE PARA EL USO DE ESTE EQUIPO Y LOS CONSUMIBLES QUE VA A UTILIZAR, SIGA LAS MEDIDAS DE SEGURIDAD DE SU SUPERVISOR.

LISEZ ET COMPRENEZ LES INSTRUCTIONS DU FABRICANT EN CE QUI REGARDE CET EQUIPMENT ET LES PRODUITS A ETRE EMPLOYES ET SUIVEZ LES PROCEDURES DE SECURITE DE VOTRE EMPLOYEUR.

LESEN SIE UND BEFOLGEN SIE DIE BETRIEBSANLEITUNG DER ANLAGE UND DEN ELEKTRODENEINSATZ DES HERSTELLERS. DIE UNFALLVERHÜTUNGSVORSCHRIFTEN DES ARBEITGEBERS SIND EBENFALLS ZU BEACHTEN.

			
● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone.	● Turn power off before servicing.	● Do not operate with panel open or guards off.	**WARNING**
● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.	● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio.	● No operar con panel abierto o guardas quitadas.	Spanish **AVISO DE PRECAUCION**
● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.	● Débranchez le courant avant l'entretien.	● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.	French **ATTENTION**
● Vermeiden Sie das Einatmen von Schweibrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!	● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)	● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen!	German **WARNUNG**
● Mantenha seu rosto da fumaça. ● Use ventilação e exhaustão para remover fumo da zona respiratória.	● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas.	● Mantenha-se afastado das partes moventes. ● Não opere com os paineis abertos ou guardas removidas.	Portuguese **ATENÇÃO**
● ヒュームから頭を離すようにして下さい。 ● 換気や排煙に十分留意して下さい。	● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。	● パネルやカバーを取り外したままで機械操作をしないで下さい。	Japanese **注意事項**
●頭部遠離煙霧。 ●在呼吸區使用通風或排風器除煙。	●維修前切斷電源。	●儀表板打開或沒有安全罩時不準作業。	Chinese **警 告**
● 얼굴로부터 용접가스를 멀리하십시요. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시요.	● 보수전에 전원을 차단하십시요.	● 판넬이 열린 상태로 작동치 마십시요.	Korean **위 험**
● ابعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها.	● اقطع التيار الكهربائي قبل القيام بأية صيانة.	● لا تشغل هذا الجهاز اذا كانت الاغطية الحديدية الواقية ليست عليه.	Arabic **تحذير**

LEIA E COMPREENDA AS INSTRUÇÕES DO FABRICANTE PARA ESTE EQUIPAMENTO E AS PARTES DE USO, E SIGA AS PRÁTICAS DE SEGURANÇA DO EMPREGADOR.

使う機械や溶材のメーカーの指示書をよく読み、まず理解して下さい。そして貴社の安全規定に従って下さい。

請詳細閱讀並理解製造廠提供的説明以及應該使用的銀捍材料，並請遵守貴方的有関勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

اقرأ بتمعن وافهم تعليمات المصنع المنتج لهذه المعدات والمواد قبل استعمالها واتبع تعليمات الوقاية لصاحب العمل.

CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.

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