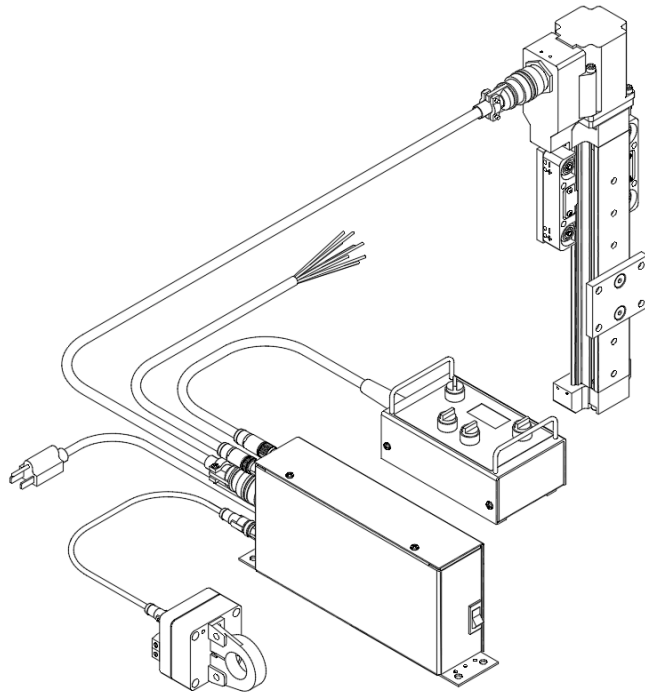


# Operator's Manual

## ***CWT<sup>™</sup> ATC-3***



For use with machines having Numbers:

**S0A5119**



**Register your machine:**

[www.lincolnelectric.com/register](http://www.lincolnelectric.com/register)

**Authorized Service and Distributor Locator:**

[www.lincolnelectric.com/locator](http://www.lincolnelectric.com/locator)

**Save for future reference**

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Code: (ex: 10859)

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**S8M5023** | Issue Date Jun-22

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**THE LINCOLN ELECTRIC COMPANY**

22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.

Phone: +1.216.481.8100 • [www.lincolnelectric.com](http://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.

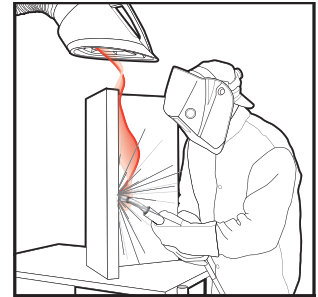
**READ** and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.

**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.**

# ELECTROMAGNETIC COMPATIBILITY (EMC)

---

## CONFORMANCE

Products displaying the CE mark are in conformity with European Community Council Directive. It was manufactured in conformity with a national standard that implements a harmonized standard: EN 60974-10 Electromagnetic Compatibility (EMC) Product Standard for Arc Welding Equipment. It is for use with other Lincoln Electric equipment. It is designed for industrial and professional use.

---

## INTRODUCTION

All electrical equipment generates small amounts of electromagnetic emission. Electrical emission may be transmitted through power lines or radiated through space, similar to a radio transmitter. When emissions are received by other equipment, electrical interference may result. Electrical emissions may affect many kinds of electrical equipment; other nearby welding equipment, radio and TV reception, numerical controlled machines, telephone systems, computers, etc.

**WARNING:** This Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There may be potential difficulties in ensuring electro-magnetic compatibility in those locations, due to conducted as well as radiated disturbances.

---

## INSTALLATION AND USE

The user is responsible for installing and using the welding equipment according to the manufacturer's instructions.

If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing (grounding) the welding circuit, see Note. In other cases it could involve constructing an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

**NOTE:** The welding circuit may or may not be earthed for safety reasons. Follow your local and national standards for installation and use. Changing the earthing arrangements should only be authorized by a person who is competent to assess whether the changes will increase the risk of injury, e.g., by allowing parallel welding current return paths which may damage the earth circuits of other equipment.

---

## ASSESSMENT OF AREA

Before installing welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

- a) other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment;
- b) radio and television transmitters and receivers;
- c) computer and other control equipment;
- d) safety critical equipment, e.g., guarding of industrial equipment;
- e) the health of the people around, e.g., the use of pacemakers and hearing aids;
- f) equipment used for calibration or measurement;
- g) the immunity of other equipment in the environment. The user shall ensure that other equipment being used in the

environment is compatible. This may require additional protection measures;

- h) the time of day that welding or other activities are to be carried out.

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

---

## METHODS OF REDUCING EMISSIONS

### Public Supply System

Welding equipment should be connected to the public supply system according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the system. Consideration should be given to shielding the supply cable of permanently installed welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

### Maintenance of the Welding Equipment

The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturer's instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

### Welding Cables

The welding cables should be kept as short as possible and should be positioned close together, running at or close to the floor level.

### Equipotential Bonding

Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

### Earthing of the Workpiece

Where the workpiece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, e.g., ship's hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

### Screening and Shielding

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications.<sup>1</sup>

<sup>1</sup> Portions of the preceding text are contained in EN 60974-10 "Electromagnetic Compatibility (EMC) product standard for arc welding equipment."



## 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.P65warnings.ca.gov/diesel](http://www.P65warnings.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](http://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 W117.2-1974. 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.

- Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.
- Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.
- 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.

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



### ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS



- Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines
- EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.
- Exposure to EMF fields in welding may have other health effects which are now not known.
- All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:
  - Route the electrode and work cables together - Secure them with tape when possible.
  - Never coil the electrode lead around your body.
  - 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.
  - Connect the work cable to the workpiece as close as possible to the area being welded.
  - 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 Z87.1 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.

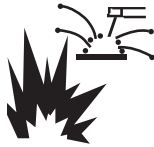


- 5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding hardfacing (see instructions on container 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 02269-9101.
- 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-1, "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.**





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## 1.0 OVERVIEW

The Lincoln Electric Company Automatic Torch Control (ATC-3) is a compact, lightweight, welding torch manipulation control system; comprised of the Automatic Torch Control (ATC-3), an Operator Control Pendant and a stepper motor driven Linear Slide Assembly (LSA). This system provides independent control of torch movements in the vertical plane.

The ATC-3 provides Torch Height Tracking control using Lincoln Electric Company's patented Thru-Arc™ sensing technology. The Thru-Arc Tracking System provides two modes of Torch Height Tracking Control, Arc Voltage Control (AVC) or Arc Current Control (ACC) utilizing feedback information from the welding arc voltage and welding current measured with an external voltage/current sensor assembly provided with the system.

The Linear Slide Assembly (LSA) provides 7" of vertical motion and has a weight capacity of 25 lbs @ 3" from the face of the carriage. The Torch Slide Assembly module is installed using the provided mounting bracket. The mounting bracket is designed to fit any of the bracket mount locations on the back of the slide.

### ATC-3 ENCLOSURE GENERAL SPECIFICATIONS

Dimensions	4.75"h x 2.0"w x 11.0"l (120.6mm x 50.8mm x 279.4mm)
Mounting Dimension	1.25" wide x 10.25" long, four 0.25" diameter hole
Weight	4 lbs (1.18 kgms)
Power Input	120 or 240 $\pm$ 10% vac 50 / 60 hz @ 5.0 amps
Operating Temperature	-10°F (-23°C) to +140°F (+60°C)

### ATC-3 ENCLOSURE CONTROL SPECIFICATIONS

Motor Output Current	1.0 - 6.5 amps peak each phase
Motor Output Voltage	1.5 - 18.0 volts peak each phase
Current Profile	Sine / Cosine
Limit with Inputs	CW and CCW 5.0 vdc active low Inputs with internal 4.7K ohm pull up resistor
Step Resolutions	10 micro steps / step
Velocity	10 - 8000 steps / sec
Acceleration	10 - 1000 steps / sec <sup>2</sup>
Index step count	1 - 65535 steps
Index Scale Factor	1-255 steps / step scale factor
Communications	Isolated RS485 19,200 Baud Modbus RTU port

### LSA-3007 SLIDE SPECIFICATIONS

Dimensions	15.86"H x 3.98"W x 2.59"D (403mm X 100mm x 66mm)
Mounting Dimensions	2.125" H X 1.625" W (53.98mm X 41.28mm)
Weight	7 lbs (3.18kg)
Weight Capacity	25 lbs (11.34 kg) at 3" (76.2mm) from slide face
Max Travel Distance	6.5" (165.1mm)
Travel Velocity	0.2" – 1.5" (5.08mm - 38.1mm) per second
Operating Temperature	0° to 150° F (0° to 65° C)

## VOLTAGE SENSOR SPECIFICATIONS

Range	0 – 100 vdc
Accuracy	$\pm 2.0\%$ full scale, $\pm 2$ digits
Resolution	0.1 volts

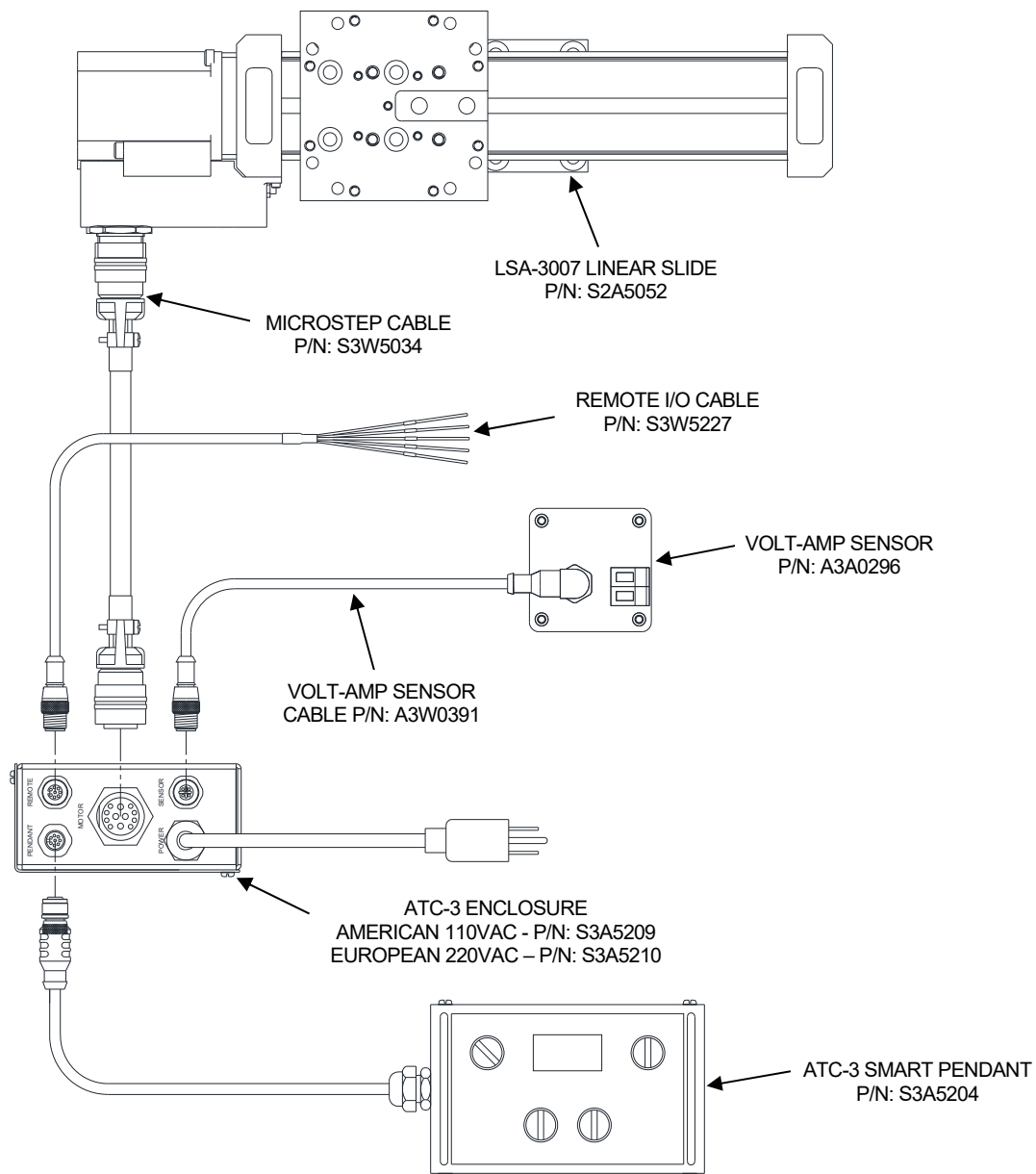
## CURRENT SENSOR SPECIFICATIONS

Range	0 – 950 adc
Accuracy	$\pm 2.5\%$ full scale, $\pm 3$ digits
Resolution	1 adc

## 2.0 INSTALLATION

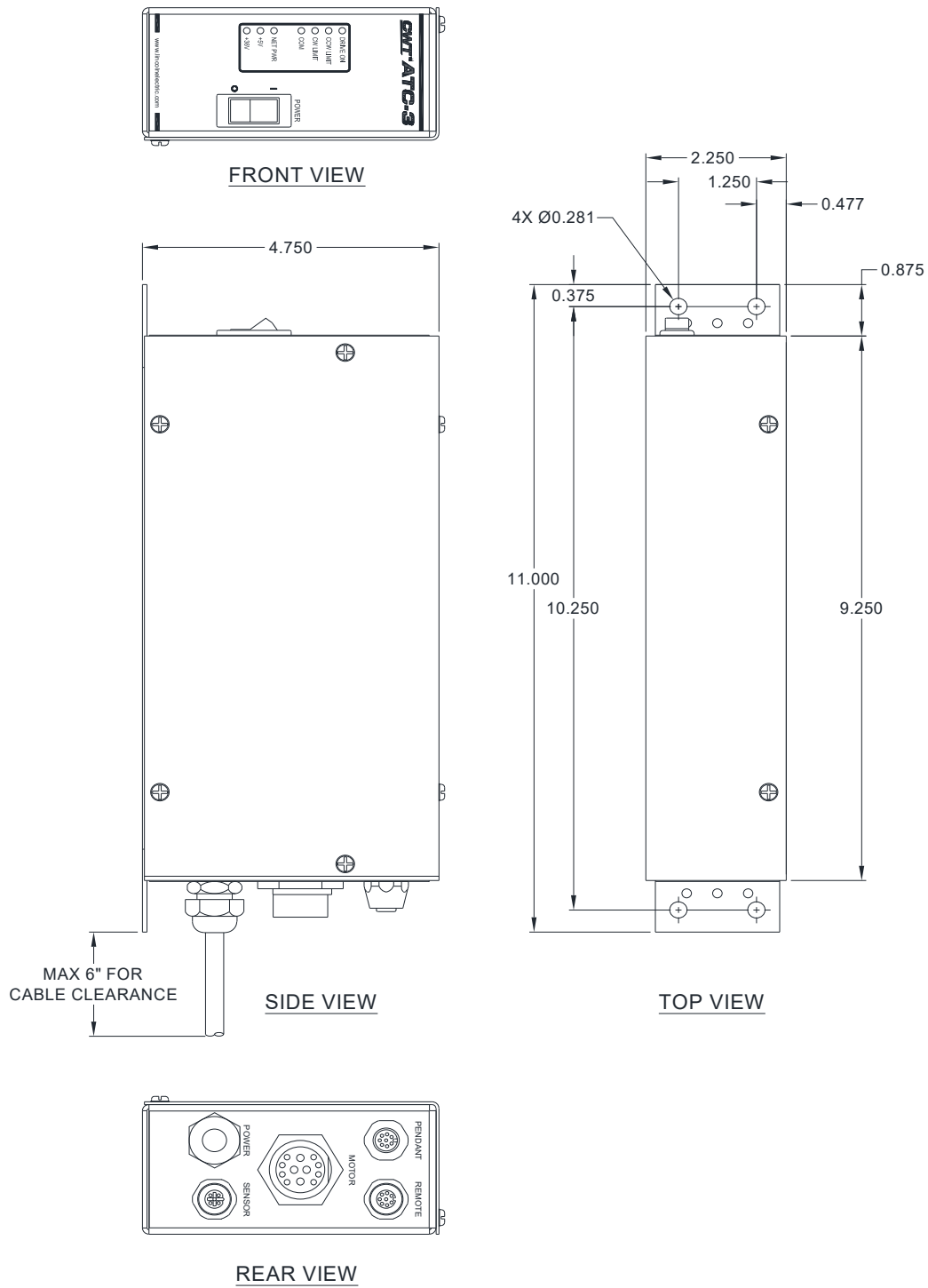
### 2.1 ATC-3 CONTROL

Place the ATC-3 control in a convenient location keeping in mind the motor cable and operator pendant cable length. Do not install the enclosure directly above the Welding ARC or in a location that exposes it to direct Weld ARC radiated heat. The control enclosure has two 0.281" mounting holes located on each end of the enclosure. Figure 2-1 shows the System Layout. Figure 2-2 shows the physical dimensions of the ATC-3 Control Enclosure. Figure 2-3 shows the physical dimensions of the ATC-3 Operator Pendant. Figure 2-4 shows the physical dimensions of the LSA-3007 Slide.



**FIGURE 2-1: System Layout**

## ATC-3 Enclosure



**FIGURE 2-2: ATC-3 Control Enclosure Physical Dimensions**

## ATC-3 Operator Pendant

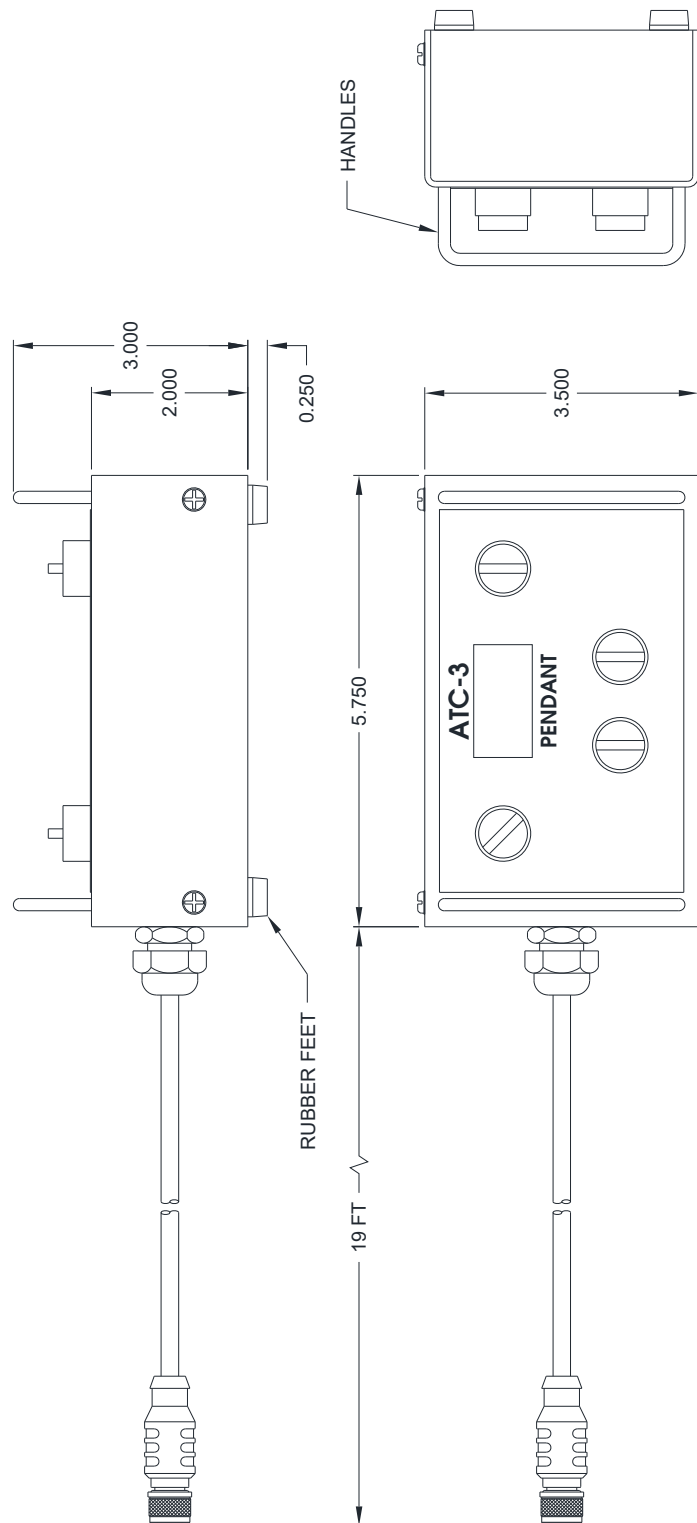


FIGURE 2-3: ATC-3 Operator Pendant Physical Dimensions



## 2.2 ATC-3 SLIDE

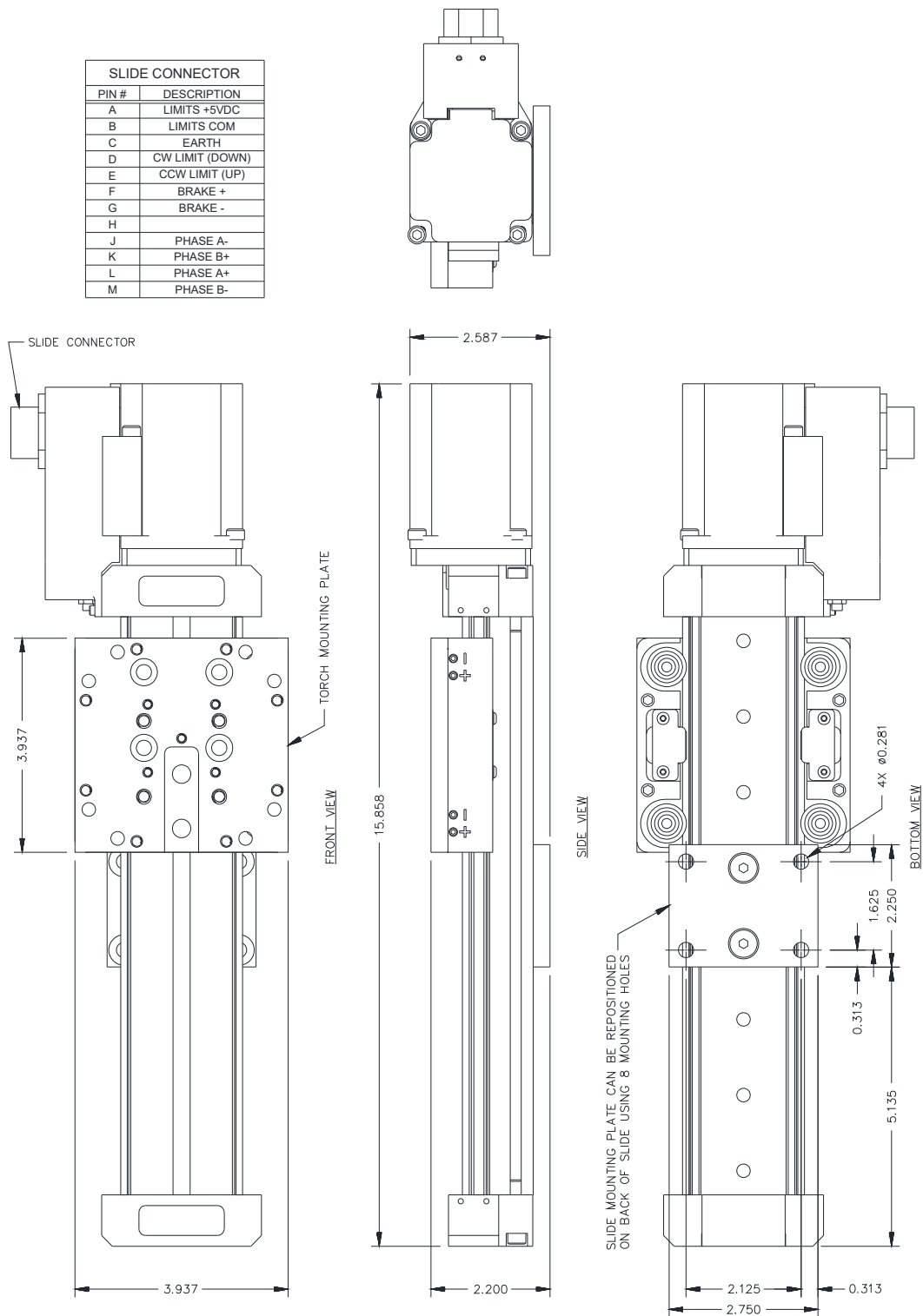
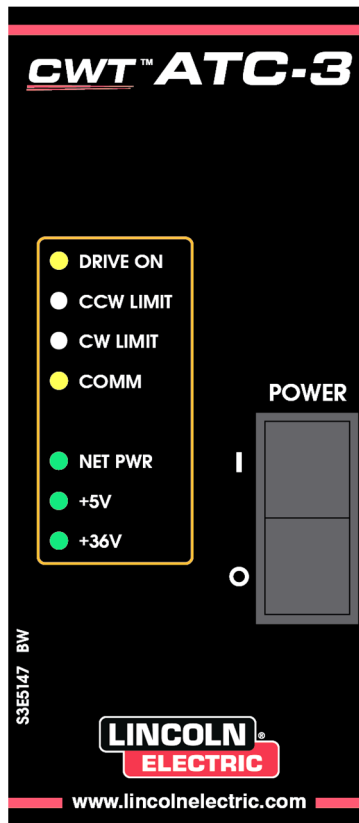
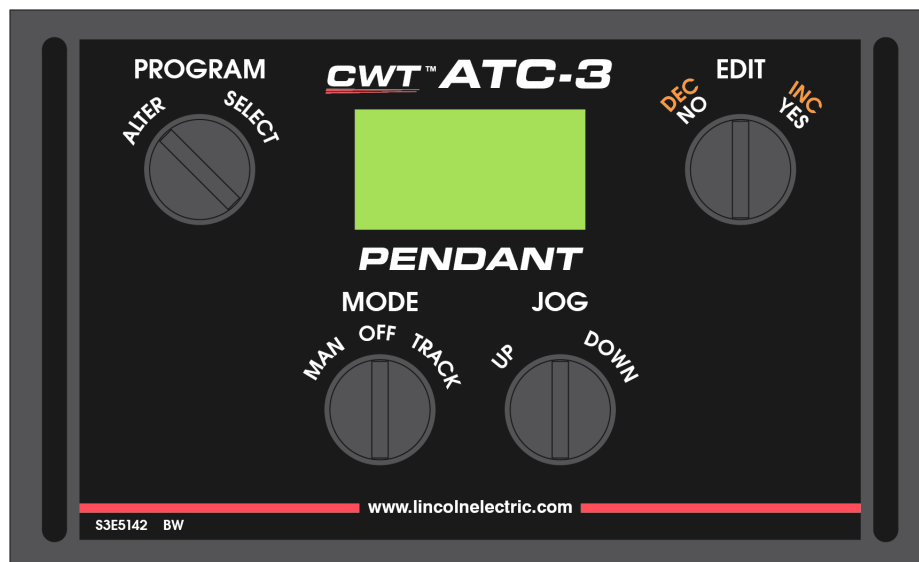


FIGURE 2-4: LSA-3007 Physical Dimensions



ATC-3 Front Control Panel Layout



ATC-3 Operator Pendant Layout

## 2.3 CABLES

Perform the following to install the cables and sensors for the ATC-3.

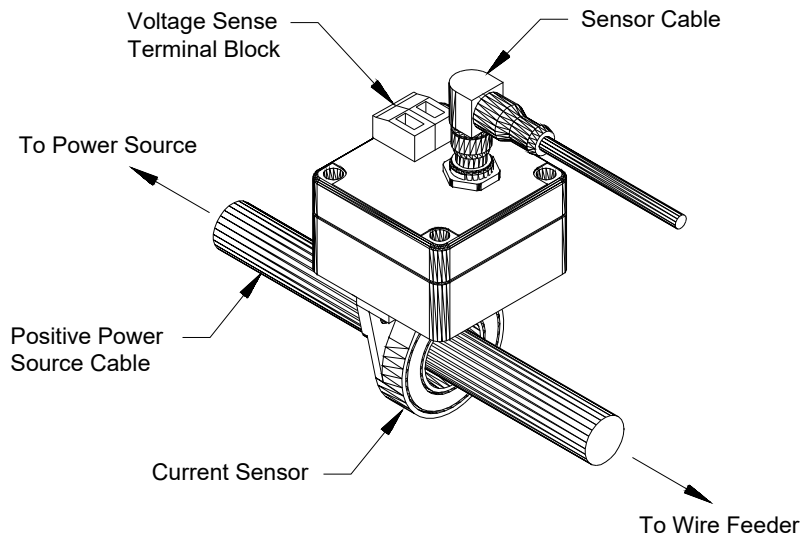
### **WARNING**

*Do not connect or disconnect the **SLIDE MOTOR CABLE** from the Slide or ATC-3 back panel with Power Applied to the control. Doing so will damage the control and slide assembly.*

- Connect the **Slide Motor Cable** from the Motor mating connector on the rear of the ATC-3 control enclosure (Fig 2-1) to the Motor mating connector on the Slide Assembly.
- The **Volt-Amp Sensor** should be installed as close as possible to the wire feed drive motor assembly. The preferred location is at the attachment point of the weld cable to the wire drive assembly. The **Volt-Amp Sensor** uses a Thru-Hole linear current sensor. The sensor has a 1.0" (25mm) opening. The sensor must be installed around the welding cable. To install the sensor, disconnect the welding cable from the wire feed drive. Insert the cable thru the sensor. Observe the Current Direction markings on the sensor for proper operation. Note: You may need to fabricate a pig-tail adapter to connect double welding cables through the current sensor to the wire feeder.

### **WARNING**

*Do not route the Sensor Cable with Welding Power Cables or AC Power cables.*



**FIGURE 2-5: Volt-Amp Sensor Installation**

- Connect the RED and BLACK leads of the **Voltage Sensor** in accordance with **Table 1** below. Connect the lead for the Electrode as close as possible to the welding torch.

APPLICATION	RED (+) LEAD	BLACK (-) Lead
GMAW	Electrode	Work
P-GMAW	Electrode	Work
GTAW	Work	Electrode
P-GTAW	Work	Electrode
PAW	Work	Electrode
P-PAW	Work	Electrode

**Table 1 - Voltage Sensor Installation**

- Connect the **Sensor Cable** from the **Volt-Amp Sensor** to the Sensor Connector on the rear panel of the ATC-3 (Fig 2-1).
- Connect the **Power Cable** to the rear mating POWER connector on the rear panel of the ATC-3 (Fig 2-1).
- This completes the cable installation.

## 2.4 OPERATOR PENDANT CONTROLS

The ATC-3 Operator Pendant provides the operator with control of the following functions.

**"PROGRAM SWITCH - ALTER/SELECT"** - This PROGRAM switch is used to Enter/Exit the edit parameter function and to select the parameter for editing. Setting the switch to the "ALTER" position will start the edit function. Use the "INC/DEC" to scroll thru the available parameters. To edit a parameter, toggle the switch to the "SELECT" position. To exit the parameter, toggle the "SELECT" switch again. To exit the Edit parameter function, toggle the switch to the "ALTER" position.

*(Note: The "INC/DEC" will toggle numeric parameters by one for each toggle. Holding the Switch in one position (INC or DEC) will auto increment the parameter at a faster rate).*

**"EDIT SWITCH – INC/DEC"** - The EDIT switch is used to increment or decrement the selected menu item or to enable/disable a selected mode. This switch only works when the Edit Parameter function is enabled (Program Switch is set to ALTER).

**"MODE SWITCH – MAN /OFF/TRACK"** – The "Mode" switch is a three position switch. When in the "OFF" position the ATC-3 is in an idle state.

After a power up the ATC-3, the Operator Pendant will display "INITIALIZE". Setting the Mode Switch to the "MAN" position will start the Initialize sequence. (See section 3.1 for sequence) Return the "MODE" switch to the "OFF" position while the sequence is complete.

Setting the Mode switch to the "TRACK" position will start the Touch Retract routine if it is enabled in the Edit Parameter Function. If the Touch Retract is not enabled the ATC-3 will wait for an arc on condition then begin torch height tracking from the current torch position.

Setting the Mode switch to the "OFF" position at any time will STOP the torch height control tracking.

**"JOG SWITCH – UP/DOWN"** - When the ATC-3 is in the idle mode the "JOG" switch is used to manually jog the slide position up or down. If you want to save the position into the "START POS" parameter, toggle the "MODE" switch to the "MAN" position to save the current slide location.

When the ATC-3 is performing Height Tracking the "JOG" switch is used to change the tracking reference value "UP" or "DOWN". The reference value will increment or decrement by a value of 1 for each toggle of the "JOG" switch Up (Increment) or Down (Decrement).

## ATC-3 MESSAGES

The ATC-3 has an OLED Graphic display. When the ATC-3 is activated the Display will show the Volt and Amp values as read from the VA sensor. During the normal Operation the ATC-3 will display various status messages. The following is a brief description of the message screens:

- **"INIATIZE SLIDE?"** - The ATC-3 slide needs to be initialized
- **"HOMING SLIDE"** - The ATC-3 is initialization vertical slide.
- **"ARC ON "** - The ATC-3 has detected an arc on condition.
- **"TRACKING ON"** - The ATC-3 is performing Torch height Tracking
- **"MOVING TO START"** - The ATC-3 moves the slide to Start Position.
- **"TC ERROR - NO REF "** - No Touch sense voltage detected.
- **"TC ERROR - NO TOUCH "** - Weld surface was not detected.
- **"TOUCH COMPLETE"** - The Touch-Retract Sequence was completed.
- **"ERROR - NO COMM MSCII"** - No Comm with the ATC-3 slide controller
- **"SEARCHING FOR PART "** - The ATC-3 Touch/Retract Search Routine.
- **"MOVING TO TORCH UP "** - The slide is moving to the Up Position.

## ATC-3 EDIT MESSAGES (Displayed when ALTER selected)

- **'TRACK REF = '** - Volt/Amp reference for Torch height Tracking
- **'START POS = '** - Start Weld Position for Torch
- **'TORCH UP = '** - Torch Up position when not welding
- **'RETRACT = '** - Retract Distance for Touch/Retract
- **'TOUCH RETRACT = '** - Enable Torch/Retract ATC-3 function
- **'MOVE TO START = '** - Enable auto move to Search position
- **'ENABLE ACC = '** - Disable ATC-3 and enable ACC mode
- **'Device ID = '** - ATC-3 Modbus™ Device ID number
- **'TORCH GAIN = '** - ATC-3/ACC torch tracking gain
- **'CORR LIMIT = '** - Max Torch Correction Limit Per Cycle
- **'MOVE SPEED = '** - Slide Move to position slide speed
- **'SEARCH SPEED = '** - Touch/Retract search slide speed
- **'JOG SPEED = '** - Jog Slide UP/DOWN speed
- **'TRACK SPEED = '** - Torch Height Tracking slide speed
- **'MOTOR POWER = '** - Disable power to slide
- **'RESET PWM = '** - Reset the ACT III motor drive control
- **'SAVE CFG = '** - Save all configuration data to NVRAM

**Note:** The following items should only be changed during factory calibration

- **'VOLT GAIN = '** - Set the Volt sensor gain value
- **'VOLT ZERO = '** - Set the Volt sensor zero value
- **'AMP GAIN = '** - Set Amp sensor gain value
- **'AMP ZERO = '** - Set Volt Sensor zero value.

## 2.5 USER I/O CONTROLS

The control also provides a user I/O interface for remote control of the ATC-3. There are two isolated Solid State Relay (SSR) outputs CR1 (TRACK ON) and CR2 (TOUCH RETRACT ACTIVE). There are two Isolated inputs INP1 (MOVE TO TORCH UP POSITION) and INP2 (REMOTE TRACKING ON/OFF) is used to start and stop Tracking from an external control. The SSR outputs are rated at 28 VDC @ 100ma and the inputs are rated at 12 – 28 VDC @ 10 ma. The inputs and outputs provide galvanic isolation from the ATC-3 controller. The ATC-3 also provides a non-isolated 24 VDC @ 100 ma source for I/O purposes.

The following is a functional description of the ATC-3 I/O:

- **INP 1** - If the ATC-3 is idle mode, then setting this input will move the torch to the Torch UP position
- **INP 2** - If the ATC-3 is idle mode or if the ATC-3 has an Arc On condition, then the Torch Height tracking will be enabled. The Tracking is turned on or off with this input. Set it low to turn off or high to turn on.
- **CR1 - TRACK ON** - Is set When the Track On function is running. It is cleared when the tracking function is off.
- **CR2 - TOUCH RETRACT RUNNING** - Is set when the Touch retract routine is active and is cleared when complete. This is used to provide a touch reference voltage signal to the torch when not welding.

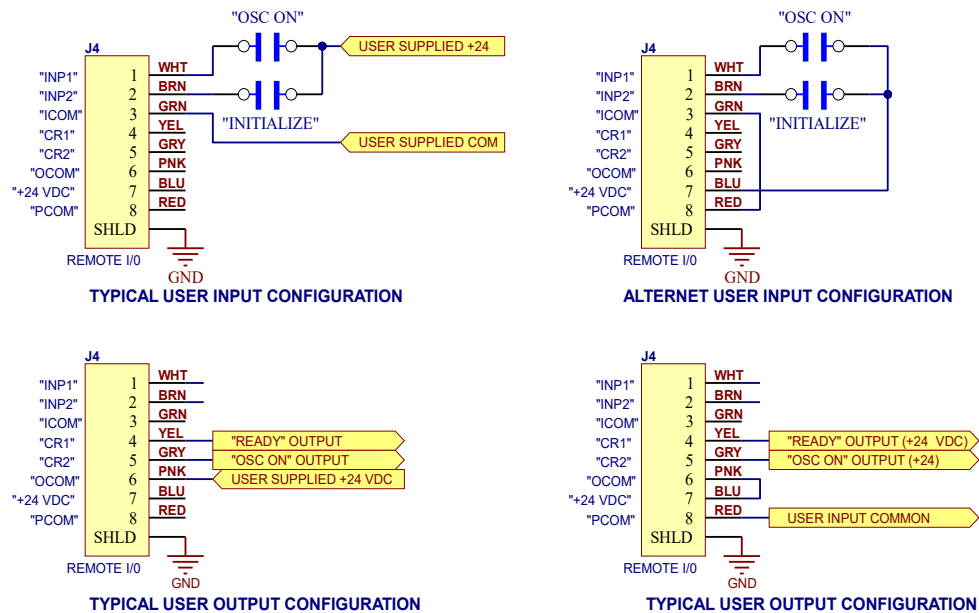


FIGURE 2-6 – User I/O Configuration



## 3.0 OPERATION

### 3.1 OPERATIONAL SEQUENCES

The following operational sequence is the control operational sequence.

- **To operate the control**, place the ATC-3 Control power switch to the "ON" position. The NET, +5VDC and +36 VDC LED's will illuminate. The ATC-3 Operator Pendant will display the Software Version banner until power up sequence is complete. When the power up sequence is complete, the Pendant Display will display "INITIALIZE".
- **To initialize the ATC-3**, turn the "MODE" switch to the "MAN" position. The Torch carriage will move to the upper slide limit switch (toward the slide Motor) and stop. Turn the "MODE" switch to the "OFF" position. **This operation must be performed every time the ATC-3 is powered on.**

If a Torch Weld Position is saved in the Operator Pendant, the slide will move the torch to the saved position after the Home Routine is completed.

- **To manually move the Torch Slide** use the "JOG" switch. Holding the "JOG" switch in the "UP" direction will move Torch Slide in the up direction. Holding the "JOG" switch in the "DOWN" position will move the torch slide in the down direction. The "JOG" switch is disabled when the "TRACKING" Switch is on or the "REMOTE TRACKING INPUT" is active and the "Welding ARC IS ACTIVE".

To save the current touch position as the Start Weld Position rotate the MODE Switch to the MAN position.

- **To Perform a Touch Retract** use the PROGRAM switch. Turn the switch to Alter and release to bring up the program screen. Use the Edit switch to go to Torch Retract screen then turn the Touch Retract Feature ON then enter a retract distance in the "RETRACT=".

Use the JOG switch to move the Torch the desired Start Touch Retract position then save the position as the Start Weld Position.

To start the Touch Retract function rotate the MODE switch to the TRACKING position. The Slide will move to the Start Weld Position, stop, and then run the search routine until the part is found, stop and then retract.

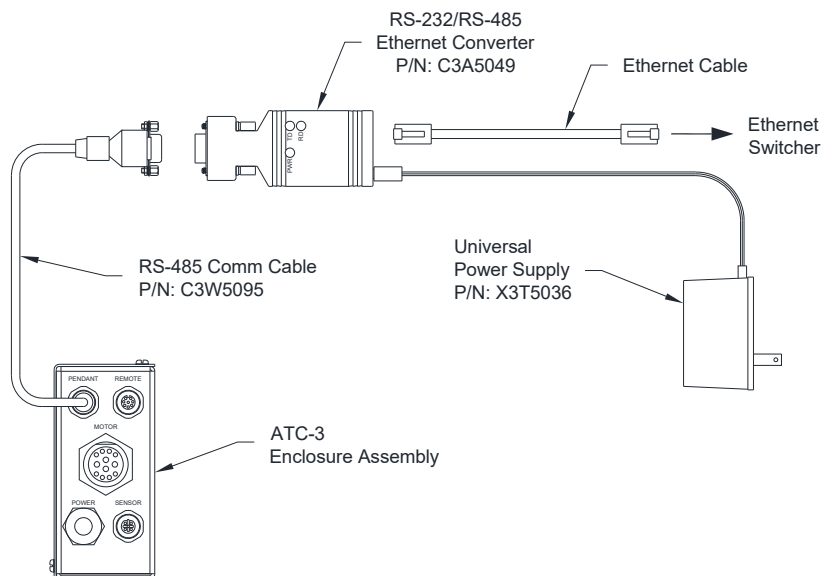
If the part is not located within 0.5 inch from the start search position the ATC-3 will generate a **"TC ERROR - NO REF"** fault.

- When the MODE Switch is set to Tracking and the Weld ARC is active the operator can use the JOG switch to change the Torch Height Tracking Reference to change the Tracking ARC Length. The JOG switch will increment or decrement the tracking reference 1 value for each time it is toggled from OFF to ON.
- When the MODE switch is set to OFF(not Tracking) while the Weld ARC is Active the operator can use the Jog UP/DOWN switch to manipulate the torch position while welding. When using this operation mode adjust the Jog Speed to provide operator with the best movement control.

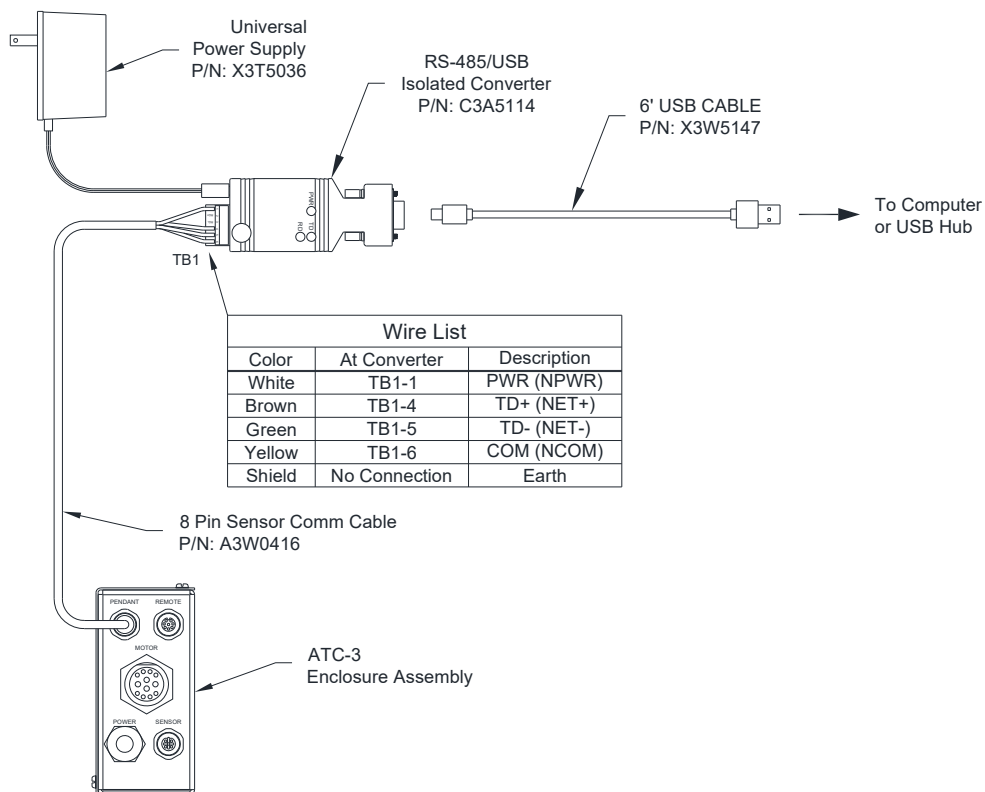
## **4.0 MODBUS TERMINAL PROTOCOL**

The ATC-3 has a single RS-485, 2-wire port for Modbus RTU communications. This port is used by the Operator Pendant to run the ATC-3. Contact factory Service Support for additional information and for a copy of Modbus Register and Coil Map for the system.

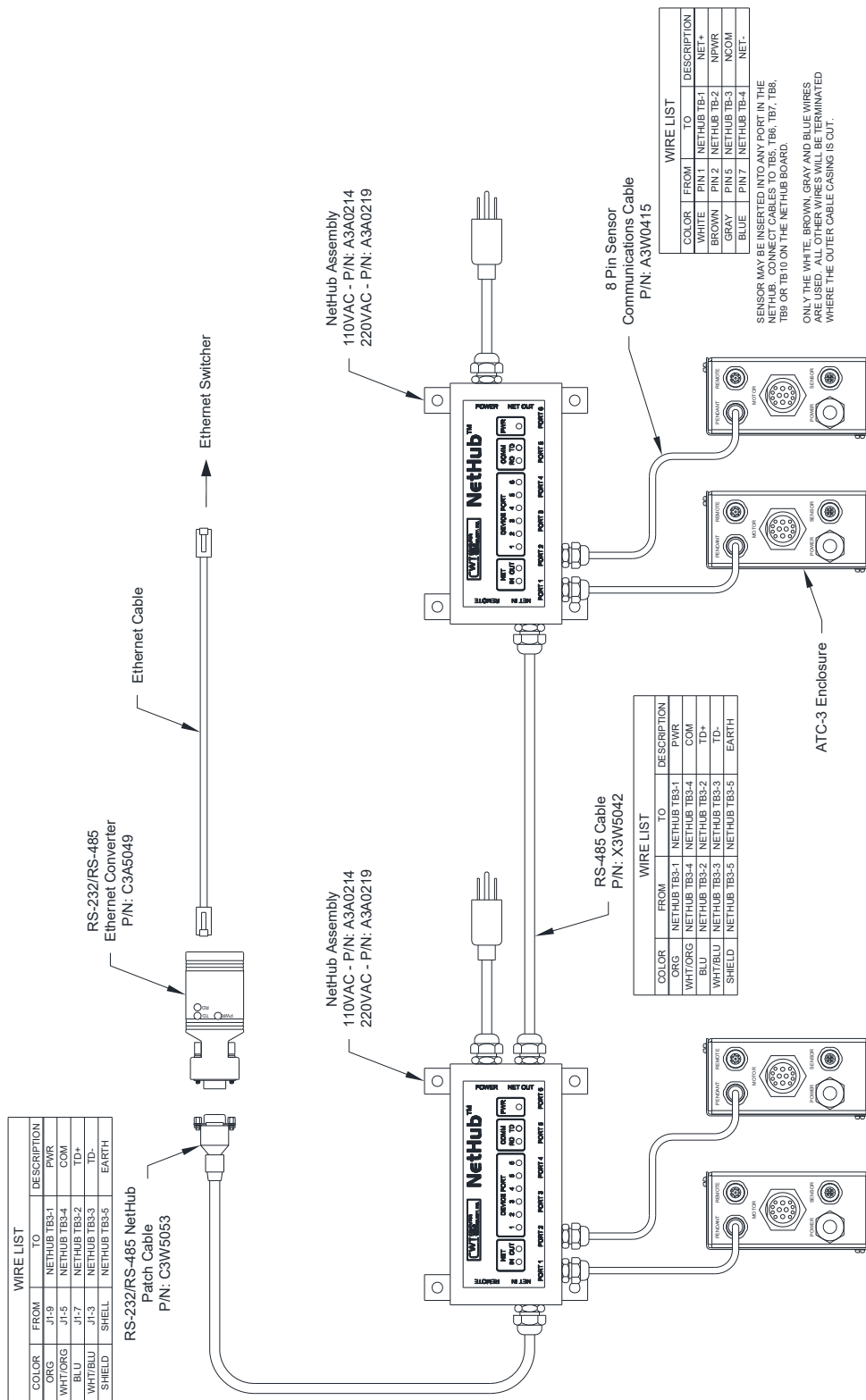
## 5.0 COMMUNICATION DIAGRAMS



**Single ATC-3 Enclosure to an RS-485 to Ethernet Converter Diagram**



**Single ATC-3 Enclosure to an RS-485 to USB Converter Diagram**

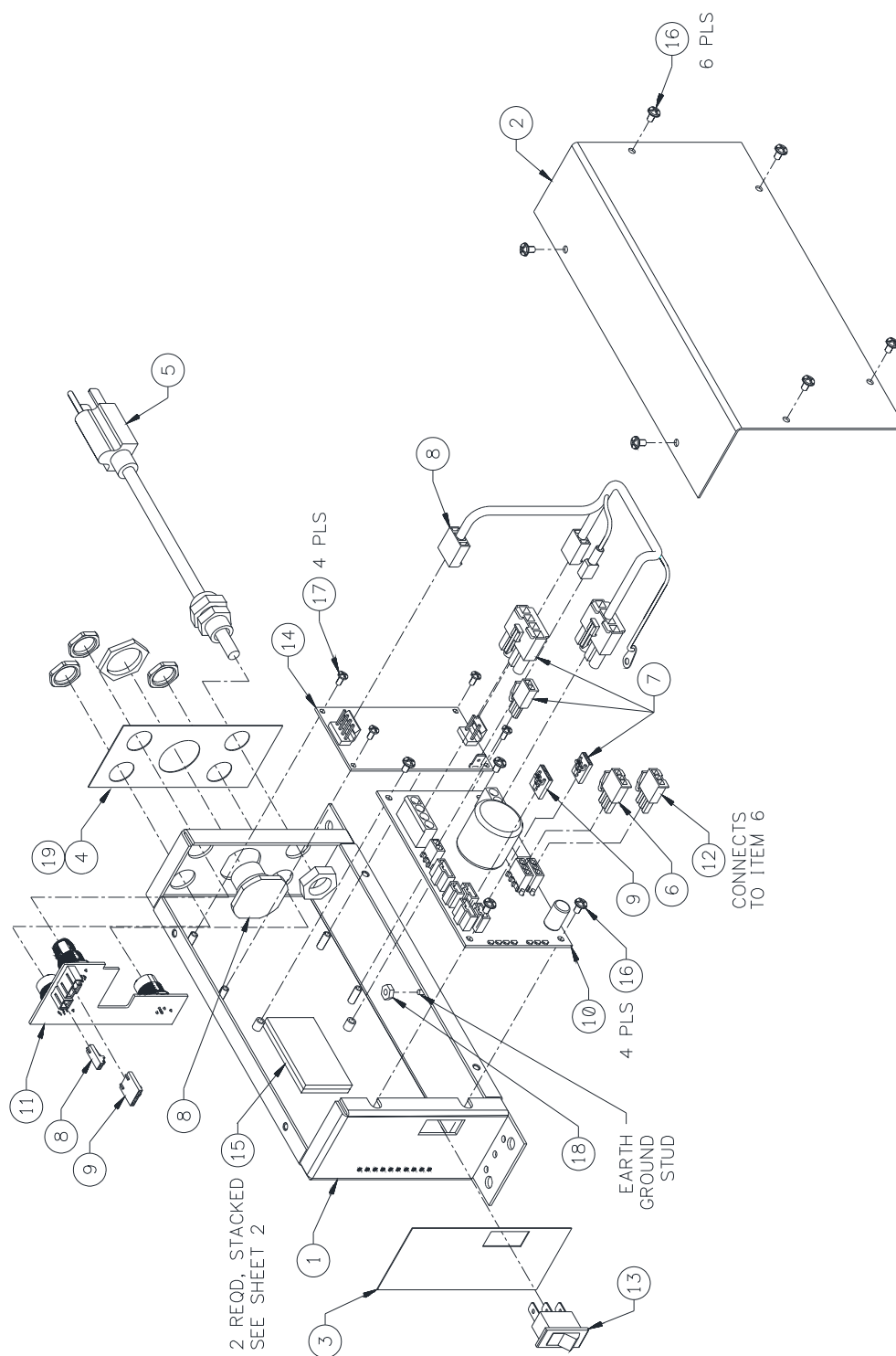


**Multiple ATC-3 Enclosure to a NetHub with Ethernet Communications Diagram**

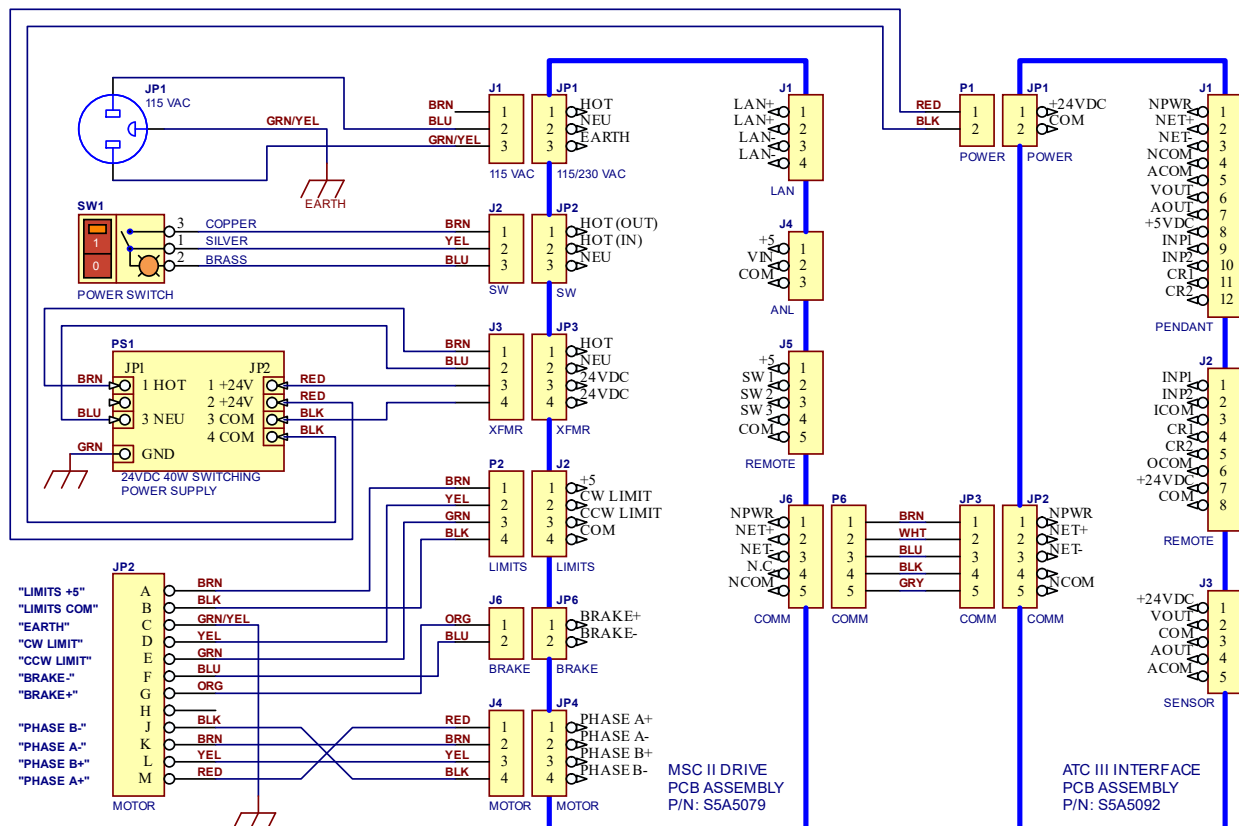


## 6.0 ATC-3 SYSTEM DRAWINGS

### 6.1 ATC-3 CONTROL ENCLOSURE



ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	S3E5165	Enclosure
2	1	S3E5166	Cover
3	1	S3E5147	Overlay, Front
4	1	S3E5148	Overlay, Rear
5	1	S3W5159	Cable, American 110vac Power
6	1	S3W5160	Harness, Power Switch
7	1	S3W5169	Harness, Motor
8	1	S3W5224	Harness, Power Supply
9	1	S3W5225	Harness, Comm
10	1	S5A5079	PCB Assembly, MSC-2
11	1	S5A5092	PCB Assembly, ATC-3 Interface
12	1	X3P5875	Connector, Housing Plug 3 Circuit
13	1	X3S5078	Switch, Rocker
14	1	X3T5095	Supply, Power Ac-DC 24VDC 40W
15	2	S2M5212	Pad, Thermal
16	10		Screw, 6-32 x 1/4" Pan Head w/ Internal Lock Washer
17	4		Screw, 4-40 x 1/4" Pan Head w/ Internal Lock Washer
18	1		Nut, 6-32 Hex
19	1		Label, Serial Number

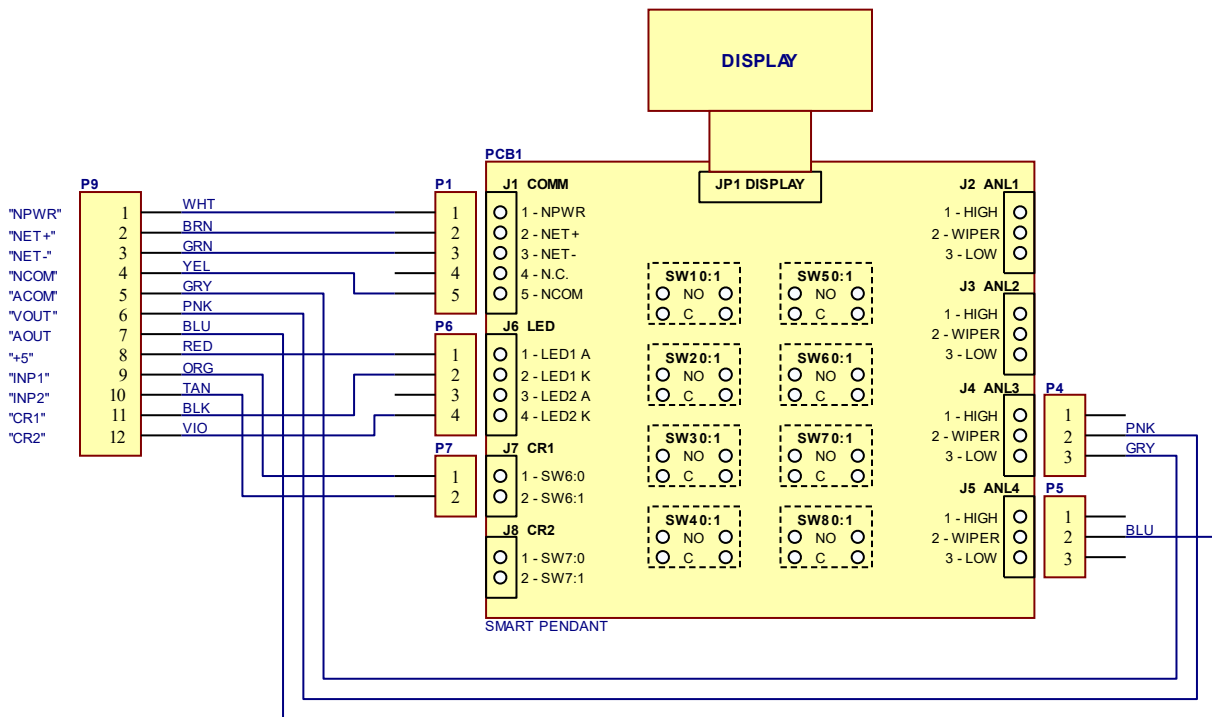


ATC-3 Control Enclosure 110VAC Internal Wiring Diagram

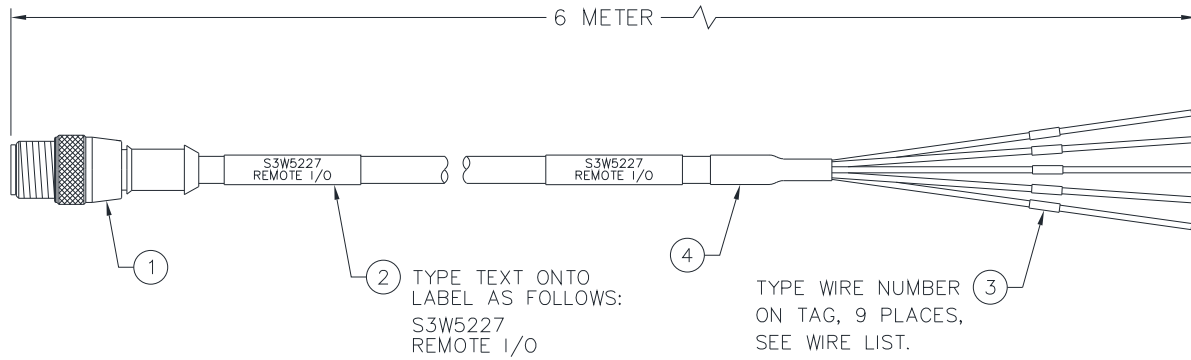




ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	S3E5141	Base, Smart Pendant w/ Display
2	1	S3E5142	Overlay, ATC-3 Smart Pendant
3	1	C3E5008	Cover, Pendant
4	1	A3E0179	Lens, Display
5	1	S5A5083-ATC3	PCB Assembly, Smart Pendant ATC-3
6	1	S5A5107	PCB Assembly, GFM Display
7	1	X3S5147	Switch, Selector 3 Position Maintained
8	3	X3S5148	Switch, Selector 3 Position Center Maintained
9	2	X6A5014	Handle, Black 3" Center
10	1	X3Z5006	Relief, Strain
11	1	X3W5144	Cable, M12 12Conductor Shielded Female Straight Single Ended
12	4	X6Z5090	Bumper, Black Self-Adhesive
13	2	X6S5026	Spacer, #4-40 x 1" Long Female-Female
14	1	X3P5838	Connector, Housing Plug 2 Circuit
15	2	X3P5873	Connector, Housing Plug 3 Circuit
16	1	X3P5839	Connector, Housing Plug 4 Circuit
17	1	X3P5840	Connector, Housing Plug 5 Circuit
18	12	X3P5843	Terminal, Crimp
19	1	X3P5257	Lug, Locking Ring Terminal
20	8		Screw, #4-40 x 1/4" Pan Head w/ Inter Lock Washer
21	4		Screw, #6-32 x 1/4" Pan Head w/ Inter Lock Washer
22	1		Nut, Hex #6-32
23	1		Label, Serial Number



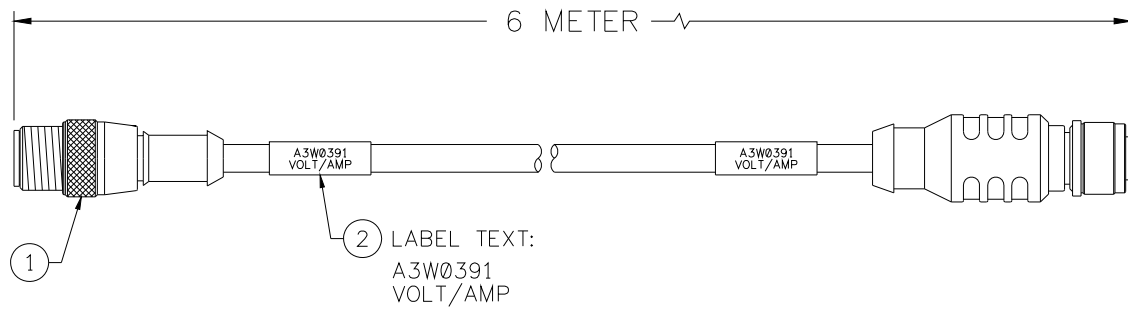
### 6.3 REMOTE I/O CABLE P/N: S3W5227



ITEM	QTY	PART NO	DESCRIPTION
1	1	X3W5121	Cable, M12 8 Circuit Male Straight Single Ended
2	2		Sleeve, Cable
3	9		Sleeve, Wire Makers
4	1		Tubing, Black Heat Shrink 3/8" Diameter 1" Long

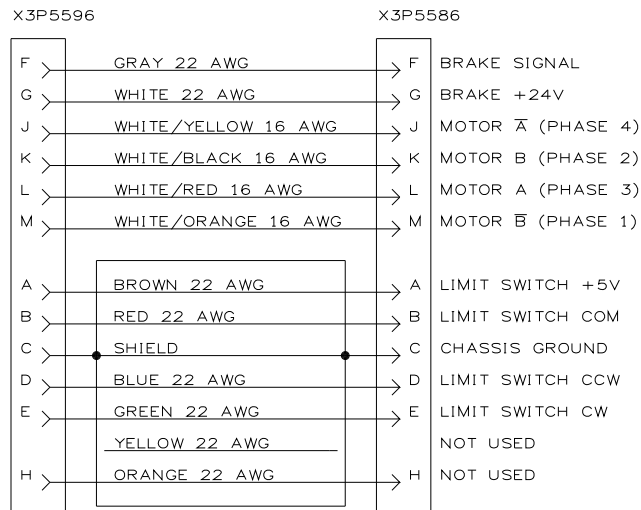
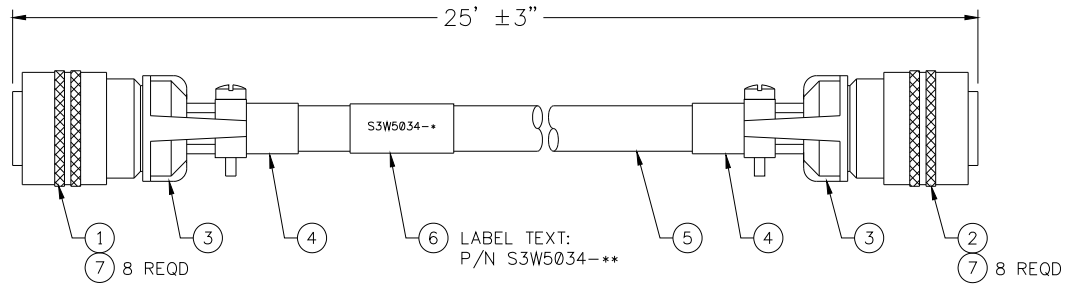
WIRE COLOR	PIN NO.	REFERENCE
WHITE	1	INP1
BROWN	2	INP2
GREEN	3	ICOM
YELLOW	4	CR1
GRAY	5	CR2
PINK	6	OCOM
BLUE	7	+24VDC
RED	8	COM
SHIELD	BODY	EARTH

## 6.4 VOLT-AMP SENSOR CABLE P/N: A3W0391



ITEM	QTY	PART NO	DESCRIPTION
1	1	X3W5115	Cable, 5 Circuit M12
2	2		Sleeve, Cable

## 6.5 MICROSTEP MOTOR CABLE P/N: S3W5034



ITEM	QTY	PART NO	DESCRIPTION
1	1	X3P5596	Connector, Plug 12 Circuit
2	1	X3P5586	Connector, Plug 12 Circuit
3	2	X3P5589	Clamp, Cable
4	2	X3P5505	Boot, Cable Clamp
5	25'	X3W5080	Cable, Motor Drive
6	1		Sleeve, Cable
7	16		Tubing, Heat Shrink 1/8" dia, x 1/2" long



<b>WARNING</b>	<ul style="list-style-type: none"> <li>Do not touch electrically live parts or electrode with skin or wet clothing.</li> <li>Insulate yourself from work and ground.</li> </ul>	<ul style="list-style-type: none"> <li>Keep flammable materials away.</li> </ul>	<ul style="list-style-type: none"> <li>Wear eye, ear and body protection.</li> </ul>
Spanish <b>AVISO DE PRECAUCION</b>	<ul style="list-style-type: none"> <li>No toque las partes o los electrodos bajo carga con la piel o ropa mojada.</li> <li>Aíslese del trabajo y de la tierra.</li> </ul>	<ul style="list-style-type: none"> <li>Mantenga el material combustible fuera del área de trabajo.</li> </ul>	<ul style="list-style-type: none"> <li>Protéjase los ojos, los oídos y el cuerpo.</li> </ul>
French <b>ATTENTION</b>	<ul style="list-style-type: none"> <li>Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension.</li> <li>Isolez-vous du travail et de la terre.</li> </ul>	<ul style="list-style-type: none"> <li>Gardez à l'écart de tout matériel inflammable.</li> </ul>	<ul style="list-style-type: none"> <li>Protégez vos yeux, vos oreilles et votre corps.</li> </ul>
German <b>WARNUNG</b>	<ul style="list-style-type: none"> <li>Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung!</li> <li>Isolieren Sie sich von den Elektroden und dem Erdboden!</li> </ul>	<ul style="list-style-type: none"> <li>Entfernen Sie brennbares Material!</li> </ul>	<ul style="list-style-type: none"> <li>Tragen Sie Augen-, Ohren- und Körperschutz!</li> </ul>
Portuguese <b>ATENÇÃO</b>	<ul style="list-style-type: none"> <li>Não toque partes elétricas e electrodos com a pele ou roupa molhada.</li> <li>Isole-se da peça e terra.</li> </ul>	<ul style="list-style-type: none"> <li>Mantenha inflamáveis bem guardados.</li> </ul>	<ul style="list-style-type: none"> <li>Use proteção para a vista, ouvido e corpo.</li> </ul>
Japanese <b>注意事項</b>	<ul style="list-style-type: none"> <li>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。</li> <li>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。</li> </ul>	<ul style="list-style-type: none"> <li>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。</li> </ul>	<ul style="list-style-type: none"> <li>目、耳及び身体に保護具をして下さい。</li> </ul>
Chinese <b>警告</b>	<ul style="list-style-type: none"> <li>皮肤或湿衣物切勿接触带电部件及焊条。</li> <li>使你自己与地面和工件绝缘。</li> </ul>	<ul style="list-style-type: none"> <li>把一切易燃物品移离工作场所。</li> </ul>	<ul style="list-style-type: none"> <li>佩戴眼、耳及身体劳动保护用具。</li> </ul>
Korean <b>위험</b>	<ul style="list-style-type: none"> <li>전도체나 용접봉을 젖은 형갑 또는 피부로 절대 접촉치 마십시오.</li> <li>모재와 접지를 접촉치 마십시오.</li> </ul>	<ul style="list-style-type: none"> <li>인화성 물질을 접근시키지 마십시오.</li> </ul>	<ul style="list-style-type: none"> <li>눈, 귀와 몸에 보호장구를 착용하십시오.</li> </ul>
Arabic <b>تحذير</b>	<ul style="list-style-type: none"> <li>لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الألكترود بجسد الجسم أو بالملابس المبللة بالماء.</li> <li>ضع عازلا على جسمك خلال العمل.</li> </ul>	<ul style="list-style-type: none"> <li>ضع المواد القابلة للاشتعال في مكان بعيد.</li> </ul>	<ul style="list-style-type: none"> <li>ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.</li> </ul>

**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.**



			
<ul style="list-style-type: none"> <li>● Keep your head out of fumes.</li> <li>● Use ventilation or exhaust to remove fumes from breathing zone.</li> </ul>	<ul style="list-style-type: none"> <li>● Turn power off before servicing.</li> </ul>	<ul style="list-style-type: none"> <li>● Do not operate with panel open or guards off.</li> </ul>	<b>WARNING</b>
<ul style="list-style-type: none"> <li>● Los humos fuera de la zona de respiración.</li> <li>● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.</li> </ul>	<ul style="list-style-type: none"> <li>● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio.</li> </ul>	<ul style="list-style-type: none"> <li>● No operar con panel abierto o guardas quitadas.</li> </ul>	Spanish <b>AVISO DE PRECAUCION</b>
<ul style="list-style-type: none"> <li>● Gardez la tête à l'écart des fumées.</li> <li>● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.</li> </ul>	<ul style="list-style-type: none"> <li>● Débranchez le courant avant l'entretien.</li> </ul>	<ul style="list-style-type: none"> <li>● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.</li> </ul>	French <b>ATTENTION</b>
<ul style="list-style-type: none"> <li>● Vermeiden Sie das Einatmen von Schweißrauch!</li> <li>● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!</li> </ul>	<ul style="list-style-type: none"> <li>● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)</li> </ul>	<ul style="list-style-type: none"> <li>● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen!</li> </ul>	German <b>WARNUNG</b>
<ul style="list-style-type: none"> <li>● Mantenha seu rosto da fumaça.</li> <li>● Use ventilação e exaustão para remover fumo da zona respiratória.</li> </ul>	<ul style="list-style-type: none"> <li>● Não opere com as tampas removidas.</li> <li>● Desligue a corrente antes de fazer serviço.</li> <li>● Não toque as partes elétricas nuas.</li> </ul>	<ul style="list-style-type: none"> <li>● Mantenha-se afastado das partes moventes.</li> <li>● Não opere com os painéis abertos ou guardas removidas.</li> </ul>	Portuguese <b>ATENÇÃO</b>
<ul style="list-style-type: none"> <li>● ヒュームから頭を離すようにして下さい。</li> <li>● 換気や排煙に十分留意して下さい。</li> </ul>	<ul style="list-style-type: none"> <li>● 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して下さい。</li> </ul>	<ul style="list-style-type: none"> <li>● 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。</li> </ul>	Japanese <b>注意事項</b>
<ul style="list-style-type: none"> <li>● 頭部遠離煙霧。</li> <li>● 在呼吸區使用通風或排風器除煙。</li> </ul>	<ul style="list-style-type: none"> <li>● 維修前切斷電源。</li> </ul>	<ul style="list-style-type: none"> <li>● 儀表板打開或沒有安全罩時不準作業。</li> </ul>	Chinese <b>警告</b>
<ul style="list-style-type: none"> <li>● 얼굴로부터 용접가스를 멀리하십시오.</li> <li>● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시오.</li> </ul>	<ul style="list-style-type: none"> <li>● 보수전에 전원을 차단하십시오.</li> </ul>	<ul style="list-style-type: none"> <li>● 판넬이 열린 상태로 작동치 마십시오.</li> </ul>	Korean <b>위험</b>
<ul style="list-style-type: none"> <li>● ابعد رأسك بعيداً عن الدخان.</li> <li>● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها.</li> </ul>	<ul style="list-style-type: none"> <li>● اقطع التيار الكهربائي قبل القيام بأية صيانة.</li> </ul>	<ul style="list-style-type: none"> <li>● لا تشغيل هذا الجهاز اذا كانت الاغطية الحديدية الواقية ليست عليه.</li> </ul>	Arabic <b>تحذير</b>

**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說明以及應該使用的銀焊材料，並請遵守貴方的有關勞動保護規定。

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.

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