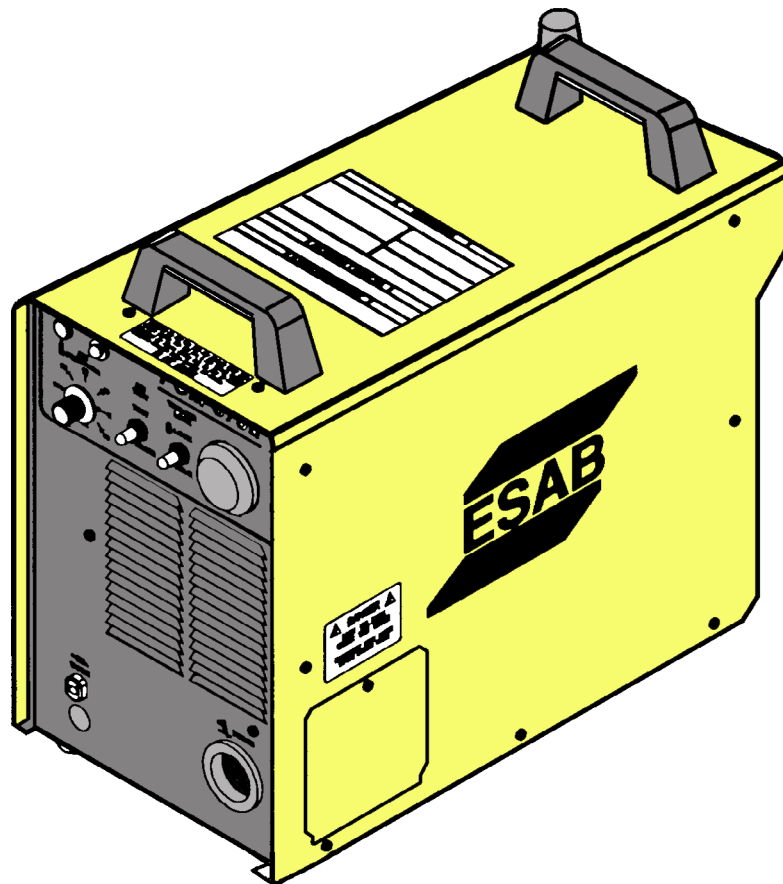




ESP-50

Plasma Arc Cutting Package



Instruction Manual

This manual provides installation and operation instructions for the following ESP-50 cutting packages starting with Serial No.: PxxJ403xxx

Consoles:

P/N 0558004371 - 208/230 V, 50/60 Hz, 1 or 3-phase

P/N 0558004372 - 400CE/460 V, 50/60 Hz, 3-phase, CE

**BE SURE THIS INFORMATION REACHES THE OPERATOR.
YOU CAN GET EXTRA COPIES THROUGH YOUR SUPPLIER.**

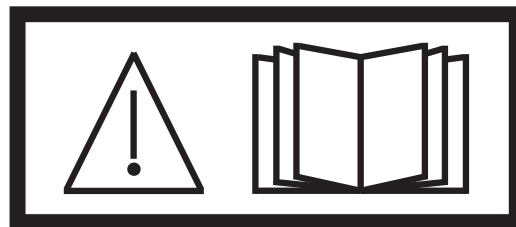
CAUTION

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for arc welding and cutting equipment, we urge you to read our booklet, "Precautions and Safe Practices for Arc Welding, Cutting, and Gouging," Form 52-529. Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information. Be sure to read the Safety Precautions before installing or operating this equipment.

USER RESPONSIBILITY

This equipment will perform in conformity with the description thereof contained in this manual and accompanying labels and/or inserts when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically. Malfunctioning or poorly maintained equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, the manufacturer recommends that a telephone or written request for service advice be made to the Authorized Distributor from whom it was purchased.

This equipment or any of its parts should not be altered without the prior written approval of the manufacturer. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than the manufacturer or a service facility designated by the manufacturer.



READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR OPERATING.

PROTECT YOURSELF AND OTHERS!

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1.0 Safety Precautions



WARNING: These Safety Precautions are for your protection. They summarize precautionary information from the references listed in Additional Safety Information section.

Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below as well as all other manuals, material safety data sheets, labels, etc. Failure to observe Safety Precautions can result in injury or death.



PROTECT YOURSELF AND OTHERS -- Some welding, cutting, and gouging processes are noisy and require ear protection. The arc, like the sun, emits ultraviolet (UV) and other radiation

and can injure skin and eyes. Hot metal can cause burns. Training in the proper use of the processes and equipment is essential to prevent accidents. Therefore:

1. Always wear safety glasses with side shields in any work area, even if welding helmets, face shields, and goggles are also required.
2. Use a face shield fitted with the correct filter and cover plates to protect your eyes, face, neck, and ears from sparks and rays of the arc when operating or observing operations. Warn bystanders not to watch the arc and not to expose themselves to the rays of the electric-arc or hot metal.
3. Wear flameproof gauntlet type gloves, heavy long-sleeve shirt, cuffless trousers, high-topped shoes, and a welding helmet or cap for hair protection, to protect against arc rays and hot sparks or hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.
4. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned, and open pockets eliminated from the front of clothing.
5. Protect other personnel from arc rays and hot sparks with a suitable non-flammable partition or curtains.
6. Use goggles over safety glasses when chipping slag or grinding. Chipped slag may be hot and can fly far. Bystanders should also wear goggles over safety glasses.

1.1 Safety - English



FIRES AND EXPLOSIONS -- Heat from flames and arcs can start fires. Hot slag or sparks can also cause fires and explosions. Therefore:

1. Remove all combustible materials well away from the work area or cover the materials with a protective non-flammable covering. Combustible materials include wood, cloth, sawdust, liquid and gas fuels, solvents, paints and coatings, paper, etc.
2. Hot sparks or hot metal can fall through cracks or crevices in floors or wall openings and cause a hidden smoldering fire or fires on the floor below. Make certain that such openings are protected from hot sparks and metal."
3. Do not weld, cut or perform other hot work until the workpiece has been completely cleaned so that there are no substances on the workpiece which might produce flammable or toxic vapors. Do not do hot work on closed containers. They may explode.
4. Have fire extinguishing equipment handy for instant use, such as a garden hose, water pail, sand bucket, or portable fire extinguisher. Be sure you are trained in its use.
5. Do not use equipment beyond its ratings. For example, overloaded welding cable can overheat and create a fire hazard.
6. After completing operations, inspect the work area to make certain there are no hot sparks or hot metal which could cause a later fire. Use fire watchers when necessary.
7. For additional information, refer to NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.




ELECTRICAL SHOCK -- Contact with live electrical parts and ground can cause severe injury or death. DO NOT use AC welding current in damp areas, if movement is confined, or if there is danger of falling.

1. Be sure the power source frame (chassis) is connected to the ground system of the input power.
 2. Connect the workpiece to a good electrical ground.
 3. Connect the work cable to the workpiece. A poor or missing connection can expose you or others to a fatal shock.
 4. Use well-maintained equipment. Replace worn or damaged cables.
 5. Keep everything dry, including clothing, work area, cables, torch/electrode holder, and power source.
 6. Make sure that all parts of your body are insulated from work and from ground.
 7. Do not stand directly on metal or the earth while working in tight quarters or a damp area; stand on dry boards or an insulating platform and wear rubber-soled shoes.
 8. Put on dry, hole-free gloves before turning on the power.
 9. Turn off the power before removing your gloves.
 10. Refer to ANSI/ASC Standard Z49.1 (listed on next page) for specific grounding recommendations. Do not mistake the work lead for a ground cable.
3. Welders should use the following procedures to minimize exposure to EMF:
 - A. Route the electrode and work cables together. Secure them with tape when possible.
 - B. Never coil the torch or work cable around your body.
 - C. Do not place your body between the torch and work cables. Route cables on the same side of your body.
 - D. Connect the work cable to the workpiece as close as possible to the area being welded.
 - E. Keep welding power source and cables as far away from your body as possible.



FUMES AND GASES -- Fumes and gases, can cause discomfort or harm, particularly in confined spaces. Do not breathe fumes and gases. Shielding gases can cause asphyxiation.

Therefore:

 **ELECTRIC AND MAGNETIC FIELDS — May be dangerous. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding and cutting current creates EMF around welding cables and welding machines. Therefore:**

1. Welders having pacemakers should consult their physician before welding. EMF may interfere with some pacemakers.
2. Exposure to EMF may have other health effects which are unknown.
1. Always provide adequate ventilation in the work area by natural or mechanical means. Do not weld, cut, or gouge on materials such as galvanized steel, stainless steel, copper, zinc, lead, beryllium, or cadmium unless positive mechanical ventilation is provided. Do not breathe fumes from these materials.
2. Do not operate near degreasing and spraying operations. The heat or arc rays can react with chlorinated hydrocarbon vapors to form phosgene, a highly toxic gas, and other irritant gases.
3. If you develop momentary eye, nose, or throat irritation while operating, this is an indication that ventilation is not adequate. Stop work and take necessary steps to improve ventilation in the work area. Do not continue to operate if physical discomfort persists.
4. Refer to ANSI/ASC Standard Z49.1 (see listing below) for specific ventilation recommendations.

5. 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.)



CYLINDER HANDLING -- Cylinders, if mishandled, can rupture and violently release gas. Sudden rupture of cylinder, valve, or relief device can injure or kill. Therefore:

1. Use the proper gas for the process and use the proper pressure reducing regulator designed to operate from the compressed gas cylinder. Do not use adaptors. Maintain hoses and fittings in good condition. Follow manufacturer's operating instructions for mounting regulator to a compressed gas cylinder.
 2. Always secure cylinders in an upright position by chain or strap to suitable hand trucks, undercarriages, benches, walls, post, or racks. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.
 3. When not in use, keep cylinder valves closed. Have valve protection cap in place if regulator is not connected. Secure and move cylinders by using suitable hand trucks. Avoid rough handling of cylinders.
 4. Locate cylinders away from heat, sparks, and flames. Never strike an arc on a cylinder.
 5. For additional information, refer to CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", which is available from Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.
1. Always have qualified personnel perform the installation, troubleshooting, and maintenance work. Do not perform any electrical work unless you are qualified to perform such work.
 2. Before performing any maintenance work inside a power source, disconnect the power source from the incoming electrical power.
 3. Maintain cables, grounding wire, connections, power cord, and power supply in safe working order. Do not operate any equipment in faulty condition.
 4. Do not abuse any equipment or accessories. Keep equipment away from heat sources such as furnaces, wet conditions such as water puddles, oil or grease, corrosive atmospheres and inclement weather.
 5. Keep all safety devices and cabinet covers in position and in good repair.
 6. Use equipment only for its intended purpose. Do not modify it in any manner.

ADDITIONAL SAFETY INFORMATION -- For more information on safe practices for electric arc welding and cutting equipment, ask your supplier for a copy of "Precautions and Safe Practices for Arc Welding, Cutting and Gouging", Form 52-529.



The following publications, which are available from the American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126, are recommended to you:

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"
2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding"
3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"
4. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting"



EQUIPMENT MAINTENANCE -- Faulty or improperly maintained equipment can cause injury or death. Therefore:

5. AWS C5.5 - "Recommended Practices for Gas Tungsten Arc Welding"
6. AWS C5.6 - "Recommended Practices for Gas Metal Arc Welding"
7. AWS SP - "Safe Practices" - Reprint, Welding Handbook.
8. ANSI/AWS F4.1, "Recommended Safe Practices for Welding and Cutting of Containers That Have Held Hazardous Substances."



MEANING OF SYMBOLS - As used throughout this manual: Means Attention! Be Alert! Your safety is involved.



Means immediate hazards which, if not avoided, will result in immediate, serious personal injury or loss of life.



Means potential hazards which could result in personal injury or loss of life.



Means hazards which could result in minor personal injury.

1.2 Safety - Spanish



ADVERTENCIA: Estas Precauciones de Seguridad son para su protección. Ellas hacen resumen de información proveniente de las referencias listadas en la sección "Información Adicional Sobre La Seguridad". Antes de hacer cualquier instalación o procedimiento de operación, asegúrese de leer y seguir las precauciones de seguridad listadas a continuación así como también todo manual, hoja de datos de seguridad del material, calcomanías, etc. El no observar las Precauciones de Seguridad puede resultar en daño a la persona o muerte.



PROTEJASE USTED Y A LOS DEMAS-- Algunos procesos de soldadura, corte y ranurado son ruidosos y requieren protección para los oídos. El arco, como el sol, emite rayos ultravioleta (UV) y otras radiaciones que pueden dañar la piel y los ojos. El metal caliente causa quemaduras. EL entrenamiento en el uso propio de los equipos y sus procesos es esencial para prevenir accidentes. Por lo tanto:

1. Utilice gafas de seguridad con protección a los lados siempre que esté en el área de trabajo, aún cuando esté usando careta de soldar, protector para su cara u otro tipo de protección.
2. Use una careta que tenga el filtro correcto y lente para proteger sus ojos, cara, cuello, y oídos de las chispas y rayos del arco cuando se esté operando y observando las operaciones. Alerta a todas las personas cercanas de no mirar el arco y no exponerse a los rayos del arco eléctrico o el metal fundido.
3. Use guantes de cuero a prueba de fuego, camisa pesada de mangas largas, pantalón de ruedo liso, zapato alto al tobillo, y careta de soldar con capucha para el pelo, para proteger el cuerpo de los rayos y chispas calientes provenientes del metal fundido. En ocasiones un delantal a prueba de fuego es necesario para protegerse del calor radiado y las chispas.
4. Chispas y partículas de metal caliente puede alojarse en las mangas enrolladas de la camisa, el ruedo del pantalón o los bolsillos. Mangas y cuellos deberán mantenerse abotonados, bolsillos al frente de la camisa deberán ser cerrados o eliminados.
5. Proteja a otras personas de los rayos del arco y chispas calientes con una cortina adecuada no-flamable como división.
6. Use careta protectora además de sus gafas de seguridad cuando esté removiendo escoria o puliendo.

La escoria puede estar caliente y desprenderse con velocidad. Personas cercanas deberán usar gafas de seguridad y careta protectora.



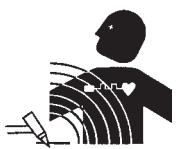
FUEGO Y EXPLOSIONES -- El calor de las flamas y el arco pueden ocasionar fuegos. Escoria caliente y las chispas pueden causar fuegos y explosiones. Por lo tanto:

1. Remueva todo material combustible lejos del área de trabajo o cubra los materiales con una cobija a prueba de fuego. Materiales combustibles incluyen madera, ropa, líquidos y gases inflamables, solventes, pinturas, papel, etc.
2. Chispas y partículas de metal pueden introducirse en las grietas y agujeros de pisos y paredes causando fuegos escondidos en otros niveles o espacios. Asegúrese de que toda grieta y agujero esté cubierto para proteger lugares adyacentes contra fuegos.
3. No corte, suelde o haga cualquier otro trabajo relacionado hasta que la pieza de trabajo esté totalmente limpia y libre de sustancias que puedan producir gases inflamables o vapores tóxicos. No trabaje dentro o fuera de contenedores o tanques cerrados. Estos pueden explotar si contienen vapores inflamables.
4. Tenga siempre a la mano equipo extintor de fuego para uso instantáneo, como por ejemplo una manguera con agua, cubeta con agua, cubeta con arena, o extintor portátil. Asegúrese que usted esta entrenado para su uso.
5. No use el equipo fuera de su rango de operación. Por ejemplo, el calor causado por cable sobrecarga en los cables de soldar pueden ocasionar un fuego.
6. Después de terminar la operación del equipo, inspeccione el área de trabajo para cerciorarse de que las chispas o metal caliente ocasionen un fuego más tarde. Tenga personal asignado para vigilar si es necesario.
7. Para información adicional, haga referencia a la publicación NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", disponible a través de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.



CHOQUE ELECTRICO -- El contacto con las partes eléctricas energizadas y tierra puede causar daño severo o muerte. NO use soldadura de corriente alterna (AC) en áreas húmedas, de movimiento confinado en lugares estrechos o si hay posibilidad de caer al suelo.

1. Asegúrese de que el chasis de la fuente de poder esté conectado a tierra a través del sistema de electricidad primario.
2. Conecte la pieza de trabajo a un buen sistema de tierra física.
3. Conecte el cable de retorno a la pieza de trabajo. Cables y conductores expuestos o con malas conexiones pueden exponer al operador u otras personas a un choque eléctrico fatal.
4. Use el equipo solamente si está en buenas condiciones. Reemplace cables rotos, dañados o con conductores expuestos.
5. Mantenga todo seco, incluyendo su ropa, el área de trabajo, los cables, antorchas, pinza del electrodo, y la fuente de poder.
6. Asegúrese que todas las partes de su cuerpo están insuladas de ambos, la pieza de trabajo y tierra.
7. No se pare directamente sobre metal o tierra mientras trabaja en lugares estrechos o áreas húmedas; trabaje sobre un pedazo de madera seco o una plataforma insulada y use zapatos con suela de goma.
8. Use guantes secos y sin agujeros antes de energizar el equipo.
9. Apague el equipo antes de quitarse sus guantes.
10. Use como referencia la publicación ANSI/ASC Standard Z49.1 (listado en la próxima página) para recomendaciones específicas de como conectar el equipo a tierra. No confunda el cable de soldar a la pieza de trabajo con el cable a tierra.



CAMPOS ELECTRICOS Y MAGNETICOS - Son peligrosos. La corriente eléctrica fluye a través de cualquier conductor causando a nivel local Campos Eléctricos y Magnéticos (EMF). Las corrientes en el área de corte y soldadura, crean EMF alrededor de los cables de soldar y las maquinas. Por lo tanto:

1. Soldadores u Operadores que use marca-pasos para el corazón deberán consultar a su médico antes de soldar. El Campo Electromagnético (EMF) puede interferir con algunos marca-pasos.
2. Exponerse a campos electromagnéticos (EMF) puede causar otros efectos de salud aún desconocidos.

3. Los soldadores deberán usar los siguientes procedimientos para minimizar exponerse al EMF:

- A. Mantenga el electrodo y el cable a la pieza de trabajo juntos, hasta llegar a la pieza que usted quiere soldar. Asegúrelos uno junto al otro con cinta adhesiva cuando sea posible.
- B. Nunca envuelva los cables de soldar alrededor de su cuerpo.
- C. Nunca ubique su cuerpo entre la antorcha y el cable, a la pieza de trabajo. Mantenga los cables a un sólo lado de su cuerpo.
- D. Conecte el cable de trabajo a la pieza de trabajo lo más cercano posible al área de la soldadura.
- E. Mantenga la fuente de poder y los cables de soldar lo más lejos posible de su cuerpo.

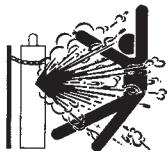


HUMO Y GASES -- El humo y los gases, pueden causar malestar o daño, particularmente en espacios sin ventilación. No inhale el humo o gases. El gas de protección puede causar falta de oxígeno.

Por lo tanto:

1. Siempre provea ventilación adecuada en el área de trabajo por medio natural o mecánico. No solde, corte, o ranure materiales con hierro galvanizado, acero inoxidable, cobre, zinc, plomo, berilio, o cadmio a menos que provea ventilación mecánica positiva. No respire los gases producidos por estos materiales.
2. No opere cerca de lugares donde se aplique sustancias químicas en aerosol. El calor de los rayos del arco pueden reaccionar con los vapores de hidrocarburo clorinado para formar un fosfógeno, o gas tóxico, y otros irritantes.
3. Si momentáneamente desarrolla irritación de ojos, nariz o garganta mientras está operando, es indicación de que la ventilación no es apropiada. Pare de trabajar y tome las medidas necesarias para mejorar la ventilación en el área de trabajo. No continúe operando si el malestar físico persiste.
4. Haga referencia a la publicación ANSI/ASC Standard Z49.1 (Vea la lista a continuación) para recomendaciones específicas en la ventilación.

5. ADVERTENCIA-- Este producto cuando se utiliza para soldaduras o cortes, produce humos o gases, los cuales contienen químicos conocidos por el Estado de California de causar defectos en el nacimiento, o en algunos casos, Cancer. (California Health & Safety Code §25249.5 et seq.)



MANEJO DE CILINDROS-- Los cilindros, si no son manejados correctamente, pueden romperse y liberar violentamente gases. Rotura repentina del cilindro, válvula, o válvula de escape puede causar daño o muerte. Por lo tanto:

1. Utilice el gas apropiado para el proceso y utilice un regulador diseñado para operar y reducir la presión del cilindro de gas. No utilice adaptadores. Mantenga las mangueras y las conexiones en buenas condiciones. Observe las instrucciones de operación del fabricante para montar el regulador en el cilindro de gas comprimido.
2. Asegure siempre los cilindros en posición vertical y amárrelos con una correa o cadena adecuada para asegurar el cilindro al carro, transportes, tableros, paredes, postes, o armazón. Nunca asegure los cilindros a la mesa de trabajo o las piezas que son parte del circuito de soldadura. Este puede ser parte del circuito eléctrico.
3. Cuando el cilindro no está en uso, mantenga la válvula del cilindro cerrada. Ponga el capote de protección sobre la válvula si el regulador no está conectado. Asegure y mueva los cilindros utilizando un carro o transporte adecuado. Evite el manejo brusco de los



MANTENIMIENTO DEL EQUIPO -- Equipo defectuoso o mal mantenido puede causar daño o muerte. Por lo tanto:

1. Siempre tenga personal cualificado para efectuar la instalación, diagnóstico, y mantenimiento del equipo. No ejecute ningún trabajo eléctrico a menos que usted esté cualificado para hacer el trabajo.
2. Antes de dar mantenimiento en el interior de la fuente de poder, desconecte la fuente de poder del suministro de electricidad primaria.
3. Mantenga los cables, cable a tierra, conexiones, cable primario, y cualquier otra fuente de poder en buen estado operacional. No opere ningún equipo en malas condiciones.
4. No abuse del equipo y sus accesorios. Mantenga el equipo lejos de cosas que generen calor como hornos, también lugares húmedos como charcos de agua, aceite o grasa, atmósferas corrosivas y las inclemencias del tiempo.
5. Mantenga todos los artículos de seguridad y coberturas del equipo en su posición y en buenas condiciones.
6. Use el equipo sólo para el propósito que fue diseñado. No modifique el equipo en ninguna manera.



INFORMACION ADICIONAL DE SEGURIDAD -- Para más información sobre las prácticas de seguridad de los equipos de arco eléctrico para soldar y cortar, pregunte a su proveedor por una copia de "Precautions and Safe Practices for Arc Welding, Cutting and Gouging-Form 52-529."

Las siguientes publicaciones, disponibles a través de la American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126, son recomendadas para usted:

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"
2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding"
3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"
4. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting"



SIGNIFICADO DE LOS SIMBOLOS
-- Según usted avanza en la lectura de este folleto: Los Símbolos Significan ¡Atención! ¡Esté Alerta! Se trata de su seguridad.



Significa riesgo inmediato que, de no ser evadido, puede resultar inmediatamente en serio daño personal o la muerte.



Significa el riesgo de un peligro potencial que puede resultar en serio daño personal o la muerte.



Significa el posible riesgo que puede resultar en menores daños a la persona.

1.3 Safety - French



AVERTISSEMENT : Ces règles de sécurité ont pour but d'assurer votre protection. Ils récapitulent les informations de précaution provenant des références dans la section

des Informations de sécurité supplémentaires. Avant de procéder à l'installation ou d'utiliser l'unité, assurez-vous de lire et de suivre les précautions de sécurité ci-dessous, dans les manuels, les fiches d'information sur la sécurité du matériel et sur les étiquettes, etc. Tout défaut d'observer ces précautions de sécurité peut entraîner des blessures graves ou mortelles.



PROTÉGEZ-VOUS -- Les processus de soudage, de coupage et de gougeage produisent un niveau de bruit élevé et exige l'emploi d'une protection auditive. L'arc, tout comme le soleil, émet des rayons ultraviolets en plus d'autre rayons qui peuvent causer des blessures à la peau et les yeux. Le métal incandescent peut causer des brûlures. Une formation reliée à l'usage des processus et de l'équipement est essentielle pour prévenir les accidents. Par conséquent:

1. Portez des lunettes protectrices munies d'écrans latéraux lorsque vous êtes dans l'aire de travail, même si vous devez porter un casque de soudeur, un écran facial ou des lunettes étanches.
2. Portez un écran facial muni de verres filtrants et de plaques protectrices appropriées afin de protéger vos yeux, votre visage, votre cou et vos oreilles des étincelles et des rayons de l'arc lors d'une opération ou lorsque vous observez une opération. Avertissez les personnes se trouvant à proximité de ne pas regarder l'arc et de ne pas s'exposer aux rayons de l'arc électrique ou le métal incandescent.
3. Portez des gants ignifugés à crispin, une chemise épaisse à manches longues, des pantalons sans rebord et des chaussures montantes afin de vous protéger des rayons de l'arc, des étincelles et du métal incandescent, en plus d'un casque de soudeur ou casquette pour protéger vos cheveux. Il est également recommandé de porter un tablier ininflammable afin de vous protéger des étincelles et de la chaleur par rayonnement.
4. Les étincelles et les projections de métal incandescent risquent de se loger dans les manches retroussées, les rebords de pantalons ou les poches. Il est recommandé de garder boutonnés le col et les manches et de porter des vêtements sans poches en avant.
5. Protégez toute personne se trouvant à proximité des étincelles et des rayons de l'arc à l'aide d'un rideau ou d'une cloison ininflammable.
6. Portez des lunettes étanches par dessus vos lunettes de sécurité lors des opérations d'écaillage ou de meulage du laitier. Les écailles de laitier incandescent peuvent être projetées à des distances considérables. Les personnes se trouvant à proximité doivent également porter des lunettes étanches par dessus leur lunettes de sécurité.



INCENDIES ET EXPLOSIONS -- La chaleur provenant des flammes ou de l'arc peut provoquer un incendie. Le laitier incandescent ou les étincelles peuvent également provoquer un incendie ou une explosion. Par conséquent :

1. Éloignez suffisamment tous les matériaux combustibles de l'aire de travail et recouvrez les matériaux avec un revêtement protecteur ininflammable. Les matériaux combustibles incluent le bois, les vêtements, la sciure, le gaz et les liquides combustibles, les solvants, les peintures et les revêtements, le papier, etc.
2. Les étincelles et les projections de métal incandescent peuvent tomber dans les fissures dans les planchers ou dans les ouvertures des murs et déclencher un incendie couvant à l'étage inférieur. Assurez-vous que ces ouvertures sont bien protégées des étincelles et du métal incandescent.
3. N'exécutez pas de soudure, de coupe ou autre travail à chaud avant d'avoir complètement nettoyé la surface de la pièce à traiter de façon à ce qu'il n'ait aucune substance présente qui pourrait produire des vapeurs inflammables ou toxiques. N'exécutez pas de travail à chaud sur des contenants fermés car ces derniers pourraient exploser.
4. Assurez-vous qu'un équipement d'extinction d'incendie est disponible et prêt à servir, tel qu'un tuyau d'arrosage, un seau d'eau, un seau de sable ou un extincteur portatif. Assurez-vous d'être bien instruit par rapport à l'usage de cet équipement.
5. Assurez-vous de ne pas excéder la capacité de l'équipement. Par exemple, un câble de soudage surchargé peut surchauffer et provoquer un incendie.
6. Une fois les opérations terminées, inspectez l'aire de travail pour assurer qu'aucune étincelle ou projection de métal incandescent ne risque de provoquer un incendie ultérieurement. Employez des guetteurs d'incendie au besoin.
7. Pour obtenir des informations supplémentaires, consultez le NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", disponible au National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.



CHOC ÉLECTRIQUE -- Le contact avec des pièces électriques ou les pièces de mise à la terre sous tension peut causer des blessures graves ou mortelles. NE PAS utiliser un courant de soudage c.a. dans un endroit humide, en espace restreint ou si un danger de chute se pose.

1. Assurez-vous que le châssis de la source d'alimentation est branché au système de mise à la terre de l'alimentation d'entrée.
2. Branchez la pièce à traiter à une bonne mise de terre électrique.
3. Branchez le câble de masse à la pièce à traiter et assurez une bonne connexion afin d'éviter le risque de choc électrique mortel.
4. Utilisez toujours un équipement correctement entretenu. Remplacez les câbles usés ou endommagés.
5. Veillez à garder votre environnement sec, incluant les vêtements, l'aire de travail, les câbles, le porte-électrode/torche et la source d'alimentation.
6. Assurez-vous que tout votre corps est bien isolé de la pièce à traiter et des pièces de la mise à la terre.
7. Si vous devez effectuer votre travail dans un espace restreint ou humide, ne tenez vous pas directement sur le métal ou sur la terre; tenez-vous sur des planches sèches ou une plate-forme isolée et portez des chaussures à semelles de caoutchouc.
8. Avant de mettre l'équipement sous tension, isolez vos mains avec des gants secs et sans trous.
9. Mettez l'équipement hors tension avant d'enlever vos gants.
10. Consultez ANSI/ASC Standard Z49.1 (listé à la page suivante) pour des recommandations spécifiques concernant les procédures de mise à la terre. Ne pas confondre le câble de masse avec le câble de mise à la terre.



CHAMPS ÉLECTRIQUES ET MAGNÉTIQUES — comportent un risque de danger. Le courant électrique qui passe dans n'importe quel conducteur produit des champs électriques et magnétiques localisés. Le soudage et le courant de coupage créent des champs électriques et magnétiques autour des câbles de soudage et l'équipement. Par conséquent :

1. Un soudeur ayant un stimulateur cardiaque doit consulter son médecin avant d'entreprendre une opération de soudage. Les champs électriques et magnétiques peuvent causer des ennuis pour certains stimulateurs cardiaques.
2. L'exposition à des champs électriques et magnétiques peut avoir des effets néfastes inconnus pour la santé.

3. Les soudeurs doivent suivre les procédures suivantes pour minimiser l'exposition aux champs électriques et magnétiques :
 - A. Acheminez l'électrode et les câbles de masse ensemble. Fixez-les à l'aide d'une bande adhésive lorsque possible.
 - B. Ne jamais enrouler la torche ou le câble de masse autour de votre corps.
 - C. Ne jamais vous placer entre la torche et les câbles de masse. Acheminez tous les câbles sur le même côté de votre corps.
 - D. Branchez le câble de masse à la pièce à traiter le plus près possible de la section à souder.
 - E. Veillez à garder la source d'alimentation pour le soudage et les câbles à une distance appropriée de votre corps.



LES VAPEURS ET LES GAZ -- peuvent causer un malaise ou des dommages corporels, plus particulièrement dans les espaces restreints. Ne respirez pas les vapeurs et les gaz. Le gaz de protection risque de causer l'asphyxie. Par conséquent :

1. Assurez en permanence une ventilation adéquate dans l'aire de travail en maintenant une ventilation naturelle ou à l'aide de moyens mécanique. N'effectuez jamais de travaux de soudage, de coupage ou de gougeage sur des matériaux tels que l'acier galvanisé, l'acier inoxydable, le cuivre, le zinc, le plomb, le beryllium ou le cadmium en l'absence de moyens mécaniques de ventilation efficaces. Ne respirez pas les vapeurs de ces matériaux.
2. N'effectuez jamais de travaux à proximité d'une opération de dégraissage ou de pulvérisation. Lorsque la chaleur ou le rayonnement de l'arc entre en contact avec les vapeurs d'hydrocarbure chloré, ceci peut déclencher la formation de phosgène ou d'autres gaz irritants, tous extrêmement toxiques.
3. Une irritation momentanée des yeux, du nez ou de la gorge au cours d'une opération indique que la ventilation n'est pas adéquate. Cessez votre travail afin de prendre les mesures nécessaires pour améliorer la ventilation dans l'aire de travail. Ne poursuivez pas l'opération si le malaise persiste.
4. Consultez ANSI/ASC Standard Z49.1 (à la page suivante) pour des recommandations spécifiques concernant la ventilation.

5. AVERTISSEMENT : Ce produit, lorsqu'il est utilisé dans une opération de soudage ou de coupage, dégage des vapeurs ou des gaz contenant des chimiques considérés par l'état de la Californie comme étant une cause des malformations congénitales et dans certains cas, du cancer. (California Health & Safety Code §25249.5 et seq.)



MANIPULATION DES CYLINDRES -- La manipulation d'un cylindre, sans observer les précautions nécessaires, peut produire des fissures et un échappement dangereux des gaz.

Une brisure soudaine du cylindre, de la soupape ou du dispositif de surpression peut causer des blessures graves ou mortelles. Par conséquent :

1. Utilisez toujours le gaz prévu pour une opération et le détendeur approprié conçu pour utilisation sur les cylindres de gaz comprimé. N'utilisez jamais d'adaptateur. Maintenez en bon état les tuyaux et les raccords. Observez les instructions d'opération du fabricant pour assembler le détendeur sur un cylindre de gaz comprimé.
2. Fixez les cylindres dans une position verticale, à l'aide d'une chaîne ou une sangle, sur un chariot manuel, un châssis de roulement, un banc, un mur, une colonne ou un support convenable. Ne fixez jamais un cylindre à un poste de travail ou toute autre dispositif faisant partie d'un circuit électrique.
3. Lorsque les cylindres ne servent pas, gardez les soupapes fermées. Si le détendeur n'est pas branché, assurez-vous que le bouchon de protection de la soupape est bien en place. Fixez et déplacez les cylindres à l'aide d'un chariot manuel approprié. Toujours manipuler les cylindres avec soin.
4. Placez les cylindres à une distance appropriée de toute source de chaleur, des étincelles et des flammes. Ne jamais amorcer l'arc sur un cylindre.
5. Pour de l'information supplémentaire, consultez CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", mis à votre disposition par le Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.



ENTRETIEN DE L'ÉQUIPEMENT -- Un équipement entretenu de façon défectueuse ou inadéquate peut causer des blessures graves ou mortelles. Par conséquent :

1. Efforcez-vous de toujours confier les tâches d'installation, de dépannage et d'entretien à un personnel qualifié. N'effectuez aucune réparation électrique à moins d'être qualifié à cet effet.
2. Avant de procéder à une tâche d'entretien à l'intérieur de la source d'alimentation, débranchez l'alimentation électrique.
3. Maintenez les câbles, les fils de mise à la terre, les branchements, le cordon d'alimentation et la source d'alimentation en bon état. N'utilisez jamais un équipement s'il présente une défectuosité quelconque.
4. N'utilisez pas l'équipement de façon abusive. Gardez l'équipement à l'écart de toute source de chaleur, notamment des fours, de l'humidité, des flaques d'eau, de l'huile ou de la graisse, des atmosphères corrosives et des intempéries.
5. Laissez en place tous les dispositifs de sécurité et tous les panneaux de la console et maintenez-les en bon état.
6. Utilisez l'équipement conformément à son usage prévu et n'effectuez aucune modification.



INFORMATIONS SUPPLÉMENTAIRES RELATIVES À LA SÉCURITÉ -- Pour obtenir de l'information supplémentaire sur les règles de sécurité à observer pour l'équipement de soudage à l'arc électrique et le coupage, demandez un exemplaire du livret "Precautions and Safe Practices for Arc Welding, Cutting and Gouging", Form 52-529.

Les publications suivantes sont également recommandées et mises à votre disposition par l'American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126 :

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"
2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding"
3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"
4. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting"

**SIGNIFICATION DES SYMBOLES**

Ce symbole, utilisé partout dans ce manuel, signifie "Attention"! Soyez vigilant! Votre sécurité est en jeu.

**DANGER**

Signifie un danger immédiat. La situation peut entraîner des blessures graves ou mortelles.

**AVERTISSEMENT**

Signifie un danger potentiel qui peut entraîner des blessures graves ou mortelles.

**ATTENTION**

Signifie un danger qui peut entraîner des blessures corporelles mineures.



WARNING

Use only ESAB torches that are designed for use with this console. Use of torches not designed for use with this console could create an ELECTRIC SHOCK HAZARD. Do NOT use or modify any other torch for use on this console.

2.1 GENERAL

The ESP-50 is a compact, completely self-contained plasma cutting system. As shipped, the system is ready to cut after being connected to input power, a source of compressed air (60 - 100 psi / 4.1 - 6.9 bars) and a PT-35 torch. The ESP-50 package uses the PT-35 torch to deliver cutting power for severing materials up to 5/8 inch (15.9 mm) thick. Refer to the following paragraphs for descriptions of the ESP-50 packages available as well as performance specifications.

2.2 SCOPE

The purpose of this manual is to provide the operator with all the information required to install and operate the ESP-50 plasma arc cutting package. Technical reference material is also provided to assist in troubleshooting the cutting package.

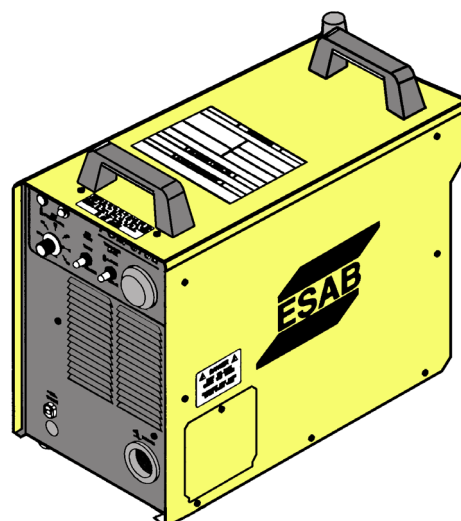
2.3 PACKAGES AVAILABLE

2.3.1 ESP-50 Mechanized Cutting Packages

The ESP-50 plasma cutting package combines the ESP-50 and PT-35 torch. A typical package includes: ESP-50 Console/Power Source, PT-35 Torch - 25' (7.6 m) or 50' (15.2 m), Torch Spare Parts Kit and a power cable. See Section 3 for installation details.

2.4 SPECIFICATIONS: ESP-50

Cuts50 in. (12.7 mm)
1 ph. Input.....	208/230 vac, 1 ph, 50/60 Hz, 46/41 A
3 ph. Input.....	208/230 vac, 3 ph, 50/60 Hz, 22 A
.....	(380 - 400)/460 vac, 3 ph, 50/60 Hz, (10 - 9)/8 A
Output @ 100% duty cycle.....	50 amps @ 100V
Dimensions	W = 10.1" (275mm)
.....	H = 18.3" (465mm)
.....	D = 20.3" (576mm)
Weight	85 lbs. (38.6kg)
Minimum Air Requirements	250 cfh @ 60 psig (117.9 l/min @ 4.1 bars)



2.5 ORDERING INFORMATION:

ESP-50, 230/230 V, 25 ft. (7.6m) PT-35	0558004378
ESP-50, 208/230 V, 50 ft. (15.2m) PT-35	0558004379
ESP-50, 230/230 V, 25 ft. (7.6m) PT-35, without rack	0558004973
ESP-50, 208/230 V, 50 ft. (15.2m) PT-35, without rack	0558004974
ESP-50, 400CE/460 V, 25 ft. (7.6m) PT-35, with rack	0558004376
ESP-50, 400CE/460 V, 50 ft. (15.2m) PT-35, with rack	0558004377
ESP-50, 400CE/460 V, 25 ft. (7.6m) PT-35, without rack	0558004374
ESP-50, 400CE/460 V, 50 ft. (15.2m) PT-35, without rack	0558004375

The components that are included in the ESP-50 packages may be purchased separately by using the appropriate P/N when placing orders. Individual part numbers are listed below:

Consoles:

ESP-50 208/230 V, 50/60 Hz, 1/3-ph.....	0558004371
ESP-50 (380 - 400)/460 V, 50/60 Hz, 3-ph.....	0558004372

PT-35 Torches:

PT-35 Torch, 25 ft. (7.6m), with rack	0558004351
PT-35 Torch, 50 ft. (15.2m), with rack.....	0558004352
PT-35 Torch, 25 ft. (7.6m), without rack	0558004353
PT-35 Torch, 50 ft. (15.2m), without rack.....	0558004354

2.6 TORCH DATA

ESP-50 uses the PT-35 torch. For complete list and breakdown of parts, refer to Figure 2.1 and 2.2.

Cutting Parameters for the PT-35 Torch

CARBON STEEL

50 AMP Data, Nozzle P/N 0558004356, Heat Shield P/N 0558004357, Electrode P/N 0558005200

Metal Thickness		Travel Speed				Amps	Air Pressure		Cutting Height		Pierce Height	
		Optimum		Maximum			psig	bar	in.	mm	in.	mm
in.	mm	ipm	(mm/min)	ipm	(mm/min)							
.625	15.875	12	304	18	457	50	60	4.1	.125	3.175	NR	NR
.500	12.700	25	635	30	762	50	60	4.1	.125	3.175	NR	NR
.375	9.525	42	101	48	1219	50	60	4.1	.125	3.175	.187*	4.750
.250	6.350	82	2082	86	2184	50	60	4.1	.125	3.175	.156*	3.962
.125	3.175	150	3810	200	5080	50	60	4.1	.125	3.175	.156*	3.962
.099 (12/13 ga.)	2.515	225	5715	250	6350	50	60	4.1	.125	3.175	.125	3.175
.059 (16 ga.)	1.499	375	9525	450	11430	50	60	4.1	.125	3.175	.125	3.175
.042 (19 ga.)	1.067	450	11430	600	15240	50	60	4.1	.125	3.175	.125	3.175
.024 (24 ga.)	0.610	750+	19050+	750+	19050+	50	60	4.1	.125	3.175	.125	3.175

NR = Not Recommended

* = If using a fixed height torch or plate rider, set cutting height equal to pierce height; cutting speed may have to be reduced due to increased cut height.

Cutting Parameters for the PT-35 Torch

STAINLESS STEEL

50 AMP Data, Nozzle P/N 0558004356, Heat Shield P/N 0558004357, Electrode P/N 0558005200

Metal Thickness		Travel Speed				Amps	Air Pressure		Cutting Height		Pierce Height	
		Optimum		Maximum								
in.	mm	ipm	(mm/min)	ipm	(mm/min)		psig	bar	in.	mm	in.	mm
.500	12.700	13	330	18	457	50	60	4.1	.125	3.175	NR	NR
.375	9.525	22	558	30	762	50	60	4.1	.125	3.175	NR	NR
.250	6.350	50	1270	60	1524	50	60	4.1	.125	3.175	.187*	4.750
.188	4.763	70	1778	93	2362	50	60	4.1	.125	3.175	.187*	4.750
.125	3.175	125	3175	162	4114	50	60	4.1	.125	3.175	.156*	3.962
.105 (12/13 ga.)	2.515	172	4368	195	4953	50	60	4.1	.125	3.175	.125	3.175
.060 (16 ga.)	1.499	345	8763	390	9906	50	60	4.1	.125	3.175	.125	3.175
.043 (19 ga.)	1.067	750+	19050+	750+	19050+	50	60	4.1	.125	3.175	.125	3.175
.025 (24 ga.)	0.610	750+	19050+	750+	19050+	50	60	4.1	.125	3.175	.125	3.175

GALVANIZED STEEL

50 AMP Data, Nozzle P/N 0558004356, Heat Shield P/N 0558004357, Electrode P/N 0558005200

Metal Thickness		Travel Speed				Amps	Air Pressure		Cutting Height		Pierce Height	
		Optimum		Maximum								
in.	mm	ipm	(mm/min)	ipm	(mm/min)		psig	bar	in.	mm	in.	mm
.071 (15 ga.)	1.803	170	4318	210	5334	50	60	4.1	.125	3.175	.125	3.175
.062 (16 ga.)	1.575	315	8001	352	8940	50	60	4.1	.125	3.175	.125	3.175
.025 (25 ga.)	0.635	450	11430	750	19050	50	60	4.1	.125	3.175	.125	3.175

NR = Not Recommended

* = If using a fixed height torch or plate rider, set cutting height equal to pierce height; cutting speed may have to be reduced due to increased cut height.

Cutting Parameters for the PT-35 Torch

ALUMINUM

50 AMP Data, Nozzle P/N 0558004356, Heat Shield P/N 0558004357, Electrode P/N 0558005200

Metal Thickness		Travel Speed				Amps	Air Pressure		Cutting Height		Pierce Height	
		Optimum		Maximum								
in.	mm	ipm	(mm/min)	ipm	(mm/min)		psig	bar	in.	mm	in.	mm
.500	12.700	21	533	30	762	50	60	4.1	.125	3.175	NR	NR
.375	9.525	36	914	45	1143	50	60	4.1	.125	3.175	NR	NR
.313	7.950	50	1270	57	1447	50	60	4.1	.125	3.175	.250*	6.350
.250	6.350	72	1828	87	2209	50	60	4.1	.125	3.175	.188*	4.775
.188	4.763	110	2794	150	3810	50	60	4.1	.125	3.175	.156*	3.962
.125	3.175	200	5080	230	5842	50	60	4.1	.125	3.175	.156*	3.962
.095 (10/11 ga.)	2.413	275	6985	300	7620	50	60	4.1	.125	3.175	.125	3.175
.049 (16 ga.)	1.245	420	10668	465	11811	50	60	4.1	.125	3.175	.125	3.175
.043 (17 ga.)	1.092	450	11430	502	12750	50	60	4.1	.125	3.175	.125	3.175
.031 (20 ga.)	0.762	750+	19050+	750+	19050+	50	60	4.1	.125	3.175	.125	3.175

NR = Not Recommended

* = If using a fixed height torch or plate rider, set cutting height equal to pierce height; cutting speed may have to be reduced due to increased cut height.

2.7 TORCH SPECIFICATIONS:

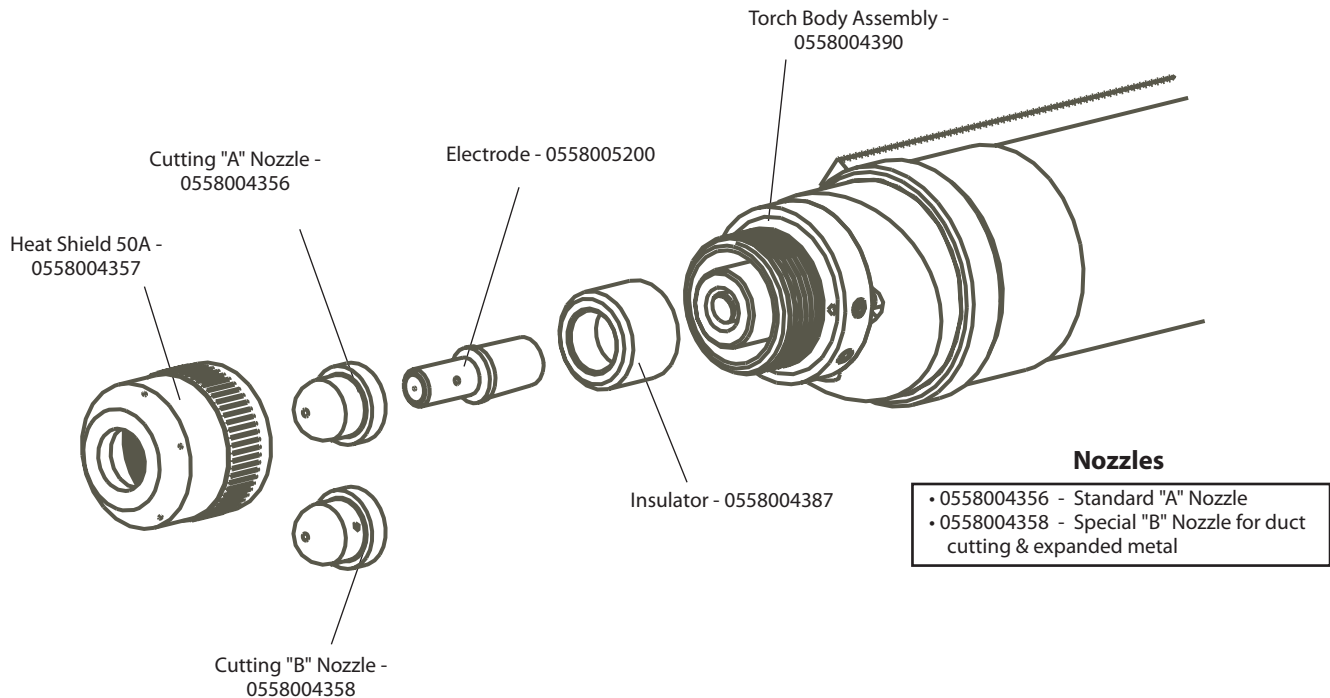


Figure 2-1. PT-35 Torch

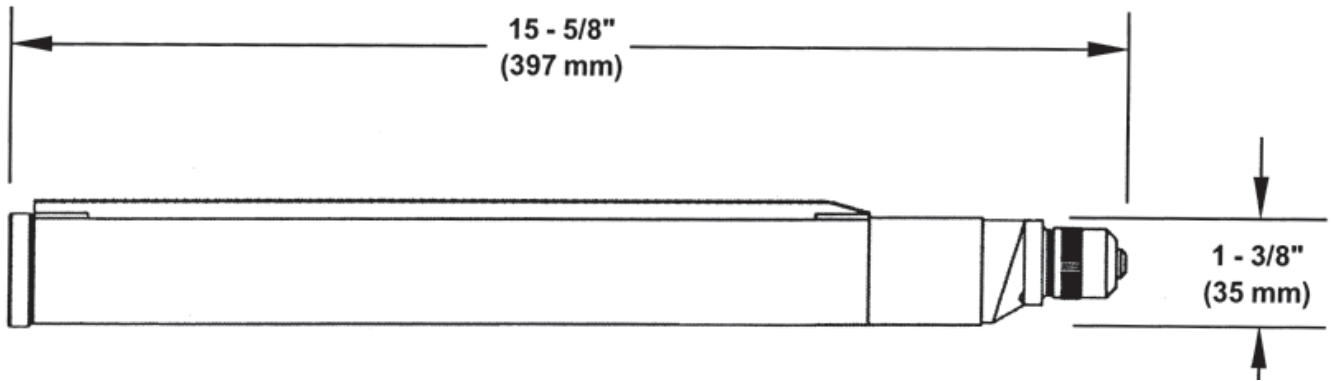


Figure 2-2. PT-35 Dimensions

2.8 OPTIONAL ACCESSORIES:

Plasma Flow Measuring Kit:

This valuable troubleshooting tool allows measurement of the actual plasma gas flow through the torch 19765 (0558000739)

(NOTE: Part numbers in parenthesis apply to "CE"/European units only.)



CNC Cable 50'0558004366

Adaptor Cable - Adaptor to directly connect HT or TD control cable to ESP-50.....0558004363

Adapter Kit PT-37 to ESP-50 - For use when adapting a PT-37 to the ESP-50..... 0558008736

Standoff Tool - Designed for use with Plate Rider for setting nozzle standoff height. Can also be used separately. 0558004364

Torch Holder Assembly 16V83 (0558004250)

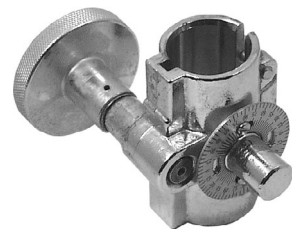


Plate Rider - height control for PT-35..... 0560936972



2.9 SPARE PARTS KITS:



50 A Spare Parts Kit0558005210

PT-35, 50 A, Spare Parts Kit, P/N 0558005210

Contents:

Description	P/N	Quantity
Shield, Retaining	0558004357	1
50 amp "A" Nozzle	0558004356	4
Electrode	0558005200	6
Fuse 2amp, 600vdc	0558003075	1
Insulator	0558004387	1

Consumable Value Pack0558005203

Consumable Value Pack, P/N 0558005203

Contents:

Description	P/N	Quantity
Electrode	0558005200	10
50 amp "A" Nozzle	0558004356	15

Consumable Set0558005201

Consumable Set, P/N 0558005201

Contents:

Description	P/N	Quantity
Electrode	0558005200	1
50 amp "A" Nozzle	0558004356	1

Consumable Set0558005202

Consumable Set, P/N 0558005202

Contents:

Description	P/N	Quantity
Electrode	0558005200	1
50 amp "B" Nozzle	0558004358	1

**CAUTION**

Installing or placing any type of filtering device will restrict the volume of intake air, thereby subjecting the power source internal components to overheating. The warranty is void if any type of filter device is used.

**WARNING**

ELECTRIC SHOCK CAN KILL! Precautionary measures should be taken to provide maximum protection against electrical shock. Be sure that all power is off by opening the line (wall) disconnect switch and by unplugging the power cord to the unit when connections are made inside of the power source.

**CAUTION**

Be sure that the power source is properly configured for your input power supply. **DO NOT** connect a power source configured for 208/230 V to a 460 V input power supply. Damage to the machine may occur.

**WARNING**

The chassis must be connected to an approved electrical ground. Failure to do so may result in electrical shock, severe burns or death.

3.1 GENERAL

Proper installation is important for satisfactory and trouble-free operation of the ESP-50 cutting package. It is suggested that each step in this section be studied carefully and followed closely.

3.2 EQUIPMENT REQUIRED

A source of clean, dry air that supplies 250 cfh (118.0 l/m) at 60-75 psig (4.1 - 5.2 bars) is required for the cutting operation. The air supply should not exceed 150 psig (10.3 bars) (the maximum inlet pressure rating of the air filter-regulator supplied with the package).

3.3 LOCATION

Adequate ventilation is necessary to provide proper cooling of the ESP-50. The amount of dirt, dust, and excessive heat to which the equipment is exposed, should be minimized. There should be at least one foot of clearance between the ESP-50 power source and wall or any other obstruction to allow freedom of air movement through the power source.

3.4 INSPECTION

- A. Remove the shipping container and all packing material and inspect for evidence of concealed damage which may not have been apparent upon receipt of the ESP-50. Notify the carrier of any defects or damage at once.
- B. Check container for any loose parts prior to disposing of shipping materials.
- C. Check air louvers and any other openings to ensure that any obstruction is removed.

3.5 PRIMARY ELECTRICAL INPUT CONNECTIONS (FIGURE 3-2)

NOTE: If using 200(208) V input power, the ESP-50 must be reconnected for 200 V use as directed in Section 3.7 and Figure 3-4.

If using (380-400) V input power, the ESP-50 must be reconnected as directed in Section 3.8, Figure 3-5.

NOTE: The 208/230 V models are equipped with a plug for single-phase connection only. The plug is mounted to a 4-conductor cable. If 3-phase connection is desired, remove the plug and proceed as described.

A line (wall) disconnect switch with fuses or circuit breakers should be provided at the main power panel (see Table 3-1 for fuse sizes). The input power cable of the console may be connected directly to the disconnect switch or you may purchase a proper plug and receptacle from a local electrical supplier. If using plug/receptacle combination, see Table 3-1 for recommended input conductors for connecting receptacle to line disconnect switch.

**3.6 SECONDARY ELECTRICAL OUTPUT CONNECTIONS
(FIGURE 3-2)**

1. For operator safety, the torch connections are located on the output terminal board behind the lower portion of the front panel. Remove access door to output terminal board from right panel of power source.
2. Thread the power cable & pilot arc cable of the PT-35 through the right open bushing of the front panel. Connect power cable to the torch fitting (left-hand threads); bolt the pilot arc cable ring connection to the copper terminal. Make sure the power and pilot arc cable connections are wrench-tight.
3. Reassemble the access door to the power source.
4. Connect your air supply to the inlet connection of the filter-regulator.
5. Clamp the work cable to the workpiece. Be sure the workpiece is connected to an approved earth ground with a properly sized ground cable.



WARNING

Before making any connections to the power source output terminals, make sure that all primary input power to the power source is deenergized (off) at the main disconnect switch and that the input power cable is unplugged.

Input Requirements			Input & Gnd	Fuse
Volts	Phase	Amps	Conductor	Size
			CU/AWG	Amps
208	1	55A	6	80
208	3	26A/Ph.	6	50
230	1	49A	6	80
230	3	24A/Ph.	6	50
400	3	13	10	25
460	3	11	10	25

Table 3-1. Recommended Sizes For Input Conductors and Line Fuses

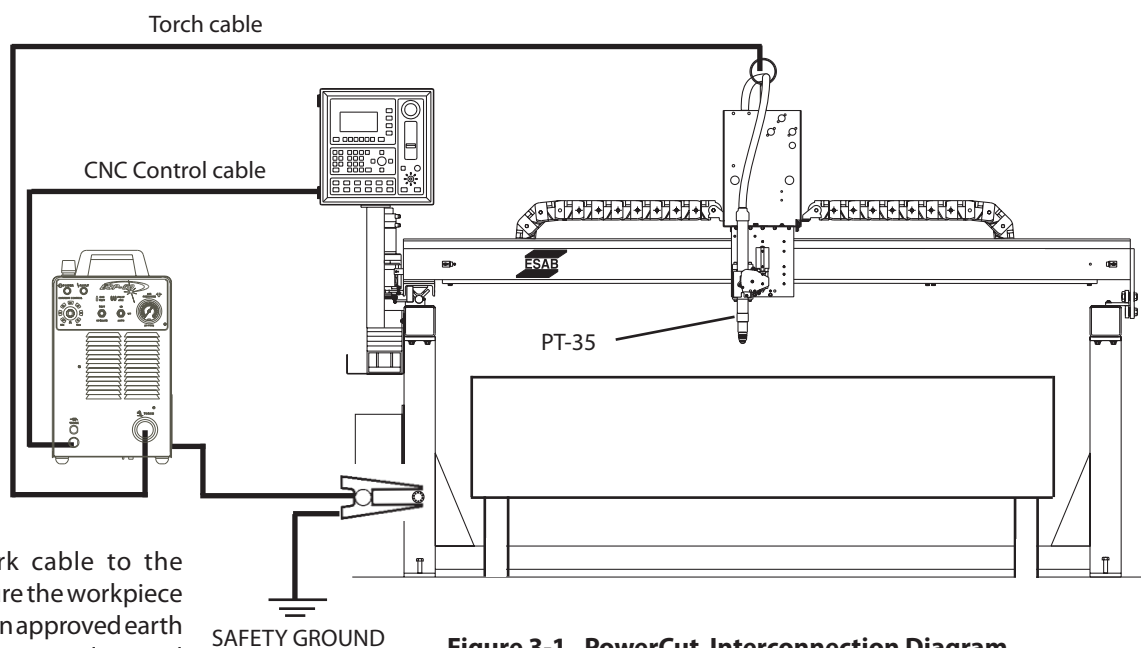
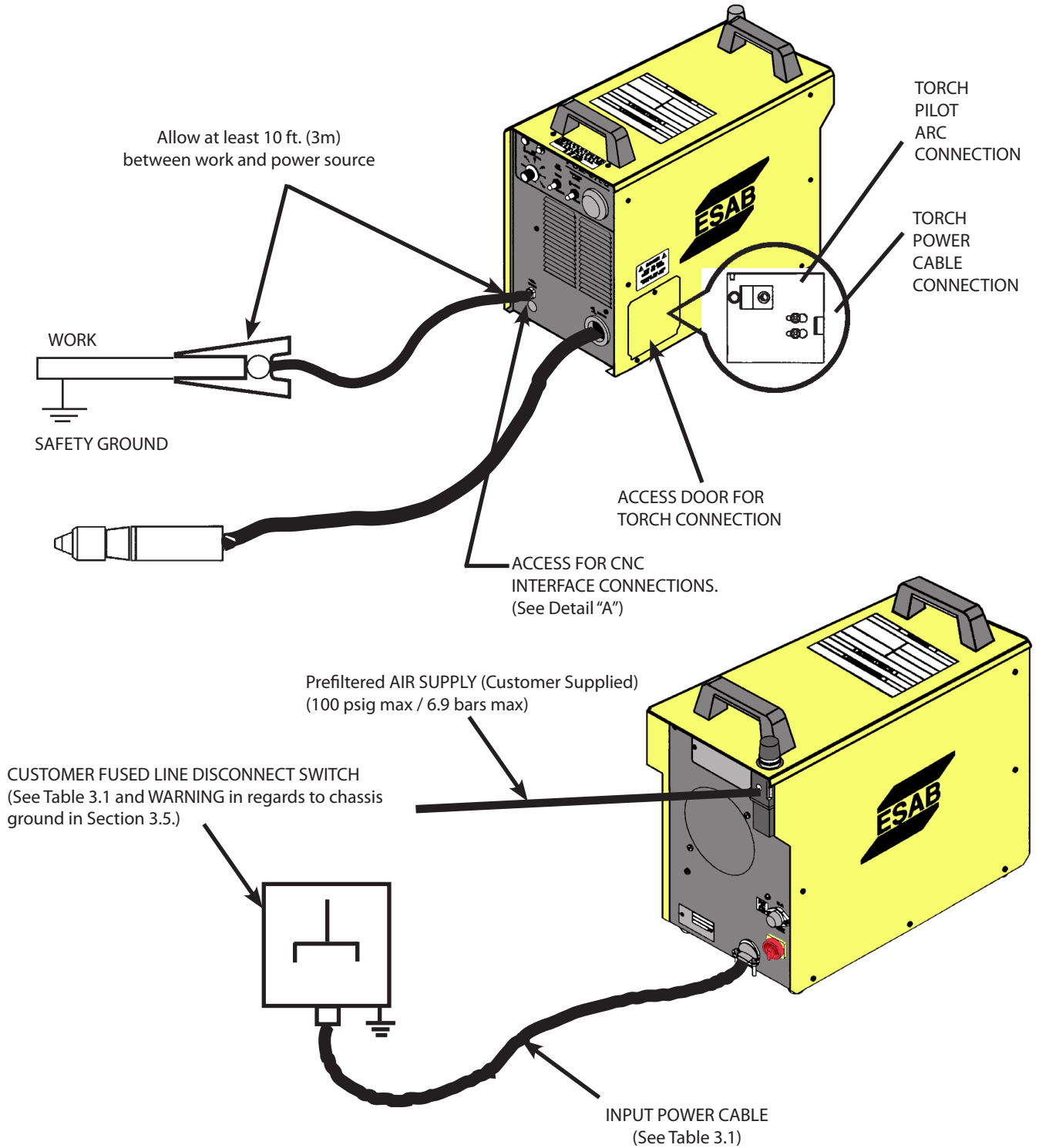


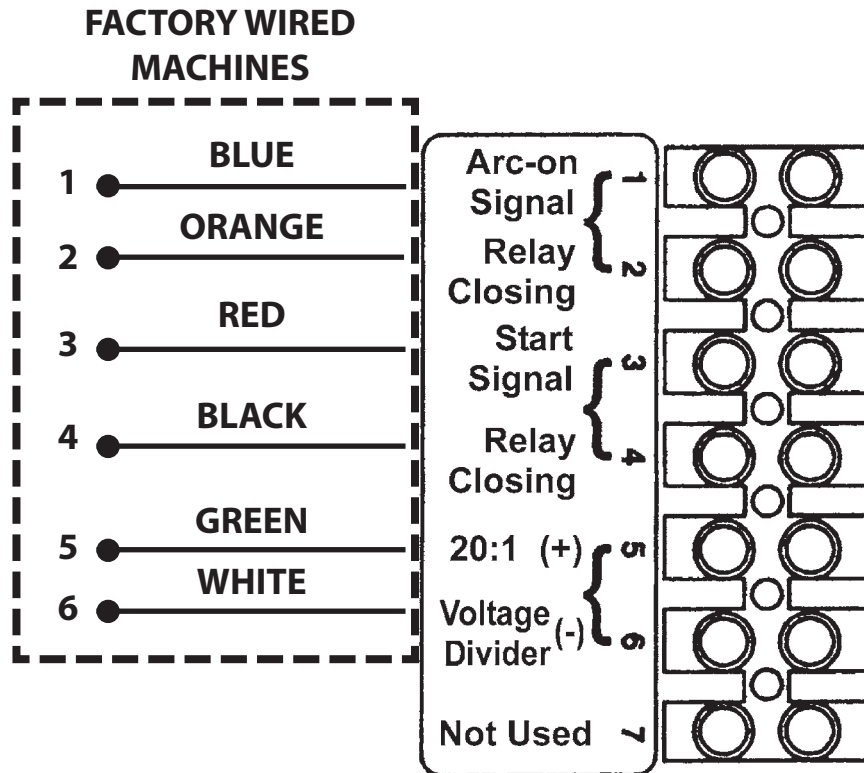
Figure 3-1. PowerCut Interconnection Diagram

Clamp the work cable to the workpiece. Be sure the workpiece is connected to an approved earth ground with a properly sized ground cable.



NOTE: The 208/230 V models are equipped with a plug for single-phase connection only. The plug is mounted to a 4-conductor cable. If 3-phase connection is desired, remove and discard the plug and refer to Sect. 3.5.

Figure 3-2. ESP-50 Interconnection Diagram



DETAIL "A"

Figure 3.3 - MECHANICAL CUTTING INTERFACE DIAGRAM
CNC Interface Connection (Located inside console, left side of base.)

3.7 CONNECTING ESP-50 FOR 200(208) VAC INPUT

**WARNING**

ELECTRIC SHOCK CAN KILL! Precautionary measures should be taken to provide maximum protection against electrical shock. Be sure that all power is off by opening the line (wall) disconnect switch and by unplugging the power cord to the unit when primary electrical connections are made to the power supply.

The ESP-50 power source with 200/230 vac, single-phase input capability is factory set for 230 vac input. If using 200(208) vac input, the ESP-50 must be reconnected as follows before connecting to your input power:

1. Remove the cover from the ESP-50 power source.
2. Locate the Input Bridge (IBR) and TB5 terminal block (see Figure 3.4.A) on the left side towards the rear panel. Disconnect the gray lead from TB5-2 and then connect it to TB5-1.
3. Locate the output bridge (D1) on left side towards the front panel (see Figure 3.4.B). Disconnect and swap leads X2 and X3 from the main transformer. For 200(208) vac input, X2 is connected to TB3 and X3 is connected to terminal 3 of D1. Make sure the connections are firmly tightened.
4. Leave all other wires the same.
5. Reinstall the cover and connect the ESP-50 to 208 vac input power.

Note: Factory set for 230 VAC input.

For 208VAC move GRY wire from TB5-2 to TB5-1, move T1-X2 to TB3 and T1-X3 to D1-3

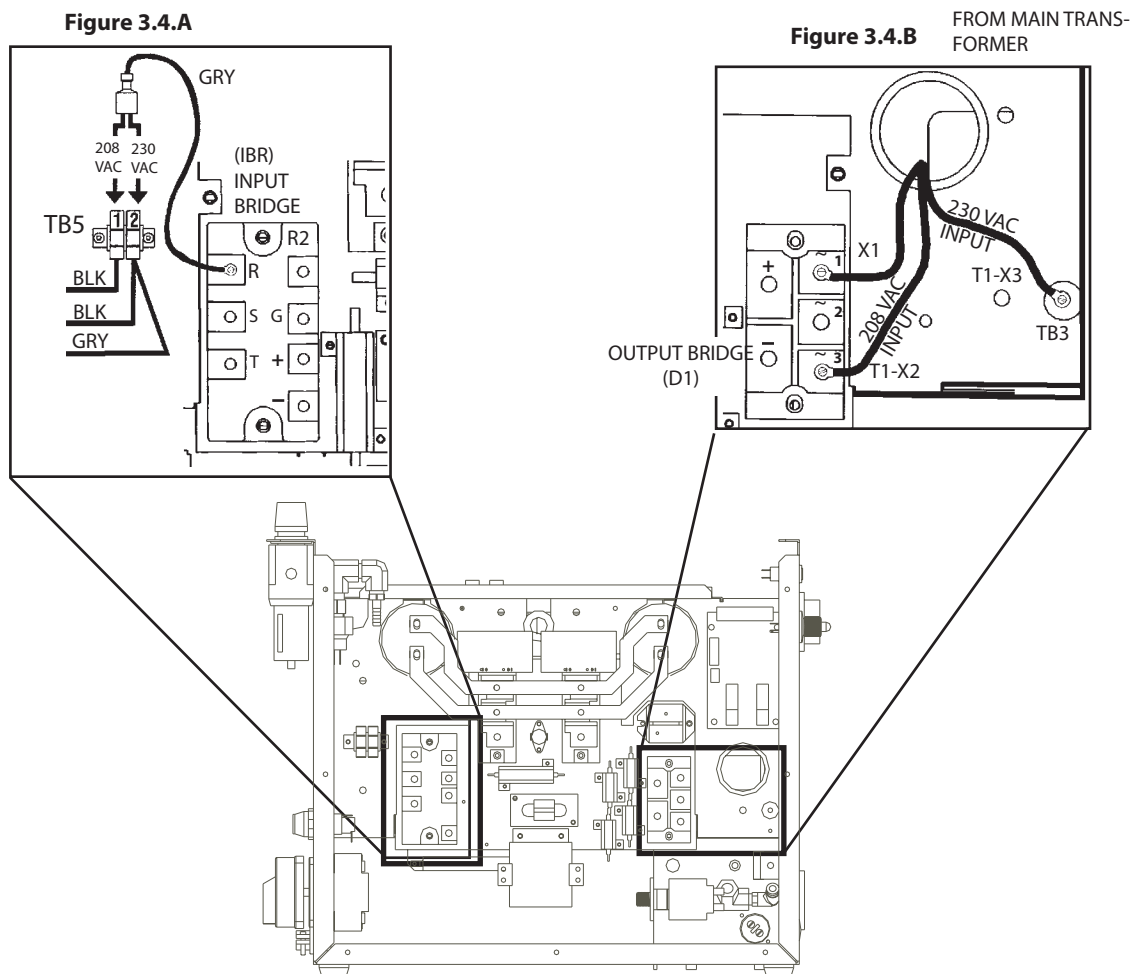


Figure 3-4. Original Factory Setup for 230 Vac Input on Power Source with 200/230 Vac Input Power Capability

3.8 CONNECTING ESP-50 FOR 400/460 VAC INPUT

**WARNING**

ELECTRIC SHOCK CAN KILL! Precautionary measures should be taken to provide maximum protection against electrical shock. Be sure that all power is off by opening the line (wall) disconnect switch and by unplugging the power cord to the unit when primary electrical connections are made to the power supply.

The ESP-50 power source with (380 - 400) /460 vac, 3-phase input capability is factory set for 460 vac input. If using 400 vac input, the ESP-50 must be reconnected as follows before connecting to your input power:

1. Remove cover from the ESP-50 power source.
2. Locate the Input Bridge (IBR) and TB5 terminal block (see Figure 3.5.A) on the left side towards the rear panel. Disconnect the gray lead from TB5-2 and then connect it to TB5-1.
3. Locate the output bridge (D1) on left side towards the front panel (see Figure 3.5.B). Disconnect and swap leads X2 and X3 from the main transformer. For 400 vac input, X2 is connected to TB3 and X3 is connected to terminal 3 of D1. Make sure the connections are firmly tightened.
4. Leave all other wires the same.
5. Reinstall cover and connect the ESP-50 to 400 vac input power.

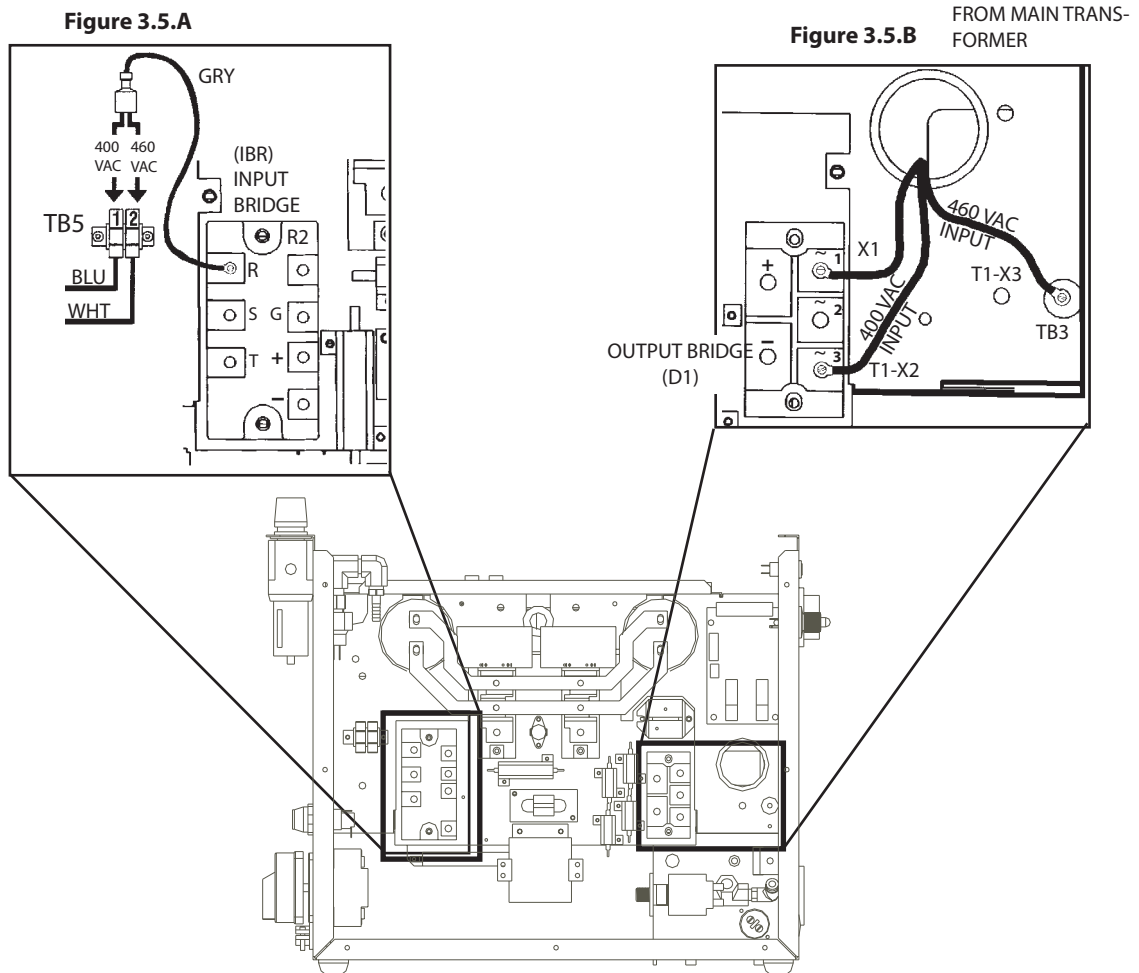


Figure 3-5. Original Factory Setup for 460 Vac Input on Power Source with 400/460 Vac Input Power Capability

**WARNING**

ELECTRIC SHOCK can kill.

- Do NOT operate the unit with the cover removed.
- Do NOT apply power to the unit while holding or carrying the unit.
- Do NOT touch any torch parts forward of the torch handle (nozzle, heat shield, electrode, etc.) with power switch on.

**WARNING**

ARC RAYS can burn eyes and skin; NOISE can damage hearing.

- Wear welding helmet with No. 6 or 7 lens shade.
- Wear eye, ear, and body protection.

**CAUTION**

Position the ESP-50 at least 10 feet (3 meters) from the cutting area. Sparks and hot slag from the cutting operation can damage the unit.

4.1 ESP-50 CONTROLS (FIGURE 4-1)

- A. Power Switch (located on rear panel).** When placed in ON position, the white pilot light will glow indicating control circuit is energized and the cooling fan will run.
- B. Output Current Control.** Adjustable from 20 to 50 amperes.
- C. Air Test Switch.** When placed in Test position, air filter-regulator can be adjusted to desired pressure (60 - 75 psig / 4.1 - 5.2 bars) before cutting operations. Allow air to flow for a few minutes. This should remove any condensation that may have accumulated during shutdown period. Be sure to place switch in OPERATE position before starting cutting operations.

D. Pilot Arc Select Switch.

Hi: Set pilot arc current level to "High" when improved stability is needed. May lessen consumable life.

Low: Maintains "Low" pilot arc current level. May improve consumable life.

Auto: Adjusts pilot arc based on output current selected. Use for standard cutting.

- E. Fault Light. Will glow amber under the following conditions and operations will come to a complete stop.**

Start Signal: On power-up, fault light will be on continuously when a start signal is present. Remove start signal to reset.

Parts in Place Fault: The fault light will be on **continuously** at power-up. This indicates missing or worn consumables. Turn power off and inspect torch.

Over Temperature: The fault light will be **mostly off** but will flick on for about 1/10th of a second every second. This indicates that the duty cycle has been exceeded. Allow the power source to cool down before continuing to operate.

High/Low Line Voltage: The fault light will **rapidly blink on and off** (five times per second). This indicates that the input voltage is outside the "+ or -" 15% range of the input rating.

Over-Current: The fault light will be on **continuously**. This indicates that input current has been exceeded.

All fault signals will remain on for a minimum of 10 seconds. If fault clears, all will reset automatically except for over-current. To clear over-current, the power must be shut off for 5 seconds and then turned back on.

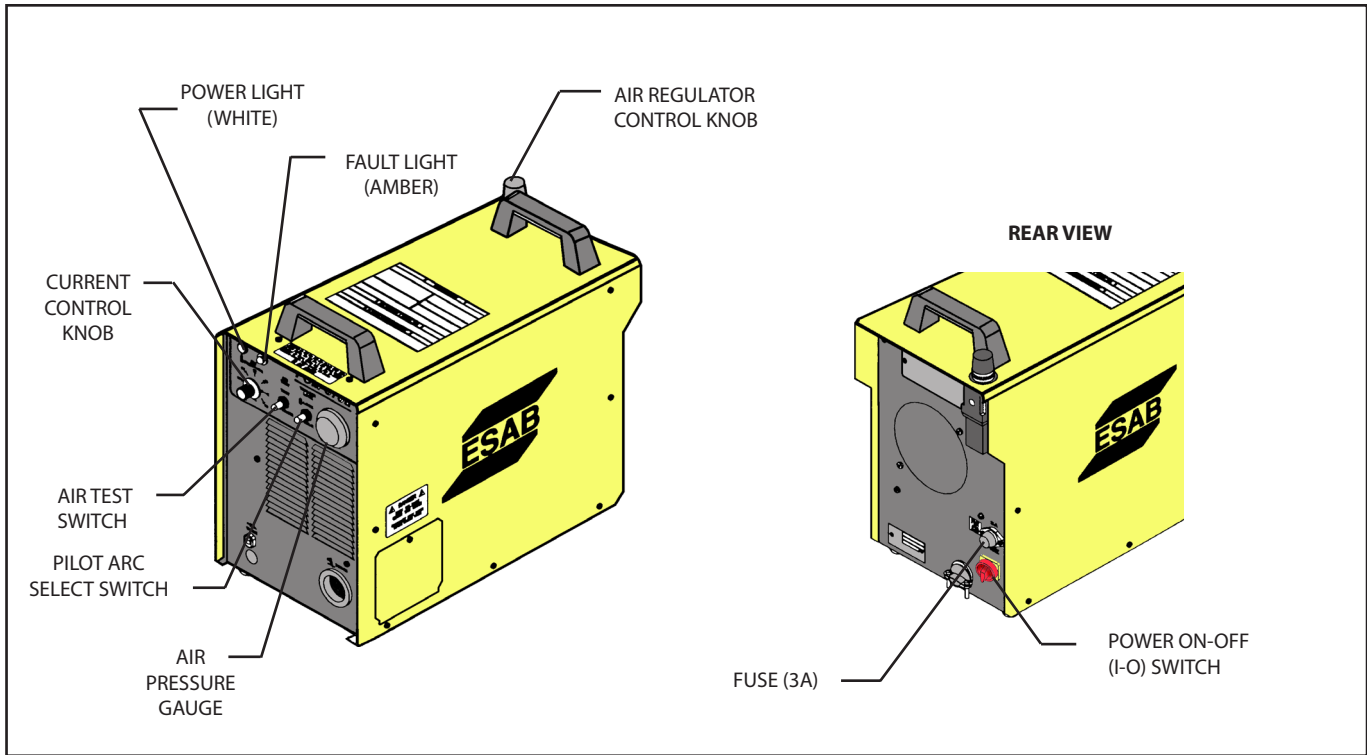


Figure 4-1. ESP-50 Controls

CAUTION
REPLACE ELECTRODE BEFORE LENGTH BECOMES SHORTER THAN .060" INCH (1.5 MM)

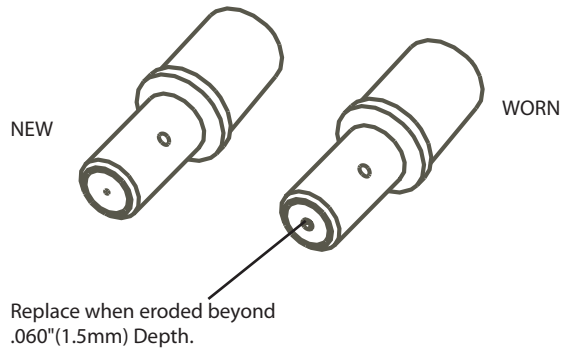


Figure 4-2. Electrode Wear Limit

NOTE: When replacing the nozzle, always inspect the electrode for wear. If electrode wear is greater than .060" (1.5 mm), replace the electrode. If the electrode is used beyond this recommended wear limit, damage to the torch and power source may occur. Nozzle life is also greatly reduced when using the electrode beyond the recommended limit. Refer to Figure 4-2.

4.2 COMMON CUTTING PROBLEMS

Listed below are common cutting problems followed by the probable cause of each. If problems are determined to be caused by the ESP-50, refer to the maintenance section of this manual. If the problem is not corrected after referring to the maintenance section, contact your ESAB distributor.

A. Insufficient Penetration.

1. Current too low.
2. Cutting speed too fast.
3. Damaged cutting nozzle.
4. Improper air pressure.
5. Low air flow rate.

B. Main Arc Extinguishes.

1. Cutting speed too slow.
2. Worn electrode.

C. Dross Formation. (In some materials and thicknesses, it may be impossible to get dross-free cuts.)

1. Current too low.
2. Cutting speed too fast or too slow.
3. Improper air pressure.
4. Faulty nozzle or electrode.
5. Low air flow rate.

D. Double Arcing. (Damaged Nozzle Orifice.)

1. Low air pressure.
2. Damaged cutting nozzle.
3. Loose cutting nozzle.
4. Heavy spatter accumulation on nozzle.

E. Uneven Arc.

1. Damaged cutting nozzle or worn electrode.

F. Unstable Cutting Conditions.

1. Incorrect cutting speed.
2. Loose cable or hose connections.
3. Electrode and/or cutting nozzle in poor condition.

G. Main Arc Does Not Strike.

1. Worn electrode.
2. Loose connections.
3. Work cable not attached.

H. Poor Consumable Life.

1. Improper gas pressure.
2. Contaminated air supply.
3. Low air flow rate.

**WARNING**

Be sure that the wall disconnect switch or wall circuit breaker is open before attempting any inspection or work inside of the ESP-50.

**CAUTION**

Water or oil occasionally accumulates in compressed air lines. Be sure to direct the first blast of air away from the equipment to avoid damage to the ESP-50.

**WARNING**

Make sure power switch on ESP-50 is in OFF position before working on the torch.

**WARNING**

Always replace torch with the proper torch manufactured by ESAB since it alone contains ESAB's patented safety interlock.

5.1 GENERAL

If this equipment does not operate properly, stop work immediately and investigate the cause of the malfunction. Maintenance work must be performed by an experienced person, and electrical work by a trained electrician. Do not permit untrained persons to inspect, clean, or repair this equipment. Use only recommended replacement parts.

5.2 INSPECTION AND CLEANING

Frequent inspection and cleaning of the ESP-50 is recommended for safety and proper operation. Some suggestions for inspecting and cleaning are as follows:

- A. Check work cable for secured connection to workpiece.
- B. Check safety earth ground at workpiece and at power source chassis.
- C. Check heat shield on torch. It should be replaced if damaged.
- D. Check the torch electrode and cutting nozzle for wear on a daily basis. Remove spatter or replace if necessary.
- E. Make sure cable and hoses are not damaged or kinked.
- F. Make sure all plugs, fittings, and ground connections are tight.
- G. With all input power disconnected, and wearing proper eye and face protection, blow out the inside of the ESP-50 using low-pressure dry compressed air.
- H. Occasionally, bleed all water from the filter beneath the air filter-regulator.

5.3 PT-35 TORCH CONSUMABLE PARTS

To assemble the consumable parts, refer to Figure 4-1.

- A. Thread electrode into torch body, hand tighten.
- B. Insert insulator into torch as shown.
- C. Place nozzle into the shield.
- D. Thread assembly to the torch body and hand tighten. **Always make sure the shield is tight before cutting.**

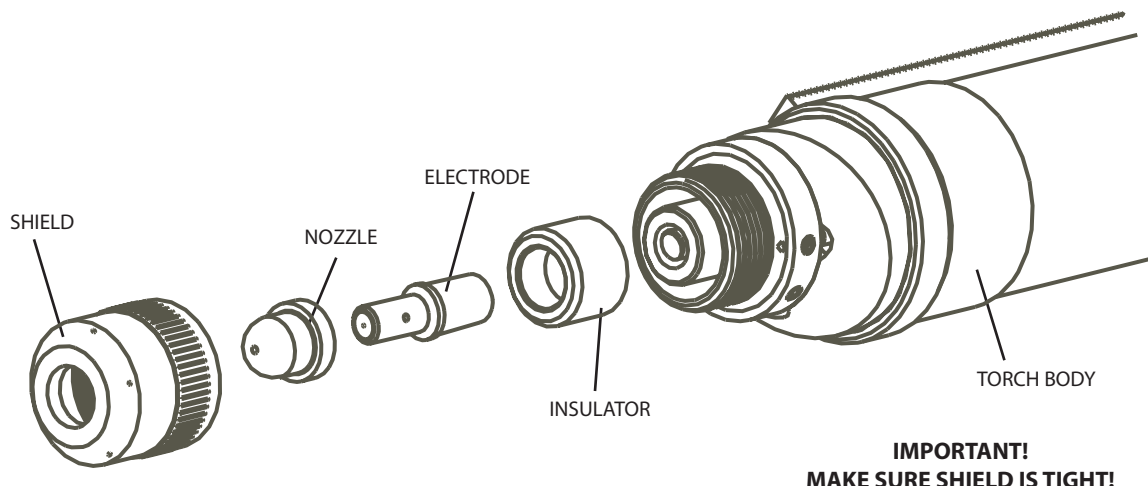


Figure 5-1. Assembly of PT-35 Torch Front End Parts

5.4 IGBT Handling & Replacement

Since IGBT gates are insulated from any other conducting region, care should be taken to prevent static build up, which could possibly damage gate oxides. All IGBT modules are shipped from the factory with conductive foam contacting the gate and emitter sense pins.

Always ground parts touching gate pins during installation. In general, standard ESD precautions application to FETs should be followed.

Other handling precautions that should also be observed are as follows:

- Use grounded work station with grounded floors and grounded wrist straps when handling devices.
- Use a 100Ω resistor in series with the gate when performing curve tracer tests.
- Never install devices into systems with power connected to the system.
- Use soldering irons with grounded tips when soldering to gate terminals.

When mounting IGBT modules on a heatsink, certain precautions should be taken to prevent any damage against a sudden torque. If a sudden torque (“one-sided tightening”) is applied at only one mounting terminal the ceramic insulation plate or silicon chip inside the module may get damaged.

The mounting screws are to be fastened in the order shown in Figure 4-3. Also, care must be taken to achieve maximum contact (i.e. minimum contact thermal resistance) for the best heat dissipation.

Application of a thermal pad on the contact surface improves its thermal conductivity. See Replacement Parts section for the required pad.

A torque wrench should be used. Tighten mounting screws to 28 in-lbs (3.2 m-n); wire connecting screws to 19 in-lbs (2.1 m-n). If torque is too heavy, the device can damage like the above “one-sided tightening”.

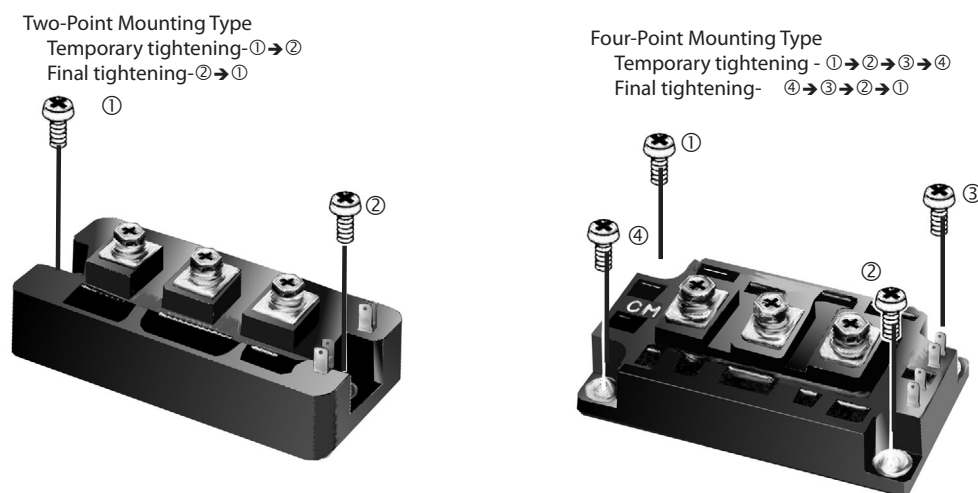


Figure 5-2. Screw Fastening Order

**WARNING**

ELECTRIC SHOCK CAN KILL! Be sure that all primary power to the machine has been externally disconnected. Open the line (wall) disconnect switch or circuit breaker before attempting inspection or work inside of the power source.

**WARNING**

Voltages in plasma cutting equipment are high enough to cause serious injury or possibly death. Be particularly careful around equipment when the covers are removed.

6.1 TROUBLESHOOTING

Check the problem against the symptoms in the following troubleshooting guide. The remedy may be quite simple. If the cause cannot be quickly located, shut off the input power, open up the unit, and perform a simple visual inspection of all the components and wiring. Check for secure terminal connections, loose or burned wiring or components, bulged or leaking capacitors, or any other sign of damage or discoloration.

The cause of control malfunctions can be found by referring to the sequence of operations and electrical schematic diagram (Figure 5-1) and checking the various components. A volt-ohmmeter will be necessary for some of these checks.

NOTE: Before checking voltages in the circuit, disconnect the power from the high frequency generator to avoid damaging your voltmeter.

6.2 TROUBLESHOOTING GUIDE

A. Power Light (PL1) does not come on.

1. Visually inspect the machine for any damage.
2. Check if the cooling fan is running. If not, then check the following :
 - a. Check if the machine power cord is plugged to the input power receptacle.
 - b. Measure the input power at the receptacle. If not present, then check the wall disconnect switch and it's fuses.
 - c. Check Fuse (F1). If fuse is ok, then check the input switch (S1) for proper operation. Replace if defective.
3. If above items check OK , the problem is internal. Send unit to an Authorized Repair Station for repair.
 - a. If the cooling fan is running, then measure voltage between pins P2-11 and P2-14 of the control board (should be 115 VAC). If there is no voltage, then replace transformer T2.
 - b. If the voltage is present, then the pilot light may be burnt out.

B. Fault light remains on at power-up.

1. Verify start signal is not present. If so, clear start signal, fault should reset.
2. Switch power to OFF, verify consumables are installed correctly.

C. No Air Flow

1. Check air inlet supply. Unit requires 250 CFH (118 l/m) at 60 psig 4.1 bars).
2. Check air hose and connections. Tighten if leaking.

3. Does air flow when "air test" switch is in test position?
 - a. If not, check torch consumables, replace if necessary.
 - b. If above items check OK, the problem is internal. Take unit to an Authorized Repair Station for repair.
- D. The Power light is on, but nothing happens when the torch switch is depressed. Fault light does not activate.**

1. Check the following:
 - a. With the machine power on, depress the torch switch. On the control board the LED 1 should be lit as long as the switch is depressed. If not then check:
 - i. Turn power off to the machine. Unplug control board. Put an ohmmeter across P5-1 and P5-2 to take resistance reading. Depress torch switch. Meter should read a short. If not, then one of the following is not working properly:
 - ii. Torch switch or the leads. Unplug the torch switch leads at the machine. Put a meter across the two plug pins. Should read a short when the torch switch is depressed. If not, then either broken switch leads or malfunctioning switch.
 - b. Check T2 transformer secondary voltages at the plugs P1 and P2. Refer to system schematic. Replace the transformer if the correct secondary voltages are not present.
 - c. If everything above checks out all right, then the PCB1 Control Board should be replaced.

E. Fault light activates when torch switch is closed.

The Fault circuit is used to monitor conditions necessary for the safe operation of the ESP-50. The fault light will glow amber under the following conditions and operations will come to a complete stop:

1. High/Low line voltage. The Fault Light will rapidly blink on and off (5 times per second). This indicates that the input voltage is outside the "+" or "-" 15% safe operating range rating.
2. Over Temperature. The fault light will be mostly off but will blink on for 1/10th of a second, every second. This generally indicates that the duty cycle has been exceeded. Allow the power source to cool before returning to operate.
 - a. Thermal switch may be open. It will open if the temperature at the IGBT base reaches 94°C. With the machine power off, check the continuity between P1-1 and P1-2 of the control board. If the switch is OK, then the ohmmeter should read a direct short. If not then it should read open.
 - b. If the switch is malfunctioning, replace it. Clean the surface of the heat sink before installing the switch.

3. **Over Current.** The fault light will be on **continuously**. **This indicates that the input current to the main transformer has exceeded preset limits.**

- a. To check if the output is shorted, remove the heat shield and nozzle from the torch and measure the resistance by putting the ohmmeter lead "+" of the meter to "+" output terminal and Work, "-" lead of the meter to the "-" output torch terminal. Reading should be about 2 K Ohms. Reverse the voltmeter leads, the resistance reading should be less than 1.5 K Ohms.
- b. If the resistance reading is different than above, check the torch and output bridge.

F. Air is On but nothing happens when torch switch is operated.

1. Check the torch. Make sure that the heat shield is very tight.
2. Any one of the following may not be working properly:
 - a. Check the operation of the Thermal Switch. See D.3.a. above.
 - b. Check Air Check switch operation. It might be stuck in On position. Pilot arc will not initiate if this switch is in the ON position.
 - c. Measure voltage across C1 or C2 capacitor. It should be as follows:

approx. 325 VDC for the 208/230 volt unit.
approx. 280 VDC to 325 VDC for the 400 or 460 volt unit

If not, one of following could be malfunctioning:

- 1.) Check the capacitors C1 and C2 for any damage.
- 2.) Check input bridge/SCR Module (IBR) This can be checked without taking it out of the circuit using an volt/ohmmeter. Replace it if found malfunctioning. Follow bridge installation instructions.
- 3.) Check Inrush current resistor, R10, located on the input bridge heat sink. Replace it if malfunctioning.
- d. IGBTs (2 on 230 V, and 1 on the 400 V & 460 V units) may be blown. See IGBT installation procedure. Before replacing IGBTs, make sure to check the zener diodes and pico fuses on the IGBT driver boards.

G. Pilot Arc is on but Main Arc does not transfer.

1. Make sure work clamp is connected to work material.
2. Check the torch. Replace consumables if necessary.

H. Poor Cutting Performance.

1. Check air supply regulator . It should be adjusted to 65 - 75 psig (4.5 - 5.2 bars).
2. The air supplied to the torch should be free of oil and water.
3. Make sure the consumables in the torch are acceptable.
4. Check the output. Use a calibrated current probe capable of measuring 100 amps.

I. Air does not shut off.

1. Check air test, the gas solenoid valve is energized when the switch is in the "on" position.
 - a. Check voltage to solenoid coil, if present when torch switch is unplugged, replace PCB1.
 - b. Turn off primary power to the power source. If gas continues to flow, replace the gas solenoid.
 - c. Turn on primary power and check the status of the Fault light. If the Fault light is on continuously and gas is on continuously, turn off primary power and inspect the torch for proper assembly of the electrode and nozzle. Press firmly on the electrode and verify that it retracts when pressed, and returns forward when released.
 - d. Reassemble the electrode and nozzle and turn on primary power. After approximately two seconds the gas should come on briefly then go off. If the Fault light comes on continuously and gas remains off, check for defective torch trigger or shorted torch trigger leads.

J. Main arc is difficult to start.

1. The most common reason is worn or missing consumables. Check and replace if necessary.
2. Input air must be clean and dry.
3. Input air pressure must be between 65 - 75 psig (4.5 - 5.2 bars).
4. Torch connections must be tight.
5. Work cable and clamp must be in good condition and must make a good electrical connection to the material to be cut.
6. If above items check OK , the problem may be internal.
 - a. Missing or weak pilot arc. Check pilot arc resistors and pilot arc wiring.

Send unit to an Authorized Repair Station for repair.

6.3 REFERENCE VOLTAGE CHECKS

A. Control Board Assembly (PCB1)

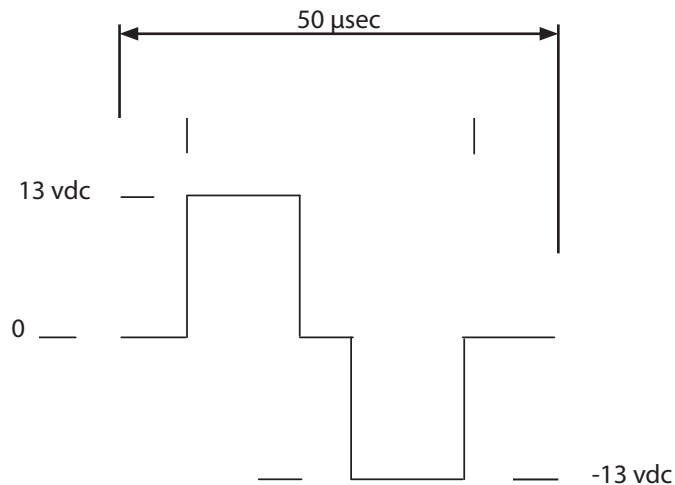
1. LED's

- LED-1 - Torch Switch
- LED-3 - Gas Solenoid Valve

2. Voltage Test Points

Tests are made with power on - no arc.

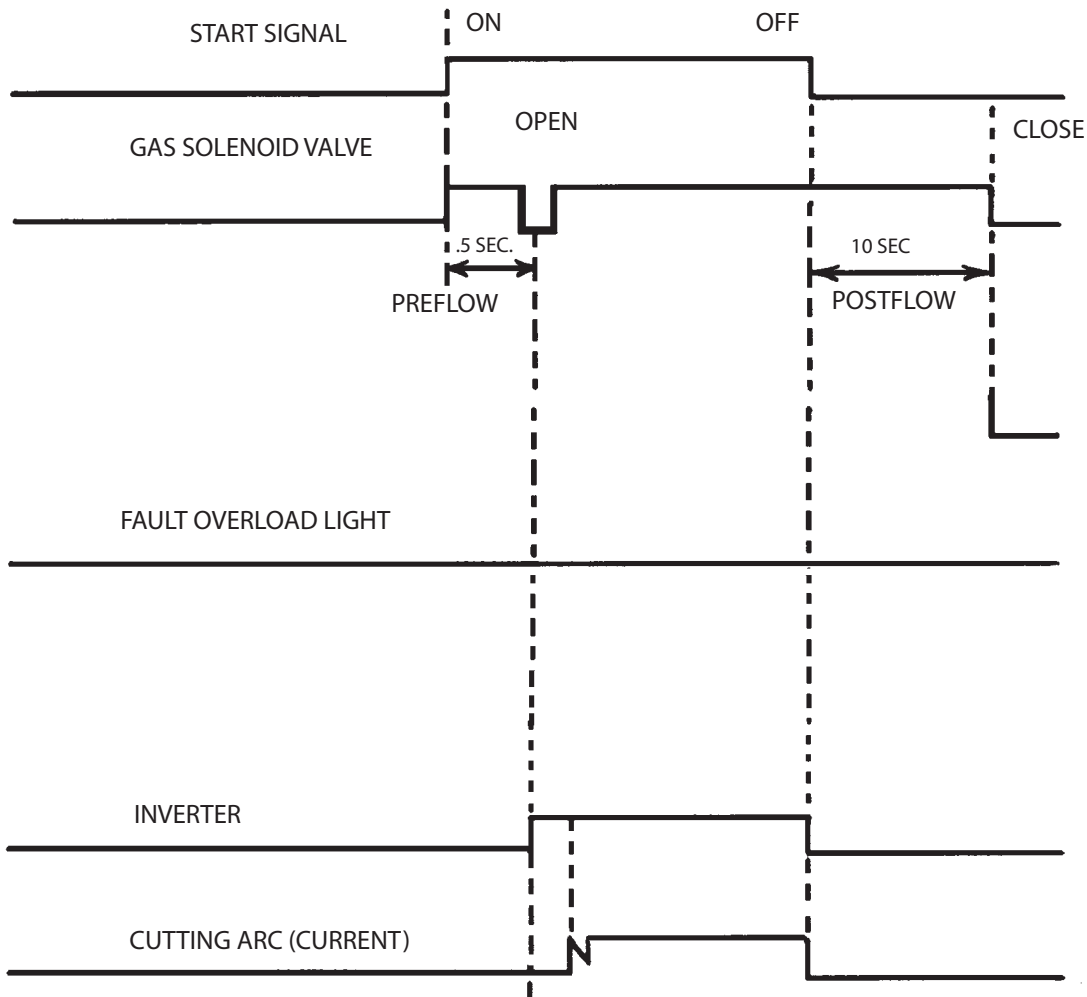
- TP-0 - Ground
- TP-1 - +15 vdc
- TP-2 - +12 vdc
- TP-3 - -12 vdc
- TP-4 - +5 vdc
- TP-9 - IGBT's driving signal - switching frequency = 20 KHz
- TP-10 - IGBT's driving signal - switching frequency = 20 KHz



For 208/230 VAC input, the IGBT off time is 3μsec.
 For 400/460 VAC input, the IGBT off time is 3μsec.

Figure 6.1 IGBT Gating Signal

6.4 SEQUENCE OF OPERATION

**NOTES:**

1. When the start signal is turned "on" during postflow period, the postflow and preflow times are canceled.
2. When the amber fault light comes on, cutting operation should be stopped. The postflow time starts from the moment the start signal is removed.

NOTE:

Schematics and Wiring Diagrams on 11" x 17" paper are included inside the back cover of this manual.

7.0 Replacement Parts

7.1 General

Always provide the serial number of the unit on which the parts will be used. The serial number is stamped on the unit nameplate.

7.2 Ordering

To ensure proper operation, it is recommended that only genuine ESAB parts and products be used with this equipment. The use of non-ESAB parts may void your warranty.

Replacement parts may be ordered from your ESAB Distributor.

Be sure to indicate any special shipping instructions when ordering replacement parts.

Refer to the Communications Guide located on the back page of this manual for a list of customer service phone numbers.

Note

Bill of material items that have blank part numbers are provided for customer information only.
Hardware items should be available through local sources.

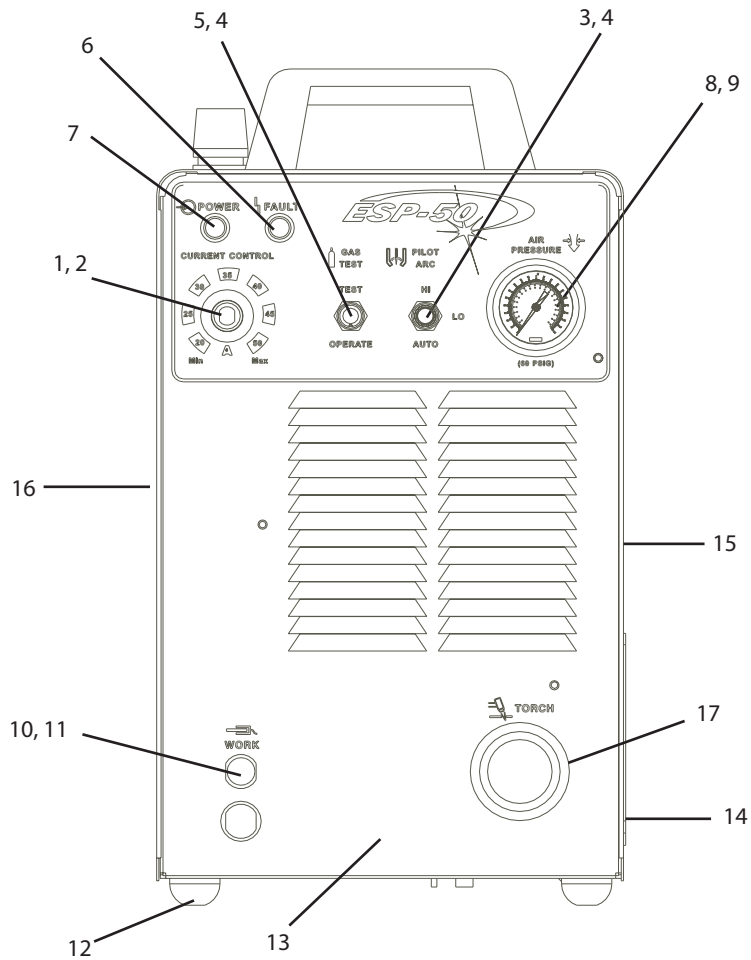


Figure 7-1. ESP-50 Power Source, Front View

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
1	1	137630611	KNOB	
2	1	0558001176	POT. 10K 3W (NOMEX INSUL. - 676876)	R1
3	1	897W65	SWITCH TOGGLE SPST 3 POS 15 A 125 V	S3
4	2	951474	SWITCH SEAL BLACK	
5	1	634518	SWITCH TOGGLE DPDT 2 POS 15 A 125 V	S2
6	1	951754	LAMP LED YEL 12 V	PL2
7	1	951814	LAMP NEON WHITE	PL1
8	2	0558003378	GAUGE HOUSING	
9	1	21711	GAUGE 1.50 160 PSI WHITE	
10	1	23606172	STRAIN RELIEF	
11	1	680560	WORK CABLE 25 FT. (Not Shown)	
12	4	182W12	FOOT RUBBER	
13	1	0558004314	CHASSIS ESP-50	
14	1	36330YL	DOOR ACCESS YEL (ESAB)	
15	1	954008	LABEL WARNING HI VOLTAGE	
16	2	13734588	LABEL ESAB	
17	1	993426	GROMMET 1.5 X 1.75 X .06	

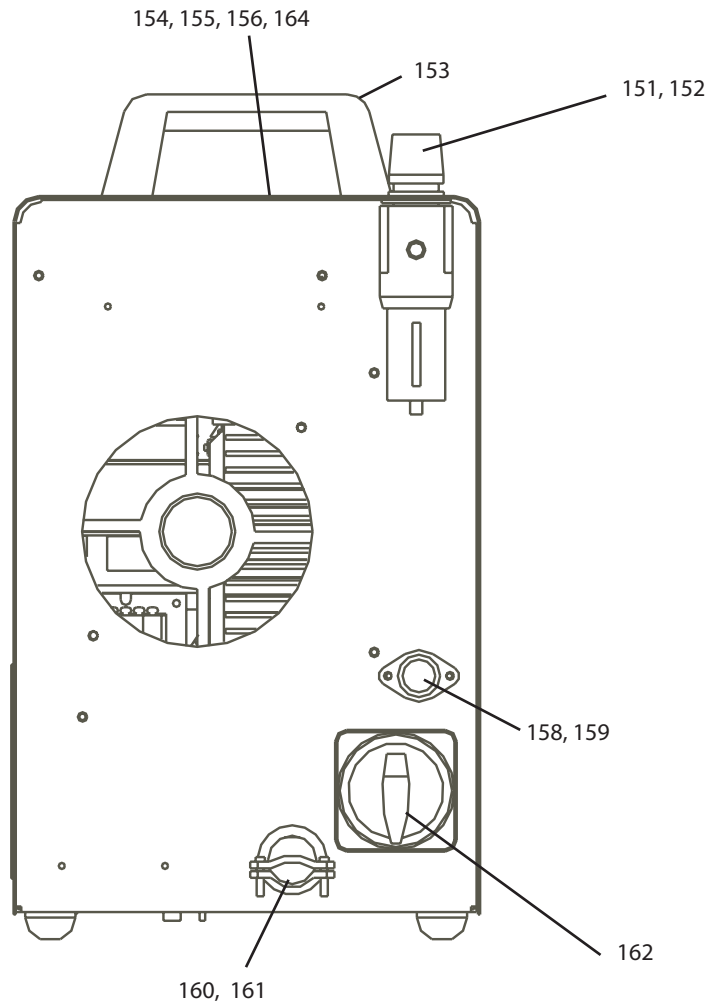


Figure 7-2. ESP-50 Power Source, Rear View

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
151	1	21710	FILTER REGULATOR	
152	1	10Z30	ADAPTOR B/A-WM x 1/4 NPTM	
153	2	951575	HANDLE	
154	1	36719YL	TOP COVER YEL	
155	1	2091514	LABEL WARNING	
156	1	954290	LABEL WARNING	
157				
158	1	952136	FUSE HOLDER	
159	1	952559	FUSE 3 A FAST ACTING	F1
160	1	97W63	STRAIN RELIEF	
161	1	37573	INPUT POWER CABLE, 6 FT (208/230 V)	
	1	0558001181	INPUT POWER CABLE, 10 FT (400CE/460 V)	
162	1	36107	SWITCH POWER 600V 63A	S1

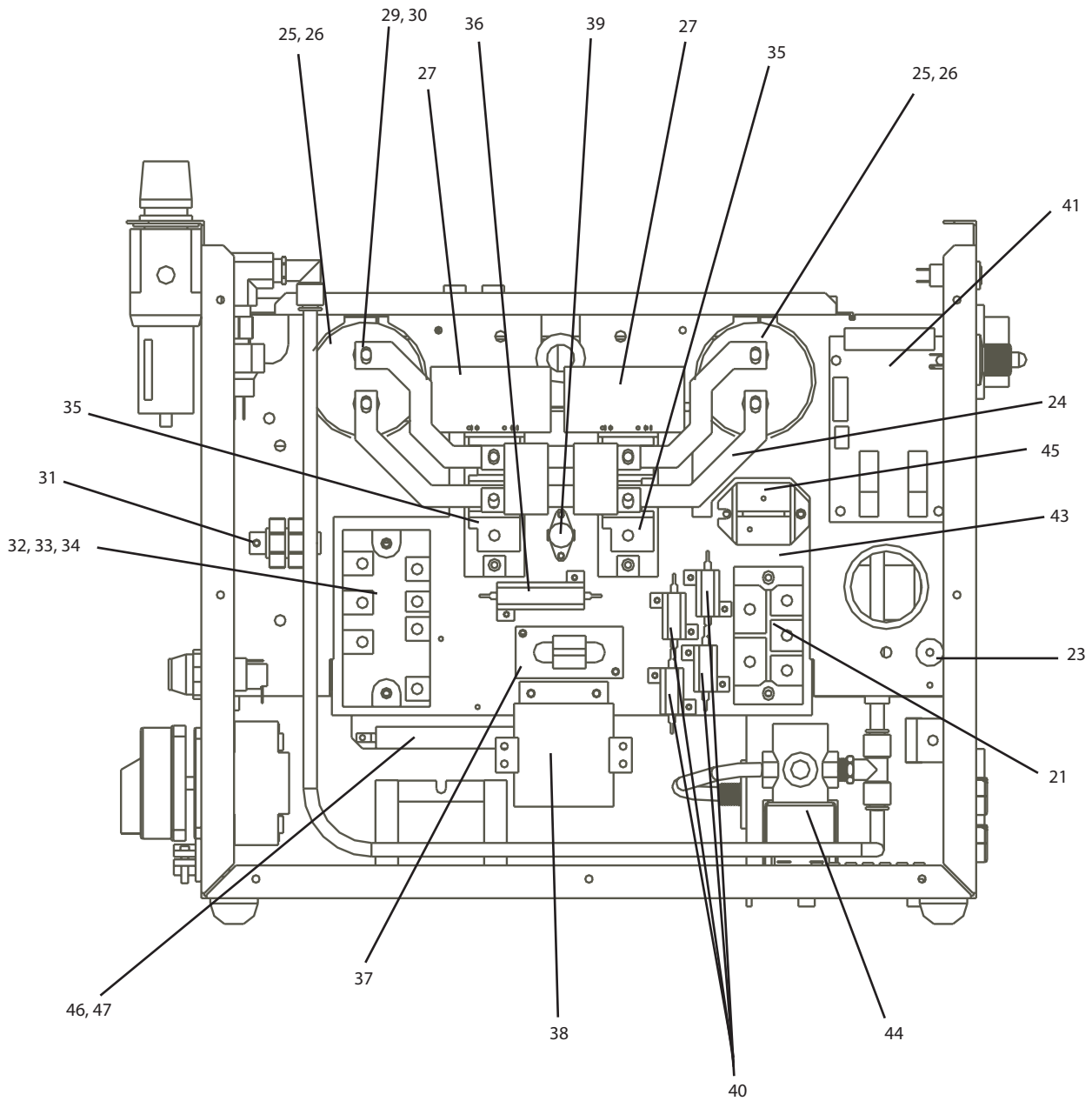


Figure 7-3. ESP-50 Power Source, Left Side View (208/230)

SECTION 7

REPLACEMENT PARTS

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
21	1	952150	BRIDGE 60ADC 100NS 600 V (includes PAD - 951192)	D1
22	1	952002	CORE SATURABLE (Not shown - see wiring)	L3
23	1	952208	STANDOFF INSULATING NYLON	TB3
24	1	36731	BUSBAR NEG	
25	2	952237	CAPACITOR 1800 μ f 450VDC	C1, 2
26	2	994674	GROMMET STRIP	
27	2	0558001177	PCB ASS'Y MOSFET IGBT DRIVER BOARD	PCB2, 3
28				
29	1	36730	BUSBAR POS	
30	1	951028	CAPACITOR 1 μ f 630VDC (Not shown - see wiring)	C3
31	1	950487	TERM BLOCK 2 POS	TB5
32	1	952235	MODULE INPUT BRIDGE/SCR (includes PAD - 952280)	IBR
33	1	2062282	CAPACITOR .22 μ f 1KV (See wiring)	C19
34	3	951321	METAL OXIDE VARISTOR 275 V (See wiring)	MOV1, 2, 3
35	2	951205	IGBT 600 V 100 A (includes PAD - 951190)	Q1, 2
36	1	17750010	RESISTOR 50 W 10 OHM (PAD - 951194)	R7
37	1	32958	CURRENT TRANSFORMER ASS'Y	T4
38	1	952255	CAPACITOR 40 μ f 400 VDC	C4
39	1	950711	THERMAL SWITCH 194°F	TS1
40	4	17721020	RESISTOR 24 W 20 OHMS (PAD 951193)	R3, 4, 5, 6
41	1	0558038258	PILOT ARC CONTROL PCB	PCB4
42	2	951940	CAPACITOR 1 μ f 630W VDC	C15, 16
43	1	952558	HEATSINK	
44	1	0558004447	SOLENOID VALVE 1/4NPT NC 24 VAC	SOL1
45	1	0558002436	DIODE SINGLE FAST RECOV	D2
46	1	17250010	RESISTOR WW FIXED 50W 10 OHM	R10
47	2	99512068	RESISTOR BRACKET	
48	1	0558003105	PRESSURE SWITCH	PS1

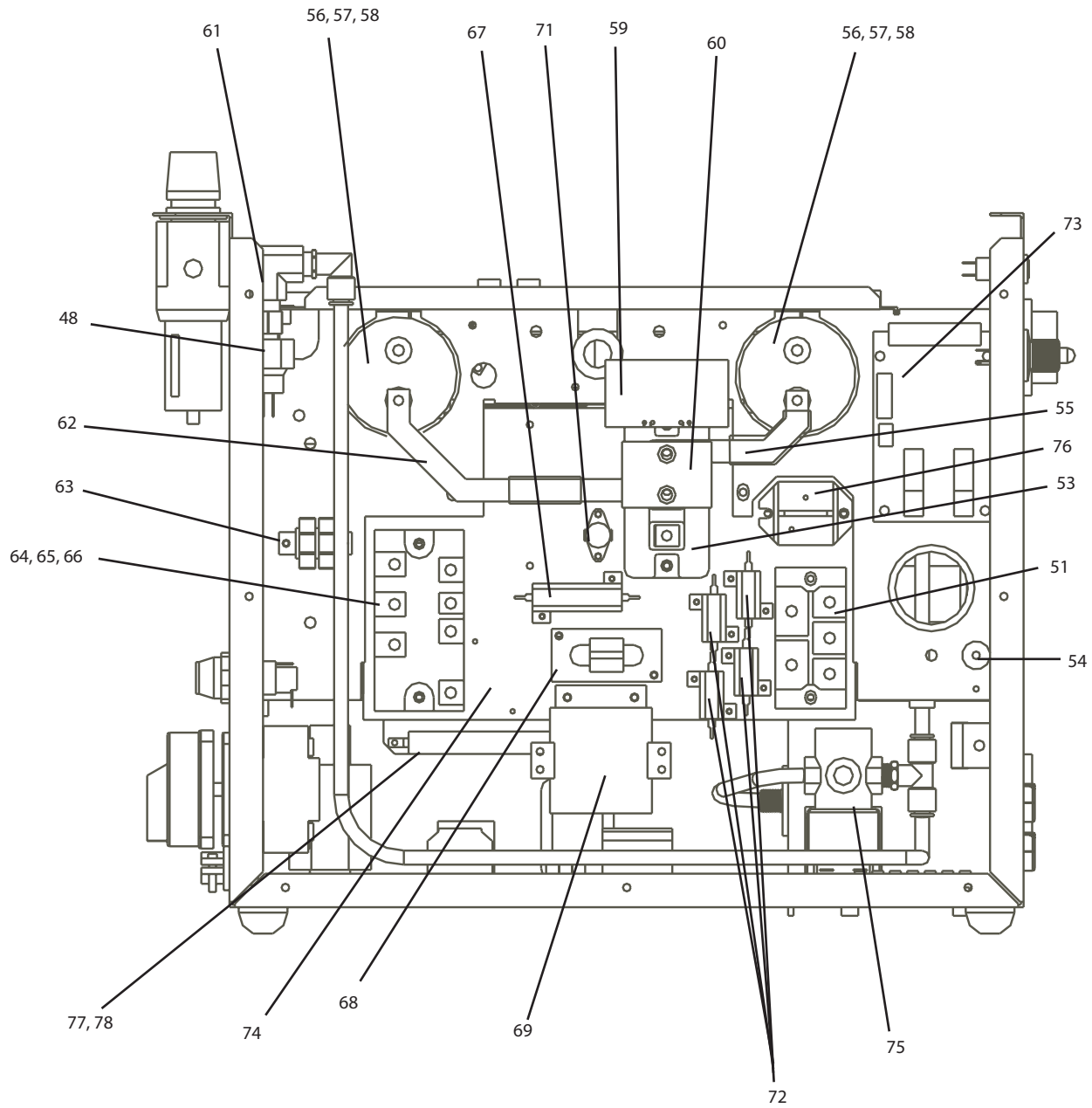


Figure 7-4. ESP-50 Power Source, Left Side View (400CE/460)

SECTION 7

REPLACEMENT PARTS

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
51	1	952150	BRIDGE 60 ADC 100NS 600 V (includes PAD - 951192)	D1
52	1	952002	CORE SATURABLE (Not shown - see wiring)	L3
53	1	951800	MODULE DUAL IGBT 150 A, 1200 V (includes PAD - 951191)	Q1
54	1	952208	STANDOFF INSULATING NYLON	TB3
55	1	36732	BUSBAR POS	
56	2	952237	CAPACITOR 1800 μ f 450 VDC (400CE/460 V)	C1, 2
	2	952562	CAPACITOR 1800 μ f 500 VDC (575 V)	C1, 2
57	2	994674	GROMMET STRIP	
58	2	951028	CAPACITOR 1 μ f 630 VDC (See wiring)	C3, 15
59	1	0558001178	PCB ASS'Y IGBT DRIVER BOARD	PCB2
60	1	951964	CAPACITOR 2 μ f 800 VDC (400CE/460V)	C16
61	1	36822	HOSE ASS'Y B/A x 1/4 NPT RUB	
62	1	36733	BUSBAR NEG	
63	1	950487	TERM BLOCK 2 POS	TB5
64	1	952235	MODULE INPUT BRIDGE/SCR (includes PAD - 952280)	IBR
65	1	2062282	CAPACITOR .22 μ f 1KV	C19
66	3	950591	METAL OXIDE VARISTOR 510 V (400CE/460 V)	MOV1, 2, 3
67	2	17750010	RESISTOR 50W 10 OHM (PAD - 951194)	R7
68	1	32958	CURRENT TRANSFORMER ASS'Y	T4
69	1	952255	CAPACITOR 40 μ f 400 VDC (400CE/460 V)	C4
70	1	058004394	INDUCTOR, PILOT ARC	L4
71	1	950711	THERMAL SWITCH 194°F	TS1
72	4	17721020	RESISTOR 25W 20 OHMS (PAD - 951193)	R3, 4, 5, 6
73	1	0558038258	PILOT ARC CONTROL PCB	PCB4
74	1	952558	HEATSINK	
75	1	950249	SOLENOID VALVE 1/4 NPT 165 PSI 24 VAC	SOL1
76	1	0558002436	DIODE SINGLE FAST RECOV	D2
77	1	17250010	RESISTOR WW FIXED 50W 10 OHM	R10
78	2	99512068	RESISTOR BRACKET	

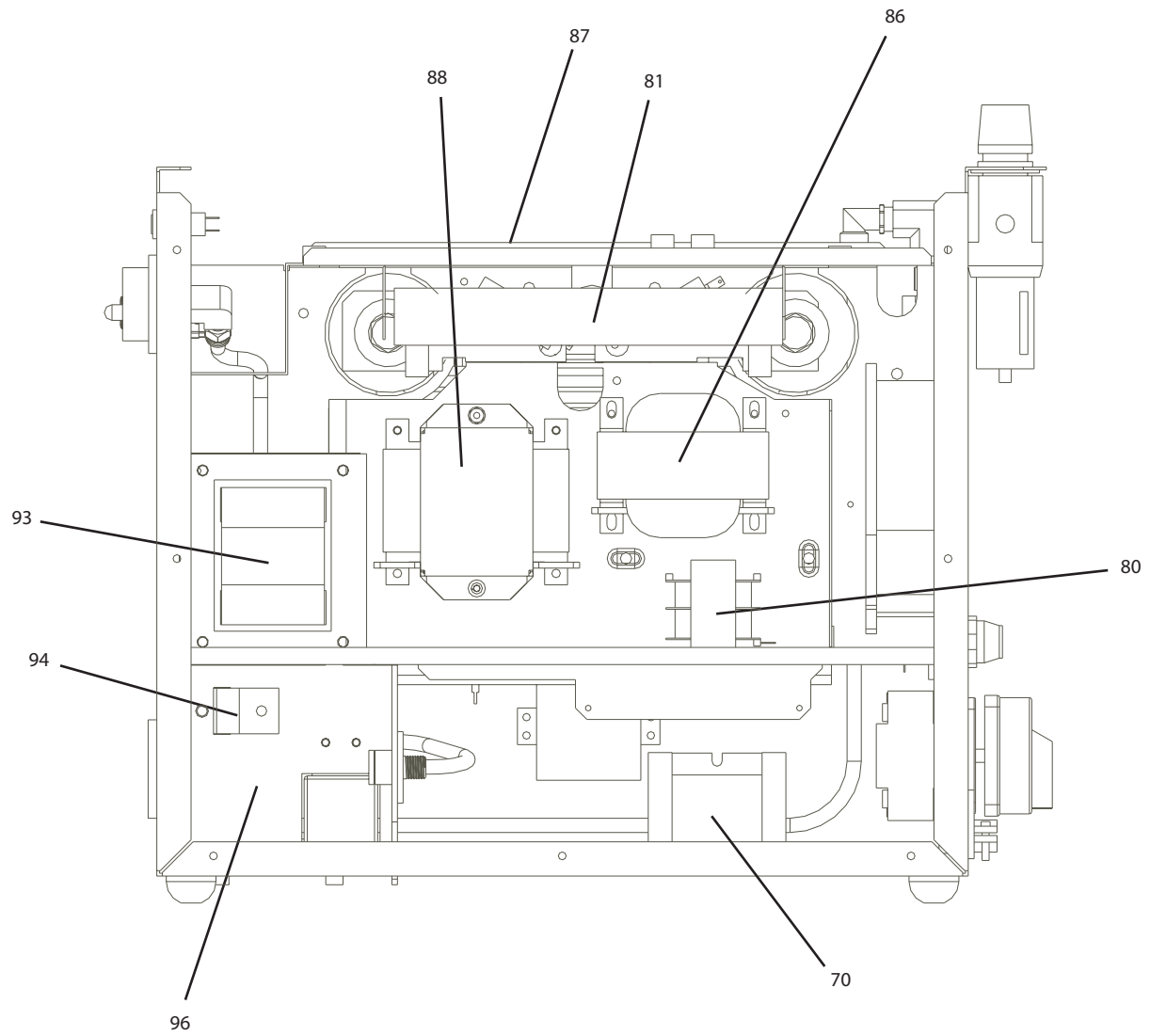


Figure 7-5. ESP-50 Power Source, Right Side View (208/230)

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
80	1	35940	CONTROL TRANSFORMER ASS'Y	T2
81	2	17300008	RESISTOR 300W 8 OHM	R11,12
82	1	0558004394	INDUCTOR, PILOT ARC	L4
83				
84				
85	1	23604891	LABEL WARNING HI VOLTAGE RED	
86	1	952232	INDUCTOR PFC	L2
87	1	0558038261	CONTROL BOARD ASS'Y	PCB1
88	1	0558004395	MAIN TRANSFORMER ASS'Y	T1
89	2	951469	CAPACITOR .022 μ f 250 VAC (See Wiring)	C17, 18
90				
91	2	951515	CAPACITOR .047 μ f 660 VAC	C21,C23
92				
93	1	952233	INDUCTOR OUTPUT	L1
94	1	36721	BUSBAR OUTPUT	
95				
96	1	36717	BRACKET OUTPUT	
97				
98				
99				
100				
101				
102	2	672348	CAPACITOR .01 μ f 1KV (See wiring)	C11, 12
103	1	952204	CAPACITOR .01 μ f 250 VAC (See wiring)	C9
104				
105				

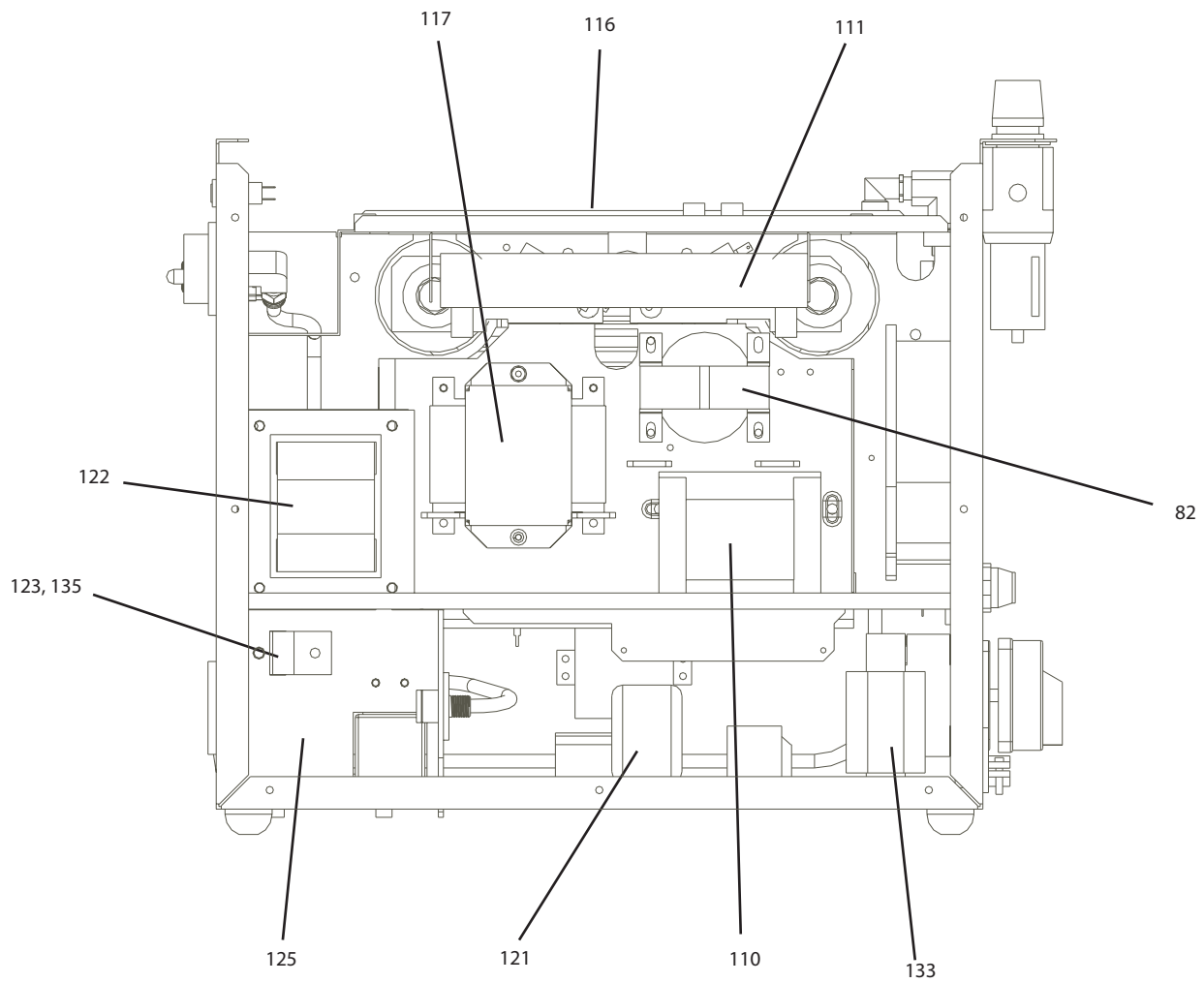


Figure 7-6. ESP-50 Power Source, Right Side View (400CE/460)

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
110	1	32914	CONTROL TRANSFORMER ASS'Y	T2
111	1	17300008	RESISTOR 300W 8 OHM	R11,12
112				
113				
114				
115	1	23604891	LABEL WARNING HI VOLTAGE RED	
116	1	0558038261	CONTROL BOARD ASS'Y	PCB1
117	1	0558004395	MAIN TRANSFORMER ASS'Y (400CE/460 V)	T1
118	2	951469	CAPACITOR .022 μ f 250 VAC (See wiring)	C17, 18
119				
120	1	951515	CAPACITOR .047 μ f 660 VAC	C23
121	1	0455803881	EMF FILTER BOARD	PCB5
122	1	952233	INDUCTOR OUTPUT	L1
123	1	36721	BUSBAR OUTPUT	
124				
125	1	36717	BRACKET OUTPUT KYDEX	
126				
127				
128				
129				
130	1	950487	TERM BLOCK 2 POS 20 A	TB1
131	2	672348	CAPACITOR .01 μ f 1KV (See wiring)	C11, 12
132	1	952204	CAPACITOR .01 μ f 250 VAC (See wiring)	C9
133	1	952213	REACTOR 3PH LINE 12 A	L2
134				
135	1	951314	CAPACITOR .022 μ f 1KV (See wiring)	C20

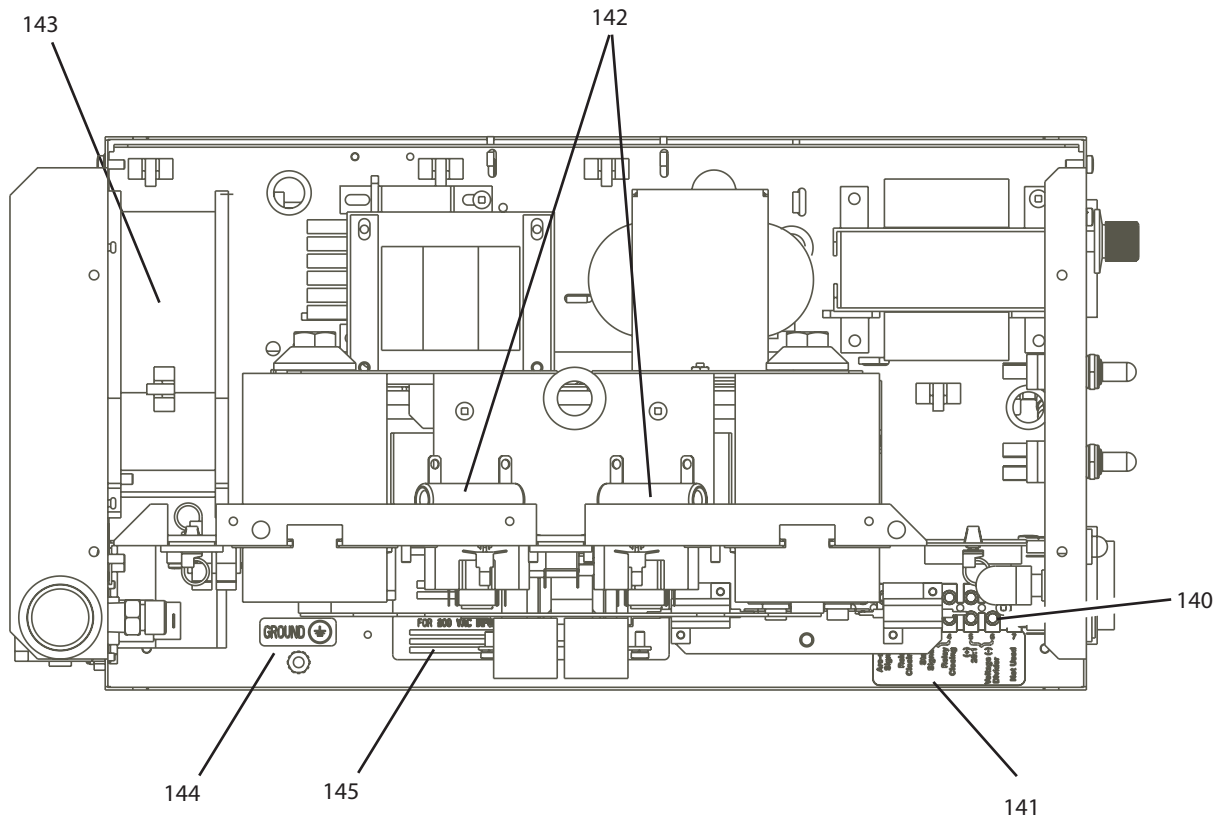


Figure 7-7. ESP-50 (208/230V) Power Source, Top View with PCB1 and Shelf Removed

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
140	1	954673	LABEL CNC INTERFACE	
141	1	952026	TERM BLOCK 7 POS 25 A	TB4
142	2	17240310	RESISTOR 10 K 25 W	R2, 15
143	1	951182	FAN AC AXIAL	M1
144	1	2091558	LABEL GROUND BLACK	
145	1	954700	LABEL INPUT (208/230 V)	
	1	954681	LABEL INPUT (400CE/460 V)	

NOTES

REVISION HISTORY

1. Original release of this manual: 02/2004.
2. 04/2004 Revision - added Pierce Height to cut data charts.
3. 01/2005 Revision - Section 2 - Chgd electrode p/n from: 0558004355 to: 0558005200 in cut data charts. Added p/n's 0558004973 & 0558004974 for ESP-50 208/230 V PT-35 packages without rack. Updated torch specifications figure 2-1 & 2-2 drawing. Updated spare parts kits with new p/n 0558005210, consumable value pack p/n 0558005203, consumable set p/n 0558005201 & consumable set p/n 0558005202. Section 4 - Updated figure 4-2 to show new electrode drawing. Created schematic pack (with new p/n's 0558004710 & 0558004711) for back cover insert.
4. Revision - 05/2005 - added Air Line Filter Regulator p/n 0558005394 note in Replacement Parts section per CN #053013.
5. Revision - 01/2006 - Removed filter regulator, item 151, p/n 0558005394 note, in replacement parts section per D. Smith.
6. Revision - 10/2007 - Updated info with 380/400 designations & updated disclaimer.
7. Revision 05/2011 - added KIT # 0558008736 per T. Turner.

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