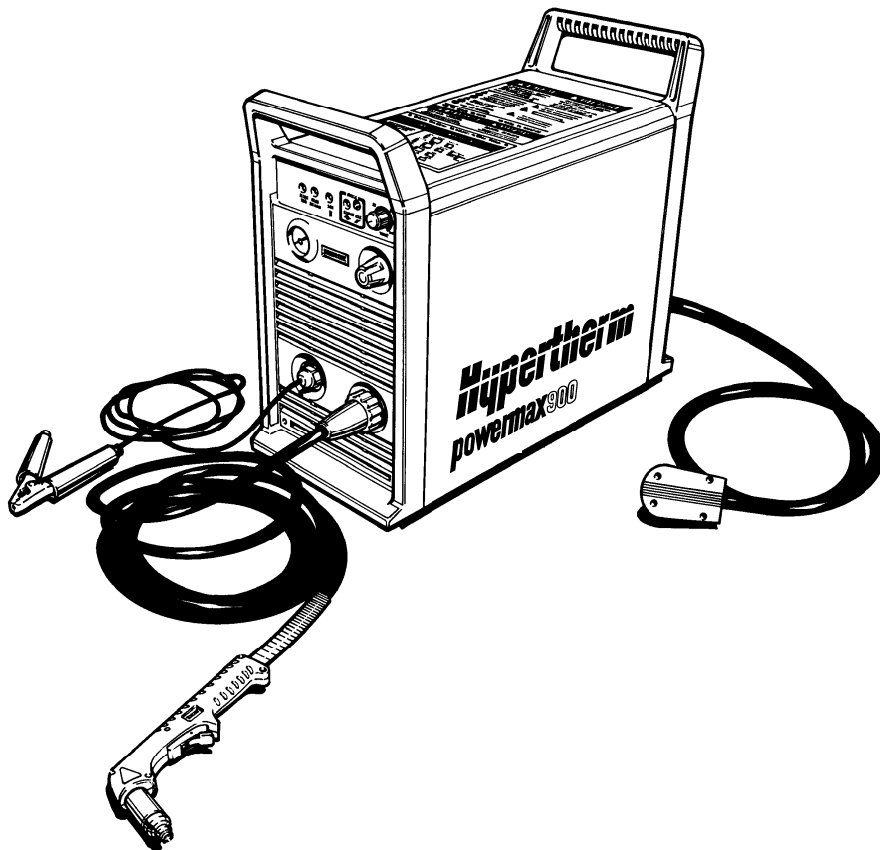


powermax900®

Plasma Arc Cutting System

***Service Manual
803150 - Revision 3***



EN50199
EN50192

powermax900

Plasma Arc Cutting System

**Service Manual
IM-315
(P/N 803150)**

**for systems beginning with serial number
900-010000**

Revision 3 June, 2000

**Hypertherm, Inc.
Hanover, NH
<http://www.hypertherm.com>
[email:info@hypertherm.com](mailto:info@hypertherm.com)**

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Hypertherm Offices Worldwide:

Hypertherm, Inc.

Etna Road, P.O. Box 5010
Hanover, NH 03755 USA
Tel.: (603) 643-3441 (Main Office)
Fax: (603) 643-5352 (All Departments)
Tel.: (800) 643-9878 (Technical Service – toll-free in USA and Canada)
Tel.: (800) 737-2978 (Customer Service – toll-free in USA and Canada)
email: info@hypertherm.com (General Information)
email: service@hypertherm.com (Technical/Customer Services)

Hypertherm Plasmatechnik GmbH

Technologiepark Hanau
Rodenbacher Chaussee 6
D-63457 Hanau-Wolfgang, Germany
Tel.: 49 6181 58 2100
Fax: 49 6181 58 2134

Hypertherm (S) Pte Ltd

No. 19 Kaki Bukit Road 2
K.B. Warehouse Complex
Singapore 417847
Tel.: 65 841 2489
Fax: 65 841 2490

Hypertherm UK Ltd

9 Berkeley Court, Manor Park
Runcorn, Cheshire, England WA7 1TQ
Tel.: 44 1928 579 074
Fax: 44 1928 579 604

France

15 Impasse des Rosiers
95610 Eragny, France
Tel.: 33 1 30 37 15 28
Fax: 33 1 30 37 15 79

Hypertherm S.r.L.

Via Torino 2
20123 Milan, Italy
Tel.: 39 02 725 46 312 (Customer Service)
Tel.: 39 02 725 46 314 (Technical Service)
Fax: 39 02 725 46 400 (All Departments)

Hypertherm B.V.

Burg, Haverkampstraat 13
7091 CN Dinxperlo, The Netherlands
Tel.: 31 315 655 866 (Customer Service)
Fax: 31 315 655 886

European Technical Support Organization (ETSO)

Edisonstraat 12
3281 NC Numansdorp, The Netherlands
Tel.: 00 800 4973 7843 (00 800 Hypertherm) – (toll-free Technical Service)
Tel.: 31 186 659494
Fax: 31 186 659495

Japan

Shinjuku Park Tower
30th Floor
3-7-1 Nishi-Shinjuku
Shinjuku-ku, Tokyo
163-1030, Japan
Tel.: 81 03 5326 3142
Fax: 81 03 5326 3001

ELECTROMAGNETIC COMPATIBILITY

EMC INTRODUCTION

Hypertherm's CE-marked equipment is built in compliance with standard EN50199. The equipment should be installed and used in accordance with the information below to achieve electromagnetic compatibility.

The limits required by EN50199 may not be adequate to completely eliminate interference when the affected equipment is in close proximity or has a high degree of sensitivity. In such cases it may be necessary to use other measures to further reduce interference.

This plasma is designed for use only in an industrial environment.

INSTALLATION AND USE

The user is responsible for installing and using the plasma equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing the cutting circuit, see *Earthing of Workpiece*. 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.

ASSESSMENT OF AREA

Before installing the 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, signalling and telephone cables; above, below and adjacent to the cutting equipment.
- b. Radio and television transmitters and receivers.
- c. Computer and other control equipment.
- d. Safety critical equipment, for example guarding of industrial equipment.
- e. Health of the people around, for example the use of pacemakers and hearing aids.
- f. Equipment used for calibration or measurement.

g. Immunity of other equipment in the environment. User shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures.

h. Time of day that cutting 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

Mains Supply

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

Maintenance of Cutting Equipment

The cutting equipment must be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the cutting equipment is in operation. The cutting 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.

Cutting Cables

The cutting 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 cutting installation and adjacent to it should be considered. However, metallic components bonded to the workpiece 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 Workpiece

Where the workpiece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, for example, 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 capacitances selected according to national regulations.

Note: The cutting circuit may or may not be earthed for safety reasons. 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, for example, by allowing parallel cutting current return paths which may damage the earth circuits of other equipment. Further guidance is given in IEC TC26 (sec)94 and IEC TC26/108A/CD Arc Welding Equipment Installation and Use.

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 plasma cutting installation may be considered for special applications.

WARRANTY

WARNING

Genuine Hypertherm parts are the factory-recommended replacement parts for your Hypertherm system. Any damage caused by the use of other than genuine Hypertherm parts may not be covered by the Hypertherm warranty.

WARNING

You are responsible for the safe use of the Product. Hypertherm does not and cannot make any guarantee or warranty regarding the safe use of the Product in your environment.

GENERAL

Hypertherm, Inc. warrants that its Products shall be free from defects in materials and workmanship, if Hypertherm is notified of a defect (i) with respect to the power supply within a period of two (2) years from the date of its delivery to you, and (ii) with respect to the torch and leads within a period of one (1) year from its date of delivery to you. This warranty shall not apply to any Product which has been incorrectly installed, modified, or otherwise damaged. Hypertherm, at its sole option, shall repair, replace, or adjust, free of charge, any defective Products covered by this warranty which shall be returned with Hypertherm's prior authorization (which shall not be unreasonably withheld), properly packed, to Hypertherm's place of business in Hanover, New Hampshire, or to an authorized Hypertherm repair facility, all costs, insurance and freight prepaid. Hypertherm shall not be liable for any repairs, replacement, or adjustments of Products covered by this warranty, except those made pursuant to this paragraph or with Hypertherm's prior written consent. **The warranty above is exclusive and is in lieu of all other warranties, express, implied, statutory, or otherwise with respect to the Products or as to the results which may be obtained therefrom, and all implied warranties or conditions of quality or of merchantability or fitness for a particular purpose or against infringement. The foregoing shall constitute the sole and exclusive remedy for any breach by Hypertherm of its warranty.** Distributors/OEMs may offer different or additional warranties, but Distributors/OEMs are not authorized to give any additional warranty protection to you or make any representation to you purporting to be binding upon Hypertherm.

PATENT INDEMNITY

Except only in cases of products not manufactured by Hypertherm or manufactured by a person other than Hypertherm not in strict conformity with Hypertherm's specifications and in cases of designs, processes,

formulae, or combinations not developed or purported to be developed by Hypertherm, Hypertherm will defend or settle, at its own expense, any suit or proceeding brought against you alleging that the use of the Hypertherm product, alone and not in combination with any other product not supplied by Hypertherm, infringes any patent of any third party. You shall notify Hypertherm promptly upon learning of any action or threatened action in connection with any such alleged infringement, and Hypertherm's obligation to indemnify shall be conditioned upon Hypertherm's sole control of, and the indemnified party's cooperation and assistance in, the defense of the claim.

LIMITATION OF LIABILITY

In no event shall Hypertherm be liable to any person or entity for any incidental, consequential, indirect, or punitive damages (including but not limited to lost profits) regardless of whether such liability is based on breach of contract, tort, strict liability, breach of warranties, failure of essential purpose or otherwise and even if advised of the possibility of such damages.

LIABILITY CAP

In no event shall Hypertherm's liability, whether such liability is based on breach of contract, tort, strict liability, breach of warranties, failure of essential purpose or otherwise, for any claim action suit or proceeding arising out of or relating to the use of the Products exceed in the aggregate the amount paid for the Products that gave rise to such claim.

INSURANCE

At all times you will have and maintain insurance in such quantities and types, and with coverage sufficient and appropriate to defend and to hold Hypertherm harmless in the event of any cause of action arising from the use of the Products.

NATIONAL AND LOCAL CODES

National and Local codes governing plumbing and electrical installation shall take precedent over any instructions contained in this manual. **In no event** shall Hypertherm be liable for injury to persons or property damage by reason of any code violation or poor work practices.

TRANSFER OF RIGHTS

You may transfer any remaining rights you may have hereunder only in connection with the sale of all or substantially all of your assets or capital stock to a successor in interest who agrees to be bound by all of the terms and conditions of this Warranty.

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Section 1

SAFETY

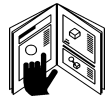
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RECOGNIZE SAFETY INFORMATION

The symbols shown in this section are used to identify potential hazards. When you see a safety symbol in this manual or on your machine, understand the potential for personal injury, and follow the related instructions to avoid the hazard.



FOLLOW SAFETY INSTRUCTIONS

Read carefully all safety messages in this manual and safety labels on your machine.

- Keep the safety labels on your machine in good condition. Replace missing or damaged labels immediately.
- Learn how to operate the machine and how to use the controls properly. Do not let anyone operate it without instruction.

- Keep your machine in proper working condition. Unauthorized modifications to the machine may affect safety and machine service life.

DANGER WARNING CAUTION

A signal word DANGER or WARNING is used with a safety symbol. DANGER identifies the most serious hazards.

- DANGER and WARNING safety labels are located on your machine near specific hazards.
- WARNING safety messages precede related instructions in this manual that may result in injury or death if not followed correctly.
- CAUTION safety messages precede related instructions in this manual that may result in damage to equipment if not followed correctly.



CUTTING CAN CAUSE FIRE OR EXPLOSION

Fire Prevention

- Be sure the area is safe before doing any cutting. Keep a fire extinguisher nearby.
- Remove all flammables within 35 feet (10 m) of the cutting area.
- Quench hot metal or allow it to cool before handling or before letting it touch combustible materials.
- Never cut containers with potentially flammable materials inside – they must be emptied and properly cleaned first.
- Ventilate potentially flammable atmospheres before cutting.
- When cutting with oxygen as the plasma gas, an exhaust ventilation system is required.

Explosion Prevention

- Do not use the plasma system if explosive dust or vapors may be present.
- Do not cut pressurized cylinders, pipes, or any closed container.
- Do not cut containers that have held combustible materials.



WARNING

Explosion Hazard
Argon-Hydrogen and Methane

Hydrogen and methane are flammable gases that present an explosion hazard. Keep flames away from cylinders and hoses that contain methane or hydrogen mixtures. Keep flames and sparks away from the torch when using methane or argon-hydrogen plasma.



WARNING

Hydrogen Detonation with Aluminum Cutting

- When cutting aluminum underwater, or with the water touching the underside of the aluminum, free hydrogen gas may collect under the workpiece and detonate during plasma cutting operations.
- Install an aeration manifold on the floor of the water table to eliminate the possibility of hydrogen detonation. Refer to the Appendix section of this manual for aeration manifold details.



ELECTRIC SHOCK CAN KILL

Touching live electrical parts can cause a fatal shock or severe burn.

- Operating the plasma system completes an electrical circuit between the torch and the workpiece. The workpiece and anything touching the workpiece are part of the electrical circuit.
- Never touch the torch body, workpiece or the water in a water table when the plasma system is operating.

Electric Shock Prevention

All Hypertherm plasma systems use high voltage in the cutting process (200 to 400 VDC are common). Take the following precautions when operating this system:

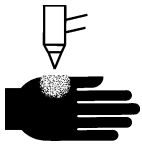
- Wear insulated gloves and boots, and keep your body and clothing dry.
- Do not stand, sit or lie on – or touch – any wet surface when using the plasma system.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground. If you must work in or near a damp area, use extreme caution.
- Provide a disconnect switch close to the power supply with properly sized fuses. This switch allows the operator to turn off the power supply quickly in an emergency situation.
- When using a water table, be sure that it is correctly connected to earth ground.
- Install and ground this equipment according to the instruction manual and in accordance with national and local codes.
- Inspect the input power cord frequently for damage or cracking of the cover. Replace a damaged power cord immediately. **Bare wiring can kill.**
- Inspect and replace any worn or damaged torch leads.
- Do not pick up the workpiece, including the waste cutoff, while you cut. Leave the workpiece in place or on the workbench with the work cable attached during the cutting process.
- Before checking, cleaning or changing torch parts, disconnect the main power or unplug the power supply.
- Never bypass or shortcut the safety interlocks.
- Before removing any power supply or system enclosure cover, disconnect electrical input power. Wait 5 minutes after disconnecting the main power to allow capacitors to discharge.
- Never operate the plasma system unless the power supply covers are in place. Exposed power supply connections present a severe electrical hazard.
- When making input connections, attach proper grounding conductor first.
- Each Hypertherm plasma system is designed to be used only with specific Hypertherm torches. Do not substitute other torches which could overheat and present a safety hazard.



CUTTING CAN PRODUCE TOXIC FUMES

Cutting can produce toxic fumes and gases that deplete oxygen and cause injury or death.

- Keep the cutting area well ventilated or use an approved air-supplied respirator.
- Do not cut in locations near degreasing, cleaning or spraying operations. The vapors from certain chlorinated solvents decompose to form phosgene gas when exposed to ultraviolet radiation.
- Do not cut metal coated or containing toxic materials, such as zinc (galvanized), lead, cadmium or beryllium, unless the area is well ventilated and the operator wears an air-supplied respirator. The coatings and any metals containing these elements can produce toxic fumes when cut.
- Never cut containers with potentially toxic materials inside – they must be emptied and properly cleaned first.
- 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.



PLASMA ARC CAN CAUSE INJURY AND BURNS

Instant-On Torches

Plasma arc comes on immediately when the torch switch is activated.

The plasma arc will cut quickly through gloves and skin.

- Keep away from the torch tip.
- Do not hold metal near the cutting path.
- Never point the torch toward yourself or others.



ARC RAYS CAN BURN EYES AND SKIN

Eye Protection Plasma arc rays produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.

- Use eye protection in accordance with applicable national or local codes.
- Wear eye protection (safety glasses or goggles with side shields, or a welding helmet) with appropriate lens shading to protect your eyes from the arc's ultraviolet and infrared rays.

Skin Protection Wear protective clothing to protect against burns caused by ultraviolet light, sparks and hot metal.

- Gauntlet gloves, safety shoes and hat.
- Flame-retardant clothing to cover all exposed areas.
- Cuffless trousers to prevent entry of sparks and slag.
- Remove any combustibles, such as a butane lighter or matches, from your pockets before cutting.

Arc Current		Lens Shade	
		AWS (USA)	ISO 4850
Up to 100 A		No. 8	No. 11
100-200 A		No. 10	No. 11-12
200-400 A		No. 12	No. 13
Over 400 A		No. 14	No. 14

Cutting Area Prepare the cutting area to reduce reflection and transmission of ultraviolet light:

- Paint walls and other surfaces with dark colors to reduce reflection.
- Use protective screens or barriers to protect others from flash and glare.
- Warn others not to watch the arc. Use placards or signs.



GROUNDING SAFETY

Work Cable Attach the work cable securely to the workpiece or the work table with good metal-to-metal contact. Do not connect it to the piece that will fall away when the cut is complete.

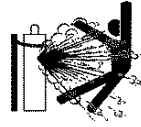
Work Table Connect the work table to an earth ground, in accordance with appropriate national or local electrical codes.

Input Power

- Be sure to connect the power cord ground wire to the ground in the disconnect box.
- If installation of the plasma system involves connecting the power cord to the power supply, be sure to connect the power cord ground wire properly.
- Place the power cord's ground wire on the stud first, then place any other ground wires on top of the power cord ground. Fasten the retaining nut tightly.
- Tighten all electrical connections to avoid excessive heating.

COMPRESSED GAS EQUIPMENT SAFETY

- Never lubricate cylinder valves or regulators with oil or grease.
- Use only correct gas cylinders, regulators, hoses and fittings designed for the specific application.
- Maintain all compressed gas equipment and associated parts in good condition.
- Label and color-code all gas hoses to identify the type of gas in each hose. Consult applicable national or local codes.

**GAS CYLINDERS CAN EXPLODE IF DAMAGED**

Gas cylinders contain gas under high pressure. If damaged, a cylinder can explode.

- Handle and use compressed gas cylinders in accordance with applicable national or local codes.
- Never use a cylinder that is not upright and secured in place.
- Keep the protective cap in place over valve except when the cylinder is in use or connected for use.
- Never allow electrical contact between the plasma arc and a cylinder.
- Never expose cylinders to excessive heat, sparks, slag or open flame.
- Never use a hammer, wrench or other tool to open a stuck cylinder valve.

**NOISE CAN DAMAGE HEARING**

Prolonged exposure to noise from cutting or gouging can damage hearing.

- Use approved ear protection when using plasma system.
- Warn others nearby about the noise hazard.

**PACEMAKER AND HEARING AID OPERATION**

Pacemaker and hearing aid operation can be affected by magnetic fields from high currents.

Pacemaker and hearing aid wearers should consult a doctor before going near any plasma arc cutting and gouging operations.

To reduce magnetic field hazards:

- Keep both the work cable and the torch lead to one side, away from your body.
- Route the torch leads as close as possible to the work cable.
- Do not wrap or drape the torch lead or work cable around your body.
- Keep as far away from the power supply as possible.

ADDITIONAL SAFETY INFORMATION

1. ANSI Standard Z49.1, *Safety in Welding and Cutting*, American Welding Society, 550 LeJeune Road, P.O. Box 351020, Miami, FL 33135
2. ANSI Standard Z49.2, *Fire Prevention in the Use of Cutting and Welding Processes*, American National Standards Institute, 1430 Broadway, New York, NY 10018
3. ANSI Standard Z87.1, *Safe Practices for Occupation and Educational Eye and Face Protection*, American National Standards Institute, 1430 Broadway, New York, NY 10018
4. AWS F4.1, *Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances*, American Welding Society, 550 LeJeune Road, P.O. Box 351040, Miami, FL 33135
5. AWS F5.2, *Recommended Safe Practices for Plasma Arc Cutting*, American Welding Society, 550 LeJeune Road, P.O. Box 351040, Miami, FL 33135
6. CGA Pamphlet P-1, *Safe Handling of Compressed Gases in Cylinders*, Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202
7. CSA Standard W117.2, *Code for Safety in Welding and Cutting*, Canadian Standards Association Standard Sales, 178 Rexdale Boulevard, Rexdale, Ontario M9W 1R3, Canada
8. NFPA Standard 51B, *Cutting and Welding Processes*, National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210
9. NFPA Standard 70-1978, *National Electrical Code*, National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210
10. OSHA, *Safety and Health Standards*, 29FR 1910, U.S. Government Printing Office, Washington, D.C. 20402.

Section 1a

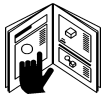
SÉCURITÉ

Cette section comprend:

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SUIVRE LES INSTRUCTIONS DE SÉCURITÉ	1a-2
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**IDENTIFIER LES CONSIGNES DE SÉCURITÉ**

Les symboles indiqués dans cette section sont utilisés pour identifier les risques éventuels. Si vous trouvez un symbole de sécurité, que ce soit dans ce manuel ou sur l'équipement, soyez conscient des risques de blessures et suivez les instructions correspondantes afin d'éviter ces risques.

**SUIVRE LES INSTRUCTIONS DE SÉCURITÉ**

Lire attentivement toutes les consignes de sécurité dans le présent manuel et sur les étiquettes de sécurité se trouvant sur la machine.

- Les étiquettes de sécurité doivent rester lisibles. Remplacer immédiatement les étiquettes manquantes ou abîmées.
- Apprendre à faire fonctionner la machine et à utiliser correctement les commandes. Ne laisser personne utiliser la machine sans connaître son fonctionnement.

- Garder la machine en bon état. Des modifications non autorisées sur la machine peuvent engendrer des problèmes de sécurité et raccourcir la durée d'utilisation de l'équipement.

DANGER AVERTISSEMENT PRÉCAUTION

Les signaux DANGER ou AVERTISSEMENT sont utilisés avec un symbole de sécurité, DANGER correspondant aux risques les plus sérieux.

- Les étiquettes de sécurité DANGER et AVERTISSEMENT sont situées sur la machine pour signaler certains dangers spécifiques.
- Les messages d'AVERTISSEMENT précèdent les instructions d'utilisation expliquées dans ce manuel et signalent les risques de blessures ou de mort au cas où ces instructions ne seraient pas suivies correctement.
- Les messages de PRÉCAUTION précèdent les instructions d'utilisation contenues dans ce manuel et signalent que le matériel risque d'être endommagé si les instructions ne sont pas suivies correctement.

**LE COUPAGE PEUT PROVOQUER UN INCENDIE OU UNE EXPLOSION****Prévention des incendies**

- Avant de commencer, s'assurer que la zone de coupage ne présente aucun danger. Conserver un extincteur à proximité.
- Éloigner toute matière inflammable à une distance d'au moins 10 m du poste de coupage.
- Tremper le métal chaud ou le laisser refroidir avant de le manipuler ou avant de le mettre en contact avec des matériaux combustibles.
- Ne jamais couper des récipients pouvant contenir des matières inflammables avant de les avoir vidés et nettoyés correctement.
- Aérer toute atmosphère potentiellement inflammable avant d'utiliser un système plasma.
- Lors de l'utilisation d'oxygène comme gaz plasma, un système de ventilation par aspiration est nécessaire.

Prévention des explosions

- Ne pas couper en présence de poussière ou de vapeurs.
- Ne pas couper de bouteilles, de tuyaux ou autres récipients fermés et pressurisés.
- Ne pas couper de récipients contenant des matières combustibles.

**AVERTISSEMENT**

Risque d'explosion
Argon-hydrogène et méthane

L'hydrogène et le méthane sont des gaz inflammables et potentiellement explosifs. Conserver à l'écart de toute flamme les bouteilles et tuyaux contenant des mélanges à base d'hydrogène ou de méthane. Maintenir toute flamme et étincelle à l'écart de la torche lors de l'utilisation d'un plasma d'argon-hydrogène ou de méthane.

**AVERTISSEMENT**

Détonation de l'hydrogène lors du coupage de l'aluminium

- Lors du coupage de l'aluminium sous l'eau, ou si l'eau touche la partie inférieure de la pièce d'aluminium, de l'hydrogène libre peut s'accumuler sous la pièce à couper et détonner lors du coupage plasma.
- Installer un collecteur d'aération au fond de la table à eau afin d'éliminer les risques de détonation de l'hydrogène. Se référer à l'annexe du manuel pour plus de renseignements sur les collecteurs d'aération.



LES CHOCS ÉLECTRIQUES PEUVENT ÊTRE FATALS

Toucher une pièce électrique sous tension peut provoquer un choc électrique fatal ou des brûlures graves.

- La mise en fonctionnement du système plasma ferme un circuit électrique entre la torche et la pièce à couper. La pièce à couper et tout autre élément en contact avec cette pièce font partie du circuit électrique.
- Ne jamais toucher le corps de la torche, la pièce à couper ou l'eau de la table à eau pendant le fonctionnement du système plasma.

Prévention des chocs électriques

Tous les systèmes plasma Hypertherm utilisent des hautes tensions pour le coupage (souvent de 200 à 400 V). On doit prendre les précautions suivantes quand on utilise le système plasma :

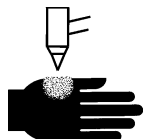
- Porter des bottes et des gants isolants et garder le corps et les vêtements au sec.
- Ne pas se tenir, s'asseoir ou se coucher sur une surface mouillée, ni la toucher quand on utilise le système plasma.
- S'isoler de la surface de travail et du sol en utilisant des tapis isolants secs ou des couvertures assez grandes pour éviter tout contact physique avec le travail ou le sol. S'il s'avère nécessaire de travailler dans ou près d'un endroit humide, procéder avec une extrême prudence.
- Installer un sectionneur avec fusibles appropriés, à proximité de la source de courant. Ce dispositif permet à l'opérateur d'arrêter rapidement la source de courant en cas d'urgence.
- En cas d'utilisation d'une table à eau, s'assurer que cette dernière est correctement mise à la terre.

- Installer et mettre à la terre l'équipement selon les instructions du présent manuel et conformément aux codes électriques locaux et nationaux.
- Inspecter fréquemment le cordon d'alimentation primaire pour s'assurer qu'il n'est ni endommagé, ni fendu. Remplacer immédiatement un cordon endommagé. **Un câble dénudé peut tuer.**
- Inspecter et remplacer les câbles de la torche qui sont usés ou endommagés.
- Ne pas saisir la pièce à couper ni les chutes lors du coupage. Laisser la pièce à couper en place ou sur la table de travail, le câble de retour connecté lors du coupage.
- Avant de vérifier, de nettoyer ou de remplacer les pièces de la torche, couper l'alimentation ou débrancher la prise de courant.
- Ne jamais contourner ou court-circuiter les verrouillages de sécurité.
- Avant d'enlever le capot du système ou de la source de courant, couper l'alimentation électrique. Attendre ensuite 5 minutes pour que les condensateurs se déchargent.
- Ne jamais faire fonctionner le système plasma sans que les capots de la source de courant ne soient en place. Les raccords exposés de la source de courant sont extrêmement dangereux.
- Lors de l'installation des connexions, attacher tout d'abord la prise de terre appropriée.
- Chaque système plasma Hypertherm est conçu pour être utilisé uniquement avec des torches Hypertherm spécifiques. Ne pas utiliser des torches inappropriées qui pourraient surchauffer et présenter des risques pour la sécurité.

LE COUPAGE PEUT PRODUIRE DES VAPEURS TOXIQUES

Le coupage peut produire des vapeurs et des gaz toxiques qui réduisent le niveau d'oxygène dans l'air et peuvent provoquer des blessures, voire la mort.

- Conserver le poste de coupage bien aéré ou utiliser un masque respiratoire homologué.
- Ne pas procéder au coupage près d'endroits où s'effectuent le dégraissage, le nettoyage ou la vaporisation. Certains solvants chlorés se décomposent sous l'effet des rayons ultraviolets et forment du phosgène.
- Ne pas couper des métaux peints ou contenant des matières toxiques comme le zinc (galvanisé), le plomb, le cadmium ou le béryllium, à moins que la zone de travail soit très bien ventilée et que l'opérateur porte un masque respiratoire. Les revêtements et métaux contenant ces matières peuvent produire des vapeurs toxiques lors du coupage.
- Ne jamais couper de récipients pouvant contenir des matières inflammables avant de les avoir vidés et nettoyés correctement.



L'ARC PLASMA PEUT PROVOQUER DES BLESSURES OU DES BRÛLURES

Torches à allumage instantané

L'arc plasma s'allume immédiatement après que la torche soit mise en marche.

L'arc plasma coupe facilement les gants et la peau.

- Rester éloigné de l'extrémité de la torche.
- Ne pas tenir de métal près de la trajectoire de coupe.
- Ne jamais pointer la torche vers soi ou d'autres personnes.



LES RAYONS DE L'ARC PEUVENT BRÛLER LES YEUX ET LA PEAU

Protection des yeux Les rayons de l'arc plasma produisent de puissants rayons visibles ou invisibles (ultraviolets et infrarouges) qui peuvent brûler les yeux et la peau.

- Utiliser des lunettes de sécurité conformément aux codes locaux ou nationaux en vigueur.
- Porter des lunettes de protection (lunettes ou masque muni d'écrans latéraux ou encore masque de soudure) avec des verres teintés appropriés pour protéger les yeux des rayons ultraviolets et infrarouges de l'arc.

- Gants à crispin, chaussures et casque de sécurité.
- Vêtements ignifuges couvrant toutes les parties exposées du corps.
- Pantalon sans revers pour éviter que des étincelles ou des scories puissent s'y loger.
- Avant le coupage, retirer de ses poches tout objet combustible comme les briquets au butane ou les allumettes.

Zone de coupage Préparer la zone de coupage afin de réduire la réverbération et la transmission de la lumière ultraviolette :

- Peindre les murs et autres surfaces de couleur sombre pour réduire la réflexion de la lumière.
- Utiliser des écrans et autres dispositifs de protection afin de protéger les autres personnes de la lumière et de la réverbération.
- Prévenir les autres personnes de ne pas regarder l'arc. Utiliser des affiches ou des panneaux.

Courant de l'arc	Puissance des verres teintés	
	AWS (É.-U.)	ISO 4850
Jusqu'à 100 A	N° 8	N° 11
100-200 A	N° 10	N° 11-12
200-400 A	N° 12	N° 13
Plus de 400 A	N° 14	N° 14



Protection de la peau Porter des vêtements de sécurité pour se protéger contre les brûlures que peuvent causer les rayons ultraviolets, les étincelles et le métal brûlant :



MISE À LA MASSE ET À LA TERRE

Câble de retour Bien fixer le câble de retour (ou de masse) à la pièce à couper ou à la table de travail de façon à assurer un bon contact métal-métal. Ne pas fixer le câble de retour à la partie de la pièce qui doit se détacher.

Table de travail Raccorder la table de travail à la terre, conformément aux codes de sécurité locaux ou nationaux appropriés.

Alimentation

- S'assurer que le fil de terre du cordon d'alimentation est connecté à la terre dans le coffret du sectionneur.
- S'il est nécessaire de brancher le cordon d'alimentation à la source de courant lors de l'installation du système, s'assurer que le fil de terre est correctement branché.
- Placer tout d'abord le fil de terre du cordon d'alimentation sur le plot de mise à la terre puis placer les autres fils de terre par-dessus. Bien serrer l'écrou de retenue.
- S'assurer que toutes les connexions sont bien serrées pour éviter la surchauffe.

SÉCURITÉ DES BOUTEILLES DE GAZ COMPRIMÉ

- Ne jamais lubrifier les robinets des bouteilles ou les régulateurs avec de l'huile ou de la graisse.
- Utiliser uniquement les bouteilles, régulateurs, tuyaux et accessoires appropriés et conçus pour chaque application spécifique.
- Entretenir l'équipement et les pièces d'équipement à gaz comprimé afin de les garder en bon état.
- Étiqueter et coder avec des couleurs tous les tuyaux de gaz afin d'identifier le type de gaz contenu dans chaque tuyau. Se référer aux codes locaux ou nationaux en vigueur.



LES BOUTEILLES DE GAZ COMPRIMÉ PEUVENT EXPLOSER EN CAS DE DOMMAGES

Les bouteilles de gaz contiennent du gaz à haute pression. Si une bouteille est endommagée, elle peut exploser.

- Manipuler et utiliser les bouteilles de gaz comprimé conformément aux codes locaux ou nationaux.
- Ne jamais utiliser une bouteille qui n'est pas placée à la verticale et bien assujettie.
- Le capuchon de protection doit être placé sur le robinet sauf si la bouteille est en cours d'utilisation ou connectée pour utilisation.
- Éviter à tout prix le contact électrique entre l'arc plasma et une bouteille.
- Ne jamais exposer des bouteilles à une chaleur excessive, aux étincelles, aux scories ou aux flammes nues.
- Ne jamais utiliser des marteaux, des clés ou d'autres outils pour débloquer le robinet des bouteilles.



LE BRUIT PEUT PROVOQUER DES PROBLÈMES AUDITIFS

Une exposition prolongée au bruit du coupage ou du gougeage peut provoquer des problèmes auditifs.

- Utiliser un casque de protection homologué lors de l'utilisation du système plasma.
- Prévenir les personnes aux alentours des risques encourus en cas d'exposition au bruit.



PACEMAKERS ET PROTHÈSES AUDITIVES

Les champs magnétiques produits par les courants à haute tension peuvent affecter le fonctionnement des prothèses auditives et des pacemakers. Les personnes portant ce type d'appareil doivent consulter un médecin avant de s'approcher d'un lieu où s'effectue le coupage ou le gougeage plasma.

Pour réduire les risques associés aux champs magnétiques :

- Garder loin de soi et du même côté du corps le câble de retour et le faisceau de la torche.
- Faire passer le faisceau de la torche le plus près possible du câble de retour.
- Ne pas s'enrouler le faisceau de la torche ou le câble de retour autour du corps.
- Se tenir le plus loin possible de la source de courant.

Section 2 SPECIFICATIONS

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SPECIFICATIONS

INTRODUCTION

The Powermax900 plasma cutting system uses an inverter power supply to provide a smooth DC output voltage, producing excellent cut and gouge quality on mild steel, stainless steel, aluminum and other metals. The Powermax900 power supply provides constant-current output variable from 20 to 55 amps, for optimum performance on all thicknesses of metal up to 5/8" (16 mm) thick. At 55 amps, the Powermax900 can also cut metals up to 7/8" (22 mm) thick and will sever metals up to 1-1/8" (29 mm) thick.

Air is the primary plasma gas, providing low operating cost combined with high-speed performance. Cylinder air or shop air can be used as long as it is clean, dry and oil-free. When properly set and maintained, the pressure regulator and gas filter on the power supply ensure that the correct pressure and flow rate is supplied to the system at the proper quantity and quality. The Powermax900 can also cut with nitrogen when extended electrode life is a priority.

This service manual provides information for qualified service technicians to troubleshoot and repair the power supply and torch. Sections 4, 5 and 6 contain in-depth parts lists of the Powermax900 systems. This manual also provides a detailed list of safety practices, so that the system can be safely tested and maintained. **READ THE SAFETY SECTION (Section 1) FIRST!**

The Powermax900 operator manual provides setup and daily operating instructions.

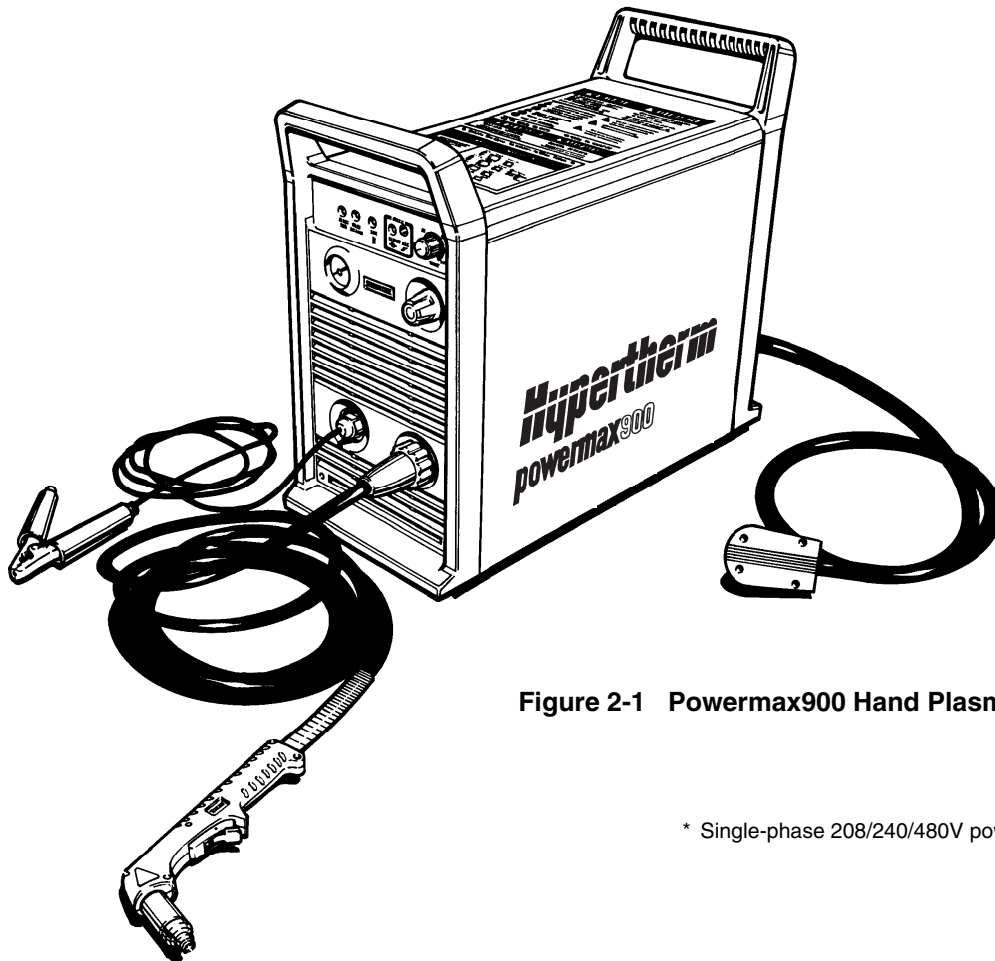


Figure 2-1 Powermax900 Hand Plasma Cutting System*

* Single-phase 208/240/480V power supply shown.

SPECIFICATIONS

Power Supply

Rated Open Circuit Voltage (OCV) (U_0)	300 VDC
Rated Output Current (I_2)	20–55 amps
Rated Output Voltage (U_2)	120 VDC
Duty Cycle (X) @ 40°C	50% ($I_2=55A$, $U_2=120V$) 100% ($I_2=39A$, $U_2=120V$ for the 208/240/480V power supplies) See data tag on power supply for more information on duty cycle.
Ambient temperature/duty cycle	Power supplies will operate between +14° and 104° F (-10° and +40° C). Power supplies operated in an ambient temperature above 86° F (30° C) may show some decrease in duty cycle.
Apparent Input Power (S_1)	12.5kVA (U_1I_1)
Input Voltage (U_1)/Input Current (I_1) @ 6.6 kw Output	208V/55A; 240V/47A; 480V/28A - 1 ϕ , 50/60 Hz 208V/32A; 240V/28A; 480V/15A - 3 ϕ , 50/60 Hz 200V/57A; 230V/50A; 400V/33A - 1 ϕ , 50/60 Hz 200V/33A; 230V/29A; 400V/18A - 3 ϕ , 50/60 Hz 230V (CE)/29A; 400V (CE)/18A - 3 ϕ , 50/60 Hz 600V/12A - 3 ϕ , 60 Hz
Dimensions and Weight:	
Depth	23.1" (590 mm)
Width	10.4" (260 mm) without wheels 15.3" (390 mm) with wheels
Height	19.6" (500 mm) without wheels 23.7" (620 mm) with wheels 27.7" (700 mm) for 600V power supply

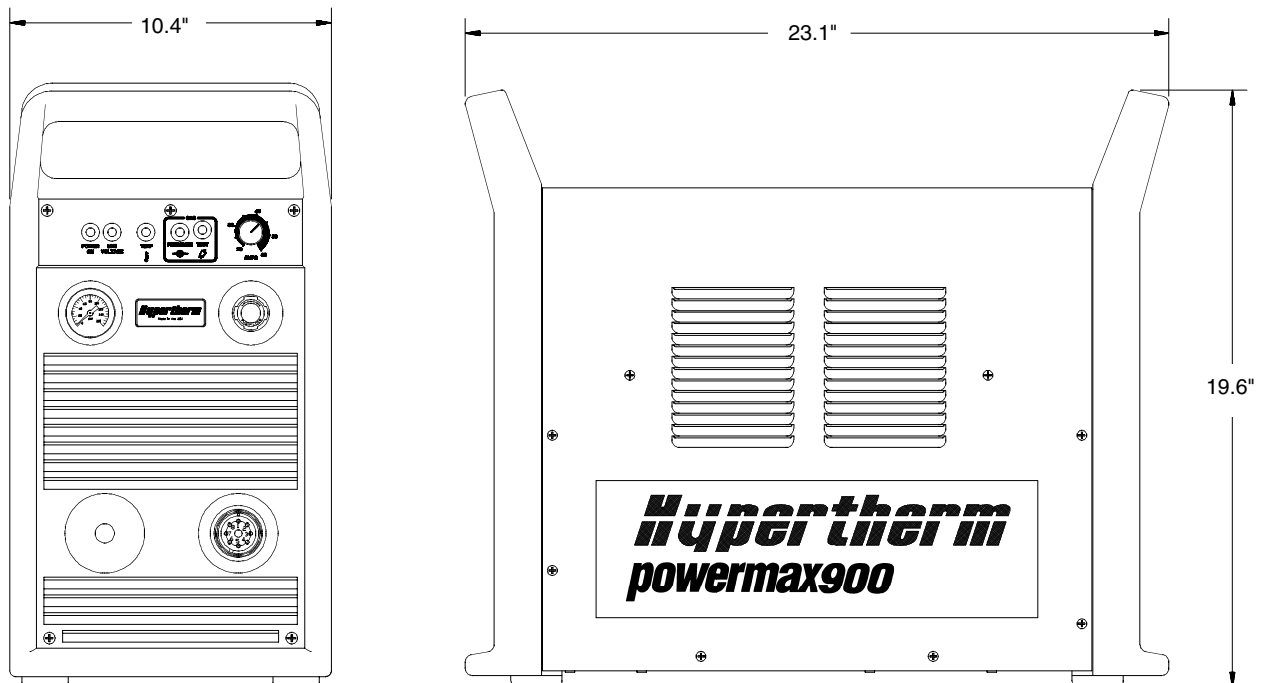


Figure 2-2 Powermax900 Power Supply with Dimensions

SPECIFICATIONS

Weight	65 pounds (30 kg) without wheels 72 pounds (33 kg) with wheels 128 pounds (58 kg) for 600V and 230V-CE power supplies
Gas Type	Air or Nitrogen
Gas Quality, Air	Clean, dry, oil-free
Gas Quality, Nitrogen	99.995% pure
Gas Inlet Pressure	90 psi (6.2 bar)
Gas Flow	360 scfh/6 scfm at 90 psi (170 l/min at 6.2 bar) supplied to power supply pressure regulator
Power Supply pressure regulator setting	70 psi (4.8 bar) flowing

PAC125 TORCHES

Maximum 55A Cutting Capacity (PAC125T)	7/8" (22 mm) @ 50% duty cycle
Maximum 55A Cutting Capacity (PAC125M)	1/2" (13 mm) @ 50% duty cycle
Maximum 39A Cutting Capacity (PAC125M)	3/8" (9.5 mm) @ 100% duty cycle
Maximum current at 50% duty cycle	55 amps
Gouging Capability (metal removal rate)	6.3 pounds (2.9 kg)/hr
Weight PAC125T	4.5 pounds (2 kg) with 25 ft (7.6 m) lead 7 pounds (3.2 kg) with 50 ft (15 m) lead
Weight PAC125M	7 pounds (3.2 kg) with 25 ft (7.6 m) lead 9.5 pounds (4.3 kg) with 50 ft (15 m) lead

PAC125T Hand Torch Assembly

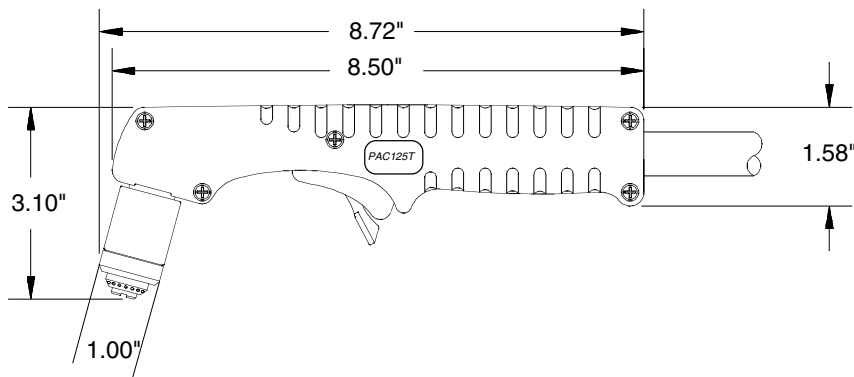


Figure 2-3 PAC125T Torch with Dimensions

PAC125M Machine Torch Assembly

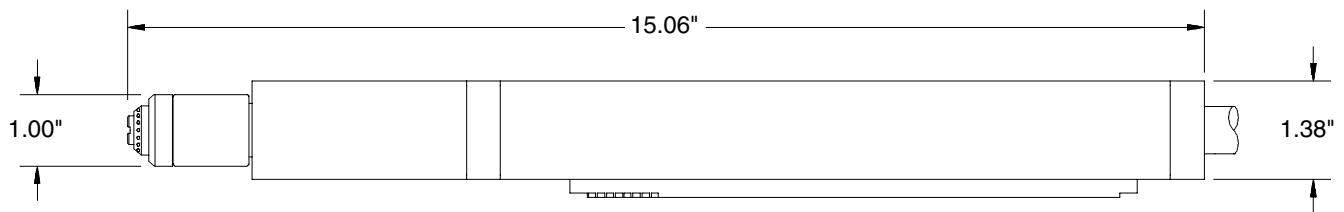


Figure 2-4 PAC125M Torch with Dimensions

S MARK

The Powermax900 conforms to **CE** standard EN50192. The **S** mark indicates that the power supply and torch are suitable for use in environments with increased hazard of electrical shock. The hand torches must have shielded consumable parts to maintain **S** mark compliance.

SETUP SPECIFICATIONS

Power Cord Plugs

All 208/240/480V power supplies are shipped with a single-phase power cord and plug. To operate as a three-phase unit, the user must obtain a power cord and plug that is certified by national or local electrical codes. The plug should be connected to the power cord by a licensed electrician.

All 200/230/400V and 400V CE power supplies are shipped with a three-phase power cord and no plug. The user must obtain a plug that is certified by national or local electrical codes. The plug should be connected to the power cord by a licensed electrician.

Power Cords

If the power cord needs to be changed, use the tables below to choose the proper wire size for the appropriate length cord. Note that the input current used to determine the cord size is I_{1eff} . In the U.S., use a 3-conductor SO type cord for single-phase, and a 4-conductor SO type cord for three-phase power supplies. In other countries, use cords that are certified by national or local codes. Prepare the power cord wires as shown in Fig. 2-5 for non-CE power supplies, or Fig. 2-6 for CE power supplies. Note that all 4 wires must loop through the toroid in the CE power supply. Cap or tin the conductor leads and use a #10 terminal on the ground wire. The cord should be installed only by a licensed electrician.

208/240/480/600V Power Supplies

Input	Phase	Input Current (I_{1eff})	Recommended Power Cord Gauge Size (AWG)				Voltage
			< 10 ft	10 – 25 ft	25 – 50 ft	50 – 100 ft	
208 VAC	1	39A	8	8	6	4	4
240 VAC	1	33A	8	8	8	6	4
480 VAC	1	19A	12	12	12	10	8
208 VAC	3	23A	8	8	8	6	4
240 VAC	3	20A	10	10	10	8	6
480 VAC	3	10A	12	12	12	12	10
600 VAC	3	8A	12	12	12	12	10

200/230/400V Power Supplies

Input Voltage	Phase	Input Current (I_{1eff})	Recommended Power Cord Gauge Size (mm ²)				
			< 3 m	3 – 7.5 m	7.5 – 15 m	15 – 30 m	30 – 45 m
200 VAC	1	40A	10	10	16	25	25
230 VAC	1	35A	6	6	10	16	25
400 VAC	1	23A	4	4	4	6	10
200 VAC	3	23A	4	4	6	16	25
230 VAC	3	21A	2.5	4	6	10	16
400 VAC	3	13A	2.5	2.5	2.5	4	6

SPECIFICATIONS

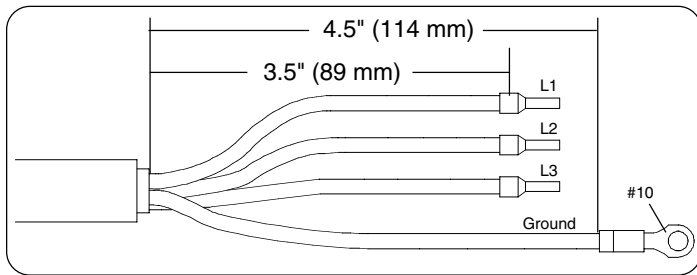


Figure 2-5 Power Cord Preparation - Non-CE

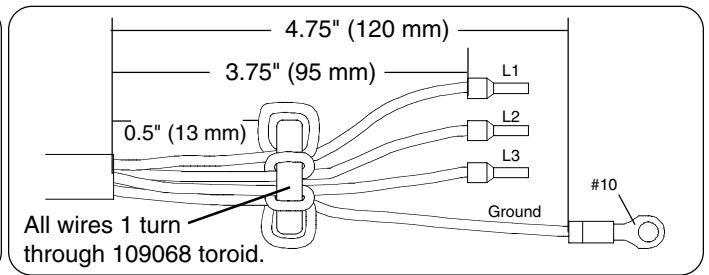


Figure 2-6 Power Cord Preparation - CE

Power Requirements

Line Voltage Disconnect Box

Use a line disconnect box for each power supply. This disconnect box allows the operator to turn the power supply off quickly in an emergency situation. The switch should be located on a wall near the power supply, and should be easily accessible to the operator. The interrupt level of the switch must be equal to or exceed the continuous rating of the fuses. Use slow-blow fuses according to the power requirements listed below.

<u>Input Voltage</u>	<u>Phase</u>	<u>Input Current @ 6.6 kw Output</u>	<u>Recommended Slow-Blow Fuse Size</u>
200 VAC	1	57 amps	70 amp
208 VAC	1	55 amps	70 amp
230 VAC	1	50 amps	70 amp
240 VAC	1	47 amps	60 amp
400 VAC	1	33 amps	40 amp
480 VAC	1	28 amps	35 amp
200 VAC	3	33 amps	40 amp
208 VAC	3	32 amps	40 amp
230 VAC	3	29 amps	35 amp
230 VAC (CE)	3	31 amps	40 amp
240 VAC	3	28 amps	35 amp
400 VAC	3	18 amps	25 amp
400 VAC (CE)	3	18 amps	25 amp
480 VAC	3	15 amps	20 amp
600 VAC	3	12 amps	20 amp

Section 3 MAINTENANCE

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INTRODUCTION

This section provides service technicians with routine maintenance, theory of operation and troubleshooting of the power supply. Also included in this section is the sequence of operation, power board and control board test points, and the removal and replacement procedures for the PAC125T trigger torch and PAC125M machine torch parts.

ROUTINE MAINTENANCE

Bowl Draining/Filter Element Cleaning

Moisture coming out of the torch can cause the torch to sputter and hiss. If there is moisture, purge the lines. If moisture builds up in the bowl of the filter at the rear of the power supply, drain the bowl and clean the filter element:

1. **Shut the gas supply off and disconnect** the gas supply hose from the filter assembly before proceeding.
2. Remove the cap at the bottom of the filter bowl and turn the knurled drain valve to the right to release water from the bowl.

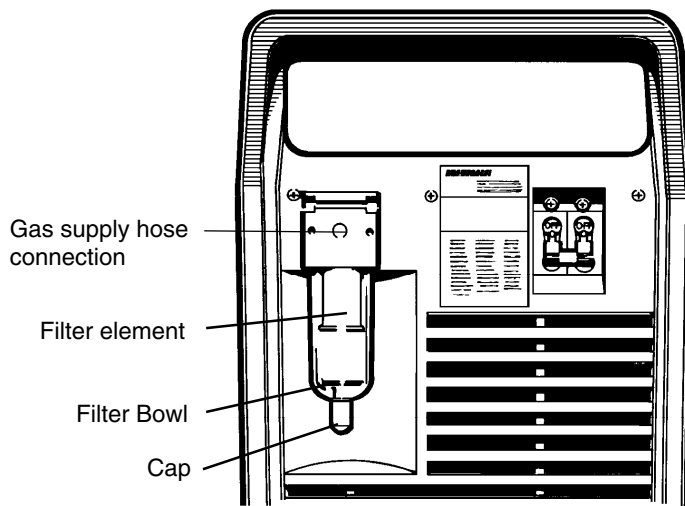


Figure 3-1 Filter Assembly

3. Unscrew the filter bowl.
4. Unscrew the filter element. See *Powermax900 Field Upgrade Kits and Optional Parts* in **Section 4** for part number information.
5. Clean filter element with alcohol, then blow out with air from the inside of the filter element. Clean the bowl with household soap only.
6. Replace the filter element and filter bowl.
7. Reconnect the gas supply hose.

Removal, Cleaning and Replacement of the Cooling Air Filter

Powermax900 systems are normally shipped without air filters. If your Powermax900 has the air filter option, it will need periodic cleaning. Excessively dirty or dusty environments can block the cooling air filter (if installed) and cause the power supply to overheat and shut down.



WARNING



SHOCK HAZARD: Always turn off power and unplug cord from wall and wait 5 minutes before removing any power supply cover. If power supply is directly connected to a line disconnect switch, place line disconnect switch to OFF position. In the U.S., use a "lock-out / tag-out" procedure until the service or maintenance work is complete. In other countries, follow appropriate local or national safety procedures.

1. Turn the Powermax900 power switch to the OFF (0) position, unplug the power cable from the wall receptacle and disconnect the gas supply.
2. Remove the screws that secure the power supply cover to the chassis.
3. Remove the cover, and remove the cooling air filter from the clips by sliding the filter to the left and then up - Fig. 3-2. See *Powermax900 Field Upgrade Kits and Optional Parts* in Section 4 for part number information.

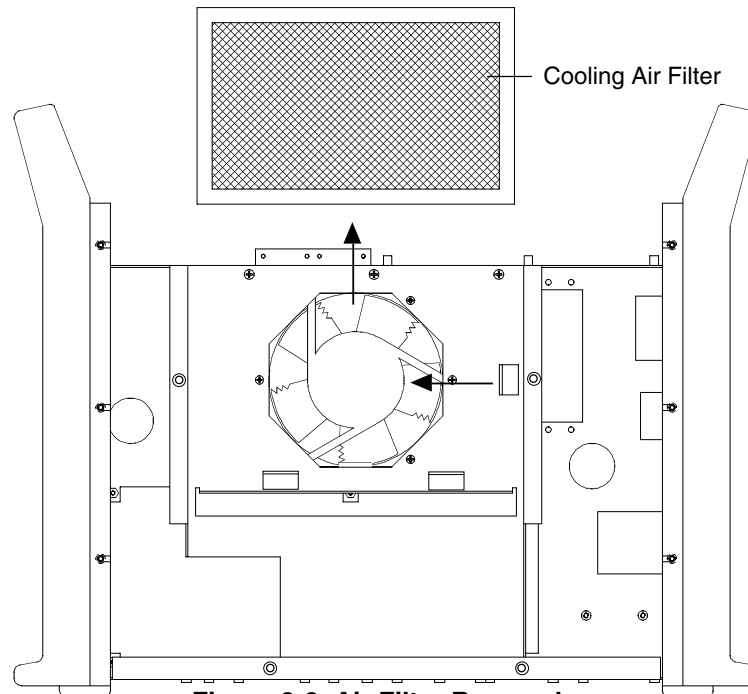


Figure 3-2 Air Filter Removal

4. Clean the air filter with either soap and water or with low pressure compressed air.
5. Replace the dry filter in the power unit with the wire mesh facing the fan.
6. Replace and re-fasten the power supply cover with the existing screws.

MAINTENANCE

CONTROLS AND INDICATORS

- **Green POWER ON LED**
When illuminated, indicates that all control circuits are activated, the torch safety interlock is satisfied and the system is ready for operation.
- **Green LINE VOLTAGE LED**
When illuminated green, indicates that the AC line voltage is within proper operating limits. If disabled, (white) or if illuminated or blinking any other color, see *Basic Troubleshooting* in **Section 5** of Powermax900 Operator manual 803080.
- **Yellow TEMP LED**
When illuminated, indicates that the power supply temperature has exceeded operating limits.
- **Green GAS PRESSURE LED**
When illuminated, indicates that the gas pressure is within operating limits.
- **GAS TEST Switch**
When pushed in, allows the operator to view and adjust the pressure setting.
- **AMPS Output Adjustment Knob**
Adjusts output current between 20 and 55 amps.
- **Pressure Regulator**
Regulates input gas pressure to power supply.
- **Pressure Gauge**
Indicates gas pressure at power supply.
- **ON (I)/OFF (0) Power Switch**
Activates the power supply and its control circuits.

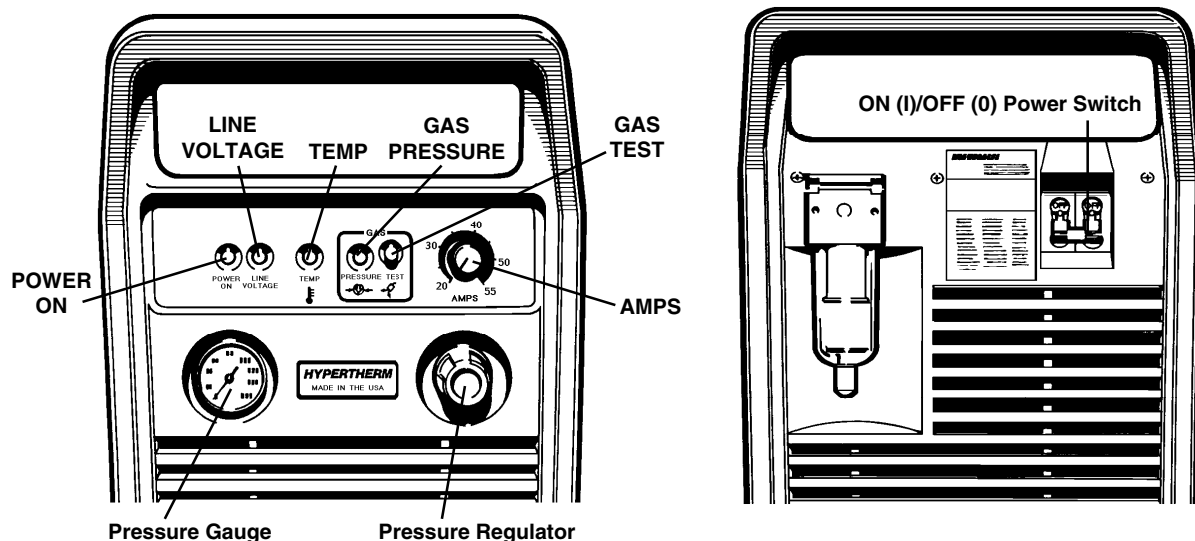
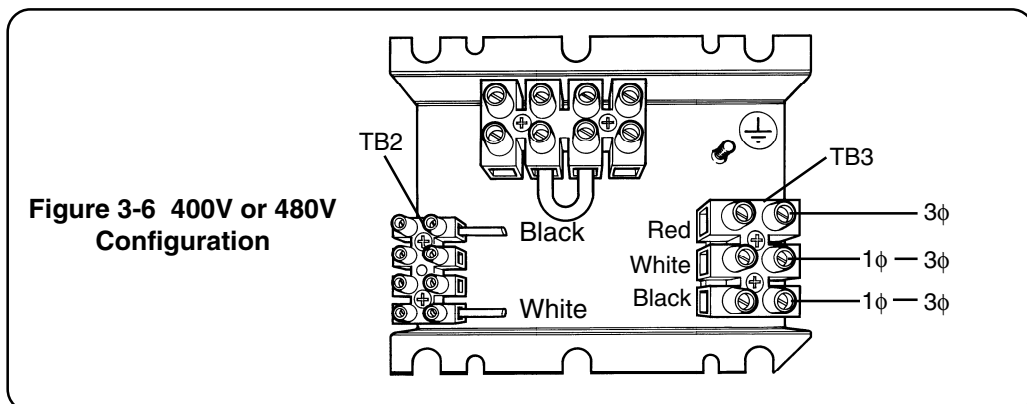
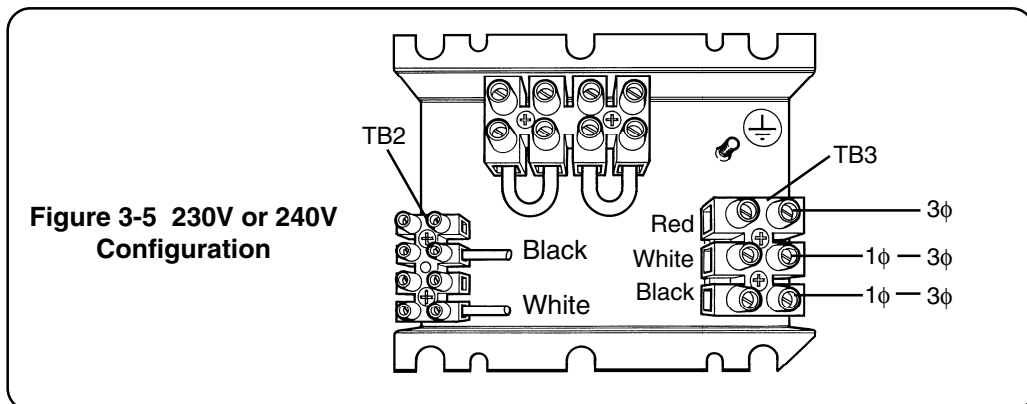
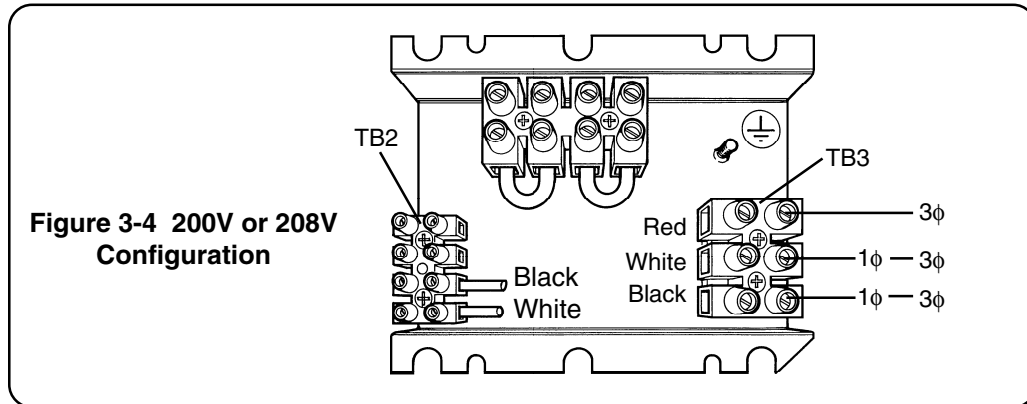


Figure 3-3 Powermax900 Controls and Indicators

THEORY OF OPERATION

General

The Powermax900 is a multi-voltage, multi-phase power supply. The two inverter inputs are linked in *parallel* for 208 or 240V on the 208/240/480V units, and for 200 or 230V on the 200/230/400V units. The inverters are linked in *series* for 480V on the 208/240/480V units, and for 400V on the 200/230/400V units. The inverter links are located in the link box, behind the rear panel at TB3. See Figs. 3-4, 3-5, 3-6. The 400V CE power supply does not have a link box.



Functional Description

Refer to block diagram 3-7, and the system wiring diagram. See **Parts List Sections 4, 5 or 6:** to identify system components referenced in this description.

AC power enters power switch S1 from terminal block TB1. The MOV and filter capacitor block MOV1 provides spike and noise suppression. A "soft start" is implemented via power board resistors R1 and R2 and relay RL1, and the main contactor CR1. Once the capacitors on the power board are charged up and incoming power is within limits, the control board turns on the main contactor. Diode bridge D1 rectifies the AC to DC. The DC voltage is then supplied to the inverters.

Each inverter consists of several components: an isolated gate bipolar transistor (IGBT - Q1 or Q2), a coil of the power transformer (T2), a current sense transformer (CS1 or CS2), and sections of the power board. The inverters operate as a pulse width modulator controlled half-bridge circuit. The inverters are capacitor fed and transformer coupled, switching at 20 KHZ. The inverter outputs are connected in series, and are rectified by output diodes D2 and D3.

The output circuitry consists of a current sensor CS4 and transfer sensor CS3 located on the control board, pilot arc relay CR2, and output inductor L1.

The feedback loop operates as follows: The amp adjust pot P1 is first set to the desired value. Current sensor CS4 measures the actual output current and compares it at the error amplifier with the user-set current setting. The error amplifier output is an analog indication of how wide the pulse width should be to maintain the current setting. The error amplifier output is then fed to the pulse width modulator chip PWM. The pulse width modulator sends the signal to the gate drive board transformers, and the gate drive boards in turn drive the inverter IGBTs Q1 and Q2.

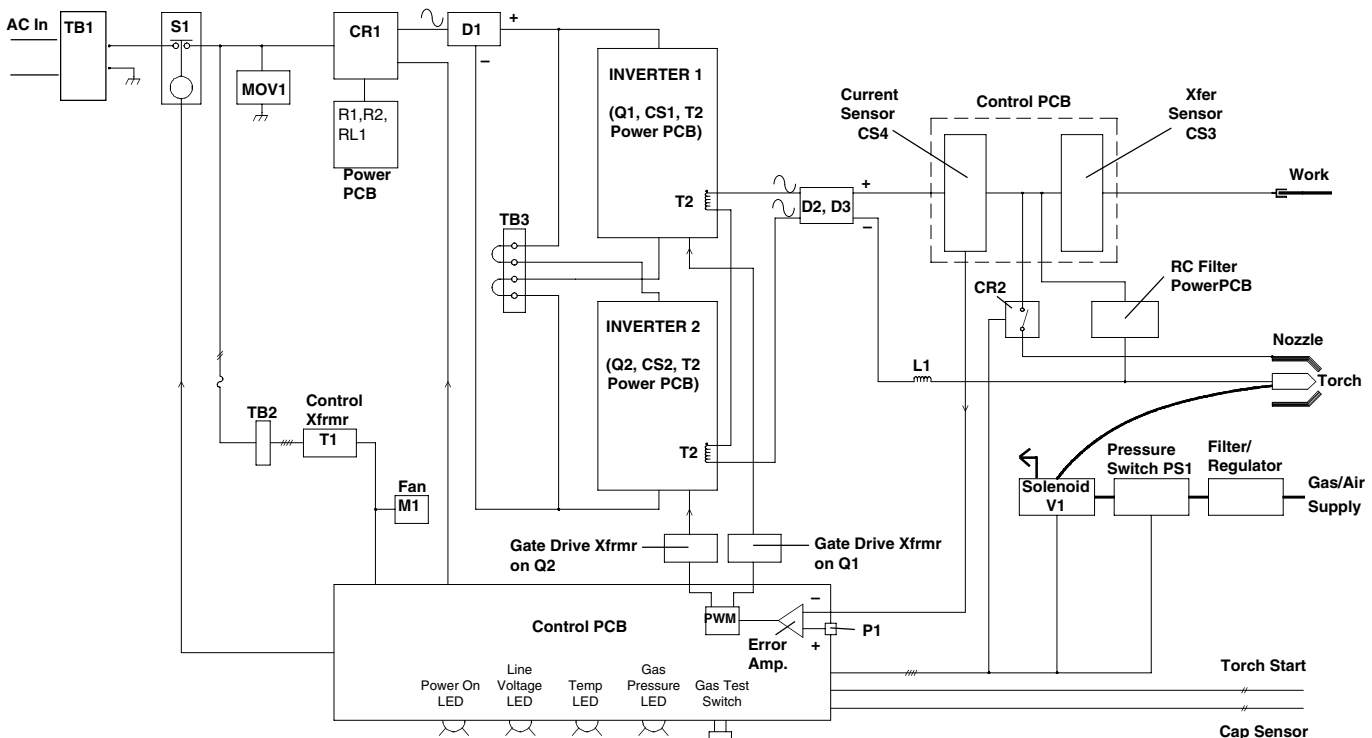
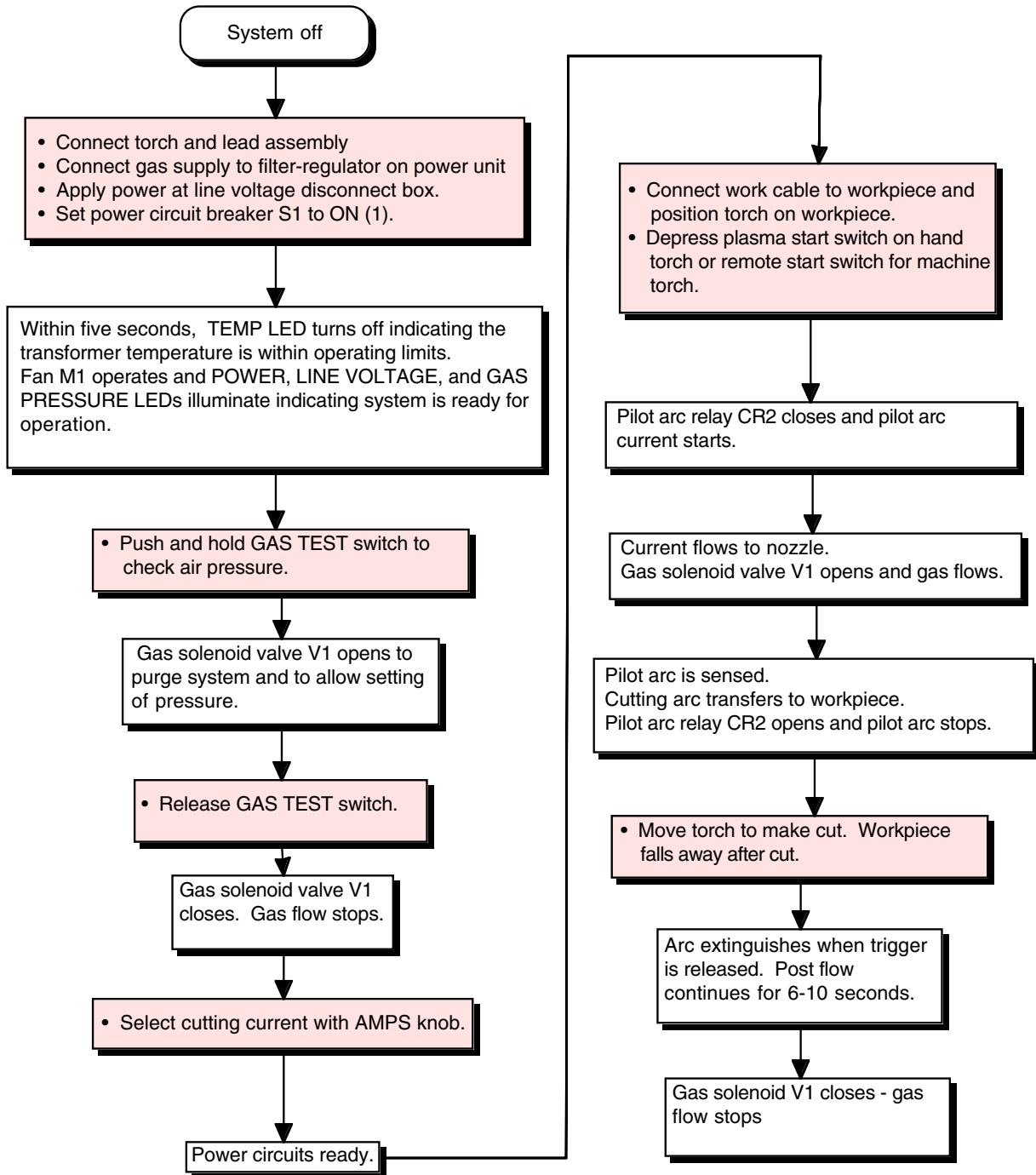


Figure 3-7 Single-Phase, 200/208/230/240 Block Diagram

SEQUENCE OF OPERATION

Shaded boxes represent operator action. Clear boxes represent results from operator action.



TROUBLESHOOTING

The troubleshooting procedures include the *Troubleshooting Guide*, *Resistance Checks* and the *Voltage Checks*.

The complexity of the circuits require that service technicians have a working knowledge of inverter power supply theory. In addition to being technically qualified, technicians must perform all testing with safety in mind.

If questions or problems arise during servicing, call the Hypertherm Technical Services Department at 1 800 643 9878, or email Technical Services at: - service@hypertherm.com.

Test Equipment

- Multimeter

Troubleshooting Procedures

Maintenance of the Powermax900 power supply consists of performing visual inspection and troubleshooting procedures.

- Refer to the system wiring diagram when performing the checkout procedures.
- To locate power supply components refer to **Sections 4, 5 or 6**. Refer to **Section 7** for torch components.
- After the problem has been located and repaired, refer to the *Sequence of Operation* flow diagram in this section to test the power unit for proper operation.

Visual Inspection - External

1. Inspect the outside of the power supply for damage to the cover and external components.
2. Inspect the torch and the torch lead for damage.

Visual Inspection - Internal

**WARNING**

SHOCK HAZARD: Always turn off power and unplug cord from wall and wait 5 minutes before removing any cover of the power supply. If power supply is directly connected to a line disconnect box, place line disconnect switch to OFF position. In the U.S., use a "lock-out / tag-out" procedure until the service or maintenance work is complete. In other countries, follow appropriate national or local safety procedures.

If power is required for servicing, be aware that dangerous voltages exist within the power supply which could cause serious injury or death. If questions or problems arise during servicing, call the Hypertherm Technical Services department at 1-800-643-9878.

**WARNING**

SHOCK HAZARD: Do not attempt repairs on the power board or control board. Do not in any way cut away or remove the protective conformal coating from either board. To do so will risk a short between the AC input circuit to the output circuit and may cause serious injury or death.

The power supply and PC boards are subjected to dielectric and insulation resistance tests per applicable CSA and IEC standards for the safety of the operator and service technicians.

Removal of the protective conformal coatings and other unauthorized repairs to the PC boards will void the warranty.

If questions or problems arise during servicing, call the Hypertherm Technical Services department at 1-800-643-9878.

MAINTENANCE

1. Set the Powermax900 power switch to O (off), unplug the power cord, and disconnect the gas supply.
2. Remove the cover of the power supply by removing the securing screws.
3. Visually inspect the inside of the power supply, especially on the side with the power board (see Figure 4-3). Look for broken or loose wiring connections, burn and char marks, damaged components, etc. Repair or replace as necessary.

Resistance Checks

All resistance values in this section were taken with the power cord disconnected, all internal power supply wires attached, and with the torch unplugged. Perform *Visual Inspection - Internal* before continuing in this section.

- If your resistance values are not close to the values given in this section, isolate the problem by removing wires attached to the resistance check points or component until the problem is found.
- After the problem has been located and repaired, refer to the *Sequence of Operation* flow diagram in this section to test the power unit for proper operation.

Resistance Check #1 - Fig. 3-8

- **Input to Chassis**
Inputs to the chassis are open (greater than $50M\Omega$).
- **Output to Chassis**
Outputs to the chassis are open (greater than $50M\Omega$).

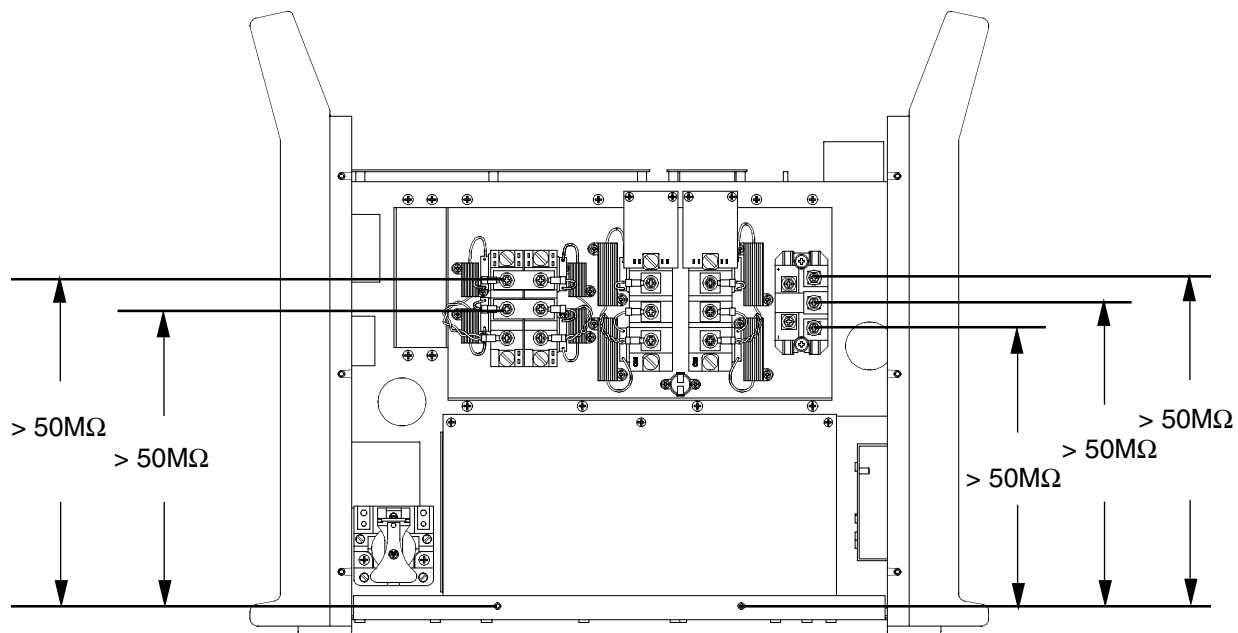
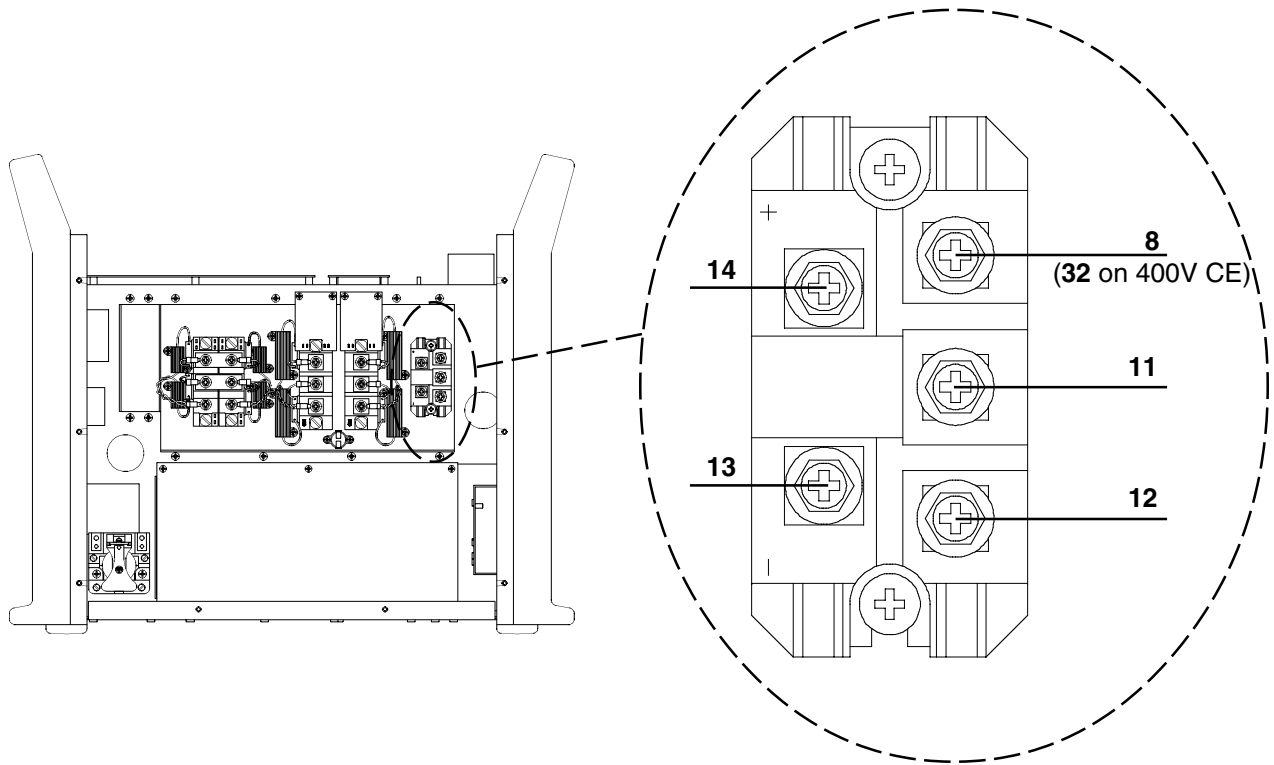


Figure 3-8 Resistance Check #1 - Input to Chassis, Output to Chassis

Resistance Check #2 - Fig. 3-9

- **Across Input Diode Bridge**

Take measurements placing the + multimeter lead to wire 14 or 13, and the – multimeter lead to all other wires.



From Wire (+ meter lead)	To Wire (– meter lead)	Resistance (in MegOhms)
14	8 (32 on 400V CE)	0.7 - 0.9
14	11	0.7 - 0.9
14	12	0.7 - 0.9
13	8 (32 on 400V CE)	0.7 - 0.9
13	11	0.7 - 0.9
13	12	0.7 - 0.9

Figure 3-9 Resistance Check #2 - Across Input Diode Bridge

MAINTENANCE

Resistance Check #3 - Fig. 3-10

- **Across Output Diode Bridge**

Take 2 output diode bridge measurements.

First, place the + multimeter lead on wire 29 and the – multimeter lead on wire 30.

Next, place the – multimeter lead on wire 29 and the + multimeter lead on wire 30.

Values are shown below.

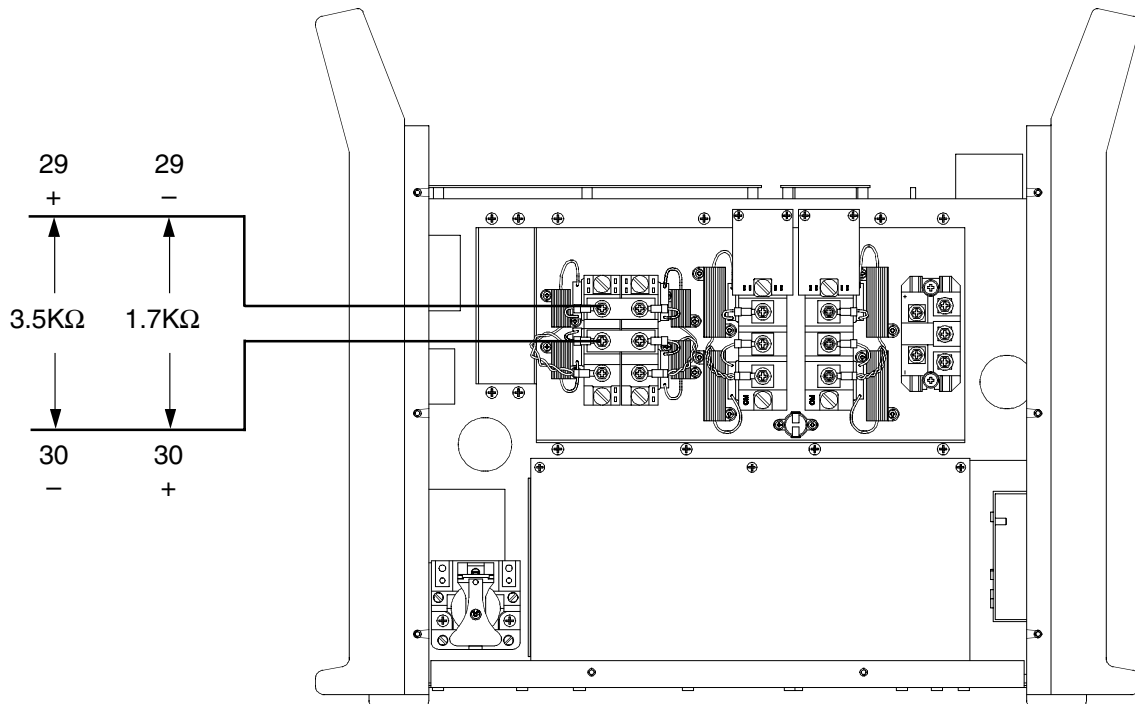


Figure 3-10 Resistance Check #3 - Across Output Diode Bridge

If no problems were found during the initial resistance checks and the power supply still does not operate correctly, follow the *Troubleshooting Guide*.

Note: In the *Troubleshooting Guide* are "best-guess" solutions. Study the system wiring diagram and understand the theory of operation before troubleshooting. Before purchasing a major replacement component, check with Hypertherm's Technical Service group at 1 800 643 9878 or the nearest Hypertherm repair facility.

POWERMAX900 TROUBLESHOOTING GUIDE

Symptom	Possible Problem	Solution
1. Breaker trips immediately	Input voltage greater than +15%	<p>1.1 Verify that input voltage is correct.</p> <p>1.2 Verify proper configuration in the link box - see page 3-5 for proper connections.</p>
2. Breaker trips after 2-3 seconds	Cap-sensor circuit not satisfied	<p>2.1 Verify that the torch lead assembly is properly installed into the power supply quick disconnect receptacle.</p> <p>2.2 Verify that consumables are installed properly.</p> <p>2.3 Loosen the torch retaining cap and then retighten. Listen for the microswitch to click. If the microswitch does not click, replace the torch body.</p> <p>2.4 Disconnect the torch and lead assembly. Measure resistance between pins 2 and 8 on the quick disconnect end of the lead assembly. If there is an open circuit with the consumables in place, replace the torch and leads.</p> <p>2.5 Replace the control PCB.</p>
3. Breaker trips after 5-10 seconds	Input voltage not in specification	<p>3.1 Verify that input voltage is correct.</p> <p>3.2 Verify proper configuration in the link box - see page 3-5 for proper connections.</p>
4. Contactor does not close	Input voltage not in specification	<p>4.1 Verify that input voltage is correct.</p> <p>4.2 Verify proper configuration in the link box - see page 3-5 for proper connections.</p>
	Contactor failure	<p>4.3 Verify 120 VAC is being supplied to the contactor coil. If 120 VAC is present, replace the contactor. If 120 VAC is not present, check continuity of wiring back to the control board. If there is continuity, replace the control PCB.</p>

POWERMAX900 TROUBLESHOOTING GUIDE

Symptom	Possible Problem	Solution
5. The Power On LED is not illuminated	No supply voltage	5.1 Verify that the power supply is connected to the correct voltage source.
	Fuses F1 and/or F2 are blown	5.2 Check continuity of fuses F1 and F2. If fuses are blown, verify for correct input voltage, then check circuit for shorts. Replace blown fuse(s).
	Control transformer failure	5.3 Verify that the control transformer has the proper input voltage. Also check the control transformer output at the input to the control board. Replace transformer if required.
	Control board failure	5.4 Verify that the input control voltages are correct. If voltages are correct, replace the control PCB.
6. Gas Pressure LED is extinguished.	Incorrect air pressure	6.1 Verify that the air pressure gauge is above 40 psi (2.8 bar). The pressure should be 70 psi (4.8 bar) for optimum performance. Correct any leaky hoses or faulty air source.
	Faulty pressure switch	6.2 Place a jumper wire between wires 92 and 93 at pressure switch PS1. If the gas pressure LED illuminates, replace pressure switch PS1. See sections 4, 5 or 6 for pressure switch part number.
7. Temp LED is on	System has overheated	7.1 Ensure that the machine's duty cycle has not been exceeded.
	Fan failure	7.2 Ensure that the fan is operating. See step 8.
	Faulty temperature switch	7.3 Check continuity of switch. Switch should be closed. If system is cool and switch is open, replace switch.

POWERMAX900 TROUBLESHOOTING GUIDE

Symptom	Possible Problem	Solution
8. The fan is not operating	Faulty or seized fan motor	8.1 Rotate the fan by hand. The fan should spin freely with minimum resistance. If it does not spin freely, replace the fan. Check the corresponding parts section in this manual for the proper fan part number.
	Low voltage to fan	8.2 Remove the fan bracket and check for 120 VAC at the fan connection. If there is 120 VAC at the fan connection, replace the fan. Check the corresponding parts section in this manual for the proper fan part number. If there isn't 120 VAC at the fan connection, refer to the electrical wiring diagrams and follow the 120 VAC line to troubleshoot.
9. A buzzing sound is heard from the power supply ON/OFF switch area within 5-7 seconds of the system being energized	Damaged or dirty contacts	9.1 Clean or replace contactor CR1.
	Improper output from the control board	9.2 Verify that the output from control board wires 56 & 57 (J4 pins 11 & 12) is 27 VAC. If there is no 27 VAC at J4, replace the control board.
10. Air flows from the torch before the trigger switch is depressed	Damaged gas test switch	10.1 Check switch S1 on the control board. There should be an open circuit between pins 1 & 2 and a closed circuit between pins 2 & 3 of S1. If these conditions are not present, replace the control board.
	Gas solenoid failure	10.2 Disconnect input voltage connection. If air flow stops, control PCB is outputting voltage and should be replaced. If air flow continues, replace valve.
11. Circuit breaker trips (480V models only)	Inverter imbalance	11.1 Inspect IGBTs for damage, perform power board tests, verify continuity of wires between gate drives and control PCB. If there are no problems found, replace control PCB, and IGBTs.

POWERMAX900 TROUBLESHOOTING GUIDE

Symptom	Possible Problem	Solution
12. No air flow	Start circuit is engaged on power up	12.1 Check to see if LED6 is illuminated. If LED6 is illuminated, look for a short in the torch lead assembly or, if a mechanized system, remove the start signal from the controller.
	The power supply is not receiving the start signal from the torch	12.2 Check LED6 on the control PCB. If the LED does not illuminate, check continuity of start circuit from the torch head to the control PCB.
	Temp LED illuminated	12.3 See step 7.
	Pressure LED extinguished	12.4 See step 6.
	Input voltage out of specs.	12.5 See step 4.
13. Momentary burst of air	Cap-sense or start shorted to + or –	13.1 Inspect torch head for cut wires or shorts. Repair connections or replace torch assembly.
14. Air flow, but no arc	Pilot arc relay failure	14.1 Check to see if pilot arc relay is closing. If relay is not closing, verify LED3 is illuminating and 120 VAC is supplied to the relay. If LED3 is not illuminated, replace control PCB. If voltage is present at relay, replace relay. Check if contacts are worn or pitted. If contacts are worn or pitted, replace relay.
	Sticky torch plunger assembly	14.2 Remove consumables and move the plunger by hand. The plunger should move freely with limited resistance. If it does not move freely, replace the torch main body with the switch assembly. See section 7 of this manual for part number information.
	Anode (+) and cathode (–) shorted	14.3 Inspect torch head for cut wires or shorts. Repair connections or replace torch assembly.
	Power circuit failure	14.4 Perform resistance and voltage checks outlined in section 3 of this manual.

POWERMAX900 TROUBLESHOOTING GUIDE

Symptom	Possible Problem	Solution
15. Pilot arc starts, but extinguishes before transfer	Input voltage is out of specs	15.1 See step 4.
	Work cable not connected or, there is a bad connection	16.1 Ensure that the work clamp is properly connected to a clean surface of the workpiece. Check the work cable for continuity. Replace the cable and clamp assembly if there is no continuity.
16. Arc does not cut through metal, or cuts slower than normal	Amps adjust pot is disconnected	16.2 Verify that the 3-pin connector is inserted in J5 of the control PCB. Check the potentiometer by measuring the resistance: Resistance should be 0 ohms between black & yellow wires in full counterclockwise position. Resistance should be approximately 230 ohms between black & yellow wires in full clockwise position.
	Inverter imbalanced (240V models only)	16.3 Inspect IGBTs for damage, perform power board tests, verify continuity of wires between gate drives and control PCB. If there are no problems found, replace control PCB, and IGBTs.
17. System cuts abnormally	Current sensor (torroid) disconnected	17.1 Check to see that both current sensors are connected properly.

MAINTENANCE

Voltage Checks



SHOCK HAZARD - See warnings on page 3-9 before proceeding.

Before switching on the power supply, perform *Visual Checks - Internal, Resistance Checks* and also review the warnings on page 3-9.

- Verify that the torch is plugged into the power supply.
- Connect the power cord into the line voltage disconnect switch box or plug into a properly grounded outlet.
- Switch the power supply on.
- Connect the gas supply to the pressure regulator at the rear of the power supply.

Voltage Check #1 - Figure 3-11

- **Voltage at Input of Input Diode Bridge**
The AC voltage between any 2 input wires will equal the line voltage on 3 ϕ systems.
On 1 ϕ systems, the AC voltage between the top 2 input wires will equal the line voltage.

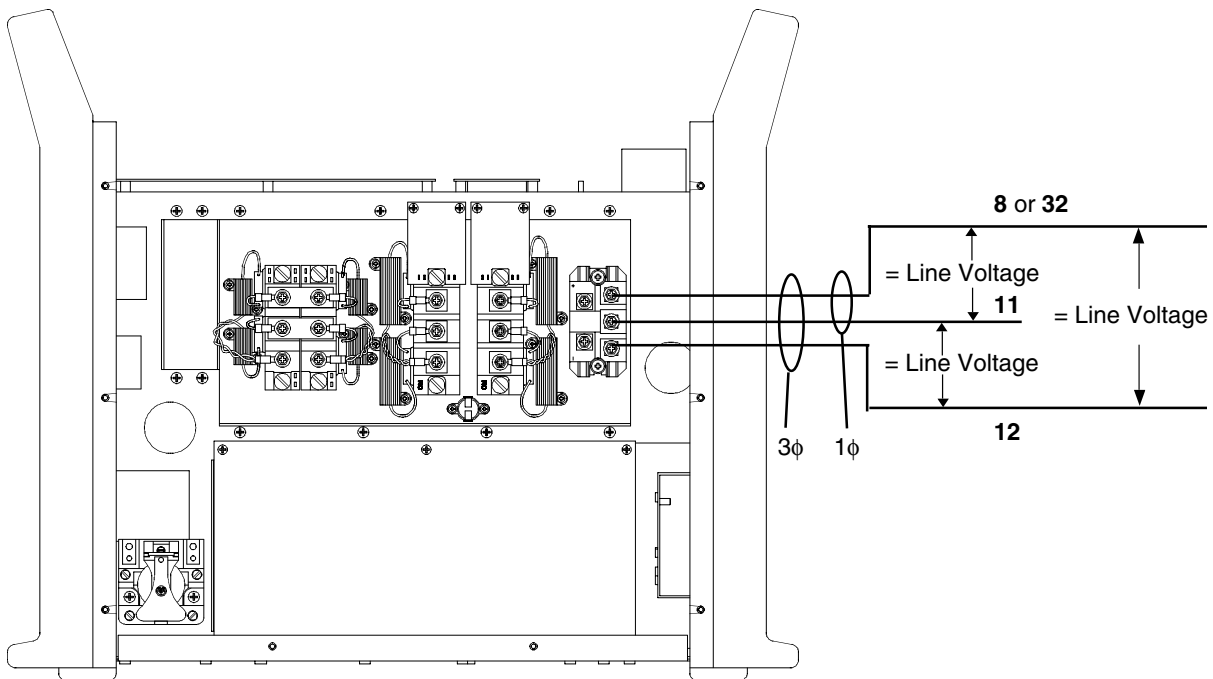


Figure 3-11 Voltage Check #1 - Input of Input Diode Bridge

Voltage Check #2 - Figure 3-12

- Voltage at Output of Input Diode Bridge**
 This DC voltage will approximately equal the line voltage X 1.414 - See table below.

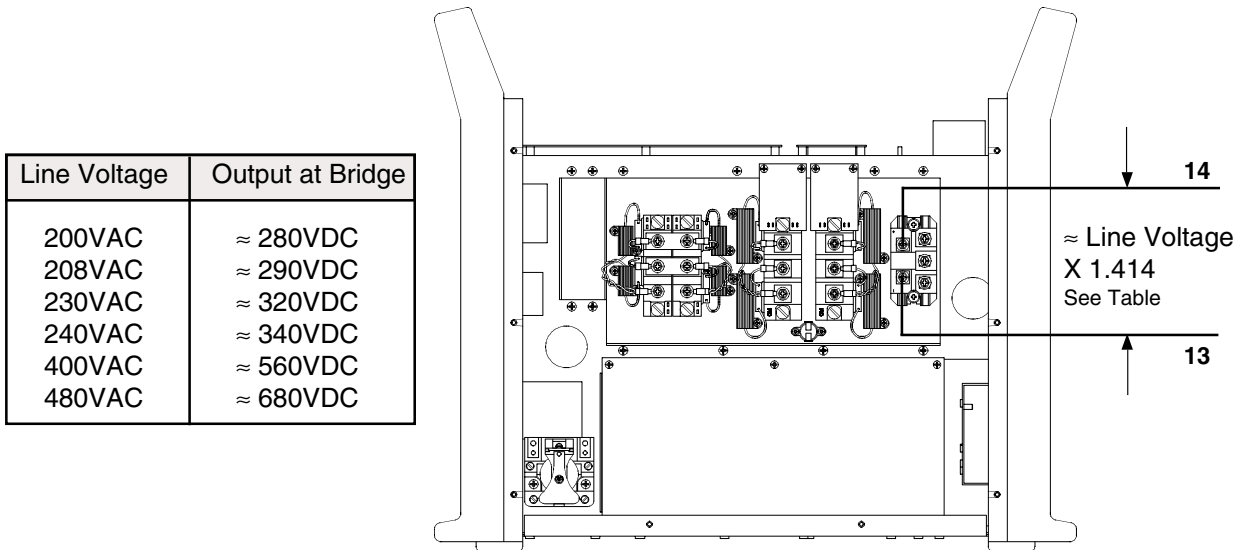


Figure 3-12 Voltage Check #2 - Output of Input Diode Bridge

Voltage Check #3 - Figure 3-13

- Voltage Across Power Board Capacitors (taken at Q1 and Q2)**
 See the table in Figure 3-13 to find the correct voltage readings across the power board capacitors.

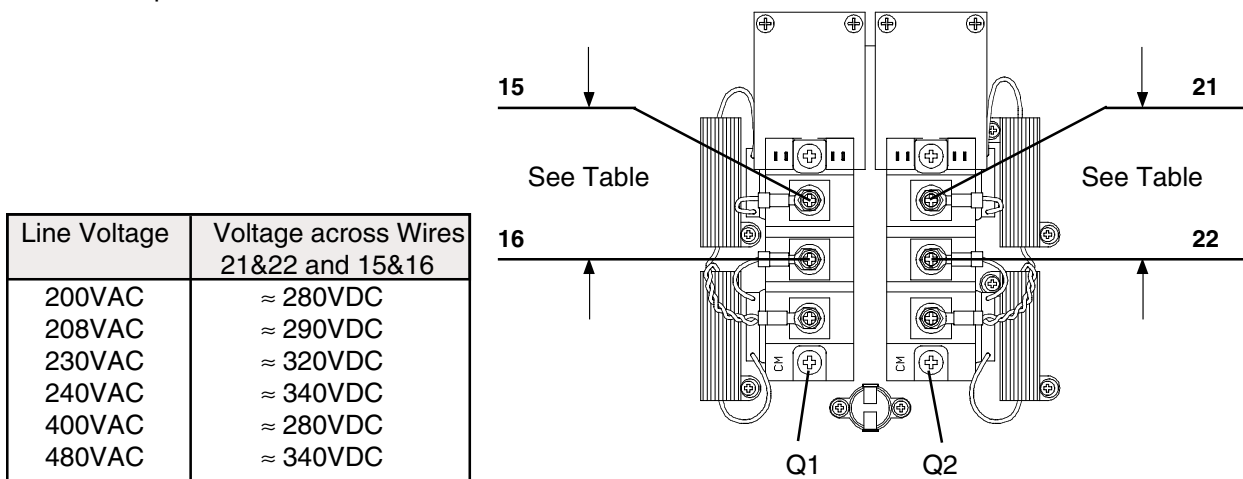


Figure 3-13 Voltage Check #3 - Across Power Board Capacitors

MAINTENANCE

Voltage Check #4 - Figure 3-14

- **Output Voltage With Transferred Arc**

The voltage is approximately 140VDC at the output diode bridge when the torch arc is transferred to the workpiece. Take this reading across the two bars spanning output diodes D2 and D3 (wires 29 and 30).

If the torch is not working, the voltage will be approximately 300VDC for 5 seconds and then drop to 0VDC.

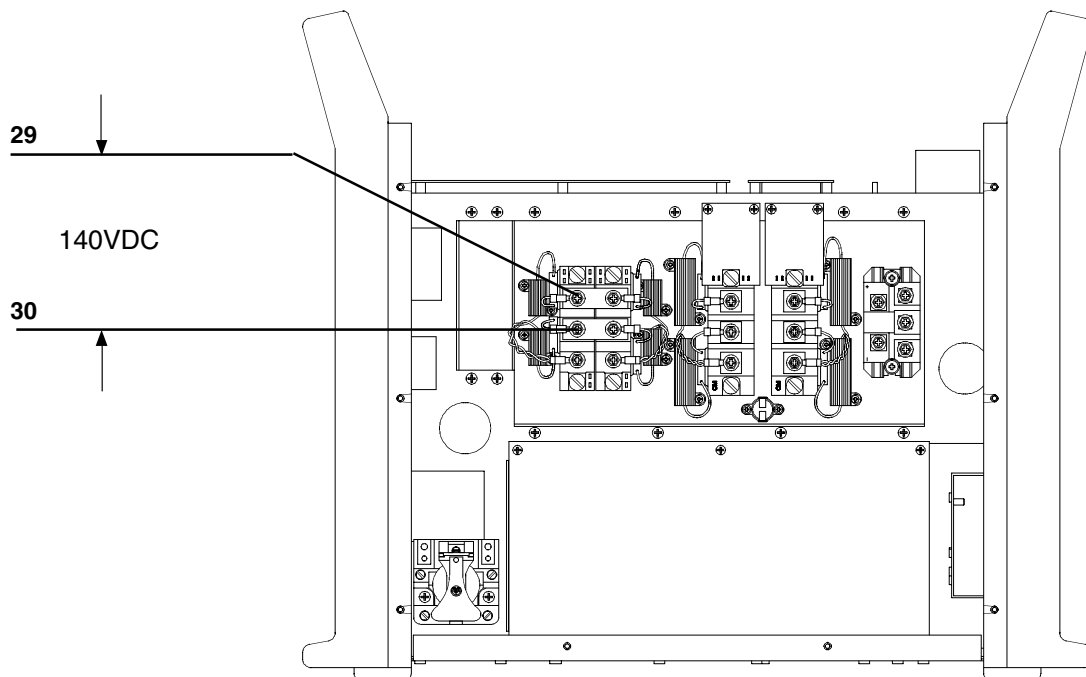


Figure 3-14 Voltage Check #4 - Output Voltage with Transferred Arc

Notes

POWER BOARD

The power board contains part of a "soft start" or "in-rush" circuit, an over-voltage shut down circuit, and the high-voltage power circuits for left and right inverters. Voltages can be taken at the rear of the power PCB to check these functions.



WARNING



SHOCK HAZARD: The "E" terminals and J1 are accessible from the back side of the power PCB. Use extreme caution when taking these readings. Voltages up to 300 VDC are present at the rear of the power PCB.

The large electrolytic capacitors, (blue-cased cylinders) located on the front side of the power PC board store large amounts of energy in the form of electrical voltage. Even if the power is off, dangerous voltages exist at the capacitor terminals on the PC board and on certain areas of the PC board. Never discharge the capacitors with a screwdriver or other implement... explosion, property damage and/or personal injury will result.

Wait at least 5 minutes after turning the power supply off before handling the PC board or capacitors. If questions or problems arise during servicing, call Hypertherm Technical Services at 1-800-643-9878.

Use extreme caution when taking the voltage readings on the back of the power PCB - see warning above. Use an isolated or "floating" digital volt meter, since high voltages are present. The following table lists the test points, their descriptions and values. Refer also to Figure 3-15 to locate test points.

Power Board Test Points

Test Point	Description	Value
E1 to E3	High-voltage power - left inverter	+300VDC
E14 to E3	One-half of high-voltage power - left inverter	+150VDC
E4 to E5	High-voltage power - right inverter	+300VDC
E15 to E5	One-half of high-voltage power - right inverter	+150VDC
J1-5 to J1-4	"Soft start" signal from control PCB. After incoming voltage is accepted by control board, control board sends +12VDC to relay RL1 on power board. LINE VOLTAGE LED will remain illuminated until soft start signal is complete (about 5 seconds after S1 is thrown).	+12VDC 5 seconds after throwing power switch S1
J1-6 to J1-4	Shut down signal from power board. Protection circuit on power board will go low (=0 VDC) to control board to shut down power supply if it detects over voltage.	+12VDC normally. = 0VDC if voltage is too high



WARNING



SHOCK HAZARD: Do not attempt repairs on the power board or control board. Do not in any way cut away or remove the protective conformal coating from either board. To do so will risk a short between the AC input circuit to the output circuit and may cause serious injury or death.

The power supply and PC boards are subjected to dielectric and insulation resistance tests per applicable CSA and IEC standards for the safety of the operator and service technicians.

Removal of the protective conformal coatings and other unauthorized repairs to the PC boards will void the warranty.

If questions or problems arise during servicing, call the Hypertherm Technical Services department at 1-800-643-9878.

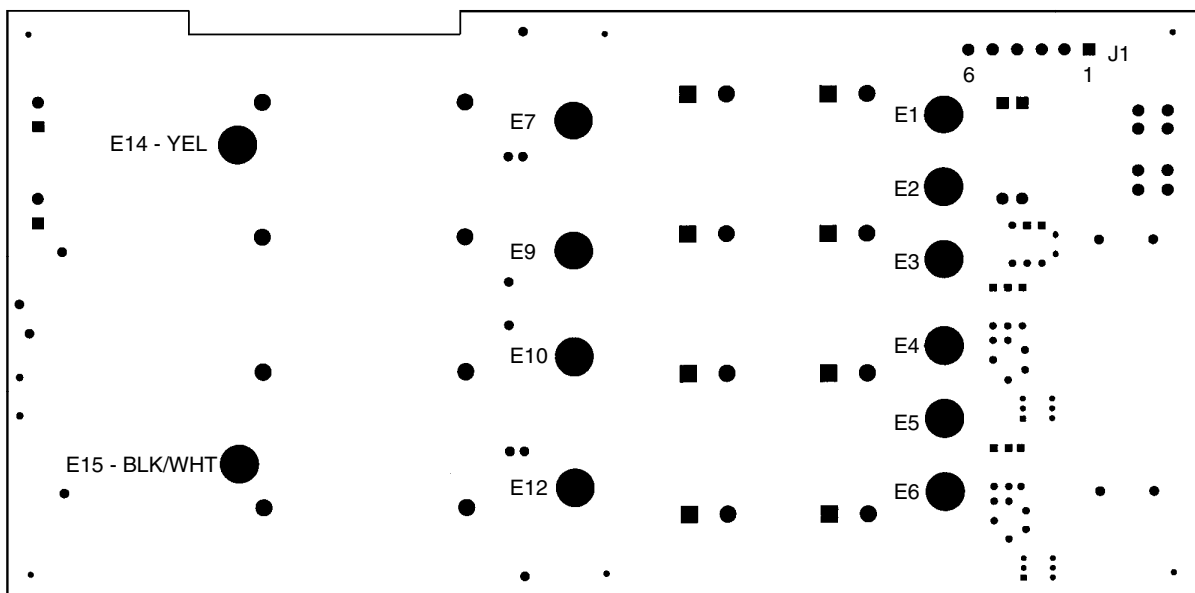


Figure 3-15 Back Side of Power Board - Test Points

CONTROL BOARD

Control Board LEDs

Control Board LEDs Visible from the Powermax900 Front Panel

- **LED2 POWER ON:** Illuminates when power is applied.
- **LED5 LINE VOLTAGE:** Illuminates different colors for different conditions.
 - LED5 not illuminated (white)
Extremely low AC line voltage or micro-controller failure.
 - LED5 blinking yellow
Line voltage is less than 20% below nominal. In this condition, the power supply is disabled and the contactor is open.
 - LED5 continuous yellow
Line voltage is between 15% and 20% below nominal. Machine will function, but with some performance degradation.

Lower Limit (LED5 continuous yellow)	Line Voltage	Upper Limit	Note: To avoid performance deterioration of the Powermax900, input voltage (as measured at the input terminals to the power supply under load) should be within 10% of the specified system line voltage setting.
170VAC	200VAC	235VAC	
178VAC	208VAC	239VAC	
195VAC	230VAC	270VAC	
204VAC	240VAC	276VAC	
340VAC	400VAC	470VAC	
408VAC	480VAC	552VAC	
510VAC	600VAC	690VAC	

- LED5 continuous green
Line voltage is within proper operating limits (between -15% and +15% of nominal as shown above).
- LED5 continuous red
Voltage is greater than +15% of nominal, or
Retaining cap has not engaged the cap-sensor micro-switch, or
There is an inverter imbalance, or
There is a micro-controller failure.
- LED5 blinking red
There is an internal torch failure (a short from electrode to START or CAP lines).
- **LED11 OVER-TEMP LED:** Remains off when temperature is within operating limits. It illuminates when the thermostat in the power transformer T2 opens (over 135° C (275° F)) or if the heatsink becomes too hot (over 85° C (185° F)). Overheating can be caused by exceeding the duty cycle rate or by operating at low line voltage.
- **LED14 GAS PRESSURE:** Illuminates when incoming gas pressure sensed by PS1 is within operating limits (over 39 psi (2.7 bar)).

Control Board LEDs Visible from Inside the Powermax900

- **LED1 GAS SOLENOID:** Illuminates when gas solenoid is energized (when GAS TEST switch is pressed or when plasma start is pressed).
- **LED3 PILOT ARC RELAY:** Illuminates when pilot arc relay CR2 is energized.
- **LED4 MAIN CONTACTOR:** Illuminates when contactor CR1 is energized (following "soft start").

- **LED6 PLASMA START:** Illuminates when the torch start button is pushed or when start button is activated from the machine interface.
- **LED7 INVERTER ON:** Illuminates when the command to turn on the inverter modulator is given.
- **LED8 CURRENT:** Illuminates when current greater than 10 amps is detected in electrode circuit.
- **LED9 BLOWBACK:** Illuminates when more than 25 arc volts is detected.
- **LED10 ARC TRANSFER:** Illuminates when arc transfers to the workpiece (when arc current is greater than 1.5 amps).
- **LED12 OVERCURRENT:** Illuminates when CS1 or CS2 senses current above 70 amps. Release the START switch to clear.
- **LED13 FAULT:** Illuminates when there is either an overvoltage condition, an imbalance in the inverters, or a micro-controller failure.

The control board also controls the sequence required to generate plasma:

- Turns on the inverter approximately 1 second after the torch trigger switch is pressed
- After a short delay, turns on the gas solenoid valve V1 to blow back the electrode
- Monitors the pilot arc for arc transfer
- Ramps the current control command from the pilot arc level (22 amps) to the cut current selected by the operator
- Turns the inverter off if the output current fails for any reason
- Turns the inverter off if the torch blow back does not occur within 2 seconds
- Turns off the power supply when the retaining cap is loose or when line voltage is too high.

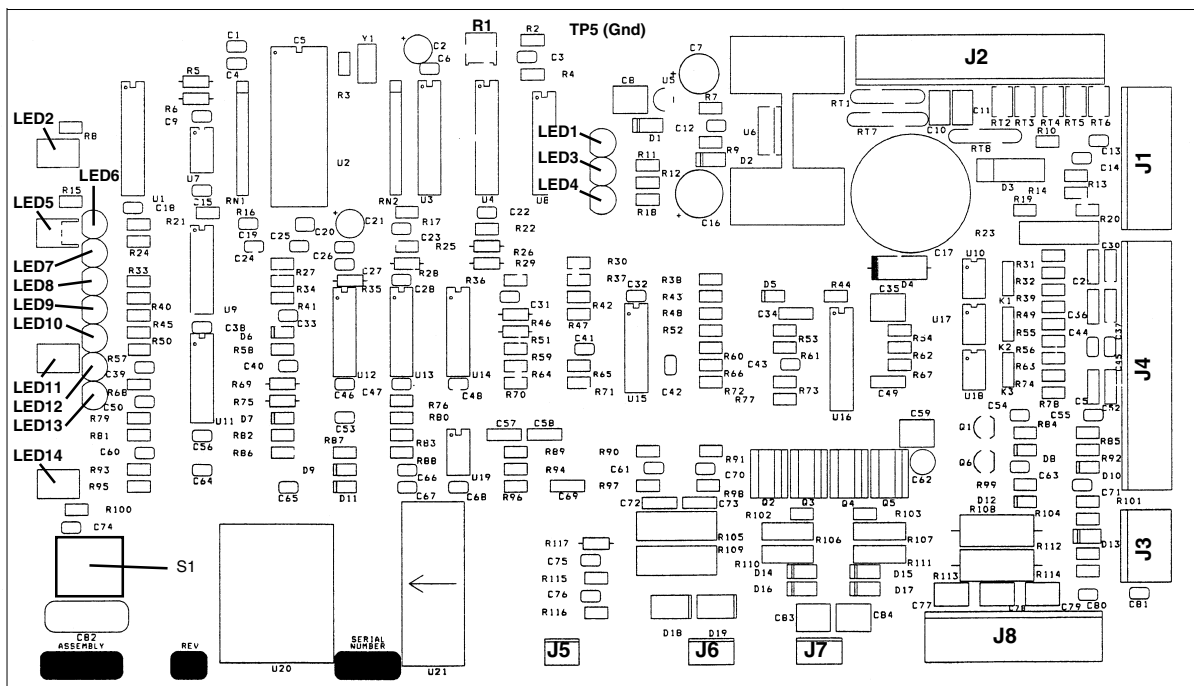


Figure 3-16 Control Board LED Locations

PAC125T TORCH PARTS REMOVAL AND REPLACEMENT

Torch Main Body Removal and Replacement

To remove and replace the torch main body, order the torch main body with cap-on sensor switch and refer to the following procedure and Figures 3-17 and 3-18.

1. **Set the Powermax900 power switch to O (off), unplug the power cable, and disconnect the gas supply. Disconnect the torch lead quick disconnect from the power supply.**
 2. Remove the 5 screws that secure the handle halves together and remove handles from torch main body, torch switch and safety trigger (Fig. 3-18).
- Note for step 3: Disconnect wires by pulling on terminals. Do **not** pull on wires.
3. Disconnect the two lead terminals (blue wire in each terminal) from the two wires of the cap sensor microswitch (Fig. 3-17).
 4. Disconnect the plunger wire from the torch main body by holding the plunger nut with a 1/4" (6 mm) wrench or nut driver and removing the plunger screw (Fig. 3-17).
 5. Disconnect the torch main body and torch lead gas fittings using 3/8" (9.5 mm) and 1/2" (13 mm) open-end wrenches.
 6. Replace the new torch main body by reversing these instructions. Note: When connecting the plunger wire, be certain to keep the plunger wire terminal at the proper angle as shown in the Fig. 3-17 inset. Tighten the plunger screw with 8 lb-in (9 kg-cm) of torque.
 7. Install the torch main body and torch switch back into the handle (Fig. 3-18). Be certain that the torch switch slides into position above the safety trigger, and that trigger movement activates the switch pushbutton and then releases. While positioning the handle halves together, be careful not to pinch any wires.
 8. Replace the 5 screws to secure the handle halves together.

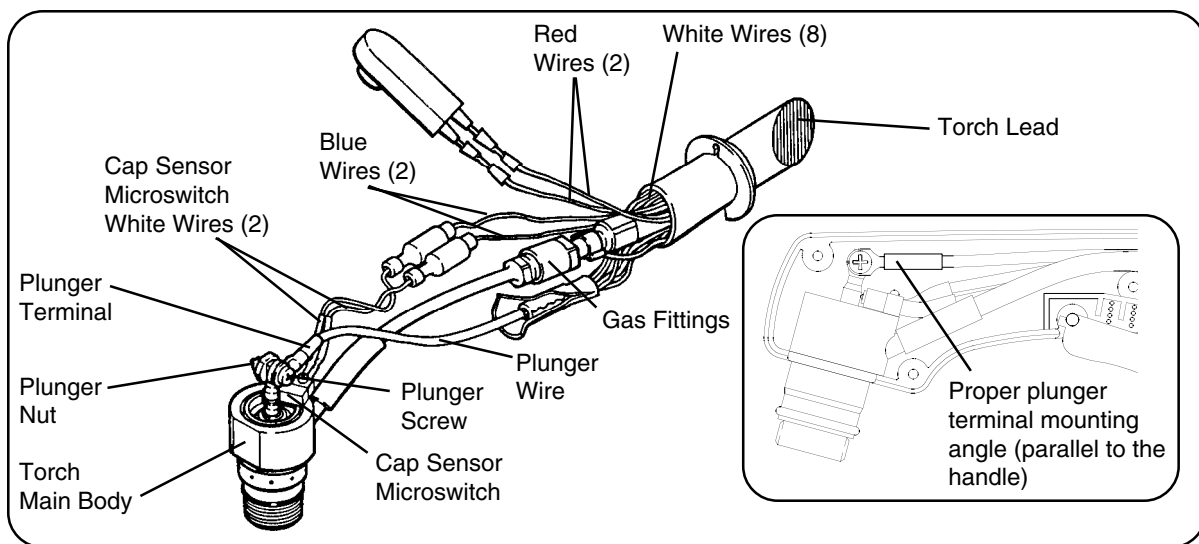


Figure 3-17 PAC125T Torch Main Body Removal

Torch Switch Removal and Replacement

To remove and replace the torch switch, order the torch switch repair kit (see **Section 7** for part number) and refer to the following procedure and Figure 3-18. See **Section 7** for a complete list of torch parts.

1. **Ensure the Powermax900 power switch is positioned to O (off), unplug the power cable, and disconnect the gas supply.**
2. Remove the 5 screws that secure the handle halves together.
3. Remove the torch switch from the handle.
4. Remove the torch switch by cutting the 2 splices at the torch lead (violet wires).
5. Replace the torch switch by crimping the switch wires and the violet wires from the torch lead together with the splices.
6. Install the torch switch back into the handle. Be certain that the torch switch slides into position above the safety trigger, and that trigger movement activates the switch pushbutton and then releases. While positioning the handle halves together, be careful not to pinch any wires.
7. Replace the 5 screws to secure the handle halves together.

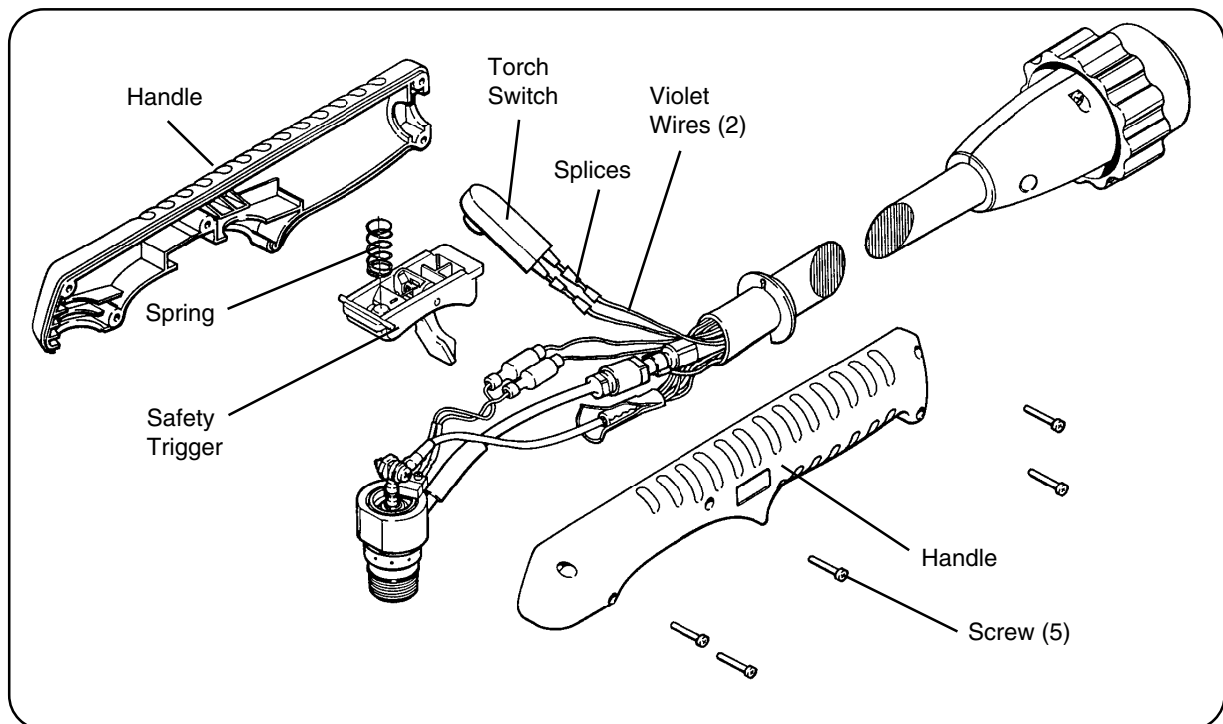


Figure 3-18 PAC125T Torch Switch Removal

PAC125M TORCH PARTS REMOVAL AND REPLACEMENT

Repair of the PAC125M machine torch normally requires replacement of the torch main body and/or the torch lead. Order the torch main body with switch. Refer to Figure 3-19 and perform the steps below. See **Section 7** for a complete list of the machine torch parts.

Removal

1. **Set the Powermax900 power switch to O (off), unplug the power cable, and disconnect the gas supply. Disconnect the torch lead quick disconnect from the power supply.**
2. Unscrew the retaining cap and remove the remaining parts (nozzle, electrode and swirl ring).
3. Unscrew the positioning sleeve from the torch sleeve and slide it back along the lead and out of the way.
4. Cut the plastic ties holding the high-current wire to the lead. Note the position of the ties for reassembly.
5. Remove the heat shrink to expose the high-current pin and receptacle connection. Disconnect the pin from the receptacle.

Note for step 6: Disconnect wires by pulling on terminals. Do **not** pull on wires.

6. Remove the heat shrink from the cap sensor microswitch connectors (blue wires from the lead and white wires from the microswitch) to expose the terminals. Disconnect the terminals.
7. Disconnect the torch main body and torch lead gas fitting using 3/8" (10 mm) and 1/2" (13 mm) open-end wrenches.
8. Disconnect the torch main body from the torch sleeve by using snap-ring pliers to remove the snap ring that holds the torch head to the sleeve. Remove the torch main body from the torch sleeve.

Replacement

1. To replace the torch main body to the torch sleeve, line up the anti-rotation screw on the torch head to the locating hole in the torch sleeve.
2. Insert the torch main body into the torch sleeve and using the snap-ring pliers, secure the torch body to the sleeve with the snap ring.
3. Connect the torch main body to the torch lead gas fitting using 3/8" (10 mm) and 1/2" (13 mm) open-end wrenches. Torque to 70 in-lbs.

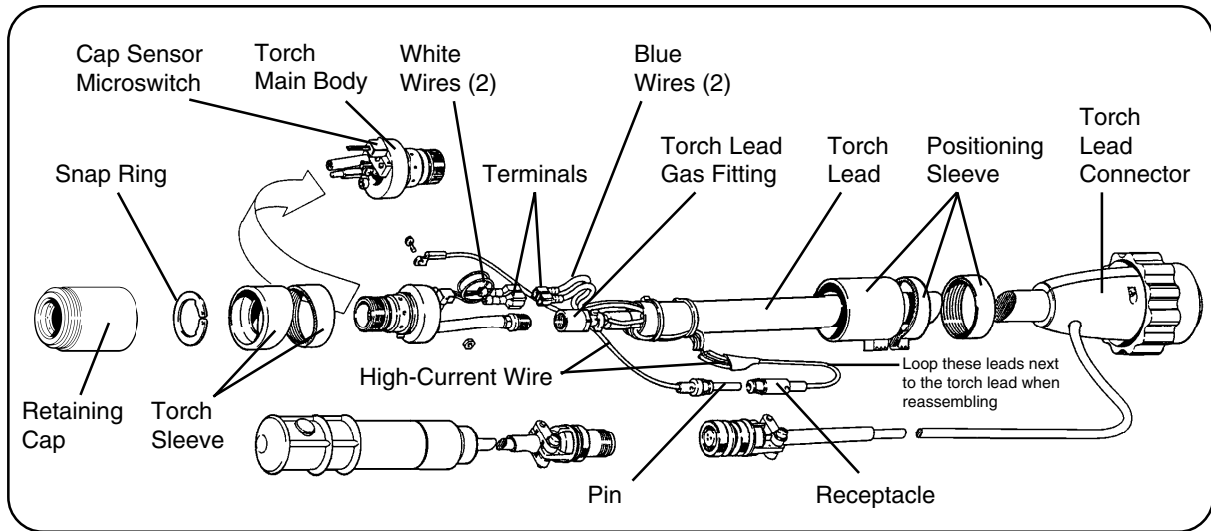


Figure 3-19 PAC125M Torch Assembly

4. Slip 2 small pieces of heat shrink over the cap-sensor microswitch wires and connect the white wires to the blue wire terminals on the torch lead. Slide the heat shrink over the terminals and apply heat.
5. Slip a large piece of heat shrink over the high-current wire and connect the pin to the receptacle. Slide the heat shrink over the pin-receptacle connection and apply heat.
6. Loop the high-current wire next to the torch lead and secure with 2 plastic ties. Be certain that there is slack between the high-current wire and the torch lead gas fitting.
7. Slide the positioning sleeve back down over the torch lead and screw it into the torch sleeve. Be certain not to pinch any wires when screwing sleeves together.
8. Install the proper consumables into the torch. When the retaining cap is tightened, the microswitch will click, indicating that the torch main body has been replaced correctly.

QUICK DISCONNECT O-RING REMOVAL AND REPLACEMENT

The quick disconnect O-ring on the PAC125 torch leads provides a tight seal between the quick disconnect plug and the power supply receptacle. This O-ring prevents plasma gas from leaking during cutting. To remove and replace the O-ring in the event of damage or wear, proceed as follows and refer to Figure 3-20.

1. Turn the Powermax900 power switch OFF (0).
2. Unplug the power cable or set line disconnect switch to off, and disconnect gas supply.
3. Unscrew and remove the torch lead quick disconnect plug from the receptacle on the power supply.
4. Remove the O-ring from the quick disconnect as shown in Figure 3-20 using needle nose pliers, tweezers, etc.
5. Replace O-ring. Ensure it seats properly.

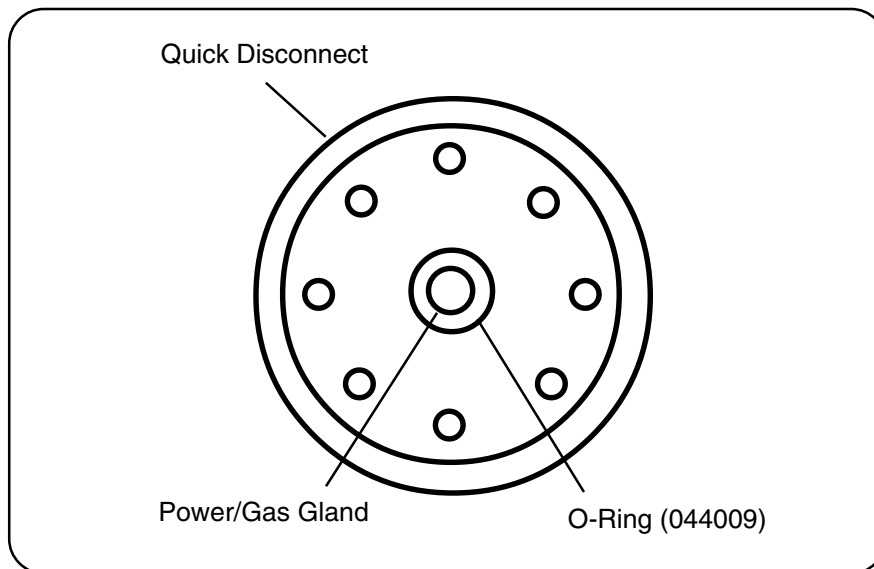


Figure 3-20 Quick Disconnect O-Ring Removal and Replacement

Section 4 PARTS LIST – 208/240/480V

In this section:

Power Supply - 208/240/480V	
Front	4-2
Top and Right Side	4-4
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Powermax900 Field Upgrade Kits and Optional Parts	4-10
Power Supplies - 208/240/480V	4-10
Recommended Spare Parts - Powermax900 - 208/240/480V	4-11

PARTS LIST - 208/240/480V

POWER SUPPLY - 208/240/480V

Front

Index No.	Part No.	Description	Ref. Desig.	Quantity
1	001502	Pnl:PMX800/900 Pwr Unit Plastic Front		1
2	004675	Spacer:PMX800/900 Pressure Gauge		1
3	008965	Knob:.850 Dia. 1/4 SFT Blk/Sil		1
4	023922	Cable w/Clamp:PMX800/900 Work 20'		1
	129326	Manifold SA:PMX900 Pwr Unit		1
5	005112	Pressure Switch:39 Psi .013 Orifice	PS1	1
6	006110	Sol. Valve:100# 1/8FPT 24VAC 3W	V1	1
7	011073	Regulator:0-125 Psig 1/8FPT		1
8	022027	Press. Gauge:160# 1.5" 1/8CBM Panel		1
	129356	Harness:PMX900 Power Unit		1
9	129325	Recept. SA:PMX900 Pwr Unit Quick Disc.		1
10	129389	Current Control Assy, PMX900		1

Notes: **Bold** part numbers and descriptions are subassemblies.
Indented normal type items are components of subassemblies

All mounting hardware in power supply drawings shown for reference only.

See also **Section 5 Parts List - 200/230/400V**, and **Section 6 Parts List - 400V CE** to identify parts for other Powermax900 power supplies.

POWER SUPPLY - 208/240/480V

Front

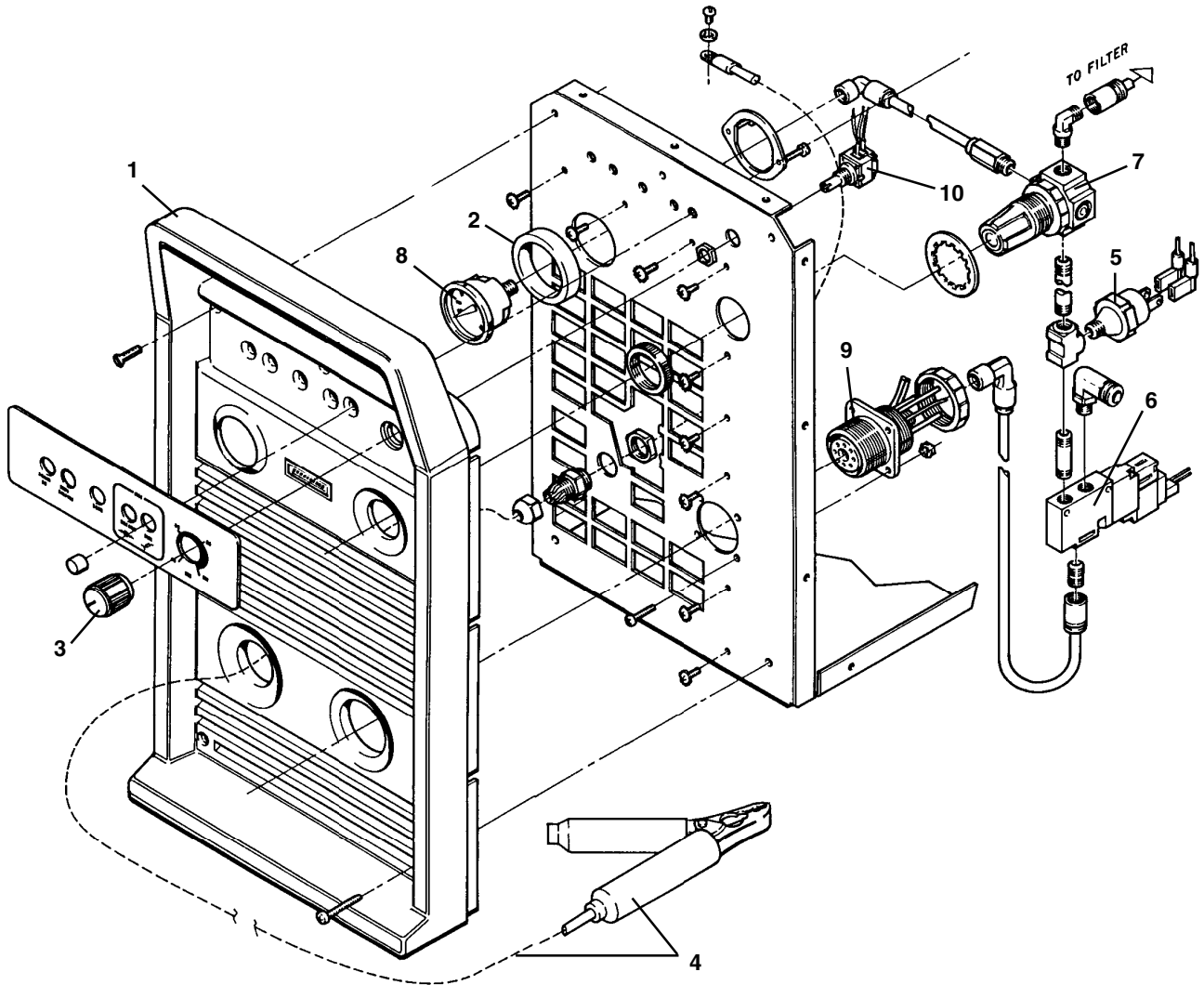


Figure 4-1 Powermax900 - 208/240/480V - Front

PARTS LIST - 208/240/480V

POWER SUPPLY - 208/240/480V

Top and Right Side

Index No.	Part No.	Description	Ref. Desig.	Quantity
1	003078	Relay:30A NO Mag Blwt QDisc Term	CR2	1
2	029674	MOV/Cap Assy:MAX42/43/70 3PH	MOV1	1
	029957	Heatsink SA:Powermax800/900 Power Unit		1
3	029998	IGBT Gate Drive SA:Powermax800/900	Q1	1
4	029998	IGBT Gate Drive SA:Powermax800/900	Q2	1
5	109018	Diode:600V 100A UFast Recovery Dual	D2	1
6	109018	Diode:600V 100A UFast Recovery Dual	D3	1
7	109019	Diode:1600V 100A 3PH Module	D1	1
8	041668	PCB Assy:Pwrmx900 Micro Control		1
9	041532	PCB Assy:Powermax800/900-ZB Power		1
10	014137	Current Sense Transformer, 40A	CS1	1
11	014137	Current Sense Transformer, 40A	CS2	1
12	008809	Fuse:1A 600V 13/32 X 1-1/2 Slo	F1,F2	2
13	029978*	Heatsink SA:Powermax800/900 PA Cont PCB Q3		
14	041486*	PCB Assy:Powermax800/900 PA Cont		
	128241**	Kit:Powermax900 Machine Interface 208/240/480V		
15	041494**	PCB Assy:Powermax800/900 Machine Interface		

Notes: **Bold** part numbers and descriptions are subassemblies.
Indented normal type items are components of subassemblies.
All mounting hardware in power supply drawings shown for reference only.

* Available only on power supplies with the pilot arc control option

** Available only on power supplies with the machine interface option

See also **Section 5 Parts List - 200/230/400V**, and **Section 6 Parts List - 400V CE** to identify parts for other Powermax900 power supplies.

POWER SUPPLY - 208/240/480V

Top and Right Side

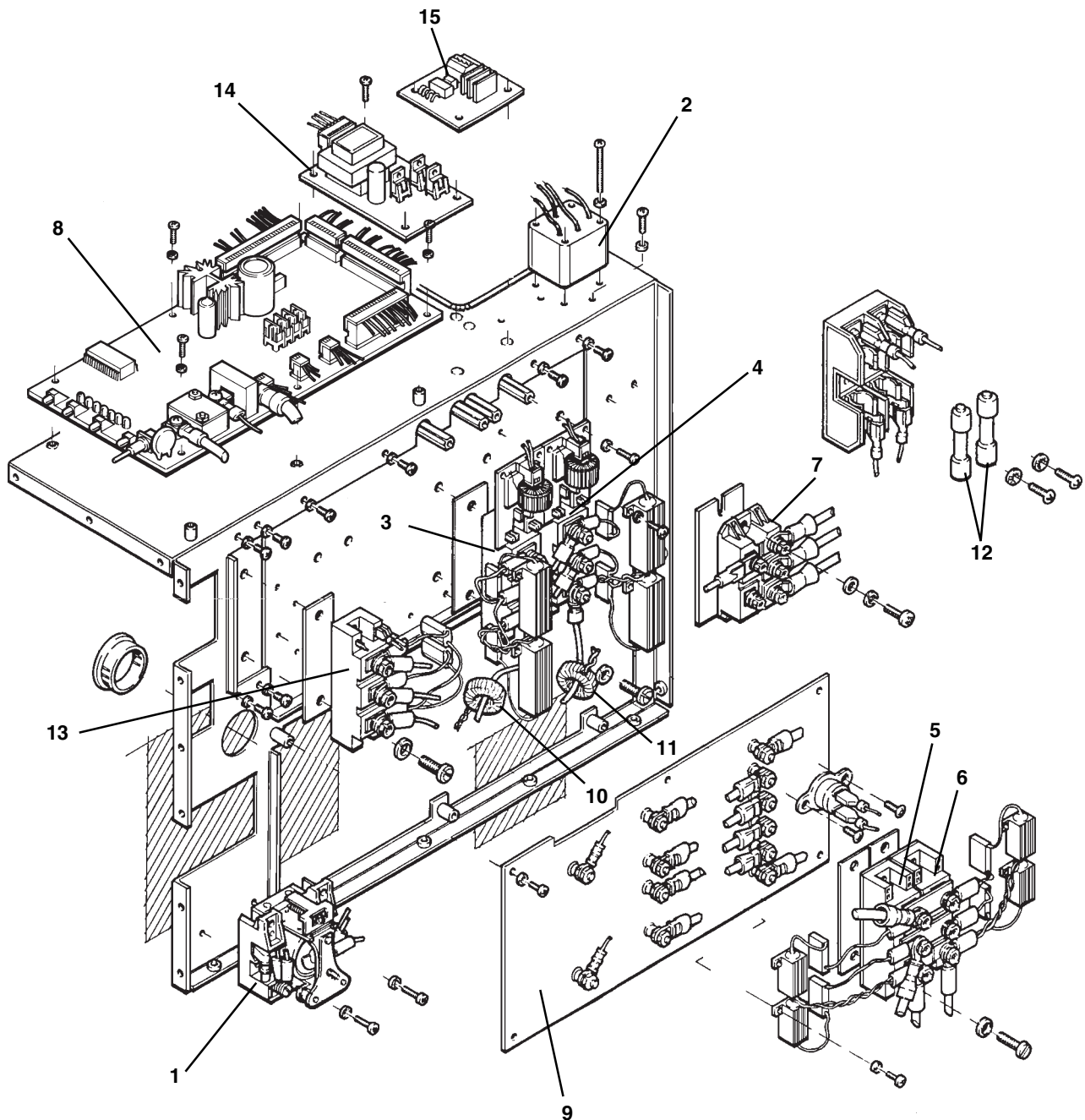


Figure 4-2 Powermax900 - 208/240/480V - Top and Right Side

PARTS LIST - 208/240/480V

POWER SUPPLY - 208/240/480V

Bottom and Left Side

Index No.	Part No.	Description	Ref. Desig.	Quantity
1	014207	Xfmr:Powermax800/900 208-240-480 Control	T1	1
2	014228	Xfmr:Powermax900 208-240-480 Power	T2 (w/TS2)	1
3	014230	Inductor:Powermax900 0.8MH 55A	L1	1
4	027080	Fan:225CFM 120VAC 50-60HZ	M1	1
5	041532 029978*	PCB Assy:Powermax800/900-ZB Power Heatsink SA:Pwrmx800/900 PA Cont PCB	Q3	1
6	004673*	Heatsink:Powermax800/900 PA Cont		
7	028908**	Kit:Powermax800/900 Cooling Fan Filter		

Notes: **Bold** part numbers and descriptions are subassemblies.
Indented normal type items are components of subassemblies

All mounting hardware in power supply drawings shown for reference only.

* Available only on power supplies with the pilot arc control option

** Available only as an option

See also **Section 5 Parts List - 200/230/400V**, and **Section 6 Parts List - 400V CE** to identify parts for other Powermax900 power supplies.

POWER SUPPLY - 208/240/480V

Bottom and Left Side

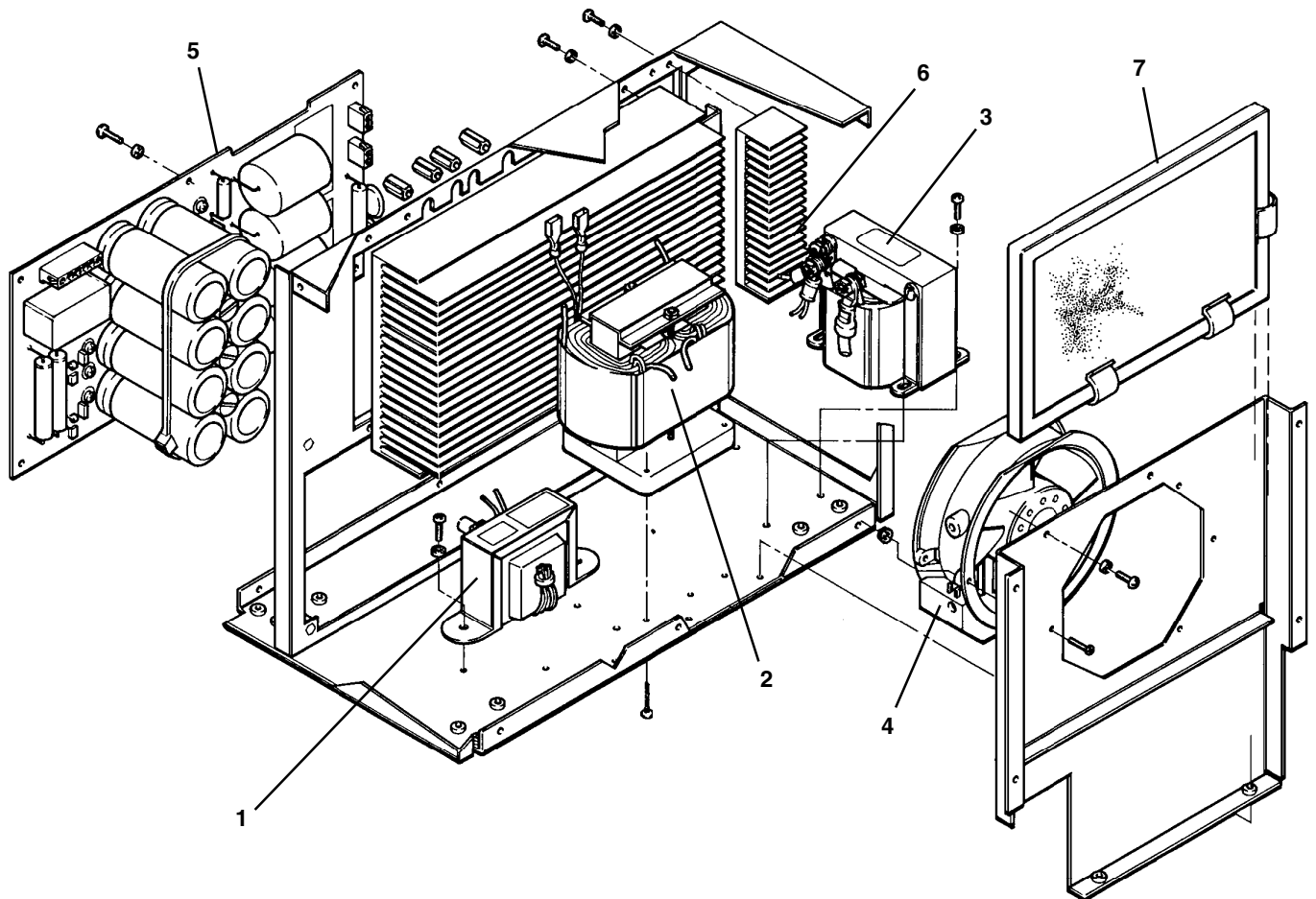


Figure 4-3 Powermax900 - 208/240/480V - Bottom and Left Side

PARTS LIST - 208/240/480V

POWER SUPPLY - 208/240/480V

Rear

Index No.	Part No.	Description	Ref. Desig.	Quantity
1	001503	Pnl:Powermax800/900 Pwr Unit Plastic Rear		1
2	129068	Circuit Breaker SA:4Pole 480V W/TC	S1	1
3	128405	Contactorm Replacement:Powermax800/900	CR1	1
	129300	Regulator SA:Powermax800/900 Pwr Unit		1
4	011072	Filter:20 Micron 1/8FPT		1
5	015285	Male Connector:1/8NPTX1/4Push in Tube		1
6	011079	Filter Element for 011072 Filter		1
	129327	Linecord Panel SA:Powermax900 208/240/480V		1
7	001660*	Panel:Powermax900 Power Cord		1
8	008228	Cord Grip:1NPT .690-.990 2Screws		1
9	129114	Power Cord SA:Powermax800/900		1
10	123099**	Cable: Powermax800/900 Machine Interface		1

Notes: **Bold** part numbers and descriptions are subassemblies.
Indented normal type items are components of subassemblies

All mounting hardware in power supply drawings shown for reference only.

* Use 129332 to order power cord rear panel for 208/240/480V power supplies if you have the machine interface option.

** Available only with the machine interface option.

See also **Section 5 Parts List - 200/230/400V**, and **Section 6 Parts List - 400V CE** to identify parts for other Powermax900 power supplies.

POWER SUPPLY - 208/240/480V

Rear

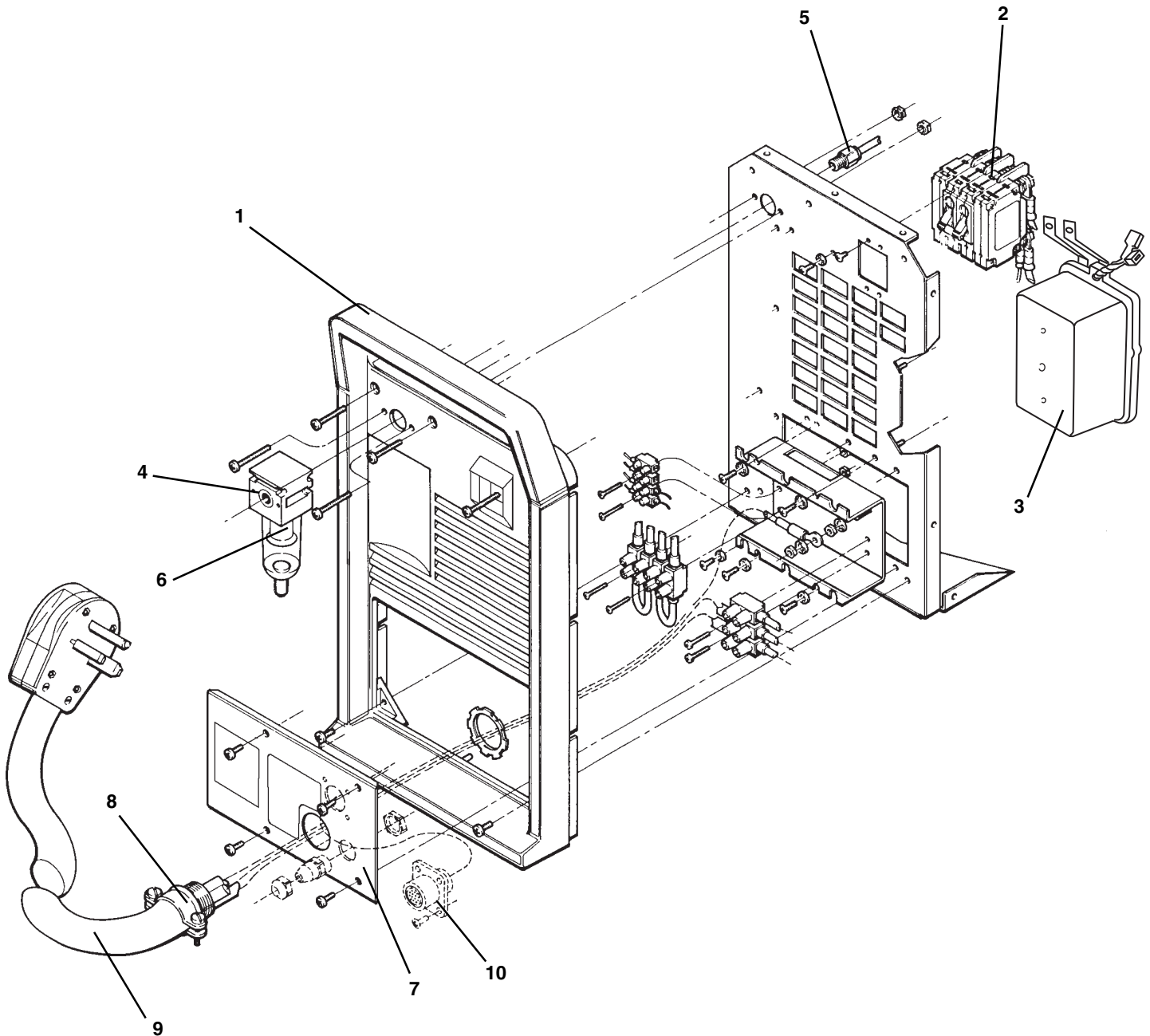


Figure 4-4 Powermax900 - 208/240/480V - Rear

PARTS LIST - 208/240/480V

Powermax900 Field Upgrade Kits and Optional Parts

Part Number	Description
028714	On/Off Pendant with Lead, 25 ft (7.6 m) (Also comes standard with most machine torch system configurations. See note below.)
128061	On/Off Pendant with Lead, 50 ft (15.2 m)
128062	On/Off Pendant with Lead, 75 ft (23 m)
128316	Kit: Powermax900 Power Unit Wheels
128317	Kit: Powermax900 Pilot Arc Controller
128241	Kit: Powermax900 Machine Interface, 208/240/480V
028907	Work Cable, 50 ft (15.2 m)
028908	Kit: Powermax900, Cooling Air Filter
011079	Filter Element
129019	Jumper:Powermax900 Link Box
128312	Kit: Powermax900 600V Conversion
008809	Fuse:1A 600V 13/32 X 1-1/2 Slo
023206	Cable: Machine Interface, 25 ft (7.6 m) (Comes standard with machine torch system configurations and with machine interface kits.)
024548	Leather Cable Covers, 25 ft (7.6 m)

POWER SUPPLIES - 208/240/480V, 1 ϕ /3 ϕ , 60 HZ

<u>Part Number</u>	<u>For Torch Type</u>	<u>With Pilot Arc Control</u>	<u>With Machine Interface</u>
083063	Hand	No	No
083076	Hand	Yes	No
083077	Machine	No	Yes
083078	Machine	Yes	Yes

Notes: Contact your distributor or call the nearest Hypertherm office for hand and machine torch system configurations.

See also **Section 5 Parts List - 200/230/400V**, and **Section 6 Parts List - 400V CE** to identify parts for other Powermax900 power supplies.

RECOMMENDED SPARE PARTS - POWERMAX900- 208/240/480V

Part Number	Description	Page Reference
003078	Relay:30A NO Mag Blwt QDisc Term	4-5
129068	Circuit Breaker SA:4Pole 480V W/TC	4-9
128405	Contactora Replacement:Powermax800/900	4-9
008809	Fuse:1A 600V 13/32X1-1/2Slo (2)	4-4
014207	Xfmr:Powermax800/900 208-240-480 Control	4-7
014228	Xfmr:Powermax900 208-240-480 Power	4-7
014230	Inductor:Powermax900 0.8MH 55A	4-7
023922	Cable w/Clamp:PMX800/900 Work 20'	4-3
027080	Fan:225CFM 120VAC 50-60HZ	4-7
005112	Pressure Switch:39 Psi .013 Orifice	4-3
006110	Sol. Valve:100# 1/8FPT 24VAC 3W	4-3
011072	Filter:20 Micron 1/8FPT	4-9
011079	Filter Element for 011072 Filter	4-9
011073	Regulator:0-125 Psig 1/8FPT	4-3
022027	Press. Gauge:160# 1.5" 1/8CBM Panel	4-3
029957	Heatsink SA:Powermax800/900 Power Unit	4-5
109018/008906	Diode:600V 100A UFast Recovery Dual (2) /Thermal Pad:AL-380-100 (2)	4-5
109019/008904	Diode:1600V 100A 3PH Module/Thermal Pad:AL-340-180	4-5
009849/008903	Resistor:20-Ohm 50W 5% NON-IND (4) /Thermal Pad: AL 197-114 (4)	4-5
009850/008902	Resistor:20-Ohm 25W 5% NON-IND (4) /Thermal Pad:AL 103-108 (4)	4-5
029998/008905	IGBT Gate Drive SA:Powermax800/900 (2) /Thermal Pad:AL-370-134 (2)	4-5
041668	PCB Assy:Powermax900 Micro Control	4-5
041532	PCB Assy:Powermax800/900-ZB Power	4-5, 4-7
129114	Cord/Plug:42 1Phase 8-3SO 3Prong 7'3"	4-9
029674	MOV/Cap Assy:MAX42/43/70 3PH	4-5
028908	Kit:Powermax800/900 Cooling Fan Filter	4-7

PARTS LIST - 208/240/480V

Section 5 PARTS LIST - 200/230/400V

In this section:

Power Supply - 200/230/400V	5-2
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Recommended Spare Parts - Powermax900 - 200/230/400V	5-11

PARTS LIST - 200/230/400V

POWER SUPPLY - 200/230/400V

Front

Index No.	Part No.	Description	Ref. Desig.	Quantity
1	001502	Pnl:PMX800/900 Pwr Unit Plastic Front		1
2	004675	Spacer:PMX800/900 Pressure Gauge		1
3	008965	Knob:.850 Dia. 1/4 SFT Blk/Sil		1
4	023922	Cable w/Clamp:PMX800/900 Work 20'		1
	129326	Manifold SA:PMX900 Pwr Unit		1
5	005112	Pressure Switch:39 Psi .013 Orifice	PS1	1
6	006110	Sol. Valve:100# 1/8FPT 24VAC 3W	V1	1
7	011073	Regulator:0-125 Psig 1/8FPT		1
8	022027	Press. Gauge:160# 1.5" 1/8CBM Panel		1
	129356	Harness:PMX900 Power Unit		1
9	129325	Recept. SA:PMX900 Pwr Unit Quick Disc.		1
10	129389	Current Control Assy, PMX900		1

Notes: **Bold** part numbers and descriptions are subassemblies.
Indented normal type items are components of subassemblies

All mounting hardware in power supply drawings shown for reference only.

See also **Section 4 Parts List - 208/240/480V**, and **Section 6 Parts List - 400V CE** to identify parts for other Powermax900 power supplies.

POWER SUPPLY - 200/230/400V

Front

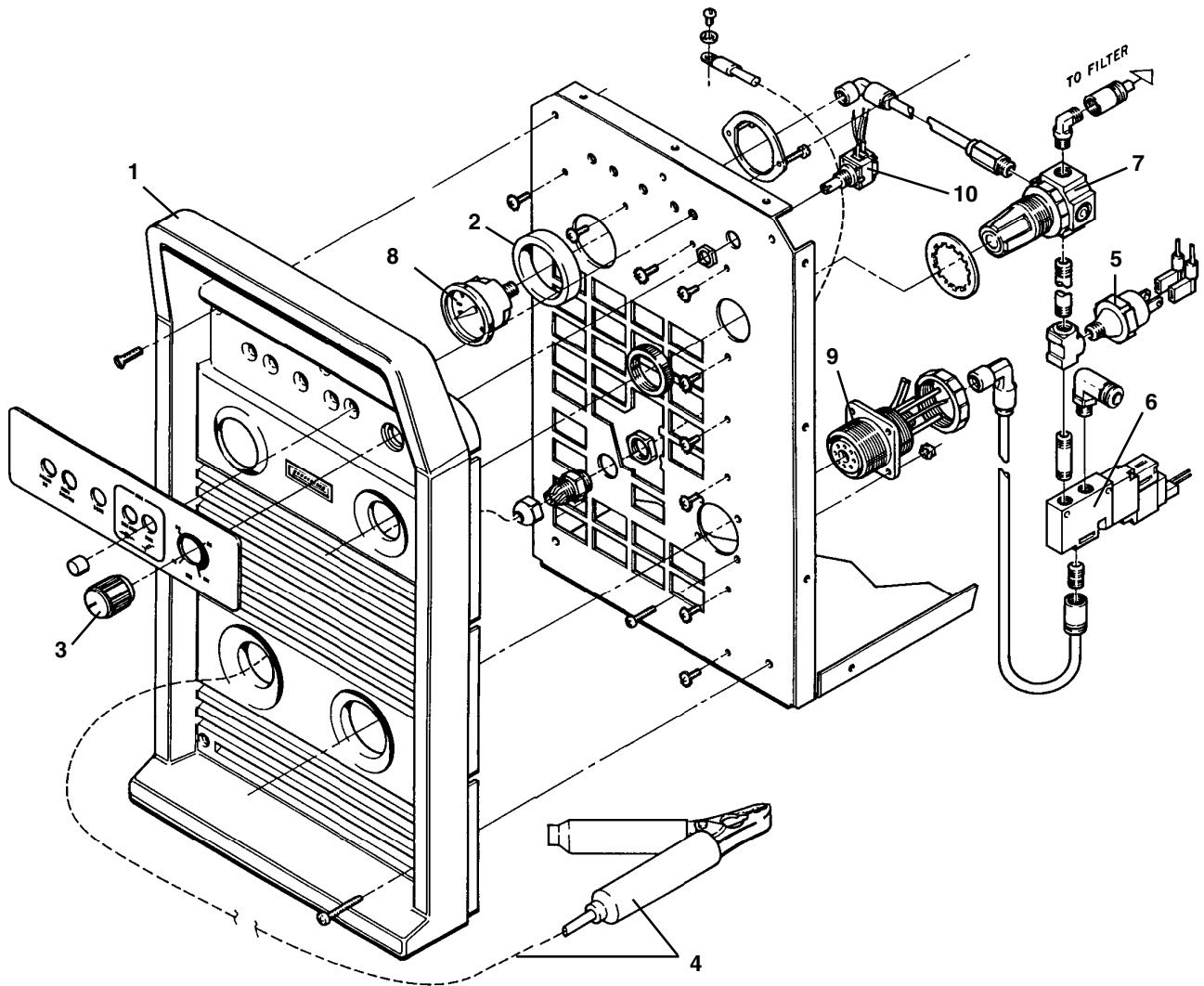


Figure 5-1 Powermax900 - 200/230/400V - Front

PARTS LIST - 200/230/400V

POWER SUPPLY - 200/230/400V

Top and Right Side

Index No.	Part No.	Description	Ref. Desig.	Quantity
1	003078	Relay:30A NO Mag Blwt QDisc Term	CR2	1
2	029674	MOV/Cap Assy:MAX42/43/70 3PH	MOV1	1
	029957	Heatsink SA:Powermax800/900 Power Unit		1
3	029998	IGBT Gate Drive SA:Powermax800/900	Q1	1
4	029998	IGBT Gate Drive SA:Powermax800/900	Q2	1
5	109018	Diode:600V 100A UFast Recovery Dual	D2	1
6	109018	Diode:600V 100A UFast Recovery Dual	D3	1
7	109019	Diode:1600V 100A 3PH Module	D1	1
8	041668	PCB Assy:Pwrmx900 Micro Control		1
9	041532	PCB Assy:Powermax800/900-ZB Power		1
10	014137	Current Sense Transformer, 40A	CS1	1
11	014137	Current Sense Transformer, 40A	CS2	1
12	008958	Fuse:1A 500V 10mmX38mm Slo	F1,F2	2
13	029978*	Heatsink SA:Powermax800/900 PA Cont PCB Q3		
14	041486*	PCB Assy:Powermax800/900 PA Cont		
	128242**	Kit:Powermax900 Machine Interface 200/230/400V		
15	041494**	PCB Assy:Powermax800/900 Machine Interface		

Notes: **Bold** part numbers and descriptions are subassemblies.
Indented normal type items are components of subassemblies.
All mounting hardware in power supply drawings shown for reference only.

* Available only on power supplies with the pilot arc control option

** Available only on power supplies with the machine interface option

See also **Section 4 Parts List - 208/240/480V**, and **Section 6 Parts List - 400V CE** to identify parts for other Powermax900 power supplies.

POWER SUPPLY - 200/230/400V

Top and Right Side

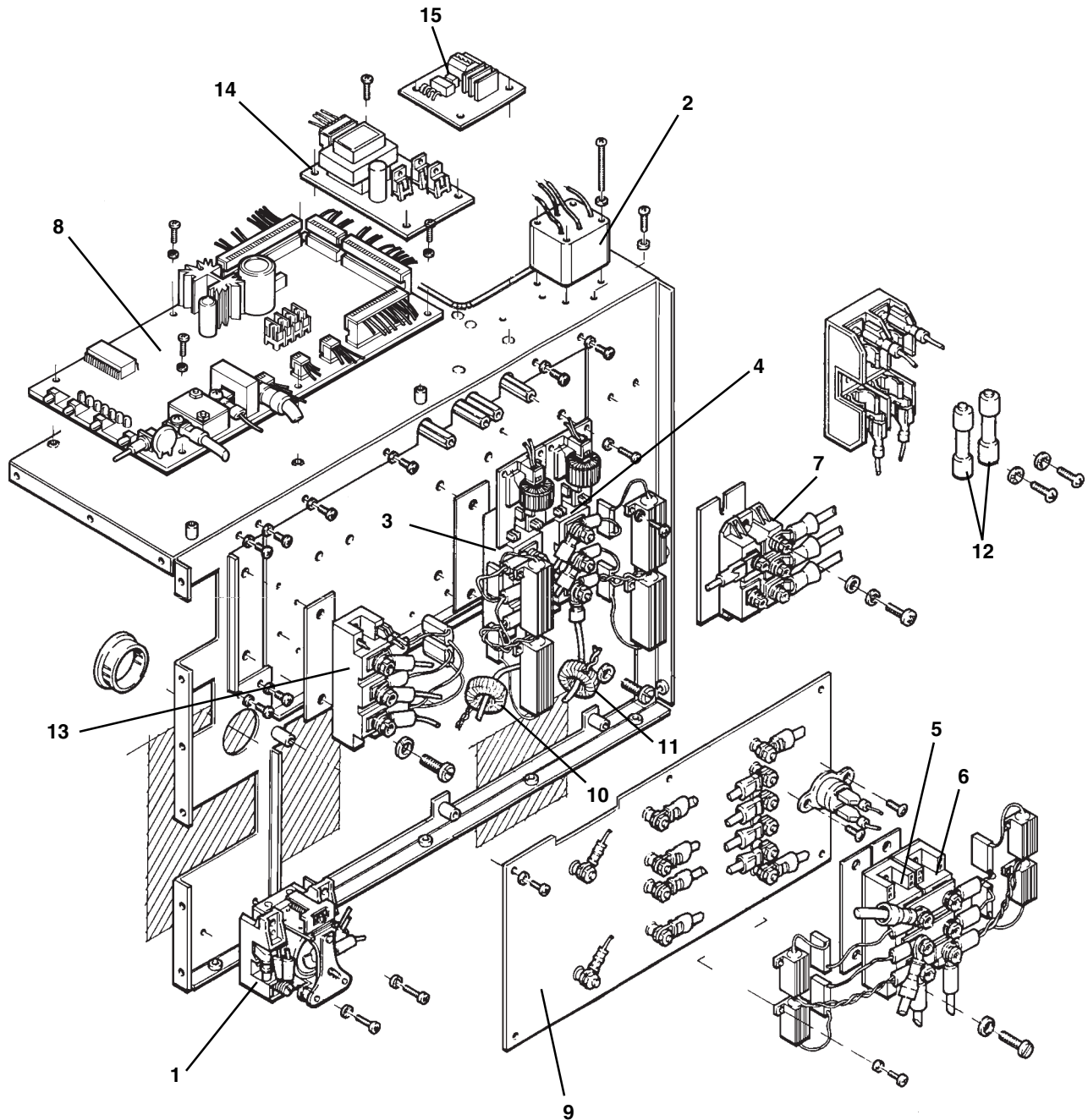


Figure 5-2 Powermax900 - 200/230/400V - Top and Right Side

PARTS LIST - 200/230/400V

POWER SUPPLY - 200/230/400V

Bottom and Left Side

Index No.	Part No.	Description	Ref. Desig.	Quantity
1	014208	Xfmr:Powermax800/900 200-230-400 Control	T1	1
2	014229	Xfmr:Powermax900 200-230-400 Power	T2 (w/TS2)	1
3	014230	Inductor:Powermax900 .08MH 55A	L1	1
4	027443	Fan:260CDM 120VAC 50-60HZ	M1	1
5	041532	PCB Assy:Powermax800/900-ZB Power		1
	029978*	Heatsink SA:Pwrmx800/900 PA Cont PCB	Q3	
6	004673*	Heatsink:Powermax800/900 PA Cont		
7	028908**	Kit:Powermax800/900 Cooling Fan Filter		

Notes: **Bold** part numbers and descriptions are subassemblies.
Indented normal type items are components of subassemblies

All mounting hardware in power supply drawings shown for reference only.

* Available only on power supplies with the pilot arc control option

** Available only as an option

See also **Section 4 Parts List - 208/240/480V**, and **Section 6 Parts List - 400V CE** to identify parts for other Powermax900 power supplies.

POWER SUPPLY - 200/230/400V

Bottom and Left Side

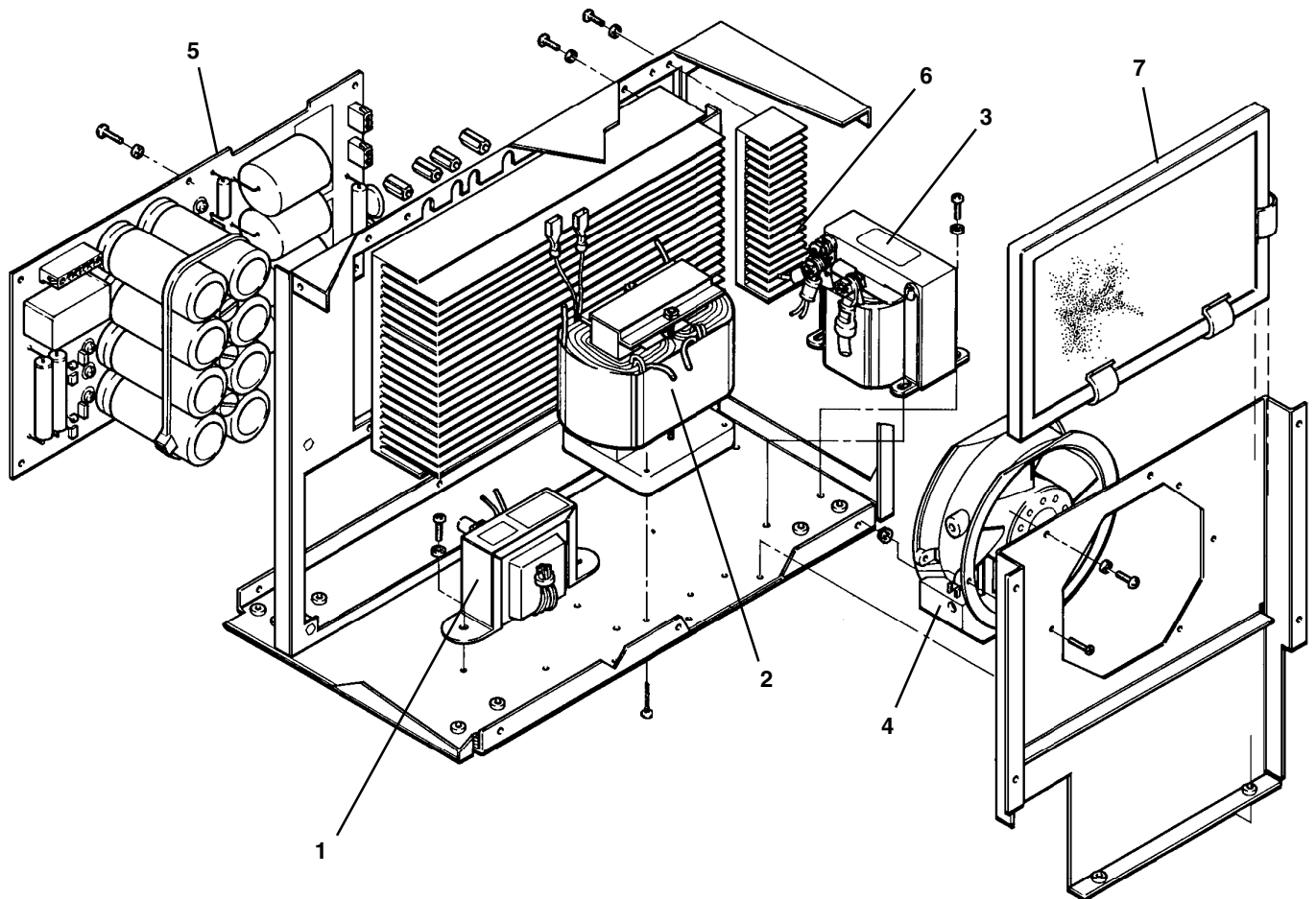


Figure 5-3 Powermax900 - 200/230/400V - Bottom and Left Side

PARTS LIST - 200/230/400V

POWER SUPPLY - 200/230/400V

Rear

Index No.	Part No.	Description	Ref. Desig.	Quantity
1	001503	Pnl:Powermax800/900 Pwr Unit Plastic Rear		1
2	129068	Circuit Breaker SA:4Pole 480V W/TC	S1	1
3	128405	Contactora Replacement:Powermax800/900	CR1	1
	129300	Regulator SA:Powermax800/900 Pwr Unit		1
4	011072	Filter:20 Micron 1/8FPT		1
5	015285	Male Connector:1/8NPTX1/4Push in Tube		1
6	011079	Filter Element for 011072 Filter		1
	129330	Linecord Panel SA:Powermax900 200/230/400V		1
7	001660*	Panel:Powermax900 Power Cord		1
8	008228	Cord Grip:1NPT .690-.990 2Screws		1
9	129115	Power Cord SA:Powermax800/900 200V		1
10	123099**	Cable: Powermax800/900 Machine Interface		

Notes: **Bold** part numbers and descriptions are subassemblies.
Indented normal type items are components of subassemblies

All mounting hardware in power supply drawings shown for reference only.

* Use 129333 to order power cord rear panel for 200/230/400V power supplies if you have the machine interface option.

** Available only with the machine interface option.

See also **Section 4 Parts List - 208/240/480V**, and **Section 6 Parts List - 400V CE** to identify parts for other Powermax900 power supplies.

POWER SUPPLY - 200/230/400V

Rear

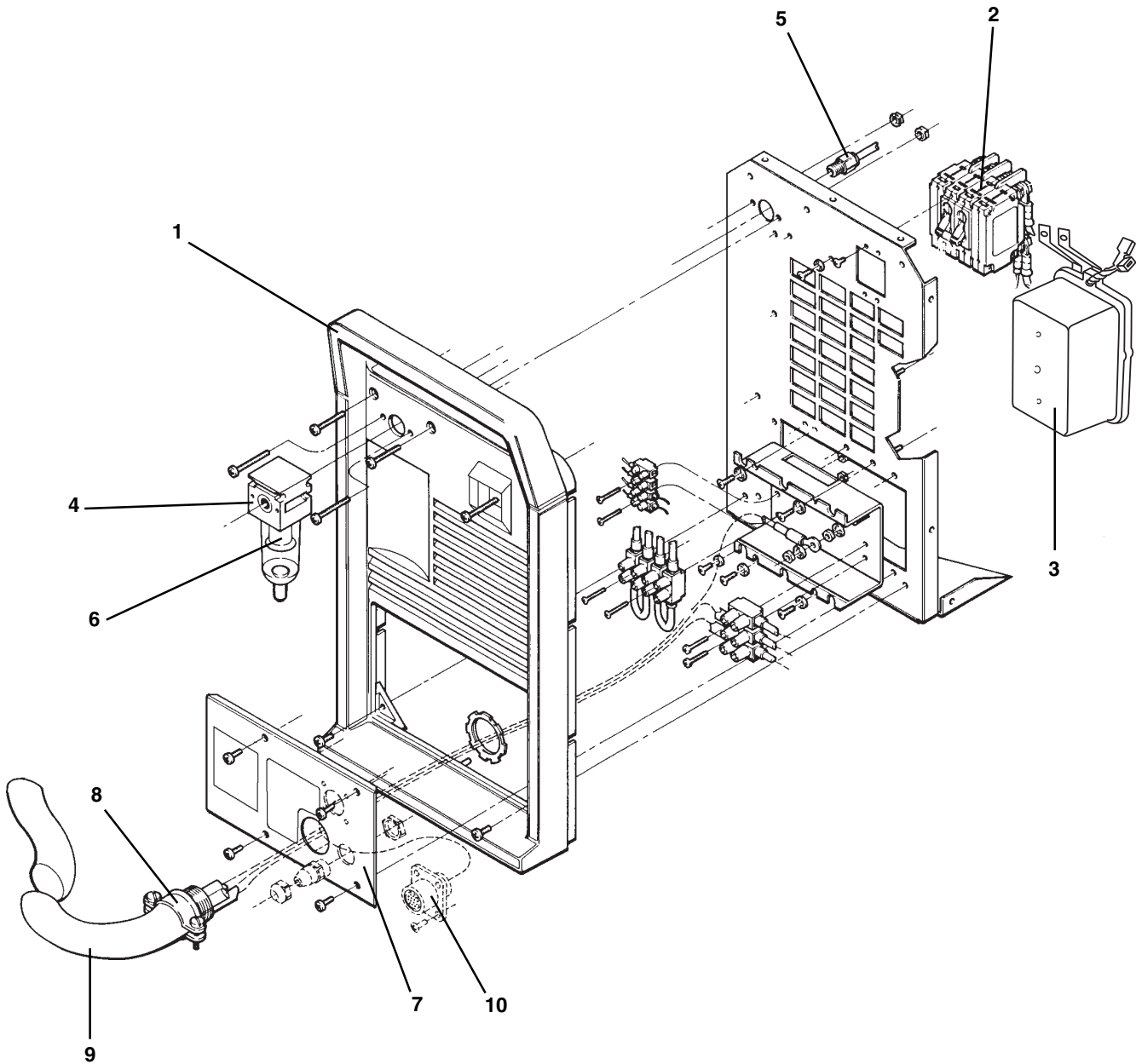


Figure 5-4 Powermax900 - 200/230/400V - Rear

PARTS LIST - 200/230/400V

Powermax900 Field Upgrade Kits and Optional Parts

Part Number	Description
028714	On/Off Pendant with Lead, 25 ft (7.6 m) (Also comes standard with most machine torch system configurations. See note below.)
128061	On/Off Pendant with Lead, 50 ft (15.2 m)
128062	On/Off Pendant with Lead, 75 ft (23 m)
128316	Kit: Powermax900 Power Unit Wheels
128317	Kit: Powermax900 Pilot Arc Controller
128242	Kit: Powermax900 Machine Interface, 200/230/400V
028907	Work Cable, 50 ft (15.2 m)
028908	Kit: Powermax900, Cooling Air Filter
011079	Filter Element
129019	Jumper:Powermax900 Link Box
008958	Fuse:1A 500V 10mm X 38mm Slo
023206	Cable: Machine Interface, 25 ft (7.6 m) (Comes standard with machine torch system configurations and with machine interface kits.)
024548	Leather Cable Covers, 25 ft (7.6 m)

POWER SUPPLIES - 200/230/400V, 1 ϕ /3 ϕ , 50/60 HZ

Part Number	For Torch Type	With Pilot Arc Control	With Machine Interface
083065	Hand	No	No
083082	Hand	Yes	No
083083	Machine	No	Yes
083084	Machine	Yes	Yes

Notes: Contact your distributor or call the nearest Hypertherm office for hand and machine torch system configurations.

See also **Section 4 Parts List - 208/240/480V**, and **Section 6 Parts List - 400V CE** to identify parts for other Powermax900 power supplies.

RECOMMENDED SPARE PARTS - POWERMAX900- 200/230/400V

Part Number	Description	Page Reference
003078	Relay:30A NO Mag Blwt QDisc Term	5-5
129068	Circuit Breaker SA:4Pole 480V W/TC	5-9
128405	Contactora Replacement:Powermax800/900	5-9
008958	Fuse:1A 500V 10mmX38mm SLO (2)	5-4
014208	Xfmr:Powermax800/900 200-230-400 Control	5-7
014229	Xfmr:Powermax900 200-230-400 Power	5-7
014230	Inductor:Powermax900 0.8MH 55A	5-7
023922	Cable w/Clamp:PMX800/900 Work 20'	5-3
027443	Fan:260CDM 120VAC 50-60HZ	5-7
005112	Pressure Switch:39 Psi .013 Orifice	5-3
006110	Sol. Valve:100# 1/8FPT 24VAC 3W	5-3
011072	Filter:20 Micron 1/8FPT	5-9
011079	Filter Element for 011072 Filter	5-9
011073	Regulator:0-125 Psig 1/8FPT	5-3
022027	Press. Gauge:160# 1.5" 1/8CBM Panel	5-3
029957	Heatsink SA:Powermax800/900 Power Unit	5-5
109018/008906	Diode:600V 100A UFast Recovery Dual (2) /Thermal Pad:AL-380-100 (2)	5-5
109019/008904	Diode:1600V 100A 3PH Module/Thermal Pad:AL-340-180	5-5
009849/008903	Resistor:20-Ohm 50W 5% NON-IND (4) /Thermal Pad: AL 197-114 (4)	5-5
009850/008902	Resistor:20-Ohm 25W 5% NON-IND (4) /Thermal Pad:AL 103-108 (4)	5-5
029998/008905	IGBT Gate Drive SA:Powermax800/900 (2) /Thermal Pad:AL-370-134 (2)	5-5
041668	PCB Assy:Powermax900 Micro Control	5-5
041532	PCB Assy:Powermax800/900-ZB Power	5-5, 5-7
129115	Cord: 2.5mm PVC HD21/22	5-9
029674	MOV/Cap Assy:MAX42/43/70 3PH	5-5
028908	Kit:Powermax800/900 Cooling Fan Filter	5-7

PARTS LIST - 200/230/400V

Section 6 PARTS LIST - 400V CE

In this section:

Power Supply - 400V CE	6-2
Front	6-2
Top and Right Side	6-4
Bottom and Left Side	6-6
Rear	6-8
Powermax900 Field Upgrade Kits and Optional Parts	6-10
Power Supplies - 400V CE	6-10
Recommended Spare Parts - Powermax900 - 400V CE	6-11

PARTS LIST - 400V CE

POWER SUPPLY - 400V CE

Front

Index No.	Part No.	Description	Ref. Desig.	Quantity
1	001502	Pnl:PMX800/900 Pwr Unit Plastic Front		1
2	004675	Spacer:PMX800/900 Pressure Gauge		1
3	008965	Knob:.850 Dia. 1/4 SFT Blk/Sil		1
4	023922	Cable w/Clamp:PMX800/900 Work 20'		1
	129326	Manifold SA:PMX900 Pwr Unit		1
5	005112	Pressure Switch:39 Psi .013 Orifice	PS1	1
6	006110	Sol. Valve:100# 1/8FPT 24VAC 3W	V1	1
7	011073	Regulator:0-125 Psig 1/8FPT		1
8	022027	Press. Gauge:160# 1.5" 1/8CBM Panel		1
	129356	Harness:PMX900 Power Unit		1
9	129325	Recept. SA:PMX900 Pwr Unit Quick Disc.		1
10	129389	Current Control Assy, PMX900		1

Notes: **Bold** part numbers and descriptions are subassemblies.
Indented normal type items are components of subassemblies

All mounting hardware in power supply drawings shown for reference only.

See also **Section 4 Parts List - 208/240/480V**, and **Section 5 Parts List - 200/230/400V** to identify parts for other Powermax900 power supplies.

POWER SUPPLY - 400V CE

Front

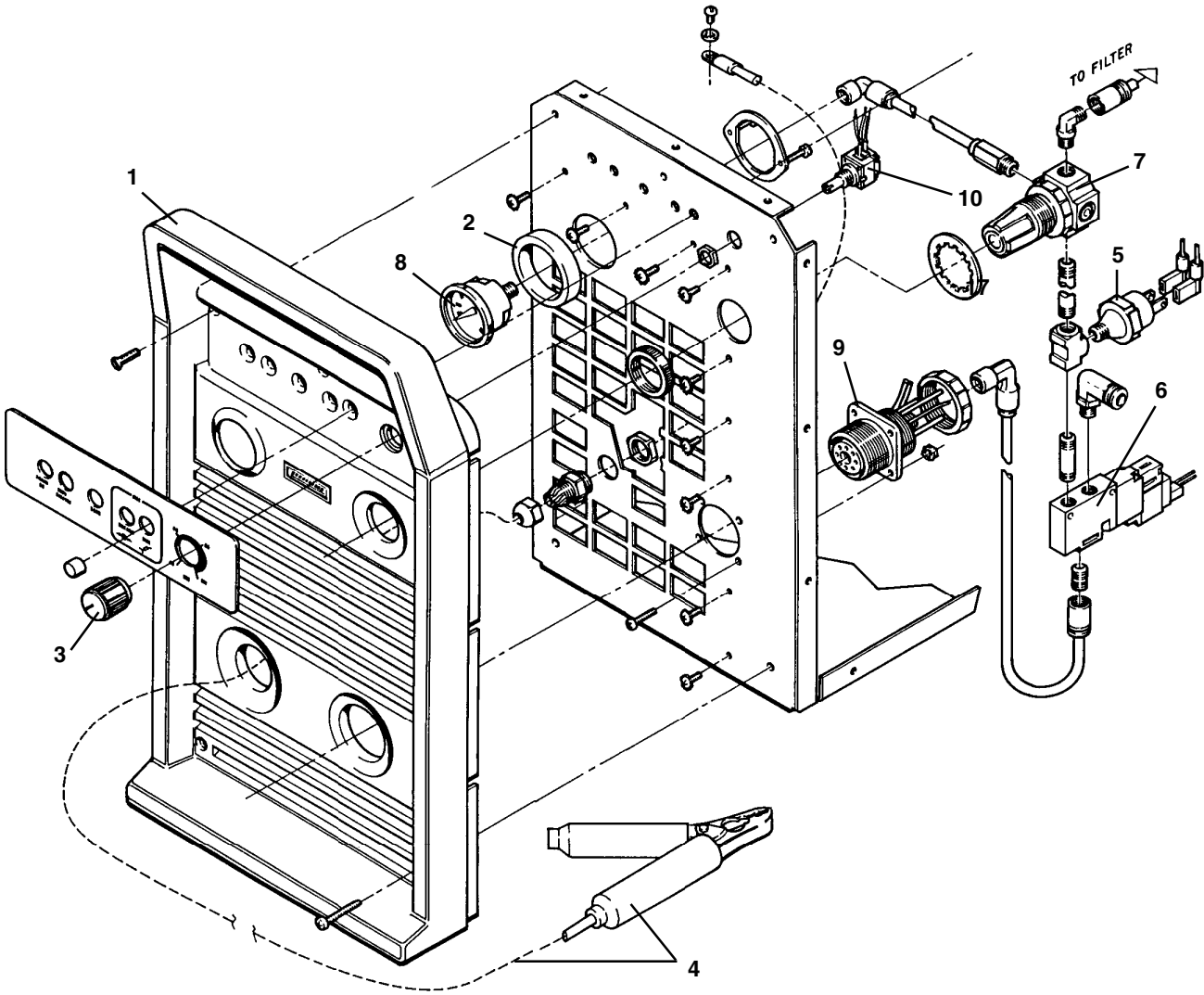


Figure 6-1 Powermax900 - 400V CE - Front

PARTS LIST - 400V CE

POWER SUPPLY - 400V CE

Top and Right Side

Index No.	Part No.	Description	Ref. Desig.	Quantity
1	003078	Relay:30A NO Mag Blwt QDisc Term	CR2	1
	129046	Heatsink SA:Powermax800/900 CE Power Unit		1
2	029998	IGBT Gate Drive SA:Powermax800/900	Q1	1
3	029998	IGBT Gate Drive SA:Powermax800/900	Q2	1
4	109018	Diode:600V 100A UFast Recovery Dual	D2	1
5	109018	Diode:600V 100A UFast Recovery Dual	D3	1
6	109043	Diode:1600V 30A 3PH Bridge Isol Bplr	D1	1
7	041668	PCB Assy:Powermax900 Micro Control		1
8	041532	PCB Assy:Powermax800/900-ZB Power		1
9	014137	Current Sense Transformer, 40A	CS1	1
10	014137	Current Sense Transformer, 40A	CS2	1
11	008958	Fuse:1A 500V 10mmX38mm Slo	F1, F2	2
12	008959	Fuse:20A 500V 10mmX38mm Slo		3
13	029978*	Heatsink SA:Pwrmax800/900 PA Cont PCB	Q3	
14	041486*	PCB Assy:Pwermax800/900 PA Cont		
	128286**	Kit:Powermax900 Machine Interface 400V CE		
15	041494**	PCB Assy:Powermax800/900 Machine Interface		

Notes: **Bold** part numbers and descriptions are subassemblies.
Indented normal type items are components of subassemblies.
All mounting hardware in power supply drawings shown for reference only.

* Available only on power supplies with the pilot arc control option

** Available only on power supplies with the machine interface option

See also **Section 4 Parts List - 208/240/480V**, and **Section 5 Parts List - 200/230/400V** to identify parts for other Powermax900 power supplies.

POWER SUPPLY - 400V CE

Top and Right Side

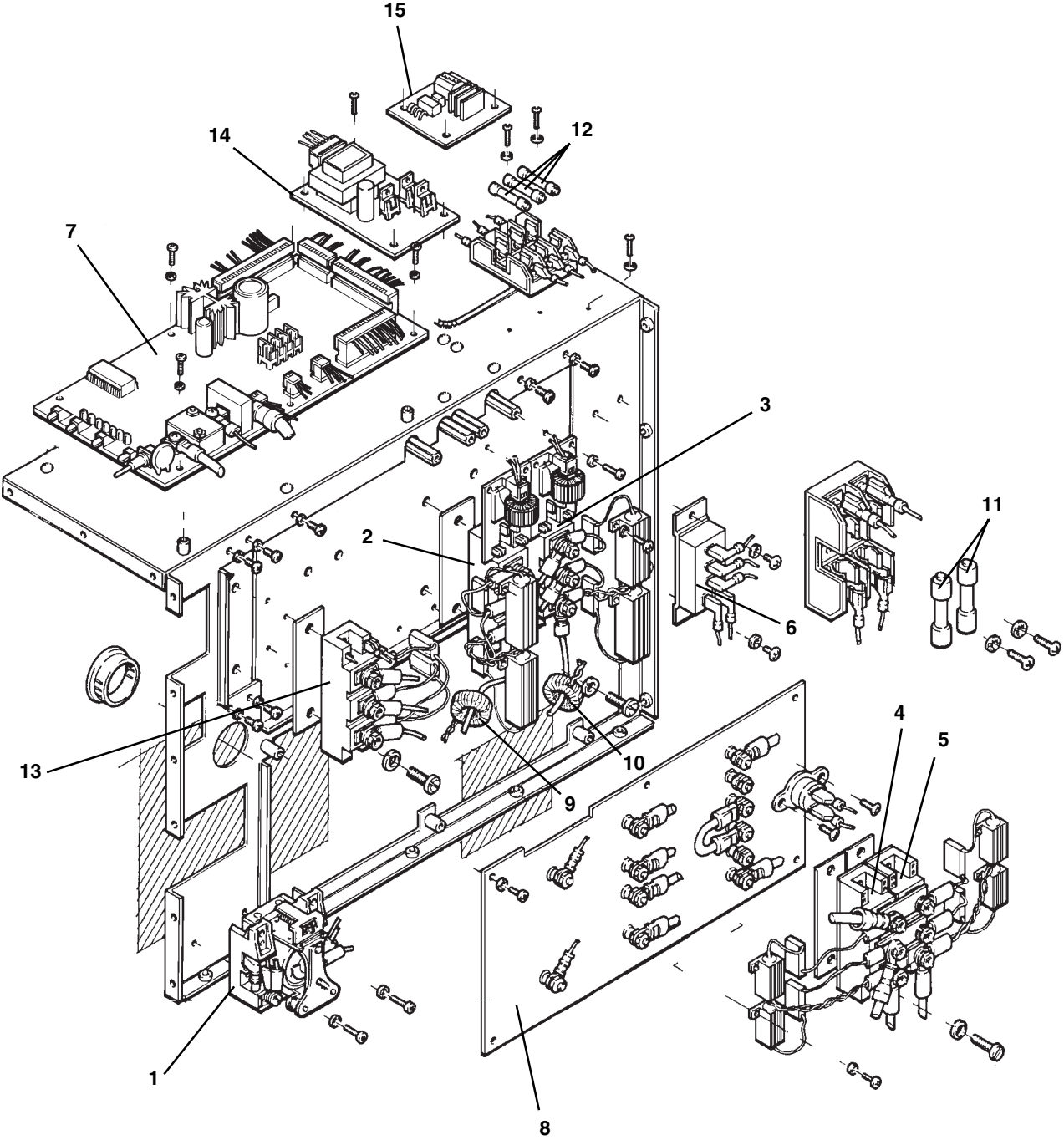


Figure 6-2 Powermax900 - 400V CE - Top and Right Side

PARTS LIST - 400V CE

POWER SUPPLY - 400V CE

Bottom and Left Side

Index No.	Part No.	Description	Ref. Desig.	Quantity
1	014209	Xfmr:Powermax800/900 CE 400V Control	T1	1
2	014229	Xfmr:Powermax800/900 200-230-400 Power	T2 (w/TS2)	1
3	014230	Inductor:Powermax900 0.8MH 55A	L1	1
4	027443	Fan:260CDM 120VAC 50-60HZ	M1	1
5	041532	PCB Assy:Powermax800/900-ZB Power		1
	029978*	Heatsink SA:Pwrmx800/900 PA Cont PCB	Q3	
6	004673*	Heatsink:Powermax800/900 PA Cont		
7	028908**	Kit:Powermax800 Cooling Fan Filter		
8	129100	Capacitor SA:Powermax800/900-CE		1

Notes: **Bold** part numbers and descriptions are subassemblies.
Indented normal type items are components of subassemblies.

All mounting hardware in power supply drawings shown for reference only.

* Available only on power supplies with the pilot arc control option

** Available only as an option

See also **Section 4 Parts List - 208/240/480V**, and **Section 5 Parts List - 200/230/400V** to identify parts for other Powermax900 power supplies.

POWER SUPPLY - 400V CE

Bottom and Left Side

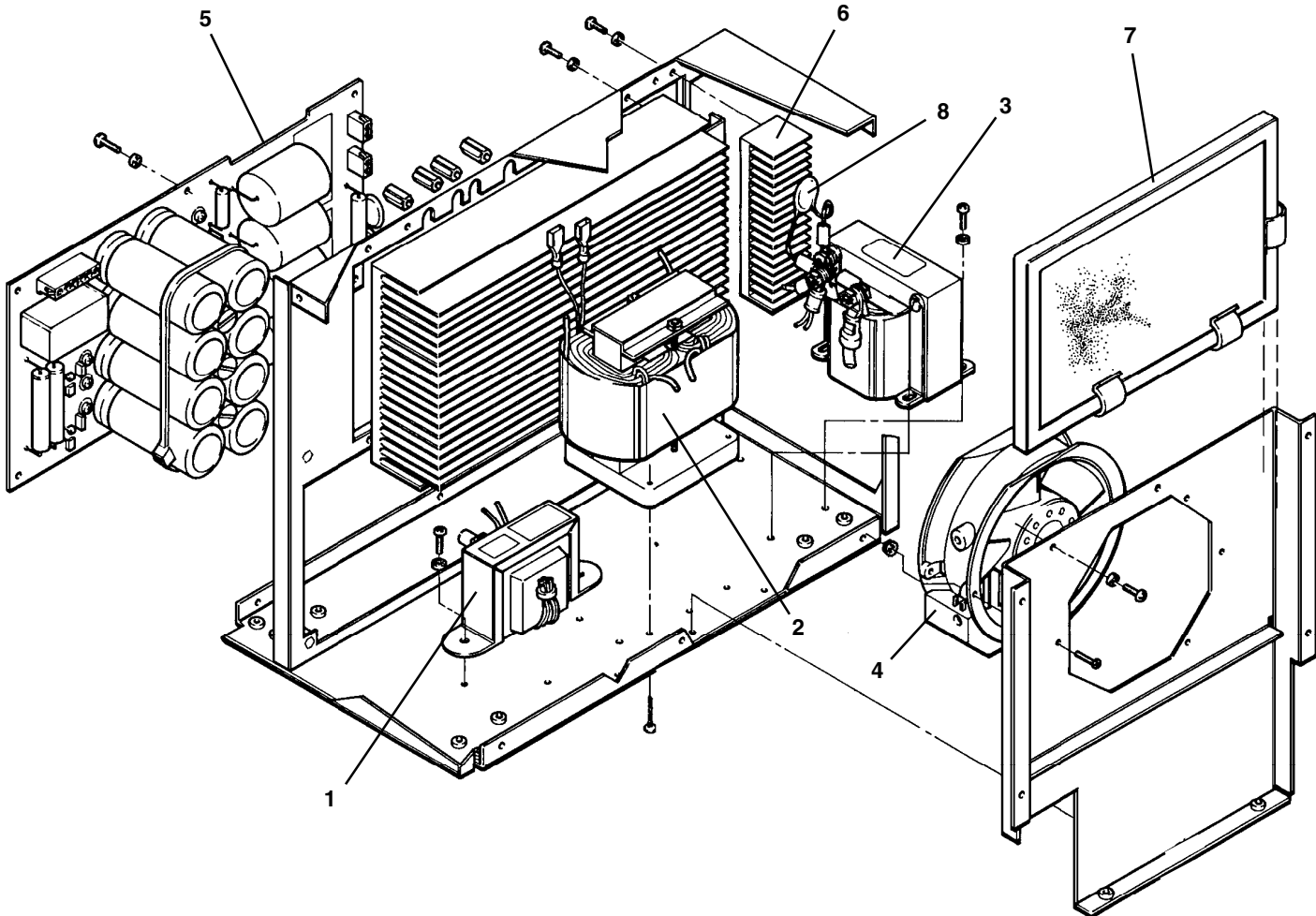


Figure 6-3 Powermax900 - 400V CE - Bottom and Left Side

PARTS LIST - 400V CE

POWER SUPPLY - 400V CE

Rear

Index No.	Part No.	Description	Ref. Desig.	Quantity
1	001503	Pnl:Powermax800/900 Pwr Unit Plastic Rear		1
2	003132	Circuit Breaker SA:4Pole 480V W/TC	S1	1
3	128405	Contactora Replacement:Powermax800/900	CR1	1
	129300	Regulator SA:Powermax800/900 Pwr Unit		1
4	011072	Filter:20 Micron 1/8FPT		1
5	015285	Male Connector:1/8NPTX1/4Push in Tube		1
6	011079	Filter Element for 011072 Filter		1
	129357	Linecord Panel SA:Powermax900 CE Pwr Unit		1
7	001571*	Panel:Powermax800/900 Power Cord & EMI		1
8	008782	Strain Relief:3/4NPT .375-.500		1
	109068***	Toroid:Powermax1100/900		1
9	129376	Power Cord SA:PMX900-CE/200-230-		1
10	041505	PCB Assy:Powermax800/900-CE Line Filter		1
11	123099**	Cable: Powermax800 Machine Interface		1

Notes: **Bold** part numbers and descriptions are subassemblies.
Indented normal type items are components of subassemblies

All mounting hardware in power supply drawings shown for reference only.

* Use 129372 to replace power cord rear panel if you have the machine interface option.

** Available only with the machine interface option

*** Not shown in Figure 6-4

See also **Section 4 Parts List - 208/240/480V**, and **Section 5 Parts List - 200/230/400V** to identify parts for other Powermax900 power supplies.

POWER SUPPLY - 400V CE

Rear

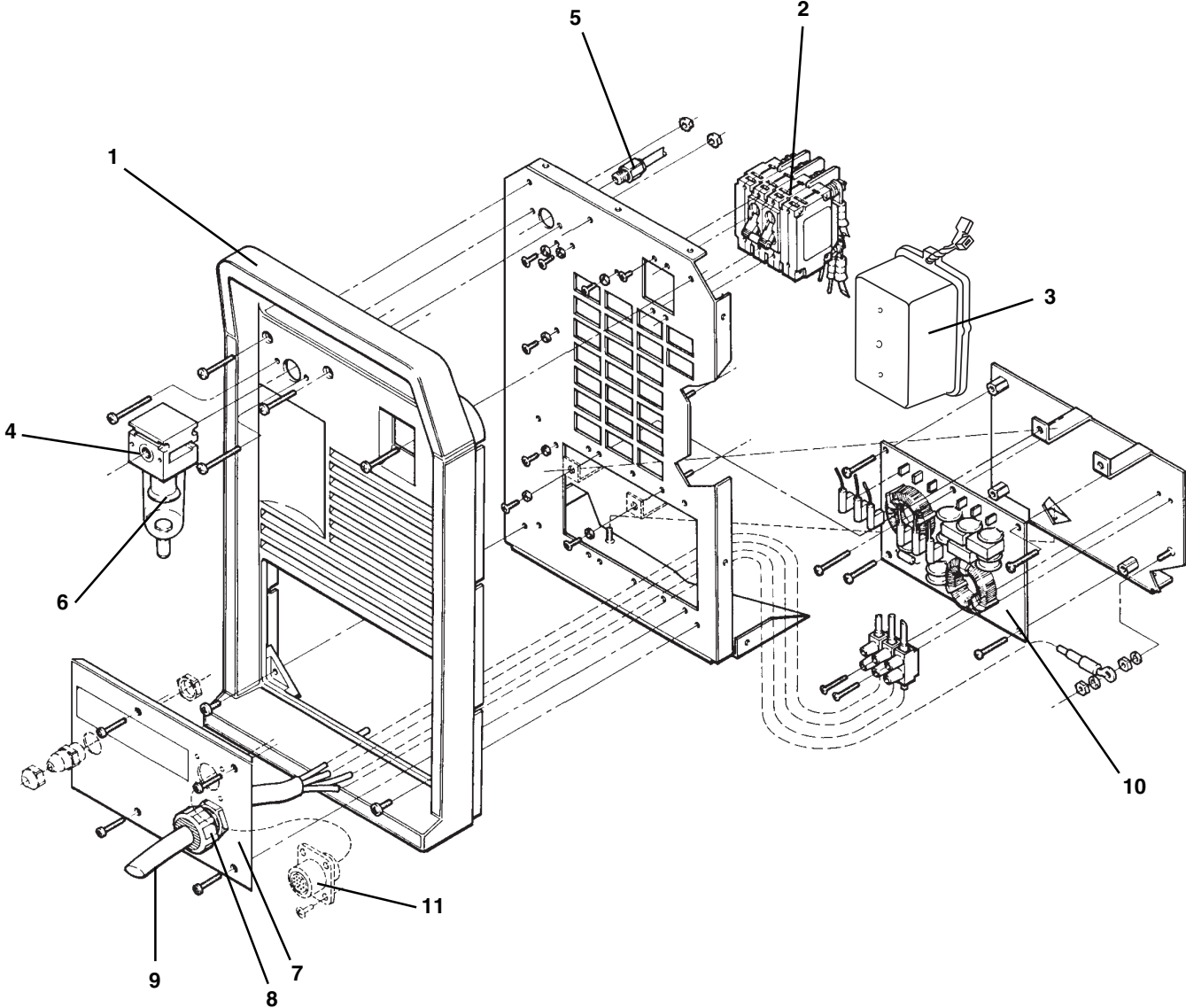


Figure 6-4 Powermax900 - 400V CE - Rear

PARTS LIST - 400V CE

Powermax900 Field Upgrade Kits and Optional Parts

Part Number	Description
028714	On/Off Pendant with Lead, 25 ft (7.6 m) (Also comes standard with most machine torch system configurations. See note below.)
128061	On/Off Pendant with Lead, 50 ft (15.2 m)
128062	On/Off Pendant with Lead, 75 ft (23 m)
128316	Kit: Powermax900 Power Unit Wheels
128317	Kit: Powermax900 Pilot Arc Controller
128286	Kit: Powermax900 Machine Interface, 400V CE
128313	Kit: Powermax900 CE 230V Conversion
028907	Work Cable, 50 ft (15.2 m)
028908	Kit: Powermax900, Cooling Air Filter
011079	Filter Element
129019	Jumper:Powermax900 Link Box
008958	Fuse:1A 500V 10mm X 38mm Slo
023206	Cable: Machine Interface, 25 ft (7.6 m) (Comes standard with machine torch system configurations and with machine interface kits.)
024548	Leather Cable Covers, 25 ft (7.6 m)
109068	Toroid (Used only on 400V CE power supply linecord assemblies.)

POWER SUPPLIES - 400V CE, 3 ϕ , 50 HZ

Part Number	For Torch Type	With Pilot Arc Control	With Machine Interface
083064	Hand	No	No
083079	Hand	Yes	No
083080	Machine	No	Yes
083081	Machine	Yes	Yes

Notes: Contact your distributor or call the nearest Hypertherm office for hand and machine torch system configurations.

See also **Section 4 Parts List - 208/240/480V**, and **Section 5 Parts List - 200/230/400V** to identify parts for other Powermax900 power supplies.

RECOMMENDED SPARE PARTS - POWERMAX900 400V CE

Part Number	Description	Page Reference
003078	Relay:30A NO Mag Blwt QDisc Term	6-5
003132	Circuit Breaker SA:4Pole 480V W/TC	6-9
128405	Contactora Replacement:Powermax800/900	6-9
008958	Fuse:1A 500V 10mm X 38mm GI Slo(2)	6-5
008959	Fuse:20A 500V 10mm X 38mm GI Slo(3)	6-5
014209	Xfmr:Powermax800/900 CE 400V Control	6-7
014229	Xfmr:Powermax900 200/230/400 Power	6-7
014230	Inductor:Powermax900 0.8MH 55A	6-7
023922	Cable w/Clamp:PMX800/900 Work 20'	6-3
027443	Fan:260CDM 120VAC 50-60HZ	6-7
005112	Pressure Switch:39 Psi .013 Orifice	6-3
006110	Sol. Valve:100# 1/8FPT 24VAC 3W	6-3
011072	Filter:20 Micron 1/8FPT	6-9
011079	Filter Element for 011072 Filter	6-9
011073	Regulator:0-125 Psig 1/8FPT	6-3
022027	Press. Gauge:160# 1.5" 1/8CBM Panel	6-3
129046	Heatsink SA:Powermax800/900 CE Power Unit	6-5
109018/008906	Diode:600V 100A UFast Recovery Dual (2) /Thermal Pad:AL-380-100 (2)	6-5
109043/008947	Diode:1600V 30A 3PH Bridge/Thermal Pad:AL-315-114	6-5
009849/008903	Resistor:20-Ohm 50W 5% NON-IND (4) /Thermal Pad:AL-197-114 (4)	6-5
009850/008902	Resistor:20-Ohm 25W 5% NON-IND (4) /Thermal Pad:AL-103-108 (4)	6-5
029998/008905	IGBT Gate Drive SA:Powermax800/.900 (2) /Thermal Pad:AL-370-134 (2)	6-5
041668	PCB Assy:Powermax900 Micro Control	6-5
041532	PCB Assy:Powermax800/900-ZB Power	6-5, 6-7
129049	Electric Line Filter SA:Powermax800/900-CE	6-9
129376	Power Cord SA:Powermax900-CE	6-9
028908	Kit:Powermax800/900 Cooling Fan Filter	5-7

PARTS LIST - 400V CE

Section 7 PARTS LIST - TORCHES AND CONSUMABLES

In this section:

PAC125T Torch Assembly	7-2
PAC125M Torch Assembly	7-3
Consumable Parts Kits.....	7-4
Consumable Configurations	7-5

PARTS LIST - TORCH AND CONSUMABLES

PAC125T Torch Assembly and 25 ft (7.6 m) Lead - 083066

PAC125T Torch Assembly and 50 ft (15.2 m) Lead - 083067

Part Number	Description
001288	Handle, PAC121/125T
002244	Safety Trigger, PAC121/125T
128284	Kit: Switch Repair
120573	Electrode, Air
120576	Ring, Swirl
027254	Trigger Spring, PAC121/125T
004764	Ring, Gutcha
075339	Screws, P/S, # 4 X 1/2, PH, RND, S/B
120577	Nozzle: PAC125 55A Shield
120601	Shield: PAC121T
120600	Cap, Retaining
120570	Torch Main Body with Switch, PAC125T
044016	O-Ring: BUNA 90 Duro .614X.070
129352	Torch Lead, 25 ft (7.6 m)
129353	Torch Lead, 50 ft (15.2 m)
044009	Quick Disconnect O-Ring (not shown)

* Used only in 083066

** Used only in 083067

Note: See page 7-4 or 7-5 for detail of consumable parts

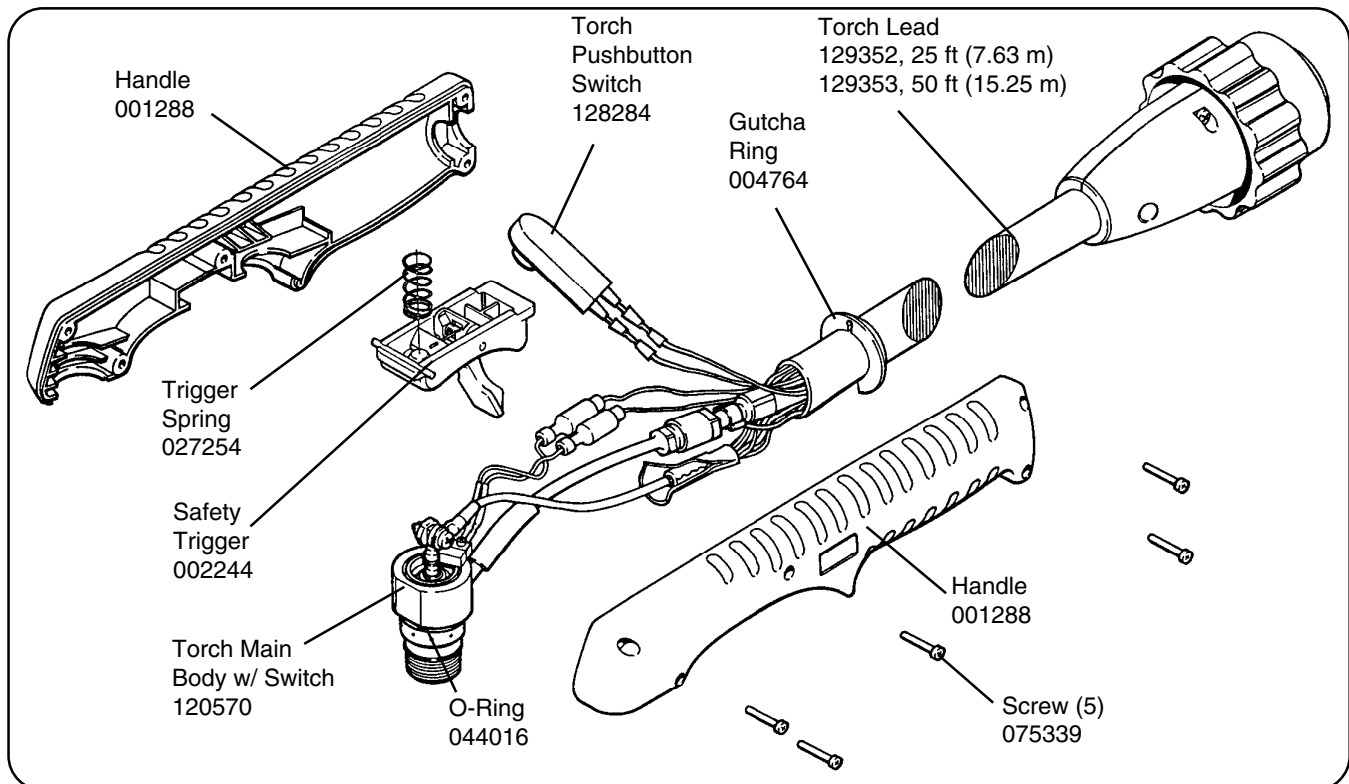


Figure 7-1 PAC125T Torch Assembly and Leads

PARTS LIST - TORCH AND CONSUMABLES

PAC125M Torch Assembly and 14 ft (4.3 m) Lead - 083069 w/pigtail, 083073 no pigtail
PAC125M Torch Assembly and 25 ft (7.6 m) Lead - 083068 w/pigtail, 083072 no pigtail
PAC125M Torch Assembly and 35 ft (10.6 m) Lead - 083070 w/pigtail, 083074 no pigtail
PAC125M Torch Assembly and 50 ft (15.2 m) Lead - 083071 w/pigtail, 083075 no pigtail

Part Number	Description
120573	Electrode, Air
120576	Ring, Swirl
120613	Sleeve, Machine Torch, PAC125M
020620	Sleeve, Torch Position, PAC121/125M
129339	Torch Lead w/pigtail, 14 ft (4.3 m)
129338	Torch Lead w/pigtail, 25 ft (7.6 m)
129340	Torch Lead w/pigtail, 35 ft (10.6 m)
129341	Torch Lead w/pigtail, 50 ft (15.2 m)
129343	Torch Lead, no pigtail, 14 ft (4.3 m)
129342	Torch Lead, no pigtail, 25 ft (7.6 m)
129344	Torch Lead, no pigtail, 35 ft (10.6 m)
129345	Torch Lead, no pigtail, 50 ft (15.2 m)
044009	Quick Disconnect O-Ring (not shown)
027599	Snap Ring
120577	Nozzle: PAC125 55A Shield
120602	Shield: PAC121M Machine Torch
120600	Cap, Retaining
120583	Torch Main Body w/ Switch, PAC125M
044016	O-Ring: BUNA 90 Duro .614X.070

Note: See page 7-4 for detail of consumable parts

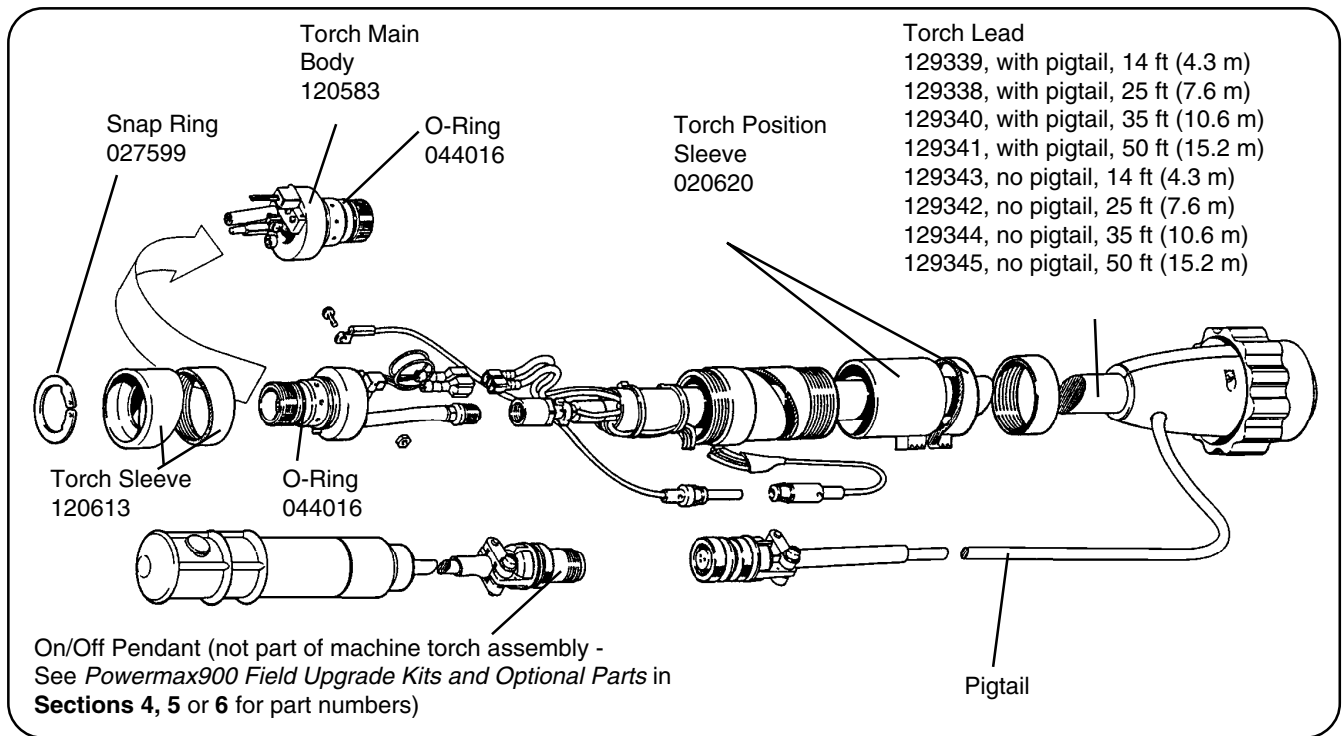


Figure 7-2 PAC125M Torch Assembly and Leads

PARTS LIST - TORCH AND CONSUMABLES

Consumable Parts Kits

Hand Consumable Spare Parts Kit (128287)	
Part Number	Description (Quantity)
001285	Box, Consumable Parts (1)
120573	Electrode (3)
120574	Electrode, Extended (1)
120577	Nozzle, 55A, Shielded (3)
120578	Nozzle, Pipe Saddle, Extended (1)
120607	Nozzle, Gouging (1)
120601	Shield, 55A (1)
120608	Shield, Gouging (1)
120303	Deflector (1)
044016	O-Ring (3)
015152	Nipple, 1/8 NPT, QDisc, Steel (1)
015604	Reducer, 1/4 FPT X 1/8 NPT, Brass (1)
027055	Lubricant, Silicone 1/4 Oz Tube (1)

Machine Consumable Spare Parts Kit (128288)	
Part Number	Description (Quantity)
001285	Box, Consumable Parts (1)
120573	Electrode (3)
120574	Electrode, Extended (3)
120577	Nozzle, 55A, Shielded (3)
120606	Nozzle, 35A, Extended (3)
120602	Shield, PAC125M Machine Torch (1)
120303	Deflector (1)
044016	O-Ring (3)
015152	Nipple, 1/8 NPT, QDisc, Steel (1)
015604	Reducer, 1/4 FPT X 1/8 NPT, Brass (1)
027055	Lubricant, Silicone 1/4 Oz Tube (1)

Consumable Spare Parts Kit - CE (128289)	
Part Number	Description (Quantity)
001285	Box, Consumable Parts (1)
120573	Electrode, Air (3)
120577	Nozzle, 55A, Shielded (3)
120607	Nozzle, Gouging (1)
120608	Shield, Gouging (1)
120601	Shield, 55A (1)
044016	O-Ring (3)
015152	Nipple, 1/8 NPT, QDisc, Steel (1)
015301	Adapter, 1/8 NPT to 1/4 Hose (1)
027055	Lubricant, Silicone 1/4 Oz Tube (1)

PARTS LIST - TORCH AND CONSUMABLES

Consumable Configurations

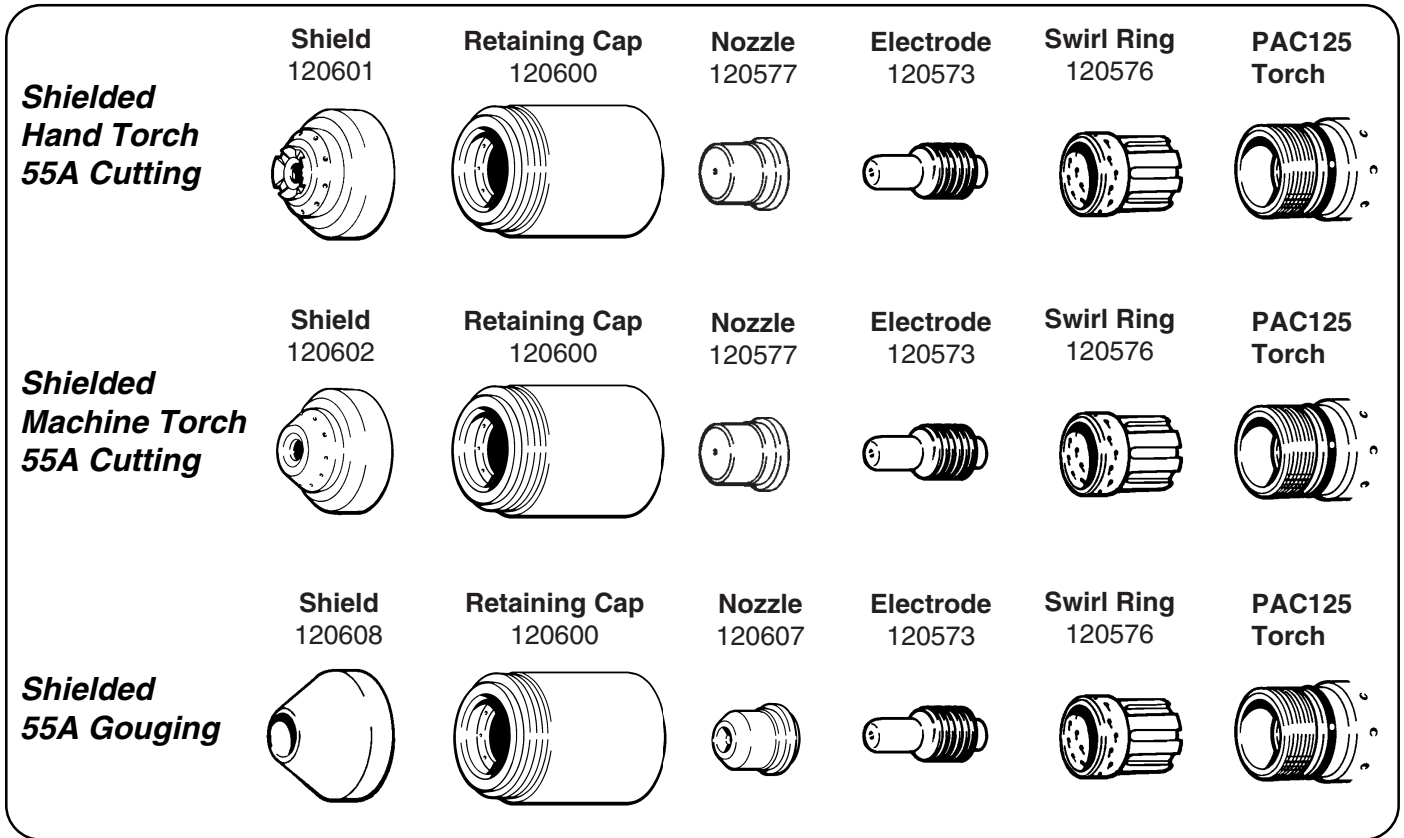


Figure 7-3 Shielded Consumable Configurations

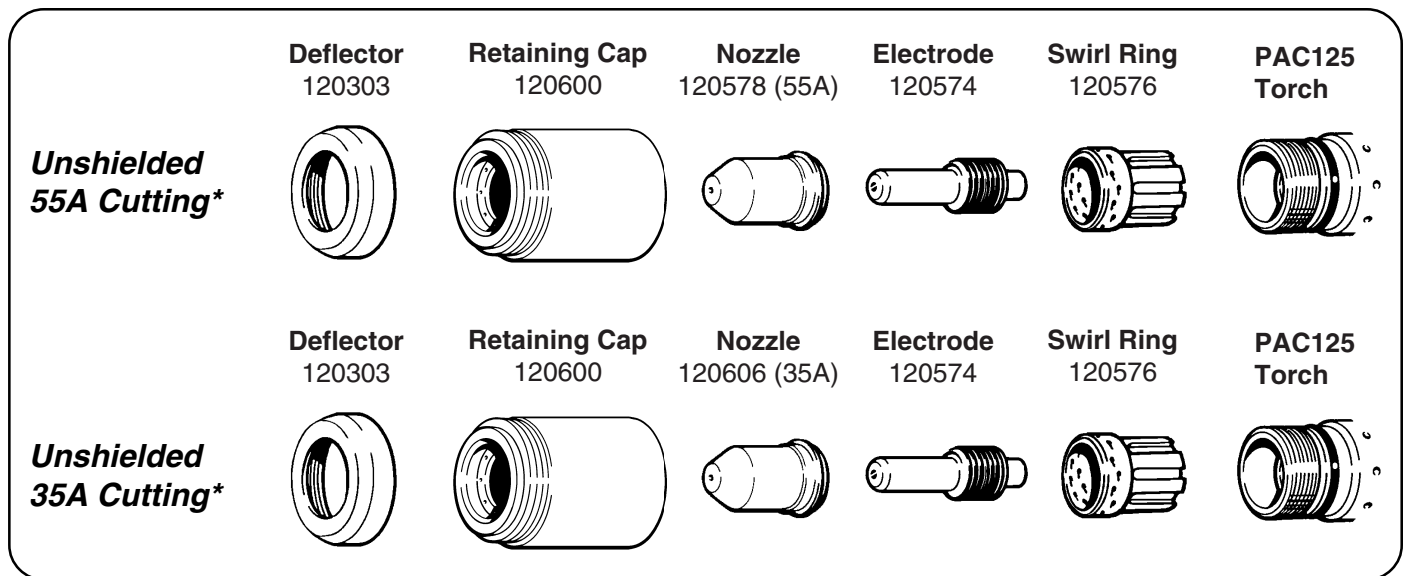


Figure 7-4 Unshielded Consumable Configurations

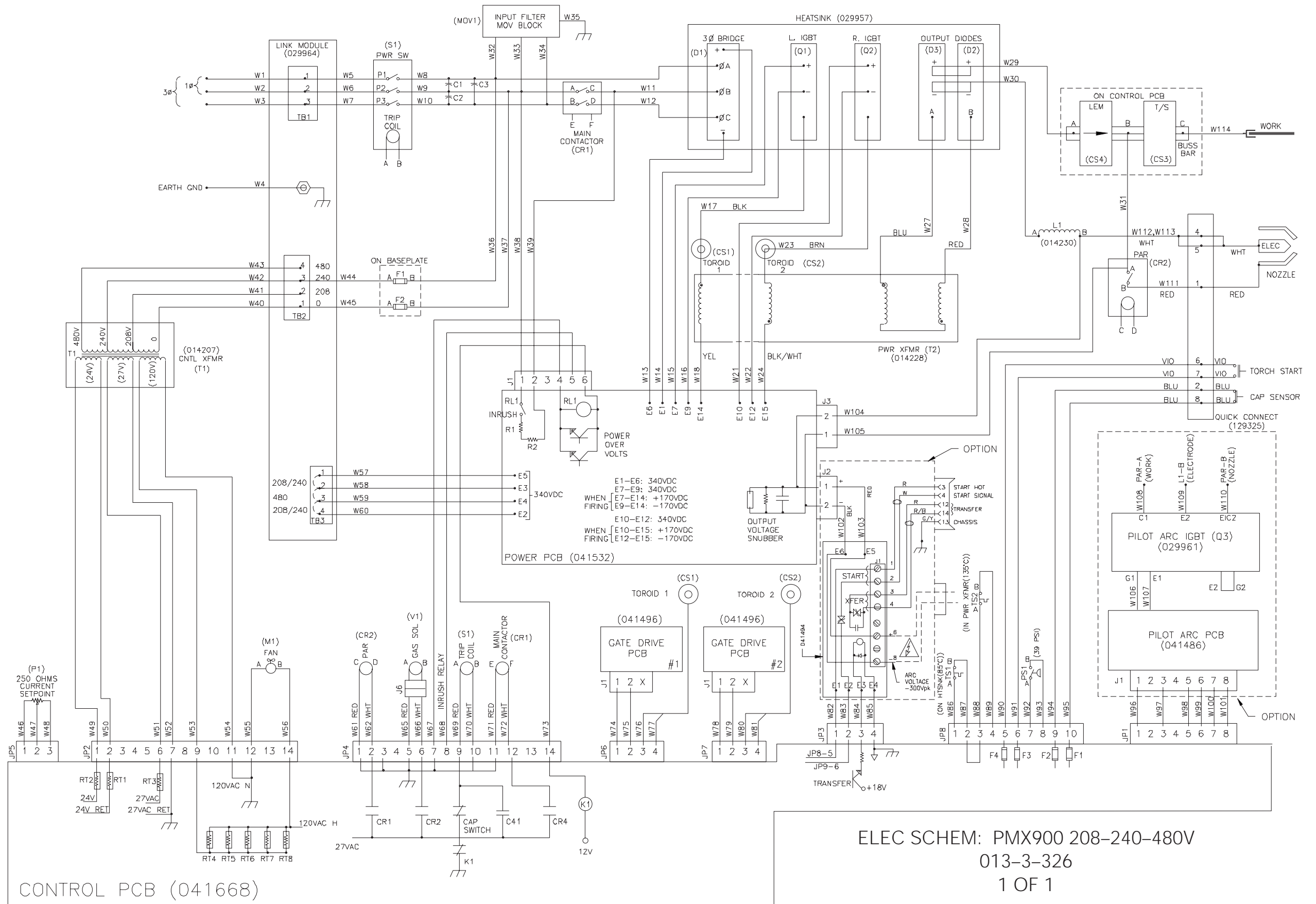
* In CE countries, use unshielded consumables only in machine-torch applications.

PARTS LIST - TORCH AND CONSUMABLES

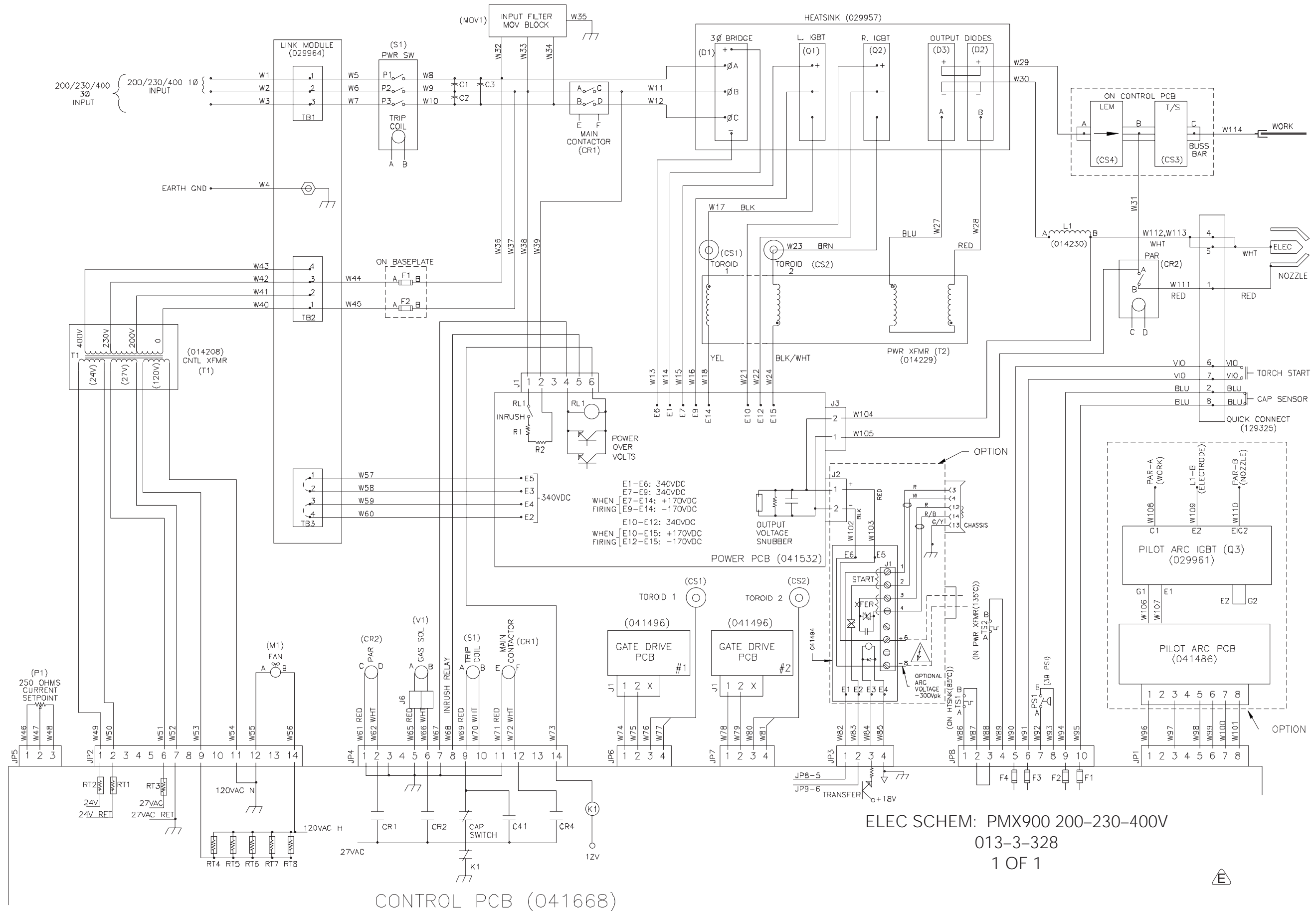
Section 8 WIRING DIAGRAMS

In this section:

Powermax900 Electrical Schematic: 208/240/480V	8-2
Powermax900 Electrical Schematic: 200/230/400V	8-3
Powermax900 Electrical Schematic: 400V–CE	8-4

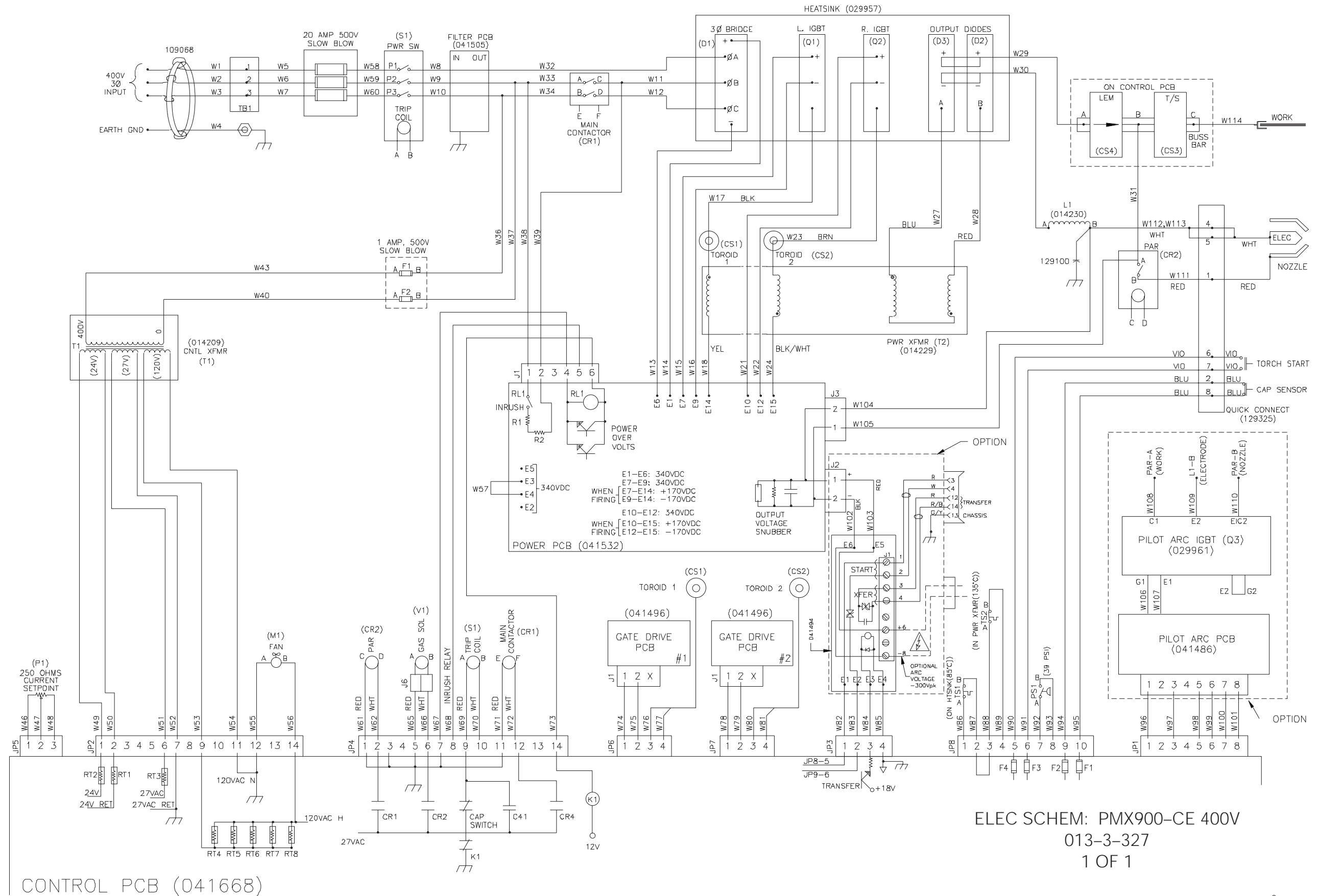


ELEC SCHEM: PMX900 208-240-480V
 013-3-326
 1 OF 1



ELEC SCHEM: PMX900 200-230-400V
 013-3-328
 1 OF 1

CONTROL PCB (041668)



AERATION MANIFOLD FOR PLASMA CUTTING ALUMINUM

Introduction

When plasma arc cutting aluminum at the water table surface or below water, free hydrogen gas may be generated by the cutting process. The high temperature of the plasma process causes disassociation of oxygen and hydrogen from the water in the water table. The hot aluminum, which has a high affinity for oxygen, then combines with the oxygen leaving free hydrogen.

An effective means of avoiding free hydrogen buildup is to install an aeration manifold on the floor of the water table to replenish the oxygen content of the water.

Making an Aeration Manifold - Figure a-1

Make an **Aeration Manifold** with two-inch (50 mm) PVC tubing with one-inch (25 mm) **Distribution Lines** connected to it. Drill 1/8 inch (3 mm) holes every six inches (150 mm) in the distribution lines. Cap the ends of the distribution lines and install the lines so that oxygen is delivered to all parts of the cutting area.

Connect the manifold to a shop air line. Set a pressure regulator to obtain a steady stream of bubbles.

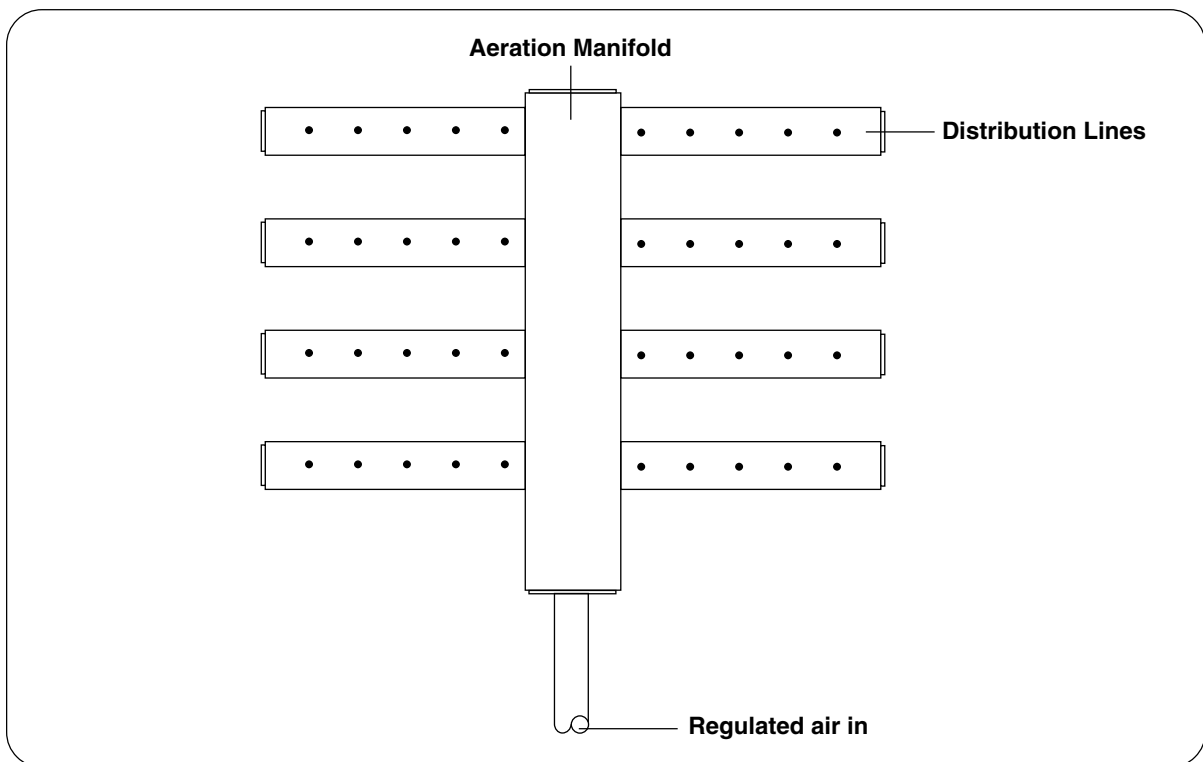


Figure a-1 Aeration Manifold

APPENDIX B

STANDARDS INDEX

For further information concerning safety practices to be exercised with plasma arc cutting equipment, please refer to the following publications:

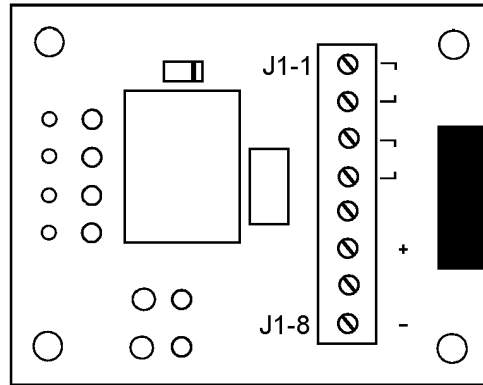
1. ANSI Standard Z49.1, *Safety in Welding and Cutting*, obtainable from the American Welding Society, 550 LeJeune Road, P.O. Box 351020, Miami, FL 33135.
2. NIOSH, *Safety and Health in Arc Welding and Gas Welding and Cutting*, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
3. OSHA, *Safety and Health Standards*, 29FR 1910, obtainable from the U.S. Government Printing Office, Washington, D.C. 20402.
4. ANSI Standard Z87.1, *Safe Practices for Occupation and Educational Eye and Face Protection*, obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
5. ANSI Standard Z41.1, *Standard for Men's Safety-Toe Footwear*, obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
6. ANSI Standard Z49.2, *Fire Prevention in the Use of Cutting and Welding Processes*, obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
7. AWS Standard A6.0, *Welding and Cutting Containers Which Have Held Combustibles*, obtainable from the American Welding Society, 550 LeJeune Road, P.O. Box 351040, Miami, FL 33135.
8. NFPA Standard 51, *Oxygen — Fuel Gas Systems for Welding and Cutting*, obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
9. NFPA Standard 70-1978, *National Electrical Code*, obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
10. NFPA Standard 51B, *Cutting and Welding Processes*, obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
11. CGA Pamphlet P-1, *Safe Handling of Compressed Gases in Cylinders*, obtainable from the Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.
12. CSA Standard W117.2, *Code for Safety in Welding and Cutting*, obtainable from the Canadian Standards Association Standard Sales, 178 Rexdale Boulevard, Rexdale, Ontario M9W 1R3, Canada.
13. NWSA booklet, *Welding Safety Bibliography*, obtainable from the National Welding Supply Association, 1900 Arch Street, Philadelphia, PA 19103.
14. American Welding Society Standard AWS F4.1, *Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances*, obtainable from the American Welding Society, 550 LeJeune Road, P.O. Box 351040, Miami, FL 33135.
15. ANSI Standard Z88.2, *Practices for Respiratory Protection*, obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
16. Canadian Electrical Code Part 1, *Safety Standards for Electrical Installations*, obtainable from the Canadian Standards Association, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W1R3.

MACHINE INTERFACE SPECIFICATIONS

See the following page for machine interface board and cable details.

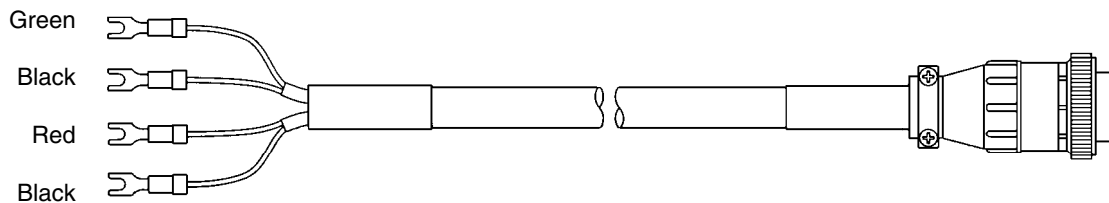
PLASMA START	
Logic	Close external contacts to START
Recommended interface	Mechanical relay contacts, gold or fine-silver
Allowable leakage-current	100 microamps, DC or AC peak
Maximum allowable snubber across START contacts	0.01 μ F capacitor
Maximum voltage	300 V peak
"HOT" OCV, machine interface PCB (041494) terminal J1-1	38 VDC peak, half-wave pulsing at 50 or 60 Hz
"HOT" short-circuit current, machine interface PCB (041494) terminal J1-1	32 milliamps DC peak, half-wave pulsing at 50 or 60 Hz
"SIGNAL" current required to activate 041494 terminal J1-2	650 microamps DC peak
"SIGNAL" voltage required to activate 041494 terminal J1-2	23.1 volts DC peak, half-wave pulsing at 50 or 60 Hz
MACHINE MOTION	
Logic	Mechanical relay contacts close on arc transfer
Contact material	Silver-Cadmium-Oxide (AgCdO)
Contact rating	8 amps
Resistive-capacitive snubber	None
Transient voltage suppression	250 V peak
Maximum voltage	120 VAC, 180 V peak

APPENDIX C



Machine Interface PCB 041494

Machine Interface PCB 041494	Signal:	Connector on rear of power supply	Power supply internal wire harness color	Machine interface Cable 023206 wire color
J1-1	START - HOT	Socket 3	Red	Green
J1-2	START-SIGNAL	Socket 4	White	Black
J1-3	TRANSFER	Socket 12	Red	Red
J1-4	TRANSFER	Socket 14	Red/Black	Black
Chassis common	Ground	Socket 13	Green/Yellow	None (cut)
J1-6	ARC VOLTAGE +			
J1-8	ARC VOLTAGE -			



Machine Interface Cable 023206