Plasma Arc Cutting System

Service Manual
802280 - Revision 4
Plasma Arc Cutting System

Service Manual
IM-228
(P/N 802280)

for systems beginning with serial number
800-010000

Revision 4  December, 1997

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EMC INTRODUCTION

The 400V CE power supply has been built in compliance with standard EN50199. To ensure that the equipment works in a compatible manner with other radio and electronic systems, 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 equipment should be used only in an industrial environment. It may be difficult to ensure electromagnetic compatibility in a domestic 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.

METHODS OF REDUCING EMISSIONS

Mains Supply

Cutting equipment should 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 should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the 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.

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.

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.
**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.

**GENERAL**

HYPERTHERM, Inc. warrants that Products shall be free from defects in materials and workmanship, under proper and normal use for which such Equipment is recommended, for a period of two (2) years, except only with respect to the Torch, for which the warranty period shall be one (1) year, from the date of its delivery to you.

HYPERTHERM, at its sole option, shall repair, replace, or adjust, free of charge, any 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, all costs, insurance and freight prepaid, and which examination proves not to be free from defects in materials and workmanship. HYPERTHERM shall not be liable for any repairs, replacements, or adjustments of Products covered by this warranty, except those made pursuant to this paragraph or with HYPERTHERM's written consent. This warranty shall not apply to any Product which has been mishandled, incorrectly installed, modified or assembled by you or any other person. HYPERTHERM shall be liable for breach of this warranty only if it receives written notice of such breach within the applicable warranty period specified herein above. THE FOREGOING SHALL CONSTITUTE THE SOLE REMEDY TO DISTRIBUTORS OR THEIR CUSTOMERS FOR ANY BREACH BY HYPERTHERM OF ITS WARRANTY.

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Section 1  SAFETY

Before using this plasma arc system. . .

Each person who will operate this equipment, perform service or maintenance, or supervise its use must read the safety instructions and warnings in this manual and the labels on the equipment.

About Notes, Cautions and Warnings

Notes: Throughout this manual, useful information for operating the plasma system is presented in "notes", such as shown in this paragraph.

Cautions: Information in bold type and surrounded by a box describes a situation that may cause damage to the plasma system.

WARNING — Instant-On Torches

Instant-on torches produce a plasma arc immediately after the torch switch is pushed.

Always hold a hand torch away from your body as a precaution against accidental torch firing. Be aware of this hazard, which has potential for serious bodily injury.

WARNING — Electric Shock

• Never touch the torch body, workpiece or the water in a water table when operating the plasma system.
• When using a water table, be sure that it is correctly connected to earth ground.
• Operating the plasma system completes an electrical circuit between the torch and the workpiece and anything touching the workpiece. The workpiece is part of the electrical circuit.
SAFETY

Eye Protection

• Wear dark safety glasses or goggles with side shields, or a welding helmet, in accordance with applicable national or local codes, to protect eyes against the plasma arc's ultraviolet and infrared rays.

<table>
<thead>
<tr>
<th>Arc Current</th>
<th>Lens Shade</th>
</tr>
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<tbody>
<tr>
<td>Up to 100 A</td>
<td>AWS (USA)</td>
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<tr>
<td></td>
<td>No. 8</td>
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<tr>
<td>100–200 A</td>
<td>ISO-4850</td>
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<td></td>
<td>No. 10</td>
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<td>200–400 A</td>
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<td>No. 12</td>
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<tr>
<td>Over 400 A</td>
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<td>No. 14</td>
</tr>
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</table>

• Replace the glasses, goggles or helmet when the lens becomes pitted or broken.

• Warn other people in the area not to look directly at the arc unless they are wearing glasses, goggles or a helmet.

• Prepare the cutting area in a manner that reduces the reflection and transmission of ultraviolet light:
  – Paint walls and other surfaces with dark colors to reduce reflection.
  – Install protective screens or curtains to reduce ultraviolet transmission.

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 which covers all exposed areas.
  – Cuffless trousers to prevent entry of sparks and slag.

Toxic Fume Prevention

• Keep the cutting area well ventilated.

• Remove all chlorinated solvents from the cutting area before cutting. Certain chlorinated solvents decompose when exposed to ultraviolet radiation to form phosgene gas.

• Wear proper breathing mask and use proper ventilation when cutting galvanized metal.

• Do not cut containers with toxic materials inside. Clean containers that have held toxic materials thoroughly before cutting.

**WARNING — Toxic Fumes**

Do not cut metal or painted metals containing zinc, lead, cadmium or beryllium unless the operator, or anyone else subjected to the fumes, wears respiratory equipment or an air-supplied helmet.

Fire Prevention

• Make fire extinguishers available in the cutting area.

• Remove all combustible materials from the immediate cutting area to a distance of at least 35 feet (10 m).

• Quench freshly cut metal or allow metal to cool before handling it or bringing it into contact with combustible materials.

• Never use a plasma system to cut containers with potentially flammable materials inside. Such containers must be thoroughly cleaned prior to cutting.

• Ventilate potentially flammable atmospheres before cutting with a plasma system. When cutting with oxygen as the plasma gas, an exhaust ventilation system is required.

• Never operate the plasma system in an atmosphere which contains heavy concentrations of dust, flammable gas or combustible liquid vapors unless properly vented.

Electric Shock Prevention

All Hypertherm plasma systems use high voltage (up to 280 VDC) to initiate the plasma arc. Take the following precautions when operating the plasma system:

• Wear insulated gloves and boots, and keep body and clothing dry.

• Do not stand, sit or lie on—or touch—any wet surface when using the plasma system.

• Maintain proper insulation against electrical shock. If you must work in or near a damp area, use extreme caution.

• Provide a wall-mounted disconnect switch with properly sized fuses close to the power supply. This switch allows the operator to turn the power supply off quickly in an emergency situation.

• Conform to all local electrical codes for primary wiring sizes and types.

• Inspect the primary power cord frequently for damage or cracking of the cover. Bare wiring can kill. Do not use a system with a damaged power cord. Replace a damaged power cord immediately.

• Inspect the torch leads. Replace if frayed or damaged.

• 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.
Electric Shock Prevention (continued)

- Before changing the torch parts, disconnect the main power or unplug the power supply. After changing torch parts and replacing the retaining cap, plug in the power supply again.
- Never bypass or shortcut the safety interlocks.
- Before removing a power supply cover for maintenance, disconnect the main power at the wall disconnect switch or unplug the power supply. To avoid exposure to severe electrical hazard, wait five minutes after disconnecting the main power to allow capacitors to discharge.
- Never operate the plasma system unless the power supply unit covers are in place. Exposed power supply connections present a severe electrical hazard.

Pressure Regulators

- Be certain that all pressure regulators are in proper working condition.
- Never use a regulator for any gas other than that for which it is intended.
- Never use a regulator that leaks, creeps excessively or is physically damaged in any way.
- Never attempt to lubricate a regulator with oil or grease.

Explosion Prevention

WARNING — Compressed Gas

The plasma system uses compressed gas. Observe proper precautions when handling and using compressed gas equipment and cylinders.

- Do not use the plasma system if explosive dust or vapors may be present.
- Do not cut pressurized cylinders or any closed container.

WARNING — Hydrogen Explosion Hazard

If your system uses hydrogen, remember that this is a flammable gas that presents an explosion hazard. Keep flames away from cylinders containing hydrogen mixtures and hoses that carry hydrogen mixtures. Also, keep flames and sparks away from the torch when using argon-hydrogen as the plasma gas.

Compressed Gas Cylinders

Handle and use compressed gas cylinders in accordance with safety standards published by the U.S. Compressed Gas Association (CGA), American Welding Society (AWS), Canadian Standards Association (CSA) or applicable national or local codes.

- Never use a cylinder that leaks or is physically damaged.
- Never use a cylinder that is not upright and secured in place.
- Never move or transport a cylinder without its protective valve cover in place.
- Never use a gas cylinder or its contents for any purpose other than that for which it is intended.
- Never lubricate cylinder valves with oil or grease.
- Never allow electrical contact between the plasma arc and a cylinder.
- Never expose cylinders to excessive heat, sparks, slag or open flame.
- Never use hammers, wrenches or other tools to open stuck cylinder valves.

Hoses

- Label and color-code all gas hoses in order to clearly identify the type of gas in each hose. Consult applicable national or local codes.
- Never use the oxygen hose for any gas other than oxygen.
- Examine hoses at regular intervals for leaks, wear, loose connections or other hazard.
- Replace hose that is damaged in any way.
SAFETY

Hoses (continued)
• Keep hose lengths to a minimum to prevent damage, reduce pressure drop and to prevent possible flow restrictions.
• Prevent kinking by laying out hoses as straight as possible between termination points.
• Coil any excess hose and place it out of the way to prevent damage and to eliminate the danger of tripping.

Noise Protection
The plasma cutting process can generate high levels of noise. Depending on the arc current, material being cut, acoustics and size of the cutting room, distance from the torch and other factors, acceptable noise levels as defined by national or local codes may be exceeded by your plasma system.
• Always wear proper ear protection when cutting or gouging with the plasma system.

Grounding
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 properly connect the power cord ground wire. Conform to Canadian Standards Association (CSA) standards by placing the power cord 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.

Work Cable
• Attach the work cable securely to the workpiece or the work table by making 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 a high-quality earth ground, in accordance with the U.S. National Electrical Code, Article 250, Section H, Grounding Electrode System, or other appropriate national or local codes.

Safety Reminders
• Never bypass or shortcut the safety interlocks on any of the plasma system units.
• Except in Hypertherm’s largest mechanized systems, all Hypertherm torches are designed with a safety interlock that prevents firing of the plasma arc when the retaining cap is loosened.
• 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 potentially dangerous situation to the operator and any personnel in the area. Hypertherm’s warranty does not cover problems caused by the use of torches not made by Hypertherm.
• Use only consumable parts and replacement parts made by Hypertherm. Hypertherm’s warranty does not cover problems caused by the use of parts not made by Hypertherm.
• Never operate the plasma system with any of its covers not in place. This would be hazardous to the operator and other people in the area, and prevents the proper cooling of the equipment.

Electronic Health Support Equipment
Plasma arc cutting and gouging systems create electric and magnetic fields that may interfere with the correct operation of electronic health support equipment, such as pacemakers or hearing aids. Any person who wears a pacemaker or hearing aid should consult a doctor before operating or being near any plasma system when it is in use. To minimize exposure to EMF:
• Keep both the work cable and the torch lead on one side of your body. Keep your body from coming in between the torch lead and the work cable.
• Route torch leads as close as possible to work cable.
• Do not wrap the torch lead or work cable around your body.
• Stay as far away from the power supply as possible.
Section 1a  SÉCURITÉ

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 situés sur la machine pour signaler certains dangers spécifiques.
- Les étiquettes de sécurité DANGER et AVERTISSEMENT sont situées sur la machine.
- 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.

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.
- 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.

LE COUPAGE PEUT PROVOQUER UN INCENDIE OU UNE EXPLOSION

AVERTISSEMENT
Risque d’explosion Argon-hydrogène et 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 coupe 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.
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 coupe (sovent 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.

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 coupe bien aéré ou utiliser un masque respiratoire homologué.
• Ne pas procéder au coupe 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.

• 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.
• Ne pas saisir la pièce à couper ni les chutes lors du coupe. Laisser la pièce à couper en place ou sur la table de travail, le câble de retour connecté lors du coupe.
• 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.
SÉCURITÉ

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 ignifugés 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.

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 :

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

MISE À LA MASSE ET À LA TERRE

Câble de retour
Bien fixer le câble de retour (ou du 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.

HYPERTHERM Systèmes plasma
SÉCURITÉ

SÉCURITÉ DES BOUTEILLES DE GAZ COMPRESSE

- 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 COMPRESSE 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

DESCRIPTION & SPECIFICATIONS

In this section

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SPECIFICATIONS ............................................................. 2-3
PAC121 50A Torches ......................................................... 2-4
IEC SYMBOLS USED ......................................................... 2-6
**DESCRIPTION & SPECIFICATIONS**

**INTRODUCTION**

The Powermax800 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 Powermax800 power supply provides constant-current output variable from 20 to 50 amps, for optimum performance on all thicknesses of metal up to 1/2 inch (12 mm) thick. At 50 amps, the Powermax800 can cut metals up to 3/4 inch (20 mm) thick and will sever metals up to 1 inch (25 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 Powermax800 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 and 5 contain in-depth parts lists of the Powermax800 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 Powermax800 operator manual provides setup and daily operating instructions.

![Powermax800 Hand Plasma Cutting System](image)

* Single-phase 208/240/480V power supply shown. See **Section 5** for part numbers and descriptions of other Powermax800 power supplies.
SPECIFICATIONS

Power Supply

- Rated Open Circuit Voltage (OCV) ($U_o$) .............. 300VDC
- Rated Output Current ($I_2$) ............................. 20-50 amps
- Rated Output Voltage ($U_2$) ............................. 120VDC
- Duty Cycle ($X$) @ 40°C .................................... 50% ($I_2$=50A, $U_2$=120V)
  100% ($I_2$=44A, $U_2$=97V) See data tag on power supply for more information on duty cycle
- Ambient temperature/duty cycle .................... Power supplies will operate between +14°C and 104°F (-10°C 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 ($S_1$) .......................... 10.4kVA ($U_1 I_1$)
- Input Voltage ($U_1$)/Input Current ($I_1$) @ 6 kW Output ........................................... 208V/50A; 240V/43A; 480V/25A - 1φ, 60 Hz
  208V/29A; 240V/35A; 480V/13A - 3φ, 60 Hz
  200V/52A; 230V/45A; 400V/30A - 1φ, 50/60 Hz
  200V/30A; 230V/26A; 400V/16A - 3φ, 50/60 Hz
  400V (CE)/16A - 3φ, 50/60 Hz
  600V/11A - 3φ, 60 Hz
- Dimensions and Weight:
  - Depth .................................................. 23.1" (590 mm)
  - Width .................................................. 10.4" (260 mm) without wheels
    15.25" (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 Powermax800 Power Supply with Dimensions
DESCRIPTION & SPECIFICATIONS

Weight ........................................................................... 65 pounds (30 kg) without wheels
72 pounds (33 kg) with wheels
128 pounds (58 kg) for 600V power supply

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 ....................................................................... 320 scfh/5.3 scfm at 90 psi (150 l/min at 6.2 bar) supplied to power supply pressure regulator

Power Supply pressure regulator setting ...................... 70 psi (4.8 bar) flowing

PAC121 50A TORCHES

Maximum 50A Cutting Capacity (PAC121TS) .............. 3/4" (20 mm) @ 50% duty cycle
Maximum 50A Cutting Capacity (PAC121MS) .............. 3/8" (10 mm) @ 50% duty cycle
Maximum 35A Cutting Capacity (PAC121MS) .............. 1/4" (6 mm) @ 100% duty cycle

Maximum current at 50% duty cycle ............................. 50 amps
Gas Flow ....................................................................... 320 scfh/5.3 scfm at 70 psi (150 l/min at 4.8 bar)

Gouging Capability (metal removal rate) ....................... 6.3 pounds (2.9 kg)/hr

Weight PAC121TS ........................................................ 4.5 pounds (2 kg) with 25 ft (7.6 m) lead
7 pounds (3.2 kg) with 50 ft (15 m) lead

Weight PAC121MS ....................................................... 7 pounds (3.2 kg) with 25 ft (7.6 m) lead
9.5 pounds (4.3 kg) with 50 ft (15 m) lead

PAC121TS Hand Torch Assembly

PAC121MS Machine Torch Assembly

Figure 2-3 PAC121TS Torch with Dimensions

Figure 2-4 PAC121MS Torch with Dimensions
**WARNING**

The voltage between the tip of the torch and the workpiece will exceed 113VDC if shielded consumable parts are not installed in the torch. If using the 400V CE power supply, the PAC121TS torch must be operated with shielded parts to maintain the \( S \) mark and CE low-voltage compliance for hand held applications. See Figure 2-5 below and also Section 5: *Consumable Parts - For CE Compliance* for a list of CE consumable parts. This requirement does not apply to machine torch applications.

---

**Description & Specifications**

**S MARK**

The Powermax800 conforms to 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 torches must have shielded consumable parts to maintain \( S \) mark compliance. See warning below and Figure 2-5.

---

*Consumable Parts*

---

**Figure 2-5** \( S \) Mark Label.
**DESCRIPTION & SPECIFICATIONS**

**IEC SYMBOLS USED**

- **Direct Current (DC)**
- **Alternating current (AC)**
- **Plasma cutting torch**
- **AC input power connection**
- **The terminal for the external protective (earth) conductor**
- **An inverter-based power source**
- **Anode (+) work clamp**
- **Temperature switch**
- **Pressure switch**
- **Plasma torch in the TEST position (cooling and cutting gas exiting nozzle)**
- **Power is on**
- **Power is off**
- **Volt/amp curve, "drooping" characteristic**
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 PAC121T trigger torch and PAC121M 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.

3. Unscrew the filter bowl.

4. Unscrew the filter element. See Powermax800 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.
Cooling Air Filter Removal, Cleaning and Replacement

Powermax800 systems are normally shipped without air filters. If your Powermax800 has the air filter option, it will need cleaning periodically. 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 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 local or national safety procedures.

1. **Turn the Powermax800 power switch to the OFF (0) position,** unplug the power cable from the wall receptacle and disconnect the gas supply. See warning above.

2. **Remove the 22 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.

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.**

---

**Figure 3-2 Air Filter Removal**

---

Air Filter
THEORY OF OPERATION

General

The Powermax800 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 Fig. 3-3. The 400V CE power supply does not have a link box.

![Figure 3-3 Inverter Links](image-url)

Functional Description

Refer to block diagram 3-4, Figure 3-3 and the system wiring diagram. See Section 4: Parts List 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.
SEQUENCE OF OPERATION

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

- Connect gas supply to filter-regulator on power unit
- Apply power at line voltage disconnect box.
- Set power circuit breaker S1 to ON (1).

After five seconds, LINE VOLTAGE and TEMP LEDs turn off indicating line voltage and transformer temperatures are within operating limits. Fan M1 operates and POWER and GAS PRESSURE LEDs light indicating system is ready for operation.

- Push and hold GAS TEST switch to check air pressure.

Gas solenoid valve V1 opens to purge system and to allow setting of pressure.

- Release GAS TEST switch.

Gas solenoid valve V1 closes. Gas flow stops.

- Select cutting current with AMPS knob.

Power circuits ready.

- Connect work cable to workpiece and position torch on workpiece.
- Depress plasma start switch on hand torch or remote start switch for machine torch.

Gas solenoid valve V1 opens and gas flows. Pilot arc relay CR1 closes and pilot arc starts. Cutting arc transfers to workpiece. Pilot arc relay CR1 opens and pilot arc stops.

- Move torch to make cut. Workpiece falls away after cut.

Gas solenoid V1 closes and gas flow stops.

- Release GAS TEST switch.

Power circuits ready.
TROUBLESHOOTING

The troubleshooting procedures include the *Initial Resistance Checks* and the *Corrective Maintenance Checks*. These procedures are presented in a flow diagram format.

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.

**Test Equipment**

- Multimeter

**Troubleshooting Procedures**

Maintenance of the Powermax800 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 and torch components refer to Section 4 for 208/240/480V and 200/230/400V power supplies, and Section 5 for 400V CE power supplies.

- 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.
**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 local or national 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**

The aluminum heatsink on the power PC board is electrically live when the plasma is on. In case of an electrical failure of the inverter circuit, the heatsink may be live when the power is off.

**SHOCK HAZARD:** The large electrolytic capacitors, (blue-cased cylinders) located on 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 touching the PC board or capacitors. If questions or problems arise during servicing, call Hypertherm Technical Services at 1-800-643-9878.
MAINTENANCE

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.

1. Set the Powermax800 power switch to O (off), unplug the power cord, and disconnect the gas supply - see warnings.

2. Remove the cover of the power supply by removing 22 securing screws.

3. Visually inspect the inside of the power supply, especially on the side with the power board (see Figures 4-2 and 4-3). Look for broken or loose wiring connections, burn and char marks, damaged components, etc. Repair or replace as necessary.

Initial Resistance Checks

1. After visually inspecting the exterior and interior of the power supply, always perform the initial resistance checks before applying power to the power supply. If these checks are not performed prior to power up, further damage to the power supply could result.

2. Perform the initial resistance checks beginning on the following page.

3. 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.
Set power switch S1 to OFF (0).

Measure resistance between the conductors (line and neutral) on the plug of the power cord. Do not use the ground conductor on the plug as a measuring point.

- Meter indicates an open?
  - No: Check power cord and power switch S1. Replace faulty component (Fig 4-4)
  - Yes: Set power switch S1 to ON (1). Measure resistance between the conductors (line and neutral) on the plug of the power cord. This reading is the resistance across the control transformer primary for the selected input voltage.

- Meter indicates 18 ohms (200V)
  - 20 ohms (208V)
  - 22 ohms (230V)
  - 22 ohms (240V)
  - 56 ohms (400V)
  - 65 ohms (480V)

  - Yes: To page 3-13, Check # 2
  - No: Indicates low ohms or short?
    - Yes: Isolate and check control transformer T1, power switch S1, input filter MOV1, capacitor C1, and associated wiring for shorts. Repair problem and repeat check.
    - No: Indicates high ohms or infinity?
      - Yes: Isolate and check control transformer T1, power switch S1, fuses F1 and F2 and associated wiring for opens. Repair problem and repeat check.
MAINTENANCE

Three-Phase Check # 1
Set power switch S1 of OFF (0)

Measure resistance between the conductors connected to link box terminal TB1-1 & TB1-2, TB1-1 & TB1-3, and TB1-2 & TB1-3 on the plug of the power cord. Do not use the ground pin on the plug as a measuring point. Note: On the 400V CE power supply, there is no link box.

Meter indicates an open?
No
Check power cord and power switch S1. Replace faulty component (Fig 4-4).
Yes

Set power switch S1 to ON (1). Measure resistance between the conductors on the plug of the power cord. Do not use the ground pin on the plug as a measuring point. The reading between TB1-1 & TB1-2 is the resistance across the control transformer primary for the selected input voltage.

To page 3-12 L

To page 3-12 R

Between TB1-1 & TB1-2 does meter indicate
18 ohms (200V)
20 ohms (208V)
22 ohms (230V)
22 ohms (240V)
56 ohms (400V)
65 ohms (480V)
?

Yes
To page 3-13 Check # 2

No

Indicates low ohms or short?

Isolate and check control transformer T1, power switch S1, input filter MOV1, capacitors C1, C2 and C3, contactor CR1 and all associated wiring for shorts. Repair problem and repeat check.

Indicates high ohms or infinity?

Isolate and check control transformer T1, power switch S1, input filter MOV1, capacitor C1, and associated wiring for shorts. Repair problem and repeat check.

Isolate and check control transformer T1, power switch S1, fuses F1 and F2, and associated wiring for opens. Repair problem and repeat check.
Disconnect torch lead.
Place + lead of ohm meter to upper bar spanning output diodes D2 and D3.
Place – lead of ohm meter to lower bar spanning output diodes D2 and D3.

Meter indicates infinity or high Kohms?
Yes

Place – lead of ohm meter to upper bar spanning output diodes D2 and D3.
Place + lead of ohm meter to lower bar spanning output diodes D2 and D3.

Meter indicates 1.7K ohms?
No
Replace diodes D2 and D3.

Yes

Replace diodes D2 and D3.

To page 3-14
Check # 3

Location of Bars Spanning D2 and D3
Check # 3
All Power Supplies
Start

Measure resistance between the power supply chassis and the conductors on the plug of the power cord. Do not use the ground conductor on the plug as a measuring point.

Meter indicates an open?

Yes

No

There is an internal short in the power supply. Visually and with a meter, inspect the unit for pinched, broken, and loose wires and wires with damaged insulation contacting the chassis. Also check for loose hardware such as screws, nuts and bolts.

Problem found and repaired?

Yes

No

Continue checking out unit until problem is found. Then repeat check.

To page 3-15
Check # 4
Check # 4
All Power Supplies

Start

Measure resistance between the power supply chassis and the work cable clamp (Fig 4-1).

Meter indicates an open?

Yes

No

There is an internal short in the power supply. Visually and with a meter, inspect the unit for pinched, broken, and loose wires and wires with damaged insulation contacting the chassis. Also check for loose hardware such as screws, nuts and bolts.

Problem found and repaired?

Yes

No

Continue checking out unit until problem is found. Then repeat check.

To page 3-16
Check # 5
Check # 5
All Power Supplies
Start

Measure resistance between the conductors on the plug of the power cord and the work cable clamp. Do not use the ground conductor on the plug as a measuring point.

Meter indicates an open?

Yes

No

There is an internal short in the power supply. Visually and with a meter, inspect the unit for pinched, broken, and loose wires and wires with damaged insulation contacting the chassis. Also check for loose hardware such as screws, nuts and bolts.

Problem found and repaired?

Yes

End of resistance checks. To page 3-17

No

Continue checking out unit until problem is found. Then repeat check.
Corrective Maintenance Checks

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 local or national 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

The aluminum heatsink on the power PC board is electrically live when the plasma is on. In case of an electrical failure of the inverter circuit, the heatsink may be live when the power is off.

SHOCK HAZARD: The large electrolytic capacitors, (blue-cased cylinders) located on 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 touching the PC board or capacitors. If questions or problems arise during servicing, call Hypertherm Technical Services at 1-800-643-9878.
If no problems were found during the initial resistance checks and the power supply still does not operate correctly, perform the following corrective maintenance checks.

Note: The corrective maintenance flow charts 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.

1. Connect the torch lead to the power supply.
2. Connect the power cord into the line voltage disconnect switch box or plug into a properly grounded outlet.
3. Connect the gas supply to the pressure regulator at the rear of the power supply.
4. Perform the corrective maintenance checks starting on the following page.
5. After the problem has been located and repaired, refer to the Sequence of Operation in this section for the normal operation of the power supply from power up to cutting.
Start

Set power switch S1 to ON (1).

To page 3-20

S1 shuts OFF?

Yes

LINE VOLTAGE LED lights briefly before shutdown?

Yes

At torch, check that retaining cap is on tightly and that consumables are properly installed. Loosen retaining cap and listen for cap sense microswitch to open (click). Tighten retaining cap and listen for switch to close.

Replace torch main body and switch.

Microswitch opens & closes?

No

Yes

With retaining cap tightened, disconnect connector JP8 at Control PCB (Fig 4-2). Measure resistance between JP8 sockets 9&10. Ensure cap sense microswitch is closed.

Yes

Control board replacement fix problem?

To page 3-20

No

Correct supply voltage?

Yes

Is line voltage for:

- 200V > 235V?
- 208V > 239V?
- 230V > 270V?
- 240V > 276V?
- 400V > 470V?
- 480V > 552V?
- 600V > 690V?

Yes

Correct supply voltage. See label in linkbox and Powermax800 Operator Manual (IM227) Section 3. Note: 400V CE power supplies have no link box.

No

Replace Control Board and repeat test

No

No

Yes

Meter indicates 0 ohms?

Yes

See Torch Check, Cap Sensor Circuit later in this section.

Replace Control Board and repeat test

No

No

Yes

Meter indicates 0 ohms?

Check connectors, wires W94 and W95 and solder joints. Repair as needed. See also, Torch Check, Cap Sensor Circuit later in this section.

Replace torch main body and switch or torch lead. See also, Torch Check, Cap Sensor Circuit later in this section.

Disconnect torch lead. Measure resistance between pins 2 & 8 of torch lead plug.
From page 3-20

Yes

LINE VOLTAGE LED Off?

No

Check for low input voltage at TB1

Is line voltage for:
- 200V < 170V?
- 208V < 178V?
- 230V < 195V?
- 240V < 204V?
- 400V < 340V?
- 480V < 408V?
- 600V < 510V?

Yes

Correct supply voltage

No

Check connectors & wires between fuses and T1. Repair as needed.

Yes

Meter indicates 0 ohms?

No

Replace F1 and/or F2.

Yes

Unplug power cord. Measure resistances of fuses F1 & F2

No

Check control board JP2: 24VAC at pins 1 & 2; 27VAC at pins 6 & 7

No

Yes

Replace control board

Yes

Replace control board
From page 3-21

Yes

GAS PRESSURE LED On?

No

Check pressure regulator gauge for 70 psi

70 psi?

No

Adjust pressure regulator for 70 psi

Pressure corrected?

No

Yes

Disconnect wires W92 & W93 on pressure switch PS1. Measure voltage.

24 VAC?

Yes

Replace PS1.

No


0 ohms?

No

Check connections and wiring between control board JP8 and terminals on PS1.

Yes

Replace control PCB.

Yes

Check inlet gas supply pressure to pressure regulator. It should be a minimum of 90 psi (6.2 bar)

Inlet Pressure Ok?

No

Adjust inlet pressure for 90 psi (6.2bar).

Yes

Replace control PCB.

To page 3-23
Unplug power cord. Allow power supply to cool down to room temperature. Plug in power cord and turn power supply on.

TEMP LED remains Off?

No

Unplug power cord. Allow power supply to cool down to room temperature. Disconnect JP8 from control PCB. Measure resistance between JP8 sockets 1 & 2 and 3 & 4.

Yes

TEMP LED remains Off?

No

0 ohms?

Yes

Problem is either with transformer T2, heatsink SA, control board or associated wiring.

No

Replace transformer T2.

Yes

0 ohms?

No

Disconnect temperature switch TS2 wires W88 & W99 at power transformer T2. Measure resistance across wires coming from transformer.

Yes

Problem is either with transformer T2, heatsink SA, control board or associated wiring.

No

Replace transformer T2.

Yes

Temperature switches are functioning. Problem is either with transformer T2, heatsink SA, control board or associated wiring.

No
Press & hold GAS TEST switch S2. Adjust pressure regulator for 70 psi (4.8 bar) indication (dynamic) on gauge.

70 psi (4.8 bar) dynamic?

Yes

Indicates 0 psi?

No

Yes

Check regulator & hoses for leaks.

Ensure GAS TEST switch S2 has been released. Press torch start switch to fire pilot arc.

Pilot arc fires?

No

Check regulator & hoses for leaks.

Yes

Air coming out of torch?

No

Yes

Check control board TP2 for 12V when torch start switch is pressed.

12V?

No

Yes

Check JP4 sockets and control board pins 5 & 6. Check wires W65 & W66. Check gas solenoid V1 & pressure regulator. If no problems are found replace control PCB.

Check JP4 sockets and control board pins 5 & 6. Check wires W65 & W66. Check gas solenoid V1 & pressure regulator. If no problems are found replace control PCB.


0 ohms?

Yes

No

See Torch Check Start Circuit later in this section.

Disconnect torch lead and check pins 6 & 7 of torch lead plug when torch start button is pressed.

0 ohms?

Yes

No

See Torch Check Start Circuit later in this section.

Check wiring from power supply quick disconnect to control board JP8.

Wiring OK?

Yes

Repair wiring as needed.

No

See Torch Check Start Circuit later in this section.

Check consumables and replace nozzle, if necessary.

Relay CR2 closes when torch start switch is pressed?

No

Yes

Check JP4 sockets and control board pins 1 & 2. Check wires W61 & W62. Check pilot arc relay CR2. Repair or replace as needed.
Connect work clamp to workpiece. Set AMPS control P1 to minimum (20 amps). Depress torch start switch to transfer arc to workpiece.

Arc transfers?

Yes

Check TP1 of control board for 12V.

12V?

Yes

Replace control board

No

Replace AMPS control pot P1. If new pot does not fix problem, replace control board.

Cutting current adjustable?

Yes

Corrective maintenance checks complete.

No

Replace consumables.

Set AMPS control to maximum (50 amps). Depress torch start switch to transfer arc to workpiece to see if cutting current is adjustable.

Repair or replace work cable and clamp.

Check that work clamp is making good metal-to-metal contact.

Work clamp OK?

Yes

Replace control board

No

No

No

Repair or replace work clamp.
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 3-5 to locate test points.

**Power Board Test Points**

<table>
<thead>
<tr>
<th>Test Point</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1 to E3</td>
<td>High-voltage power - Left Inverter</td>
<td>+300VDC</td>
</tr>
<tr>
<td>E14 to E3</td>
<td>One-half of High-voltage power - Left Inverter</td>
<td>+150VDC</td>
</tr>
<tr>
<td>E4 to E5</td>
<td>High-voltage power - Right Inverter</td>
<td>+300VDC</td>
</tr>
<tr>
<td>E15 to E5</td>
<td>One-half of High-voltage power - Right Inverter</td>
<td>+150VDC</td>
</tr>
<tr>
<td>J1-5 to J1-4</td>
<td>&quot;Soft start&quot; 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 lit until &quot;soft start&quot; signal is complete (about 5 seconds after S1 is thrown).</td>
<td>+12VDC 5 sec. after throwing power switch S1.</td>
</tr>
<tr>
<td>J1-6 to J1-4</td>
<td>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.</td>
<td>≈ 0 VDC if voltage too high.</td>
</tr>
</tbody>
</table>
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 3-5 Back Side of Power Board - Test Points
CONTROL BOARD

Control Board LEDs
There are 4 control board LEDs visible from the Powermax800 front panel. There are 6 more LEDs that are visible only when the cover is removed. See Figure 3-6 for location of LEDs.

- **D8** POWER ON: Illuminates when power is applied.
- **D15** LINE VOLTAGE: Illuminates when the input voltage is out of limits. This LED will remain on if the line voltage is too low, and go on briefly before the power supply shuts down if the line voltage is too high.
  Note: LINE VOLTAGE LED always remains on for about 5 seconds after the power supply is turned on and before a "soft start" signal is sent from the control board to the power board.
  The upper and lower range for line voltages are as follows:

<table>
<thead>
<tr>
<th>Lower Limit</th>
<th>Line Voltage</th>
<th>Upper Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>170VAC</td>
<td>200VAC</td>
<td>235VAC</td>
</tr>
<tr>
<td>178VAC</td>
<td>208VAC</td>
<td>239VAC</td>
</tr>
<tr>
<td>195VAC</td>
<td>230VAC</td>
<td>270VAC</td>
</tr>
<tr>
<td>204VAC</td>
<td>240VAC</td>
<td>276VAC</td>
</tr>
<tr>
<td>340VAC</td>
<td>400VAC</td>
<td>470VAC</td>
</tr>
<tr>
<td>408VAC</td>
<td>480VAC</td>
<td>552VAC</td>
</tr>
<tr>
<td>510VAC</td>
<td>600VAC</td>
<td>690VAC</td>
</tr>
</tbody>
</table>

Note: To avoid performance deterioration of the Powermax800, input voltage should be within 10% of the specified system line voltage setting.

- **D24** OVERCURRENT: Illuminates when CS1 or CS2 senses current above 70 amps.
- **D25** PILOT ARC RELAY: Illuminates when pilot arc relay CR2 is energized.
- **D26** GAS SOLENOID: Illuminates when gas solenoid is energized (when GAS TEST switch is pressed or when plasma start is pressed).
- **D27** MAIN CONTACTOR: Illuminates when contactor CR1 is energized (following "soft start").
- **D29** TEMP LED: Remains off when temperature is within operating limits. It illuminates when the thermostat in the power transformer opens (over 110° C (230° F)) or if the heatsink becomes too hot (over 85°C (185° F)). Overheating can be caused by exceeding the duty cycle rate.
- **D35** GAS PRESSURE: Illuminates when incoming gas pressure sensed by PS1 is within operating limits (over 39 psi (2.7 bar)).
- **D38** ARC TRANSFER: Illuminates when arc transfers to the workpiece.
- **D42** PLASMA START: Illuminates when the torch start button is pushed or when start button is activated from the machine interface.

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

- Turns on the inverter when the torch switch button 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 (20 amps) to the cut current selected by the operator
- Turns the inverter off if the arc transfer does not occur within 5 seconds
- Turns the power supply off when the retaining cap is loose or when line voltage is too high
## Control Board Test Points

<table>
<thead>
<tr>
<th>Test Point</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP1</td>
<td>Transfer signal.</td>
<td>A logic high (12V) indicates that the arc is transferred.</td>
</tr>
<tr>
<td>TP2</td>
<td>Start signal.</td>
<td>A logic high (12V) indicates that the torch start switch is on.</td>
</tr>
<tr>
<td>TP3</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>TP4</td>
<td>+12V</td>
<td></td>
</tr>
<tr>
<td>TP5</td>
<td>Unregulated DC voltage.</td>
<td>Approximately 30VDC at nominal input voltage.</td>
</tr>
<tr>
<td>TP6</td>
<td>+18V</td>
<td></td>
</tr>
<tr>
<td>TP7</td>
<td>INV-ON signal.</td>
<td>A logic high (12V) indicates that the inverter is on.</td>
</tr>
<tr>
<td>TP8</td>
<td>Transfer latch signal.</td>
<td>A logic high (12V) indicates that unit is in transferred mode.</td>
</tr>
<tr>
<td>TP9</td>
<td>Temp OK signal.</td>
<td>A logic high (12V) indicates that all temperatures are OK.</td>
</tr>
<tr>
<td>TP10</td>
<td>Continuous PA threshold voltage.</td>
<td>Set to 3.55V by P3.</td>
</tr>
<tr>
<td>TP11</td>
<td>7.0V</td>
<td></td>
</tr>
<tr>
<td>TP15</td>
<td>Error amplifier reference voltage.</td>
<td>During inverter operation this signal is 1.915V at 50A current setting and .75V at 20A current setting.</td>
</tr>
<tr>
<td>TP16</td>
<td>Error amplifier output voltage</td>
<td></td>
</tr>
<tr>
<td>TP17</td>
<td>Reference voltage</td>
<td>2.50V</td>
</tr>
<tr>
<td>TP18</td>
<td>Output current value signal</td>
<td>38.3mV/amp</td>
</tr>
<tr>
<td>TP19</td>
<td>Wiper voltage.</td>
<td>2.5V at 50A current setting and 1.00V at 20A current setting.</td>
</tr>
<tr>
<td>TP20</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>TP21</td>
<td>Buffered, inverted, capacitor feed version of pulse width modulator B signal.</td>
<td></td>
</tr>
<tr>
<td>TP22</td>
<td>Buffered, inverted version of pulse width modulator A signal.</td>
<td></td>
</tr>
</tbody>
</table>

### Fuses
- F1, F2: Cap sensor circuit protection .5A (see Parts List for part number and specifications)
- F3, F4: Start circuit protection .5A (see Parts List for part number and specifications)

---

**Figure 3-6  Control Board Test Points and LED Locations**
TORCH CHECK

A failure of the torch cap sensor circuit will cause the Powermax800 power supply to shut down, and a failure of the torch start circuit will prevent the torch from firing. If your Powermax800 has either of these problems and you have followed the Corrective Maintenance Checks beginning on page 3-17, proceed with the following checks.

Cap Sensor Circuit Check

If the torch retaining cap is screwed down tightly and the ON/OFF power switch shuts off, there could be a problem with the torch cap sensor circuit.

1. Disconnect power and gas. See warning above.
2. Remove the power supply cover.
3. Locate fuses F1 and F2 on the control board. See Fig. 3-6.
4. Check to see if the fuses are open.

If the fuses are open, replace the torch, the torch leads and the control board fuse(s). See Section 4: Parts List or Section 5: Parts List - CE to order new components.

If the fuses are OK, the retaining cap microswitch is working, the line voltage is OK, and the power supply continues to shut off, replace the control board.

WARNING

Set the Powermax800 power switch to O (off), unplug the power cable, and disconnect the gas supply. Always wait 5 minutes before removing any cover of the power supply.
TORCH CHECK (cont.)

Start Circuit Check

If the torch start trigger is pressed and there is no pilot arc, there could be a problem with the torch start circuit.

WARNING

Set the Powermax800 power switch to O (off), unplug the power cable, and disconnect the gas supply. Always wait 5 minutes before removing any cover of the power supply.

1. Disconnect power and gas. See warning above.
2. Remove the power supply cover.
3. Locate fuses F3 and F4 on the control board. See Fig. 3-6.
4. Check to see if the fuses are open.

If the fuses are open, replace the torch, the torch leads and the control board fuse(s). See Section 4: Parts List or Section 5: Parts List - CE to order new components.

If the fuses are OK, the gas supply is OK, pressing the torch switch closes the connection between JP8 sockets 5 & 6, and the torch does not start, replace the control board.

If the fuses are OK, the gas supply is OK, pressing the torch switch does not close connection between JP8 sockets 5 & 6, and the torch does not start, replace the torch and the torch leads.
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 3-7 and 3-8.

1. Set the Powermax800 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 five screws that secure the handle halves together and remove handles from torch main body, torch switch and safety trigger (Fig. 3-8).

3. Remove the red wires attached to the pilot arc tab (Fig. 3-7).

   Note for step 4: Disconnect wires by pulling on terminals. Do not pull on wires.

4. Disconnect the two lead terminals (blue wire in each terminal) from the two white wires of the cap sensor microswitch (Fig. 3-7).

5. Disconnect the plunger wire from the torch main body by holding the plunger nut with a 1/4" (6mm) wrench or nut driver and removing the plunger screw (Fig. 3-7).

6. Disconnect the torch main body and torch lead gas fittings using 5/16" (8mm) and 7/16" (11mm) open-end wrenches.

7. Replace with 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 Fig. 3-7 inset. Tighten the plunger screw with 8 lb-in (9 kg-cm) of torque.

8. Install the torch main body and torch switch back into handle (Fig. 3-8). Be certain that torch switch slides into position above 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.

9. Replace the five screws to secure the handle halves together.

---

Figure 3-7  PAC121TS Torch Main Body Removal
Torch Switch Removal and Replacement

To remove and replace the torch switch, order the torch switch and two splices (074069) and refer to the following procedure and Figure 3-8. See page 4-10 for a complete torch parts list.

1. **Ensure the Powermax800 power switch is set to O (off), unplug the power cable, and disconnect the gas supply.**

2. Remove the five screws that secure the handle halves together.

3. Remove the torch switch from the handle.

4. Remove the torch switch by cutting the two 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 handle. Be certain that torch switch slides into position above 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 five screws to secure the handle halves together.
MAINTENANCE

PAC121MS TORCH PARTS REMOVAL AND REPLACEMENT

Repair of the PAC121MS 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 3-9 and perform the steps
below. See page 4-11 for a complete torch parts list.

Removal

1. Set the Powermax800 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. Remove the O-ring from the torch main body.
4. Remove the three screws securing the torch sleeve to the torch main body.
5. Unscrew the torch position sleeve from the torch sleeve and slide it back out of the way.
6. Remove the screw securing the red wires from the torch lead to the torch main body.
   Note for steps 7 and 8: Disconnect wires by pulling on terminals. Do not pull on wires.
7. Disconnect the two lead terminals (four white wires in each terminal) from the two black
   plunger wire terminals of the torch main body.
8. Disconnect the two lead terminals (blue wire in each terminal) from the two white wires of the
cap sensor microswitch.
9. Disconnect the torch main body and torch lead gas fitting using the 5/16" (8 mm) and 7/16"
   (11 mm) open-end wrenches.

Replacement

1. Remove the O-ring from the replacement torch main body.
   Caution: Use caution when removing the O-ring, it can easily be damaged.
2. Connect the torch main body to the torch lead gas fitting using open-end wrenches.
3. Connect the two lead terminals (blue wire in each terminal) to the two white wires of the cap
   sensor microswitch.
4. Connect the two lead terminals (four white wires in each terminal) to the two black plunger
   wires of the torch main body.
5. Secure the red wires from the torch lead to the torch main body with screw.

6. Position the torch sleeve onto the torch main body and secure it with the three screws.

7. Use caution when installing the O-ring onto the torch main body, it can be easily damaged. Lightly coat with silicone.

8. Screw the torch position sleeve and the torch sleeve together.

9. When the nozzle, electrode and swirl ring are properly in place, replace the retaining cap with shield. When the retaining cap is tightened, the microswitch will click, indicating that the torch main body has been replaced correctly.

10. Align the connector plug key (on torch lead) with the connector receptacle key slot (on power supply) and push it in until the pins seat.

11. Turn the connector securing ring 1/4 turn counterclockwise to ensure that the securing ring threads and the connector receptacle threads are aligned prior to tightening. Turn the connector securing ring clockwise to tighten.
QUICK DISCONNECT O-RING REMOVAL AND REPLACEMENT

The quick disconnect O-ring on the PAC121 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 3-10.

1. Turn the Powermax800 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 3-10 using needle nose pliers, tweezers, etc.
5. Replace O-ring. Ensure it seats properly.

![Figure 3-10 Quick Disconnect O-Ring Removal and Replacement](image)
Section 4   PARTS LIST

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# Parts List

**POWER SUPPLY - 208/240/480V**

**200/230/400V**

Note: See Section 5 Parts List 400V CE for parts and components of the 400V CE Powermax800 system.

## Front

<table>
<thead>
<tr>
<th>Index No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Ref. Desig.</th>
<th>Quantity</th>
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<tbody>
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<td>Chassis:PMX800 Pwr Unit</td>
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<tr>
<td>3</td>
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<td>Spacer:PMX800 Pressure Gauge</td>
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<td>4</td>
<td>008965</td>
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<tr>
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<td>075498</td>
<td>Flat washer: .257 .500 .062 Black Nylon</td>
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<td>5</td>
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<td>Label:PMX800 Pwr Unit Control Panel</td>
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<td>6</td>
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<td>7</td>
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<td>Strain Relief:PG9 X .187-.312 Nylon</td>
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<td>8</td>
<td>005112</td>
<td>Pressure Switch:39 Psi .013 Orifice</td>
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<td>V1</td>
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<td>12</td>
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<tr>
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<td>Press. Gauge:160# 1.5” 1/8CBM Panel</td>
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<td>19</td>
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<td>009480</td>
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<td>Locknut:42/43 Quick Disc. Recept.</td>
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<td>23</td>
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</tbody>
</table>

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.
POWER SUPPLY - 208/240/480V
200/230/400V
# Parts List

## Power Supply - 208/240/480V

### 200/230/400V

Note: See Section 5 Parts List 400V CE for parts and components of the 400V CE Powermax800 system.

### Top and Right Side

<table>
<thead>
<tr>
<th>Index No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Ref. Desig.</th>
<th>Quantity</th>
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<td>Pnl: Powermax800 Pwr Unit Center</td>
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<td>Relay:30A NO Mag Blwtd QDisc Term</td>
<td>CR2</td>
<td>1</td>
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<td>3</td>
<td>029674</td>
<td>MOV/Cap Assy: MAX42/43/70 3PH</td>
<td>MOV1</td>
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<tr>
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<td>029957</td>
<td>Heatsink SA: Powermax800 Power Unit</td>
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<tr>
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<td>004721</td>
<td>Heatsink: Powermax800 Pwr Unit</td>
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<td>Thermal Pad: AL-340-180</td>
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<td>Temp. Switch Opens 85°C/Closes 75°C</td>
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<td>PCB Assy: Pwrmx800 Control - 208/240/480V</td>
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<td>008989</td>
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<td>Current Sense Transformer, 40A</td>
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<tr>
<td>23</td>
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<td>Thermal Pad: AL-370-134</td>
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<td>28</td>
<td>028905**</td>
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<tr>
<td>29</td>
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<td>PCB Assy: Powermax800 Machine Interface</td>
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</table>

**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.
- † Order corresponding thermal pads when ordering these items
- * Available only on power supplies with the pilot arc control option
- ** Available only on power supplies with the machine interface option
- *** Used only on 208/240/480V power supplies
- **** Used only on 200/230/400V power supplies
- ***** For power supplies with serial numbers before 800-010000, order 128108 power board kit to replace power board.
Figure 4-2  Powermax800 - Top and Right Side
# Parts List

## Power Supply - 208/240/480V

### 200/230/400V

**Bottom and Left Side**

<table>
<thead>
<tr>
<th>Index No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Ref. Desig.</th>
<th>Quantity</th>
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</thead>
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<tr>
<td>1</td>
<td>001521</td>
<td>Panel:Powermax800 Pwr Unit Center</td>
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</tr>
<tr>
<td>2</td>
<td>001522</td>
<td>Chassis:Powermax800 Pwr Unit</td>
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<tr>
<td>3</td>
<td>004667</td>
<td>Bracket:Powermax800 Pwr Unit Fan</td>
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<td>4</td>
<td>014207***</td>
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<td>T1</td>
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<td>014208****</td>
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<td>5</td>
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<td>11</td>
<td>028908**</td>
<td>Kit:Powermax800 Cooling Fan Filter</td>
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</tbody>
</table>

**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
- *** Used only on 208/240/480V power supplies
- **** Used only on 200/230/400V power supplies
- ***** For power supplies with serial numbers before 800-010000, order 128108 power board kit to replace power board.
POWER SUPPLY - 208/240/480V
200/230/400V

Figure 4-3 Powermax800 - Bottom and Left Side
# Parts List

## Power Supply - 208/240/480V 200/230/400V

Note: See Section 5 Parts List 400V CE for parts and components of the 400V CE Powermax800 system.

### Rear

<table>
<thead>
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<th>Part No.</th>
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<th>Quantity</th>
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</thead>
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<td>3</td>
<td>129068</td>
<td>Circuit Breaker SA: 4Pole 480V W/TC</td>
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<tr>
<td>4</td>
<td>129151</td>
<td>Contactor SA: Powermax800</td>
<td>CR1</td>
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<td></td>
<td>029955</td>
<td>Manifold SA: Powermax800 Pwr Unit</td>
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<tr>
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<td>011072</td>
<td>Filter: 20 Micron 1/8FPT</td>
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<td>1</td>
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<tr>
<td>6</td>
<td>015285</td>
<td>Male Connector: 1/8NPTX1/4Push in Tube</td>
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<td>7</td>
<td>011079</td>
<td>Filter Element for 011072 Filter</td>
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<tr>
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<td>029964</td>
<td>Linecord Panel SA: Powermax800 208/240/480V</td>
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<td>001506*</td>
<td>Panel: Powermax800 Power Cord</td>
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<td>9</td>
<td>008228</td>
<td>Cord Grip: 1NPT .690-.990 2Screws</td>
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<td>129114****</td>
<td>Power Cord SA: Powermax800</td>
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<td>129055</td>
<td>Linecord Panel SA: Powermax800 200/230/400V</td>
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<td>9</td>
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<td>129058</td>
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<td>TB2</td>
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<td>Terminal Board: 3-Terminal with protector</td>
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<td>15</td>
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<td>Strain Relief: PG9/5X.187-.312 Nylon</td>
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</tr>
<tr>
<td>16</td>
<td>123099***</td>
<td>Cable: Powermax800 Machine Interface</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>008201***</td>
<td>Receptacle Shell: 17-14 Reverse Sex</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>008186***</td>
<td>Socket: 24-20 AWG Type III</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

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 129134 to order power cord rear panel for 208/240/480V power supplies if you have the machine interface option.

** Use 129135 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.

**** Single-phase cord with plug used on 208/240/480V systems.

***** 200/230/400V Three-phase cord without plug (129115) not shown in Figure 4-4.
POWER SUPPLY - 208/240/480V
200/230/400V

***** 200/230/400V Three-phase power cord not shown in Figure 4-4

Figure 4-4 Powermax800 - Rear
## Parts List

### PAC121TS Torch Assembly and 25' (7.6 m) Lead - 083003
### PAC121TS Torch Assembly and 50' (15.2 m) Lead - 083004

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>001288</td>
<td>Handle, PAC121T</td>
</tr>
<tr>
<td>002244</td>
<td>Safety Trigger, PAC121T</td>
</tr>
<tr>
<td>005094</td>
<td>Switch, Torch Pushbutton</td>
</tr>
<tr>
<td>020351</td>
<td>Electrode, Air</td>
</tr>
<tr>
<td>020361</td>
<td>Ring, Swirl</td>
</tr>
<tr>
<td>027254</td>
<td>Trigger Spring, PAC 121T</td>
</tr>
<tr>
<td>027466</td>
<td>Ring, Gutcha</td>
</tr>
<tr>
<td>075340</td>
<td>Screws, P/S, # 4 x 5/8, PH, RND, S/B</td>
</tr>
<tr>
<td>120282</td>
<td>Nozzle: PAC121 50A Shield</td>
</tr>
<tr>
<td>120283</td>
<td>Shield: PAC121 50A</td>
</tr>
<tr>
<td>120301</td>
<td>Cap, Retaining</td>
</tr>
<tr>
<td>120556</td>
<td>Torch Main Body w/Switch, PAC121T</td>
</tr>
<tr>
<td>044016</td>
<td>O-Ring: BUNA 90Duro .614X.070</td>
</tr>
<tr>
<td>129001*</td>
<td>Torch Lead, 25 ft. (7.6 m)</td>
</tr>
<tr>
<td>129002**</td>
<td>Torch Lead, 50 ft. (15.2 m)</td>
</tr>
<tr>
<td>044009</td>
<td>Quick Disconnect O-Ring (not shown)</td>
</tr>
</tbody>
</table>

* Used only in 083003  
** Used only in 083004

Note: See page 4-12 for detail of consumable parts

---

**Figure 4-5 PAC121TS Torch Assembly and Leads**

---

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---

powermax8000 Service Manual
### Parts List

PAC121MS Torch Assembly and 14 ft (4.3 m) Lead - 083049 w/pigtail, 083054 no pigtail
PAC121MS Torch Assembly and 25 ft (7.6 m) Lead - 083011 w/pigtail, 083056 no pigtail
PAC121MS Torch Assembly and 35 ft (10.6 m) Lead - 083044 w/pigtail, 083057 no pigtail
PAC121MS Torch Assembly and 50 ft (15.2 m) Lead - 083012 w/pigtail, 083058 no pigtail

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>020351</td>
<td>Electrode</td>
</tr>
<tr>
<td>020361</td>
<td>Ring, Swirl</td>
</tr>
<tr>
<td>020559</td>
<td>Sleeve, Machine Torch, PAC121M</td>
</tr>
<tr>
<td>020620</td>
<td>Sleeve, Torch Position, PAC121M</td>
</tr>
<tr>
<td>028923</td>
<td>Torch Lead w/pigtail, 14 ft (4.3 m)</td>
</tr>
<tr>
<td>028918</td>
<td>Torch Lead w/pigtail, 25 ft (7.6 m)</td>
</tr>
<tr>
<td>028926</td>
<td>Torch Lead w/pigtail, 35 ft (10.6 m)</td>
</tr>
<tr>
<td>028919</td>
<td>Torch Lead w/pigtail, 50 ft (15.2 m)</td>
</tr>
<tr>
<td>128123</td>
<td>Torch Lead, no pigtail, 14 ft (4.3 m)</td>
</tr>
<tr>
<td>128125</td>
<td>Torch Lead, no pigtail, 25 ft (7.6 m)</td>
</tr>
<tr>
<td>128126</td>
<td>Torch Lead, no pigtail, 35 ft (10.6 m)</td>
</tr>
<tr>
<td>128127</td>
<td>Torch Lead, no pigtail, 50 ft (15.2 m)</td>
</tr>
<tr>
<td>044009</td>
<td>Quick Disconnect O-Ring (not shown)</td>
</tr>
<tr>
<td>075321</td>
<td>Socket Cap, 4-40 X 1/2, HX, SS</td>
</tr>
<tr>
<td>075322</td>
<td>M/S, 4-40 X 1/4, SL, SZ</td>
</tr>
<tr>
<td>120282</td>
<td>Nozzle: PAC121 50A Shield</td>
</tr>
<tr>
<td>120326</td>
<td>Shield: PAC121M Machine Torch</td>
</tr>
<tr>
<td>120301</td>
<td>Cap, Retaining</td>
</tr>
<tr>
<td>120558</td>
<td>Torch Main Body w/ Switch, PAC121M</td>
</tr>
<tr>
<td>044016</td>
<td>O-Ring: BUNA 90 Duro .614X.070</td>
</tr>
</tbody>
</table>

**Note:** See page 4-12 for detail of consumable parts

---

**Figure 5-8 PAC121MS Torch Assembly and Leads**
### Consumable Parts List

#### CONSUMABLE PARTS

**Shields**
- 120601 Retaining Cap
- 120602

**Nonshielded**
- 120303 Deflector
- 120301 Electrodes
- 020480 (N₂)
- 120282 (Air)
- 120601 Torch O-Ring
- 044016 (2)

**Extended**
- 120608 Gouging Shield
- 120303 Deflector
- 120301 Electrodes

**Gouging**
- 120304 Deflector
- 120301 Electrodes
- 020395 O-Ring

### Consumable Spare Parts Kit (028904)

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<thead>
<tr>
<th>Part Number</th>
<th>Description (Qty.)</th>
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</thead>
<tbody>
<tr>
<td>001285</td>
<td>Box, Consumable Parts (1)</td>
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<tr>
<td>120573</td>
<td>Electrode (3)</td>
</tr>
<tr>
<td>120574</td>
<td>Electrode, Extended (1)</td>
</tr>
<tr>
<td>120282</td>
<td>Nozzle, 50A, Shielded (3)</td>
</tr>
<tr>
<td>120281</td>
<td>Nozzle, 50A, Gouging (1)</td>
</tr>
<tr>
<td>120305</td>
<td>Nozzle, Pipe Saddle, Extended (1)</td>
</tr>
<tr>
<td>120601</td>
<td>Shield, Torch (1)</td>
</tr>
<tr>
<td>120608</td>
<td>Shield, Gouging (1)</td>
</tr>
<tr>
<td>120303</td>
<td>Deflector (1)</td>
</tr>
<tr>
<td>044016</td>
<td>O-Ring (3)</td>
</tr>
<tr>
<td>015152</td>
<td>Nipple, 1/8 NPT, QDisc, Steel (1)</td>
</tr>
<tr>
<td>015570</td>
<td>Bushing, Reducer, 1/4 X 1/8, Brass (1)</td>
</tr>
<tr>
<td>015604</td>
<td>Reducer, 1/4 FPT X 1/8 NPT, Brass (1)</td>
</tr>
<tr>
<td>027055</td>
<td>Lubricant, Silicone 1/4 Oz Tube (1)</td>
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### Mach. Consumable Spare Parts Kit (128030)

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<th>Part Number</th>
<th>Description (Qty.)</th>
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<tbody>
<tr>
<td>001285</td>
<td>Box, Consumable Parts (1)</td>
</tr>
<tr>
<td>120573</td>
<td>Electrode (4)</td>
</tr>
<tr>
<td>120574</td>
<td>Electrode, Extended (2)</td>
</tr>
<tr>
<td>120282</td>
<td>Nozzle, 50A, Shielded (2)</td>
</tr>
<tr>
<td>120438</td>
<td>Nozzle, 40A, Shielded (2)</td>
</tr>
<tr>
<td>120305</td>
<td>Nozzle, Pipe Saddle, Extended (2)</td>
</tr>
<tr>
<td>120602</td>
<td>Shield, Torch (1)</td>
</tr>
<tr>
<td>120303</td>
<td>Deflector (1)</td>
</tr>
<tr>
<td>044016</td>
<td>O-Ring (3)</td>
</tr>
<tr>
<td>015152</td>
<td>Nipple, 1/8 NPT, QDisc, Steel (1)</td>
</tr>
<tr>
<td>015570</td>
<td>Bushing, Reducer, 1/4 X 1/8, Brass (1)</td>
</tr>
<tr>
<td>015604</td>
<td>Reducer, 1/4 FPT X 1/8 NPT, Brass (1)</td>
</tr>
<tr>
<td>027055</td>
<td>Lubricant, Silicone 1/4 Oz Tube (1)</td>
</tr>
</tbody>
</table>

Note: See Section 5 Parts List 400V CE for parts and components of the 400V CE Powermax800 system.
### PARTS LIST

**POWERMAX800 FIELD UPGRADE KITS AND OPTIONAL PARTS**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>028714</td>
<td>On/Off Pendant w/Lead, 25 ft. (7.6 m) (Also comes standard with most machine torch system configurations. See note below.)</td>
</tr>
<tr>
<td>128061</td>
<td>On/Off Pendant w/Lead, 50 ft. (15.2 m)</td>
</tr>
<tr>
<td>128062</td>
<td>On/Off Pendant w/Lead, 75 ft. (23 m)</td>
</tr>
<tr>
<td>028864</td>
<td>Kit: Powermax800 Pwr Unit Wheels</td>
</tr>
<tr>
<td>028898</td>
<td>Pilot Arc Controller Kit</td>
</tr>
<tr>
<td>028905</td>
<td>Machine Interface Kit, 208/240/480V</td>
</tr>
<tr>
<td>128035</td>
<td>Machine Interface Kit, 200/230/400V</td>
</tr>
<tr>
<td>028907</td>
<td>Work Cable, 50' (15.2 m)</td>
</tr>
<tr>
<td>028908</td>
<td>Cooling Fan Filter Kit: Powermax800</td>
</tr>
<tr>
<td>011079</td>
<td>Gas Filter Element</td>
</tr>
<tr>
<td>129019</td>
<td>Jumper: Powermax800 Link Box</td>
</tr>
<tr>
<td>128032</td>
<td>Kit: Powermax800 600V</td>
</tr>
<tr>
<td>008809</td>
<td>Fuse: 1A 600V 13/32 X 1-1/2 Slo (Used on 208/240/480V power supplies)</td>
</tr>
<tr>
<td>008958</td>
<td>Fuse: 1A 500V 10mm X 38mm Slo (Used on 200/230/400V and 400V CE power supplies)</td>
</tr>
<tr>
<td>023206</td>
<td>Cable: Machine Interface, 25 ft (7.6 m) (Comes standard with machine torch system configurations and with machine interface kits.)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Part Number</th>
<th>For Torch Type</th>
<th>With Pilot Arc Control</th>
<th>With Machine Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>083002</td>
<td>Hand</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>083015</td>
<td>Hand</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>083016</td>
<td>Machine</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>083017</td>
<td>Machine</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Part Number</th>
<th>For Torch Type</th>
<th>With Pilot Arc Control</th>
<th>With Machine Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>083030</td>
<td>Hand</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>083033</td>
<td>Hand</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>083036</td>
<td>Machine</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>083039</td>
<td>Machine</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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

See Section 5 Parts List 400V CE for parts and components of the 400V CE Powermax800 system.
### RECOMMENDED SPARE PARTS - POWERMAX800- 208/240/480V

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Page Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>003078</td>
<td>Relay:30A NO Mag Blwt QDisc Term</td>
<td>4-5</td>
</tr>
<tr>
<td>129068</td>
<td>Circuit Breaker SA:4Pole 480V W/TC</td>
<td>4-9</td>
</tr>
<tr>
<td>129151</td>
<td>Contactor SA:Powermax800</td>
<td>4-9</td>
</tr>
<tr>
<td>008809</td>
<td>Fuse:1A 500V 10mmX38mm SLO (2)</td>
<td>4-9</td>
</tr>
<tr>
<td>014207</td>
<td>Xfmr:Powermax800 200-230-400 Control</td>
<td>4-7</td>
</tr>
<tr>
<td>014210</td>
<td>Xfmr:Powermax800 208-240-480 Power</td>
<td>4-7</td>
</tr>
<tr>
<td>014186</td>
<td>Inductor:Powermax800 2MH 50A</td>
<td>4-7</td>
</tr>
<tr>
<td>023922</td>
<td>Cable w/Clamp:PMX800 Work 20'</td>
<td>4-3</td>
</tr>
<tr>
<td>027080</td>
<td>Fan:225CFM 120VAC 50-60HZ</td>
<td>4-7</td>
</tr>
<tr>
<td>005112</td>
<td>Pressure Switch:39 Psi .013 Orifice</td>
<td>4-3</td>
</tr>
<tr>
<td>006054</td>
<td>Sol. Valve:100# 1/8FPT 24VAC NC</td>
<td>4-3</td>
</tr>
<tr>
<td>011072</td>
<td>Filter:20 Micron 1/8FPT</td>
<td>4-9</td>
</tr>
<tr>
<td>011079</td>
<td>Filter Element for 011072 Filter</td>
<td>4-9</td>
</tr>
<tr>
<td>011073</td>
<td>Regulator:0-125 Psig 1/8FPT</td>
<td>4-3</td>
</tr>
<tr>
<td>022027</td>
<td>Press. Gauge:160# 1.5&quot; 1/8CBM Panel</td>
<td>4-3</td>
</tr>
<tr>
<td>029957</td>
<td>Heatsink SA:Powermax800 Power Unit</td>
<td>4-5</td>
</tr>
<tr>
<td>109018/008906</td>
<td>Diode:600V 100A UFast Recovery Dual (2)/Thermal Pad:AL-380-100 (2)</td>
<td>4-5</td>
</tr>
<tr>
<td>109019/008904</td>
<td>Diode:1600V 100A 3PH Module,Thermal Pad:AL-340-180</td>
<td>4-5</td>
</tr>
<tr>
<td>005178</td>
<td>Temp. Switch Opens 85°C/Closes 75°C</td>
<td>4-5</td>
</tr>
<tr>
<td>009849/008903</td>
<td>Resistor:20-Ohm 50W 5% NON-IND (4)/Thermal Pad: AL 197-114 (4)</td>
<td>4-5</td>
</tr>
<tr>
<td>009850/008902</td>
<td>Resistor:20-Ohm 25W 5% NON-IND (4)/Thermal Pad:AL 103-108 (4)</td>
<td>4-5</td>
</tr>
<tr>
<td>009918</td>
<td>Capacitor:012UF 1000WV 10% Poly (4)</td>
<td>4-5</td>
</tr>
<tr>
<td>009968</td>
<td>Capacitor:6800UF 1000WV 10% Poly (4)</td>
<td>4-5</td>
</tr>
<tr>
<td>029998/008905</td>
<td>IGBT Gate Drive SA:Powermax800 (2)/Thermal Pad:AL-370-134 (2)</td>
<td>4-5</td>
</tr>
<tr>
<td>041472</td>
<td>PCB Assy:Powermax800 Control</td>
<td>4-5</td>
</tr>
<tr>
<td>041532</td>
<td>PCB Assy:Powermax800-ZB Power</td>
<td>4-5, 4-7</td>
</tr>
<tr>
<td>129114</td>
<td>Cord/Plug:42 1Phase 8-3SO 3Prong 7&quot;</td>
<td>4-9</td>
</tr>
<tr>
<td>029674</td>
<td>MOV/Cap Assy:MAX42/43/70 3PH</td>
<td>4-5</td>
</tr>
<tr>
<td>028908</td>
<td>Kit:Powermax800 Cooling Fan Filter</td>
<td>4-7</td>
</tr>
</tbody>
</table>

### RECOMMENDED SPARE PARTS - POWERMAX800- 200/230/400V

<table>
<thead>
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<th>Part Number</th>
<th>Description</th>
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<td>Relay:30A NO Mag Blwt QDisc Term</td>
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<tr>
<td>129068</td>
<td>Circuit Breaker SA:4Pole 480V W/TC</td>
<td>4-9</td>
</tr>
<tr>
<td>129151</td>
<td>Contactor SA:Powermax800</td>
<td>4-9</td>
</tr>
<tr>
<td>008809</td>
<td>Fuse:1A 500V 10mmX38mm SLO (2)</td>
<td>4-9</td>
</tr>
<tr>
<td>014208</td>
<td>Xfmr:Powermax800 200-230-400 Control</td>
<td>4-7</td>
</tr>
<tr>
<td>014211</td>
<td>Xfmr:Powermax800 200-230-400 Power</td>
<td>4-7</td>
</tr>
<tr>
<td>014186</td>
<td>Inductor:Powermax800 2MH 50A</td>
<td>4-7</td>
</tr>
<tr>
<td>023922</td>
<td>Cable w/Clamp:PMX800 Work 20'</td>
<td>4-3</td>
</tr>
<tr>
<td>027443</td>
<td>Fan:225CFM 120VAC 50-60HZ</td>
<td>4-7</td>
</tr>
<tr>
<td>005112</td>
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<td>4-3</td>
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<td>Sol. Valve:100# 1/8FPT 24VAC NC</td>
<td>4-3</td>
</tr>
<tr>
<td>011072</td>
<td>Filter:20 Micron 1/8FPT</td>
<td>4-9</td>
</tr>
<tr>
<td>011079</td>
<td>Filter Element for 011072 Filter</td>
<td>4-9</td>
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<tr>
<td>011073</td>
<td>Regulator:0-125 Psig 1/8FPT</td>
<td>4-3</td>
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<td>Heatsink SA:Powermax800 Power Unit</td>
<td>4-5</td>
</tr>
<tr>
<td>109018/008906</td>
<td>Diode:600V 100A UFast Recovery Dual (2)/Thermal Pad:AL-380-100 (2)</td>
<td>4-5</td>
</tr>
<tr>
<td>109019/008904</td>
<td>Diode:1600V 100A 3PH Module,Thermal Pad:AL-340-180</td>
<td>4-5</td>
</tr>
<tr>
<td>005178</td>
<td>Temp. Switch Opens 85°C/Closes 75°C</td>
<td>4-5</td>
</tr>
<tr>
<td>009849/008903</td>
<td>Resistor:20-Ohm 50W 5% NON-IND (4)/Thermal Pad: AL 197-114 (4)</td>
<td>4-5</td>
</tr>
<tr>
<td>009850/008902</td>
<td>Resistor:20-Ohm 25W 5% NON-IND (4)/Thermal Pad:AL 103-108 (4)</td>
<td>4-5</td>
</tr>
<tr>
<td>009918</td>
<td>Capacitor:012UF 1000WV 10% Poly (4)</td>
<td>4-5</td>
</tr>
<tr>
<td>009968</td>
<td>Capacitor:6800UF 1000WV 10% Poly (4)</td>
<td>4-5</td>
</tr>
<tr>
<td>029998/008905</td>
<td>IGBT Gate Drive SA:Powermax800 (2)/Thermal Pad:AL-370-134 (2)</td>
<td>4-5</td>
</tr>
<tr>
<td>041472</td>
<td>PCB Assy:Powermax800 Control</td>
<td>4-5</td>
</tr>
<tr>
<td>041532</td>
<td>PCB Assy:Powermax800-ZB Power</td>
<td>4-5, 4-7</td>
</tr>
<tr>
<td>129114</td>
<td>Cord/Plug:42 1Phase 8-3SO 3Prong 7&quot;</td>
<td>4-9</td>
</tr>
<tr>
<td>029674</td>
<td>MOV/Cap Assy:MAX42/43/70 3PH</td>
<td>4-5</td>
</tr>
<tr>
<td>028908</td>
<td>Kit:Powermax800 Cooling Fan Filter</td>
<td>4-7</td>
</tr>
</tbody>
</table>
Section 5  PARTS LIST - CE

In this section:

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## Parts List - CE

**Power Supply - 400V CE**

Note: See Section 4 Parts List for parts and components of the non-CE Powermax800 systems.

### Front

<table>
<thead>
<tr>
<th>Index No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Ref. Desig.</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>001502</td>
<td>Pnl:PMX800 Pwr Unit Plastic Front</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>001522</td>
<td>Chassis:PMX800 Pwr Unit</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>004675</td>
<td>Spacer:PMX800 Pressure Gauge</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>008965</td>
<td>Knob:.850 Dia. 1/4 SFT Blk/Sil</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4A</td>
<td>075498</td>
<td>Flat washer:.257 .500 .062 Black Nylon</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>010917</td>
<td>Label:PMX800 Pwr Unit Control Panel</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>023922</td>
<td>**Cable w/Clamp:**PMX800 Work 20'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>008279</td>
<td>Strain Relief:PG9 X .187-.312 Nylon</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>005112</td>
<td>Pressure Switch:39 Psi .013 Orifice</td>
<td>PS1</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>006054</td>
<td>Sol. Valve:100# 1/8FPT 24VAC NC</td>
<td>V1</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>011073</td>
<td>Regulator:0-125 Psig 1/8FPT</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>011074</td>
<td>Nut:Regulator Panel Mounting</td>
<td></td>
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</tr>
<tr>
<td>12</td>
<td>015282</td>
<td>Female Elbow:1/8NPTX1/4Push in tube</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>015283</td>
<td>Male Elbow:1/8NPX1/4Push in tube</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>015285</td>
<td>Male Conn.:1/8NPTX1/4Push in tube</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>015517</td>
<td>Nip:1/8 X CL Hex Brass</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>015540</td>
<td>Tee:1/8 Brass</td>
<td></td>
<td>1</td>
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<tr>
<td>17</td>
<td>015588</td>
<td>Nip:1/8 X 2&quot;L Brass</td>
<td></td>
<td>1</td>
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<tr>
<td>18</td>
<td>022027</td>
<td>Press. Gauge:160# 1.5&quot; 1/8CBM Panel</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>046077</td>
<td>Tubing:1/4&quot;OD .04W Blue Nylon</td>
<td></td>
<td>2.3 ft</td>
</tr>
<tr>
<td>20</td>
<td>009480</td>
<td>Pot:250-Ohm 1W 10% 1T Cerm</td>
<td>P1</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>029962</td>
<td>**Recept. SA:**PMX800 Pwr Unit Quick Disc.</td>
<td></td>
<td>1</td>
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<tr>
<td>22</td>
<td>004532</td>
<td>Locknut:42/43 Quick Disc. Recept.</td>
<td></td>
<td>1</td>
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<tr>
<td>23</td>
<td>008606</td>
<td>Socket:MS Cont</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>24</td>
<td>015282</td>
<td>Female Elbow:1/8NPTX1/4Push in tube</td>
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<td>1</td>
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<tr>
<td>25</td>
<td>075362</td>
<td>Flat Washer:1/2 .500 .150 .125 Nylon</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**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.
### PARTS LIST - CE

#### POWER SUPPLY - 400V CE

Note: See Section 4 Parts List for parts and components of the non-CE Powermax800 systems.

**Top and Right Side**

<table>
<thead>
<tr>
<th>Index No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Ref. Desig.</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>001521</td>
<td>Pnl:Powermax800 Pwr Unit Center</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>003078</td>
<td>Relay:30A NO Mag Blwt QDisc Term</td>
<td>CR2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>129046</td>
<td>Heatsink SA:Powermax800 CE Power Unit</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>004721</td>
<td>Heatsink:Powermax800 Pwr Unit</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>008947</td>
<td>Thermal Pad:AL-315-114</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>008905</td>
<td>Thermal Pad:AL-370-134</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>008906</td>
<td>Thermal Pad:AL-380-100</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>009849</td>
<td>Resistor:20-Ohm 50W 5% NON-IND</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>009850</td>
<td>Resistor:20-Ohm 25W 5% NON-IND</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>009918</td>
<td>Capacitor:.012µF 1000WV 10% Poly</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>009968</td>
<td>Capacitor:6800µF 1000MV 10% Poly</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>029998†</td>
<td>IGBT Gate Drive SA:Powermax800</td>
<td>Q1</td>
<td>1</td>
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<tr>
<td>14</td>
<td>109018†</td>
<td>Diode:600V 100A UFast Recovery Dual</td>
<td>D2</td>
<td>1</td>
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<tr>
<td>15</td>
<td>109043†</td>
<td>Diode:1600V 30A 3PH Bridge Isol Bplr</td>
<td>D1</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>041517</td>
<td>PCB Assy:Powermax800 Control</td>
<td></td>
<td>1</td>
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<tr>
<td>17</td>
<td>041532***</td>
<td>PCB Assy:Powermax800-ZB Power</td>
<td>CS1</td>
<td>1</td>
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<tr>
<td>18</td>
<td>014137</td>
<td>Current Sense Transformer, 40A</td>
<td>CS2</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>014137</td>
<td>Current Sense Transformer, 40A</td>
<td></td>
<td>1</td>
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<tr>
<td>20</td>
<td>000810</td>
<td>Fuse Holder:2P 30A 13/32 X 1-1/2</td>
<td>F1, F2</td>
<td>2</td>
</tr>
<tr>
<td>21</td>
<td>008752</td>
<td>Fuse Block:3P 30A 600V 13/32X1-1/2&quot;</td>
<td></td>
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<tr>
<td>22</td>
<td>008958</td>
<td>Fuse:1A 500V 10mmX38mm Slo</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>23</td>
<td>008959</td>
<td>Fuse:20A 500V 10mmX38mm Slo</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>24</td>
<td>029978*</td>
<td>Heatsink SA:Pwrmx800 PA Cont PCB</td>
<td>Q3</td>
<td></td>
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<tr>
<td>25</td>
<td>004673*</td>
<td>Heatsink:Powermax800 PA Cont</td>
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<td></td>
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<tr>
<td>26</td>
<td>008905*</td>
<td>Thermal Pad:AL-370-134</td>
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<td></td>
</tr>
<tr>
<td>27</td>
<td>109020†*</td>
<td>Diode:600V 100A Fast IGBT Module</td>
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<td></td>
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<tr>
<td>28</td>
<td>041494**</td>
<td>PCB Assy:Powermax800 Machine Interface</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.
- † Order corresponding thermal pads when ordering these items
- * Available only on power supplies with the pilot arc control option
- ** Available only on power supplies with the machine interface option
- *** For power supplies with serial numbers before 800-010000, order 128108 power board kit to replace power board.
Figure 5-2  Powermax800 CE - Top and Right Side
## Parts List - CE

**POWER SUPPLY - 400V CE**

Note: See Section 4 Parts List for parts and components of the non-CE Powermax800 systems.

**Bottom and Left Side**

<table>
<thead>
<tr>
<th>Index No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Ref. Desig.</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>001521</td>
<td>Panel: Powermax800 Pwr Unit Center</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>001522</td>
<td>Chassis: Powermax800 Pwr Unit</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>004667</td>
<td>Bracket: Powermax800 Pwr Unit Fan</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>014209</td>
<td>Xfmr: Powermax800 CE 400V Control</td>
<td>T1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>014211</td>
<td>Xfmr: Powermax800 200-230-400 Power (w/TS2)</td>
<td>T2</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>014186</td>
<td>Inductor: Powermax800 2MH 50A</td>
<td>L1</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>027443</td>
<td>Fan: 260CDM 120VAC 50-60HZ</td>
<td>M1</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>029978*</td>
<td>Heatsink: Powermax800 PA Cont PCB</td>
<td>Q3</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>028908**</td>
<td>Kit: Powermax800 Cooling Fan Filter</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>129100</td>
<td>Capacitor SA: Powermax800-CE</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

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

*** For power supplies with serial numbers before 800-010000, order 128108 power board kit to replace power board.
Figure 5-3  Powermax800 CE - Bottom and Left Side
## Parts List - CE

### Power Supply - 400V CE

#### Note:
See Section 4 Parts List for parts and components of the non-CE Powermax800 systems.

## Rear

<table>
<thead>
<tr>
<th>Index No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Ref. Desig.</th>
<th>Quantity</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>001503</td>
<td>Pnl:Powermax800 Pwr Unit Plastic Rear</td>
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<td>1</td>
</tr>
<tr>
<td>2</td>
<td>001522</td>
<td>Chassis:Powermax800 Pwr Unit</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>129068</td>
<td>Circuit Breaker SA:4Pole 480V W/TC</td>
<td>S1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>129151</td>
<td>Contactor SA:Powermax800</td>
<td>CR1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>029955</td>
<td>Manifold SA:Powermax800 Pwr Unit</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>011072</td>
<td>Filter:20 Micron 1/8FPT</td>
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</tr>
<tr>
<td>6</td>
<td>015285</td>
<td>Male Connector:1/8NPTX1/4Push in Tube</td>
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<td>1</td>
</tr>
<tr>
<td>7</td>
<td>011079</td>
<td>Filter Element for 011072 Filter</td>
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<tr>
<td>8</td>
<td>129048</td>
<td>Linecord Panel SA:Powermax800 CE Pwr Unit</td>
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</tr>
<tr>
<td>9</td>
<td>001571*</td>
<td>Panel:Powermax800 Power Cord &amp; EMI</td>
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<td>1</td>
</tr>
<tr>
<td>10</td>
<td>008782</td>
<td>Strain Relief:3/4NPT .375-.500</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>047180</td>
<td>Cord:2.5mm PVC HD21/22 7'3&quot;</td>
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</tr>
<tr>
<td>12</td>
<td>129049</td>
<td>Electric Line Filter SA:Powermax800 CE</td>
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<td>1</td>
</tr>
<tr>
<td>13</td>
<td>004692</td>
<td>PCB Assy:Powermax800-CE Line Filter</td>
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<td>1</td>
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<tr>
<td>14</td>
<td>008949</td>
<td>Bracket:Powermax800-CE EMI</td>
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<tr>
<td>15</td>
<td>123099**</td>
<td>Cable: Powermax800 Machine Interface</td>
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<tr>
<td></td>
<td>008201**</td>
<td>Receptacle Shell: 17-14 Reverse Sex</td>
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</tr>
<tr>
<td></td>
<td>008186**</td>
<td>Socket:24-20 AWG Type III</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

#### 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 129136 to replace power cord rear panel if you have the machine interface option.

** Available only with the machine interface option.
Figure 5-4  Powermax800 CE - Rear
### Part List - CE

**PAC121TS Torch Assembly and 25' (7.6 m) Lead - 083003**  
**PAC121TS Torch Assembly and 50' (15.2 m) Lead - 083004**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>001288</td>
<td>Handle, PAC121T</td>
</tr>
<tr>
<td>002244</td>
<td>Safety Trigger, PAC121T</td>
</tr>
<tr>
<td>005094</td>
<td>Switch, Torch Pushbutton</td>
</tr>
<tr>
<td>020351</td>
<td>Electrode, Air</td>
</tr>
<tr>
<td>020361</td>
<td>Ring, Swirl</td>
</tr>
<tr>
<td>027254</td>
<td>Trigger Spring, PAC 121T</td>
</tr>
<tr>
<td>027466</td>
<td>Ring, Gutcha</td>
</tr>
<tr>
<td>075340</td>
<td>Screws, P/S, # 4 x 5/8, PH, RND, S/B</td>
</tr>
<tr>
<td>120282</td>
<td>Nozzle:PAC121 50A Shield</td>
</tr>
<tr>
<td>120283</td>
<td>Shield:PAC121 50A</td>
</tr>
<tr>
<td>120301</td>
<td>Cap, Retaining</td>
</tr>
<tr>
<td>120556</td>
<td>Torch Main Body w/Switch, PAC121T</td>
</tr>
<tr>
<td>044016</td>
<td>O-Ring:BUNA 90Duro .614X.070</td>
</tr>
<tr>
<td>129001*</td>
<td>Torch Lead, 25 ft. (7.6 m)</td>
</tr>
<tr>
<td>129002**</td>
<td>Torch Lead, 50 ft. (15.2 m)</td>
</tr>
<tr>
<td>044009</td>
<td>Quick Disconnect O-Ring (not shown)</td>
</tr>
</tbody>
</table>

* Used only in 083003  
** Used only in 083004

Note: See page 5-12 for detail of consumable parts

---

**Figure 5-5 PAC121TS Torch Assembly and Leads**
PAC121MS Torch Assembly and 14 ft (4.3 m) Lead - 083049 w/pigtail, 083054 no pigtail
PAC121MS Torch Assembly and 25 ft (7.6 m) Lead - 083011 w/pigtail, 083056 no pigtail
PAC121MS Torch Assembly and 35 ft (10.6 m) Lead - 083044 w/pigtail, 083057 no pigtail
PAC121MS Torch Assembly and 50 ft (15.2 m) Lead - 083012 w/pigtail, 083058 no pigtail

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>020351</td>
<td>Electrode</td>
</tr>
<tr>
<td>020361</td>
<td>Ring, Swirl</td>
</tr>
<tr>
<td>020559</td>
<td>Sleeve, Machine Torch, PAC121M</td>
</tr>
<tr>
<td>020620</td>
<td>Sleeve, Torch Position, PAC121M</td>
</tr>
<tr>
<td>028923</td>
<td>Torch Lead w/pigtail, 14 ft (4.3 m)</td>
</tr>
<tr>
<td>028918</td>
<td>Torch Lead w/pigtail, 25 ft (7.6 m)</td>
</tr>
<tr>
<td>028926</td>
<td>Torch Lead w/pigtail, 35 ft (10.6 m)</td>
</tr>
<tr>
<td>028919</td>
<td>Torch Lead w/pigtail, 50 ft (15.2 m)</td>
</tr>
<tr>
<td>128123</td>
<td>Torch Lead, no pigtail, 14 ft (4.3 m)</td>
</tr>
<tr>
<td>128125</td>
<td>Torch Lead, no pigtail, 25 ft (7.6 m)</td>
</tr>
<tr>
<td>128126</td>
<td>Torch Lead, no pigtail, 35 ft (10.6 m)</td>
</tr>
<tr>
<td>128127</td>
<td>Torch Lead, no pigtail, 50 ft (15.2 m)</td>
</tr>
<tr>
<td>044009</td>
<td>Quick Disconnect O-Ring (not shown)</td>
</tr>
<tr>
<td>075321</td>
<td>Socket Cap, 4-40 X 1/2, HX, SS</td>
</tr>
<tr>
<td>075322</td>
<td>M/S, 4-40 X 1/4, SL, SZ</td>
</tr>
<tr>
<td>120282</td>
<td>Nozzle: PAC121 50A Shield</td>
</tr>
<tr>
<td>120326</td>
<td>Shield: PAC121M Machine Torch</td>
</tr>
<tr>
<td>120301</td>
<td>Cap, Retaining</td>
</tr>
<tr>
<td>120558</td>
<td>Torch Main Body w/ Switch, PAC121M</td>
</tr>
<tr>
<td>044016</td>
<td>O-Ring: BUNA 90 Duro .614X.070</td>
</tr>
</tbody>
</table>

Note: See page 5-12 for detail of consumable parts

Figure 5-8 PAC121MS Torch Assembly and Leads
CONSUMABLE PARTS - CE

Note: See Section 4 Parts List for parts and components of the non-CE Powermax800 systems.

Consumable Spare Parts Kit - CE (128033)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description (Quantity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>001285</td>
<td>Box, Consumable Parts (1)</td>
</tr>
<tr>
<td>120573</td>
<td>Electrode (3)</td>
</tr>
<tr>
<td>020361</td>
<td>Swirl Ring (1)</td>
</tr>
<tr>
<td>120282</td>
<td>Nozzle, 50A, Shielded (3)</td>
</tr>
<tr>
<td>120281</td>
<td>Nozzle, 50A, Gouging (1)</td>
</tr>
<tr>
<td>120601</td>
<td>Shield, T torch, (1)</td>
</tr>
<tr>
<td>120602</td>
<td>Shield, M torch (1)</td>
</tr>
<tr>
<td>120608</td>
<td>Shield, Gouging (1)</td>
</tr>
<tr>
<td>044016</td>
<td>O-Ring (3)</td>
</tr>
<tr>
<td>015152</td>
<td>Nipple, 1/8 NPT, QDisc, Steel (1)</td>
</tr>
<tr>
<td>015570</td>
<td>Bushing, Reducer, 1/4 X 1/8, Brass (1)</td>
</tr>
<tr>
<td>015604</td>
<td>Reducer, 1/4 FPT X 1/8 NPT, Brass (1)</td>
</tr>
<tr>
<td>027055</td>
<td>Lubricant, Silicone 1/4 Oz Tube (1)</td>
</tr>
</tbody>
</table>

Figure 5-7 Consumable Parts - CE
# POWERMAX800 FIELD UPGRADE KITS AND OPTIONAL PARTS

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>028714</td>
<td>On/Off Pendant w/Lead, 25 ft. (7.6 m) (Also comes standard with most machine torch system configurations. See note below.)</td>
</tr>
<tr>
<td>128061</td>
<td>On/Off Pendant w/Lead, 50 ft. (15.2 m)</td>
</tr>
<tr>
<td>128062</td>
<td>On/Off Pendant w/Lead, 75 ft. (23 m)</td>
</tr>
<tr>
<td>028864</td>
<td>Kit: Powermax800 Pwr Unit Wheels</td>
</tr>
<tr>
<td>028898</td>
<td>Pilot Arc Controller Kit</td>
</tr>
<tr>
<td>128036</td>
<td>Machine Interface Kit, 400V CE</td>
</tr>
<tr>
<td>028907</td>
<td>Work Cable, 50' (15.2 m)</td>
</tr>
<tr>
<td>028908</td>
<td>Cooling Fan Filter Kit: Powermax800</td>
</tr>
<tr>
<td>011079</td>
<td>Gas Filter Element</td>
</tr>
<tr>
<td>129019</td>
<td>Jumper: Powermax800 Link Box</td>
</tr>
<tr>
<td>008958</td>
<td>Fuse: 1A 500V 10mm X 38mm Slo (Used on 200/230/400V and 400V CE power supplies)</td>
</tr>
<tr>
<td>023206</td>
<td>Cable: Machine Interface, 25 ft (7.6 m) (Comes standard with machine torch system configurations and with machine interface kits.)</td>
</tr>
</tbody>
</table>

## POWER SUPPLIES - 400V CE, 3φ, 50 Hz

<table>
<thead>
<tr>
<th>Part Number</th>
<th>For Torch Type</th>
<th>With Pilot Arc Control</th>
<th>With Machine Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>083018</td>
<td>Hand</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>083021</td>
<td>Hand</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>083024</td>
<td>Machine</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>083027</td>
<td>Machine</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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

See Section 4 Parts List for parts and components of non-CE Powermax800 systems.
## PARTS LIST - CE

### RECOMMENDED SPARE PARTS - POWERMAX800 400V CE

<table>
<thead>
<tr>
<th>Part Number Reference</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>003078</td>
<td>Relay: 30A NO Mag Blwq QDisc Term</td>
<td>5-5</td>
</tr>
<tr>
<td>129068</td>
<td>Circuit Breaker SA: 4Pole 480V W/TC</td>
<td>5-9</td>
</tr>
<tr>
<td>129151</td>
<td>Contactor SA: Powermax800</td>
<td>5-9</td>
</tr>
<tr>
<td>008958</td>
<td>Fuse: 1A 500V 10mm X 38mm GI Slo(2)</td>
<td>5-5</td>
</tr>
<tr>
<td>008959</td>
<td>Fuse: 20A 500V 10mm X 38mm GI Slo(3)</td>
<td>5-5</td>
</tr>
<tr>
<td>014209</td>
<td>Xfmr: Powermax800 CE 400V Control</td>
<td>5-7</td>
</tr>
<tr>
<td>014211</td>
<td>Xfmr: Powermax800 200/230/400 Power</td>
<td>5-7</td>
</tr>
<tr>
<td>014186</td>
<td>Inductor: Powermax800 2MH 50A</td>
<td>5-7</td>
</tr>
<tr>
<td>023922</td>
<td>Cable w/ Clamp: PMX800 Work 20'</td>
<td>5-3</td>
</tr>
<tr>
<td>027443</td>
<td>Fan: 260CDM 120VAC 50-60HZ</td>
<td>5-7</td>
</tr>
<tr>
<td>005112</td>
<td>Pressure Switch: 39 Psi, 0.13 Orifice</td>
<td>5-3</td>
</tr>
<tr>
<td>006054</td>
<td>Sol. Valve: 100# 1/8FPT 24VAC NC</td>
<td>5-3</td>
</tr>
<tr>
<td>022027</td>
<td>Press. Gauge: 160# 1.5&quot;, 1/8CBM Panel</td>
<td>5-3</td>
</tr>
<tr>
<td>129046</td>
<td>Heatsink SA: Powermax800 CE Power Unit</td>
<td>5-5</td>
</tr>
<tr>
<td>109018/008906</td>
<td>Diode: 600V 100A UFast Recovery Dual (2)/Thermal Pad: AL-380-100 (2)</td>
<td>5-5</td>
</tr>
<tr>
<td>109043/008947</td>
<td>Diode: 1600V 30A 3PH Bridge/Thermal Pad: AL-315-114</td>
<td>5-5</td>
</tr>
<tr>
<td>005178</td>
<td>Temp. Switch Opens 85°/Closes 75°C</td>
<td>5-5</td>
</tr>
<tr>
<td>009849/008903</td>
<td>Resistor: 20 Ohm 5W 5% NON-IND (4)/Thermal Pad: AL-197-114 (4)</td>
<td>5-5</td>
</tr>
<tr>
<td>009850/008902</td>
<td>Resistor: 20 Ohm 25W 5% NON-IND (4)/Thermal Pad: AL-103-108 (4)</td>
<td>5-5</td>
</tr>
<tr>
<td>009918</td>
<td>Capacitor: 0.012UF 1000WV 10% Poly (4)</td>
<td>5-5</td>
</tr>
<tr>
<td>009968</td>
<td>Capacitor: 6800pF 1000MV 10% Poly (4)</td>
<td>5-5</td>
</tr>
<tr>
<td>029998/008905</td>
<td>IGBT Gate Drive SA: Powermax800 (2)/Thermal Pad: AL-370-134 (2)</td>
<td>5-5</td>
</tr>
<tr>
<td>031137</td>
<td>PCB Assy: Powermax800 Control</td>
<td>5-5</td>
</tr>
<tr>
<td>041517</td>
<td>PCB Assy: Powermax800-ZB Power</td>
<td>5-5, 5-7</td>
</tr>
<tr>
<td>129049</td>
<td>Electric Line Filter SA: Powermax800-CE</td>
<td>5-9</td>
</tr>
<tr>
<td>047180</td>
<td>Cord: 2.5mm PVC HD21/22, 73&quot;</td>
<td>5-9</td>
</tr>
<tr>
<td>028908</td>
<td>Kit: Powermax800 Cooling Fan Filter</td>
<td>5-7</td>
</tr>
</tbody>
</table>

See Section 4 Parts List for parts and components of non-CE Powermax800 systems.
Section 6  WIRING DIAGRAMS

In this section:

- Powermax800 Electrical Schematic: 208/240/480V ..................... 6-2
- Powermax800 Electrical Schematic: 200/230/400V ..................... 6-3
- Powermax800 Electrical Schematic: 400V–CE .......................... 6-4
- Powermax800 Troubleshooting Schematic 1 of 2 ..................... 6-5
- Powermax800 Troubleshooting Schematic 2 of 2 ..................... 6-6
- Powermax800 CE Troubleshooting Schematic 1 of 2 ................. 6-7
- Powermax800 CE Troubleshooting Schematic 2 of 2 ................. 6-8
### Power Board Test Points

<table>
<thead>
<tr>
<th>Test Point</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1 to E3</td>
<td>High-voltage power - Left Inverter</td>
<td>+360VDC</td>
</tr>
<tr>
<td>E14 to E13</td>
<td>Overall High-voltage power - Left Inverter</td>
<td>+360VDC</td>
</tr>
<tr>
<td>E4 to E5</td>
<td>High-voltage power - Right Inverter</td>
<td>+360VDC</td>
</tr>
<tr>
<td>E15 to E5</td>
<td>One-half of High-voltage power - Right Inverter</td>
<td>+180VDC</td>
</tr>
</tbody>
</table>

**J1-5 to J1-4** "Soft start" signal from control PCB. After incoming voltage is accepted by control board, control board sends +15VDC to relay R11 on power board. LME VOLTAGE LED will remain lit until "soft start" signal is complete (about 6 seconds after S1 is thrown).

**J1-6 to J1-4** Shut down signal from power board. Protection circuit on power board will go low (~5 VDC) to control board to shut down power supply if it detects over voltage.

---

**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 PCB 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 PCB board and on certain areas of the PCB 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 PCB board or capacitors. If questions or problems arise during servicing, call Hypertherm Technical Services at 1-800-643-9678.

---

### Diagram

![Diagram](image)

---

**NOTES:**

1. THIS IS A TROUBLE SHOOTING REFERENCE SCHEMATIC WHICH PERTAINS TO BOTH DOMESTIC AND MULTI-VOLT INTL. UNITS. DIFFERENCES IN MULTI-VOLT INTL. UNITS VOLTAGES ARE IN SQUARE BRACKETS.

2. VOLTAGE LINKING

<table>
<thead>
<tr>
<th>Line Voltage</th>
<th>Control Voltage Connection</th>
<th>Jumper Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>20k(20k)</td>
<td>20k(20k)</td>
<td>TB3(1) TO TB3(2) AND TB3(3) TO TB3(4)</td>
</tr>
<tr>
<td>24V(230)</td>
<td>24V(230)</td>
<td>TB3(1) TO TB3(2) AND TB3(3) TO TB3(4)</td>
</tr>
<tr>
<td>400(400)</td>
<td>400(400)</td>
<td>TB3(2) TO TB3(3)</td>
</tr>
</tbody>
</table>

3) TRANSFORMER T2 IS SINGLE CORE DUAL SECTION SHOWN SEPARATED FOR CLARITY.

4) ALL TERMINALS PREFIXED WITH (E) ARE LOCATED ON POWER PCB

---

PMX800 TROUBLE SHOOTING SCH

013-2-292

2 OF 2
<table>
<thead>
<tr>
<th>Test Point</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP1</td>
<td>Transfer signal</td>
<td>A logic high [12V] indicates that the arc is transferred.</td>
</tr>
<tr>
<td>TP2</td>
<td>Start signal</td>
<td>A logic high [12V] indicates that the torch start switch is on.</td>
</tr>
<tr>
<td>TP3</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>TP4</td>
<td>Unregulated DC voltage</td>
<td>Approximately 30VDC at normal input voltage.</td>
</tr>
<tr>
<td>TP5</td>
<td>R5-ON signal</td>
<td>A logic high [12V] indicates that the inverter is on.</td>
</tr>
<tr>
<td>TP6</td>
<td>Transfer latch signal</td>
<td>A logic high [12V] indicates that unit is in transferred mode.</td>
</tr>
<tr>
<td>TP7</td>
<td>Torch OK signal</td>
<td>A logic high [12V] indicates that all temperature are OK.</td>
</tr>
<tr>
<td>TP8</td>
<td>Continuous FA threshold voltage</td>
<td>Set to 3.8V as per P3.</td>
</tr>
<tr>
<td>TP11</td>
<td>Error amplifier reference voltage</td>
<td>During inverter operation this signal is 1.91V at 50A current setting and 1.7V at 150A current setting.</td>
</tr>
<tr>
<td>TP16</td>
<td>Error amplifier output voltage</td>
<td>2.5V.</td>
</tr>
<tr>
<td>TP18</td>
<td>Output current sense signal</td>
<td>38.3V/mAmp.</td>
</tr>
<tr>
<td>TP19</td>
<td>Power voltage</td>
<td>2.9V at 50A current setting and 1.8V at 150A current setting.</td>
</tr>
<tr>
<td>TP20</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>TP21</td>
<td>Buffered, inverted, capacitor feed version of pulse with modulator B signal.</td>
<td></td>
</tr>
<tr>
<td>F2,F4</td>
<td>Start circuit protection</td>
<td>SA (see Parts List for part number and specifications).</td>
</tr>
</tbody>
</table>

---

**PMX800-CE TROUBLE SHOOTING SCH**

013-2-296

1 OF 2
Power Board Test Points

<table>
<thead>
<tr>
<th>Test Point</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1 to E2</td>
<td>High-voltage power - Left inverter</td>
<td>+300VDC</td>
</tr>
<tr>
<td>E14 to E2</td>
<td>One half of high-voltage power - Left inverter</td>
<td>+150VDC</td>
</tr>
<tr>
<td>E4 to E5</td>
<td>High-voltage power - Right inverter</td>
<td>+300VDC</td>
</tr>
<tr>
<td>E15 to E5</td>
<td>One half of high-voltage power - Right inverter</td>
<td>+150VDC</td>
</tr>
<tr>
<td>J1-5 to J1-4</td>
<td>&quot;Soft start&quot; signal from control PCB. After incoming voltage is accepted by control board, control board sends +12VDC to relay RLT1 on power board. LINE VOLTAGE LED will remain lit until &quot;soft start&quot; signal is complete (about 5 seconds after S1 is thrown).</td>
<td>+12VDC 5 sec. after throwing power switch S1.</td>
</tr>
<tr>
<td>J1-6 to J1-4</td>
<td>Shut down signal from power board. Protection circuit on power board will go low (+5 VDC) to control board to shut down power supply if it detects over-voltage.</td>
<td>+12 VDC normally. +5 VDC if voltage too high.</td>
</tr>
</tbody>
</table>

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 PCB 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 PCB and on certain areas of the PCB 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 PCB board or capacitors. If questions or problems arise during servicing, call Hypertherm Technical Services at 1-800-643-9878.

NOTES:
1. THIS IS A TROUBLE SHOOTING REFERENCE SCHEMATIC, WHICH PERTAINS TO THE PHABBOO® CE UNIT.
2) TRANSFORMER T2 IS SINGLE CORE DUAL SECTION SHOWN SEPARATED FOR CLARITY
3) ALL TERMINALS PREFIXED WITH (E) ARE LOCATED ON POWER PCB

PMX800® CE TROUBLE SHOOTING SCH 6-8
013-2-296
2 OF 2
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 c-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
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.


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.


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.


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.


13. NWSA booklet, Welding Safety Bibliography, obtainable from the National Welding Supply Association, 1900 Arch Street, Philadelphia, PA 19103.

