Hypertherm®

Powermax30® AIR

Plasma Arc Cutting System with Integrated Air Compressor

Service Manual

808850 | Revision 1 | English

Powermax30 AIR

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English

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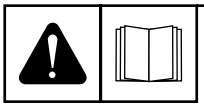


ENGLISH

WARNING! Before operating any Hypertherm equipment, read the safety instructions in your product's manual and in the *Safety and Compliance Manual* (80669C). Failure to follow safety instructions can result in personal injury or in damage to equipment.

Copies of the manuals may accompany the product in electronic and printed formats. You can also obtain copies of the manuals, in all languages available for each manual, from the "Documents library" at www.hypertherm.com.

DEUTSCH / GERMAN

WARNUNG! Bevor Sie ein Hypertherm-Gerät in Betrieb nehmen, lesen Sie bitte die Sicherheitsanweisungen in Ihrer Bedienungsanleitung sowie im *Handbuch für Sicherheit und Übereinstimmung* (80669C). Das Nichtbefolgen der Sicherheitsanweisungen kann zu Verletzungen von Personen oder Schäden am Gerät führen.

Bedienungsanleitungen und Handbücher können dem Gerät in elektronischer Form oder als Druckversion beiliegen. Alle Handbücher und Anleitungen können in den jeweils verfügbaren Sprachen auch in der „Dokumente-Bibliothek" unter www.hypertherm.com heruntergeladen werden.

FRANÇAIS / FRENCH

AVERTISSEMENT! Avant d'utiliser tout équipement Hypertherm, lire les consignes de sécurité importantes dans le manuel de votre produit et dans le *Manuel de sécurité et de conformité* (80669C). Le non-respect des consignes de sécurité peut engendrer des blessures physiques ou des dommages à l'équipement.

Des copies de ces manuels peuvent accompagner le produit en format électronique et papier. Vous pouvez également obtenir des copies de chaque manuel dans toutes les langues disponibles à partir de la « Bibliothèque de documents » sur www.hypertherm.com.

ESPAÑOL / SPANISH

¡ADVERTENCIA! Antes de operar cualquier equipo Hypertherm, leer las instrucciones de seguridad del manual de su producto y del *Manual de Seguridad y Cumplimiento* (80669C). No cumplir las instrucciones de seguridad podría dar lugar a lesiones personales o daño a los equipos.

Pueden venir copias de los manuales en formato electrónico e impreso junto con el producto. También se pueden obtener copias de los manuales, en todos los idiomas disponibles para cada manual, de la "Biblioteca de documentos" en www.hypertherm.com.

ITALIANO / ITALIAN

AVVERTENZA! Prima di usare un'attrezzatura Hypertherm, leggere le istruzioni sulla sicurezza nel manuale del prodotto e nel *Manuale sulla sicurezza e la conformità* (80669C). Il mancato rispetto delle istruzioni sulla sicurezza può causare lesioni personali o danni all'attrezzatura.

Il prodotto può essere accompagnato da copie elettroniche e cartacee del manuale. È anche possibile ottenere copie del manuale, in tutte le lingue disponibili per ogni manuale, dall'"Archivio documenti" all'indirizzo www.hypertherm.com.

NEDERLANDS / DUTCH

WAARSCHUWING! Lees voordat u Hypertherm-apparatuur gebruikt de veiligheidsinstructies in de producthandleiding en in de *Veiligheids- en nalevingshandleiding* (80669C). Het niet volgen van de veiligheidsinstructies kan resulteren in persoonlijk letsel of schade aan apparatuur.

De handleidingen kunnen in elektronische en gedrukte vorm met het product worden meegeleverd. De handleidingen, elke handleiding beschikbaar in alle talen, zijn ook verkrijgbaar via de "Documentenbibliotheek" op www.hypertherm.com.

DANSK / DANISH

ADVARSEL! Inden Hypertherm udstyr tages i brug skal sikkerhedsinstruktionerne i produktets manual og i *Manual om sikkerhed og overholdelse af krav* (80669C), gennemlæses. Følges sikkerhedsvejledningen ikke kan det resultere i personskade eller beskadigelse af udstyret.

Kopier af manualerne kan ledsage produktet i elektroniske og trykte formater. Du kan også få kopier af manualer, på alle sprog der er til rådighed for hver manuel, fra "Dokumentbiblioteket" på www.hypertherm.com.

PORTUGUÊS / PORTUGUESE

ADVERTÊNCIA! Antes de operar qualquer equipamento Hypertherm, leia as instruções de segurança no manual do seu produto e no *Manual de Segurança e de Conformidade* (80669C). Não seguir as instruções de segurança pode resultar em lesões corporais ou danos ao equipamento.

Cópias dos manuais podem acompanhar os produtos nos formatos eletrônico e impresso. Também é possível obter cópias dos manuais em todos os idiomas disponíveis para cada manual na "Biblioteca de documentos" em www.hypertherm.com.

日本語 / JAPANESE

警告！Hypertherm 機器を操作する前に、安全に関する重要な情報について、この製品説明書にある安全情報、および製品に同梱されている別冊の「安全とコンプライアンスマニュアル」(80669C) をお読みください。安全情報に従わないと怪我や装置の損傷を招くことがあります。

説明書のコピーは、電子フォーマット、または印刷物として製品に同梱されています。各説明書は、www.hypertherm.com の「ドキュメントライブラリ」から各言語で入手できます。

简体中文 / CHINESE (SIMPLIFIED)

警告！ 在操作任何海宝设备之前，请阅读产品手册和 《安全和法规遵守手册》 (80669C) 中的安全操作说明。若未能遵循安全操作说明，可能会造成人员受伤或设备损坏。

随产品提供的手册可能提供电子版和印刷版两种格式。您也可从 "Documents library"（文档资料库）中获取每本手册所有可用语言的副本，网址为 www.hypertherm.com.

NORSK / NORWEGIAN

ADVARSEL! Før du bruker noe Hypertherm-utstyr, må du lese sikkerhetsinstruksjonene i produktets håndbok og i *Håndboken om sikkerhet og samsvar* (80669C). Unnlatelse av å følge sikkerhetsinstruksjoner kan føre til personskade eller skade på utstyr.

Eksemplarer av håndbøkene kan medfølge produktet i elektroniske og trykte utgaver. Du kan også få eksemplarer av håndbøkene i alle tilgjengelige språk for hver håndbok fra dokumentbiblioteket på www.hypertherm.com.

SVENSKA / SWEDISH

VARNING! Läs häftet *säkerhetsinformationen i din produkts säkerhets- och efterlevnadsmanual* (80669C) för viktig säkerhetsinformation innan du använder eller underhåller Hypertherm-utrustning. Underlåtenhet att följa dessa säkerhetsinstruktionerkan resultera i personskador eller skador på utrustningen.

Kopior av manualen kan medfölja produkten i elektronisk och tryckform. Du hittar även kopior av manualerna i alla tillgängliga språk i dokumentbiblioteket (Documents library) på www.hypertherm.com.

한국어 / KOREAN

경고! Hypertherm 장비를 사용하기 전에 제품 설명서와 안전 및 규정 준수 설명서 (80669C)에 나와 있는 안전 지침을 읽으십시오. 안전 지침을 준수하지 않으면 신체 부상이나 장비 손상을 초래할 수 있습니다.

전자 형식과 인쇄된 형식으로 설명서 사본이 제품과 함께 제공될 수 있습니다. www.hypertherm.com 의 'Documents library (문서 라이브러리)'에서도 모든 언어로 이용할 수 있는 설명서 사본을 얻을수 있습니다.

ČESKY / CZECH

VAROVÁNÍ! Před uvedením jakéhokoliv zařízení Hypertherm do provozu si přečtěte bezpečnostní pokyny v příručce k produktu a v *Manuálu pro bezpečnost a dodržování předpisů* (80669C). Nedodržování bezpečnostních pokynů může mít za následek zranění osob nebo poškození majetku.

Kopie příruček a manuálů mohou být součástí dodávky produktu, a to v elektronické i tištěné formě. Kopie příruček a manuálů ve všech jazykových verzích, v nichž byly dané příručky a manuály vytvořeny, naleznete v „Knihovně dokumentů“ na webových stránkách www.hypertherm.com.

POLSKI / POLISH

OSTRZEŻENIE! Przed rozpoczęciem obsługi jakiegokolwiek systemu firmy Hypertherm należy się zapoznać z instrukcjami bezpieczeństwa zamieszczonymi w podręczniku produktu oraz w *Podręczniku bezpieczeństwa i zgodności* (80669C). Nieprzestrzeganie instrukcji bezpieczeństwa może skutkować obrażeniami ciała i uszkodzeniem sprzętu.

Do produktu mogą być dołączone kopie podręczników w formacie elektronicznym i drukowanym. Kopie podręczników, w każdym udostępnionym języku, można również znaleźć w „Bibliotece dokumentów” pod adresem www.hypertherm.com.

РУССКИЙ / RUSSIAN

БЕРЕГИСЬ! Перед работой с любым оборудованием Hypertherm ознакомьтесь с инструкциями по безопасности, представленными в руководстве, которое поставляется вместе с продуктом, а также в *Руководстве по безопасности и соответствию* (80669J). Невыполнение инструкций по безопасности может привести к телесным повреждениям или повреждению оборудования.

Копии руководств, которые поставляются вместе с продуктом, могут быть представлены в электронном и бумажном виде. Копии руководств на всех языках, на которые переведено то или иное руководство, можно также загрузить в разделе «Библиотека документов» на веб-сайте www.hypertherm.com.

SUOMI / FINNISH

VAROITUS! Ennen minkään Hypertherm-laitteen käyttöä lue tuotteen käyttöoppaassa olevat turvallisuusohjeet ja *turvallisuus- ja vaatimustenmukaisuusohje* (80669C). Turvallisuusohjeiden laiminlyönti voi aiheuttaa henkilökohtaisen loukkaantumisen tai laitevahingon.

Käyttöoppaiden kopiot voivat olla tuotteen mukana elektronisessa ja tulostetussa muodossa. Voit saada käyttöoppaiden kopiot kaikilla kielillä ”latauskirjastosta”, joka on osoitteessa www.hypertherm.com.

БЪЛГАРСКИ / BULGARIAN

ПРЕДУПРЕЖДЕНИЕ! Преди да работите с което и да е оборудване Hypertherm, прочетете инструкциите за безопасност в ръководството на вашия продукт и „Инструкция за безопасност и съответствие“ (80669C). Неспазването на инструкциите за безопасност би могло да доведе до телесно нараняване или до повреда на оборудването.

Копия на ръководствата може да придружават продукта в електронен и в печатен формат. Можете да получите копия на ръководствата, предлагани на всички езици, от „Documents library“ (Библиотека за документи) на адрес www.hypertherm.com.

ROMÂNĂ / ROMANIAN

AVERTIZARE! Înainte de utilizarea oricărui echipament Hypertherm, citiți instrucțiunile de siguranță din cadrul manualului produsului și din cadrul *Manualului de siguranță și conformitate* (80669C). Nerespectarea instrucțiunilor de siguranță pot rezulta în vătămare personală sau în avarierea echipamentului.

Produsul poate fi însoțit de copii ale manualului în format tipărit și electronic. De asemenea, dumneavoastră puteți obține copii ale manualelor, în toate limbile disponibile pentru fiecare manual, din cadrul secțiunii „Bibliotecă documente” aflată pe site-ul www.hypertherm.com.

TÜRKÇE / TURKISH

UYARI! Bir Hypertherm ekipmanını çalıştırmadan önce, ürün kullanım kılavuzunda ve *Güvenlik ve Uyumluluk Kılavuzu'nda* (80669C) yer alan güvenlik talimatlarını okuyun. Güvenlik talimatlarına uyulmaması durumunda kişisel yaralanmalar veya ekipman hasarı meydana gelebilir.

Kılavuzların kopyaları, elektronik ve basılı formatta ürünle birlikte verilebilir. Her biri tüm dillerde yayınlanan kılavuzların kopyalarını www.hypertherm.com adresindeki “Documents library” (Dosyalar kitaplığı) başlığından da elde edebilirsiniz.

MAGYAR / HUNGARIAN

VIGYÁZAT! Mielőtt bármilyen Hypertherm berendezést üzemeltetne, olvassa el a biztonsági információkat a termék kézikönyvében és a *Biztonsági és szabálykövetési kézikönyvben* (80669C). A biztonági utasítások betartásának elmulasztása személyi sérüléshez vagy a berendezés károsodásához vezethet.

A termékhez a kézikönyv példányai elektronikus és nyomtatott formában is mellékelve lehetnek. A kézikönyvek példányai (minden nyelven) a www.hypertherm.com weboldalon a „Documents library” (Dokumentum könyvtár) részben is beszerezhetők.

ΕΛΛΗΝΙΚΑ / GREEK

ΠΡΟΕΙΔΟΠΟΙΗΣΗ! Πριν θέσετε σε λειτουργία οποιονδήποτε εξοπλισμό της Hypertherm, διαβάστε τις οδηγίες ασφαλείας στο εγχειρίδιο του προϊόντος και στο *Εγχειρίδιο ασφάλειας και συμμόρφωσης* (80669C). Η μη τήρηση των οδηγιών ασφαλείας μπορεί να επιφέρει σωματική βλάβη ή ζημιά στον εξοπλισμό.

Αντίγραφα των εγχειριδίων μπορεί να συνοδεύουν το προϊόν σε ηλεκτρονική και έντυπη μορφή. Μπορείτε, επίσης, να λάβετε αντίγραφα των εγχειριδίων σε όλες τις γλώσσες που διατίθενται για κάθε εγχειρίδιο από την ψηφιακή βιβλιοθήκη εγγράφων (Documents library) στη διαδικτυακή τοποθεσία www.hypertherm.com.

繁體中文 / CHINESE (TRADITIONAL)

警告！ 在操作任何 Hypertherm 設備前，請閱讀您產品手冊和 《安全和法務遵從手冊》(80669C) 內的安全指示。不遵守安全指示可能會導致人身傷害或設備損壞。

手冊複本可能以電子和印刷格式隨附產品提供。您也可以在 www.hypertherm.com 的 「文檔資料庫」內獲取所有手冊的多語種複本。

SLOVENŠČINA / SLOVENIAN

OPOZORILO! Pred uporabo katerekoli Hyperthermove opreme preberite varnostna navodila v priročniku vašega izdelka ter v *Priročniku za varnost in skladnost* (80669C). Neupoštevanje navodil za uporabo lahko povzroči telesne poškodbe ali materialno škodo.

Izdelku so lahko priloženi izvodi priročnikov v elektronski ali tiskani obliki. Izvode priročnikov v vseh razpoložljivih jezikih si lahko prenesete tudi iz knjižnice dokumentov “Documents library” na naslovu www.hypertherm.com.

SRPSKI / SERBIAN

UPOZORENJE! Pre rukovanja bilo kojom Hyperthermovom opremom pročitajte uputstva o bezbednosti u svom priručniku za proizvod i u *Priručniku o bezbednosti i usaglašenosti* (80669C). Oglušavanje o praćenje uputstava o bezbednosti može da ima za posledicu ličnu povredu ili oštećenje opreme.

Može se dogoditi da kopije priručnika prate proizvod u elektronskom i štampanom formatu. Takođe možete da pronađete kopije priručnika, na svim jezicima koji su dostupni za svaki od priručnika, u “Biblioteci dokumenata” (“Documents library”) na www.hypertherm.com.

SLOVENČINA / SLOVAK

VÝSTRAHA! Pred použitím akéhokoľvek zariadenia od spoločnosti Hypertherm si prečítajte bezpečnostné pokyny v návode na obsluhu vášho zariadenia a v *Manuáli o bezpečnosti a súlade s normami* (80669C). V prípade nedodržania bezpečnostných pokynov môže dôjsť k ujme na zdraví alebo poškodeniu zariadenia.

Kópia návodu, ktorá je dodávaná s produktom, môže mať elektronickú alebo tlačenú podobu. Kópie návodov, vo všetkých dostupných jazykoch, sú k dispozícii aj v sekcii z „knižnice Dokumenty“ na www.hypertherm.com.

Contents

Introduction

Hypertherm's CE-marked equipment is built in compliance with standard EN60974-10. The equipment should be installed and used in accordance with the information below to achieve electromagnetic compatibility.

The limits required by EN60974-10 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 cutting equipment is designed for use only in an industrial environment.

Installation and use

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

If electromagnetic disturbances are detected then it shall be the responsibility of the user to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing the cutting circuit, see *Earthing of the 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, signaling and telephone cables; above, below and adjacent to the cutting equipment.
- **b.** Radio and television transmitters and receivers.
- **c.** Computer and other control equipment.
- **d.** Safety critical equipment, for example guarding of industrial equipment.
- **e.** Health of the people around, for example the use of pacemakers and hearing aids.
- **f.** Equipment used for calibration or measurement.
- **g.** Immunity of other equipment in the environment. User shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures.
- **h.** Time of day that cutting or other activities are to be carried out.

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

Methods of reducing emissions

Mains supply

Cutting equipment must be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply.

Consideration should be given to shielding the supply cable of permanently installed cutting equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the cutting mains supply so that good electrical contact is maintained between the conduit and the cutting power source enclosure.

Maintenance of cutting equipment

The cutting equipment must be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the cutting equipment is in operation. The cutting equipment should not be modified in any way, except as set forth in and in accordance with the manufacturer's written instructions. For example, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

Cutting cables

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

Equipotential bonding

Bonding of all metallic components in the cutting installation and adjacent to it should be considered.

However, metallic components bonded to the workpiece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode (nozzle for laser heads) at the same time.

The operator should be insulated from all such bonded metallic components.

Earthing of the workpiece

Where the workpiece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, for example, ship's hull or building steel work, 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 provided in IEC 60974-9, Arc Welding Equipment, Part 9: 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.

Attention

Genuine Hypertherm parts are the factory-recommended replacement parts for your Hypertherm system. Any damage or injury caused by the use of other than genuine Hypertherm parts may not be covered by the Hypertherm warranty, and will constitute misuse of the Hypertherm Product.

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

General

Hypertherm Inc. warrants that its Products shall be free from defects in materials and workmanship for the specific periods of time set forth herein and as follows: if Hypertherm is notified of a defect (i) with respect to the plasma power supply within a period of two (2) years from the date of its delivery to you, with the exception of Powermax brand power supplies, which shall be within a period of three (3) years from the date of delivery to you, and (ii) with respect to the torch and leads within a period of one (1) year from its date of delivery to you, with the exception of the HPRXD short torch with integrated lead, which shall be within a period of six (6) months from the date of delivery to you, and with respect to torch lifter assemblies within a period of one (1) year from its date of delivery to you, and with respect to Automation products one (1) year from its date of delivery to you, with the exception of the EDGE Connect CNC, EDGE Connect T CNC, EDGE Connect TC CNC, EDGE Pro CNC, EDGE Pro Ti CNC, MicroEDGE Pro CNC, and ArcGlide THC, which shall be within a period of two (2) years from the date of delivery to you, and (iii) with respect to HyIntensity fiber laser components within a period of two (2) years from the date of its delivery to you, with the exception of laser heads and beam delivery cables, which shall be within a period of one (1) year from its date of delivery to you.

This warranty shall not apply to any Powermax brand power supplies that have been used with phase converters. In addition, Hypertherm does not warranty systems that have been damaged as a result of poor power quality, whether from phase converters or incoming line power. This warranty shall not apply to any product which has been incorrectly installed, modified, or otherwise damaged.

Hypertherm provides repair, replacement or adjustment of the Product as the sole and exclusive remedy, if and only if the warranty set forth herein properly is invoked and applies. Hypertherm, at its sole option, shall repair, replace, or adjust, free of charge, any defective Products covered by this warranty which shall be returned with Hypertherm's prior authorization (which shall not be unreasonably withheld), properly packed, to Hypertherm's place of business in Hanover, New Hampshire, or to an authorized Hypertherm repair facility, all costs, insurance and freight pre paid by the customer. Hypertherm shall not be liable for any repairs, replacement, or adjustments of Products covered by this warranty, except those made pursuant to this paragraph and with Hypertherm's prior written consent.

The warranty set forth above is exclusive and is in lieu of all other warranties, express, implied, statutory, or otherwise with respect to the Products or as to the results which may be obtained therefrom, and all implied warranties or conditions of quality or of merchantability or fitness for a particular purpose or against infringement. The foregoing shall constitute the sole and exclusive remedy for any breach by Hypertherm of its warranty.

Distributors/OEMs may offer different or additional warranties, but Distributors/OEMs are not authorized to give any additional warranty protection to you or make any representation to you purporting to be binding upon Hypertherm.

Patent indemnity

Except only in cases of products not manufactured by Hypertherm or manufactured by a person other than Hypertherm not in strict conformity with Hypertherm's specifications and in cases of designs, processes, formulae, or combinations not developed or purported to be developed by Hypertherm, Hypertherm will have the right to defend or settle, at its own expense, any suit or proceeding brought against you alleging that the use of the Hypertherm product, alone and not in combination with any other product not supplied by Hypertherm, infringes any patent of any third party. You shall notify Hypertherm promptly upon learning of any action or threatened action in connection with any such alleged infringement (and in any event no longer than fourteen (14) days after learning of any action or threat of action), and Hypertherm's obligation to defend shall be conditioned upon Hypertherm's sole control of, and the indemnified party's cooperation and assistance in, the defense of the claim.

Limitation of liability

In no event shall Hypertherm be liable to any person or entity for any incidental, consequential direct, indirect, punitive or exemplary damages (including but not limited to lost profits) regardless of whether such liability is based on breach of contract, tort, strict liability, breach of warranty, failure of essential purpose, or otherwise, and even if advised of the possibility of such damages. Hypertherm shall not be liable for any losses to Distributor based on down time, lost production or lost profits. It is the intention of the Distributor and Hypertherm that this provision be construed by a court as being the broadest limitation of liability consistent with applicable law.

National and local codes

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

Liability cap

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

Insurance

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

Transfer of rights

You may transfer any remaining rights you may have hereunder only in connection with the sale of all or substantially all of your assets or capital stock to a successor in interest who agrees to be bound by all of the terms and conditions of this Warranty. Within thirty (30) days before any such transfer occurs, you agree to notify in writing Hypertherm, which reserves the right of approval. Should you fail timely to notify Hypertherm and seek its approval as set forth herein, the Warranty set forth herein shall be null and void and you will have no further recourse against Hypertherm under the Warranty or otherwise.

Waterjet product warranty coverage

Product	Parts coverage
HyPrecision pumps	27 months from the ship date, or 24 months from the date of proven installation, or 4,000 hours, whichever occurs first
PowerDredge abrasive removal system	15 months from the ship date or 12 months from the date of proven installation, whichever occurs first
EcoSift abrasive recycling system	15 months from the ship date or 12 months from the date of proven installation, whichever occurs first
Abrasive metering devices	15 months from the ship date or 12 months from the date of proven installation, whichever occurs first
On/off valve air actuators	15 months from the ship date or 12 months from the date of proven installation, whichever occurs first
Diamond orifices	600 hours of use with the use of a thimble filter and compliance with Hypertherm's water quality requirements

Consumable parts are not covered by this warranty. Consumable parts include, but are not limited to, high-pressure water seals, check valves, cylinders, bleed-down valves, low-pressure seals, high-pressure tubing, low- and high-pressure water filters and abrasive collection bags. All third-party pumps, pump accessories, hoppers, hopper accessories, dryer boxes, dryer box accessories and plumbing accessories are covered by the respective manufacturers' warranties and not covered by this warranty.

Section 1
Specifications

Safety information

Before operating any Hypertherm equipment, read the separate *Safety and Compliance Manual* (80669C) included with your product for important safety information.

System description

The Powermax30 AIR is a 30 A handheld plasma cutting system that contains its own internal air compressor for maximum portability and ease of use. With it, you can cut electrically conductive metals – such as mild steel, stainless steel, or aluminum – of thicknesses up to 10 mm (3/8 inches). You can also pierce thicknesses up to 6 mm (1/4 inch).

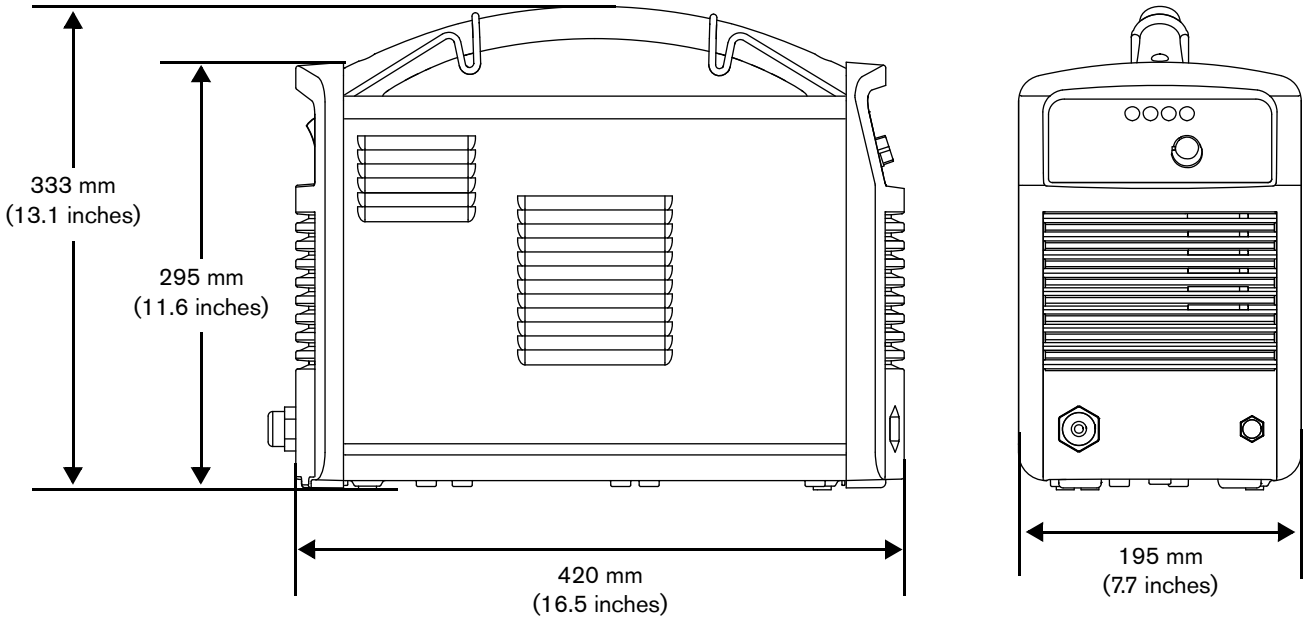
The Powermax30 AIR ships in several different configurations, based on region. Typically all configurations include:

- 1 complete set of consumables (preinstalled on the Air T30 hand torch):
  - 1 electrode
  - 1 swirl ring
  - 1 nozzle
  - 1 retaining cap
  - 1 deflector
- 1 extra nozzle
- 1 extra electrode
- Carrying strap
- Operator Manual
- Safety and Compliance Manual
- Quick Setup Card

CSA units ship with a 120 V / 15 A (NEMA 5-15P) adapter and a 240 V / 20 A (NEMA 6-50P) adapter that connect to the NEMA twist lock-style 240 V / 20 A (NEMA L6-20P) plug wired to the power supply. CE and CCC units ship without a plug on the power cord. See *Power cord considerations* on page 29 for more information.

You can order additional consumables and accessories – such as a dust cover and circle cutting guides, for example – from any Hypertherm distributor. See *Parts* on page 207 for a list of spare and optional parts.

Power supply dimensions



System weights

The following system weights include the hand torch with 4.6 m (15 foot) torch lead, a 4.6 m (15 foot) work lead with ground clamp, and a 3.0 m (10 foot) power cord:

- CSA systems: 13.5 kg (29.8 pounds)
- CE and CCC systems: 13.4 kg (29.5 pounds)

Hypertherm system ratings

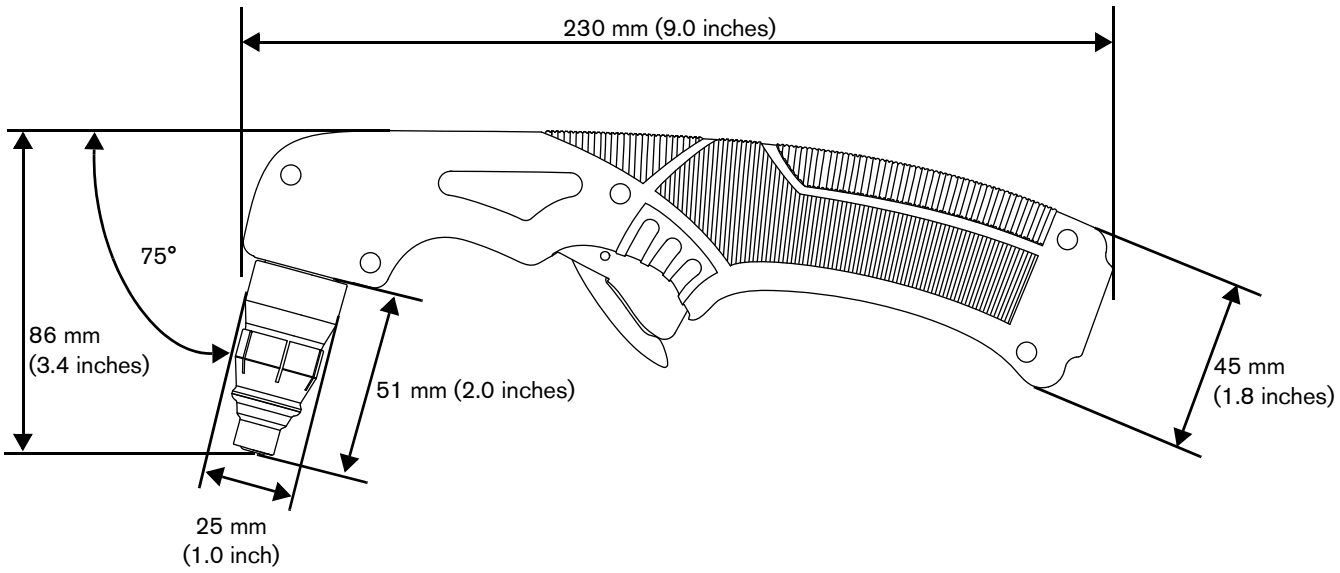
Rated open circuit voltage (U_0)	256 VDC
Output characteristic*	Drooping
Rated output current (I_2)	15 A to 30 A
Rated output voltage (U_2) at U_1 = 120 VAC	83 VDC
Rated output voltage (U_2) at U_1 = 200 VAC – 240 VAC	83 VDC
Duty cycle at 40°C, U_1 = 120 VAC (See data plate on power supply's rear panel for more information on duty cycle and for IEC ratings.)	20% (I_2 = 30 A, U_2 = 83 V)
Duty cycle at 40°C, U_1 = 200 VAC – 240 VAC (See data plate on power supply's rear panel for more information on duty cycle and for IEC ratings.)	35% (I_2 = 30 A, U_2 = 83 V)
Operating temperature	-10°C to 40°C (14°F to 104°F)
Storage temperature	-25°C to 55°C (-13°F to 131°F)
Power factor (120 V – 240 V)	0.99 – 0.97
EMC classification CISPR 11 (CE models only)**	Class A
Input voltage (U_1)/ Input current (I_1) at rated output ($U_{2\ MAX}$, $I_{2\ MAX}$) (See *Voltage configurations* on page 27 for more information.)	120 V, 1-phase, 50/60 Hz, 28.7 A 200 V – 240 V, 1-phase, 50/60 Hz, 16.7 A – 15.0 A†
Gas type	Air

* Defined as a plot of output voltage versus output current.

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

† This product meets the technical requirements of IEC 61000-3-2 and IEC 61000-3-3 and is not subject to conditional connection.

Torch dimensions



Torch weight

- Air T30 torch with consumables only: 0.3 kg (0.65 pounds)
- Air T30 torch with consumables and 4.6 m (15 foot) lead (with strain relief): 1.0 kg (2.25 pounds)

Cutting specifications

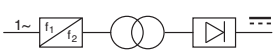
240 V	
Recommended cut capacity*	8 mm (5/16 inch) at a minimum of 500 mm/minute (20 inches/minute) 10 mm (3/8 inch) at a minimum of 250 mm/minute (10 inches/minute)
Severance cut capacity	16 mm (5/8 inch) at a minimum of 125 mm/minute (5 inches/minute)

* When you operate this system at altitudes higher than 2,200 m (7,500 feet) above sea level, you may experience some reduction in cutting performance due to the adverse effect that altitude has on air compressors.

120 V
When you operate the system at the maximum recommended output of **20 A**, the cut capacities are: ❑ 3 mm (10 gauge) at 762 mm/minute (30 inches/minute) ❑ 6 mm (1/4 inch) at 355 mm/minute (14 inches/minute) ❑ 10 mm (3/8 inch) at 125 mm/minute (5 inches/minute)

IEC symbols

The following symbols may appear on the power supply data plate, control labels, switches, and LEDs.

	Direct current (DC)		An inverter-based power source
	Alternating current (AC)		Volt/amp curve, “drooping” characteristic
	Plasma torch cutting		Power is ON (LED)
	AC input power connection		Internal air compressor fault (LED)
	The terminal for the external protective (earth) conductor		Missing or loose consumables (LED)
I	Power is ON		Power supply is overheated (LED)
O	Power is OFF		

Noise levels

This plasma system may exceed acceptable noise levels as defined by national and local codes. Always wear proper ear protection when cutting. Any noise measurements taken depend on the specific environment in which the system is used. Refer to *Noise can damage hearing* in the *Safety and Compliance Manual* (80669C) included with your system.

In addition, you can find an *Acoustical Noise Data Sheet* for your system online:

1. Go to www.hypertherm.com/docs.
2. Select a product from the “Product type” menu in the “Search” section of the page.
3. Select “Regulatory” from the “All Categories” menu.
4. Select “Acoustical Noise Data Sheets” from the “All subcategories” menu.

Symbols and marks

Your product may have one or more of the following markings on or near the data plate. Due to differences and conflicts in national regulations, not all marks are applied to every version of a product.

S mark

The S mark indicates that the power supply and torch are suitable for operations carried out in environments with increased hazard of electrical shock according to IEC 60974-1.

CSA mark

Products with a CSA mark meet the United States and Canadian regulations for product safety. The products were evaluated, tested, and certified by CSA-International. Alternatively, the product may have a mark by one of the other Nationally Recognized Testing Laboratories (NRTL) accredited in both the United States and Canada, such as UL or TÜV.

CE mark

The CE marking signifies the manufacturer's declaration of conformity to applicable European directives and standards. Only those versions of products with a CE marking located on or near the data plate have been tested for compliance with the European Low Voltage Directive and the European Electromagnetic Compatibility (EMC) Directive. EMC filters needed to comply with the European EMC Directive are incorporated within versions of the product with a CE marking.

Eurasian Customs Union (CU) mark

CE versions of products that include an EAC mark of conformity meet the product safety and EMC requirements for export to Russia, Belarus, and Kazakhstan.

GOST-TR mark

CE versions of products that include a GOST-TR mark of conformity meet the product safety and EMC requirements for export to the Russian Federation.

C-Tick mark

CE versions of products with a C-Tick mark comply with the EMC regulations required for sale in Australia and New Zealand.

RCM mark

CE versions of products with a RCM mark comply with the EMC and safety regulations required for sale in Australia and New Zealand.

CCC mark

The China Compulsory Certification (CCC) mark indicates that the product has been tested and found compliant with product safety regulations required for sale in China.

UkrSEPRO mark

The CE versions of products that include a UkrSEPRO mark of conformity meet the product safety and EMC requirements for export to the Ukraine.

Serbian AAA mark

CE versions of products that include a AAA Serbian mark meet the product safety and EMC requirements for export to Serbia.

Section 2

Power Supply Setup

Unpack the plasma system

1. Make sure that you received all items on your order in good condition. Contact your distributor if any parts are damaged or missing. (See *System contents* on page 26.)

2. Inspect the system for damage that may have occurred during shipment. If you find evidence of damage, see *Claims*, below. All communications regarding this equipment must include the model number and the serial number located on the rear panel of the power supply.

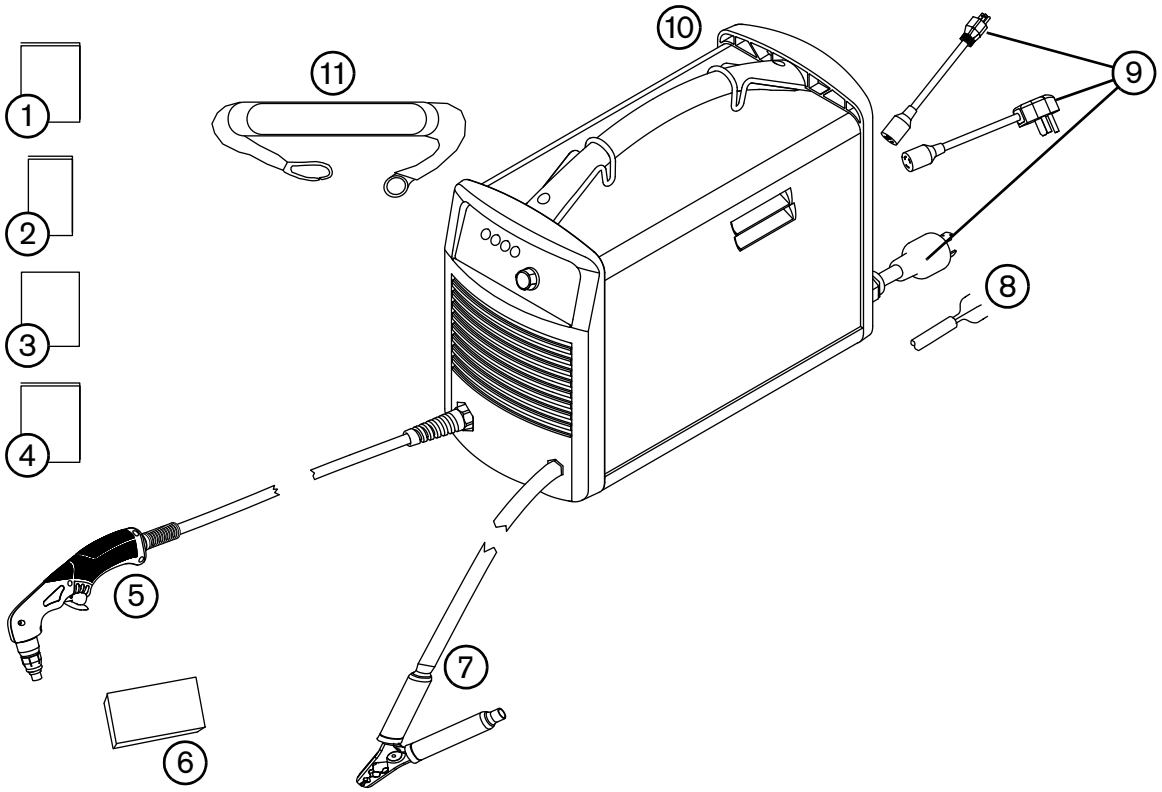
3. Before you set up and operate this system, read the separate *Safety and Compliance Manual* (80669C) included with your system for important safety information.

Claims

- **Claims for damage during shipment** – If your unit was damaged during shipment, file a claim with the carrier. You can contact Hypertherm for a copy of the bill of lading. If you need additional assistance, call the nearest Hypertherm office listed in the front of this manual.
- **Claims for defective or missing merchandise** – If any component is missing or defective, contact your Hypertherm distributor. If you need additional assistance, call the nearest Hypertherm office listed in the front of this manual.

System contents

The following illustration shows the components typically included with all system configurations.

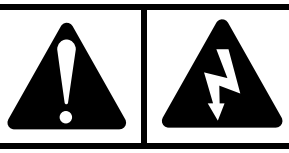


1 Operator Manual
2 Quick Setup Card
3 Registration card
4 Safety and Compliance Manual
5 Air T30 torch with lead
6 Consumable kit
7 Ground clamp and work lead
8 CE/CCC power cord (no power plug included)
9 CSA power cord with power plug adapters
10 Power supply
11 Carrying strap

The specific components included with the system are subject to change over time.

Position the plasma cutting system

- Position the plasma system near an appropriate power receptacle. The system has a 3.0 m (10 foot) power cord.
- Allow at least 0.25 m (10 inches) of space around the power supply for proper ventilation.
- When positioning the plasma system, be aware that excess moisture from the internal compressor exits through a hole in the base, underneath the power supply. You may see a small puddle form under the power supply as you operate the system.
- Place the power supply on a stable, level surface before using. The power supply can tip over if set at an angle greater than 10 degrees.
- Do not place the power supply on its side. Doing so can prevent proper air circulation needed to cool internal components. It can also divert air away from the torch and prevent it from working properly.
- Be aware that when you operate this system at altitudes higher than 2,200 m (7,500 feet) above sea level, you may experience some reduction in cutting performance due to the adverse effect that altitude has on air compressors.
- Do not use the system in rain or snow.



WARNING!

CHANCE OF ELECTRIC SHOCK

Never cut under water or submerge the torch in water. Electric shock can cause serious injury.

Prepare the electrical power

The system's maximum output voltage varies based on the input voltage and the circuit's amperage.

Additional factors must be considered when you are operating the system at an input power of 120 V, as tripped circuit breakers can result under some conditions. For more information, see *System operation guidelines* on page 49 and *Troubleshooting guide* on page 63.

Voltage configurations

The system automatically adjusts for proper operation at the current input voltage without requiring you to perform any switching or rewiring. However, you must make sure that an appropriate set of consumables is properly installed in the torch and the amperage adjustment knob is set to an appropriate output current. For more information, see *Step 1 – Install the consumables* on page 43 and *Step 3 – Adjust the output current* on page 45.

The following tables show the maximum rated output for typical combinations of input voltage and amperage. The output setting you need to use depends on the thickness of the metal and is limited by the input power to your system.

Hypertherm does not recommend operating this system on a 120 V / 15 A circuit.

The Hypertherm rated output is:

- 15 A – 30 A maximum output current
- 83 VDC maximum rated output voltage
- 2.5 kW cutting power

Determine the plasma system's cutting power in watts by multiplying its maximum output amperage by its maximum rated output voltage:

30 A × 83 VDC = 2,490 W (or 2.5 kW).

CAUTION!

A circuit capable of 120 V / 20 A or 240 V / 20 A is required for proper operation. Protect the circuit with appropriately sized slow-blow (time-delay) fuses or circuit breakers.

Table 1 – 120 V / 20 A

Input voltage	120 V
Input current at rated output (19 A × 83 V = 1.6 kW)	19.2 A
Input current at arc stretch	37.5 A
Voltage tolerance	+10% / -10%

Table 2 – 120 V / 30 A

Input voltage	120 V
Input current at rated output (30 A × 83 V = 2.5 kW)	28.7 A
Input current at arc stretch	37.5 A
Voltage tolerance	+10% / -10%

Table 3 – 200 V – 240 V / 16 A

Input voltage	200 V – 240 V
Input current at rated output (28 A × 83 V = 2.3 kW)	15.8 A – 13.4 A
Input current at arc stretch	37.5 A
Voltage tolerance	+10% / -10%

Table 4 – 200 V – 240 V / 20 A

Input voltage	200 V – 240 V
Input current at rated output (30 A × 83 V = 2.5 kW)	16.7 A – 15.0 A
Input current at arc stretch	37.5 A
Voltage tolerance	+10% / -10%

Requirements for grounding

Properly ground the system as follows to ensure personal safety and proper operation, and to reduce electromagnetic interference (EMI):

- The system must be grounded through the power cord according to national and local electrical codes.
- Single-phase service must be of the three-wire type with a green (CSA) or green/yellow (CE/CCC) wire for the protective earth ground and must comply with national and local requirements. **Do not use a two-wire service.**
- Refer to the *Safety and Compliance Manual* (80669C) for more information.

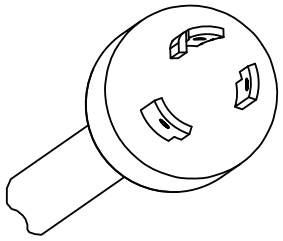
Power cord considerations

This system ships with a CSA or CE, or CCC power cord configuration. See *Exterior, rear* on page 209 for part number information.

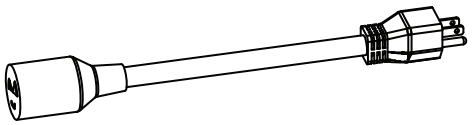
CSA power cords and plugs

CSA configurations include the following plug and adapters.

- The power cord is equipped with a NEMA twist lock-style plug (NEMA L6-20P) appropriate for use on a 240 V / 20 A circuit with a NEMA twist lock-style outlet.

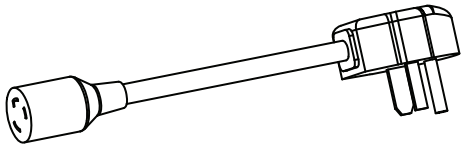


- To operate the system on a lower amperage circuit, attach the female end of the 120 V / 15 A (NEMA 5-15P) plug adapter to the power supply's NEMA twist lock-style plug.



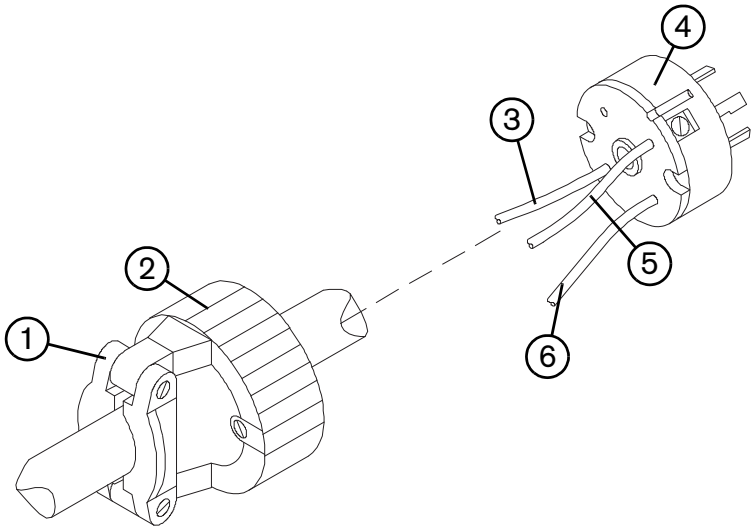
  Do not set the amperage adjustment knob above 20 A, or you may trip the circuit breaker. See *Step 3 – Adjust the output current* on page 45.

- To operate the system on a 240 V / 20 A circuit, attach the female end of the 240 V / 20 A (NEMA 6-50P) plug to the power supply's NEMA twist lock-style plug.



CE and CCC power cords

CE and CCC configurations ship without a plug on the power cord. To operate at 220 V (CCC) or 230 V (CE), obtain the correct plug for your unit and location and have it installed by a licensed electrician.



1 Cord grip

2 Outer shell

3 To line 1 terminal (brown)

4 220 V (CCC) or 230 V (CE) plug

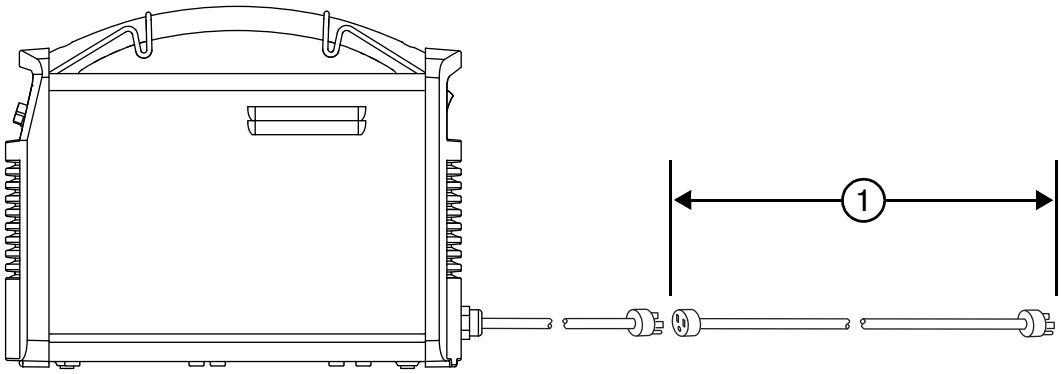
5 To line 2 terminal (blue)

6 To ground terminal (green/yellow)

Install a plug on the power cord

1. Strip back the cord insulation to separate wires 3, 5, and 6.
2. Remove each wire's insulation to allow good contact with the plug terminals.
3. Make the connections.
4. Reinstall the outer shell and cord grip, and tighten the cord grip's screws until snug. Do not overtighten.

Extension cord recommendations



Use an extension cord of an appropriate wire gauge for the cord length and system voltage. Use a cord that meets national and local codes.

Input voltage	Phase	1	
		Recommended cord gauge size	Length
120 VAC	1	4 mm² (12 AWG)	Up to 16 m (53 feet)
240 VAC	1	2 mm² (14 AWG)	Up to 40.5 m (133 feet)

Extension cords can cause the machine to receive less input voltage than the output of the circuit. This can limit the operation of your system.

Generator recommendations

Generators used with this system should produce 240 VAC.

Engine drive rating	Engine drive output current 1-phase (CSA/CE/CCC)	Performance (arc stretch)
5.5 kW	30 A	Full
4 kW	25 A	Limited

Adjust the cutting current as needed based on the generator rating, age, and condition.

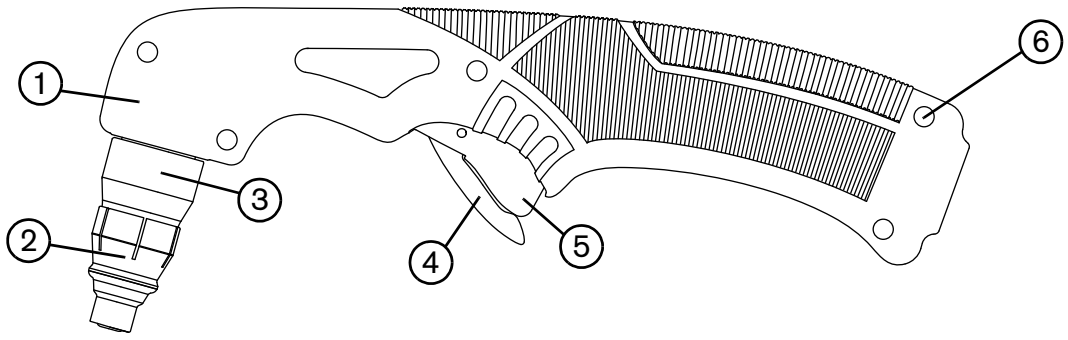
If a fault occurs while using a generator, turn OFF the system and wait approximately 60 seconds before turning it ON again. Turning the power switch quickly to OFF and ON again (called a “quick reset”) may not clear the fault.

Section 3
Torch Setup

Introduction

The Powermax30 AIR includes the Air T30 hand torch. This section explains how to set up and operate your torch. To achieve optimal consumable life and cut quality, follow the instructions in this manual.

Hand torch components



1 Handle
2 Deflector
3 Retaining cap
4 Safety catch
5 Trigger (red)
6 Screws (5)

Consumable life

Consumable life varies based on the following factors:

- Thickness of the metal.
- Length of the average cut.
- Type of cutting (piercing decreases life when compared to edge cutting).
- Pierce height (stretching the arc).
- Whether you are cutting solid metal or expanded metal. Cutting expanded metal wears out consumables more quickly. For more information, see *Cutting expanded metal* on page 45.

Hypertherm does not recommend the use of any other consumables in the Air T30 torch except for those listed in this section, which are designed specifically for this system. The use of any other consumables could adversely affect system performance.

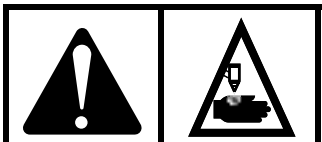
Although largely dependent on the factors listed above, as a general rule, the consumables last approximately 1 to 2 hours of actual “arc on” time.

If the consumables’ life is shorter than expected or the cut quality is poor, make sure that you are using the correct consumables and that they are properly installed. (See the following topic, *Consumable use*.) Under normal conditions, the nozzle wears out first.

For optimal cutting performance, always replace the nozzle and the electrode together.

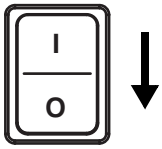
See *Hand torch operation* on page 50 for more information about proper cutting techniques.

Consumable use



WARNING!

INSTANT-ON TORCHES
PLASMA ARC CAN CAUSE INJURY AND BURNS



The plasma arc ignites immediately when you pull the torch trigger. Make sure the power is OFF before changing consumables.

The hand torch ships with a complete set of consumables installed. The consumables are designed for a broad range of cutting applications.

The amperage output setting you need to use depends on the thickness of the metal you are planning to cut and is limited by the input power to your system. See *Voltage configurations* on page 27.

Do not use any other consumables in the Air T30 torch except for those listed in this section, which are designed specifically for this system. The use of any other consumables could adversely affect system performance.

Using the cut charts

Use the following cut charts to guide you in selecting the cutting current (amperage) based on the thickness and type of the metal you need to cut.

The maximum cut speeds listed in the cut charts are the fastest possible speeds to cut metal without regard to cut quality. Adjust the cutting speed for your application to obtain the desired cut quality.

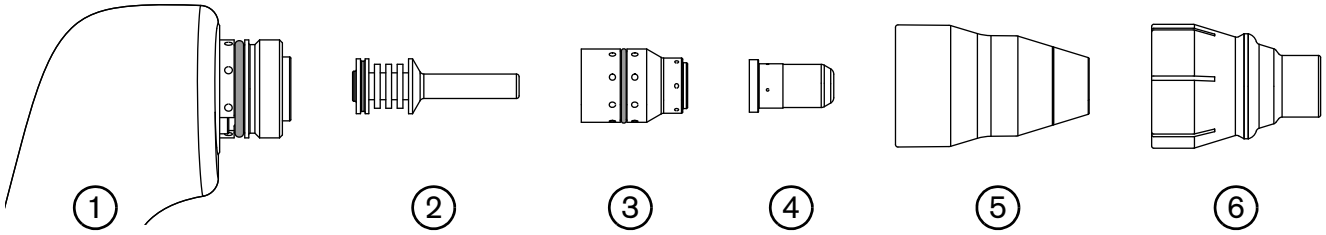
Consumable set

A complete set of consumables includes:

- Electrode
- Swirl ring
- Nozzle
- Retaining cap
- Deflector

The following consumables are designed specifically for use with the Powermax30 AIR power supply and Air T30 hand torch. They cannot be used with any other Powermax system or torch.

Hypertherm does not recommend operating this system on a 120 V / 15 A circuit.



1 Torch
2 Electrode
3 Swirl ring
4 Nozzle
5 Retaining cap
6 Deflector

240 V / 30 A cutting

Metric

Material thickness (mm)	Material	Arc current (A)	Maximum cut speed (mm/minute)
1	Mild steel	30	10,160†
2			5,145
3			2,545
4			1,450
5			1,155
7*			570
9*			400
11*			280
13*			215
16*			125
1	Stainless steel	30	10,160†
2			3,290
3			1,970
4			1,260
5			980
7*			535
9*			310
11*			215
13*			170
1	Aluminum	30	10,160†
2			6,630
3			3,585
4			2,370
5			1,770
7*			575
9*			435
11*			245
13*			135

* To cut material thicker than 6 mm (1/4 inch) at 240 V, start the torch at the edge of the workpiece.

† Maximum cut speed is limited by the test table's maximum speed (10,160 mm/minute or 400 inches/minute).

English

Material thickness (gauge/inches)	Material	Arc current (A)	Maximum cut speed (inches/minute)
18 gauge	Mild steel	30	395
14 gauge			214
12 gauge			130
10 gauge			64
1/4			30
5/16*			22
3/8*			13
1/2*			9
5/8*			5
18 gauge	Stainless steel	30	370
14 gauge			135
10 gauge			56
1/4			24
3/8*			10
1/2*			7
1/32	Aluminum	30	400†
1/16			306
1/8			111
1/4			38
3/8*			13
1/2*			6

* To cut material thicker than 6 mm (1/4 inch) at 240 V, start the torch at the edge of the workpiece.

† Maximum cut speed is limited by the test table's maximum speed (10,160 mm/minute or 400 inches/minute).

120 V / 20 A cutting

Metric

Material thickness (mm)	Material	Arc current (A)	Maximum cut speed (mm/minute)
1	Mild steel	20	6,540
2			2,420
3			1,245
4*			680
6*			400
8*			235
10*			90
1	Stainless steel	20	3,295
2			2,140
3			1,270
4*			965
5*			660
7*			150
1	Aluminum	20	5,500
2			3,610
3			1,720
4*			1,030
5*			740
7*			165

* To cut material thicker than 3 mm (10 gauge) at 120 V, start the torch at the edge of the workpiece.

English

Material thickness (gauge/inches)	Material	Arc current (A)	Maximum cut speed (inches/minute)
18 gauge	Mild steel	20	220
14 gauge			100
10 gauge			30
1/4*			14
3/8*			5
18 gauge	Stainless steel	20	120
14 gauge			89
12 gauge			54
1/4*			10
1/32	Aluminum	20	231
1/16			170
1/8			49
1/4*			14

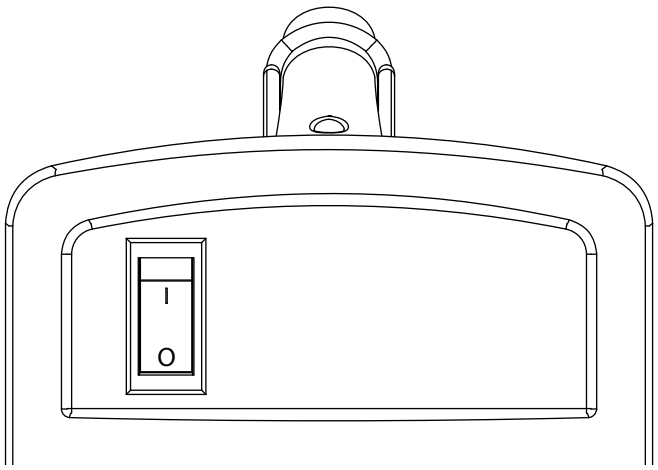
* To cut material thicker than 3 mm (10 gauge) at 120 V, start the torch at the edge of the workpiece.

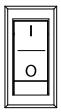
Section 4
Operation

Controls and indicators

Familiarize yourself with the controls and LED indicators on the system before you begin cutting.

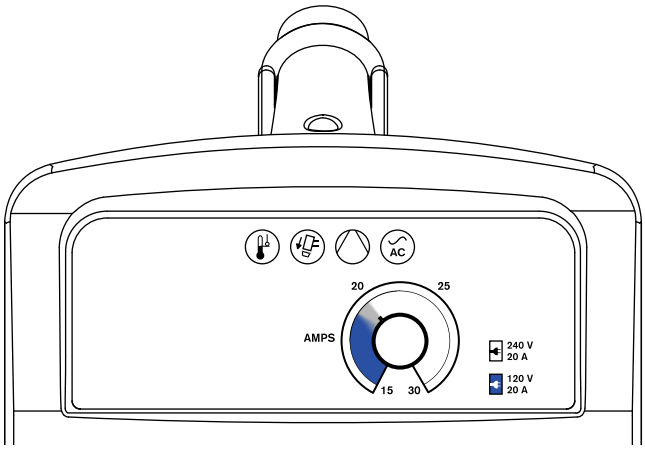
Rear controls





ON (I) / OFF (O) power switch
Activates the system and its control circuits.

Front panel controls and indicator LED symbols



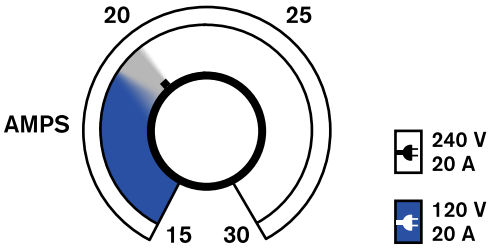
Power ON LED (green) – When illuminated, this LED indicates that the power switch has been set to ON (**I**) and that the safety interlocks are satisfied.

Internal compressor LED (yellow) – When illuminated, this LED indicates a possible issue with the internal air compressor.

Torch cap LED (yellow) – When illuminated, this LED indicates that the consumables are loose, improperly installed, or missing.

Temperature LED (yellow) – When illuminated, this LED indicates that the system's temperature is outside the acceptable operating range.

Some fault conditions cause multiple LEDs to illuminate or blink at the same time. For information on what these fault conditions are and how to clear them, see *Troubleshooting guide* on page 63.

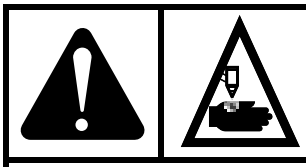
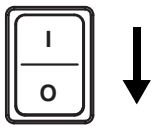


Amperage adjustment knob – Use this knob to set the output current between 15 A and 30 A.

Operate the plasma system

The following topics explain how to begin cutting with the plasma system.

Step 1 – Install the consumables

	**WARNING!** **INSTANT-ON TORCHES** **PLASMA ARC CAN CAUSE INJURY AND BURNS**
	**The plasma arc ignites immediately when you pull the torch trigger. Make sure the power is OFF (O) before changing consumables.**

Before operating the plasma system and hand torch, first make sure:

1. The power switch on the power supply is in the OFF (**O**) position.
2. A complete set of consumables is installed on the hand torch as shown:

   ① Electrode

   ② Swirl ring

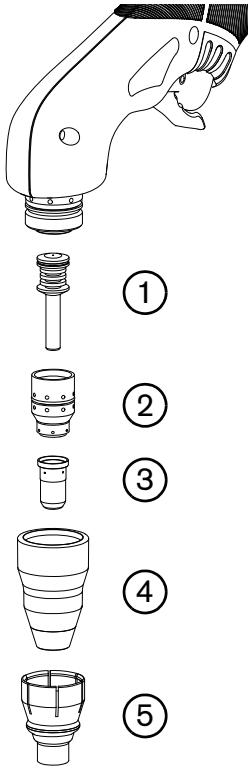
   ③ Nozzle

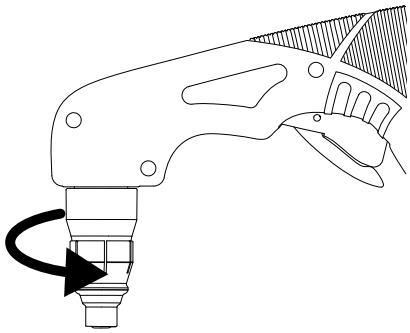
   ④ Retaining cap

   ⑤ Deflector*

* *Install the deflector by snapping it securely into place on the retaining cap.*

Do not apply grease or other lubricants to the O-rings on the electrode and swirl ring.



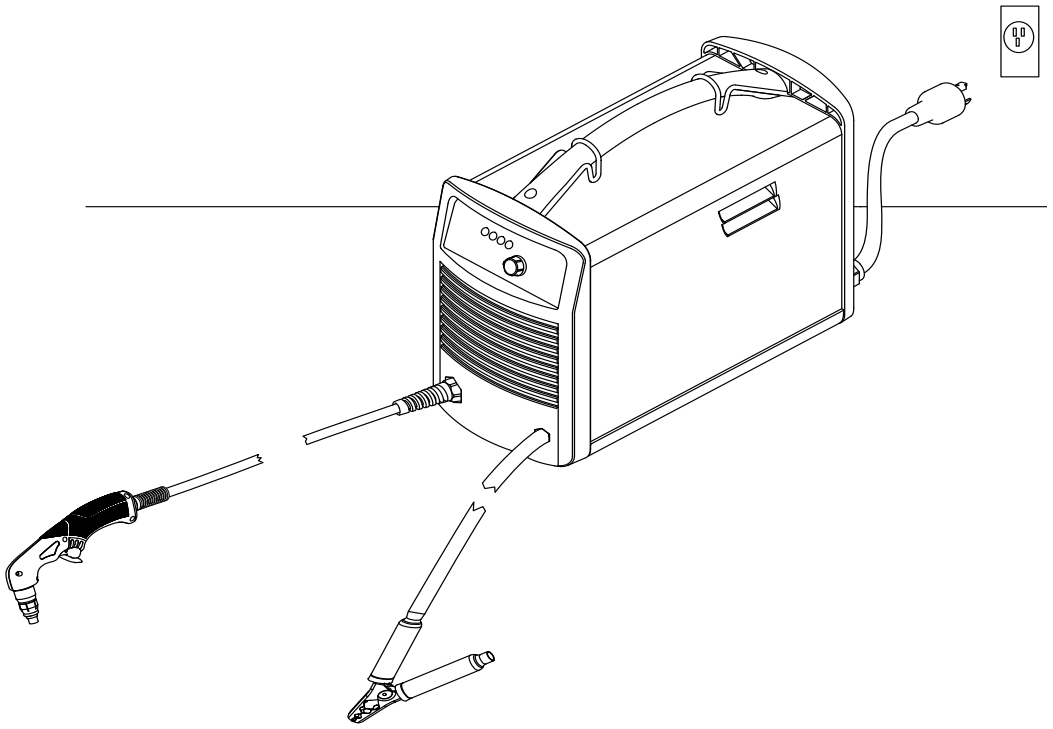


Tighten only to finger tight.

These consumables are designed specifically for the Powermax30 AIR power supply and Air T30 hand torch. They cannot be used with any other Powermax system or torch.

Step 2 – Connect the electrical power

Plug in the power cord.



See also

- For information on connecting the proper plug to the power cord, see *Power cord considerations* on page 29.
- To understand what cutting capacity to expect based on input voltage, see *Consumable use* on page 35.
- For information on electrical requirements for this system, see *Power Supply Setup* on page 25.

Step 3 – Adjust the output current

The power ON LED illuminates when the system is powered ON and ready to operate.

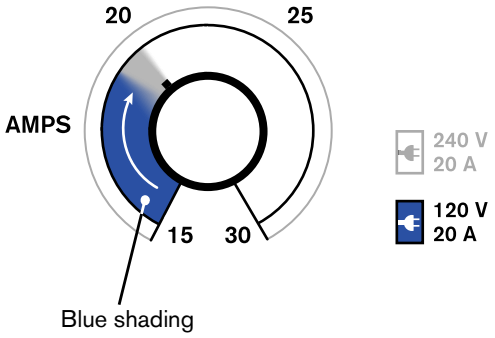
If any of the other LEDs illuminate or blink, do not try to cut – a fault has occurred. Refer to *Internal compressor LED faults* on page 66 for a list of troubleshooting steps to follow.

When the system is ready to cut, turn the amperage knob to the desired output current based on the input voltage and circuit size.

Operating the system on a 120 V / 20 A circuit

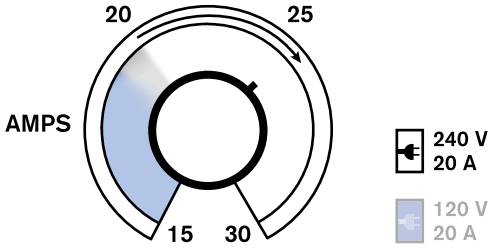
- Set the amperage below 20 A, as indicated by the blue shading around the knob (the thick inner ring).
- Make sure nothing else is drawing power from the circuit.

Hypertherm does not recommend operating this system on a 120 V / 15 A circuit.



Operating the system on a 240 V / 20 A circuit

- Set the amperage between 15 – 30 A.



Decrease output current for lower-rated power plugs

If you are operating the system using a lower-rated power plug or service, turn down the output current to avoid tripping the circuit breaker.

For example, to operate the system on a 230 V / 16 A circuit, set the amperage below 28 A.

See *Voltage configurations* on page 27 for more information.

Cutting expanded metal

Use the consumables that come with the torch to cut expanded metal. (Expanded metal has a slotted or mesh pattern.) The system does not require a dedicated mode for cutting expanded metal.

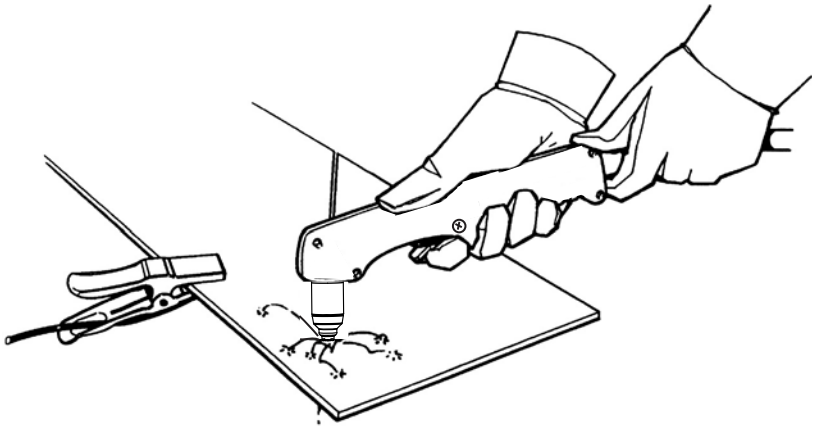
Cutting expanded metal wears out consumables more quickly because it requires a continuous pilot arc. A pilot arc occurs when the torch is fired but the plasma arc is not in contact with the workpiece.

For best results, operate on a higher rated circuit (240 V / 20 A).

Step 4 – Attach the ground clamp

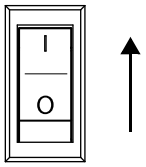
Attach the ground clamp to the workpiece.

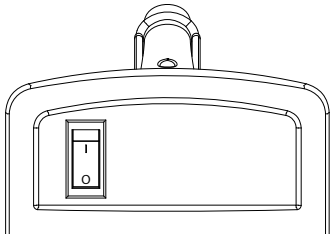
- Make sure the ground clamp and the workpiece make good metal-to-metal contact.
- Attach the ground clamp as close as possible to the area being cut to reduce exposure to electric and magnetic fields (EMF) and to achieve the best possible cut quality.
- **Do not attach the ground clamp to the portion of the workpiece that you are cutting away.**



Step 5 – Power ON the system

Set the ON/OFF switch to the ON (**I**) position.

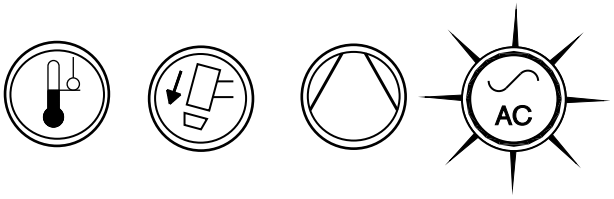




Step 6 – Check the indicator LEDs

Make sure the green power ON LED on the front of the power supply is illuminated and that none of the other LEDs are illuminated or blinking.

If the temperature, torch cap sensor, or internal compressor LEDs illuminate or blink, or if the power ON LED blinks, this indicates a fault. Correct the fault condition before continuing. See *Troubleshooting guide* on page 63 for more information.



Step 7 – Make sure the system is ready, and start cutting

When the power ON LED illuminates, none of the other LEDs illuminate or blink, and the amperage knob is set, the system is ready for use.

What to expect during and after cutting

Water at the torch nozzle

- A small amount of moisture at the torch nozzle is normal for this system, particularly in very humid environments. It should not prevent the torch from firing or degrade cut quality or performance.

Postflow

- After you complete a cut and release the torch trigger, air continues to flow from the torch in order to cool the consumables. This is referred to as *postflow*.
- The length of postflow depends on how long the torch fired a sustained arc:

Length of time arc was sustained	Length of postflow
0 – 5 seconds	5 seconds
> 5 – 21 seconds	10 seconds
> 21 – 135 seconds	15 seconds
> 135 seconds	20 seconds

Internal compressor and fan activity

- The internal compressor runs while you are cutting, and it continues to run during postflow.
- The fan inside the power supply runs for 7 minutes after postflow. It also runs intermittently during cutting.

Water under the power supply

- When cutting, you may see a small puddle form underneath the power supply because the system automatically purges excess moisture from the internal compressor. It expels this water through a hole in the bottom of the power supply.

Understand duty-cycle limitations

The duty cycle is the percentage of time out of 10 minutes that a plasma arc can remain on when operating at an ambient temperature of 40°C (104°F).

- **35% duty cycle at 240 V / 30 A:** With input power of 240 V and the output current set to 30 A, the arc can remain on for 3.5 minutes out of 10 minutes without causing the unit to overheat.
- **20% duty cycle at 120 V / 30 A*:** With input power of 120 V and the output current set to 30 A, the arc can remain on for 2.0 minutes out of 10 minutes without causing the unit to overheat.

* Although the duty cycle is rated for 30 A output, the recommended output current for 120 V circuits is 20 A or less. Operating the system at 30 A on 120 V input can result in frequent tripped circuit breakers.

When you exceed the duty cycle and the system overheats, one of the following conditions occurs:

- The temperature LED illuminates, the arc shuts off, and the cooling fan continues to run. To resume cutting, wait for the temperature LED to extinguish.
- The internal compressor LED and the temperature LED both illuminate. Allow the power supply to cool for 4 minutes before using it again. If the problem persists, see *Internal compressor LED faults* on page 66 for more troubleshooting tips.

When either condition occurs, leave the system on to allow the fan to cool the power supply. The fan runs for 7 minutes after postflow.

Stretching the arc for prolonged periods while cutting can reduce the duty cycle. Stretching the arc requires the power supply to generate a higher voltage output, which can cause it to run hotter and overheat more quickly.

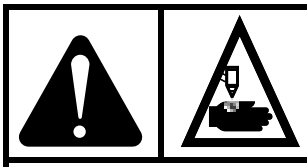
System operation guidelines

- To achieve the highest level of performance:
  - Operate the system at an input power of 240 VAC whenever possible.
  - Do not operate the system on a 120 V / 15 A circuit.
  - Avoid using an extension cord whenever possible.

    If you must use an extension cord, use a heavy conductor cord of the shortest possible length. See *Extension cord recommendations* on page 31.

- If you are operating your system on a 120 V / 20 A circuit, do not set the amperage higher than 20 A. See *Voltage configurations* on page 27.
- For best results when operating your system on a 120 V / 20 A circuit:
  - Do not connect anything else that will draw power from the same circuit.
  - Be aware that extension cords can reduce the voltage to the machine from what is output by the circuit. This reduction in power can impair cutting performance and increase the probability of tripping the circuit breaker.
- Cutting a thicker workpiece requires a higher amperage setting. It is preferable to operate on a higher rated circuit (240 V / 30 A) when cutting thicker metal. See *Voltage configurations* on page 27.
- Additional techniques to reduce the frequency of tripped circuit breakers include:
  - Turn down the amperage adjustment knob.
  - Avoid stretching the arc. Instead, drag the torch on the workpiece as explained in *Edge start on a workpiece* on page 52.
- When you operate the system at altitudes higher than 2,200 m (7,500 feet) above sea level, you may experience some reduction in cutting performance due to the adverse effect that altitude has on the internal air compressor.

Hand torch operation



WARNING!

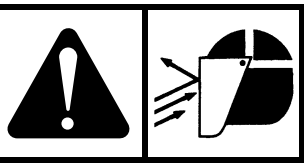
INSTANT-ON TORCHES
PLASMA ARC CAN CAUSE INJURY AND BURNS

Plasma arc ignites immediately when you pull the torch trigger. The plasma arc cuts quickly through gloves and skin.

Keep hands, clothes, and objects away from the torch tip.

Do not hold the workpiece, and keep your hands clear of the cutting path.

Never point the torch toward yourself or others.



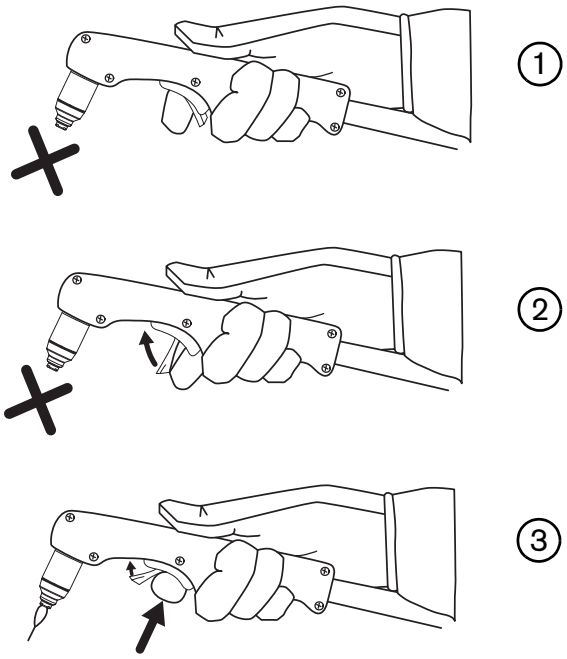
WARNING!

SPARKS AND HOT METAL
CAN INJURE EYES AND BURN SKIN

Always wear proper protective equipment including gloves and eye protection, and point the torch away from yourself and others. Sparks and hot molten metal spray out from the nozzle.

Safety catch operation

The torch is equipped with a safety catch to prevent accidental firings. When you are ready to cut with the torch, flip the safety catch forward (toward the torch head) and pull the red torch trigger.

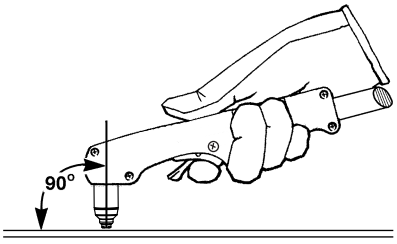


Hand torch cutting guidelines

- Drag the torch tip lightly on the workpiece to maintain a steady cut speed.

  With drag-cutting, it is normal to experience the torch sticking slightly to the workpiece.

- While cutting, make sure that sparks exit from the bottom of the workpiece. The sparks should lag slightly behind the torch as you cut (15° – 30° angle from vertical).
- If sparks spray up, you are not cutting all the way through the workpiece. Move the torch more slowly, or, if possible, increase the output current.
- Hold the torch nozzle perpendicular to the workpiece so that the nozzle is at a 90° angle to the cutting surface, and watch the arc as it cuts along the line.

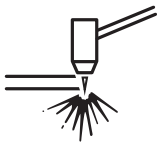


- Pulling the torch toward you along the cut is easier than pushing it or moving from side-to-side.
- For straight-line cuts, use a straight edge as a guide. To cut circles, use a template or a radius cutter attachment (a circle cutting guide). See *Accessory parts* on page 218 for the Hypertherm plasma cutting guide part numbers for cutting circles and making bevel cuts.
- If you fire the torch unnecessarily, you shorten the life of the nozzle and electrode.

Recommendations for cutting at 120 V

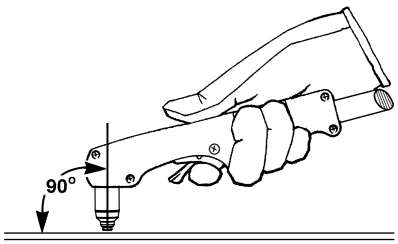
- Do not operate the system on a 15 A circuit.
- Do not use an extension cord.
- Make sure nothing else is drawing power from the circuit.
- Turn down the current adjustment knob to avoid tripping the breaker.

Edge start on a workpiece

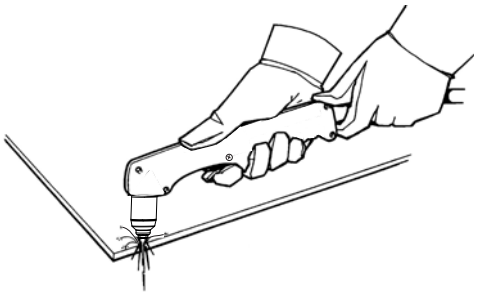


When cutting material up to 10 mm (3/8 inch) thick, start the torch at the edge of the workpiece to prolong consumable life.

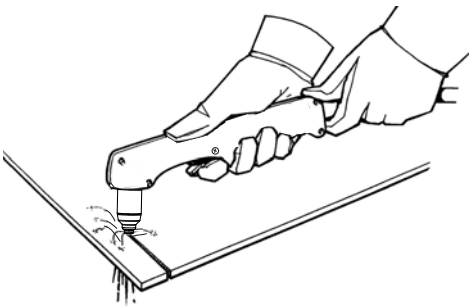
1. With the ground clamp attached to the workpiece, hold the torch perpendicular (90°) to the workpiece and on the edge.



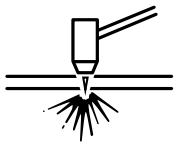
2. Pull the torch trigger to start the arc. You may need to pause at the edge until the arc has cut completely through the workpiece.



3. Drag the torch lightly across the workpiece to proceed with the cut. Maintain a steady, even pace.



Pierce a workpiece



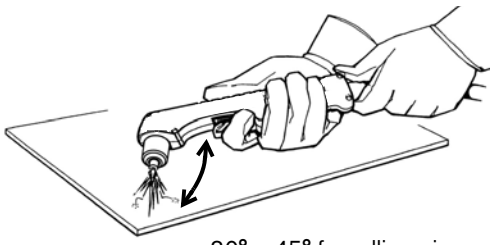
When cutting material up to 6 mm (1/4 inch) thick, use piercing to cut an interior feature. Piercing shortens the life of the deflector and the nozzle.

The type of pierce to perform depends on the thickness of the metal:

- **Straight pierce** – For cutting mild or stainless steel that is thinner than 3 mm (10 gauge).
- **Rolling pierce** – For cutting mild or stainless steel that is 3 mm (10 gauge) or thicker.

1. Attach the ground clamp to the workpiece.
2. **Straight pierce:** Hold the torch perpendicular (90°) to the workpiece with the torch tip just above the workpiece.

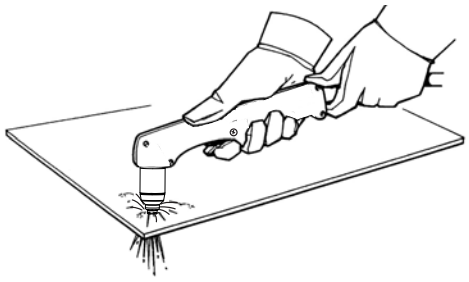
   Rolling pierce: Hold the torch at an approximate 30° – 45° angle to the workpiece with the torch tip within 1.5 mm (1/16 inch) of it before firing the torch.



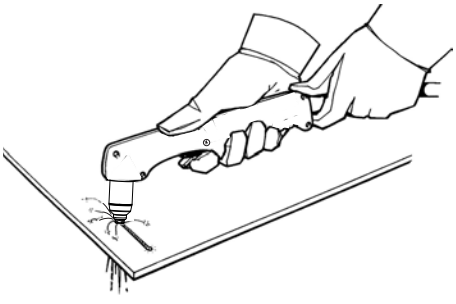
30° – 45° for rolling pierce

3. **Straight pierce:** Pull the torch trigger to start the arc.

   Rolling pierce: Pull the torch trigger to start the arc while still at an angle to the workpiece, then rotate the torch to the perpendicular (90°) position.
4. Hold the torch in place while continuing to pull the trigger. When sparks exit from the bottom of the workpiece, the arc has pierced the metal.



5. When the pierce is complete, drag the torch lightly along the workpiece to proceed with the cut.



Common hand-cutting faults

For more information on faults, see *Troubleshooting guide* on page 63.

- The torch sputters and hisses, but does not produce an arc. The cause can be:
  - Overtightened consumables
- The torch does not cut completely through the workpiece. The causes can be:
  - Cut speed is too fast
  - Worn consumables
  - Metal being cut is too thick for the selected amperage
  - Installation of the wrong consumables
  - Poor electrical contact between the ground clamp and the workpiece
- Cut quality is poor. The causes can be:
  - Metal being cut is too thick for the selected amperage
  - Installation of the wrong consumables
  - Cut speed is too fast or too slow
  - Worn or damaged consumables
- The arc sputters and consumables life is shorter than expected. The causes can be:
  - Incorrect installation of the consumables
  - Installation of the wrong consumables
  - Moisture in the consumables or in the air supply within the system

Minimizing dross

Dross is the molten metal that solidifies on the workpiece. Some amount of dross is always present when cutting with air plasma. However, you can control the amount and type of dross by adjusting your system correctly for your application.

Low-speed dross forms when the torch's cutting speed is too slow and the arc shoots ahead. It forms as a heavy, bubbly deposit at the bottom of the cut and is usually easy to remove. Increase your speed to reduce this type of dross.

High-speed dross forms when the cutting speed is too fast and the arc lags behind. It forms as a thin, linear bead of solid metal attached very close to the cut. It forms to the bottom of the cut and is often more difficult to remove. Decrease your speed to reduce this type of dross.

Dross is more likely to form on warm or hot metal than on cool metal. For example, the first cut in a series of cuts is likely to produce the least dross. As the workpiece heats up, more dross may form on subsequent cuts.

Worn or damaged consumables may produce intermittent dross.

Section 5

Troubleshooting and System Tests

Theory of operation

Functional description

AC power enters the system through the power switch (S1) to the input diode bridges (D24, D30). The voltage from the diode bridges supplies the power factor correction (PFC) boost converter, which provides a nominal 375 VDC bus voltage. The bus voltage then supplies voltage and current to the inverter, the flyback circuit power supply (DC to DC converter) on the power board (PCB2), and the compressor-driver board (DC to DC converter). The power board provides noise suppression and spike protection. A “soft start” is implemented via the power board resistor and relay (K1).

The compressor-driver board (PCB3) converts 375 VDC bus voltage from the power board to nominal 15 VDC through a DC to DC converter. The compressor-driver board supplies 15 VDC to power the internal air compressor.

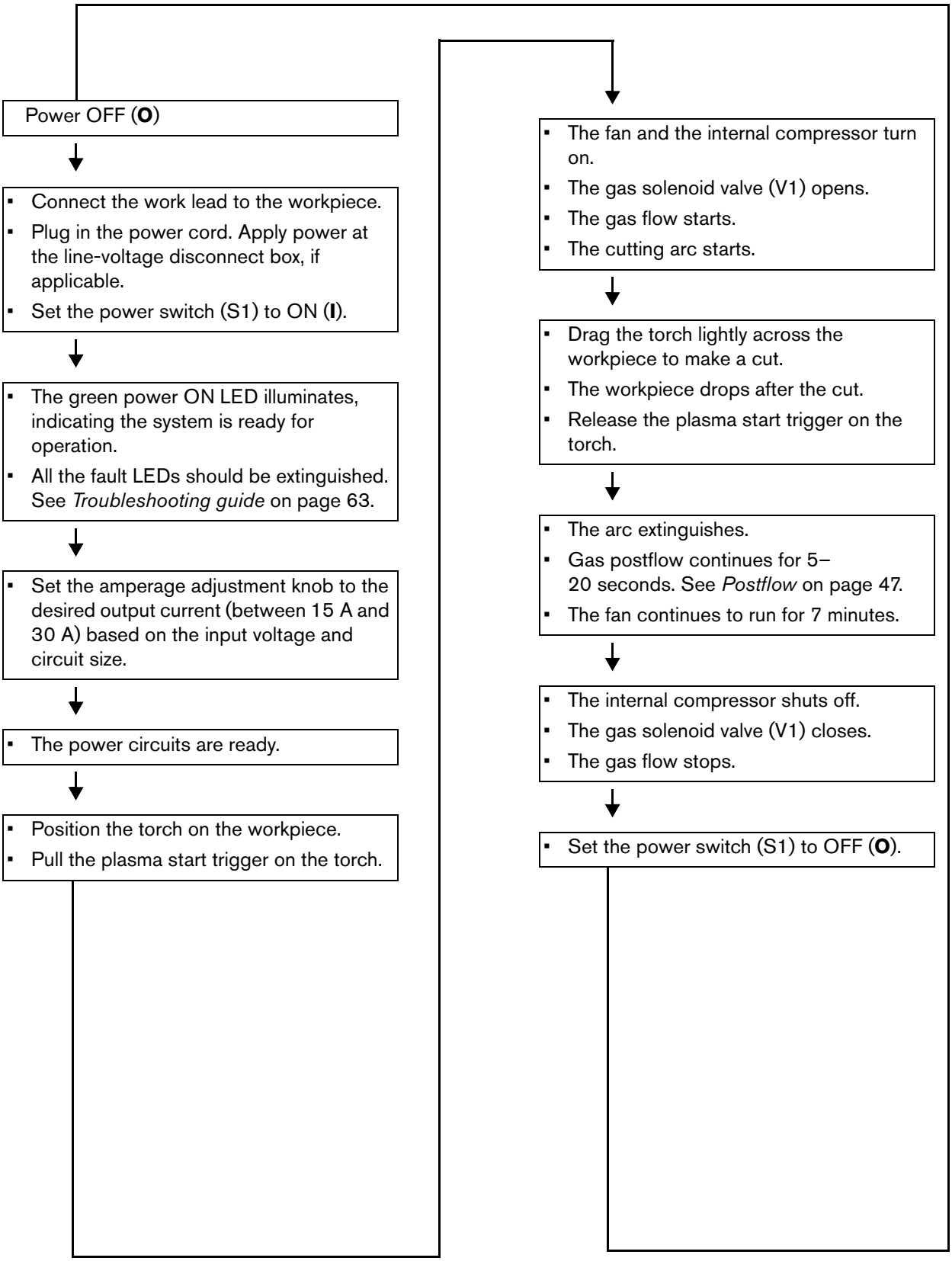
The PFC boost converter consists of an insulated gate bipolar transistor IGBT (Q1), choke, and control circuit. It provides a 375 VDC bus voltage when the input AC voltage is between 120 and 240 VAC.

The inverter consists of an IGBT (Q2), the power transformer, a current-sense transformer, and sections of the power board. The inverter operates as a pulse-width modulator-controlled bridge circuit that is rectified by the output diode (D27).

The output circuitry consists of two current sensors located on the power board, the pilot arc IGBT (inside the D27 module), and the output choke.

The control board’s microprocessor monitors and regulates the system’s operation and safety circuits. The amperage adjustment knob sets the output current to the desired value between 15 A and 30 A. The system compares the set-point to the output current by monitoring the current sensor and adjusting the pulse-width output of the inverter IGBT (Q2).

Sequence of operation



Troubleshooting preparation

The complexity of the circuits requires 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 team listed in the front of this manual.

	**WARNING!**
	**ELECTRIC SHOCK CAN KILL** **Turn OFF (O) the power and disconnect the electrical power before removing the cover from the power supply. If the power supply is connected directly to a line disconnect box, switch the line disconnect to OFF (O). In the U.S., use a "lock-out / tag-out" procedure until the service or maintenance work is complete. In other countries, follow appropriate national or local safety procedures.** **Do not touch live electrical parts! Do not touch the tip of the nozzle when the system is powered ON (I)! If power is required for servicing, use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the power supply that can cause serious injury or death.** **Do not attempt to repair the power board, control board, or compressor-driver board. Do not cut away or remove any protective conformal coating from these boards. To do so risks a short circuit between the AC input circuit and the output circuit and may result in serious injury or death.**
	**HOT PARTS CAN CAUSE SEVERE BURNS** **Allow the power supply to cool before servicing.**
	**MOVING BLADES CAN CAUSE INJURY** **Keep hands away from moving parts.**
	**STATIC ELECTRICITY CAN DAMAGE CIRCUIT BOARDS** **Put on a grounded wrist strap before handling printed circuit boards.**

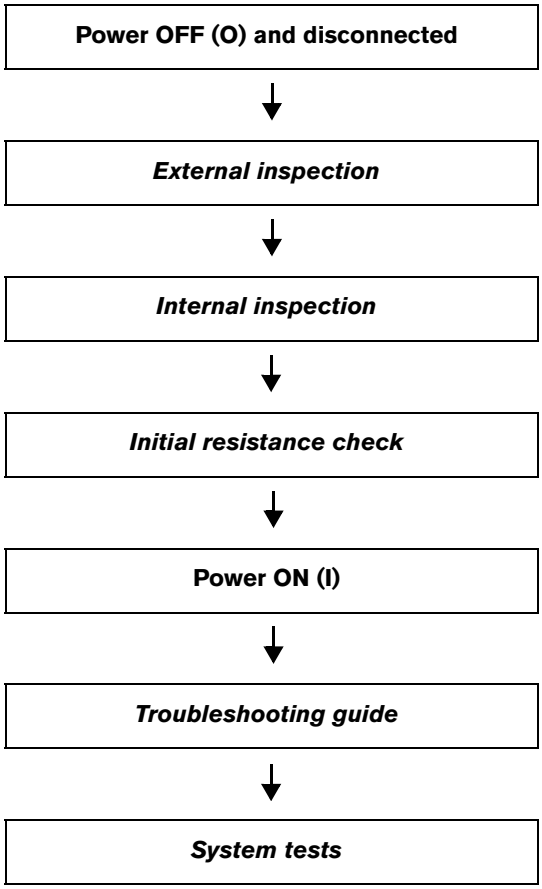
Test equipment

- Multimeter with a variety of test leads, including test hooks.
- Air pressure test gauge (kit 428643) to troubleshoot pressure-related issues.

Troubleshooting procedures and sequence

When performing the troubleshooting procedures, refer to:

- *Safety and Compliance Manual* (80669C) for detailed safety information.
- *Powermax30 AIR schematic* on page 228 for the system's electrical schematic.
- *Power Supply Component Replacement* on page 103 or *Torch Component Replacement* on page 191 for replacement procedures.
- *Parts* on page 207 for power supply components and torch components.



After the problem has been located and repaired, refer to *Sequence of operation* on page 56 to test the power supply for proper operation.

External inspection

1. Inspect the exterior of the power supply for damage to the cover and external components, such as the power cord and plug.
2. Inspect the torch and the torch lead for damage.
3. Inspect the consumables for damage or wear.
4. Repair or replace components as necessary.

Internal inspection

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the power supply handle and cover. See *Remove the power supply cover* on page 104.
3. Remove the component barrier. See *Remove the component barrier* on page 106.
4. Inspect the inside of the power supply:
   - Power board side: Look for broken or loose wiring connections, burn and char marks, damaged components, and so on.
   - Fan side: Check for leaks and loose connections at each pneumatic (air) connection point on the internal compressor, air filter, and solenoid valve.
5. Repair or replace components as necessary.

Initial resistance check

All resistance values must be taken with the power cord disconnected and all internal power supply wires attached. Perform the steps in *Internal inspection* (above) before continuing in this section.

- The type of multimeter you use significantly affects the results of the tests in this section. The resistance values in this manual are intended as a general reference point.
- If resistance values indicate a problem based on the range of values provided in this section, isolate the problem by removing wires attached to the resistance check points or component until the problem is found.
- After the problem is located and repaired, see *Sequence of operation* on page 56 to test the power supply for proper operation.

Check the power switch

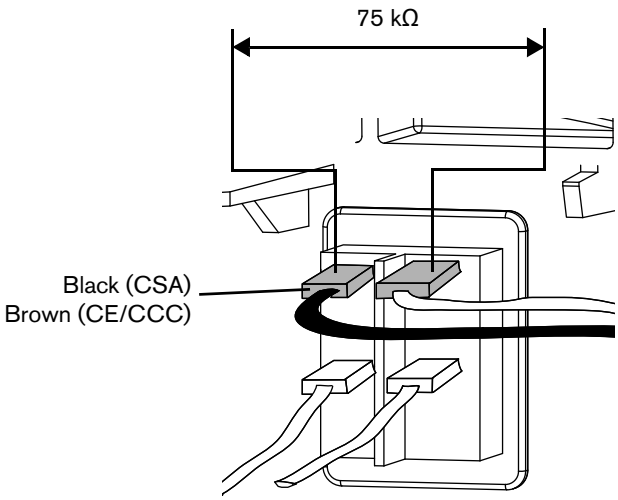
1. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and then set the power switch to ON (**I**).

2. Check the resistance across the input leads. The resistance should read as approximately 75 kΩ.

3. Check the resistance from the input leads to ground to make sure it reads as open. For all power supplies, the resistance from input to ground should read as > 20 MΩ.

   With the electrical power disconnected and the power switch set to OFF (**O**), all circuits should read as open.

   The electrical value shown is ±25%. However, this range is intended only for reference. Resistance values can vary widely depending on the type of multimeter and the polarity used to measure the readings.



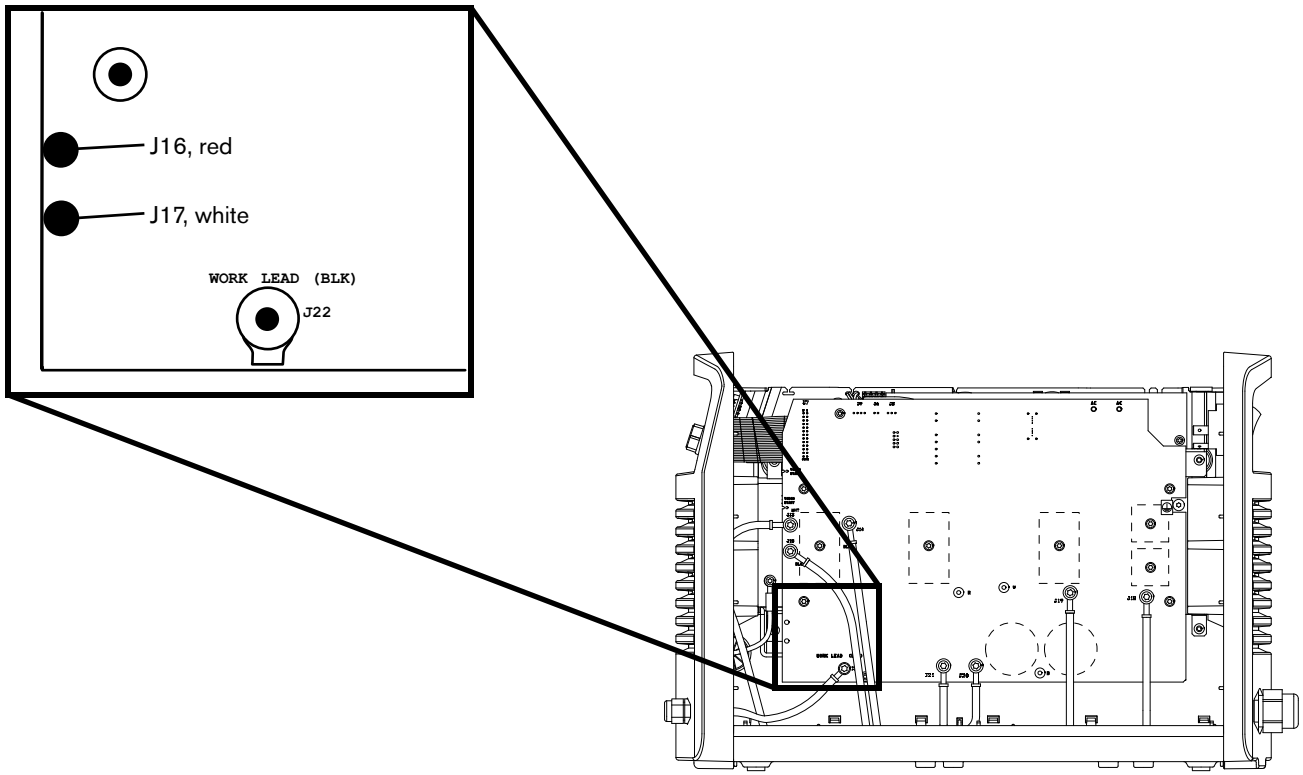
4. **Remove the consumables from the torch.** If you do not remove the consumables, the resistance values will not read correctly.

5. Check the output resistance for the values shown in the following table.

   J16 and J17 are labeled on the component side of the power board. See *Figure 1* for locations on the back side of the power board.

Measure resistance from (with consumables removed)	Approximate values
Work lead (J22) to nozzle (J16, red wire)	100 kΩ
Work lead (J22) to electrode (J17, white wire)	20 kΩ
Electrode (J17, white wire) to nozzle (J16, red wire)	120 kΩ
Work lead (J22), nozzle (J16, red wire), and electrode (J17, white wire) to ground	> 20 MΩ

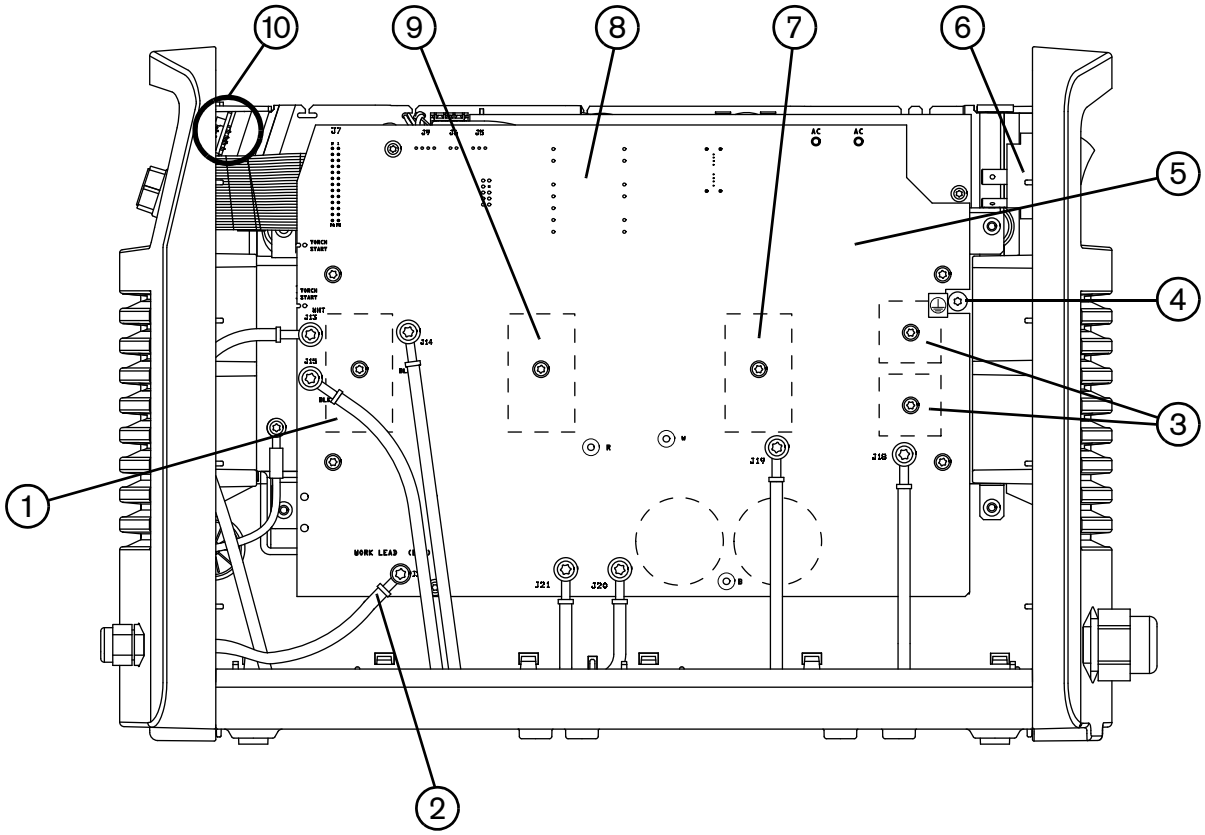
Figure 1



6. If you do not find any problems during the visual inspection or the initial resistance check, and the power supply is still not operating correctly, see *Troubleshooting guide* on page 63.

Power supply overview

Figure 2 – Power board side of power supply



1. Output diode and pilot arc IGBT module (D27)
2. Work lead connection (J22)
3. Input diode bridges (D24, D30)
4. PE (ground)
5. Power board (PCB2)
6. Power switch (S1)
7. PFC IGBT (Q1)
8. Flyback circuit
9. Inverter IGBT (Q2)
10. Control board (PCB1)

Troubleshooting guide

This guide provides the most common causes and solutions.

- Before troubleshooting, study the *Powermax30 AIR schematic* on page 228 and understand the *Theory of operation* on page 55.
- Before purchasing any major replacement component, verify the problem with Hypertherm Technical Service or the nearest Hypertherm repair facility listed in the front of this manual.
- See *System tests* on page 75 for detailed test procedures.

Power LED faults

The ON/OFF power switch is set to ON (I), but the power ON LED does not illuminate.

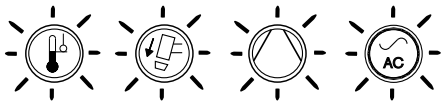
Possible causes	Possible solutions
❑ The system has no incoming voltage or an improper incoming voltage. ❑ The power cord, power switch, or power board is faulty.	❑ Make sure the electrical power is connected to an appropriately sized circuit. ❑ Make sure the system did not trip the circuit breaker. ❑ Perform *Test 1 – voltage input* on page 80.

The power ON LED illuminates, but no fault LEDs illuminate, and no gas flows when you pull the torch trigger.

Possible causes	Possible solutions
❑ The start signal is not reaching the control board due to: ● Damaged torch or torch lead ● Faulty power board OR ● Faulty control board	❑ Inspect the torch and torch lead, and replace if necessary. ❑ Make sure the control board start LED illuminates when you pull the torch trigger. If it does not, perform *Test 6 – plasma start* on page 89.

The power ON LED blinks.

Possible cause	Possible solution
❑ The incoming voltage is below 90 VAC or above 285 VAC.	❑ Perform *Test 1 – voltage input* on page 80.



All four LEDs blink when the system is powered ON.

Possible causes	Possible solutions
❑ A major fault has occurred in the power supply. For example, the fan, solenoid valve, control board, or power board may be faulty.	❑ The error LED on the control board should be blinking. The number of times it blinks between pauses indicates which components to test. See *Control board LEDs* on page 73.

Temperature LED faults

 **The temperature LED illuminates while the machine is powered ON.**	
Possible causes	**Possible solutions**
❑ The system overheated because the duty cycle was exceeded. ❑ The system is too cold to operate. The ambient temperature is too low.	❑ Let the system cool before using it. Leave the system on to allow the fan to cool the power supply. The fan runs for 7 minutes after postflow. See *Understand duty-cycle limitations* on page 48. ❑ Perform *Test 8 – fan* on page 92. ❑ Let the system warm up before using it. The operating temperature range for this system is -10°C (14°F) to 40°C (104°F).

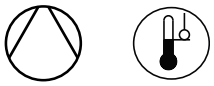
 **The temperature LED blinks while the machine is powered ON.**	
Possible causes	**Possible solutions**
This fault occurs when the system continuously draws too much input current for too long. The fault protects the power switch and power cord from damage caused by overheating. This fault most often occurs when: ❑ You are operating the system on a 120 VAC input circuit and the cutting current is set above 20 A. ❑ You are operating the system on a 120 V / 15 A circuit. ❑ You are operating the system on a 120 VAC input circuit and are frequently stretching the arc while cutting. ❑ You are using an extension cord that is too long. The maximum length for an extension cord on a 120 VAC input circuit is 16 m (53 feet). The maximum length for an extension cord on a 240 VAC input circuit is 40.5 m (133 feet).	Let the system cool for 3 minutes before using it. Leave the system on to allow the fan to cool the power supply. To prevent the fault from occurring: ❑ Operate the system on a 240 VAC input circuit whenever possible. ❑ Turn down the cutting current. See *Step 3 – Adjust the output current* on page 45. ❑ If you do operate the system on a120 VAC input circuit, use a 20 A circuit and set the cutting current below 20 A. ❑ Avoid stretching the arc. Drag the torch on the workpiece. See *Edge start on a workpiece* on page 52. ❑ Operate the system without using an extension cord. If you must use an extension cord, use a heavy conductor cord of the shortest possible length. See *Extension cord recommendations* on page 31.

Internal compressor LED faults

The internal compressor LED never illuminates by itself. It always illuminates with the temperature LED.

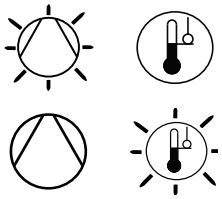
The internal compressor LED and the temperature LED illuminate while the machine is powered ON and the torch trigger is pulled.

Possible causes	Possible solutions
❑ The internal compressor overheated and turned off. You may have exceeded the duty cycle for the system. See *Understand duty-cycle limitations* on page 48.	**1. Allow the power supply to cool for 4 minutes. Leave the system on to allow the fan to cool the power supply. Then try to produce an arc by pulling the torch trigger.** When the internal compressor overheats, the compressor turns off, and the compressor and temperature LEDs remain illuminated for 4 minutes. The system does not prevent you from firing the torch before the 4 minutes elapses. However, if you begin cutting before the compressor has time to fully cool down, the same fault is likely to occur again. **If the fault LEDs persist, continue with the following troubleshooting steps in the order listed.**
❑ Environmental conditions or worn consumables are adversely affecting the power supply's performance.	**2.** Make sure the louvers in the cover are not blocked. Blocking the louvers in the cover can prevent proper air circulation needed to cool internal components. **3.** Place the power supply right-side up on a level surface. Do NOT lay the power supply on its side. Laying the power supply on its side can cause the air filter to divert air away from the torch. **4.** Inspect and replace the consumables if they are worn or damaged. Always replace the nozzle and electrode together. **5.** Was the system stored in temperatures below freezing? If so, ice might have formed in the air-flow system inside the power supply. Move the power supply to a warmer location to allow the ice to melt.



The internal compressor LED and the temperature LED illuminate while the machine is powered ON and the torch trigger is pulled.

Possible causes	Possible solutions
❑ The air inlet filter on the internal compressor is completely clogged. For the compressor's air inlet filter to trigger this LED fault, the filter would have to be so blocked that no air can flow through it.	**6.** Replace the compressor's air inlet filter. See *Replace the air inlet filter in the internal compressor* on page 171.
❑ One of the following internal components is faulty and needs to be replaced: • Internal compressor • Compressor-driver board • Power board	**7.** Systematically check the internal compressor, the compressor-driver board, and the power board to determine which component needs to be replaced. Perform *Test 9 – internal compressor, compressor-driver board, and power board* on page 93.



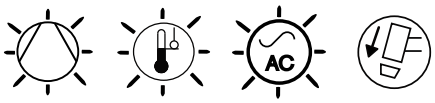
The internal compressor LED and the temperature LED blink alternately when the machine is powered ON.

Possible causes	Possible solutions
❑ The system was powered on with the torch trigger being pulled. ❑ The start circuit is stuck closed.	❑ Release the torch trigger and reset the system by turning it OFF (**O**) and then turning it ON (**I**) again. The system automatically disables itself when the power supply is turned on while the torch trigger is pulled. ❑ Perform *Test 6 – plasma start* on page 89.

Torch cap LED faults

 **The torch cap LED illuminates while the machine is powered ON.**	
Possible causes	**Possible solutions**
❑ The cap-sensing circuit is open due to: ● The consumables are loose, incorrectly installed, or missing. OR ● The cap-sensor switch, torch lead, or torch body is faulty.	❑ Make sure the consumables are installed correctly. ❑ Perform *Test 7 – torch cap-sensor* on page 91.

 **The torch cap LED blinks while the machine is powered ON.**	
Possible causes	**Possible solutions**
❑ The consumables are stuck in an open or closed position because they are installed incorrectly, worn, or damaged. ❑ The nozzle and electrode are not touching when the torch trigger is pulled. The torch plunger is stuck. ❑ The torch or torch lead has a broken or short-circuited wire.	❑ Inspect the torch lead. If it is twisted or kinked, straighten it out and try to fire the torch again. ❑ Make sure the consumables are installed correctly. See *Step 1 – Install the consumables* on page 43. ❑ Inspect the consumables for wear, and replace if necessary. Always replace the nozzle and electrode together. ❑ Perform *Test 5 – torch stuck open or torch stuck closed* on page 87.

 **The internal compressor, temperature, and power ON LEDs blink, and the torch cap LED illuminates.**	
Possible causes	**Possible solutions**
❑ The torch was repeatedly fired with worn out consumables. ❑ The inverter is saturated (is in an over-current condition).	❑ Install new consumables in the torch (they may be corroded or approaching end of life). ❑ If you continue to see this error, replace the power board. See *Replace the power board* on page 132.

Common cutting issues

Problem	Possible causes	Possible solutions
When you pull the torch trigger: ▪ Gas flows from the torch, but the torch does not fire or fires only for a short period of time. OR ▪ The pilot arc starts but then extinguishes before the normal 5-second timeout period.	▪ The consumables are worn or damaged. ▪ The torch or torch lead is damaged. ▪ The air filter element is dirty. ▪ There is a voltage imbalance on the power board. The power board may be faulty.	▪ Inspect the consumables, torch, and torch lead, and replace if necessary. ▪ Inspect the air filter element, and replace if necessary. See *Replace the air filter bowl and air filter element* on page 157. ▪ Perform *Test 3 – VBUS and voltage balance on power board* on page 84.
The arc goes out during cutting or intermittently will not fire.	▪ The work lead connection is poor. The work lead may be damaged or not properly connected to the workpiece.	▪ Inspect for loose connections at the ground clamp and at the power supply, and repair if necessary. ▪ Reposition the work lead on the workpiece. ▪ Clean the cutting surface to make a better connection with the work lead.
The pilot arc extinguishes when you move the plasma arc off the workpiece while still pulling the torch trigger.	▪ The consumables are worn or damaged. ▪ The system is connected to a generator and is running on low input voltage (for example, less than 100 V). ▪ The continuous pilot arc is not functioning correctly. The power board may be faulty.	▪ Inspect the consumables and replace if necessary. ▪ If you use a generator, make sure it is properly rated for this system. See *Generator recommendations* on page 31. ▪ Perform *Test 2 – power board voltage checks* on page 82 and *Test 3 – VBUS and voltage balance on power board* on page 84.

Problem	Possible causes	Possible solutions
Moisture exits the torch nozzle.	▪ **A small amount of moisture at the torch nozzle is normal for this system**, particularly in very humid environments. ▪ A larger amount of moisture at the torch nozzle may indicate that the air filter is not properly removing moisture from the system.	▪ A small amount of moisture should not prevent the torch from firing or degrade cut quality or performance. ▪ In case of excess moisture, examine the air filter inside the power supply. **It is normal to see water in the filter bowl.** The filter purges water when the water level in the bowl is high enough to engage the float mechanism. If the water level in the filter bowl is approximately half full (or more), the air filter may not be purging water properly. ▪ Make sure the drain hose connected to the bottom of the air filter bowl is not twisted or clogged. ▪ Water purged from the air filter exits through a hole in bottom of the of the power supply. Make sure this hole is not blocked. ▪ Replace the air filter bowl. See *Replace the air filter bowl and air filter element* on page 157. ▪ If the problem persists, replace the whole air filter assembly. See *Replace the air filter assembly* on page 154.

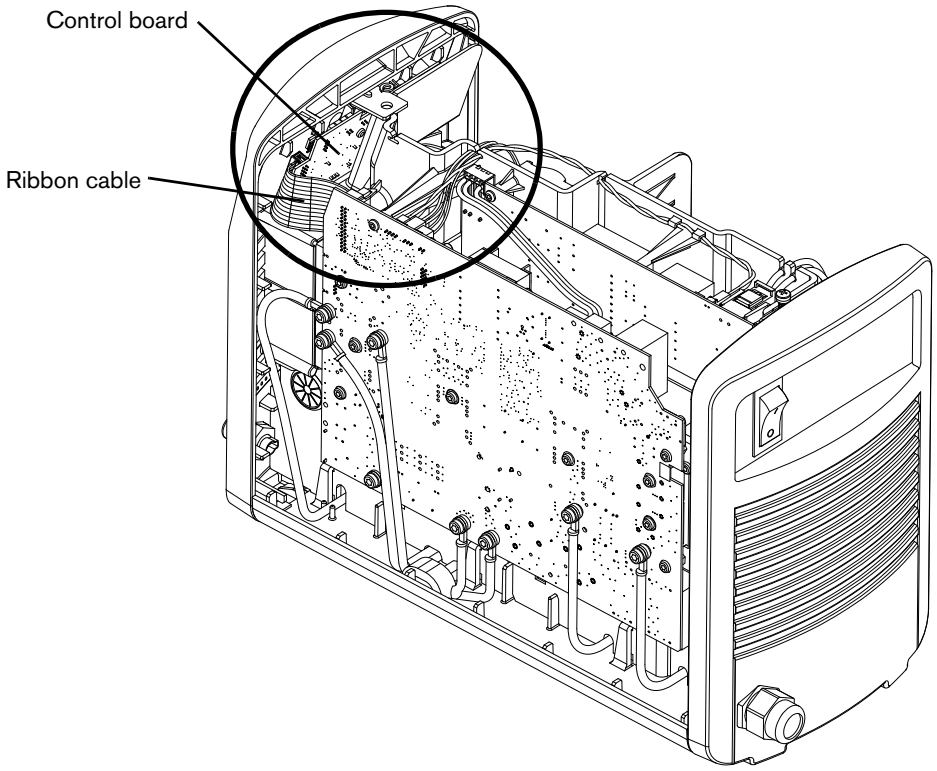
Problem	Possible causes	Possible solutions
The arc blows out but re-ignites when the torch trigger is pulled again, or the arc sputters and hisses.	▪ Too much moisture is present in the consumables. ▪ The consumables are worn or damaged.	▪ Inspect the consumables for signs of excess moisture. **A small amount of moisture at the torch nozzle is normal for this system and should not prevent the torch from firing.** If excess moisture is present, fire the torch approximately 5 times in succession. Fire the torch in the air, not on the workpiece. ▪ If the problem persists and excess moisture is not an issue, inspect and replace the consumable parts if they are worn or damaged. ▪ If firing the torch does not clear out the excess moisture, examine the air filter inside the power supply. **It is normal to see water in the filter bowl.** The filter purges water when the water level in the bowl is high enough to engage the float mechanism. If the water level in the filter bowl is approximately half full (or more), the air filter may not be purging water properly. ▪ Make sure the drain hose connected to the bottom of the air filter bowl is not twisted or clogged. ▪ Water purged from the air filter exits through a hole in bottom of the of the power supply. Make sure this hole is not blocked. ▪ Replace the air filter bowl. See *Replace the air filter bowl and air filter element* on page 157. ▪ If the problem persists, replace the whole air filter assembly. See *Replace the air filter assembly* on page 154.

Problem	Possible causes	Possible solutions
The cut quality is poor, or the cut does not sever the metal.	▪ The consumables are worn or damaged. ▪ The work lead connection is poor. The work lead may be damaged or not properly connected to the workpiece. ▪ The amperage adjustment knob is set too low. ▪ The air pressure to the torch is too low. ▪ The power board is producing low current and may be faulty. ▪ The extension cord is too long, is damaged, or is not capable of delivering sufficient power to the power supply.	▪ Inspect the consumables and replace if necessary. ▪ Reposition the work lead on the workpiece. ▪ Clean the workpiece surface to make a better connection with the work lead. ▪ Inspect the work lead and replace if necessary. ▪ If your input circuit is capable, turn the amperage adjustment knob to a higher setting. ▪ Check the gas supply line for leaks or defective parts. Perform *Test 10 – check air pressure* on page 98. ▪ Perform *Test 2 – power board voltage checks* on page 82 and *Test 3 – VBUS and voltage balance on power board* on page 84. ▪ Operate the system without using an extension cord. If you must use an extension cord, use a heavy conductor cord of the shortest possible length. See *Extension cord recommendations* on page 31.
The circuit breaker trips frequently while you are cutting.	▪ The amperage adjustment knob is set too high for the input circuit. ▪ The wrong consumables are being used. ▪ The input circuit is not delivering sufficient power to the power supply. ▪ The operator is stretching the arc by holding the torch too far from the workpiece when cutting. ▪ The extension cord is too long, is damaged, or is not capable of delivering sufficient power to the power supply.	▪ Turn down the cutting current. See *Step 3 – Adjust the output current* on page 45. ▪ Make sure the correct consumables are installed for this power supply and torch. See *Consumable use* on page 35. ▪ Operate the system on a 240 VAC input circuit whenever possible. ▪ Avoid stretching the arc. Drag the torch on the workpiece. See *Edge start on a workpiece* on page 52. ▪ Operate the system without using an extension cord. If you must use an extension cord, use a heavy conductor cord of the shortest possible length. See *Extension cord recommendations* on page 31. ▪ Make sure nothing else is drawing power on the same circuit.

Control board LEDs

The control board (PCB1) is located inside of the front panel.

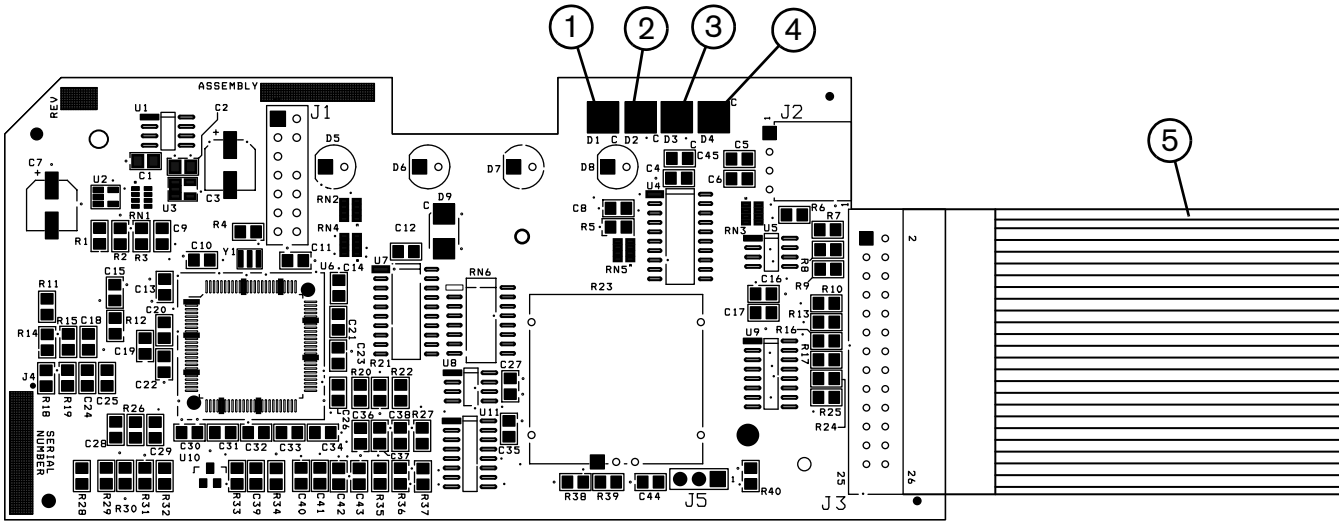
Figure 3



The control board has four diagnostic LEDs:

- **Reset** – This LED illuminates when certain voltage readings to the power board are out of range. See *Reset LED* on page 74.
- **Error** – This LED illuminates when the internal compressor, torch cap, or temperature LEDs on the front of the power supply illuminate. If all four LEDs on the front of the power supply are blinking, the Error LED also blinks. The number of blinks between pauses indicates which component may have failed.
- **Transfer** – This LED illuminates when there is proper arc transfer between the torch and the workpiece, and blinks during continuous pilot arc operation (such as when cutting expanded metal or moving the arc off the plate and then back on).
- **Start** – This LED illuminates when the power supply receives a start signal and remains illuminated during normal operation.

Figure 4



1 Reset
2 Error
3 Transfer (XFR)
4 Start
5 Ribbon cable

During normal operation, the power-ON LED on the front of the power supply and the Start and Transfer LEDs on the control board illuminate. When a problem occurs with the system, one or more of the fault LEDs on the front of the power supply and the Error LED or the Reset LED on the control board may illuminate or blink.

Use the control board Rest and Error LEDs to troubleshoot

The Reset and Error LEDs provide information to use when troubleshooting a system failure. If the LEDs on the front of the power supply are blinking, count the number of times the Error LED blinks. Then, look at *Table 5* on page 75 to determine the corrective action.

Reset LED

When the control board's Reset LED illuminates, the voltages on the power board may be incorrect. Perform the following tests at J7 on the power board. See *Test 2 – power board voltage checks* on page 82.

- Test pin 5 to ground for 3.3 VDC (±10%).
- Test pin 7 to ground for 5 VDC (±10%).
- Test pin 12 to ground for 2.2 VDC (±10%).

If the values you find are not within ±10% of the three values listed above, detach the control board's ribbon cable and perform the tests again. If you find the correct values the second time, replace the control board. Otherwise, replace the power board. See *Replace the control board* on page 124 or *Replace the power board* on page 132.

Error LED

The number of times the Error LED blinks indicates the problem detected. Each blink is a half-second long, and each series of blinks is separated by a 2-second pause. See *System tests* (below) for detailed test procedures.

Table 5

Number of blinks	Problem	Solution
3	Faulty power board or control board	▪ Perform *Test 3 – VBUS and voltage balance on power board* on page 84. If any of the values are incorrect, replace the power board. ▪ Perform *Test 2 – power board voltage checks* on page 82. If any of the values for pins *5*, 7, or *12* are incorrect, remove the control board and test again. If the values are correct, replace the control board. ▪ If the values for pins *5*, 7, or *12* are correct when you perform *Test 2 – power board voltage checks* on page 82 but any other values from Test 2 are incorrect, replace the power board.
4	Faulty fan, solenoid valve, or power board	▪ Perform *Test 4 – solenoid valve* on page 86 and *Test 8 – fan* on page 92. If the solenoid valve test and the fan test both pass, replace the power board. If Test 4 fails, replace the solenoid valve; if Test 8 fails, replace the fan.
6	Inverter saturation	▪ Install new consumables in the torch. If you continue to see this error code, replace the power board.

System tests

You can use either the ground clip near the top of the rear panel ① or the ground screw on the heatsink ② (marked by the ground symbol on the power board) for any tests that require the multimeter to be attached to ground.

Figure 5 – Grounding options

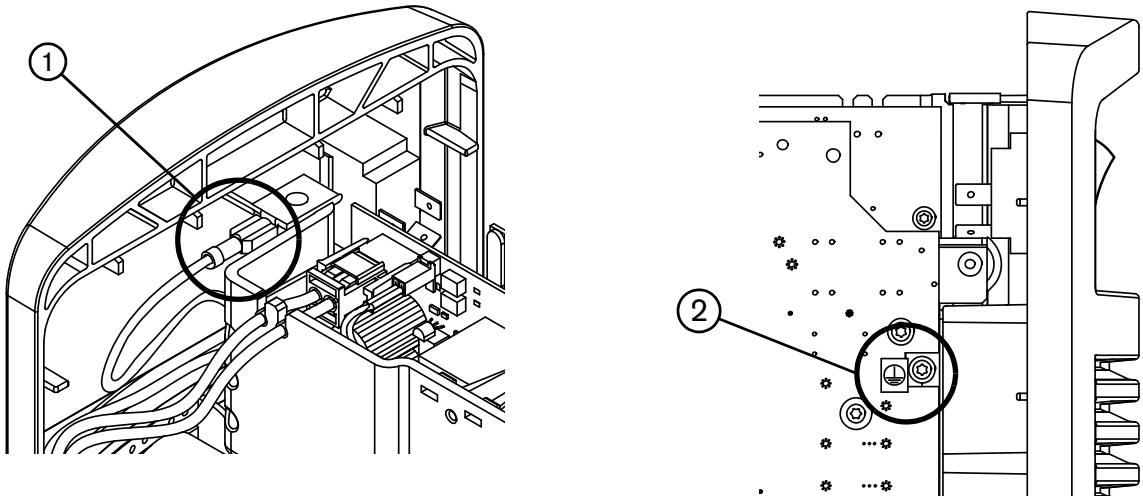
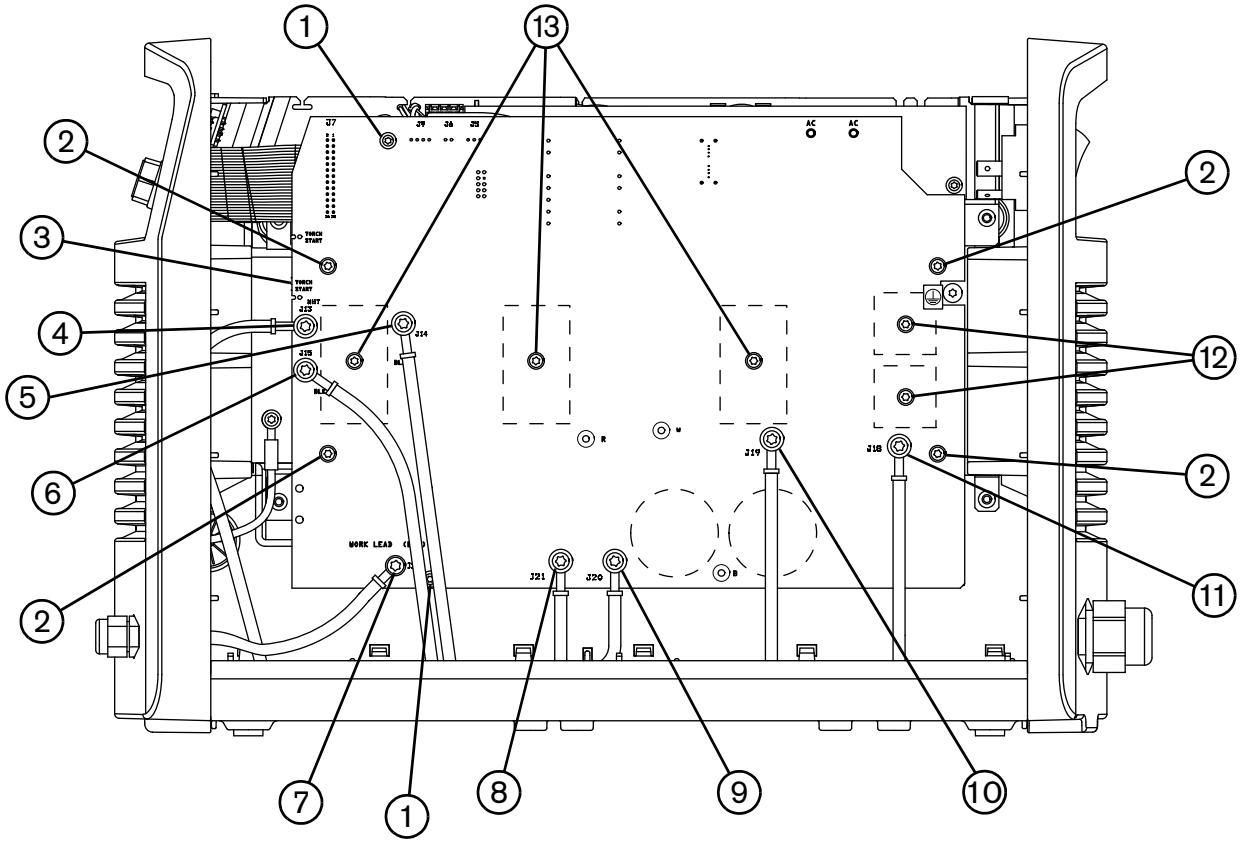


Figure 6 – Back of the power board



1 Retaining screw (2)

2 Heatsink assembly screw (4)

3 Torch start and cap-sensor (J12)

4 J13

5 J14

6 J15

7 Work lead connector (J22)

8 J21

9 J20

10 J19

11 J18

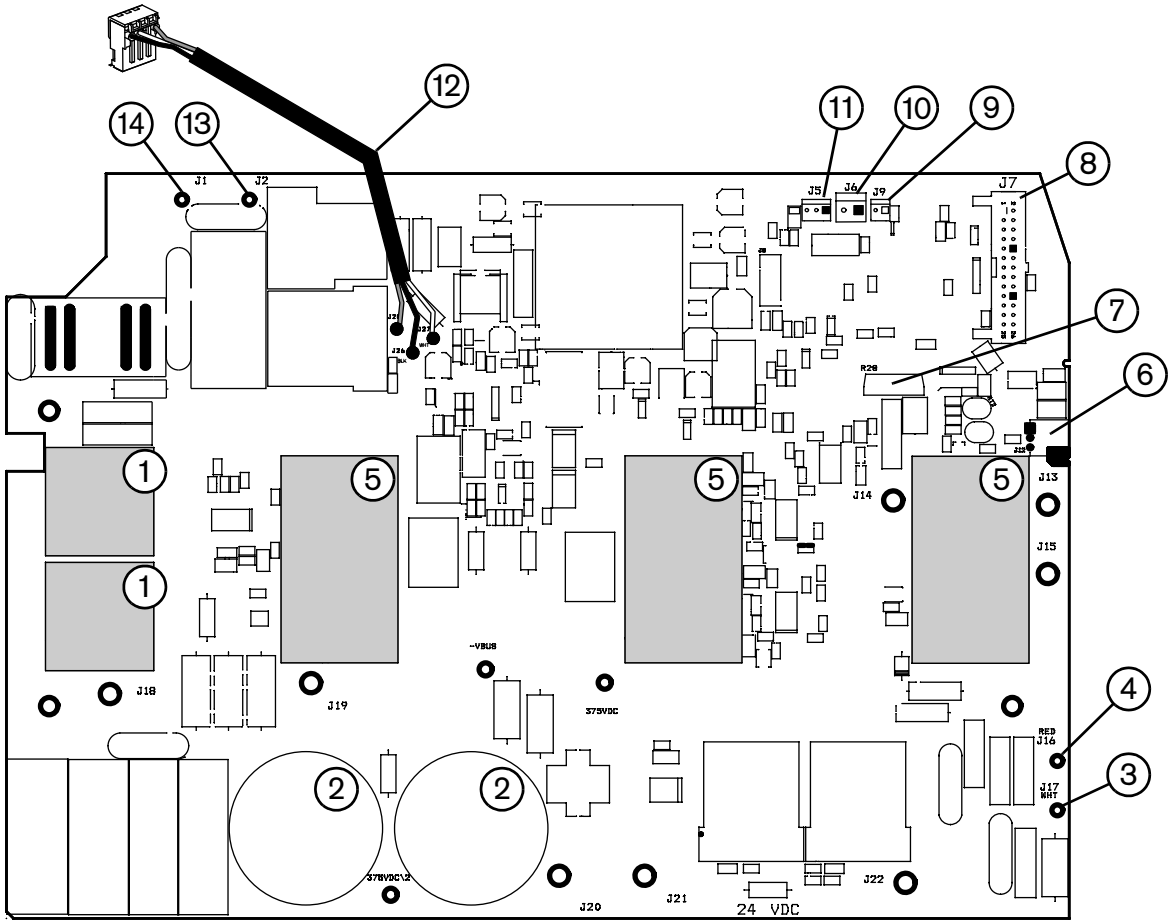
12 Input diode bridge screws (2)

13 IGBT screws (3)

WARNING!

Voltages of up to 50 VDC continue to be present on the DC bus for at least 30 seconds after disconnecting the input power. Allow bus voltages to dissipate before performing any tests.

Figure 7 – Component side of the power board



1 Input diode bridges

2 Capacitors

3 J17 (white)

4 J16 (red)

5 IGBTs

6 J12 (torch-start, cap-sensor switch connector)

7 Snubber resistor

8 Ribbon cable connector (J7) from control board

9 J9

10 J6

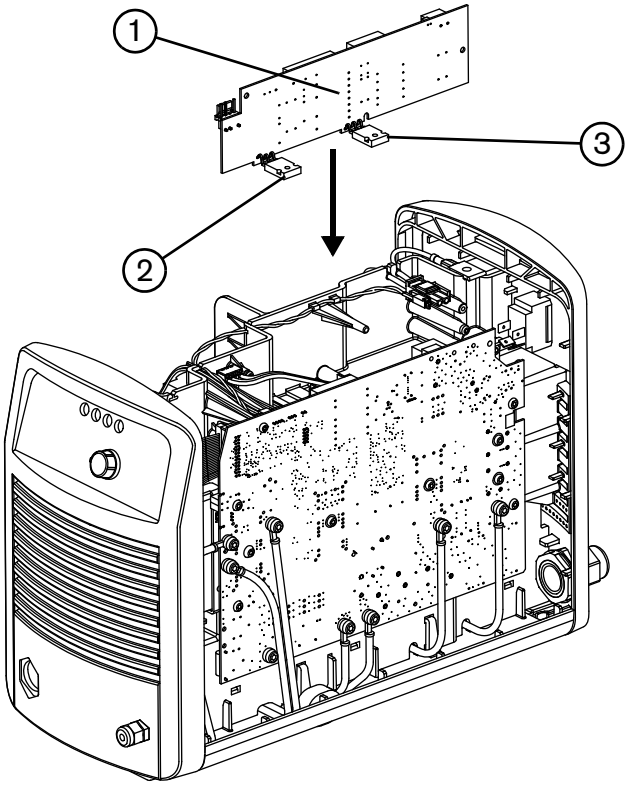
11 J5

12 375 VDC bus voltage to compressor-driver board

13 J2

14 J1

Figure 8 – Back of the compressor-driver board

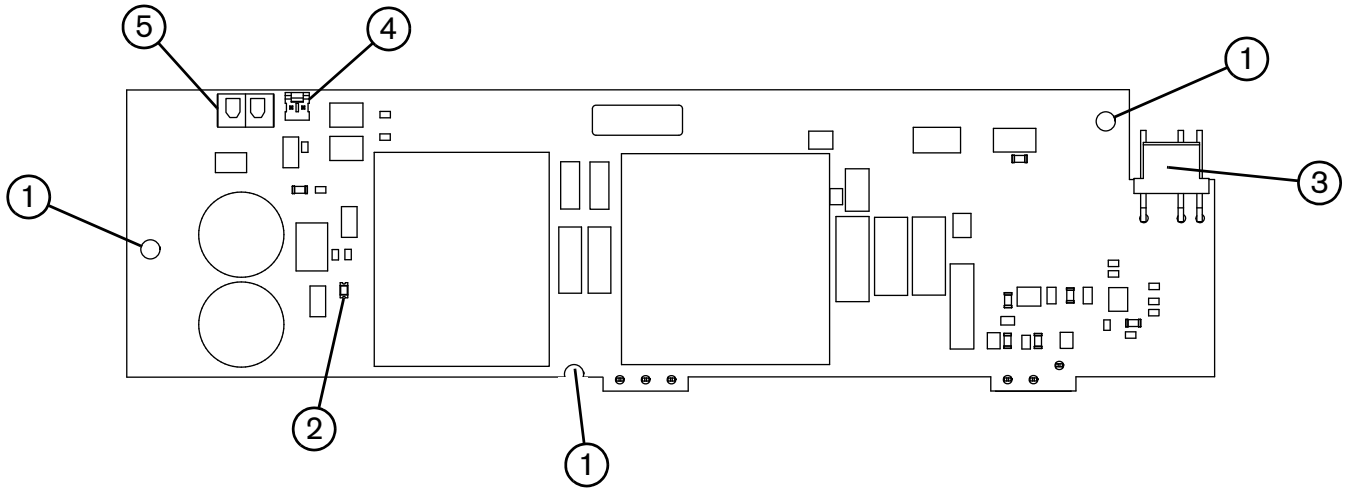


1 Compressor-driver board

2 MOSFET

3 Diode

Figure 9 – Component side of the compressor-driver board



1 Retaining screw (3)

2 Diagnostic LED (D5)

3 J3

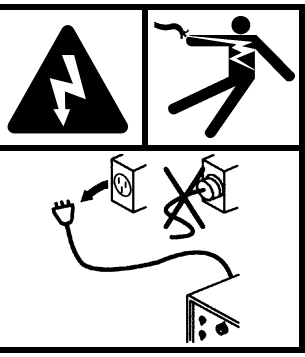
4 J1

5 J2

Test 1 – voltage input

Check the incoming voltage and the line voltage to the top of the power switch (S1).

1. Set power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the power supply handle and cover. See *Remove the power supply cover* on page 104.
3. Remove the component barrier. See *Remove the component barrier* on page 106.
4. Partially pull the power switch's top two wires out from the tabs and attach the multimeter test leads to the tabs to check the AC voltage. See *Figure 10* on page 81.



WARNING!

ELECTRIC SHOCK CAN KILL

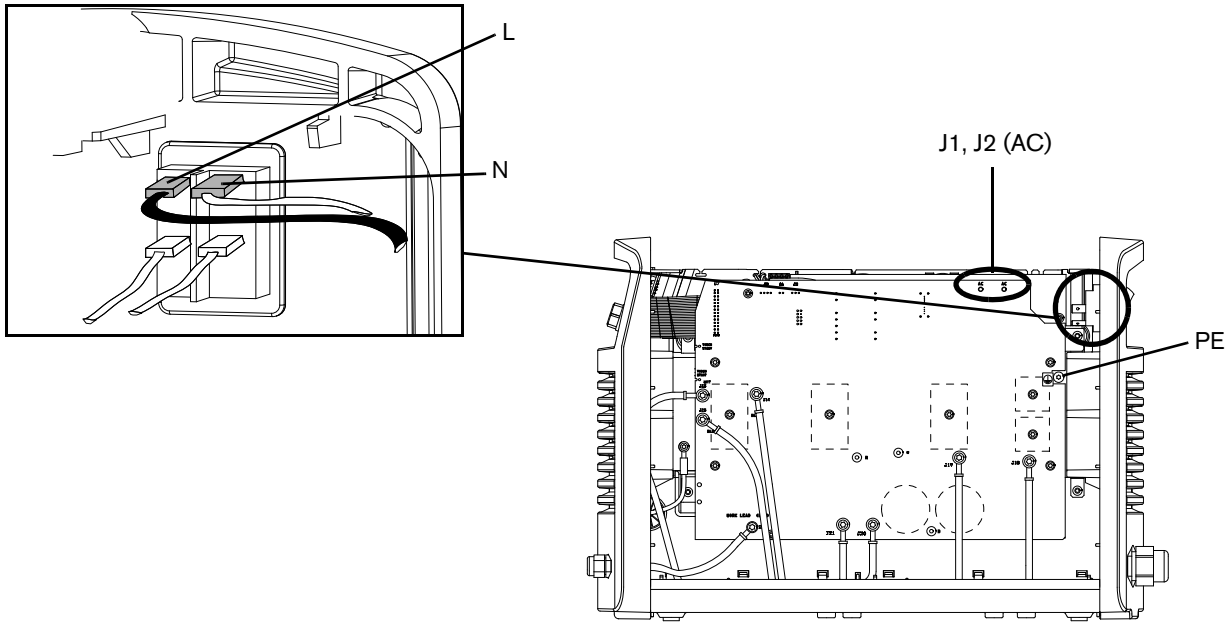
Use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the power supply that can cause serious injury or death.

See the *WARNING!* on page 57 before proceeding.

5. Once you have the test leads in place, leave the power switch set to OFF (**O**), and reconnect the electrical power. The voltage should equal the line voltage of the incoming circuit, for example 120 V or 240 V.

All values can be ±15%.

Figure 10



Single phase power supplies		
Designator	**CSA wire colors**	**CE/CCC wire colors**
L (live)	Black	Brown
N (neutral)	White	Blue
PE (ground)	Green	Green/yellow

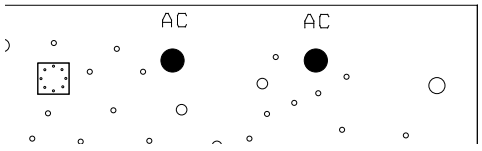
6. If the AC voltage is incorrect, make sure you have power to the unit. If you do have power, inspect the power cord for damage, and replace if necessary. See *Replace the power cord and strain relief* on page 113.

7. If the power source and power cord are functioning correctly, disconnect the power cord again and reconnect the two wires to the power switch.

8. Reconnect the electrical power and set the power switch to ON (**I**).

9. Measure the AC voltage from J1 to J2 (labeled “AC” on the back of the power board). This value should be the same as the incoming line voltage. If it is not, check the power switch and replace if necessary. See *Replace the power switch* on page 122.

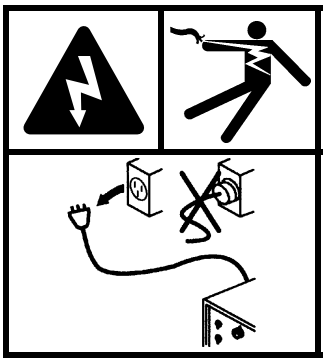
Figure 11



10. If the power-ON LED is still illuminated, perform *Test 2 – power board voltage checks* on page 82.

Test 2 – power board voltage checks

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the power supply handle and cover. See *Remove the power supply cover* on page 104.
3. Remove the component barrier. See *Remove the component barrier* on page 106.



WARNING!

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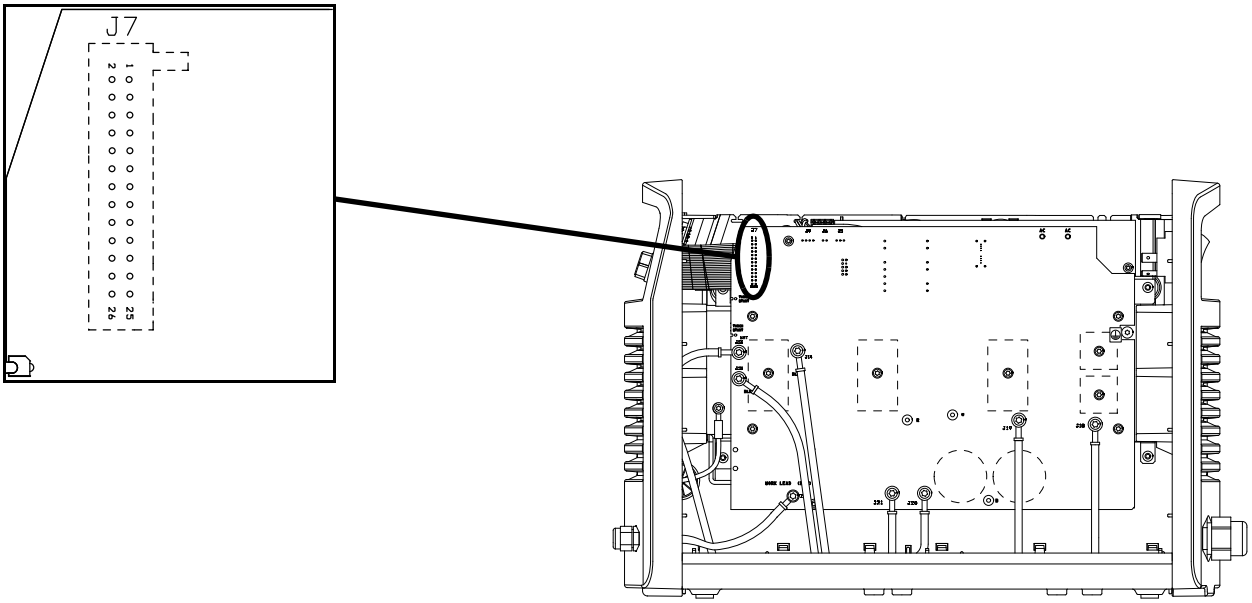
See the *WARNING!* on page 57 before proceeding.

4. Reconnect the electrical power and set the power switch to ON (**I**).
5. Use a multimeter to verify the voltages at the J7 pins listed in *Table 6* on page 83 to make sure the power board (PCB2) is functioning correctly. If any of the values are incorrect, replace the power board. See *Replace the power board* on page 132.

Figure 12



To test the values at pin 16, you must position the torch and power supply so that you can safely pull and release the torch trigger. For ground locations, see *Figure 5* on page 75.

CAUTION!

Do not use -VBUS (W) as ground. Doing so could destroy the power supply. Instead ground to either the ground wire clip on the rear panel or to the heatsink. See *Figure 5* on page 75.

Table 6

J7 pin number to ground	Test	Expected value
19	VACR (rectified AC line voltage)	0.86 V at 120 line voltage 1.87 V at 230 line voltage
21	VBUS (DC bus voltage)	2.28 VDC at 375 VBUS
18	IPFC (input current)	< 0.1 VDC
20	IFB (output current)	< 0.1 VDC
22	ITF (transfer current)	< 0.1 VDC
5	3.3 VDC	3.3 VDC ±10%
7	5 VDC	5 VDC ±10%
12	24 V sense pin	2.2 VDC ±10%
16	Start signal	3.2 VDC closed 0 VDC open

All values can be ±10%.

Test 3 – VBUS and voltage balance on power board

CAUTION!

Do not use -VBUS (W) as ground. Doing so could destroy the power supply. Instead ground to either the ground wire clip on the rear panel or to the heatsink. See *Figure 5* on page 75.

Test the power board (PCB2) to make sure the circuits are balanced. The test points are labeled on the back of the power board, as are the voltages and positive and negative capacitor terminals. See *Figure 13* on page 85 for locations of test points.

CAUTION!

Do not use a multimeter with test leads. This can cause a short-circuit between the BUS and the heatsink. Use test hook leads instead, and attach them to the test point loops.

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the power supply handle and cover. See *Remove the power supply cover* on page 104.
3. Remove the component barrier. See *Remove the component barrier* on page 106.)

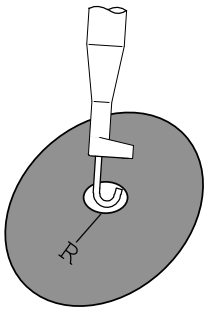
WARNING!

ELECTRIC SHOCK CAN KILL

Use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the power supply that can cause serious injury or death.

See the *WARNING!* on page 57 before proceeding.

4. Reconnect the electrical power.
5. For each of the following 3 steps, carefully connect the test hooks to the edges of the holes in the power board so that the hook makes contact with the ring on the back side of the power board.



6. Measure the voltage from W to R. See *Figure 13*.

a. Position the test hooks on W and R on the power board.

b. Turn the power ON (**I**).

c. The multimeter should read 375 VDC.

If you get a value other than 375 VDC, multiply the reading by 0.00601 to convert it to millivolts. Test pin 21 on J7. See *Test 2 – power board voltage checks* on page 82. If the values match, it is a normal reading.

7. Measure the voltage from W to B.

a. Turn the power OFF (**O**).

b. Move the test hooks to W and B.

c. Turn the power ON (**I**).

d. This value should be 187.5 VDC or one-half of the value found in *step 6*.

8. Measure the voltage from R to B.

a. Turn the power OFF (**O**).

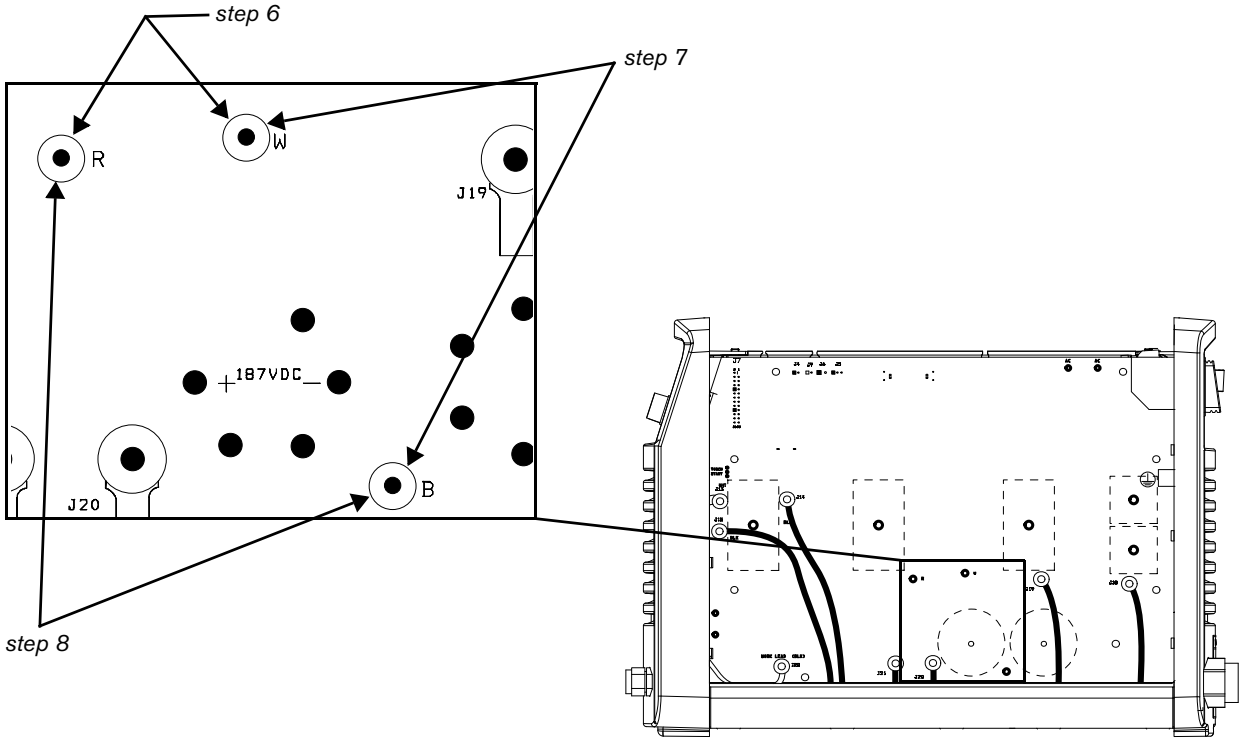
b. Move the test hooks to R and B.

c. Turn the power ON (**I**).

d. This value should be 187.5 VDC or one-half of the value found in *step 6*.

9. The values found in *step 7* and *step 8* should be approximately equal. If they differ by more than 30 V, replace the power board.

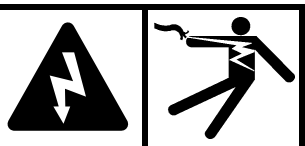
Figure 13



Test 4 – solenoid valve

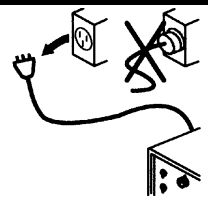
This test verifies the proper operation of the solenoid valve (V1).

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the power supply handle and cover. See *Remove the power supply cover* on page 104.
3. Remove the component barrier. See *Remove the component barrier* on page 106.



WARNING!

ELECTRIC SHOCK CAN KILL

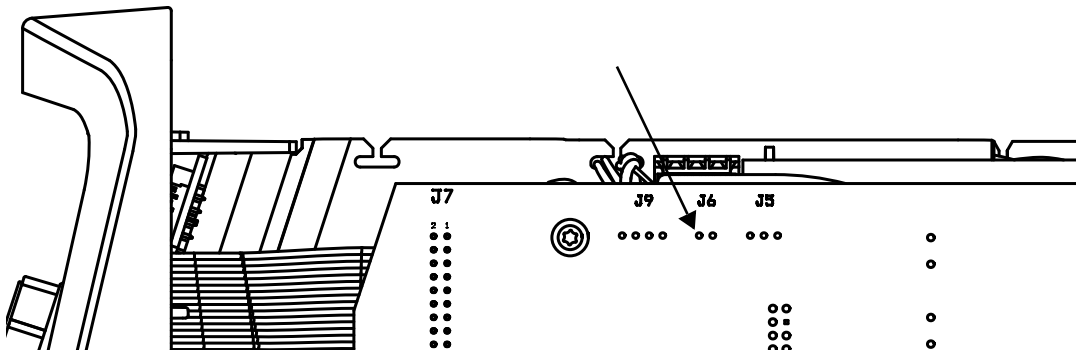


Use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the power supply that can cause serious injury or death.

See the *WARNING!* on page 57 before proceeding.

4. Reconnect the electrical power.
5. Place a jumper from pin 1 of J6 (red wire) on the power board to ground. See *Figure 5* on page 75 for grounding options.

Figure 14



6. Turn the power ON (**I**). The valve should click.
7. Measure the voltage between pin 1 of J6 and ground.
8. If you do not hear the valve click and the voltage check reads 24 VDC, replace the solenoid valve. See *Replace the solenoid valve* on page 148.

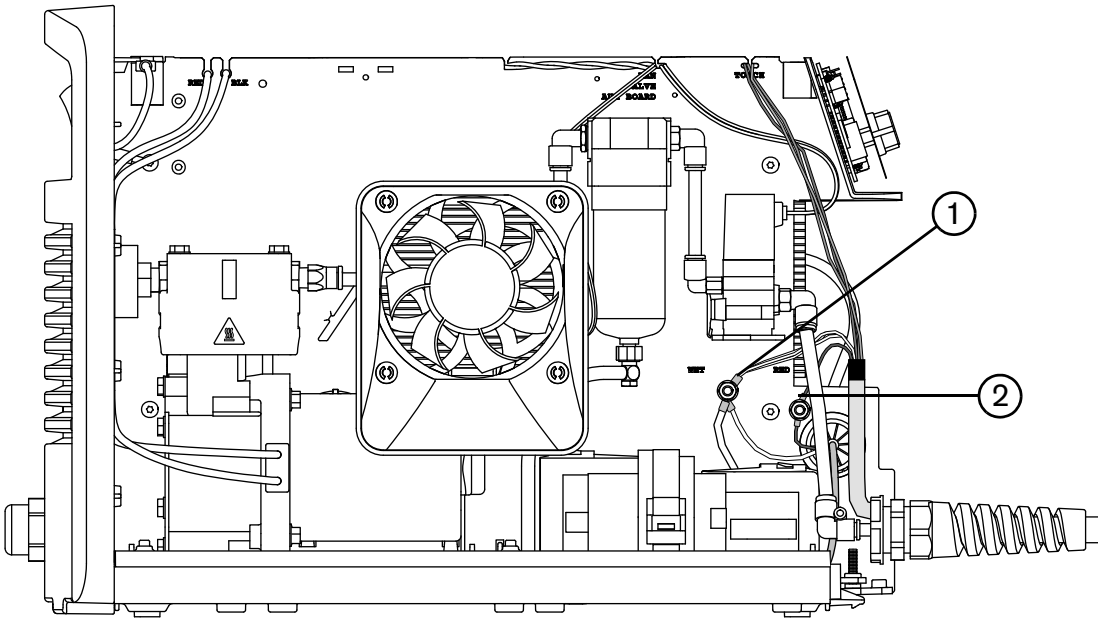
Test 5 – torch stuck open or torch stuck closed

If the nozzle and electrode are not in contact before the torch trigger is pulled, the power supply detects a “torch stuck open” fault. If the nozzle and electrode remain in contact after the torch trigger is pulled, the power supply detects a “torch stuck closed” fault.

Use the following test to determine if the torch is stuck in either position.

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the power supply handle and cover. See *Remove the power supply cover* on page 104.
3. Remove the component barrier. See *Remove the component barrier* on page 106.
4. Measure the resistance between the torch lead’s white wire group ① and red wire ②. The resistance should read very low, a closed circuit.
   - If the resistance reads as open with the power OFF, the nozzle and electrode are not in contact, or one of the wires in the lead is broken. Make sure that the torch plunger moves freely in the torch head.

Figure 15



The front panel is hidden in this figure to better show the torch lead and wires.

CAUTION!

To avoid causing a short or damage to the multimeter, do not fire the torch with the multimeter connected to the torch lead's white wire group and red wire while the system is powered ON.

5. Turn ON (**I**) the power. With the system idle, quickly tap the torch trigger to force gas flow without firing an arc. Is gas flowing?

- ❑ If yes, the gas will flow for 5 seconds before shutting off. While the gas is flowing, measure the resistance between the torch lead's white wire group ① and red wire ②. The resistance should read very high – an open circuit – when gas is flowing.

  If the resistance reads as very low (closed circuit) with the gas flowing, the nozzle and electrode are in contact or a short-circuit occurred in one of the wires in the torch lead. Continue with *step 6*.

- ❑ If no, the solenoid valve may be faulty. Perform *Test 4 – solenoid valve* on page 86.

6. Does the torch plunger move freely in the torch head?

- ❑ If yes, replace the torch lead. See *Replace the torch lead* on page 203.
- ❑ If no, replace the torch body. See *Replace the torch body* on page 199.

7. Because "torch stuck open" and "torch stuck closed" failures can be intermittent, repeat the test several times.

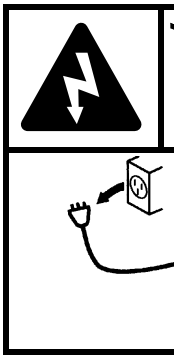
Test 6 – plasma start

Use this test to make sure the control board LED is receiving a valid start signal.

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the power supply handle and cover. See *Remove the power supply cover* on page 104.
3. Remove the component barrier. See *Remove the component barrier* on page 106.

WARNING!

While testing, do not touch the nozzle at the end of the torch. Dangerous voltages can cause serious injury.



WARNING!

ELECTRIC SHOCK CAN KILL

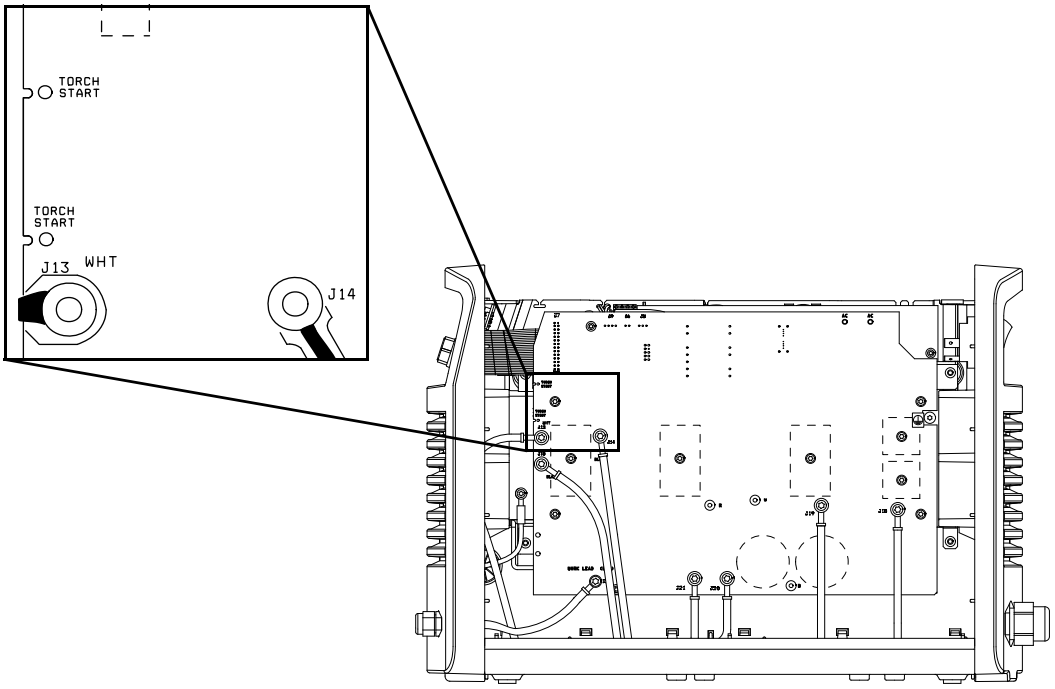
Use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the power supply that can cause serious injury or death.

See the *WARNING!* on page 57 before proceeding.

4. Reconnect the electrical power and turn the power ON (**I**).
5. Quickly tap the torch trigger to force gas flow without firing an arc, and watch the Start LED on the control board. The Start LED should illuminate whenever the trigger is pulled. See *Control board LEDs* on page 73 for the location of the Start LED.
6. Turn OFF (**O**) the power.

7. Check the resistance at the 2 torch-start test points on the power board. See *Figure 16*.
   a. With the trigger pulled, the resistance should read 10 Ω or less.
   b. With the trigger released, the circuit should read approximately 3 kΩ.

Figure 16



8. If this test fails, check the torch start switch and the torch wires. Replace if necessary. See *Replace the start switch* on page 201 or *Replace the torch lead and strain relief* on page 150.

9. Turn ON (**I**) the power.

10. Measure pin 16 of J7 to ground. See *Test 2 – power board voltage checks* on page 82.
    a. With the trigger pulled, it should measure as 0 VDC for an open circuit.
    b. With the trigger released, it should measure 3.2 VDC for a closed circuit.

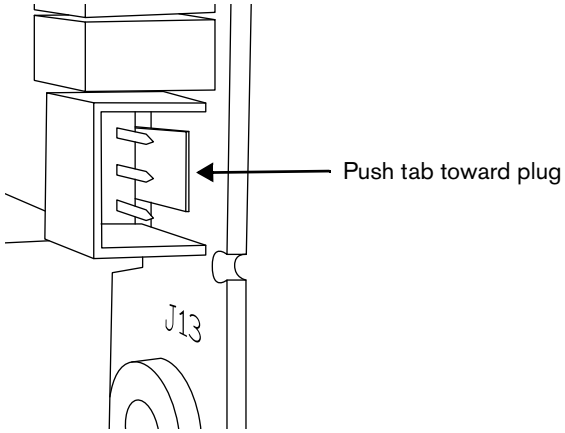
11. Are the values correct?
    - ❑ If yes, replace the control board. See *Replace the control board* on page 124.
    - ❑ If no, replace the power board. See *Replace the power board* on page 132.

Test 7 – torch cap-sensor

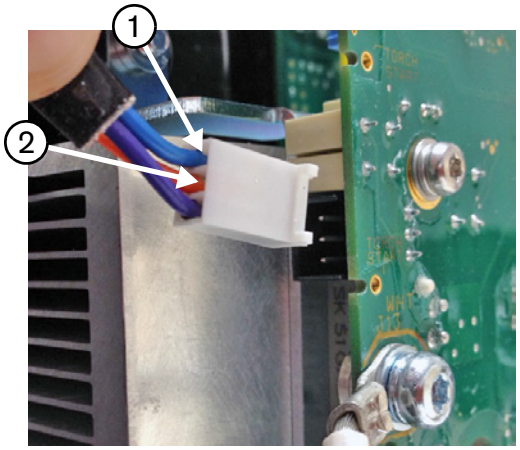
Test the torch cap-sensor switch and torch leads.

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the power supply handle and cover. See *Remove the power supply cover* on page 104.
3. Remove the component barrier. See *Remove the component barrier* on page 106.
4. Detach the front panel. See *Detach the front panel* on page 108.
5. Disconnect the cap-sensor connector at J12 on the heatsink side of the power board by pushing the tab on the connector toward the plug and pulling the plug out.

Figure 17



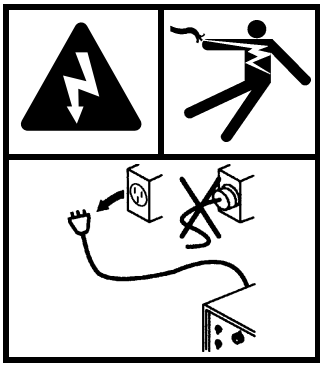
6. Measure the resistance from the blue wire (pin 1) ① to the orange wire (pin 2) ②. It should measure less than 10 Ω. If it measures high resistance, the cap-sensor switch circuit is open.
7. Make sure the torch plunger moves smoothly. If it does not, replace the torch body. See *Replace the torch body* on page 199.
8. Make sure the consumables are correctly installed. Adjust the consumables if necessary.
9. If the torch parts mentioned in *step 7* and *step 8* are working properly, the cap-sensor switch is faulty or the torch lead has a broken wire. Replace the faulty part. See *Replace the cap-sensor switch* on page 202 or *Replace the torch lead and strain relief* on page 150.



Test 8 – fan

Test the fan (M1) for proper operation.

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the power supply handle and cover. See *Remove the power supply cover* on page 104.
3. Remove the component barrier. See *Remove the component barrier* on page 106.
4. Place a jumper from ground (see *Figure 5* on page 75 for grounding options) to pin 3 of J5 (black wire, see *Figure 18*).



WARNING!

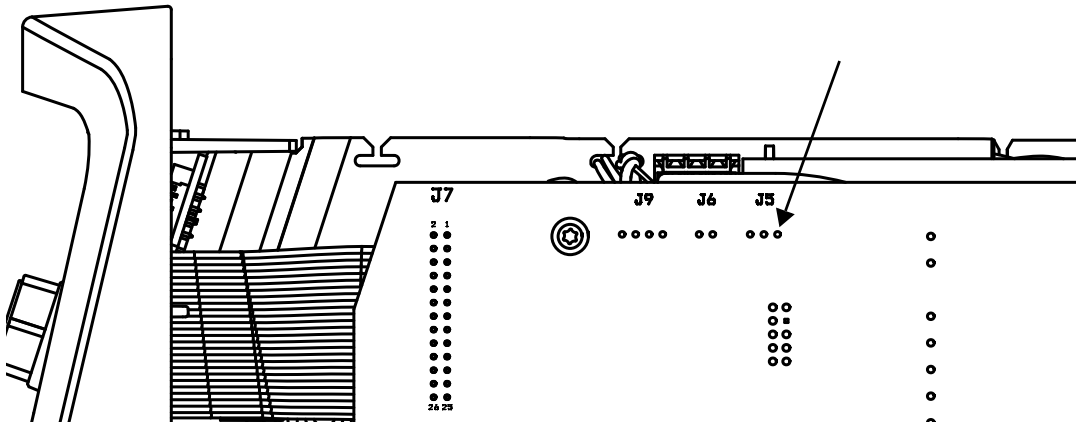
ELECTRIC SHOCK CAN KILL

Use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the power supply that can cause serious injury or death.

See the *WARNING!* on page 57 before proceeding.

5. Reconnect the electrical power and set the power switch to ON (**I**).
6. If the fan does not operate, replace the fan. See *Replace the fan* on page 161.

Figure 18



Because of protection features on the fan driver chip, this test can trigger a fault. You can disregard this fault if it occurs as a result of a fan test. The purpose of the fan test is to verify that the fan is operating properly, not to test the fan drive circuit.

Test 9 – internal compressor, compressor-driver board, and power board

If the internal compressor fault LED and temperature fault LED both illuminate, the root cause may be:

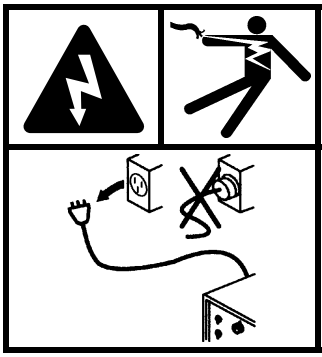
- Faulty internal compressor
- Faulty compressor-driver board (PCB3)
- Faulty power board (PCB2)

Use this test to systematically check each of these 3 components to determine which one needs to be replaced.

For a high-level overview of this procedure, see *Process flow for troubleshooting internal compressor and temperature fault LEDs* on page 226.

Turn OFF the power and remove the cover

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the power supply handle and cover. See *Remove the power supply cover* on page 104.
3. Remove the component barrier. See *Remove the component barrier* on page 106.)



WARNING!

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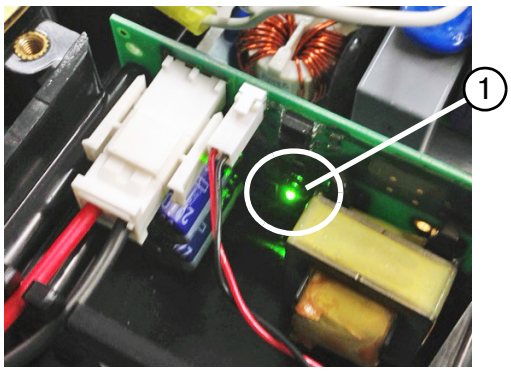
See the *WARNING!* on page 57 before proceeding.

Test 9a – Check the diagnostic LED (D5) on the compressor-driver board

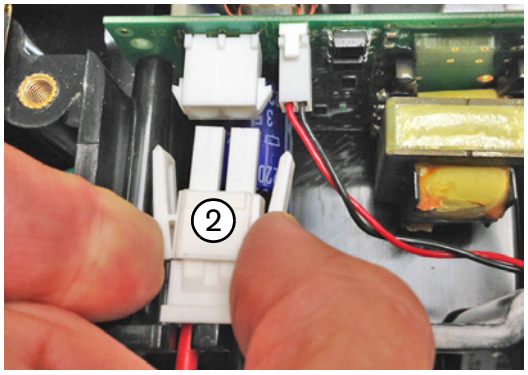
4. Reconnect the power cord, and set the power switch to ON (**I**).
5. Quickly tap the torch trigger to force gas flow without firing an arc, then watch the green diagnostic LED (D5) ① on the compressor-driver board. Does the LED illuminate while the torch is being fired?
   - **a.** If yes, check the internal compressor. Skip to *step 10*.
   - **b.** If no, continue with the next step.



The D5 diagnostic LED indicates whether or not there is 15 VDC output from the compressor-driver board to the internal compressor.

6. Set the power switch to OFF (**O**).

7. Remove the J2 connector ② from the compressor-driver board.



8. Set the power switch to ON (**I**).

9. Quickly tap the torch trigger, then watch the green diagnostic LED (D5) on the compressor-driver board. Does the LED illuminate while the torch is being fired?

   a. If yes, check the internal compressor. Continue with the next step.

   b. If no, check the compressor-driver board. Skip to *step 16*.

Test 9b – Check the internal compressor

	**WARNING!**
	**While testing, do not touch the nozzle at the end of the torch. Dangerous voltages can cause serious injury.**

	**WARNING!** **HOT SURFACE CAN CAUSE INJURY**
	**Allow the internal compressor to cool before touching it.** **The surface of the compressor can become very hot during use and can cause serious injury if it comes in contact with skin.**

10. Set the power switch to OFF (**O**).

11. On the fan side of the power supply, pull back the clip on the right side of the solenoid valve, and work the valve free from that clip ③. Carefully tilt the top of the valve towards you until you can see the gas shut-off override button ④. See *Figure 19*.

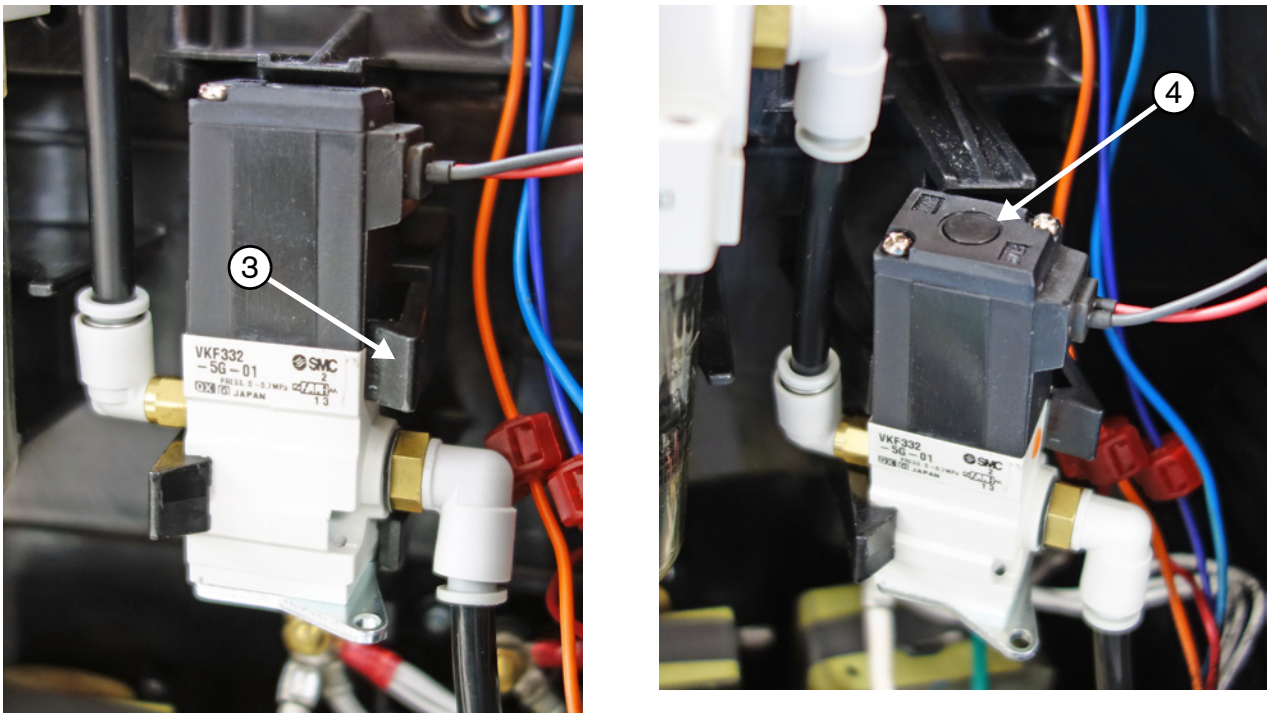
12. Connect the internal compressor to an external 12 VDC power source (for example, a car battery).

13. Hold down the gas shut-off override button on top of the solenoid valve, then quickly tap the torch trigger. Is the compressor running, and is air blowing from the torch?

   a. If yes, check the compressor-driver board. Continue with the next step.

   b. **If no, replace the internal compressor.** See *Replace the internal compressor* on page 166. Be sure to push the solenoid valve back into place between both clips from the center panel.

Figure 19



14. Push the solenoid valve back into place between both clips from the center panel.

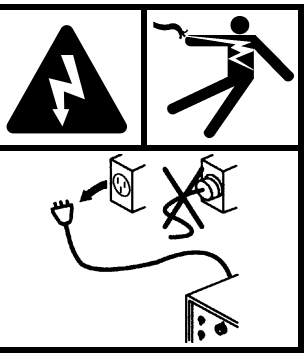
15. Make sure both of the solenoid valve's gas supply hoses are connected securely to their fittings.

Test 9c – Check the compressor-driver board

16. Set the power switch to OFF (**O**).

17. Remove the white cap from the top of the J3 connector ⑤ on the compressor-driver board. See *Figure 20* on page 96.

You may need to unplug the J3 connector in order to remove the white cap. If you do, plug the connector back in before continuing with the next step.



WARNING!

ELECTRIC SHOCK CAN KILL

Use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the power supply that can cause serious injury or death.

See the *WARNING!* on page 57 before proceeding.

18. Set the power switch to ON (**I**).

19. Check VBUS on the red and black wires on the J3 connector (pin 1 and pin 4) ⑥. Is VBUS present (nominal 375 VDC bus voltage)?

- **a.** If yes, check the compressor-enable voltage on the compressor-driver board. Skip to *step 21*.
- **b.** If no, remove the J2 connector ⑦ from the compressor-driver board. Continue with the next step.

20. Repeat the previous step to check VBUS with J2 disconnected. Is VBUS present (nominal 375 VDC bus voltage)?

- **a.** If yes, check the compressor-enable voltage on the compressor-driver board. Continue with the next step.
- **b.** If no, check the power board. Skip to *step 23*.

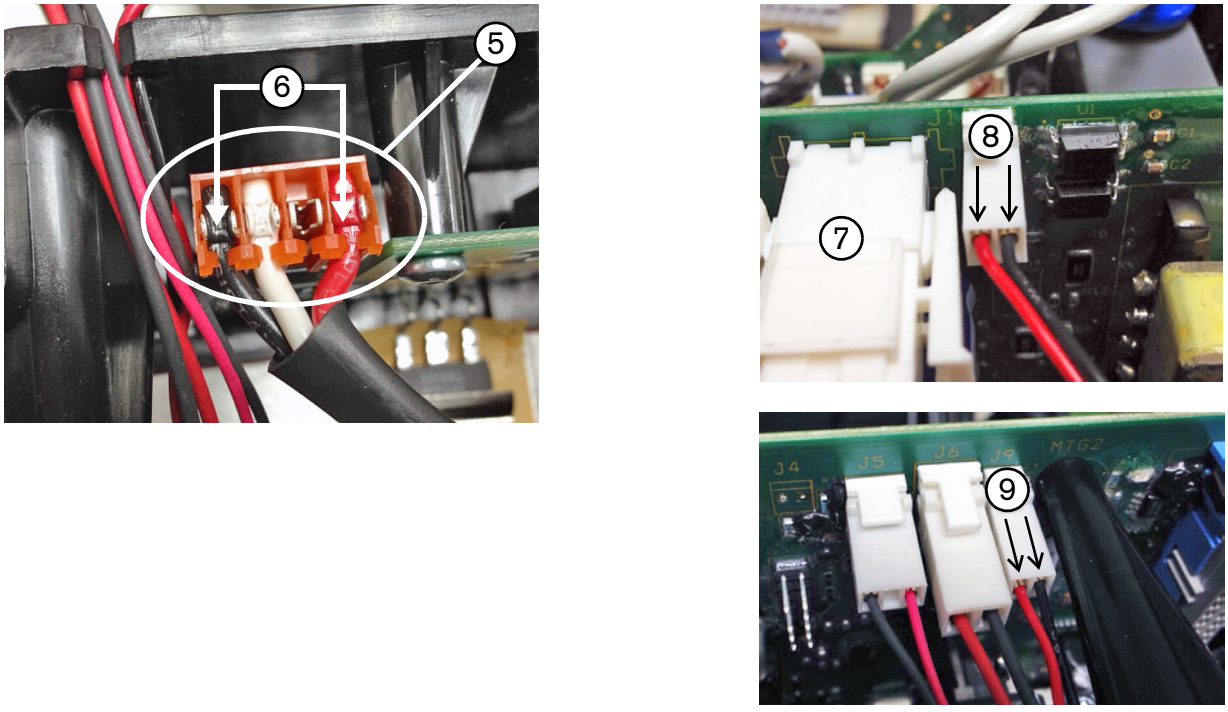
21. Quickly tap the torch trigger, then check the compressor-enable voltage on the J1 connector ⑧ on the compressor-driver board. (The J1 connector may look different from the one shown in *Figure 20*.) Is compressor-enable voltage present (3 VDC)?

- **a.** **If yes, replace the compressor-driver board.** See *Replace the compressor-driver board* on page 127.
- **b.** If no, check the twisted pair wires that connect the compressor-driver board to the power board. Continue with the next step.

22. Quickly tap the torch trigger, then check the compressor-enable voltage on the J9 connector ⑨ on the power board. (The J9 connector may look different from the one shown in *Figure 20*.) Is compressor-enable voltage present (3 VDC)?

- **a.** **If yes, replace the J1-to-J9 twisted pair wires.** See *Replace the wire group* on page 143.
- **b.** If no, check the power board. Continue with the next step.

Figure 20



Test 9d – Check the power board

23. Set the power switch to OFF (**O**).

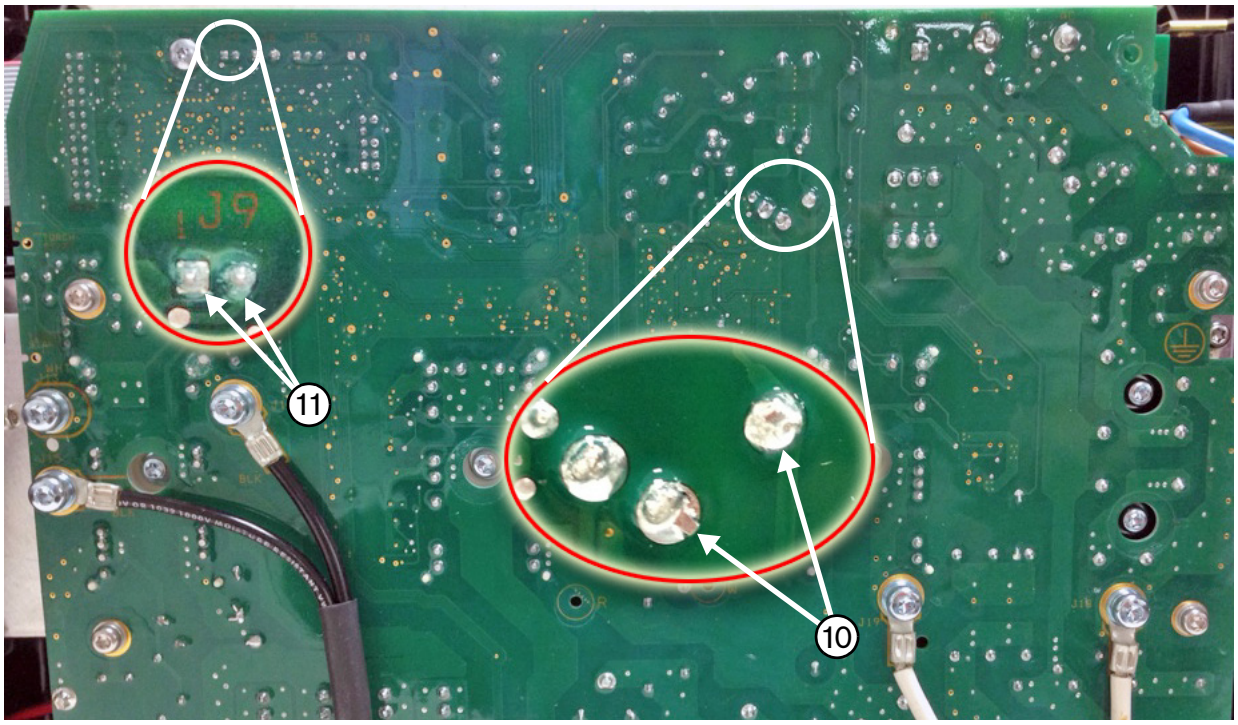
24. Remove the J1 and J3 connectors from the compressor-driver board. This isolates the power board.

25. Set the power switch to ON (**I**).

26. Check VBUS on the power board (nominal 375 VDC bus voltage) ⑩.

27. Quickly tap the torch trigger, then check compressor-enable voltage at J9 on the power board (3 VDC) ⑪.

Figure 21



28. Are VBUS and compressor-enable voltage present on the power board?

- **a.** If VBUS and compressor-enable voltage are both present on the power board, **replace the compressor-driver board**. See *Replace the compressor-driver board* on page 127.
- **b.** If neither VBUS nor compressor-enable voltage are present on the power board, **replace the power board**. See *Replace the power board* on page 132.
- **c.** If VBUS or compressor-enable voltage is present on the power board but the other is not, **replace the power board**. See *Replace the power board* on page 132.

Test 10 – check air pressure

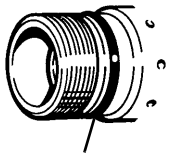
Use this test to determine if low air pressure is affecting system performance.

Tools required

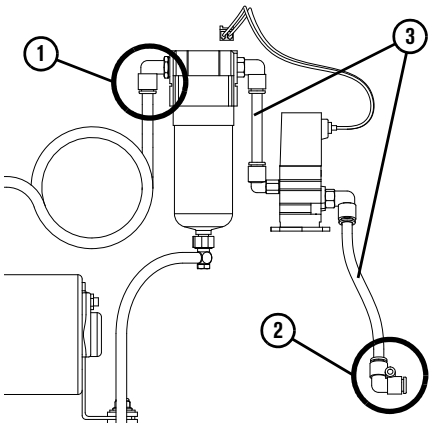
- Air pressure test gauge kit (428643)
- Leak detector solution (for example, Snoop®) or a mixture of gentle soap and water
- Silicone lubricant (027055)
- Multimeter
- Assorted Phillips® and TORX® screwdrivers

Troubleshooting steps

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Check the O-ring on the torch head.
   - If the torch O-ring is dry, apply a thin film of silicone lubricant (027055) on the O-ring and the threads. The O-ring should look shiny, but there should not be any excess or built-up lubricant.
   - If the O-ring is cracked or worn, replace it (428179).

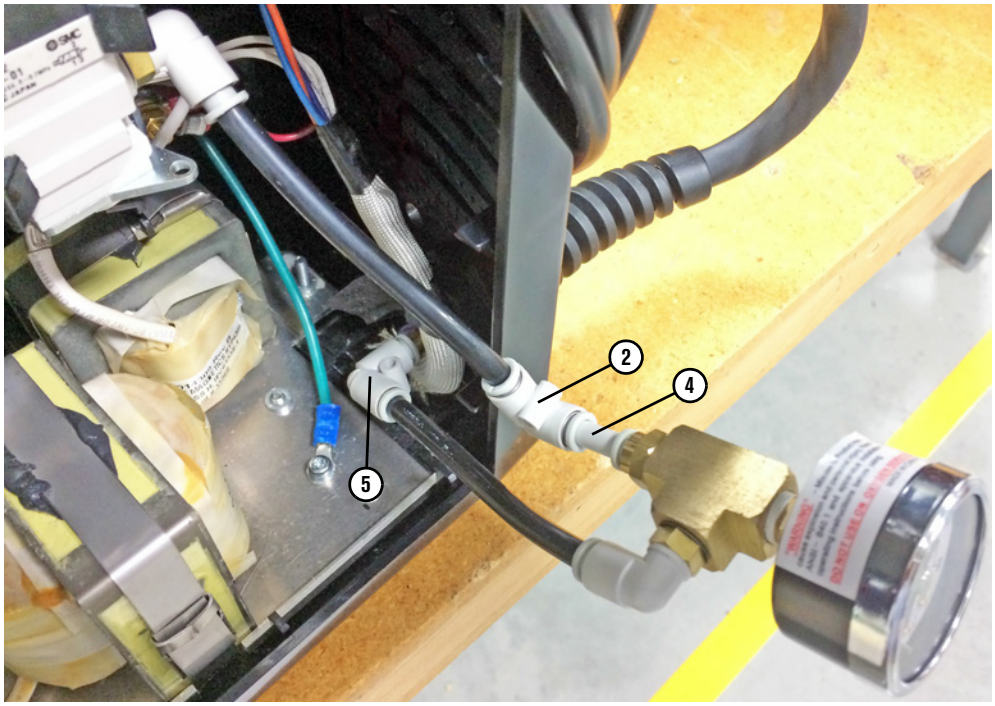

Torch O-ring

3. Install new consumables. Make sure they are the correct consumables for this system and torch and that they are installed correctly. See page 43.
4. Remove the power supply handle and cover. See page 104.
5. Make sure the heat exchange coil is fully seated in the 90° fitting ① on the air filter.
6. Make sure the 90° fitting ② is fully seated on the brass gas supply fitting from the torch lead.
7. Examine the 2 gas supply hoses ③ that connect to the solenoid valve. Make sure the hoses are fully seated in each 90° fitting. If the hoses are kinked or damaged, replace them. See page 139.



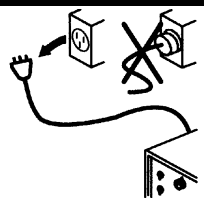
8. Connect the air pressure test gauge kit (428643) inside the power supply as shown in *Figure 22*:
   - **a.** From the fan side of the power supply, push-to-release the 90° fitting ② from the torch lead gas supply fitting.
   - **b.** Push-to-connect the 90° fitting ② onto the short tube of the pressure test gauge assembly ④.
   - **c.** Push-to-connect the 90° fitting from the pressure test gauge ⑤ onto the torch lead gas supply fitting.

Figure 22 – Pressure test gauge connected to power supply



WARNING!

ELECTRIC SHOCK CAN KILL



Use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the power supply that can cause serious injury or death.

While testing, do not touch the nozzle at the end of the torch. Dangerous voltages can cause serious injury.

See the *WARNING!* on page 57 before proceeding.

9. Reconnect the power cord, and set the power switch to ON (**I**).

10. Set the cutting current (amperage) as follows:
    - ❑ 22 A for 120 V electrical service
    - ❑ 30 A for 240 V electrical service

11. Perform a test cut in order to sustain a plasma arc for several seconds. Check the pressure reading on the gauge. It should read 2.9 – 3.4 bar (42 – 50 psi). (The pressure will be lower during postflow.)

With the compressor running, the needle on the gauge vibrates a lot. Ignore the highest and lowest points on the needle "swings." Make sure that, on average, the pressure remains within the range specified above.

12. Repeat the previous step 2–3 times to make sure the pressure readings are consistent.

13. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.

14. Remove the pressure test gauge assembly. Reconnect the 90° fitting to the gas supply fitting from the torch lead.

15. Reconnect the power cord, and set the power switch to ON (**I**).

16. If the air pressure was low, check the air compressor for proper voltage (15 V). See *Test 9a – Check the diagnostic LED (D5) on the compressor-driver board* on page 93.

17. Apply leak detector solution (for example, Snoop®) to check for leaks at the following points on the gas supply line. Quickly tap the torch trigger to force gas flow without firing an arc. See *Figure 23* on page 101.

- The 6 push-to-connect fittings between the air compressor and the torch lead gas supply fitting
- The 2 gas hoses that connect to each side of the solenoid valve
- Where the filter bowl screws into the air filter assembly
- Where the drain hose connects to the bottom of the filter bowl

> The fan may cause the appearance of a leak on some fittings even if there is not one. To avoid this, disconnect the fan from J5 on the power board before performing the leak test above. **Make sure to reconnect the fan before using the system.**

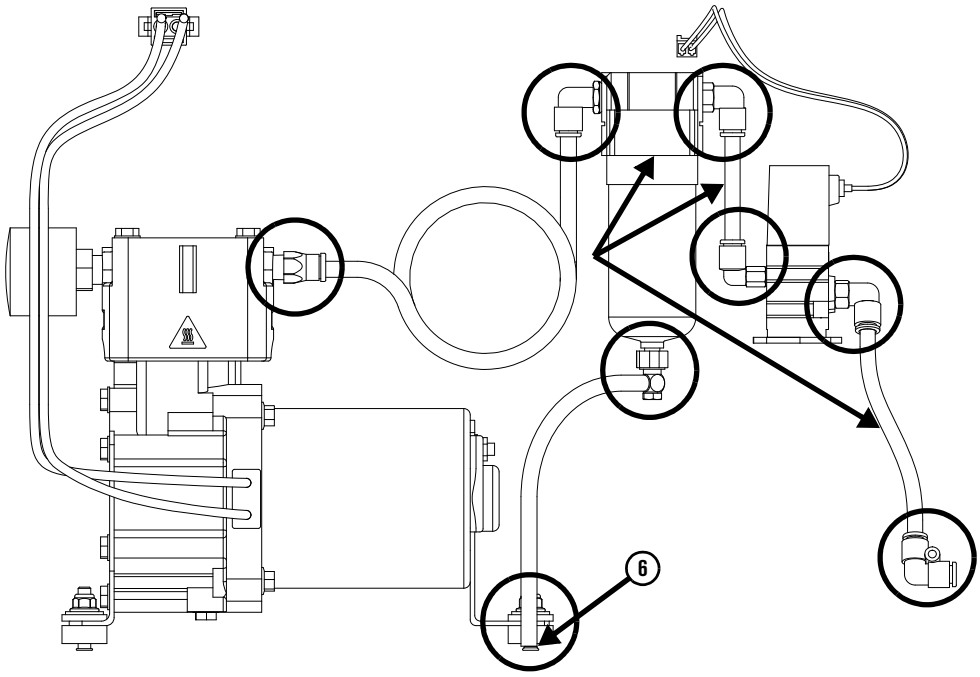
Replace damaged or defective parts as needed. See page 213 for replacement kit numbers.

18. Also check for leaks where the drain hose connects to the base of the power supply ⑥. Tilt the power supply so that you can feel if air is escaping through the hole in the base where the drain hose lets out.

19. Install a different torch to see if the low pressure issue persists. See page 150.

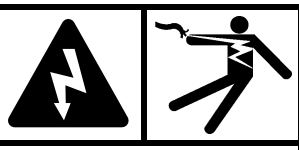
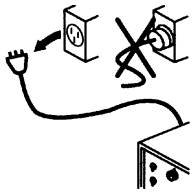
20. If low pressure persists after you complete all of these checks, the internal air compressor may be faulty. Install a new air compressor. See page 166.

Figure 23 – Where to check for gas leaks



Section 6

Power Supply Component Replacement

	**WARNING!** **ELECTRIC SHOCK CAN KILL**
	**Disconnect electrical power before performing any maintenance.** **All work requiring removal of the power supply cover must be performed by a qualified technician.** **See the *Safety and Compliance Manual* (80669C) for more safety precautions.**

	**CAUTION!**
	**Static electricity can damage circuit boards. Use proper precautions when handling printed circuit boards.** **Store PC boards in anti-static containers.** **Wear a grounded wrist strap when handling PC boards.**

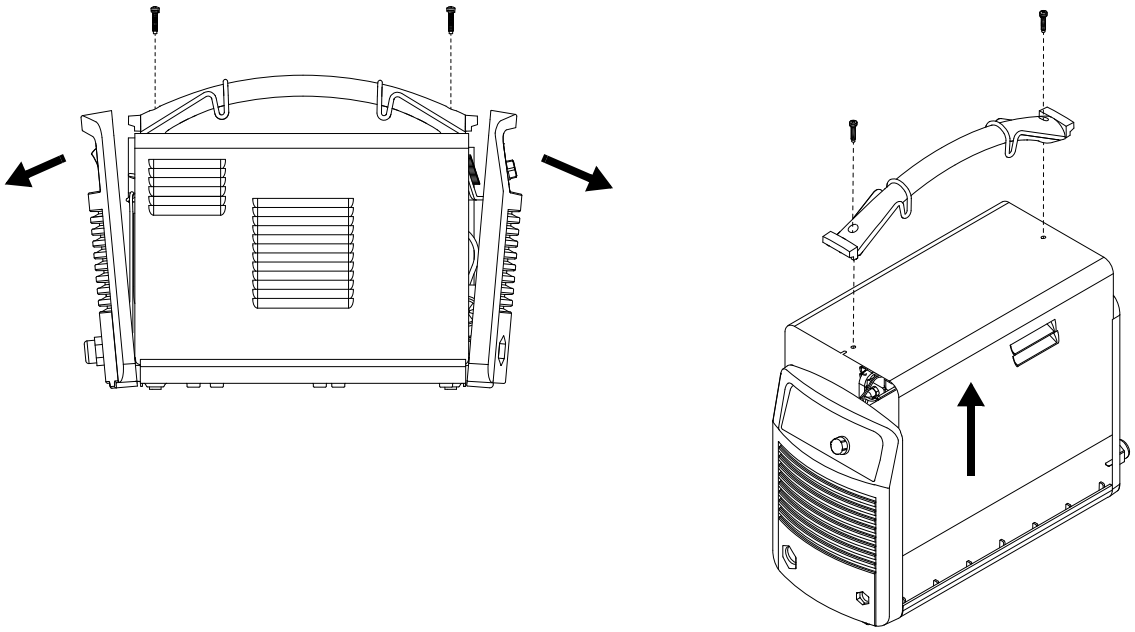
Replace the power supply cover

Kit number	Description
428396	*Kit: Power supply cover with labels, CSA*
428398	*Kit: Power supply cover with labels, CSA, Built in America*
428397	*Kit: Power supply cover with labels, CE*
428225	*Kit: Power supply cover with labels, CCC*

Remove the power supply cover

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the two screws from the handle on the top of the power supply. Gently pull on the panel nearest the screw you are removing to keep pressure on the screw. When the screw is almost out, tilt the screwdriver slightly to help pull the screw out of the recessed hole.
3. Slightly tip the front and rear panels away from the power supply so that you can get the edges of the handle out from underneath them. Remove the handle, and set it and the two screws aside.
4. Continue to tilt the panels outward to release the fan side of the cover from its track. Then lift the cover off the power supply.

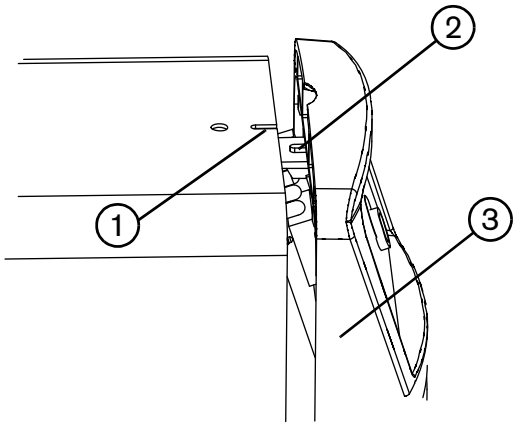
Figure 24



Install the power supply cover

1. Being careful not to pinch any wires, slide the cover onto the power supply. Align the bottom edges with the tracks, and align the slot in the top of the cover ① with the tab ② on the front panel ③ so that the largest louvers in the cover are in front of the fan.

Figure 25



2. Realign the front panel with the power supply.

3. Realign the rear panel with the power supply, making sure that the hole in the ground clip aligns with the screw holes in both the panel and the power supply.

4. Position the handle over the holes in the top of the cover, and position the ends of the handle underneath the edges of the panels.

   You may find it easier to install the screw near the rear panel before installing the screw near the front panel.

5. Install the 2 screws that attach the cover and handle. Tighten the screws to 23.0 kg·cm (20 inch·pounds).

6. Reconnect the power cord, and set the power switch to ON (**I**).

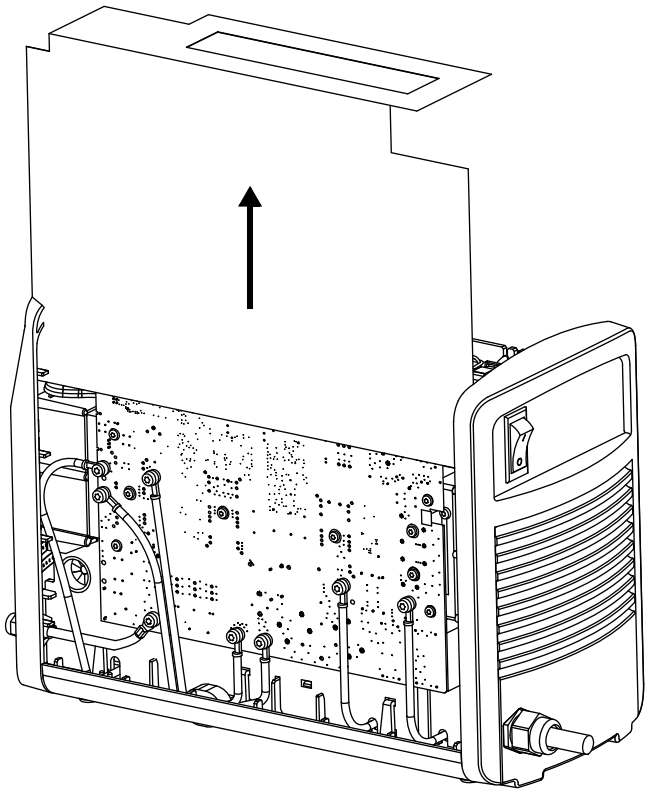
Replace the component barrier

Kit number	Description
428395	*Kit: Component barrier*

Remove the component barrier

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the power supply cover. See *Remove the power supply cover* on page 104.
3. Remove the component barrier from the power board side of the power supply. The barrier is flexible and can be bent slightly for removal.

Figure 26



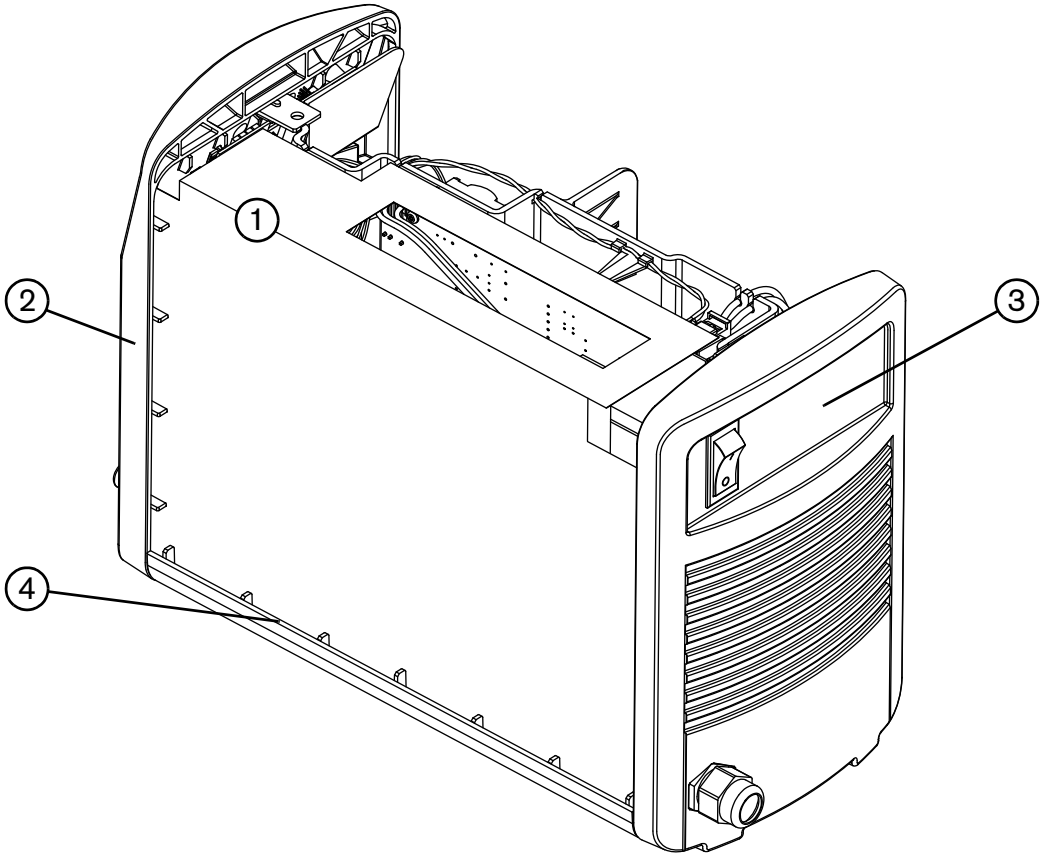
Install the component barrier

1. Position the component barrier ① so that the folded top edge will cover the top of the power board.
2. As you slide the barrier into place, tuck the sides and the bottom edge of the barrier behind the plastic notches that run along the inside of the front panel ②, rear panel ③, and plastic base.

   The barrier will not fit in the same track ④ as the power supply cover.

3. Put the power supply cover back in place. See *Install the power supply cover* on page 105.

Figure 27



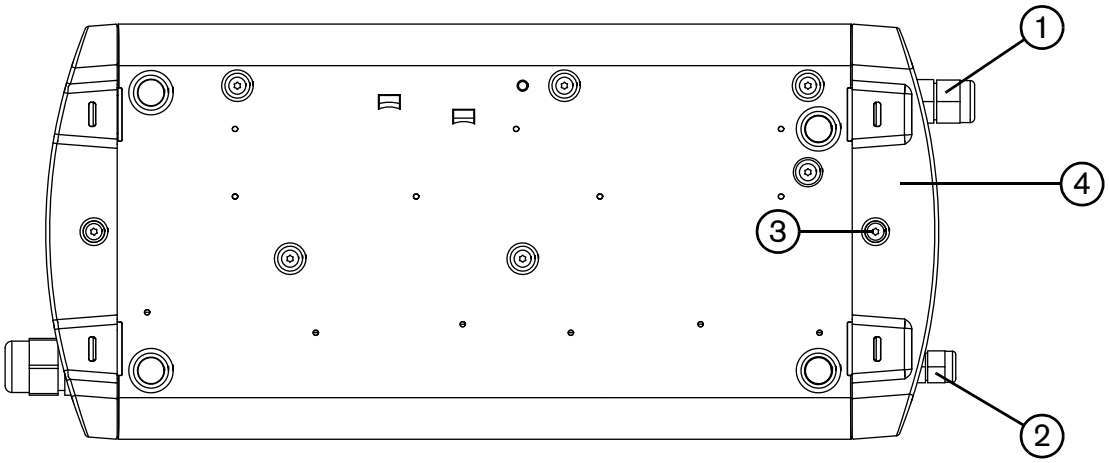
Detach and reattach the front panel

Several repairs are easier to make if you first detach the front panel from the power supply. For instructions on replacing an old front panel with a new one, see *Replace the front panel* on page 172.

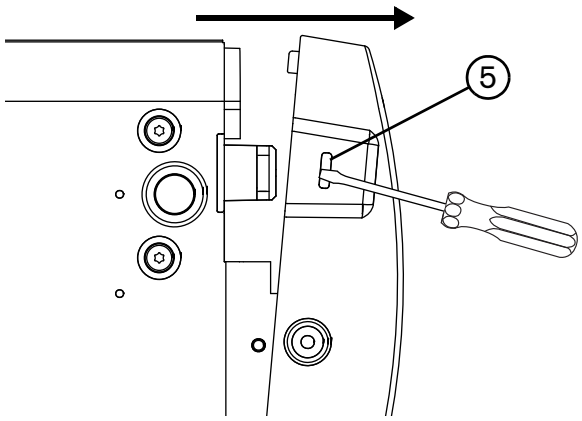
Detach the front panel

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the power supply cover. See *Remove the power supply cover* on page 104.
3. Loosen the strain relief nuts on the torch lead ① and work lead ②.
4. Lay the power supply on its side.
5. Remove the retaining screw ③ from the bottom of the front panel ④.

Figure 28



6. Insert a blade screwdriver into the opening for one of the snaps ⑤. While pushing up on the tab inside the snap, pull the corner of the front panel away from the power supply until it detaches from the base.

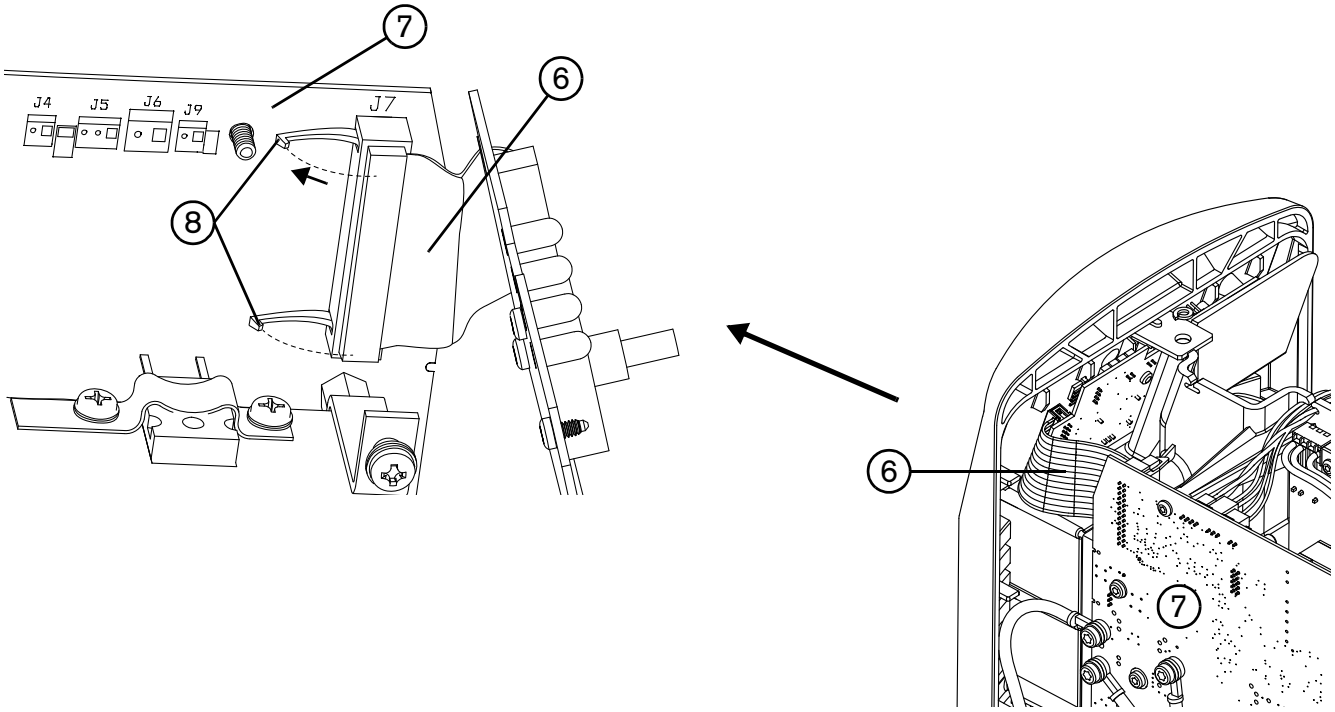


7. Repeat the previous step on the other corner of the panel.
8. Disconnect the control board's ribbon cable ⑥ from the power board ⑦ by folding the latches ⑧ back.

   In *Figure 29*, the center panel is hidden in the image on the left.

9. Gently pull the panel away from the power supply.

Figure 29



Reattach the front panel

1. Push the front panel into the base of the power supply until it snaps into place.
2. Tighten the retaining screw to 23.0 kg·cm (20 inch·pounds). See *Figure 28* on page 108.
3. Reconnect the control board's ribbon cable to the power board at J7. Make sure the latches are folded up to hold the connector in place.
4. Tighten the strain relief nuts on the torch lead and work lead.
5. Put the power supply cover back in place. See *Install the power supply cover* on page 105.

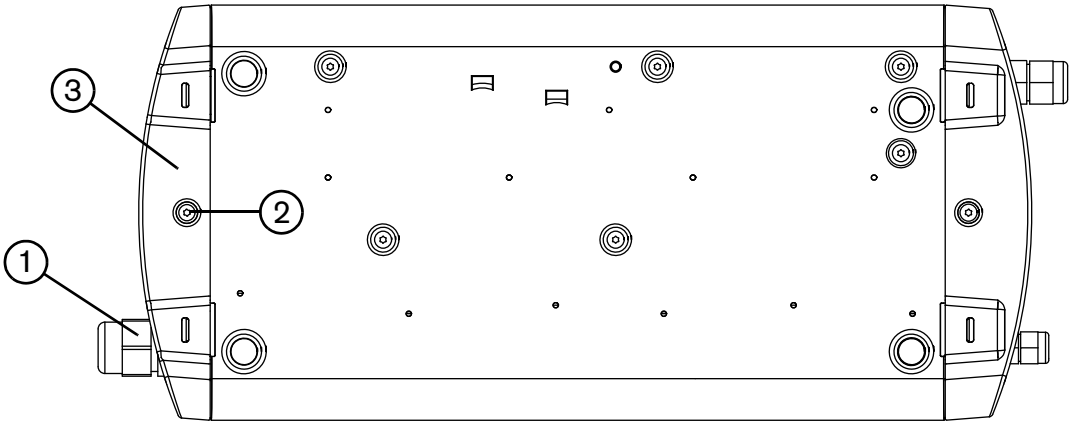
Detach and reattach the rear panel

Several repairs are easier to make if you detach the rear panel from the power supply. For instructions on replacing an old rear panel with a new one, see *Replace the rear panel* on page 175.

Detach the rear panel

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the power supply cover. See *Remove the power supply cover* on page 104.
3. Loosen the power cord's strain relief nut ①.
4. Lay the power supply on its side.
5. Remove the retaining screw ② from the bottom of the rear panel ③.

Figure 30



6. Insert a blade screwdriver into the opening for one of the snaps ④. While pushing up on the tab inside the snap, pull the corner of the rear panel away from the power supply until it detaches from the base.

7. Repeat the previous step on the other corner of the panel.

8. Disconnect the ground wire ⑤ from the ground wire clip ⑥ near the top of the rear panel ⑦. See *Figure 31*.

9. Gently pull the panel away from the power supply.

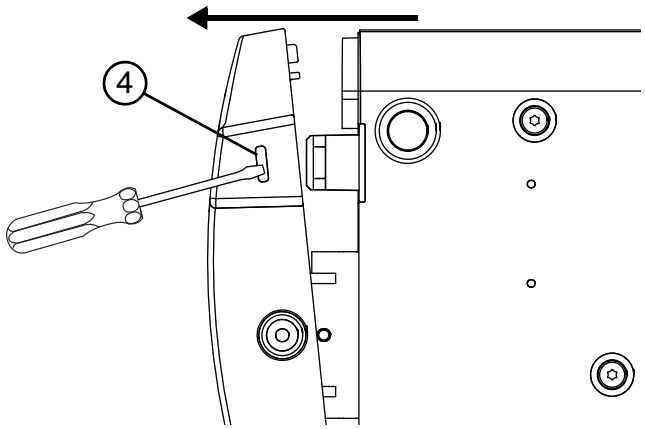
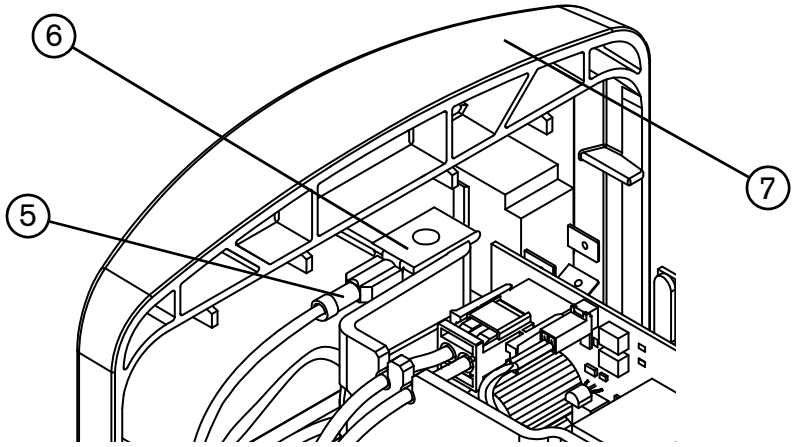


Figure 31

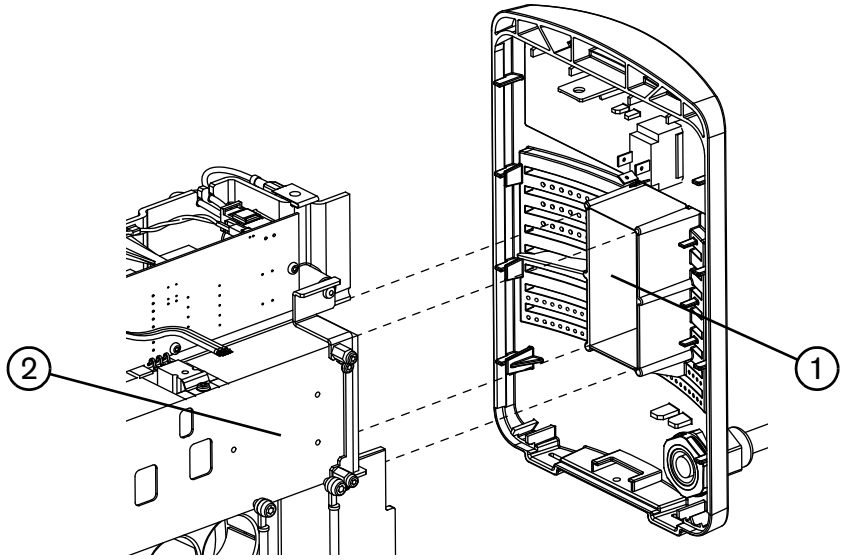


Reattach the rear panel

1. Push the rear panel into the base until it snaps into place.
2. Make sure the hole in the ground wire clip is aligned with the screw holes in the rear panel and the power supply. See *Figure 31*.
3. Tighten the retaining screw to 23.0 kg·cm (20 inch·pounds). See *Figure 30* on page 110.
4. Align the rear panel so the rectangular box ① on the inside of the panel slides over the heatsink ② in the power supply.

   The power board and the wires from the power cord are hidden in *Figure 32* in order to show the heatsink and the inside of the rear panel.

Figure 32



5. Reconnect the ground wire to the ground wire clip.
6. Tighten the strain relief nut on the power cord.
7. Put the power supply cover back in place. See *Install the power supply cover* on page 105.

Replace the power cord and strain relief

Kit number	Description
228210	*Kit: CSA power cord with NEMA twist lock-style 240 V / 20 A plug, 1-phase, 3.0 m (10 feet) (strain relief not included)*
428390	*Kit: CE power cord, 1-phase, 3.0 m (10 feet) (plug and strain relief not included)*
428231	*Kit: CCC power cord, 1-phase, 3.0 m (10 feet) (plug and strain relief not included)*
228143	*Kit: Power cord strain relief*

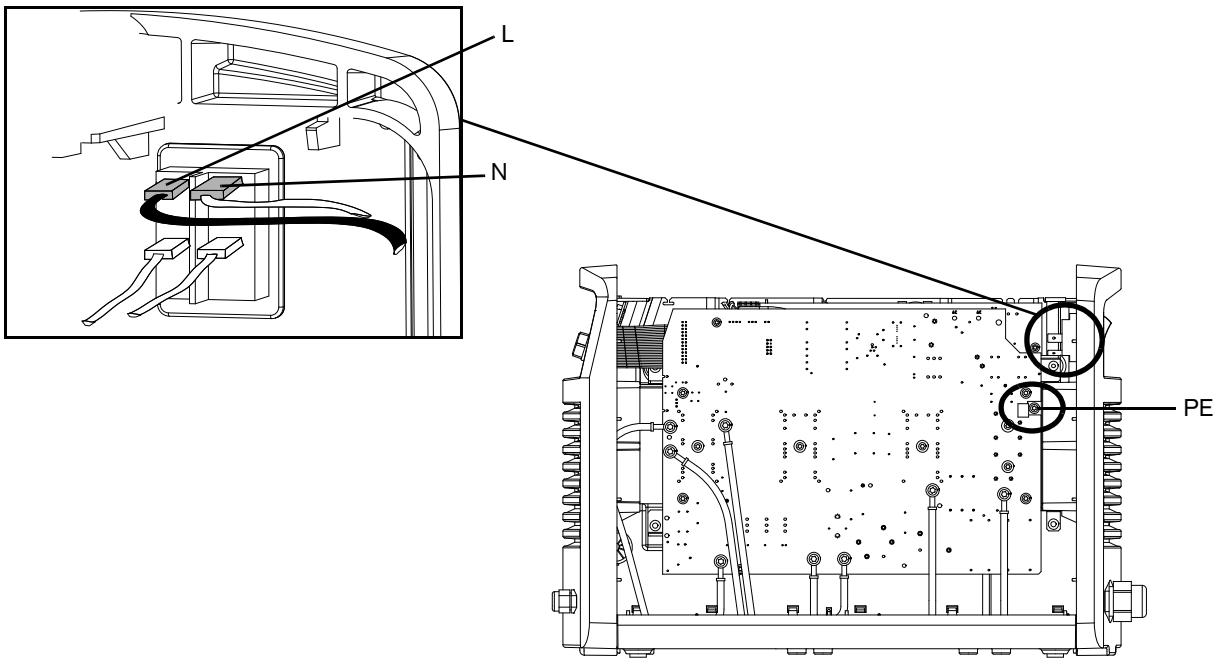
Remove the power cord and strain relief

CSA power cords

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Remove the component barrier* on page 106.
   d. See *Detach the rear panel* on page 110.

2. Remove the black and white wires from the top of the power switch.

Figure 33 – Single-phase CSA power cord wires

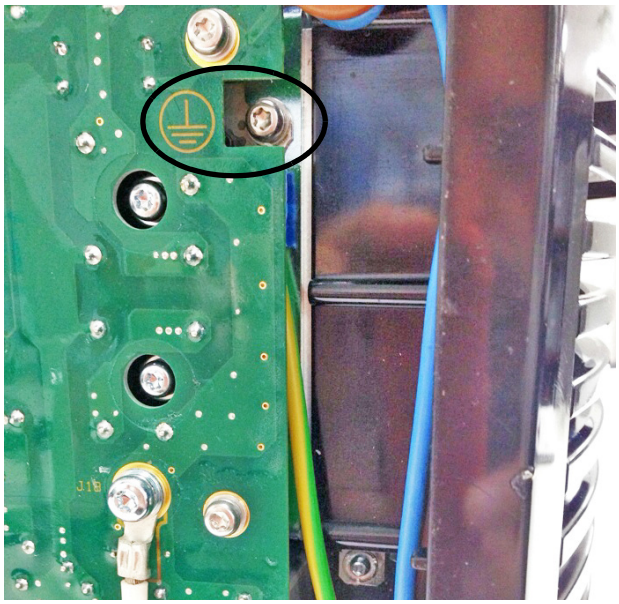


Designator	Wire color
L (live)	Black
N (neutral)	White
PE (ground)	Green

The power cord has a black wire and a white wire that connect to the power switch and a green ground wire that connects to the heatsink.

3. Remove the screw that holds the ground wire to the heatsink. A notch in the power board provides access to the screw. See *Figure 34*.

Figure 34



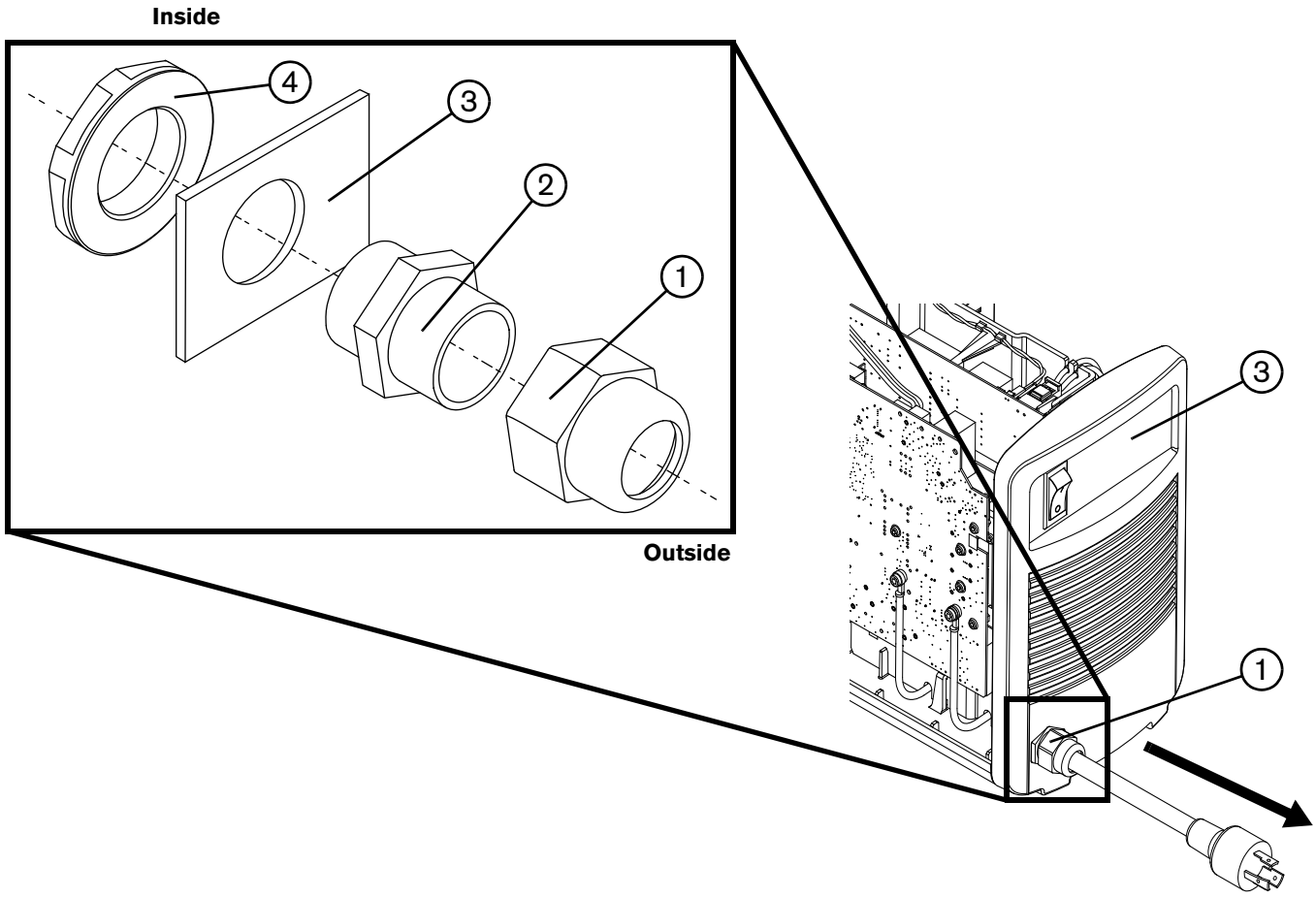
4. On the outside of the power supply, loosen the power cord's strain relief nut ① so that the wires move freely.

5. From outside of the power supply, pull the wires through the strain relief ② and through the hole in the rear panel ③ to remove the power cord.

6. Are you replacing the strain relief?

   - ❑ If yes, use an adjustable wrench to unscrew the retention nut ④ on the inside of the power supply. Remove the strain relief from the rear panel.
   - ❑ If no, continue with *Install the power cord and strain relief* on page 120.

Figure 35



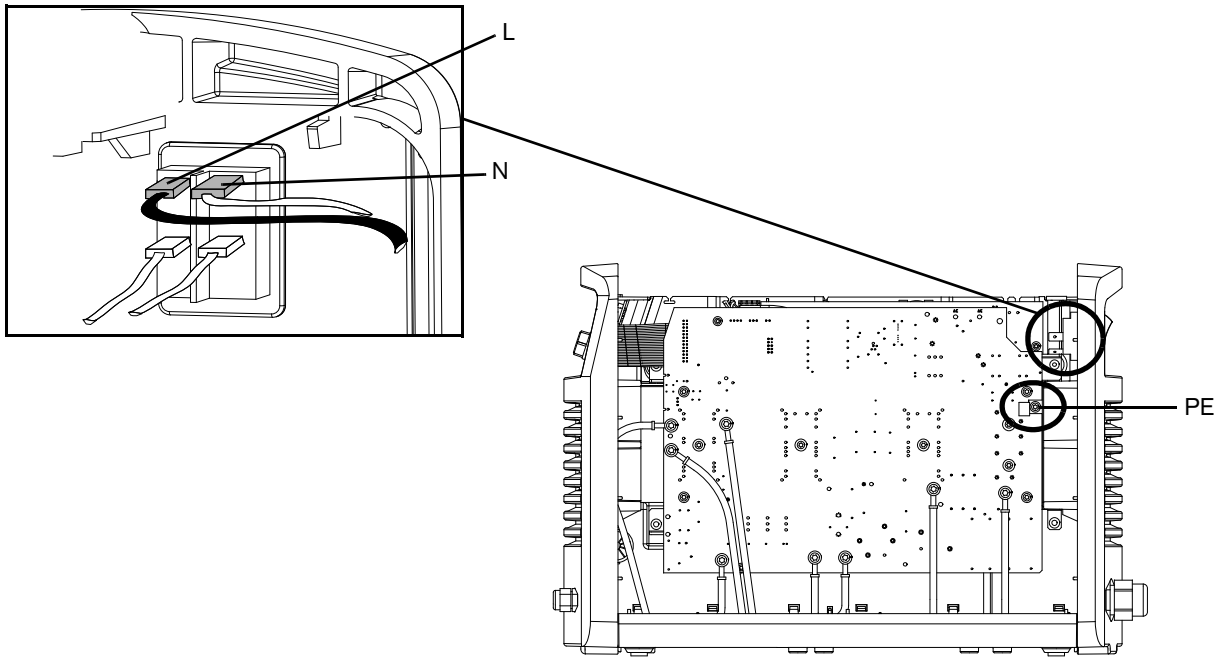
CE and CCC power cords

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Remove the component barrier* on page 106.
   d. See *Detach the rear panel* on page 110.

CE and CCC power cords have a brown wire and a blue wire that connect to the power switch and a green/yellow ground wire that connects to the heatsink.

2. Remove the blue and brown wires from the power switch.

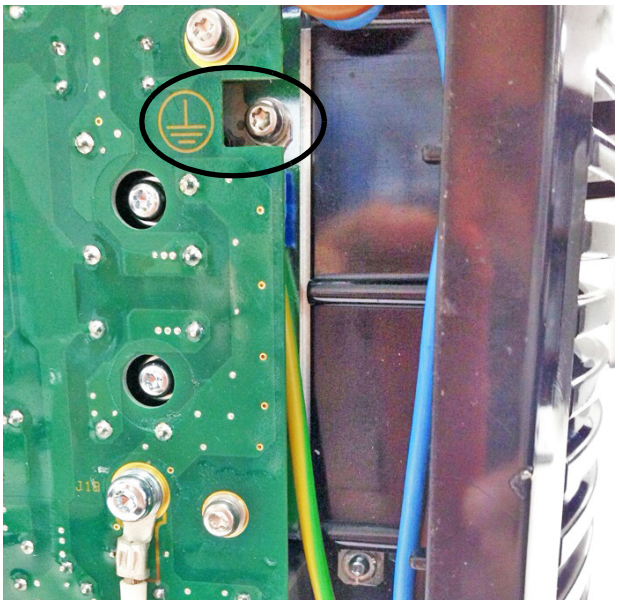
Figure 36 – Single-phase CE and CCC power cord wires



Designator	Wire color
L (live)	Brown
N (neutral)	Blue
PE (ground)	Green/yellow

3. Remove the screw that holds the green/yellow ground wire to the heatsink. A notch in the power board provides access to the screw.

Figure 37



4. On the outside of the power supply, loosen the power cord's strain relief nut ① so that the wires move freely.

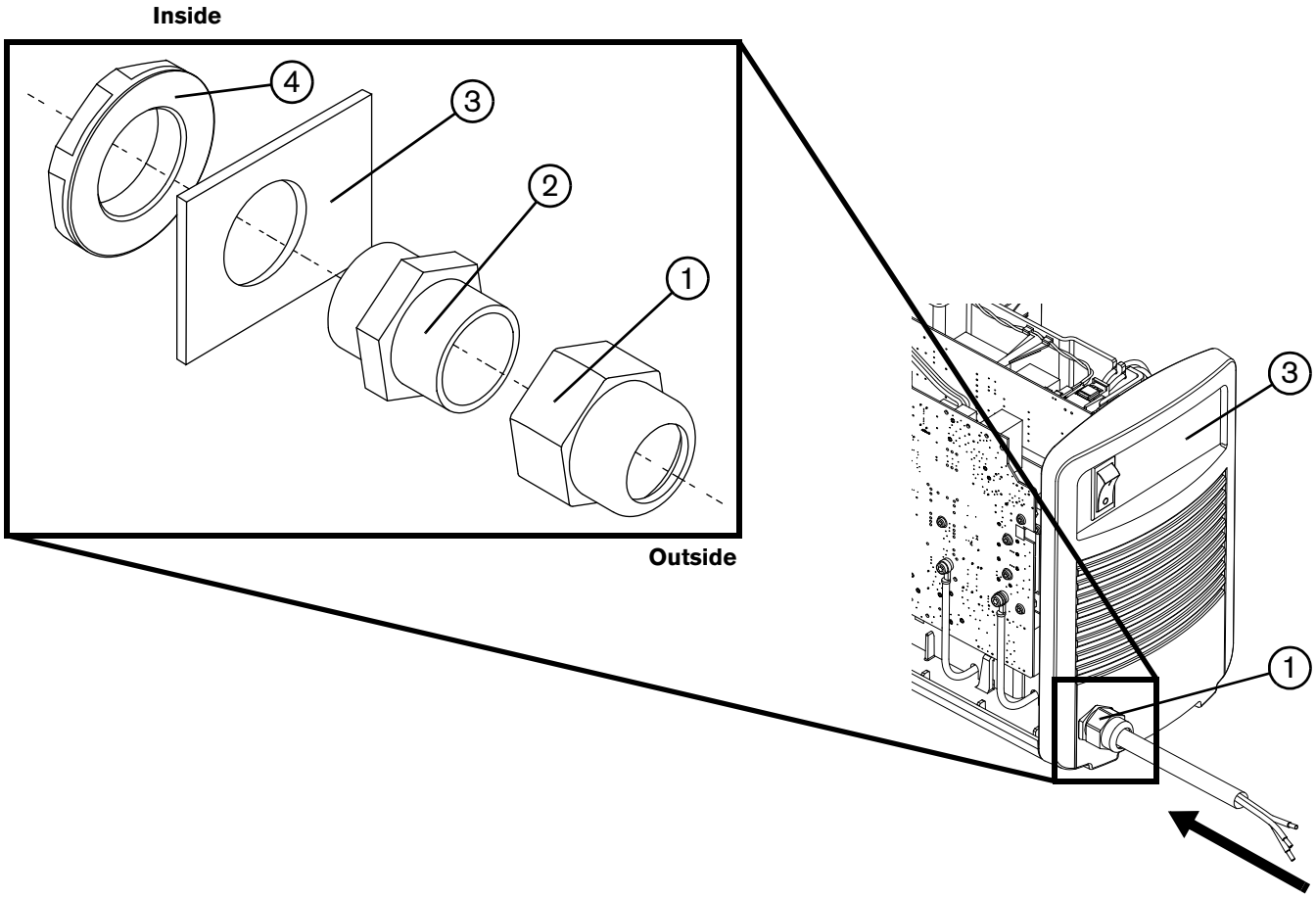
5. Remove the power plug from the old power cord.

6. From the inside of the power supply, pull the wires through the strain relief ② and the hole in the rear panel ③. See *Figure 38*. (You cannot remove the wires from outside the power supply because of the ferrite core installed on the wires.)

7. Are you replacing the strain relief?

   - ❑ If yes, use an adjustable wrench to unscrew the retention nut ④ on the inside of the power supply. Remove the strain relief from the rear panel.
   - ❑ If no, continue with *Install the power cord and strain relief* on page 120.

Figure 38



Install the power cord and strain relief

CSA power cords

1. Are you installing a new strain relief?
   - ❑ If yes, insert the strain relief into the rear panel and tighten the retention nut onto the strain relief. Loosely tighten the strain relief nut on the outside of the power supply onto the strain relief.
   - ❑ If no, continue with the next step.
2. Route the wires for the power cord through the strain relief nut and strain relief. Orient the power cord so the green ground wire is below the other 2 wires, closer to the bottom of the rear panel.
3. Press the connector for the black wire onto the pin on the upper left side of the power switch.
4. Press the connector for the white wire onto the pin on the upper right side of the power switch.
5. Tighten the green ground wire to the heatsink. Tighten the screw to 23.0 kg·cm (20 inch·pounds).
6. Position the black and white wires in the wire chase up the side of the rear panel and out of the way of the power board. At the same time realign the rear panel with the power supply. See *Reattach the rear panel* on page 112.
7. Tighten the strain relief nut on the outside of the rear panel.
8. Complete the following procedures:
   a. See *Install the component barrier* on page 107.
   b. See *Install the power supply cover* on page 105.
   c. Reconnect the power cord, and set the power switch to ON (**I**).

CE and CCC power cords

1. Are you installing a new strain relief?
   - ❑ If yes, insert the strain relief into the rear panel and tighten the retention nut onto the strain relief. Loosely tighten the strain relief nut on the outside of the power supply onto the strain relief.
   - ❑ If no, continue with the next step.
2. Route the wires for the power cord through the strain relief from the inside of the rear panel.

   Because the power cord includes the ferrite core, you cannot route the power cord through the strain relief from the outside of the power supply. Do not remove the ferrite core from the power cord wires.

3. Press the connector for the brown wire onto the pin on the upper left side of the power switch.
4. Press the connector for the blue wire onto the pin on the upper right side of the power switch.
5. Tighten the green/yellow ground wire to the heatsink. Tighten to screw to 23.0 kg·cm (20 inch·pounds).
6. Position the brown and blue wires in the wire chase up the side of the rear panel and out of the way of the power board. At the same time realign the rear panel with the power supply. See *Reattach the rear panel* on page 112.
7. Tighten the strain relief nut on the outside of the rear panel.
8. Complete the following procedures:
   - **a.** See *Install the component barrier* on page 107.
   - **b.** See *Install the power supply cover* on page 105.
   - **c.** Reconnect the power cord, and set the power switch to ON (**I**).

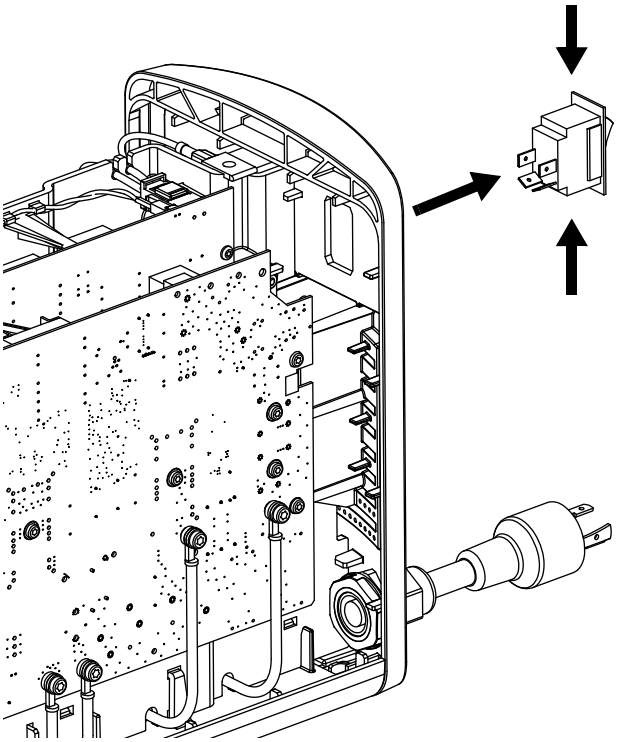
Replace the power switch

Kit number	Description
428235	*Kit: Power switch*

Remove the power switch

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Remove the component barrier* on page 106.
2. Gently tilt the top of the rear panel away from the power supply, then disconnect the 4 wires from the back of the power switch.
3. Using a small blade screwdriver, press up one of the tabs on the bottom of the power switch, and push that corner of the switch out of the rear panel.
4. Press up the other tab on the bottom of the power switch, and push that corner of the switch out of the panel. Make sure the first tab does not snap back into place as you release the second tab.
5. Repeat the previous two steps on the top of the power switch to push the top of the switch out of the rear panel. Remove the switch completely from the panel.

Figure 39



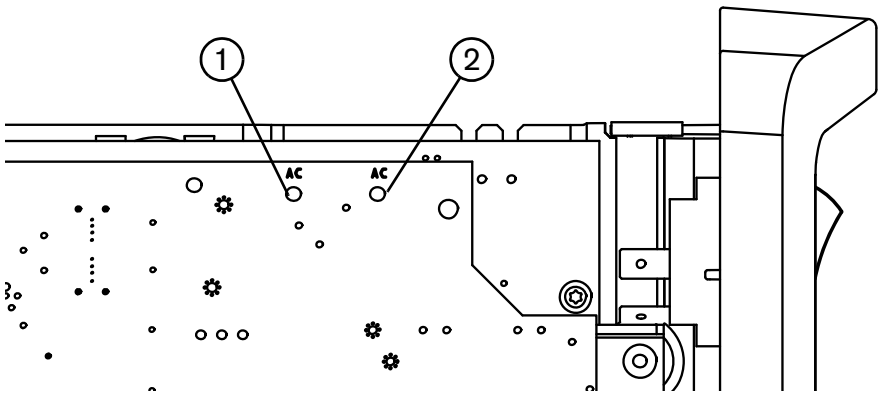
Install the power switch

1. Press the new power switch into the rear panel with the ON (**I**) label at the top of the switch.

   You should hear the switch snap into place.

2. Press the connectors for the 2 white wires that are attached to the power board at “AC” onto the bottom 2 pins of the power switch. The left “AC” wire ① connects to the bottom-left pin on the power switch; the right “AC” wire ② connects to the bottom-right pin on the power switch. See *Figure 40* and *Figure 41*.

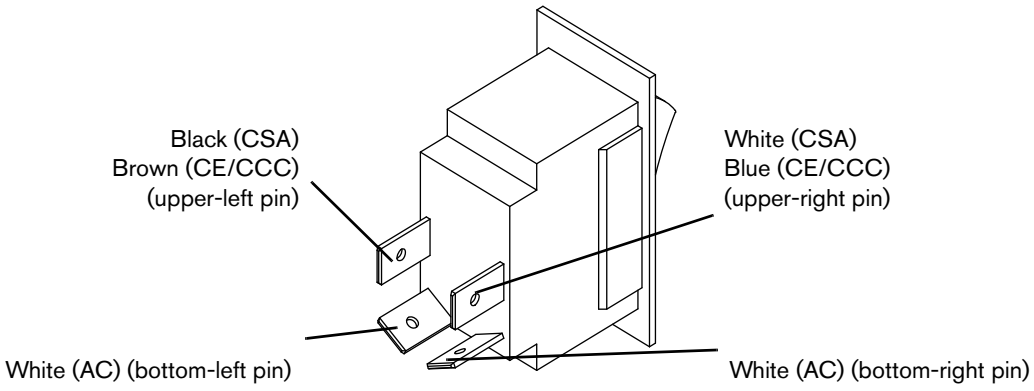
Figure 40



3. Press the connector for the black (CSA) or brown (CE/CCC) wire onto the upper-left pin on the power switch.

4. Press the connector for the white (CSA) or blue (CE/CCC) wire onto the upper-right pin on the power switch.

Figure 41



5. Complete the following procedures:
   - **a.** See *Install the component barrier* on page 107.
   - **b.** See *Install the power supply cover* on page 105.
   - **c.** Reconnect the power cord, and set the power switch to ON (**I**).

Replace the control board

Kit number	Description
428404	*Kit: Control board (141365)*

	**CAUTION!**
	**Static electricity can damage circuit boards. Use proper precautions when handling printed circuit boards.** **Store PC boards in anti-static containers.** **Wear a grounded wrist strap when handling PC boards.**

1. Complete the following procedures:
   - **a.** Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   - **b.** See *Remove the power supply cover* on page 104.
   - **c.** See *Remove the component barrier* on page 106.
   - **d.** See *Detach the front panel* on page 108.
2. Make sure the control board's ribbon cable ① is disconnected from the power board ②. See *Figure 42*.

	**WARNING!** **ELECTRIC SHOCK CAN KILL**
	**Stay clear of electrical wires and components while testing the new control board.**

3. Test the new control board ③ before installing it:
   - **a.** Attach the control board's ribbon cable to the power board at J7.
   - **b.** Reconnect the power cord to the power source, and turn the system ON (**I**).
   - **c.** Make sure the Start LED on the control board is the only LED illuminated. Also, the fault LEDs on the front panel should be extinguished. See *Control board LEDs* on page 73.

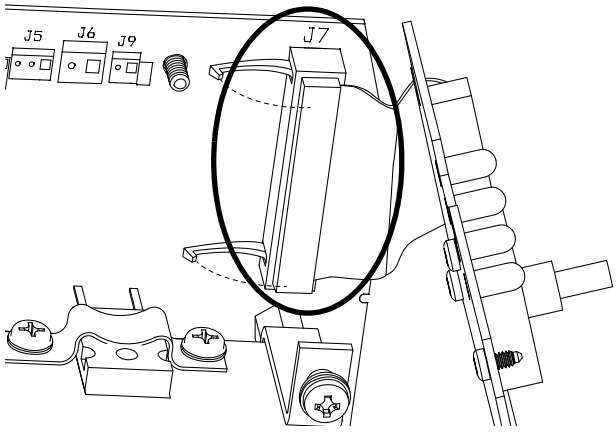
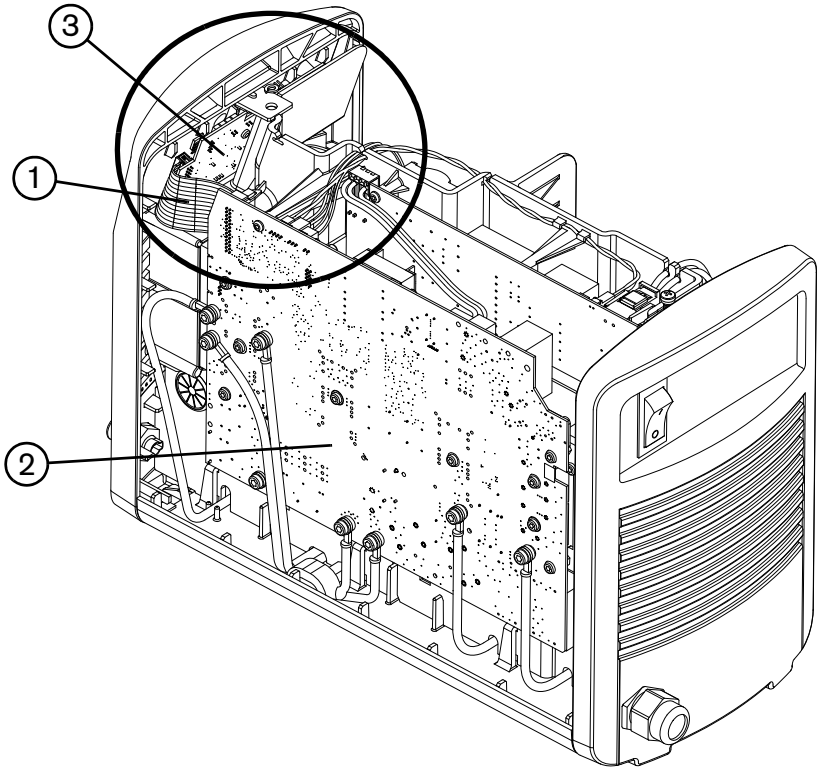


Figure 42

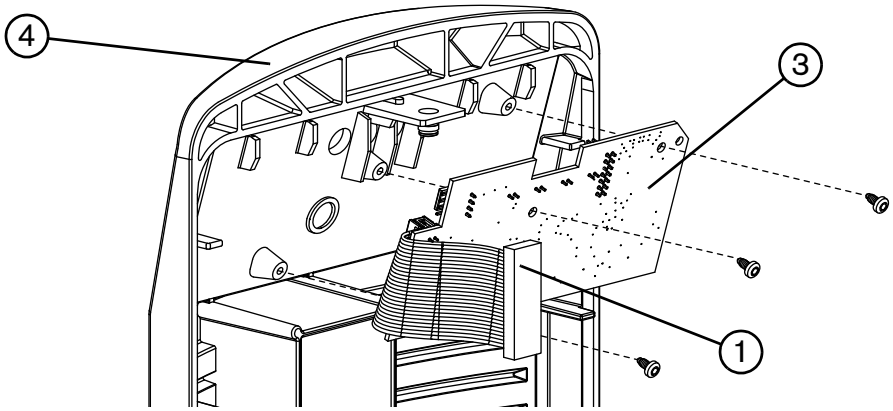


4. Turn the system OFF (**O**). Disconnect the power cord from the power source, disconnect the ribbon cable ①, and set the new control board ③ aside.

5. Remove the amperage adjustment knob from the front of the power supply by pulling it away from the front panel ④. (It does not have a set screw.)

6. Remove the 3 retaining screws from the control board. Lift the board out of the front panel.

Figure 43



7. Slide the new control board into place, and attach it to the front panel with 3 retaining screws. Tighten the screws to 4.6 kg·cm (4 inch·pounds).

8. Connect the ribbon cable to the power board at J7 (5), and fold the latches up to hold the connector in place.

9. Press the amperage adjustment knob onto the post on the front panel of the power supply.

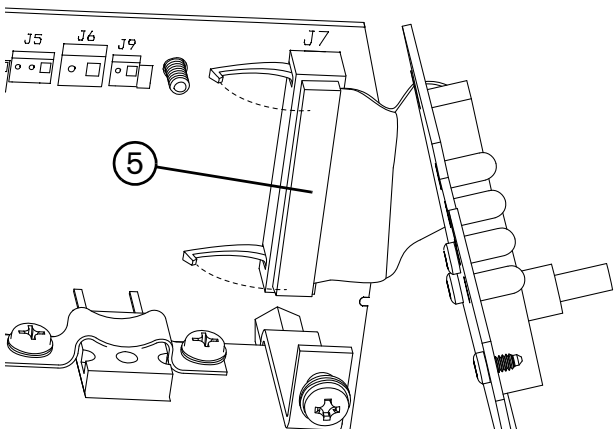
10. Complete the following procedures:

    a. See *Reattach the front panel* on page 109.

    b. See *Install the component barrier* on page 107.

    c. See *Install the power supply cover* on page 105.

    d. Reconnect the power cord, and set the power switch to ON (**I**).



Replace the compressor-driver board

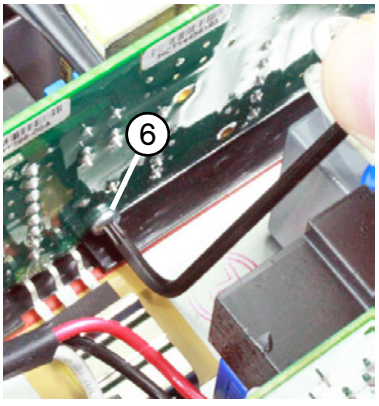
Kit number	Description
428401	*Kit: Compressor-driver board (includes thermal strips and polyimide tape) (141298)*

	**CAUTION!**
	**Static electricity can damage circuit boards. Use proper precautions when handling printed circuit boards.** **Store PC boards in anti-static containers.** **Wear a grounded wrist strap when handling PC boards.**

Remove the compressor-driver board

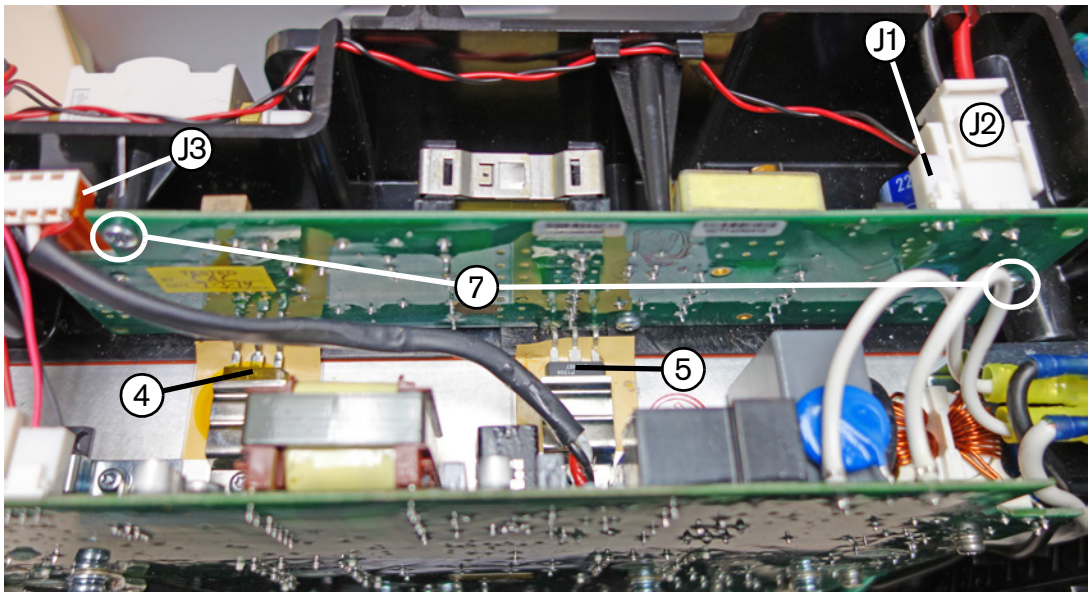
1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Remove the component barrier* on page 106.
2. Remove the wire connectors from the compressor-driver board at J1, J2, and J3. See *Figure 44* on page 128.
3. Remove the screws that secure the clips covering the MOSFET ④ and diode ⑤. Remove the clips and set them aside.
4. Use a right-angle TORX® screwdriver to loosen the retaining screw ⑥ near the bottom of the compressor-driver board, just above the heatsink. Do not remove the screw.

   A quarter turn to a half turn on the screw should loosen it enough for you to remove the compressor-driver board.



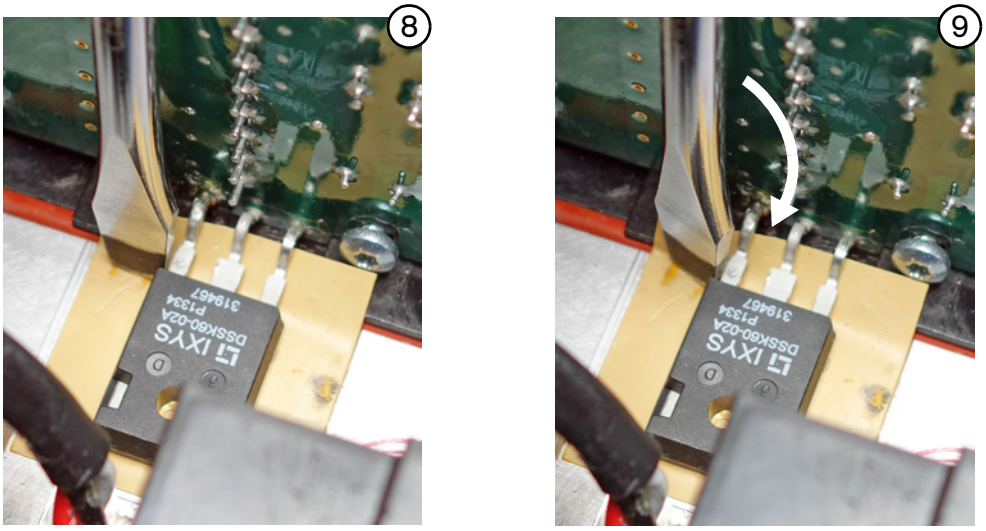
5. Remove the 2 retaining screws ⑦ from the left side and right side of the compressor-driver board.

Figure 44



6. Being careful not to scratch the heatsink, position the head of a large blade screwdriver so that it is parallel to the top edge of the diode and next to the diode's curved metal prongs ⑧. Slowly twist the screwdriver so that it pushes against the diode ⑨. Continue twisting until the diode breaks free from the thermal strip.

Figure 45

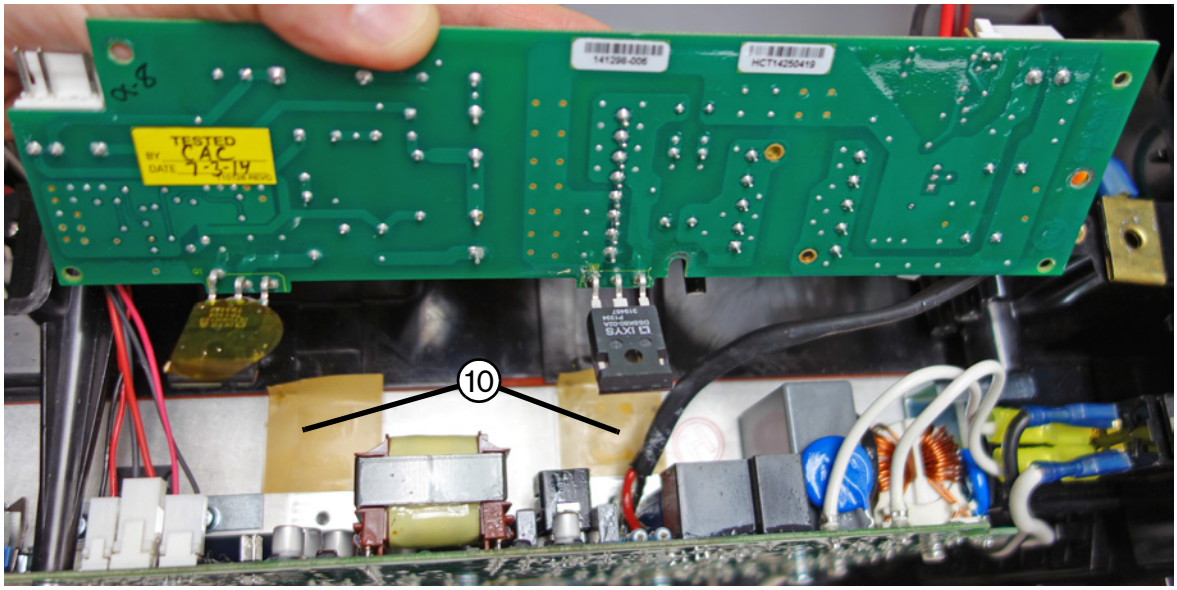


7. Repeat the previous step to detach the MOSFET from its thermal strip.

8. Make sure the MOSFET and diode are fully detached from the heatsink. Lift the compressor-driver board out of the power supply.

9. Peel both thermal protection strips ⑩ off the heatsink. If the ends of the strips are tucked down between the heatsink and center panel, firmly grip both corners of the strip and pull up to remove it from the power supply.

Figure 46



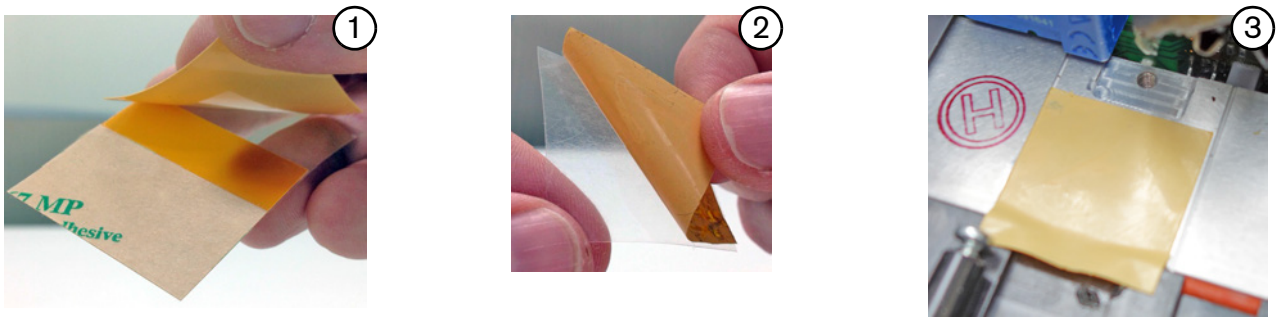
Install the compressor-driver board

1. Being careful not to scratch the heatsink, use a clean, soft cloth with isopropyl alcohol to remove any residual adhesive from the top of the heatsink.

2. Remove a square thermal strip from its long backing tab ①. Peel the thermal strip off its clear backing sheet ②. Adhere the thermal strip evenly to the heatsink where the diode sits ③. Make sure the strip meets the groove in the heatsink where the clip will be attached.

   If there are any creases or air bubbles in the thermal strip, remove it and apply a new one. The kit contains additional strips.

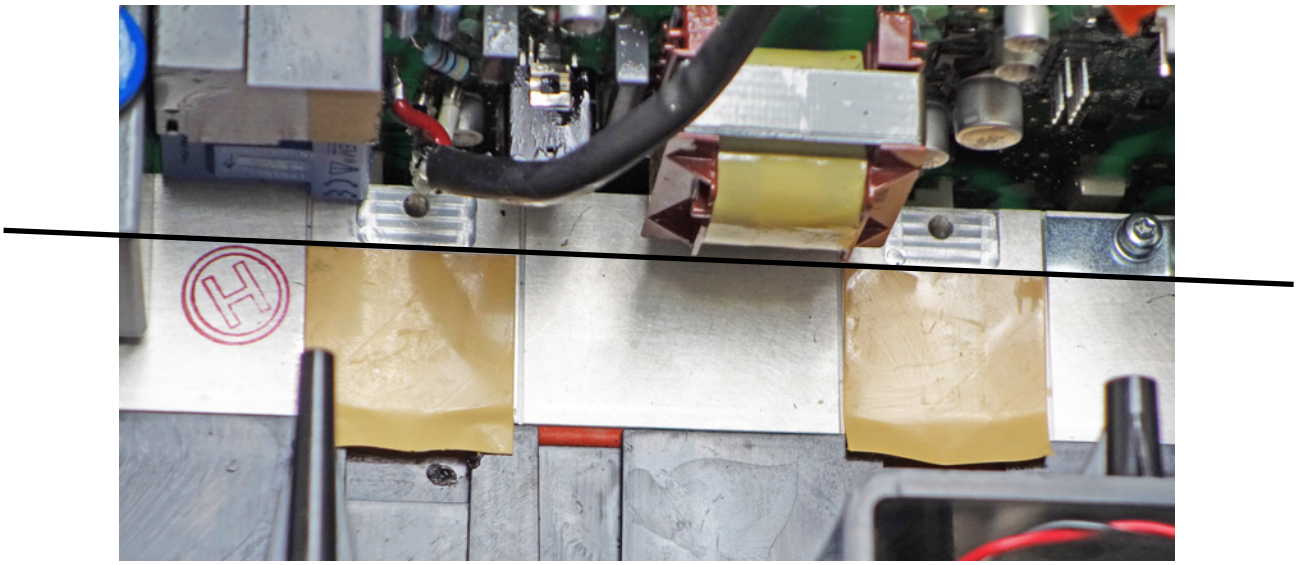
Figure 47



3. Repeat the previous step to apply a thermal strip to the heatsink where the MOSFET sits.

4. Make sure the thermal strips line up with the grooves where the clips attach to the heatsink. The thermal strips need to reach – or extend slightly beyond – the line shown in *Figure 48*.

Figure 48

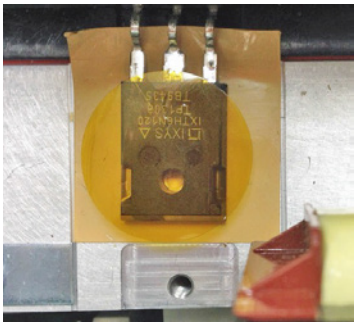


5. Place the new compressor-driver board in the power supply. Position the open slot at the bottom of the board over the retaining screw you loosened in *step 4* on page 127. Make sure the MOSFET and diode:
   - ❑ Are centered on the thermal strips and are not touching the heatsink directly.
   - ❑ Sit evenly on the thermal strips and are not angled in any direction.
6. Install the 2 retaining screws on the left side and right side of the compressor-driver board to secure the new board to the center panel. Tighten the screws to 17.3 kg·cm (15 inch·pounds).
7. Tighten the third retaining screw near the bottom of the board, just above the heatsink. Tighten the screw to 17.3 kg·cm (15 inch·pounds).

CAUTION!

Do not forget to tighten the screw at the bottom of the compressor-driver board. This screw helps to ensure the stability and reliability of the board.

8. Peel a circular piece of polyimide tape off its backing sheet. Adhere it evenly to the top of the MOSFET. Make sure the tape covers the MOSFET completely.



9. Install the clips that cover the MOSFET and diode. Tighten the screws to 17.3 kg·cm (15 inch·pounds).

   Make sure the screw for the diode's clip goes straight down into the heatsink. Do not angle the screw as you install it.

10. Reconnect the wire connectors at J1, J2, and J3 on the compressor-driver board. See *Figure 44* on page 128.
11. Complete the following procedures:
    - **a.** See *Install the component barrier* on page 107.
    - **b.** See *Install the power supply cover* on page 105.
    - **c.** Reconnect the power cord, and set the power switch to ON (**I**).

Replace the power board

Kit number	Description
428402	*Kit: Power board, CSA (141351)*
428403	*Kit: Power board, CE and CCC (141357)*

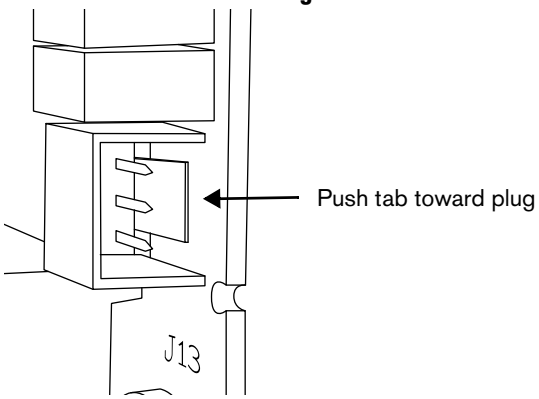
Although there are some technical differences between the power board for CSA power supplies and the power board for CE/CCC power supplies, the procedure to replace the boards is the same.

	**CAUTION!**
	**Static electricity can damage circuit boards. Use proper precautions when handling printed circuit boards.** **Store PC boards in anti-static containers.** **Wear a grounded wrist strap when handling PC boards.**

Remove the power board

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Remove the component barrier* on page 106.
   d. See *Detach the front panel* on page 108.
2. Make sure the J7 connector from the control board is removed from the power board. See *Figure 50* on page 133.
3. Remove the TORCH START connector (J12) on the component side of the power board by pushing the tab on the connector toward the plug and pulling the plug out.

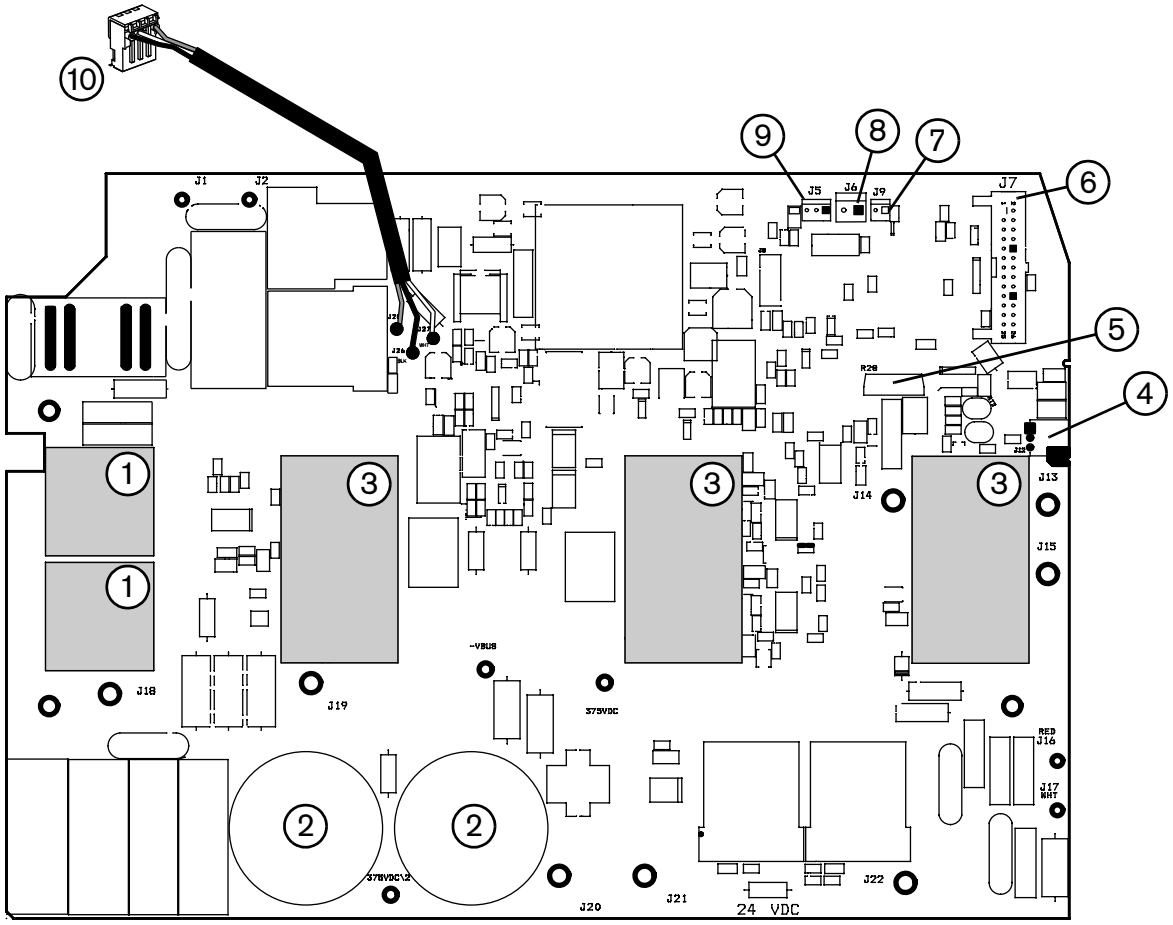
Figure 49



4. Remove the connectors at J5, J6, and J9 on the component side of the power board.

5. Remove the J3 connector from the compressor-driver board.

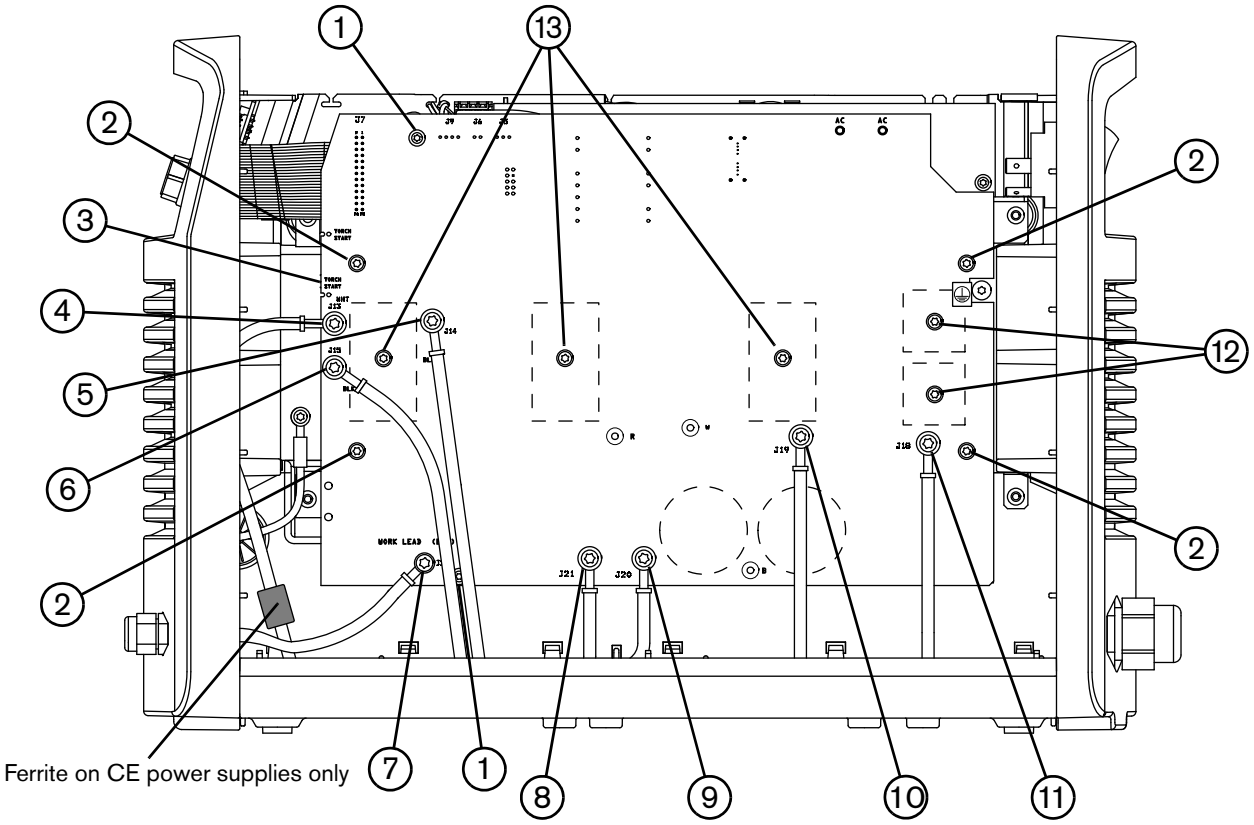
Figure 50



1	Input diode bridges	**6**	J7 (ribbon cable connector)
2	Capacitors	**7**	J9
3	IGBTs	**8**	J6
4	J12 (TORCH START connector)	**9**	J5
5	Snubber resistor	**10**	J3 (connects to compressor-driver board)

6. On the back of the power board, remove the wire connectors for the transformers and inductors. See *Figure 51*.
   a. Remove J13, J14, and J15, located on the front panel end of the power board.
   b. Remove J18 and J19, located on the rear panel end of the power board.
   c. Remove J20 and J21, located on the bottom center of the power board.
7. Remove the work lead ring terminal from J22.
8. Remove the 2 retaining screws.
9. Remove the 3 screws that attach the IGBTs to the heatsink and the 2 screws that attach the input diode bridges to the heatsink. Holes in the power board provide access to the 2 input diode bridge screws.
10. Remove the 4 heatsink assembly screws.

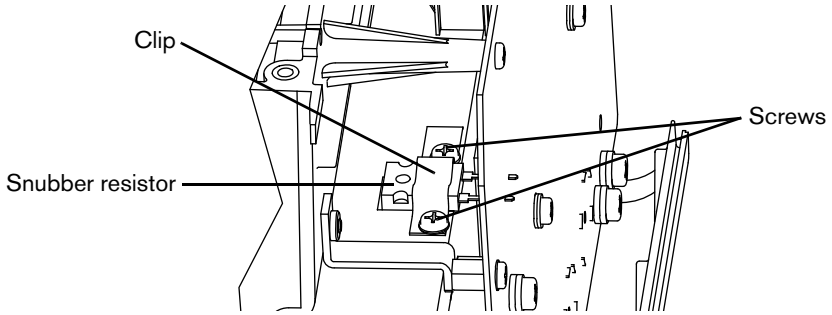
Figure 51



1 Retaining screws (2)
2 Heatsink assembly screws (4)
3 J12 (TORCH START connector)
4 J13
5 J14
6 J15
7 J22 (work lead)
8 J21
9 J20
10 J19
11 J18
12 Input diode bridge screws (2)
13 IGBT screws (3)

11. Being careful not to scratch the heatsink, remove the 2 screws from the snubber resistor clip on the top of the heatsink, and remove the clip.

Figure 52

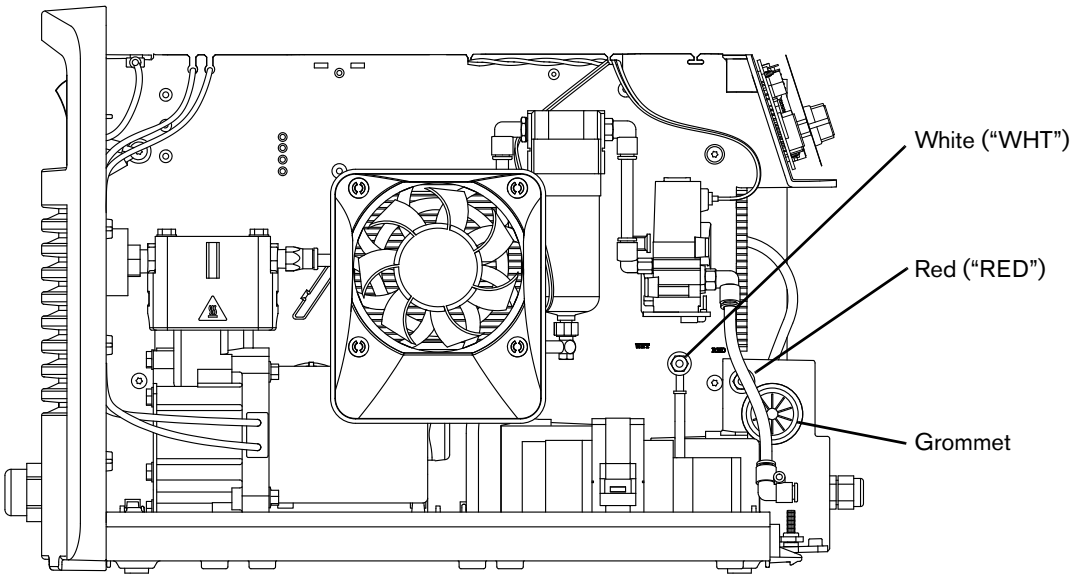


12. Disconnect the bottom two wires (both are white) from the power switch.

13. Use an 8 mm (5/16-inch) nut driver to remove the nuts that attach the red and the white wires to the studs on the fan side of the power supply. The studs are labeled “RED” and “WHT.”

14. Pull the red and white wires through the grommet in the center panel of the power supply.

Figure 53



15. From the power board side of the power supply, push the wires that you disconnected down and out of the way.

16. Pull the power board straight out from the power supply.

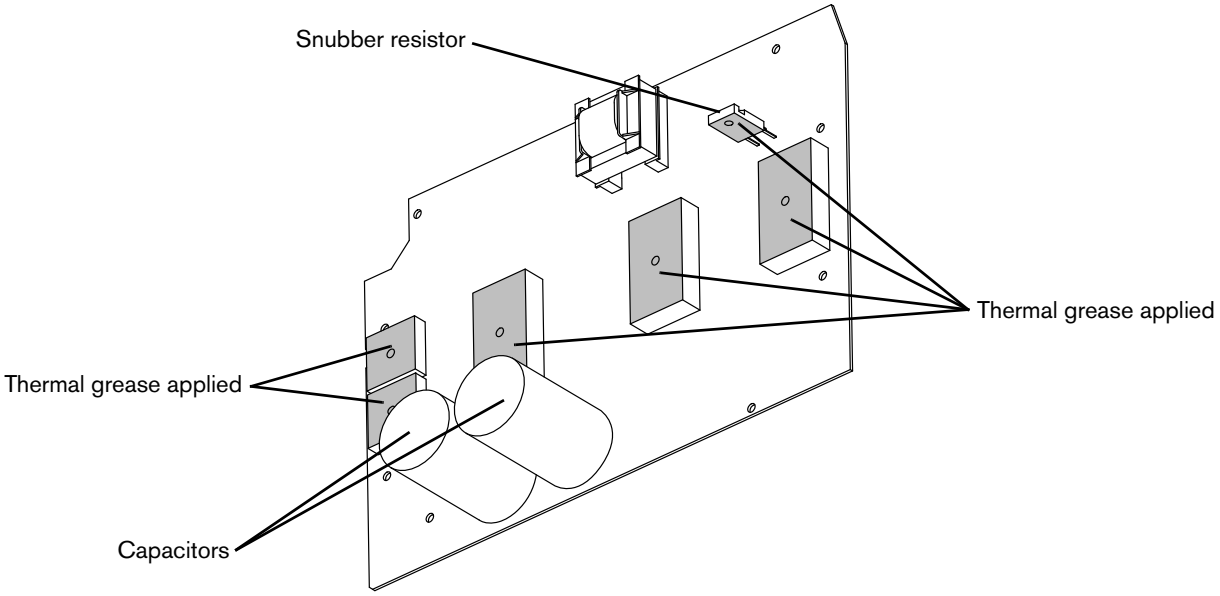
Install the power board

Before beginning this procedure, make sure you have the correct power board for your system.

- The replacement kit number for a CSA power board is 428402.
- The replacement kit number for a CE/CCC power board is 428403.

1. Being careful not to scratch the heatsink, use a clean, soft cloth with isopropyl alcohol to remove any residual thermal grease.
2. Apply a 0.051 mm (0.002 inch) layer of thermal grease, about the thickness of a sheet of paper, on all the IGBTs and the input diode bridges.
3. Apply thermal grease to the bottom of the snubber resistor as follows.
   a. Avoid getting any thermal grease on the prongs of the snubber resistor.
   b. Start from the end closest to the power board and drag away from the prongs.
   c. Spread an even layer of thermal grease 0.051 mm (0.002 inch) thick on the bottom of the snubber resistor.

Figure 54



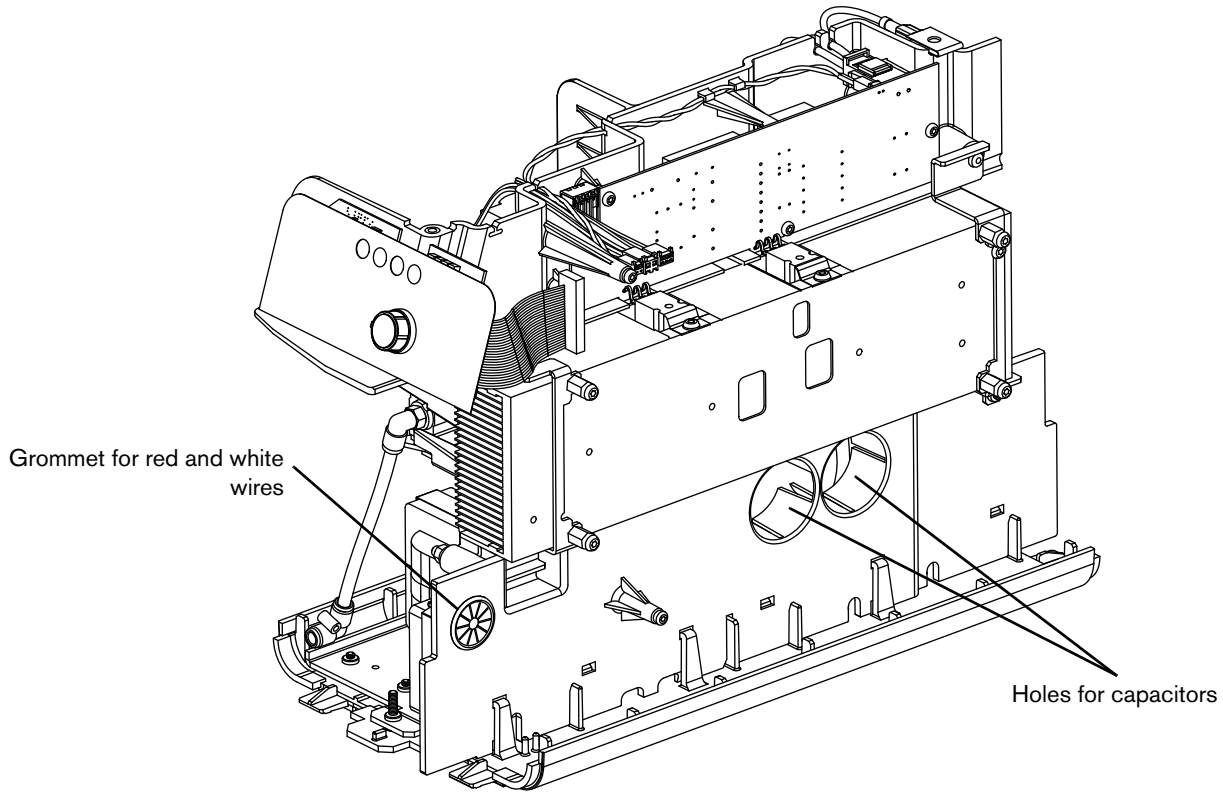
4. Push the red and white wires on the new power board through the grommet in the center panel from the power board side of the power supply to the fan side of the power supply.

5. Push the wires that you disconnected down and out of the way.

6. Line up the capacitors on the power board with the holes in the power supply's center panel. See *Figure 54* and *Figure 55*.

7. Push the power board straight in.

Figure 55



8. Reconnect the 2 white wires to the power switch. Connect the left "AC" wire to the bottom-left pin on the power switch. Connect the right "AC" wire to the bottom-right pin on the power switch.

9. Replace the 4 heatsink assembly screws. Tighten the screws to 17.3 kg·cm (15 inch·pounds).

10. Replace the 3 screws that attach the IGBTs to the heatsink and the 2 screws that attach the input diode bridges to the heatsink. Tighten the screws to 23.0 kg·cm (20 inch·pounds).

11. Replace the 2 retaining screws. Tighten the screws to 17.3 kg·cm (15 inch·pounds).

12. Being careful not to scratch the heatsink, replace the 2 screws and the clip that you removed from the snubber resistor. Tighten the screws to 23.0 kg·cm (20 inch·pounds). See *Figure 52* on page 135.

	**CAUTION!**
A torque setting higher than 23.0 kg·cm (20 inch·pounds) can damage the resistor.	

13. On the power board side of the power supply, reconnect the wires to the transformers and inductors at J13, J14, J15, J18, J19, J20, J21, and the work lead ring terminal at J22. Tighten the screws to 23.0 kg·cm (20 inch·pounds). See *Figure 51* on page 134.

14. On the component side of the power board, reconnect the connector TORCH START (J12) and the connectors at J5, J6, and J9. See *Figure 50* on page 133.

15. Reconnect the J3 connector to the compressor-driver board.

16. Reconnect the ribbon cable from the control board to the power board at J7. Make sure the latches fold up over the connector.

17. On the fan side of the power supply, reconnect the ring terminals for the red and white wires to the studs labeled “RED” and “WHT”. Tighten the nuts to 23.0 kg·cm (20 inch·pounds).

If you removed any other wires from the WHT and RED studs, install them on the studs as well.

18. Complete the following procedures:

- **a.** See *Reattach the front panel* on page 109.
- **b.** See *Install the component barrier* on page 107.
- **c.** See *Install the power supply cover* on page 105.
- **d.** Reconnect the power cord, and set the power switch to ON (**I**).

Replace the drain hose, gas supply hoses, and 90° fitting

Kit number	Description
428373	*Kit: Drain hose, 2 gas supply hoses, elbow fitting*

The power supply contains a drain hose and 2 gas supply hoses that can be replaced. See *Figure 56* on page 141.

- The drain hose runs from the bottom of the air filter bowl to the base of the power supply.
- One gas supply hose runs from the air filter to the solenoid valve.
- The other gas supply hose runs from the solenoid valve to the torch lead.

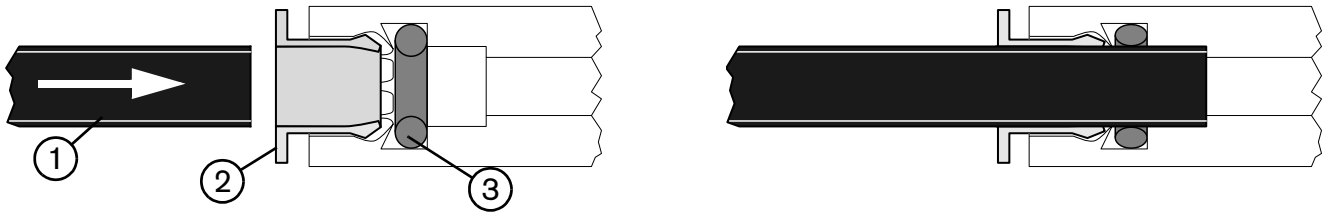
You can also replace the plastic 90° fitting that connects the gas supply hose from the solenoid valve to the gas supply fitting from the torch lead.

The gas supply hoses in this system use push-to-connect fittings.

How to use push-to-connect fittings

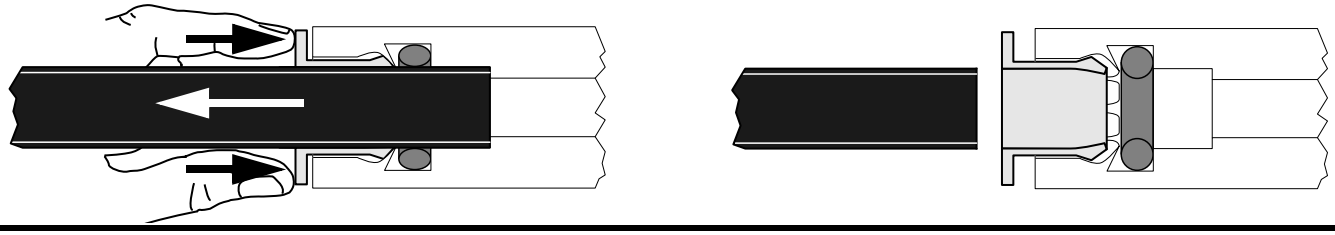
Push-to-Connect

- **To connect**, push the hose into the fitting until it stops. Pull on the hose to verify that it is secure.



1 **Hose**	2 **Collet**	3 **O-ring**

- **To release**, push the fitting collet toward the fitting, and pull the hose away from the fitting.



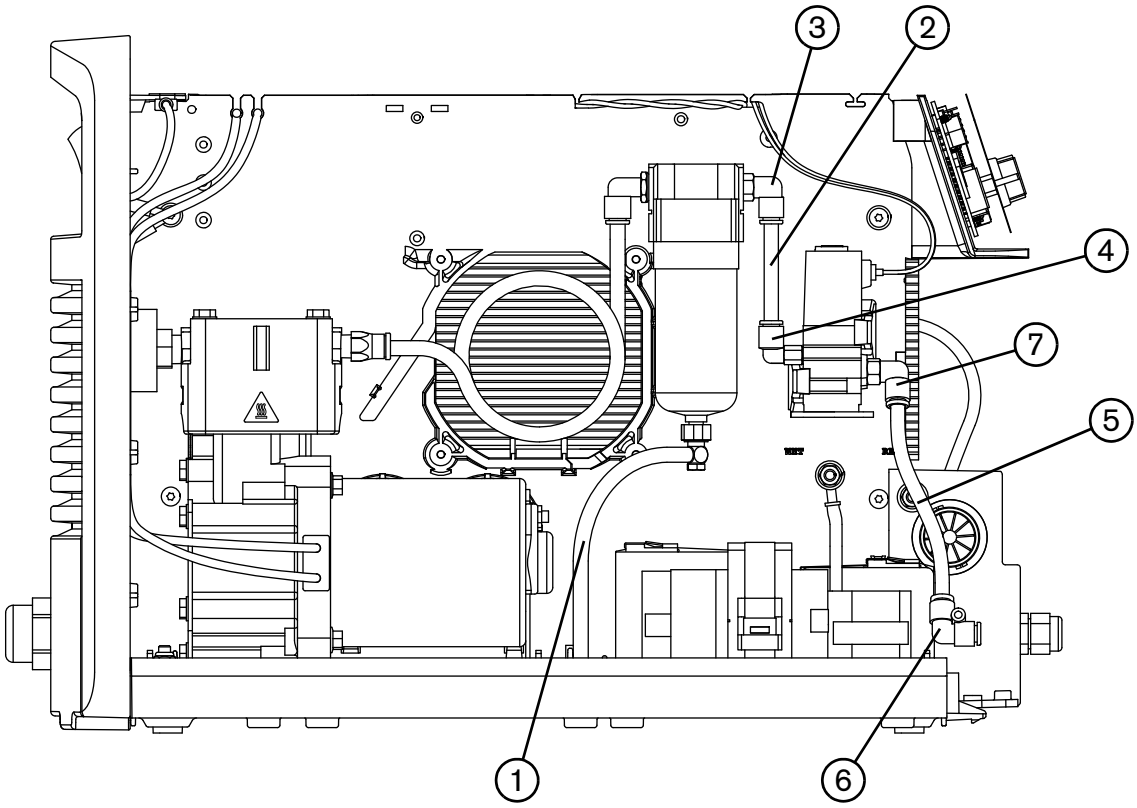
Remove the drain hose, gas supply hoses, and 90° fitting

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
2. Remove one end of the drain hose ① from the hole in the base of the power supply. See *Figure 56* on page 141.

   It is normal to see water in the drain hose and in the air filter bowl. Remove any water that spills inside the power supply before operating the system again.

3. Remove the other end of the drain hose from the fitting on the bottom of the air filter bowl.
4. Remove the gas supply hose ② that connects to the air filter and the solenoid valve:
   a. Push-to-release the gas supply hose from the fitting on the air filter ③. (See *How to use push-to-connect fittings* on page 139.)
   b. Push-to-release the gas supply hose from the fitting on the solenoid valve ④.
5. Remove the gas supply hose ⑤ and the plastic 90° fitting ⑥ that connect the solenoid valve to the torch lead:
   a. Push-to-release the gas supply hose from the fitting on the solenoid valve ⑦.
   b. Push-to-release the plastic 90° fitting ⑥ from the torch lead's brass gas supply fitting inside the front panel of the power supply.
   c. Push-to-release the gas supply hose ⑤ from the top of the plastic 90° fitting.

Figure 56



1 Drain hose

2 Gas hose from air filter to solenoid valve

3 90° fitting on air filter (right side)

4 90° fitting on solenoid valve (left side)

5 Gas hose from solenoid valve to torch lead

6 90° fitting for torch lead

7 90° fitting on solenoid valve (right side)

The fan and the front panel are hidden in *Figure 56* to better show the hoses and fittings.

Install the drain hose, gas supply hoses, and 90° fitting

1. Push one end of the new drain hose onto the fitting on the bottom of the air filter bowl. See *Figure 56* on page 141.
2. Insert the other end of the drain hose into the hole in the base of the power supply.
3. Connect the shorter gas supply hose to the air filter and solenoid valve:
   a. Push-to-connect one end of the new hose into the fitting on the air filter. (See *How to use push-to-connect fittings* on page 139.)
   b. Push-to-connect the other end of the new hose into the fitting on the solenoid valve.
4. Connect the longer gas supply hose to the solenoid valve and the plastic 90° fitting:
   a. Push-to-connect one end of the new hose into the fitting on the solenoid valve.
   b. Push-to-connect the other end of the new hose into the top of the plastic 90° fitting for the torch lead.
   c. Push-to-connect the plastic 90° fitting onto the torch lead's brass gas supply fitting inside the front panel of the power supply.
5. Check for leaks at each fitting and hose connection point on the air filter assembly and solenoid valve.

CAUTION!

If there are leaks in the gas supply hoses or connections:

- **Cut speeds can decrease.**
- **Cut quality can deteriorate.**
- **Cutting thickness capability can decrease.**
- **Consumables life can be shortened.**

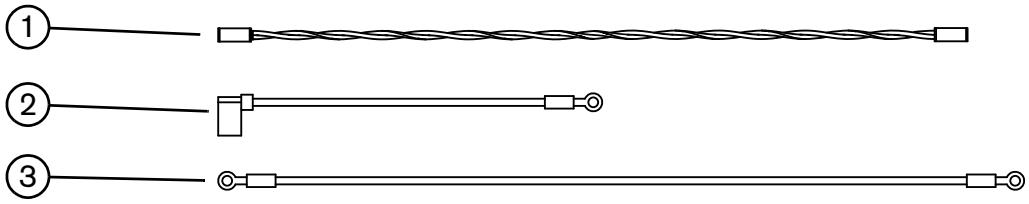
6. Complete the following procedures:
   a. See *Install the power supply cover* on page 105.
   b. Reconnect the power cord, and set the power switch to ON (**I**).

Replace the wire group

The wire group kit for the power supply includes 3 replacement wires, as follows.

Kit number	Description
428405	*Kit: Wire group:* ① *Power board (J9) to compressor-driver board (J1) twisted pair wires (red and black)* ② *Ground clip wire from rear panel to center panel (green)* ③ *Ground wire from heatsink to magnetics assembly (green)*

Figure 57

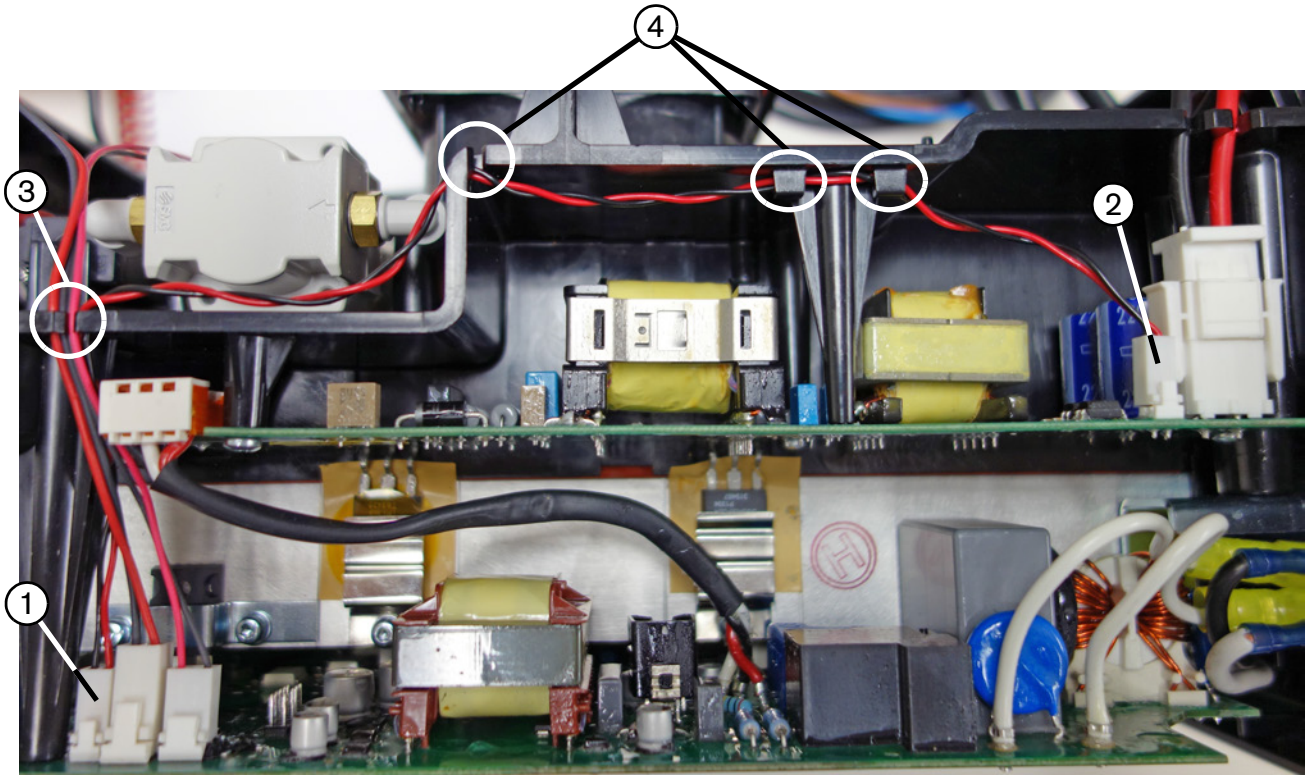


Remove and install the twisted pair wires from the power board to the compressor-driver board

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Remove the component barrier* on page 106.
2. Remove the J9 connector ① from the power board. See *Figure 58* on page 144.
3. Remove the J1 connector ② from the compressor-driver board.
4. Connect one end of the new twisted pair wires to J9 on the power board.
5. Route the wires through the notch at the top of the center panel ③. The notch is labeled “AUX BOARD” on the fan side of the power supply.
6. Route the wires along the top of the center panel. Use the notches provided ④, as shown in *Figure 58*.
7. Connect the other end of the new twisted pair wires to J1 on the compressor-driver board.

8. Complete the following procedures:
   a. See *Install the component barrier* on page 107.
   b. See *Install the power supply cover* on page 105.
   c. Reconnect the power cord, and set the power switch to ON (**I**).

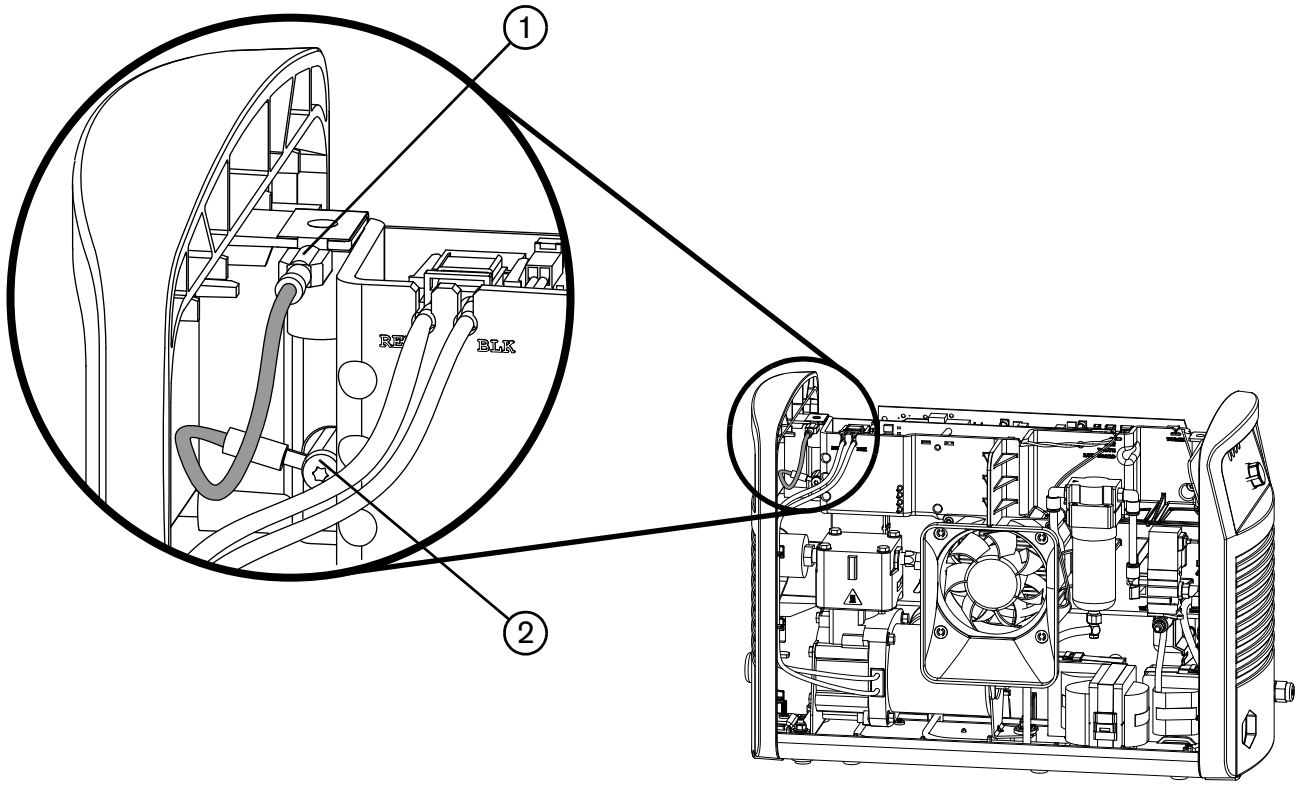
Figure 58



Remove and install the ground clip wire from the center panel to the rear panel

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
2. Detach the connector from the ground clip on the rear panel ①. See *Figure 59*.
3. Remove the ground wire's ring terminal from the screw that attaches it to the standoff in the center panel ②.
4. Tighten the new ground wire's ring terminal to the standoff in the center panel. Tighten the screw to 17.3 kg·cm (15 inch·pounds).
5. Press the connector on the other end of the wire onto the rear panel's ground clip.
6. Complete the following procedures:
   a. See *Install the power supply cover* on page 105.
   b. Reconnect the power cord, and set the power switch to ON (**I**).

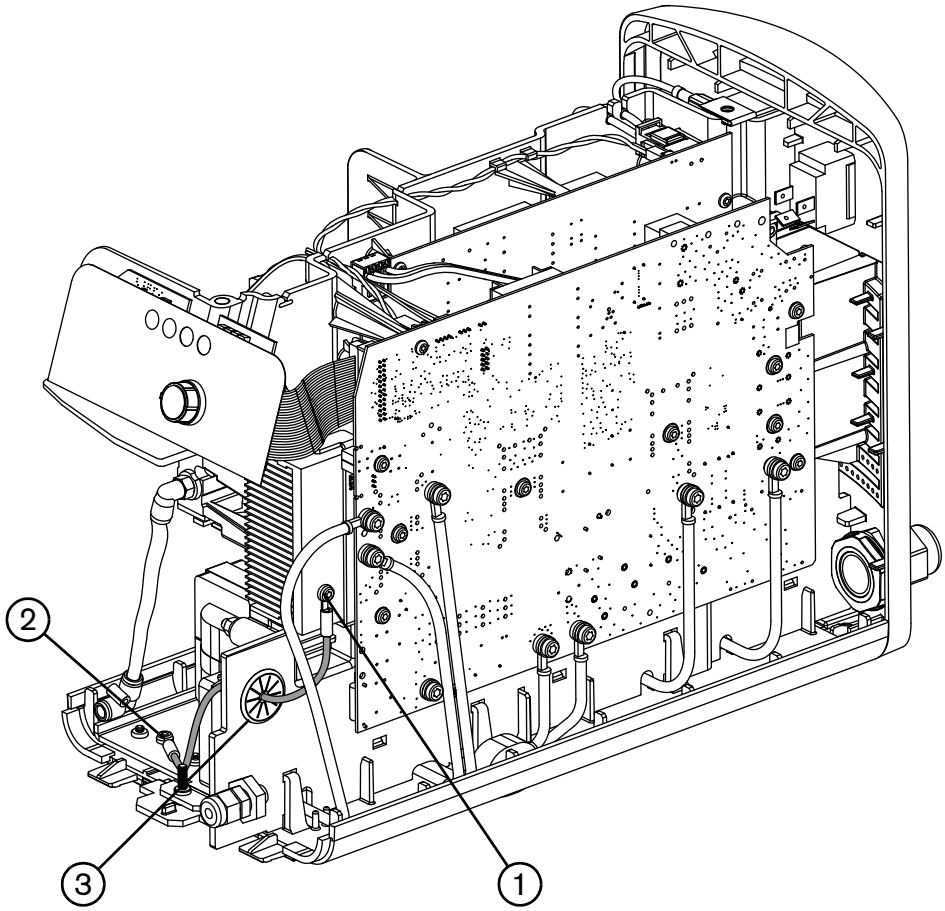
Figure 59



Remove and install the ground wire from the heatsink to the magnetics assembly

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Remove the component barrier* on page 106.
2. From the power board side, remove the ground wire's ring terminal from the screw that attaches it to the heatsink ①. See *Figure 60*.
3. From the fan side, remove the ring terminal on the other end of the ground wire from the screw that attaches it to the metal base plate of the magnetics assembly ②. The wire runs through the grommet ③ in the center panel.
4. Tighten the new ground wire's ring terminal to the heatsink. Tighten the screw to 23.0 kg·cm (20 inch·pounds).
5. Route the new ground wire through the grommet in the center panel. See *Figure 60*.
6. Use the screw to attach the ring terminal for the new wire to the metal base plate of the magnetics assembly. Tighten the screw to 17.3 kg·cm (15 inch·pounds).
7. Complete the following procedures:
   a. See *Install the component barrier* on page 107.
   b. See *Install the power supply cover* on page 105.
   c. Reconnect the power cord, and set the power switch to ON (**I**).

Figure 60



1 Ground wire attached to heatsink

2 Ground wire attached to magnetics assembly's metal base plate

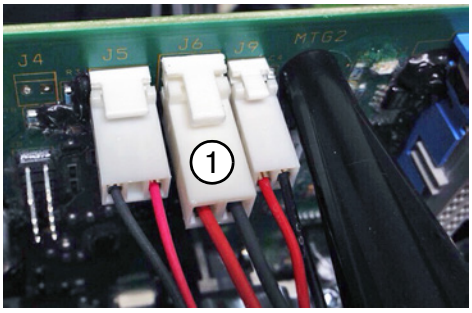
3 Grommet in center panel

Replace the solenoid valve

Kit number	Description
428374	*Kit: Solenoid valve (includes gas hoses and elbow fittings)*

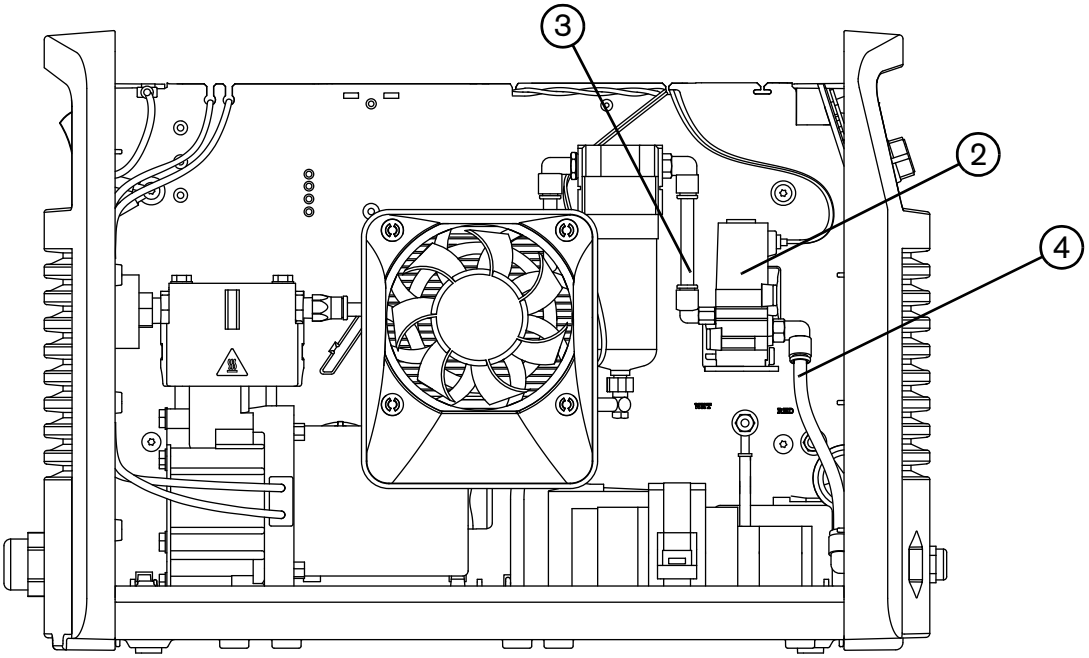
Remove the solenoid valve

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
2. Detach the connector from J6 ① on the power board. Lift the top edge of the component barrier to see the connector.



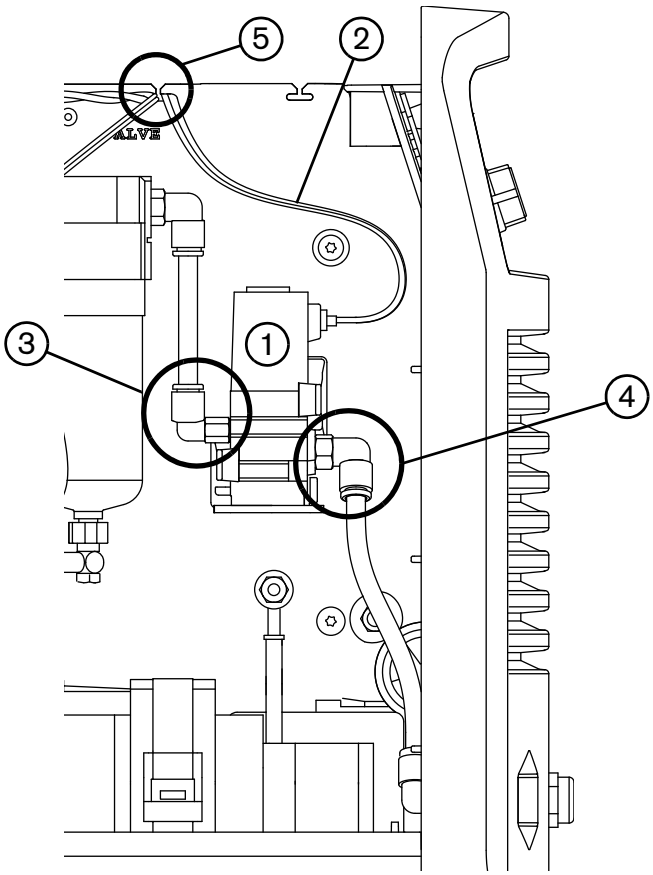
3. Remove the valve's wires from the notch at the top of the center panel.
4. Pull back the 2 clips from the center panel that hold the solenoid valve ② in place, and work the solenoid valve free from the clips.
5. Push-to-release the gas supply hose ③ from the fitting on the left side of the solenoid valve. (See *How to use push-to-connect fittings* on page 139.)
6. Push-to-release the gas supply hose ④ from the fitting on the right side of the solenoid valve.

Figure 61



Install the solenoid valve

1. Orient the new solenoid valve ① so that the red-and-black wires ② extend from the top of the valve's right side.
2. Push-to-connect the gas supply hose down into the fitting on the left side of the solenoid valve ③.
3. Push-to-connect the gas supply hose up into the fitting on the right side of the solenoid valve ④.
4. Push the solenoid valve into place between the 2 clips from the center panel. It should snap into place.
5. Connect the solenoid valve's wire connector to J6 on the power board. Route the red-and-black wires through the notch in the center panel that is labeled "VALVE" ⑤.
6. Check for leaks at each fitting on the solenoid valve assembly.
7. Complete the following procedures:
   a. See *Install the power supply cover* on page 105.
   b. Reconnect the power cord, and set the power switch to ON (**I**).



CAUTION!

If there are leaks in the gas supply hoses or connections:

- **Cut speeds can decrease.**
- **Cut quality can deteriorate.**
- **Cutting thickness capability can decrease.**
- **Consumables life can be shortened.**

Replace the torch lead and strain relief

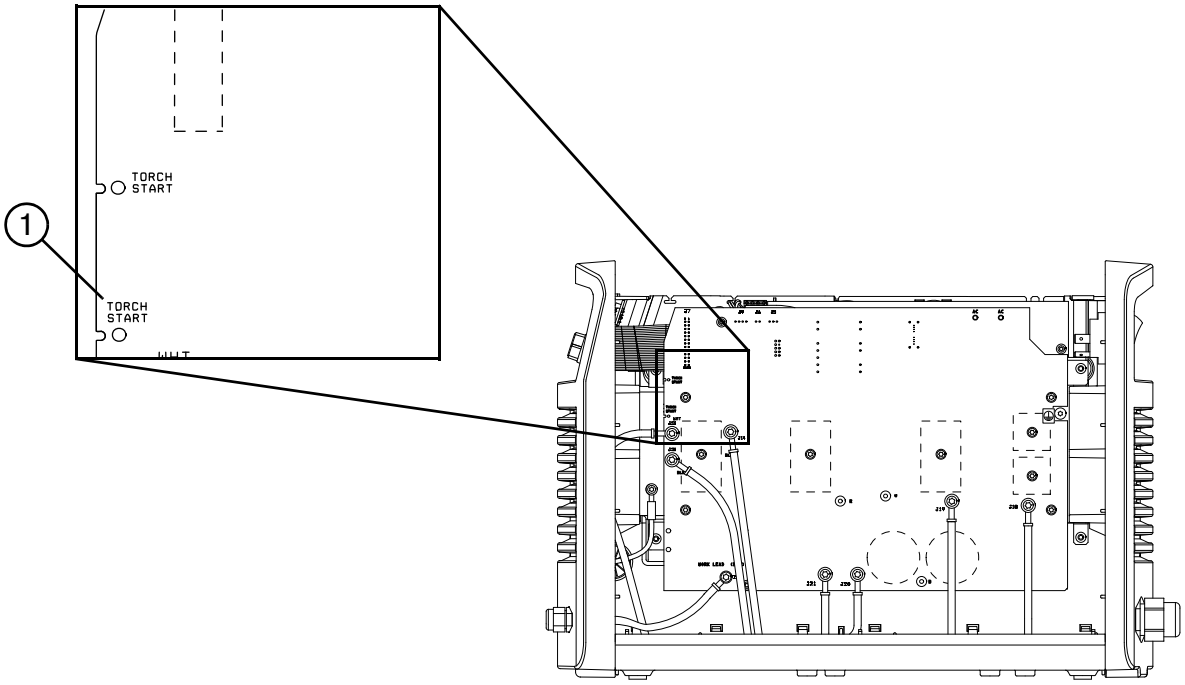
Kit number	Description
428176	*Kit: Air T30 torch lead, 4.6 m (15 feet), with strain relief*

Remove the torch lead and strain relief

If you are replacing just the torch lead cable, not the whole torch assembly, refer to *Replace the torch lead* on page 203 for details on how to remove the old lead from the torch.

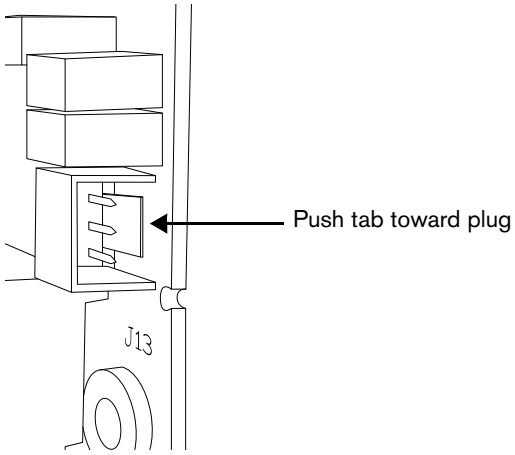
1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Detach the front panel* on page 108.
2. Locate the 3-pin connector at the TORCH START slot (J12) ① on the power board (on the side facing the heatsink) where the orange, blue, and purple wires from the torch lead connect.

Figure 62



3. Remove the connector at J12 by pushing the tab on the connector toward the plug and pulling the plug out.

Figure 63



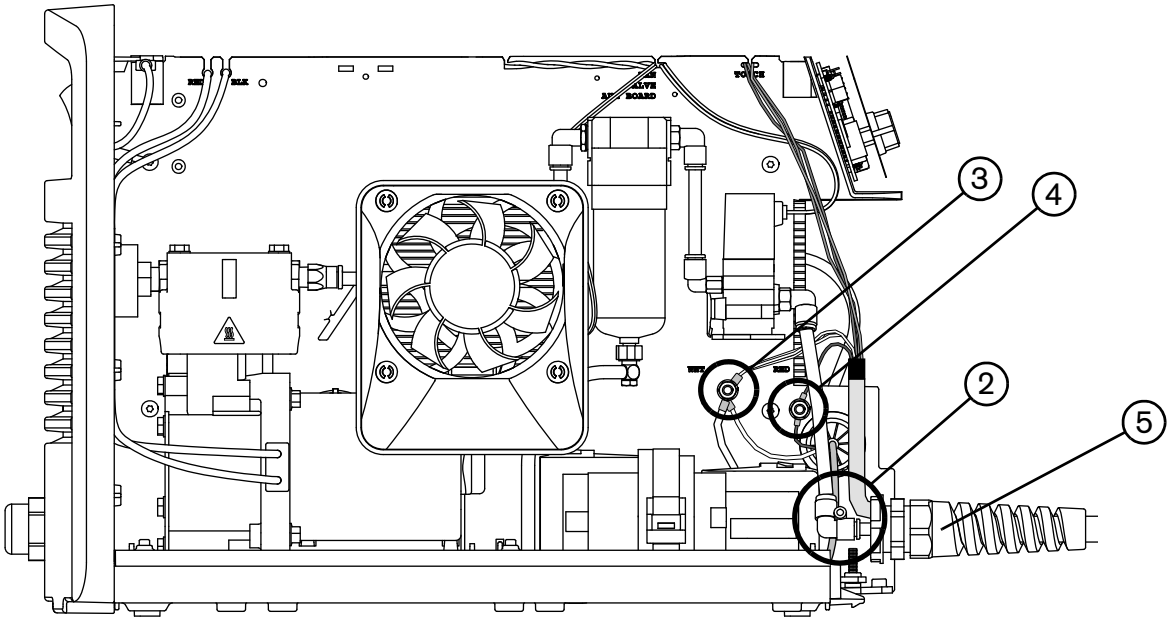
4. Push-to-release the plastic 90° fitting ② from the torch lead's brass gas supply fitting inside the front panel of the power supply. (See *How to use push-to-connect fittings* on page 139.)

5. Locate the studs that attach the white wire group ③ and the red wire ④ from the torch lead to the power supply's center panel (on the fan side of the power supply).

6. Use an 8 mm (5/16 inch) nut driver to remove the nuts from the studs, and slide the ring terminals off the studs.

7. Loosen the strain relief nut ⑤ on the torch lead outside the front panel.

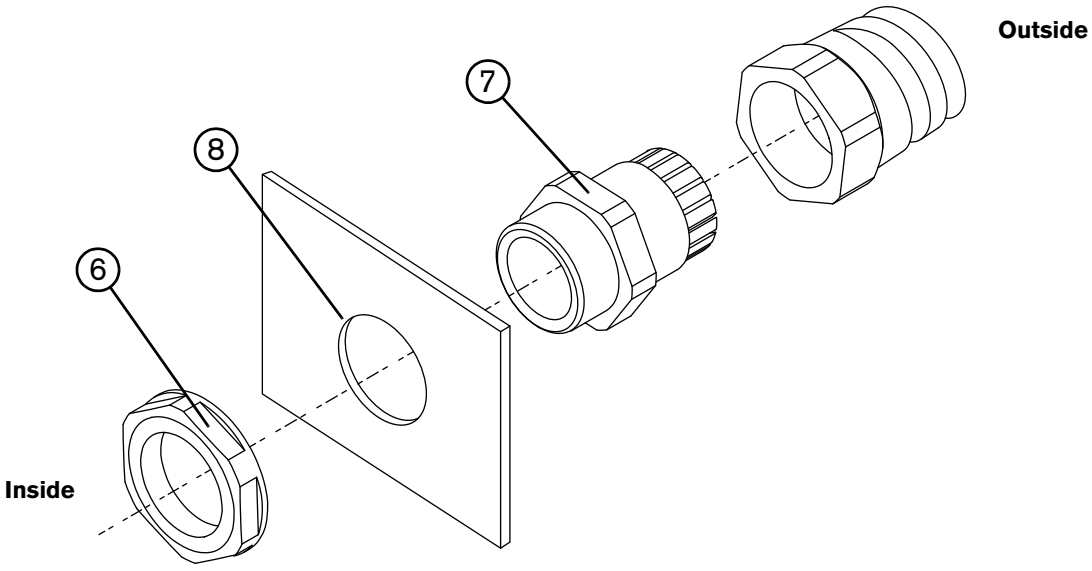
Figure 64



8. On the inside of the front panel, unscrew the retention nut ⑥ on the torch lead's strain relief ⑦ so that the torch lead moves freely. See *Figure 65*.

9. Remove the torch lead by pulling the wires through the hole in the front panel ⑧. If you are replacing the strain relief, remove the strain relief from the front panel.

Figure 65



Install the torch lead and strain relief

If you are replacing just the torch lead cable, not the whole torch assembly, refer to *Replace the torch lead* on page 203 for details on how to connect the new lead to the torch.

1. Are you installing a new strain relief?
   - ❑ If yes, slide the new strain relief and strain relief nut over the new torch lead and up to the hole in the front panel.
   - ❑ If no, continue with the next step.

2. Route the wires for the new torch lead through the hole in the front panel and then through the retention nut for the strain relief.

3. From the inside of the front panel, tighten the retention nut onto the strain relief.

CAUTION!

Be careful not to twist the torch lead as you tighten the retention nut onto the strain relief.

4. Facing the fan side of the power supply, slide the ring terminal for the bundle of 3 white wires over the left stud (labeled “WHT” on the center panel) ①.

5. Slide the ring terminal for the red wire onto the stud on the right (labeled “RED” on the center panel) ②.

   Also put back in place any other wires you removed from the WHT and RED studs.

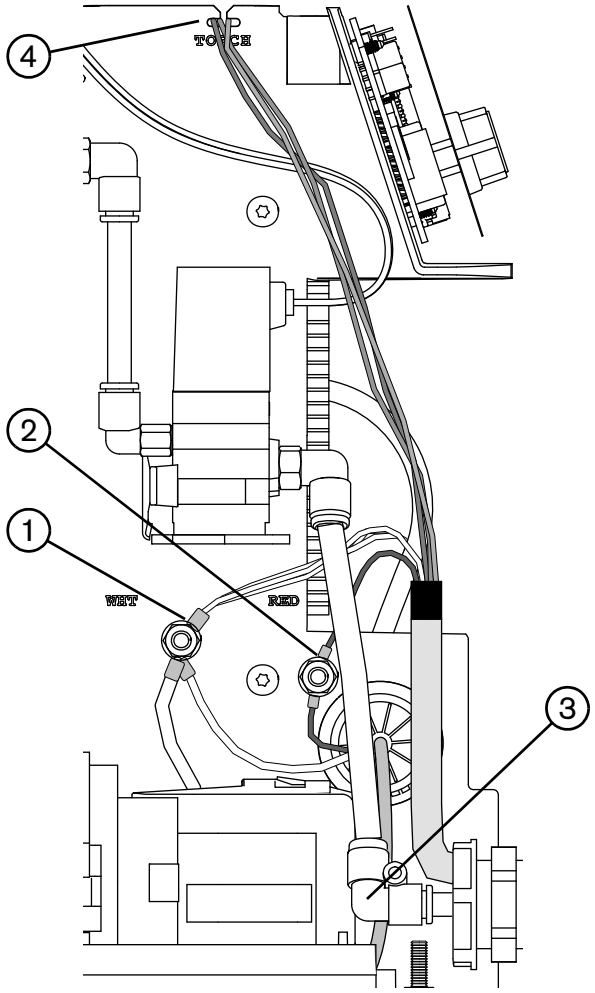
6. Use an 8 mm (5/16 inch) nut driver to tighten the nut on each stud to 23.0 kg·cm (20 inch·pounds).

7. Push-to-connect the plastic 90° fitting ③ onto the new torch lead’s brass gas supply fitting.

8. Route the orange, blue, and purple wire group over the center panel. Position the wires in the notch in the panel that is labeled “TORCH” ④.

9. Press the connector into the TORCH START slot (J12) on the power board. See *Figure 63* on page 151.

10. Tighten the torch lead’s strain relief nut onto the strain relief as you put the front panel back in place. See *Reattach the front panel* on page 109.



11. Complete the following procedures:
    a. See *Install the power supply cover* on page 105.
    b. Reconnect the power cord, and set the power switch to ON (**I**).

Replace the air filter assembly

Kit number	Description
428375	*Kit: Air filter assembly (includes gas hose, drain tube, and elbow fittings)*

Remove the air filter assembly

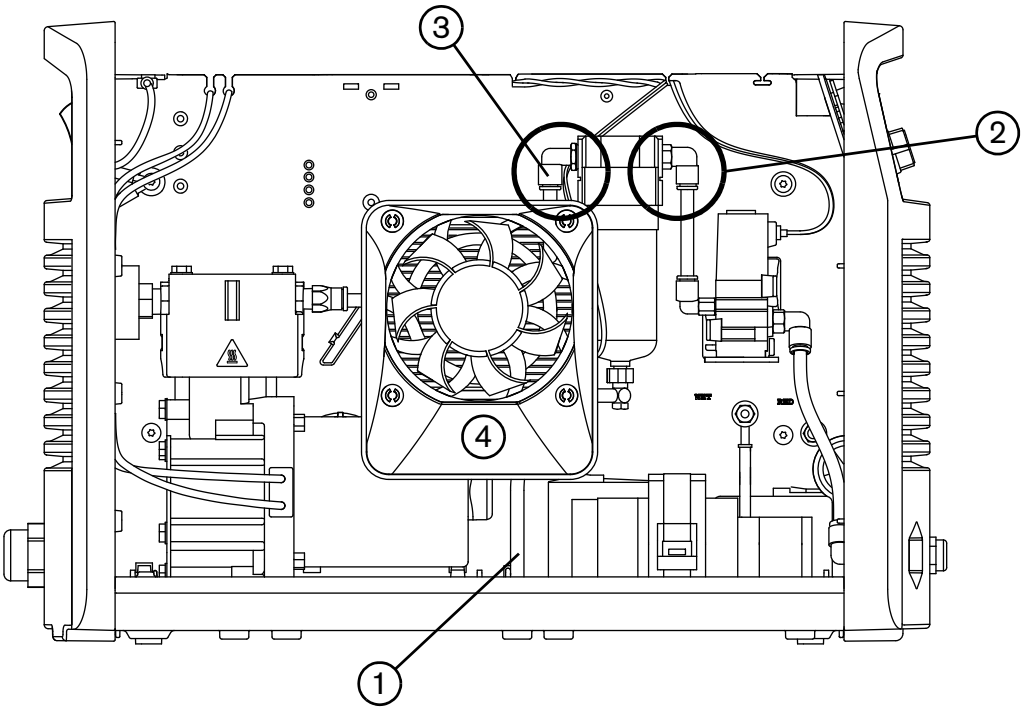
1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
2. Disconnect the drain hose ① from the hole in the bottom of the power supply's base. See *Figure 66*.

   It is normal to see water in the drain hose and in the air filter bowl. Remove any water that spills inside the power supply before operating the system again.

3. Push-to-release the gas supply hose from the fitting on the right side of the air filter ②. (See *How to use push-to-connect fittings* on page 139.)
4. Push-to-release the copper heat exchange coil from the fitting on the left side of the air filter ③.

   If you need better access to the air filter, remove the fan plenum ④. Use a pair of needlenose pliers to compress and release the plenum's top 2 corner clips first before working the bottom 2 clips free from the fan casing.

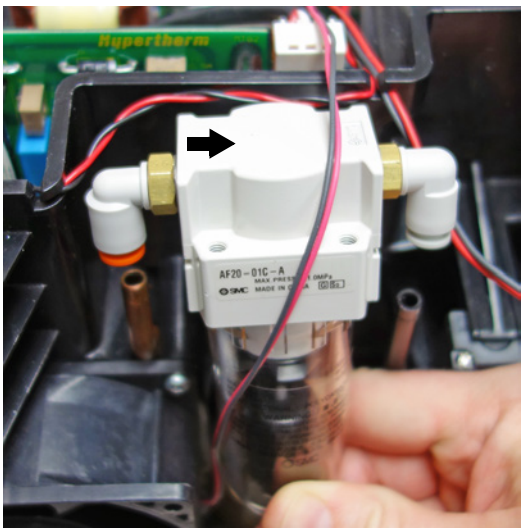
Figure 66



Install the air filter assembly

1. Orient the new air filter so the arrow on top of the filter points to the front of the power supply. Position the air filter behind the red-and-black wires from the fan.

   Be careful not to trap the fan's wires behind the filter bowl when you install the air filter.



2. Push-to-connect the copper heat exchange coil ① into the fitting on the left side of the air filter ②. (See *How to use push-to-connect fittings* on page 139.)

3. Push-to-connect the gas supply hose ③ into the fitting on the right side of the air filter ④.

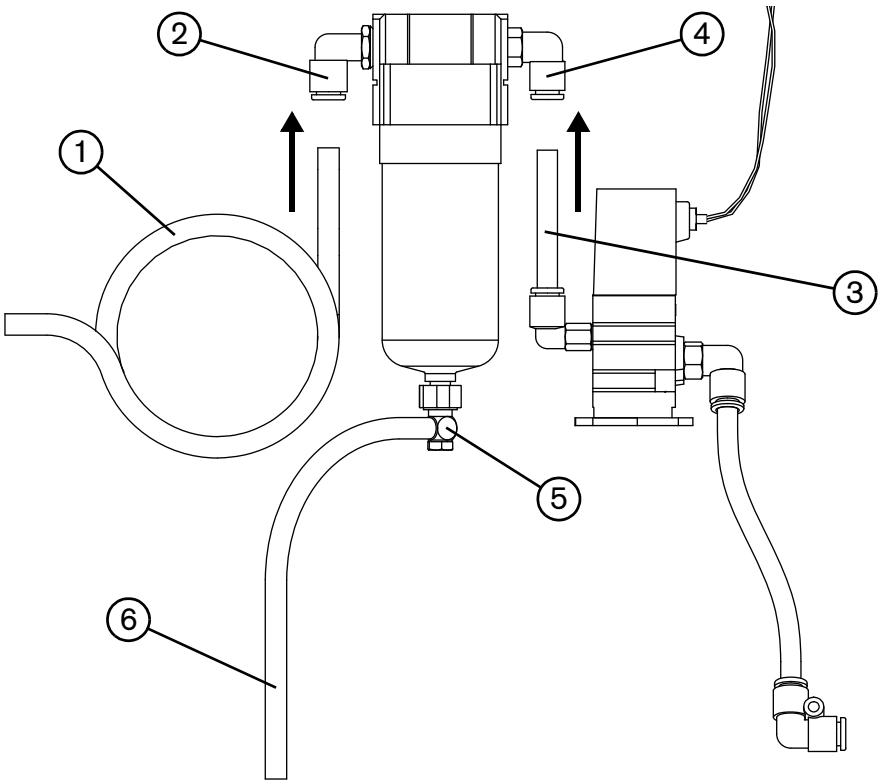
4. Make sure the top of the air filter is level. If the top of the filter is angled up to the left or to the right, check both fittings to make sure the hose and coil are properly seated.

5. Make sure the fitting at the bottom of the air filter bowl ⑤ points to the rear of the power supply.

6. Push one end of the drain hose ⑥ onto the fitting at the bottom of the air filter bowl.

7. Push the other end of the drain hose into the hole in the bottom of the power supply. The hole is underneath the fan.

Figure 67



8. Check for leaks at each fitting and hose connection point on the air filter assembly.

CAUTION!

If there are leaks in the gas supply hoses or connections:

- **Cut speeds can decrease.**
- **Cut quality can deteriorate.**
- **Cutting thickness capability can decrease.**
- **Consumables life can be shortened.**

9. Complete the following procedures:

a. See *Install the power supply cover* on page 105.

b. Reconnect the power cord, and set the power switch to ON (**I**).

Replace the air filter bowl and air filter element

Kit number	Description
428378	*Kit: Air filter element*
428380	*Kit: Air filter bowl (includes air filter element, O-ring, and drain hose)*

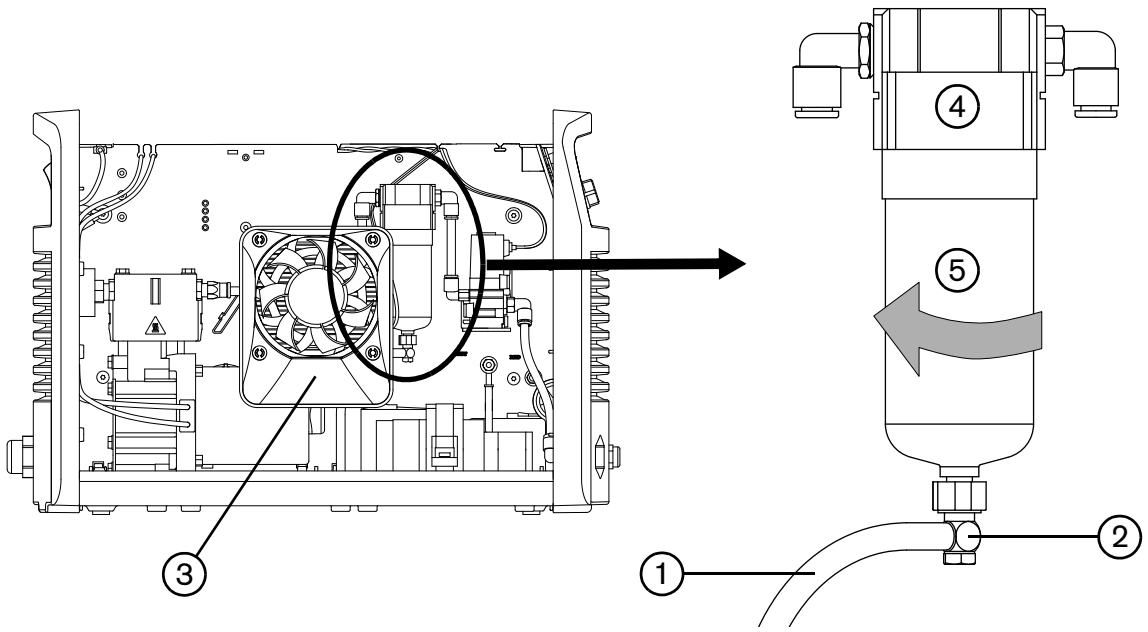
Remove the air filter bowl and air filter element

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
2. From the fan side of the power supply, disconnect the drain hose ① from the fitting ② at the bottom of the air filter bowl.

   It is normal to see water in the drain hose and in the air filter bowl. Remove any water that spills inside the power supply before operating the system again.

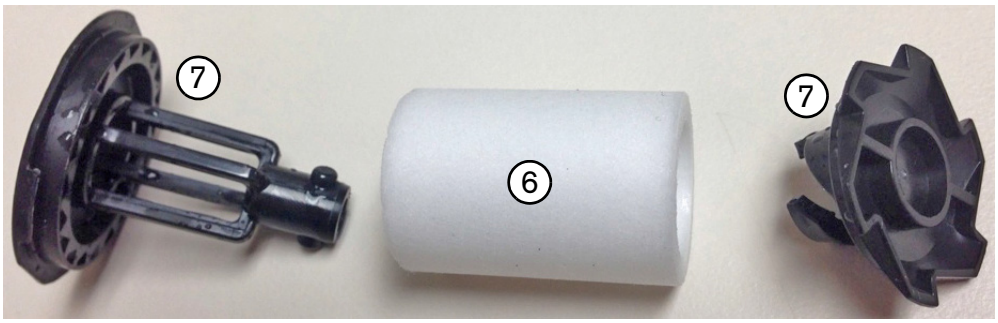
   If you need better access to the air filter, remove the fan plenum ③. Use a pair of needlenose pliers to compress and release the plenum's top 2 corner clips first before working the bottom 2 clips free from the fan casing.
3. Hold the top of the air filter assembly ④ steady with one hand. With your other hand, unscrew the air filter bowl ⑤ to remove it.

Figure 68



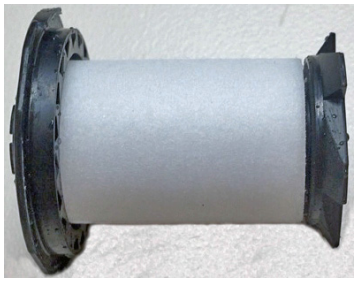
4. Does the air filter element ⑥ need to be replaced?
   - ❑ If yes, continue with the next step.
   - ❑ If no, skip to *step 5* on page 159.
5. Pry the air filter element out of the top of the filter bowl to remove it. Be careful not to damage the O-ring at the top of the bowl.
6. Gently twist the plastic fittings ⑦ until they come apart and you can remove the air filter element from them. Set the 2 plastic fittings aside.

Figure 69



Install the air filter element and air filter bowl

1. Are you replacing the whole filter bowl assembly or only the air filter element?
   - ❑ Air filter element: continue with the next step.
   - ❑ Filter bowl assembly: start with *step 5* on page 159.
2. Enclose the new air filter element in the plastic fittings. Gently twist the plastic fittings until they lock together and fit snugly against the air filter element.
3. Clean the filter bowl ① before installing it by wiping away any oil, dirt, or other contaminants. Make sure the O-ring ② on the bowl is not cracked or damaged. See *Figure 70* on page 159.



4. Place the air filter element ③ inside the air filter bowl. Press down on the filter element's top plastic fitting so that you hear it snap into place.

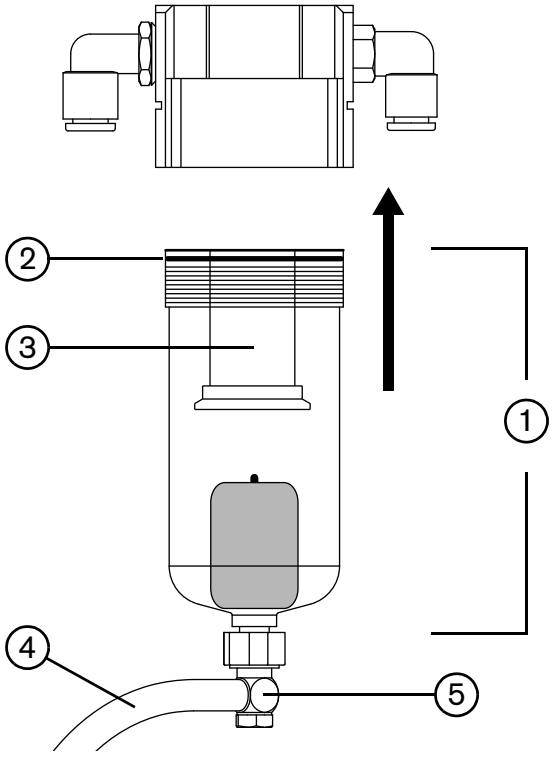
5. Position the filter bowl behind the wires from the fan. Screw the filter bowl into the air filter. Tighten the filter bowl to finger-tight.

   Be careful not to trap the fan's wires behind the filter bowl when you install the bowl.

6. Connect the drain hose ④ to the fitting ⑤ at the bottom of the filter bowl.

7. Make sure the other end of the drain hose is pressed securely in the hole in the base of the power supply.

Figure 70



8. Put the fan plenum back in place, if you removed it earlier.

9. Check for leaks and loose connections at each fitting and hose connection point on the air filter assembly.

CAUTION!

If there are leaks in the gas supply hoses or connections:

- **Cut speeds can decrease.**
- **Cut quality can deteriorate.**
- **Cutting thickness capability can decrease.**
- **Parts life can shorten.**

10. Complete the following procedures:

a. See *Install the power supply cover* on page 105.

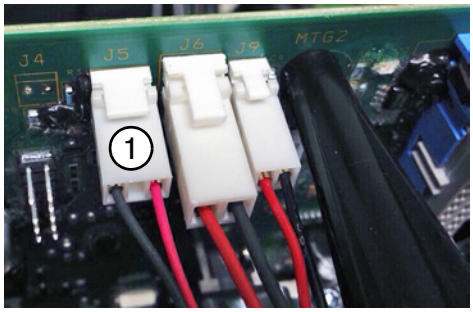
b. Reconnect the power cord, and set the power switch to ON (**I**).

Replace the fan

Kit number	Description
428236	*Kit: Fan assembly with plenum*

Remove the fan

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
2. Detach the connector from J5 on the power board ①. Lift the top edge of the component barrier to see the connector.



3. Remove the fan's red-and-black wires from the notch at the top of the center panel.
4. Carefully pull the fan plenum ② straight off the fan casing to release the 4 clips ③ at each corner of the plenum. See *Figure 71*.

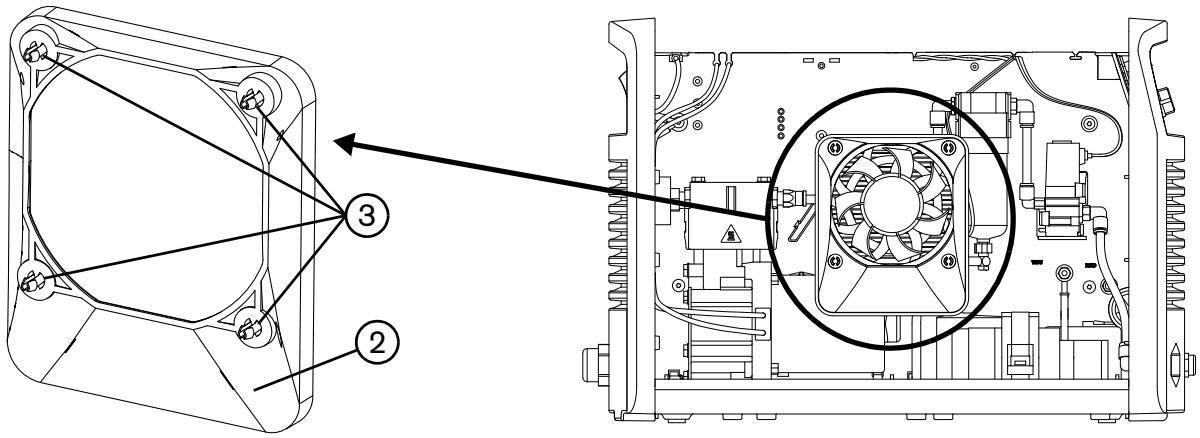
If necessary, use needlenose pliers to compress and release the plenum's top 2 corner clips first before working the bottom 2 clips free from the fan casing.

CAUTION!

Be careful not to apply too much pressure to any of the clips as you detach the plenum from the fan.

5. Remove the retaining screw from each corner of the fan. Slide the fan out of the power supply.

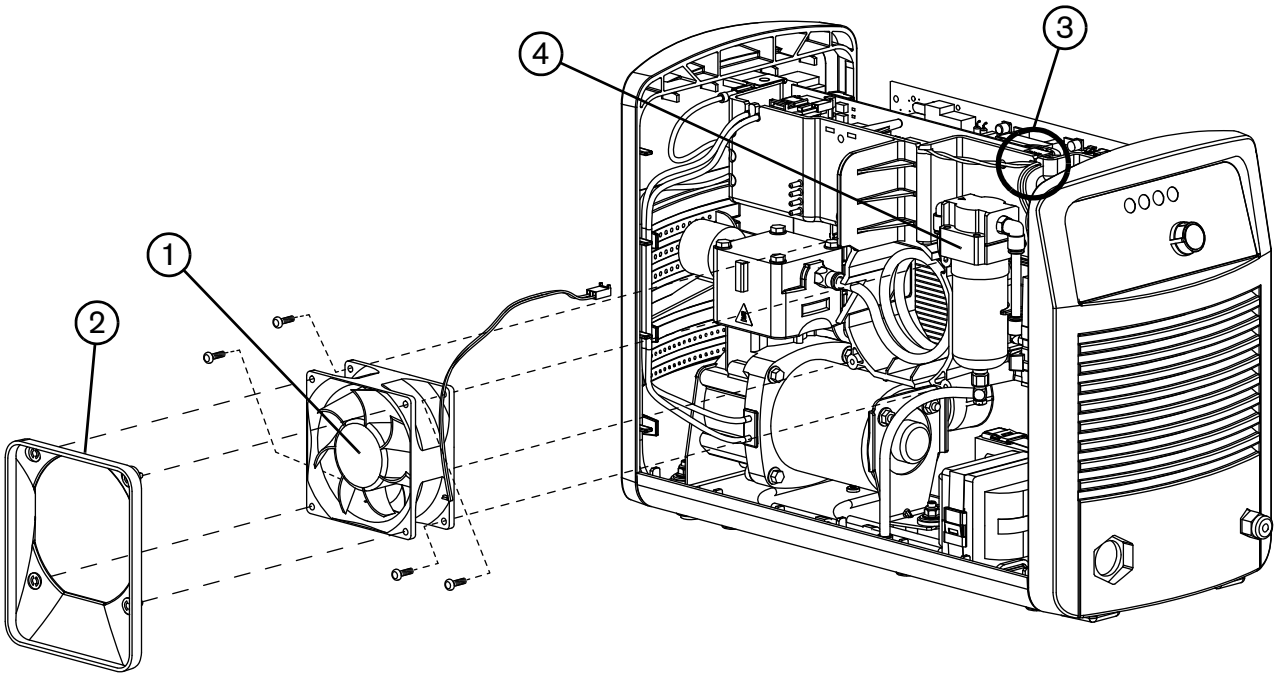
Figure 71



Install the fan

1. Orient the fan ① so that the red-and-black wires extend from the bottom-right corner of the fan (the side closest to the front panel).
2. Loosely install the 4 retaining screws. Use the screws included in the kit if needed.
3. Once all 4 retaining screws are installed, tighten them to 11.5 kg·cm (10 inch·pounds).
4. Orient the new fan plenum ② so that the wider end is at the bottom, and snap it onto the fan. See *Figure 72*.
5. Route the fan's red-and-black wires through the notch in the top of the center panel that is labeled "FAN" ③. The notch is above the air filter ④.
6. Attach the connector for the red-and-black wires to J5 on the power board.

Figure 72



7. Complete the following procedures:
   a. See *Install the power supply cover* on page 105.
   b. Reconnect the power cord, and set the power switch to ON (**I**).

Replace the heat exchange coil

Kit number	Description
428376	*Kit: Heat exchange coil (includes elbow fitting for air filter and exhaust fitting for internal compressor)*

Remove the heat exchange coil

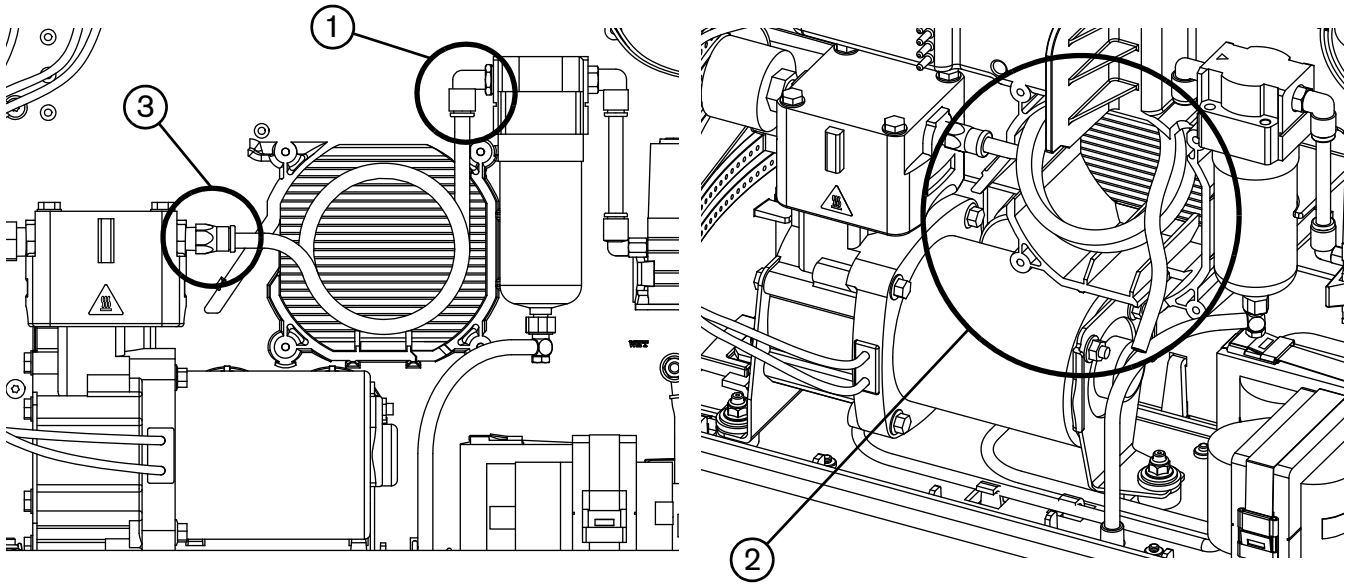
1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Remove the fan* on page 161.
2. Push-to-release the copper heat exchange coil from the elbow fitting on the left side of the air filter ①. (See *How to use push-to-connect fittings* on page 139.)
3. Rotate the coil towards you until the top of the coil points towards the bottom of the power supply ②.
4. Push-to-release the heat exchange coil from the exhaust fitting on the internal compressor ③.

   If you have trouble disconnecting the coil from the internal compressor, try pushing the coil further into the fitting to straighten and reset it. Then remove it using push-to-release.

5. Use an 11 mm (7/16 inch) wrench to remove the elbow fitting ① from the left side of the air filter.

   If the exhaust fitting ③ on the internal compressor is in good condition, leave it in place. If the fitting needs to be replaced, use an 11 mm (7/16 inch) wrench to remove it.

Figure 73



Install the heat exchange coil

1. Install a new elbow fitting ① into the left side of the air filter. Use an 11 mm (7/16 inch) wrench to tighten. Make sure the fitting points down to the bottom of the power supply.

2. Are you installing a new exhaust fitting ② on the internal compressor?

   - ❑ If yes, use an 11 mm (7/16 inch) wrench to install the fitting. Tighten until snug plus 1 turn.

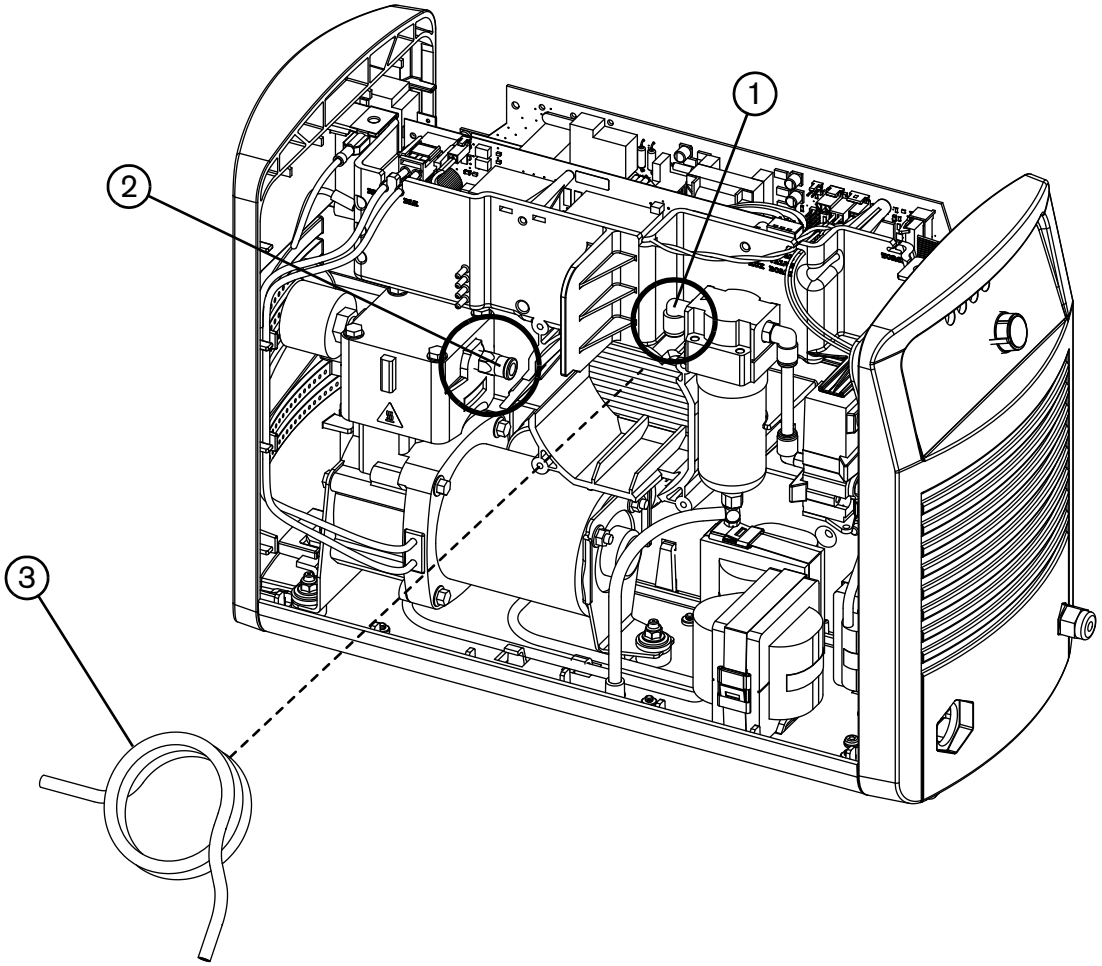
     Thread sealant is already applied to the threads of the exhaust fitting. Do not apply additional thread sealant.

   - ❑ If no, continue with the next step.

3. Orient the new heat exchange coil ③ on its side with the top end pointed towards the bottom of the power supply, as shown in *Figure 74*.

4. Push-to-connect the left end of the coil into the exhaust fitting on the internal compressor. (See *How to use push-to-connect fittings* on page 139.)

Figure 74



5. Rotate the coil into the power supply until the top of the coil points up.
6. Push-to-connect the other end of the heat exchange coil into the elbow fitting on the left side of the air filter.
7. Make sure all the hose and tube connections on the air filter are secure.

CAUTION!

If there are leaks in the gas supply hoses or connections:

- **Cut speeds can decrease.**
- **Cut quality can deteriorate.**
- **Cutting thickness capability can decrease.**
- **Parts life can shorten.**

8. Complete the following procedures:
   a. See *Install the fan* on page 162.
   b. See *Install the power supply cover* on page 105.
   c. Reconnect the power cord, and set the power switch to ON (**I**).

Replace the internal compressor

Kit number	Description
428377	*Kit: Internal compressor (includes air inlet filter and exhaust fitting)*

WARNING!

HOT SURFACE CAN CAUSE INJURY

Allow the internal compressor to cool before touching it.

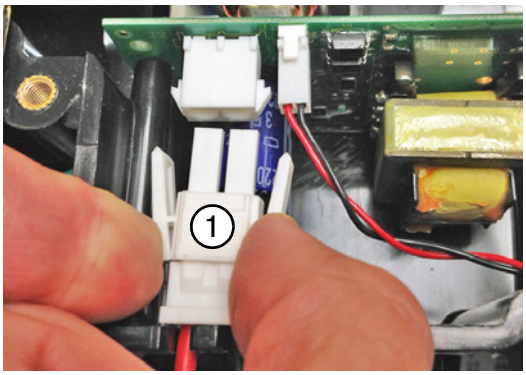
The surface of the compressor can become very hot during use and can cause serious injury if it comes in contact with skin.

Remove the internal compressor

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Detach the rear panel* on page 110.
   d. See *Remove the fan* on page 161.
   e. See *Remove the heat exchange coil* on page 163.
2. Disconnect the air filter's drain hose from the hole in the bottom of the power supply's base.

   It is normal to see water in the drain hose and in the air filter bowl. Remove any water that spills inside the power supply before operating the system again.

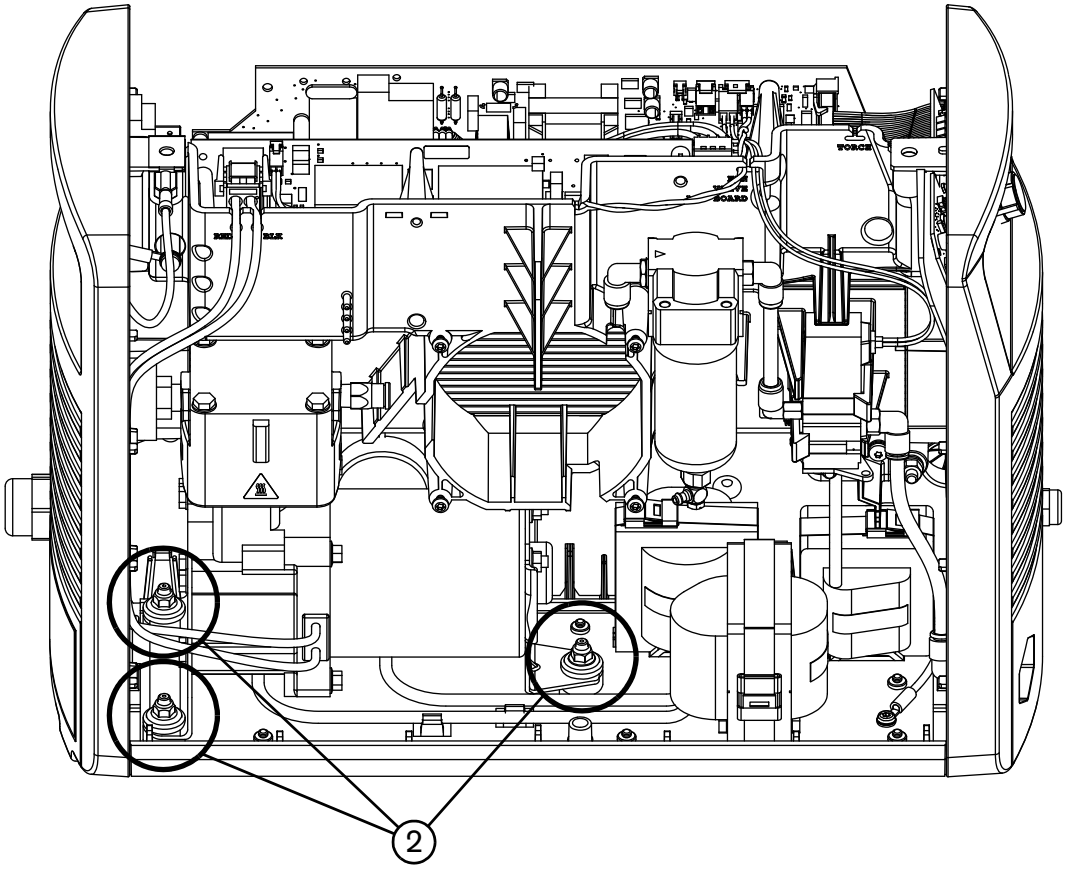
3. Remove the J2 connector ① from the compressor-driver board. Remove the J2 wires from the notches in the center panel.



4. Use an 8 mm (5/16 inch) wrench to remove the hex nuts from the 3 retaining screws ② that secure the internal compressor to the base of the power supply.

5. Remove the metal washer from each retaining screw.

Figure 75

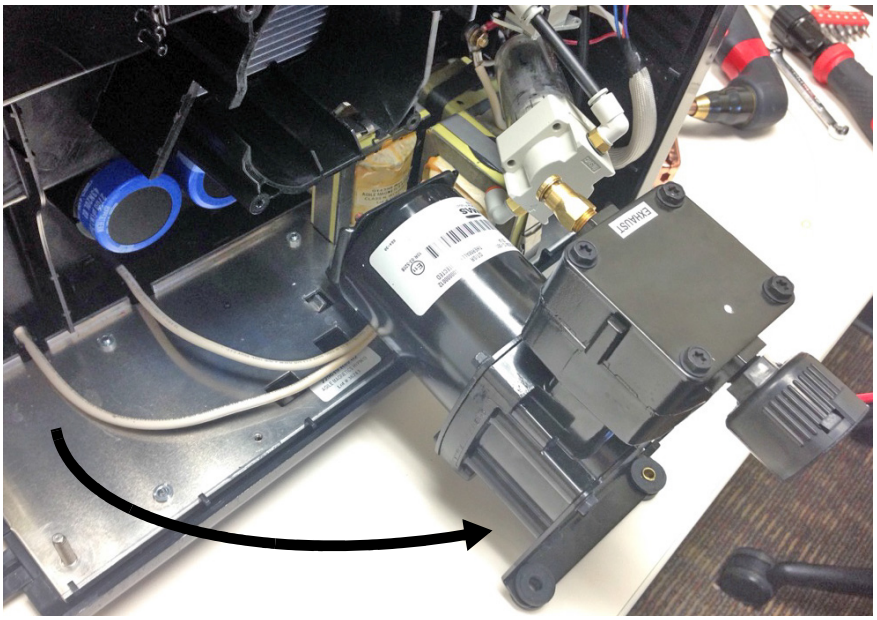


6. Hold down the base of the power supply with one hand. With your other hand, lift the end of the internal compressor that is nearest the rear panel until the compressor is free of the 2 retaining screws.

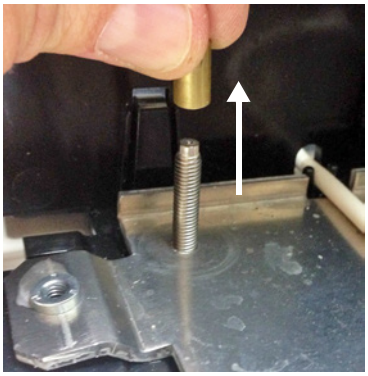
7. Rotate the internal compressor 90° counterclockwise so that it is outside the power supply. See *Figure 76*.

8. Lift the internal compressor until it is free of the third retaining screw (the one in the middle of the power supply). Remove the internal compressor from the power supply.

Figure 76



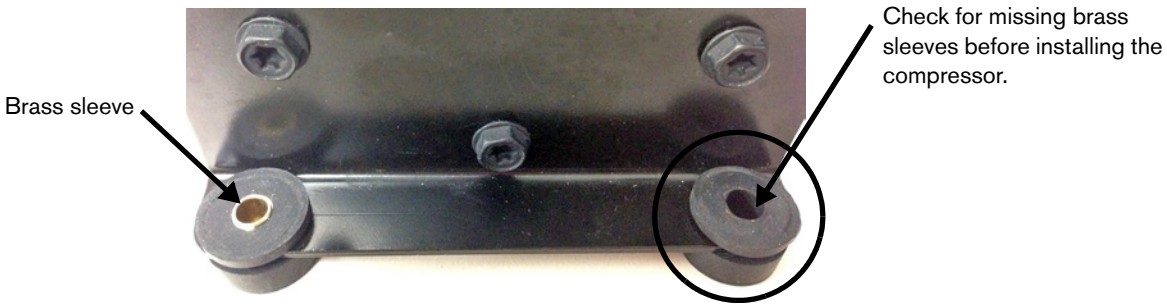
9. Check the 3 retaining screws in the power supply. If brass sleeves were left behind on any of the screws, remove the sleeves.



Install the internal compressor

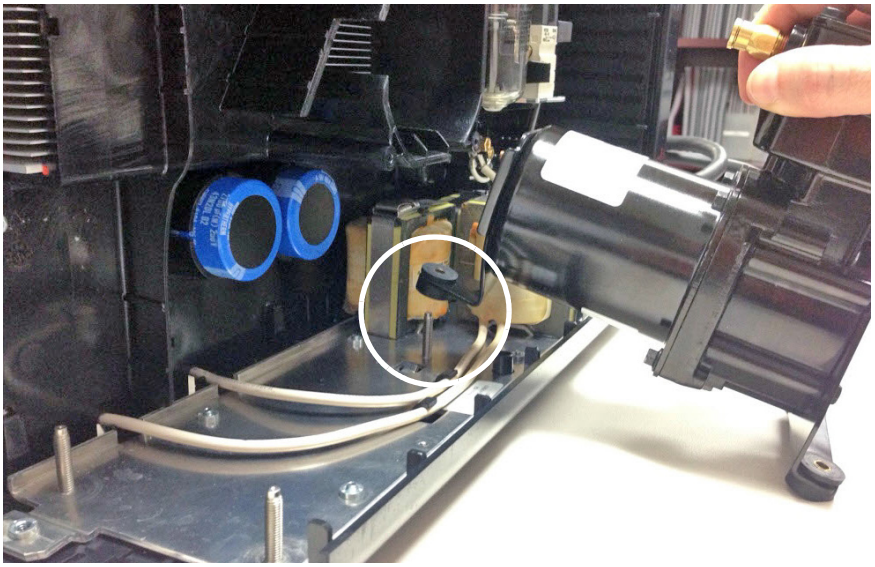
1. Check the 3 mounting brackets on the new compressor. Is the brass sleeve missing in any of the brackets? See *Figure 77*.
   - ❑ If yes, replace the missing brass sleeve with one from the old compressor.
   - ❑ If no, continue with the next step.

Figure 77



2. Orient the internal compressor so it is perpendicular to the power supply. Slide the internal compressor's bracket over the retaining screw in the middle of the power supply's base, as shown in *Figure 78*.

Figure 78

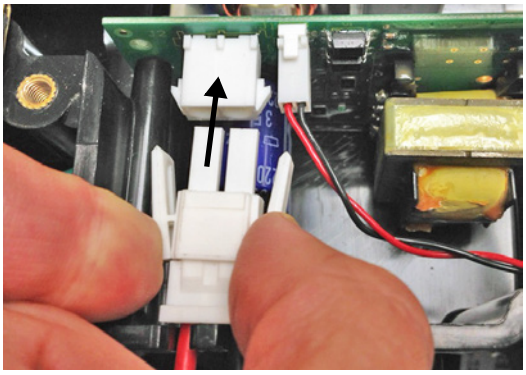


3. Rotate the internal compressor until it is inside the power supply. Slide the compressor's other 2 brackets over the 2 retaining screws in the power supply.

4. Slide a metal washer over each of the 3 retaining screws.

5. Use an 8 mm (5/16 inch) wrench to tighten a hex nut onto each of the 3 retaining screws. Tighten the nuts to 23.0 kg·cm (20 inch·pounds).

6. Plug the internal compressor's wire connector into J2 on the compressor-driver board. Route the wires through the notches at the top of the center panel labeled "RED" and "BLK." Position the wires in the wire chase up the side of the rear panel.



7. Press the air filter's drain hose into the hole in the base of the power supply.

8. Complete the following procedures:

   a. See *Install the heat exchange coil* on page 164.

   b. See *Install the fan* on page 162.

   c. See *Reattach the rear panel* on page 112.

   d. See *Install the power supply cover* on page 105.

   e. Reconnect the power cord, and set the power switch to ON (**I**).

Replace the air inlet filter in the internal compressor

Kit number	Description
428379	*Kit: Air inlet filter for internal compressor*

WARNING!

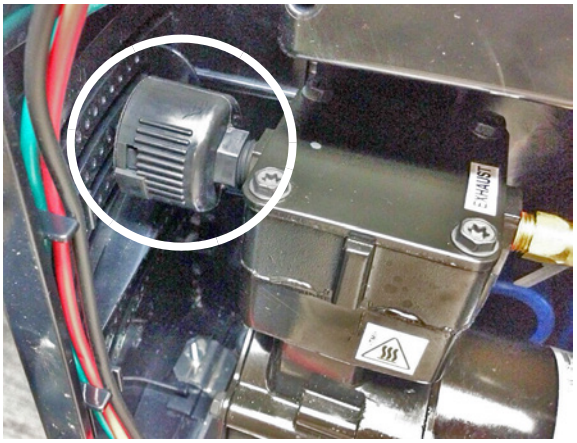
HOT SURFACE CAN CAUSE INJURY

Allow the internal compressor to cool before touching it.

The surface of the compressor can become very hot during use and can cause serious injury if it comes in contact with skin.

Remove the air inlet filter from the internal compressor

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
2. From the fan side of the power supply, gently tilt the rear panel away from the power supply so you can access the air inlet filter on the internal compressor.
3. Unscrew the filter assembly from the internal compressor.



Install the air inlet filter in the internal compressor

1. Screw the new air inlet filter assembly onto the internal compressor. Tighten the filter assembly only to finger-tight.
2. Complete the following procedures:
   a. See *Install the power supply cover* on page 105.
   b. Reconnect the power cord, and set the power switch to ON (**I**).

Replace the front panel

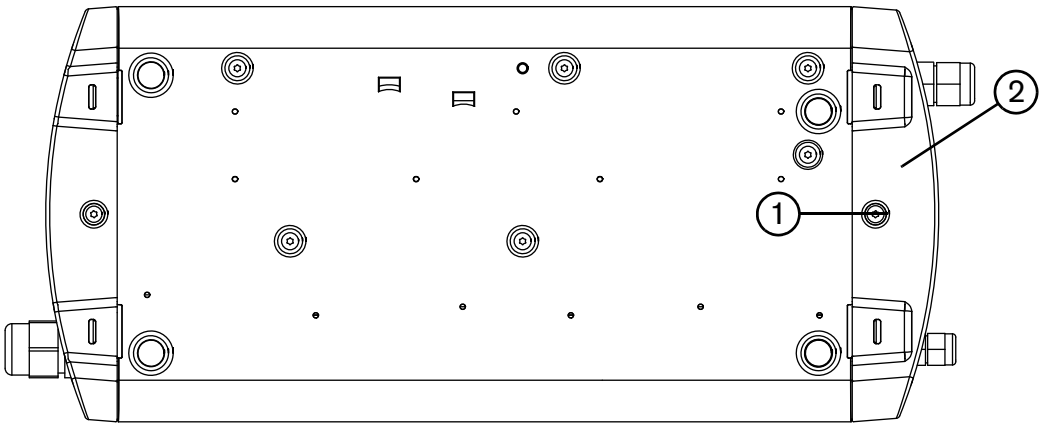
Kit number	Description
428389	*Kit: Front panel (does not include current adjustment knob)*

Remove the front panel

Use the following procedure to completely remove the front panel in order to replace it. If you just need to move the front panel out of the way to provide better access to the interior of the power supply, see *Detach the front panel* on page 108 and *Reattach the front panel* on page 109.

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Remove the component barrier* on page 106.
2. Lay the power supply on its side.
3. Remove the retaining screw ① from the bottom of the front panel ②.

Figure 79



4. Insert a blade screwdriver into the opening for one of the snaps ③. While pushing up on the tab inside the snap, pull the corner of the front panel away from the power supply until it detaches from the base.

5. Repeat the previous step on the other corner of the panel.

6. Disconnect the control board's ribbon cable ④ from the power board ⑤ by folding the latches ⑥ back.

   In *Figure 80*, the center panel is hidden in the image on the left.

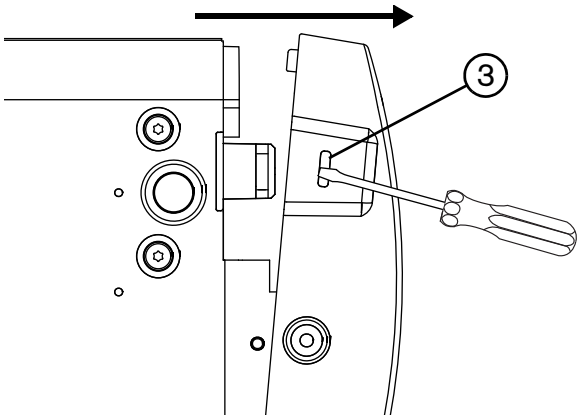
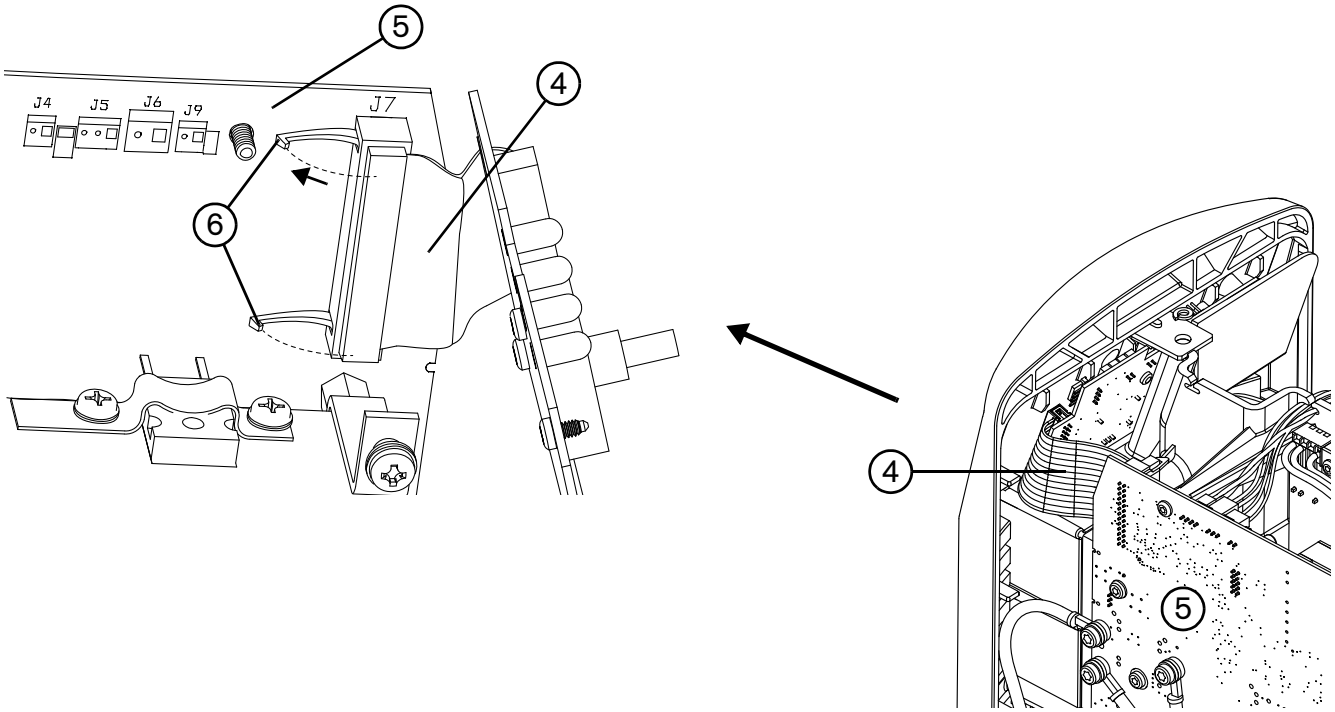


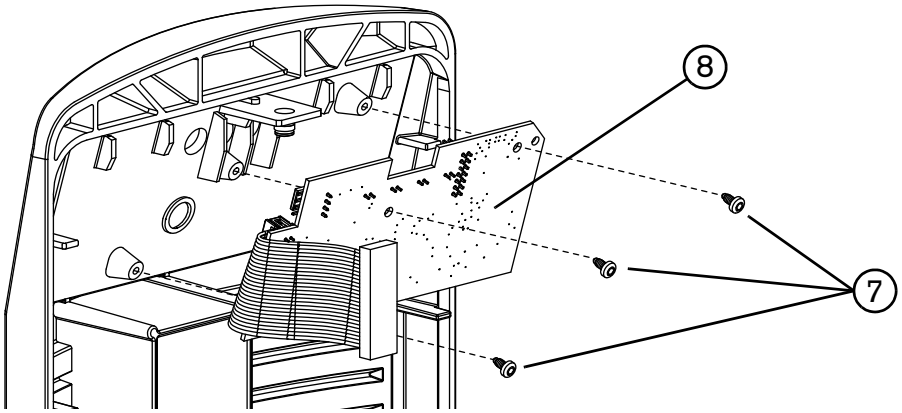
Figure 80



7. Remove the amperage adjustment knob from the front of the power supply by pulling it away from the front panel. (It does not have a set screw.) Set the knob aside.

8. Remove the 3 retaining screws ⑦ from the control board ⑧, and lift it out of the front panel. Set aside the control panel and its screws.

Figure 81



9. Disconnect the torch lead from the power supply. See *Remove the torch lead and strain relief* on page 150.

10. Disconnect the work lead from the power supply. See *Remove and install the work lead* on page 186.

Install the front panel

1. Install the torch lead through the new front panel. See *Install the torch lead and strain relief* on page 152.

2. Install the work lead. See *Remove and install the work lead* on page 186.

3. Push the new front panel into the power supply base until it snaps into place.

4. Tighten the retaining screw to 23.0 kg·cm (20 inch·pounds).

5. Attach the control board to the new front panel with the 3 retaining screws.

6. Connect the control panel ribbon cable to the power board at J7, and fold the latches up to hold it in place. See *Figure 80* on page 173.

7. Press the amperage adjustment knob onto the post on the new front panel.

8. Complete the following procedures:
   a. See *Install the component barrier* on page 107.
   b. See *Install the power supply cover* on page 105.
   c. Reconnect the power cord, and set the power switch to ON (**I**).

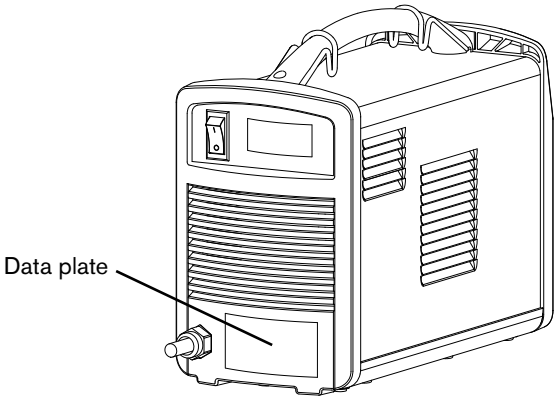
Replace the rear panel

Kit number	Description
428391	*Kit: Rear panel (includes data plate and consumables label)*

Remove the rear panel

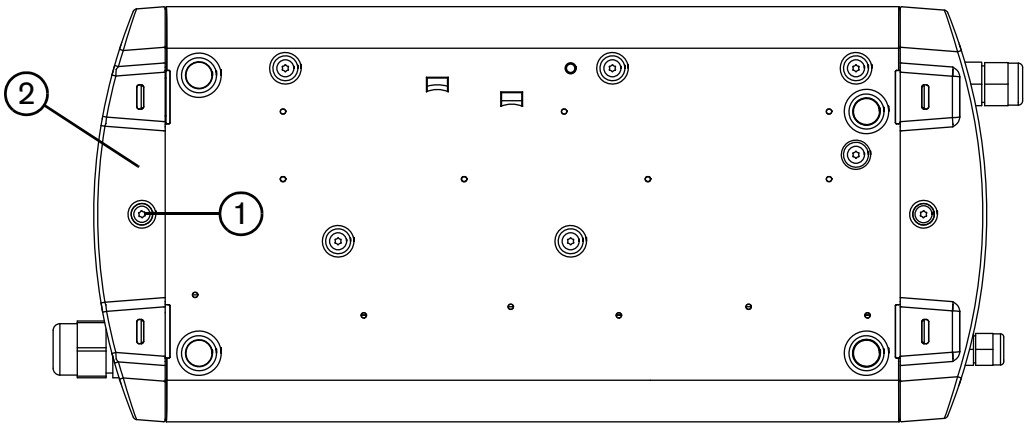
Use the following procedure to completely remove the rear panel in order to replace it. If you just need to move the rear panel out of the way to provide better access to the interior of the power supply, see *Detach the rear panel* on page 110 and *Reattach the rear panel* on page 112.

1. Make sure that the serial number on the existing rear panel matches the one on the new rear panel. Contact Hypertherm if the serial numbers do not match. The serial number can be found on the data plate.



2. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Remove the component barrier* on page 106.
3. Lay the power supply on its side.
4. Remove the retaining screw ① from the bottom of the rear panel ②.

Figure 82

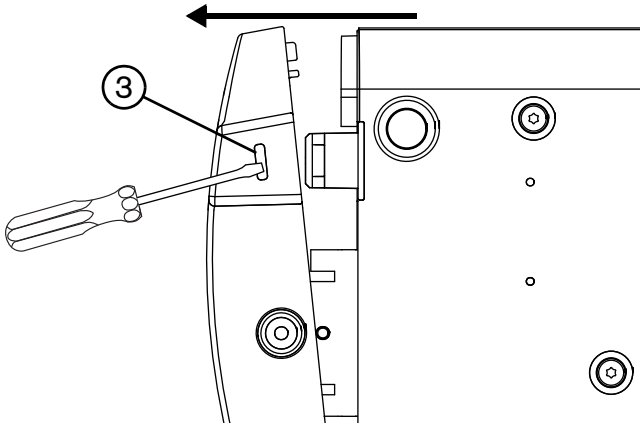


5. Insert a blade screwdriver into the opening for one of the snaps ③. While pushing up on the tab inside the snap, pull the corner of the rear panel away from the power supply until it detaches from the base.

6. Repeat the previous step on the other corner of the panel.

7. Disconnect the ground wire from the ground wire clip ④ near the top of the rear panel. See *Figure 83*.

8. Disconnect the 4 wires from the back of the power switch ⑤.

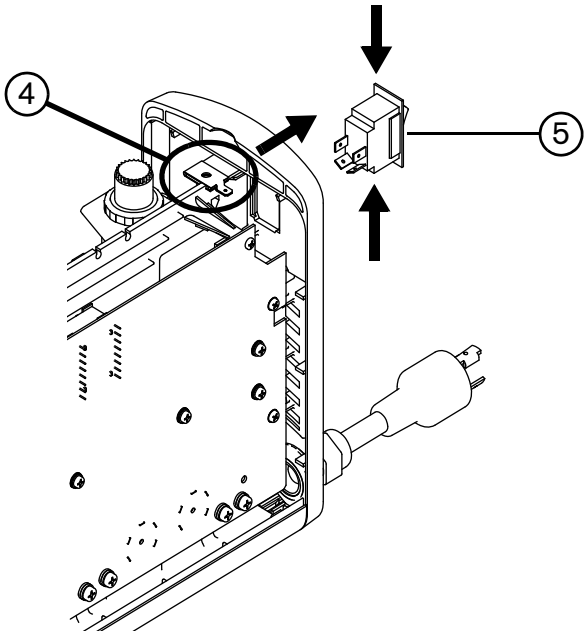


9. Using a small blade screwdriver, press up one of the tabs on the bottom of the power switch, and push that corner of the switch out of the rear panel.

10. Press up the other tab on the bottom of the power switch, and push that corner of the switch out of the panel. Make sure the first tab does not snap back into place as you release the second tab.

11. Repeat the previous two steps on the top of the power switch to push the top of the switch out of the rear panel. Remove the switch completely from the panel.

Figure 83



12. Disconnect the power cord from the power supply. See *Remove the power cord and strain relief* on page 113.

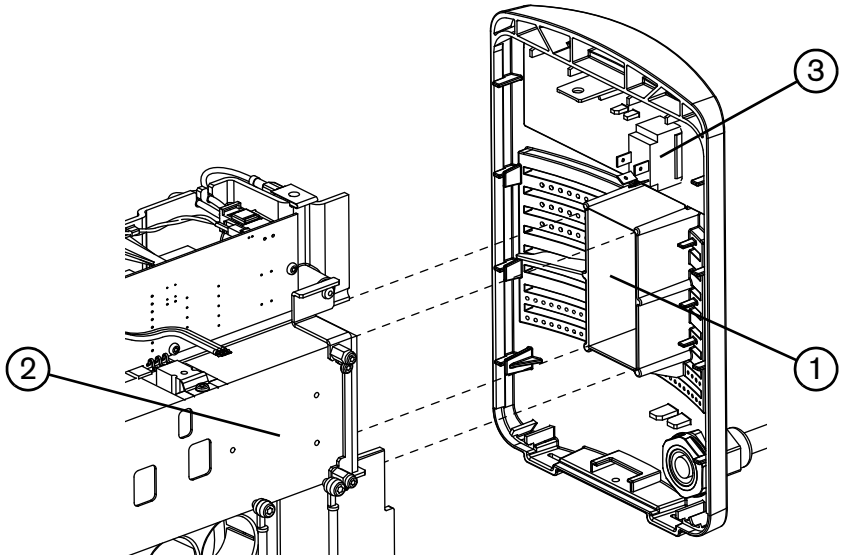
Install the new rear panel

1. Install the power cord through the new rear panel. See *Install the power cord and strain relief* on page 120.
2. Push the new rear panel into the base until it snaps into place.
3. Make sure the hole in the ground wire clip is aligned with the screw holes in the rear panel and the power supply's center panel.
4. Tighten the retaining screw to 23.0 kg·cm (20 inch·pounds).
5. Align the rear panel so the rectangular box ① on the inside of the panel slides over the heatsink ② in the power supply.

   The power board and the wires from the power cord are hidden in *Figure 84* in order to show the heatsink and the inside of the rear panel.

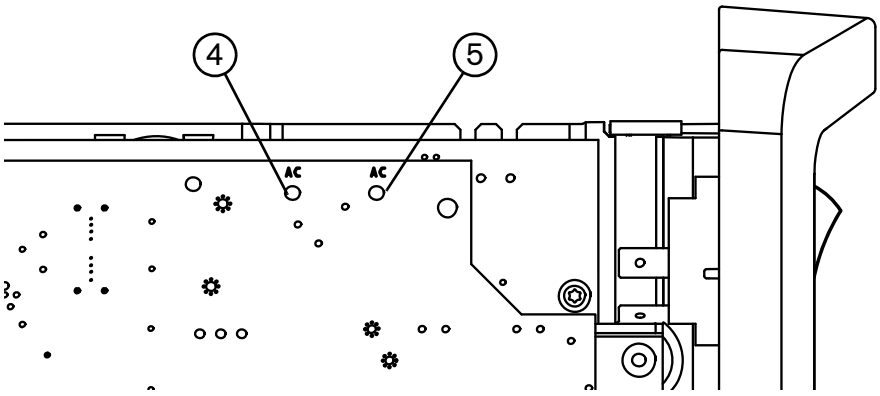
6. Press the power switch ③ into the new rear panel with the ON (**I**) label at the top of the switch. You should hear the switch snap into place.

Figure 84



7. Push the connectors for the 2 white wires that are attached to the power board at “AC” onto the bottom 2 pins of the power switch. The left “AC” wire ④ connects to the bottom-left pin on the power switch; the right “AC” wire ⑤ connects to the bottom-right pin on the power switch. See *Figure 85* and *Figure 86*.

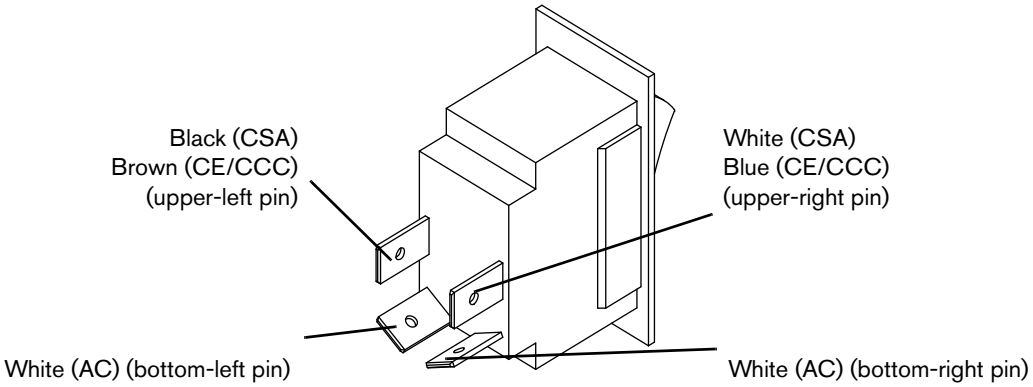
Figure 85



8. Press the connector for the black (CSA) or brown (CE/CCC) wire onto the upper-left pin on the power switch.

9. Press the connector for the white (CSA) or blue (CE/CCC) wire onto the upper-right pin on the power switch.

Figure 86



10. Reconnect the ground wire to the ground wire clip on the rear panel.

11. Tighten the strain relief nut on the power cord on the outside of the power supply.

12. Complete the following procedures:

    a. See *Install the component barrier* on page 107.

    b. See *Install the power supply cover* on page 105.

    c. Reconnect the power cord, and set the power switch to ON (**I**).

Replace the base

Kit number	Description
428399	*Kit: Plastic base (includes rubber bumpers, or "feet")*

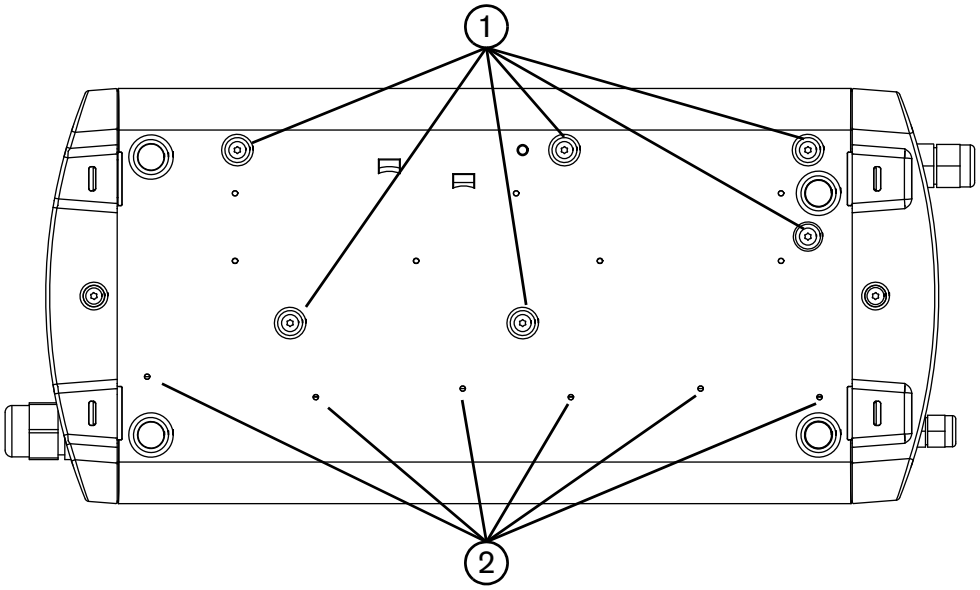
Remove the base

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Remove the component barrier* on page 106.
   d. See *Detach the front panel* on page 108.
   e. See *Detach the rear panel* on page 110.
   f. See *Remove the fan* on page 161.
   g. See *Remove the heat exchange coil* on page 163.
   h. See *Remove the internal compressor* on page 166.
2. On the fan side of the power supply, make sure the air filter's drain hose is disconnected from the hole in the bottom of the base.

   It is normal to see water in the drain hose and in the air filter bowl. Remove any water that spills inside the power supply before operating the system again.

3. Lay the power supply on its side, with the fan side facing up. See *Figure 87*.
4. Remove the 6 screws ① that attach the plastic base to the components at the bottom of the power supply.
5. Place the end of a stiff wire or other similar item with a 0.23 cm (0.092-inch) diameter in each of the 6 holes ② on the power board side of the base. Press each one until the clips release and you can pull the base away from the center panel.

Figure 87



Install the base

1. Position the new base over the metal plate on the bottom of the power supply so that the screw holes align with the holes in the metal base plate for the bottom components.
2. Align the wires from the magnetics assembly with the notches at the bottom of the center panel so that the wires do not get pinched.
3. Press the plastic base into the power supply until it snaps into place.
4. Attach the plastic base to the bottom components using the 6 screws.
5. Complete the following procedures:
   a. See *Install the internal compressor* on page 169.
   b. See *Install the heat exchange coil* on page 164.
   c. See *Install the fan* on page 162.
   d. *See Reattach the rear panel* on page 112.
   e. See *Reattach the front panel* on page 109.
   f. See *Install the component barrier* on page 107.
   g. See *Install the power supply cover* on page 105.
   h. Reconnect the power cord, and set the power switch to ON (**I**).

Replace the magnetics assembly

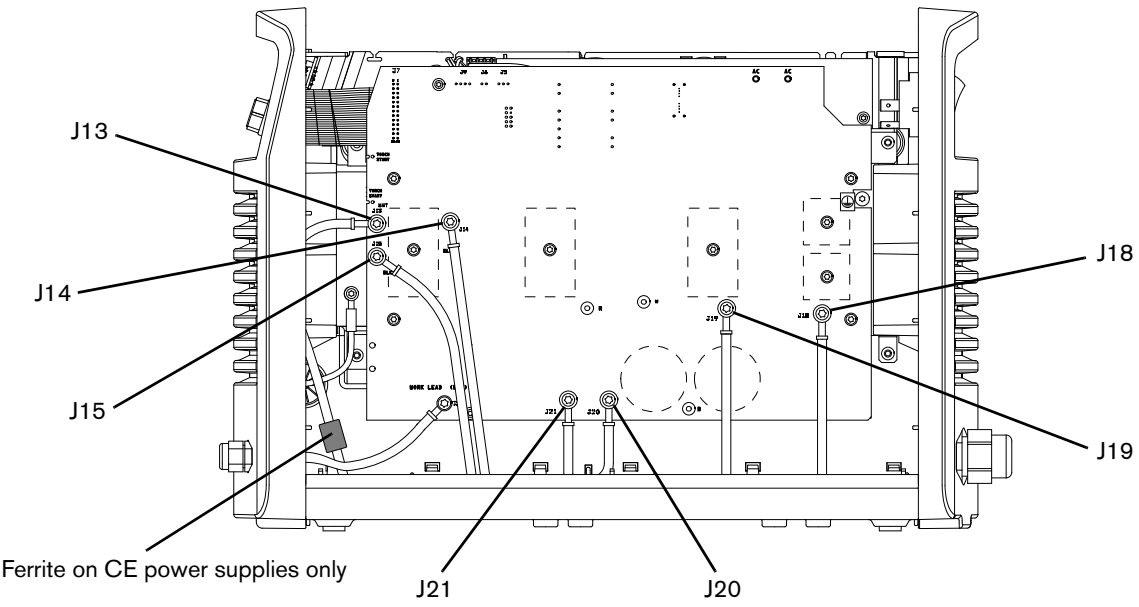
Kit number	Description
428400	*Kit: Magnetics assembly*

Replacement transformers and inductors (the magnetics) for this power supply are available only as a complete assembly with the components already mounted on a metal base plate. You cannot replace individual components.

Remove the magnetics assembly

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Remove the component barrier* on page 106.
   d. See *Detach the front panel* on page 108.
   e. See *Detach the rear panel* on page 110.
   f. See *Remove the fan* on page 161.
   g. See *Remove the heat exchange coil* on page 163.
   h. See *Remove the internal compressor* on page 166.
2. On the power board side of the power supply, remove the wires for the transformers and inductors. See *Figure 88*.
   a. Remove J13, J14, and J15, located on the front panel end of the power board.
   b. Remove J18 and J19, located on the rear panel end of the power board.
   c. Remove J20 and J21, located on the bottom center of the power board.

Figure 88



3. On the fan side of the power supply, remove the ground wire screw ① from the base of the magnetics assembly.

4. Make sure the air filter's drain hose ② is disconnected from the hole in the bottom of the base.

It is normal to see water in the drain hose and in the air filter bowl. Remove any water that spills inside the power supply before operating the system again.

5. Use an 8 mm (5/16 inch) nut driver to remove the nut that attaches the ring terminal for the output inductor's white wire to the stud labeled "WHT" ③.

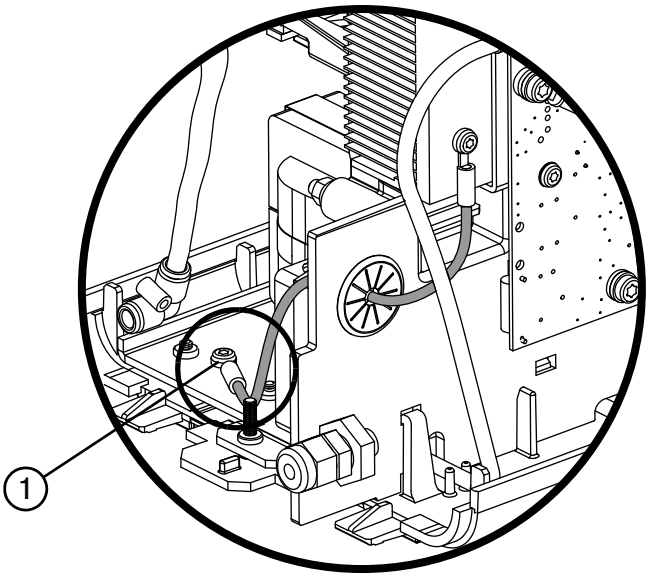
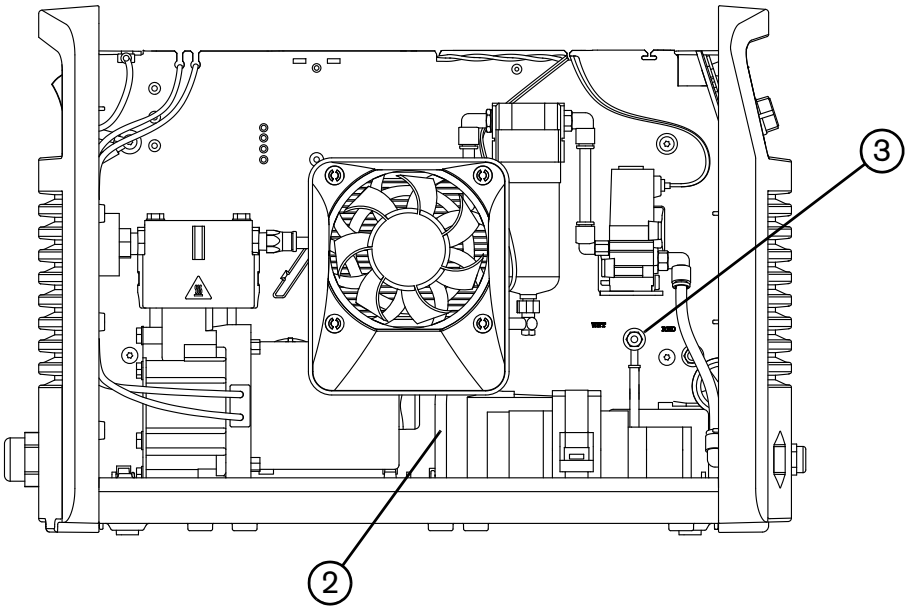


Figure 89

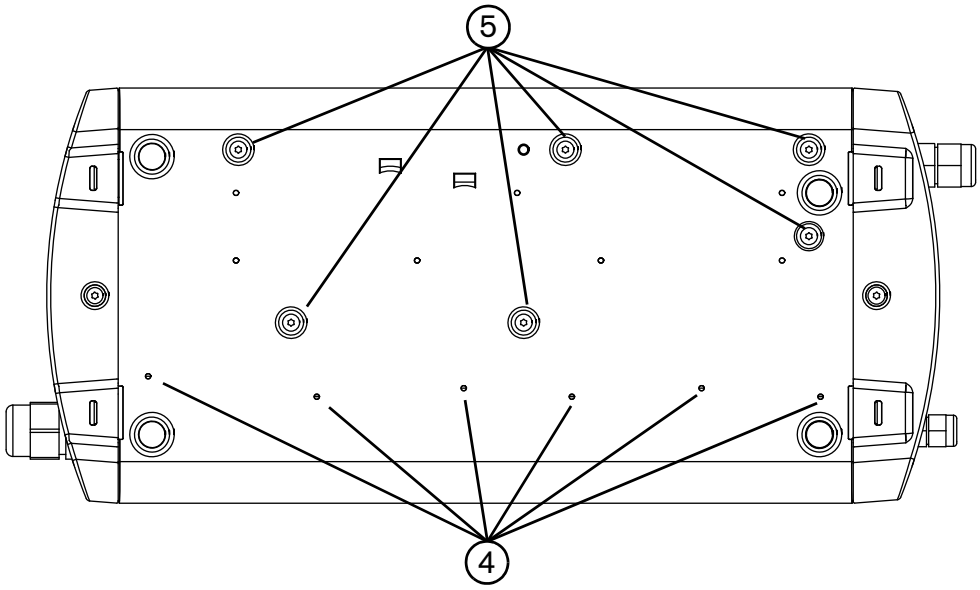


6. Lay the power supply on its side, with the fan side facing up.

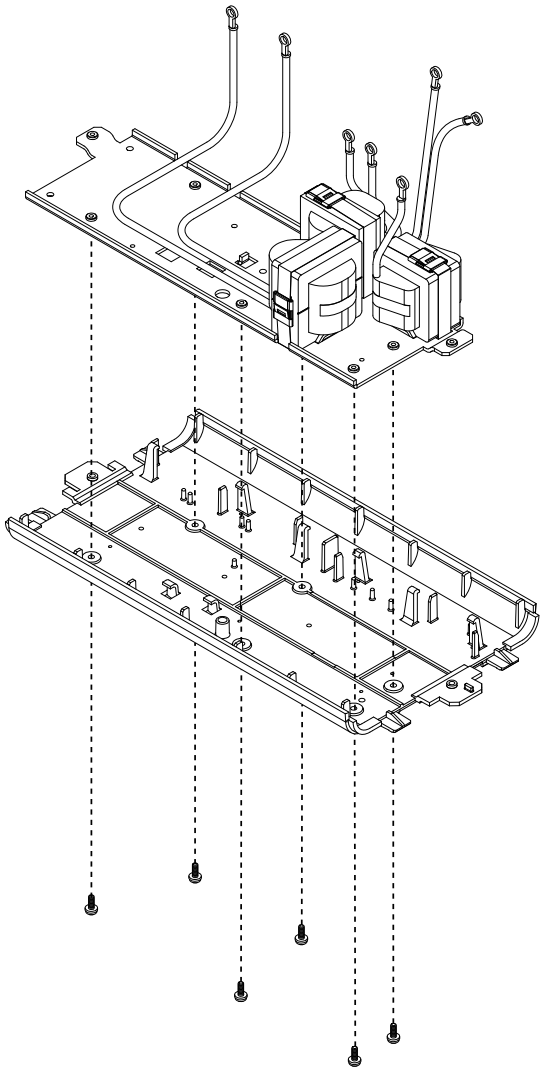
7. Place the end of a stiff wire or other similar item with a 0.23 cm (0.092 inch) diameter in each of the 6 holes ④ on the power board side of the base. Press each one in until the clips release and you can pull the base and the attached magnetics away from the center panel.

8. Remove the 6 screws ⑤ that hold the magnetics' metal mounting plate in place. Remove the plate and the magnetics.

Figure 90



Install the magnetics assembly



1. Align the screw holes in the plastic base with the screw holes in the metal plate on the bottom of the new magnetics assembly.

2. Attach the new magnetics to the plastic base using the 6 screws. Tighten the screws to 23.0 kg·cm (20 inch·pounds).

3. Align the wires from the magnetics with the notches at the bottom of the center panel so that the wires do not get pinched.

4. Press the plastic base and the magnetics into the bottom of the power supply until the assembly snaps into place.

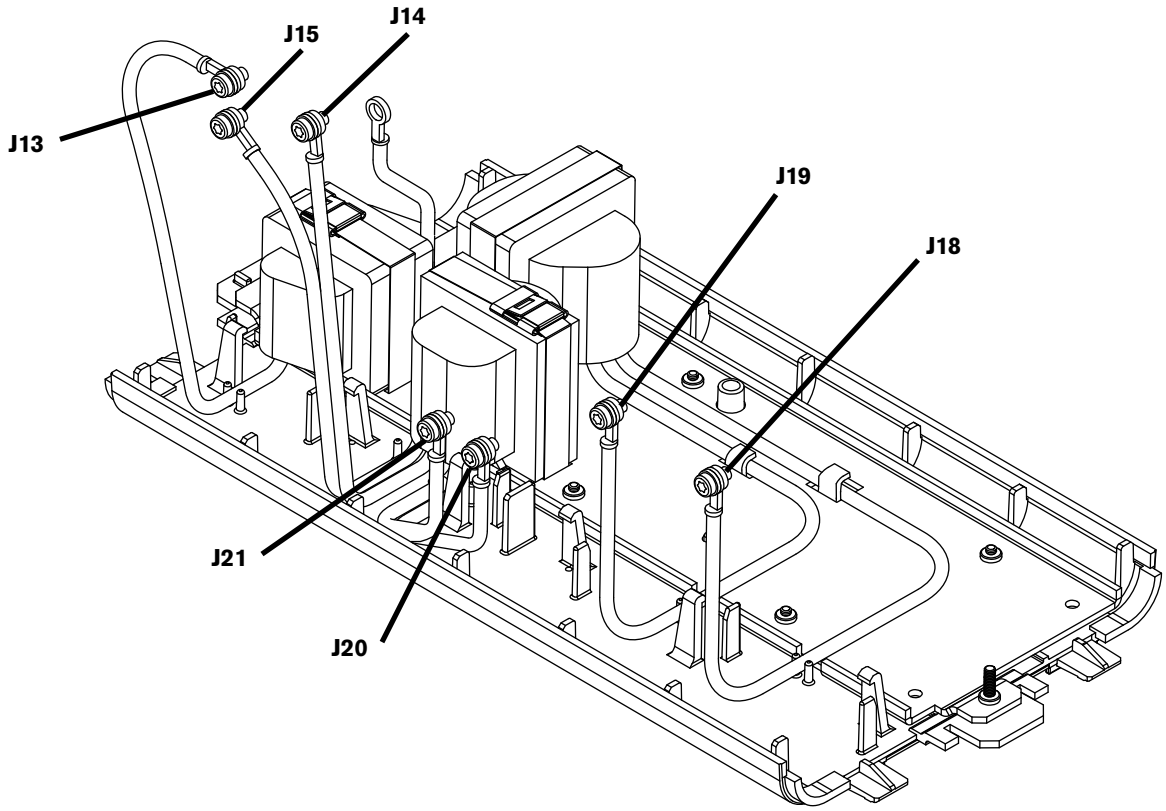
5. On the fan side of the power supply, attach the ring terminal for the output inductor's white wire to the stud labeled "WHT" using an 8 mm (5/16 inch) nut driver. Tighten the nut to 23.0 kg·cm (20 inch·pounds). See *Figure 89* on page 182.

   Also put back in place any other wires you removed from the "WHT" stud.

6. Using the screw you removed in *step 3* on page 182, attach the ground wire to the metal base plate of the magnetics assembly. Tighten the screw to 17.3 kg·cm (15 inch·pounds).

7. On the power board side of the power supply, connect the wires for the transformers and inductors on the new magnetics assembly to the power board at J13, J14, J15, J18, J19, J20, and J21. Tighten each screw to 23.0 kg·cm (20 inch·pounds).

Figure 91



8. Complete the following procedures:

- **a.** See *Install the internal compressor* on page 169.
- **b.** See *Install the heat exchange coil* on page 164.
- **c.** See *Install the fan* on page 162.
- **d.** *See Reattach the rear panel* on page 112.
- **e.** See *Reattach the front panel* on page 109.
- **f.** See *Install the component barrier* on page 107.
- **g.** See *Install the power supply cover* on page 105.
- **h.** Reconnect the power cord, and set the power switch to ON (**I**).

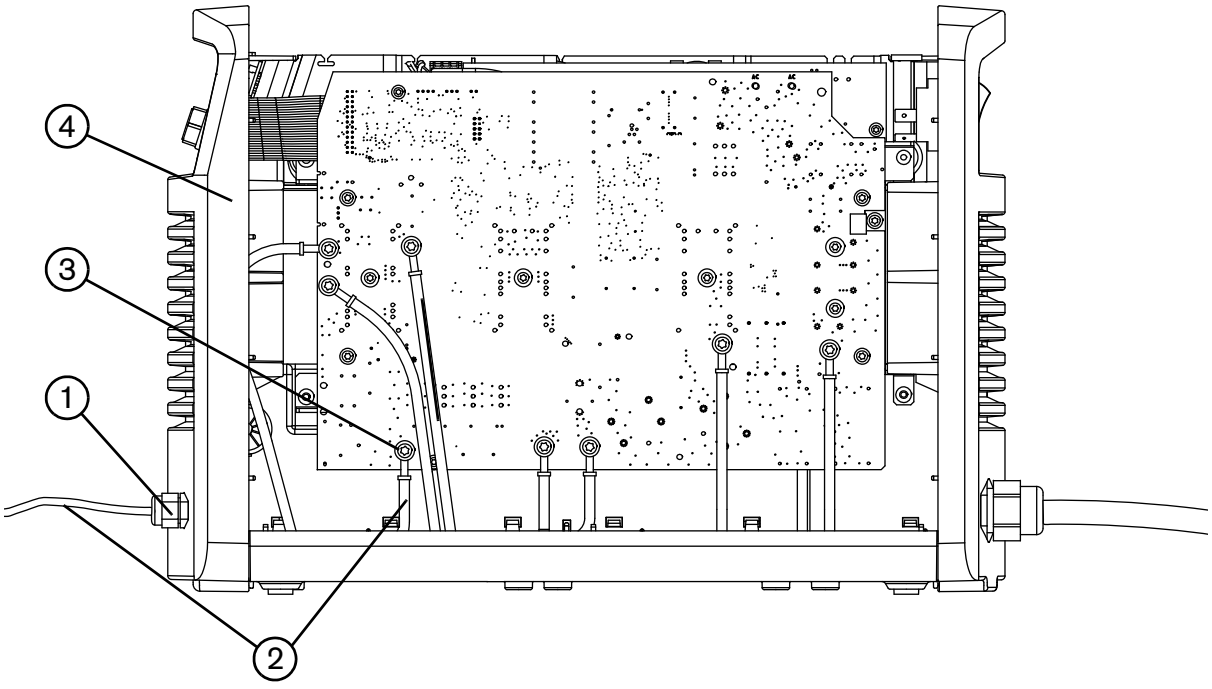
Replace the work lead and ground clamp

Kit number	Description
428388	*Kit: Work lead, 4.6 m (15 feet), with ground clamp*
228561	*Kit: Ground clamp*

Remove and install the work lead

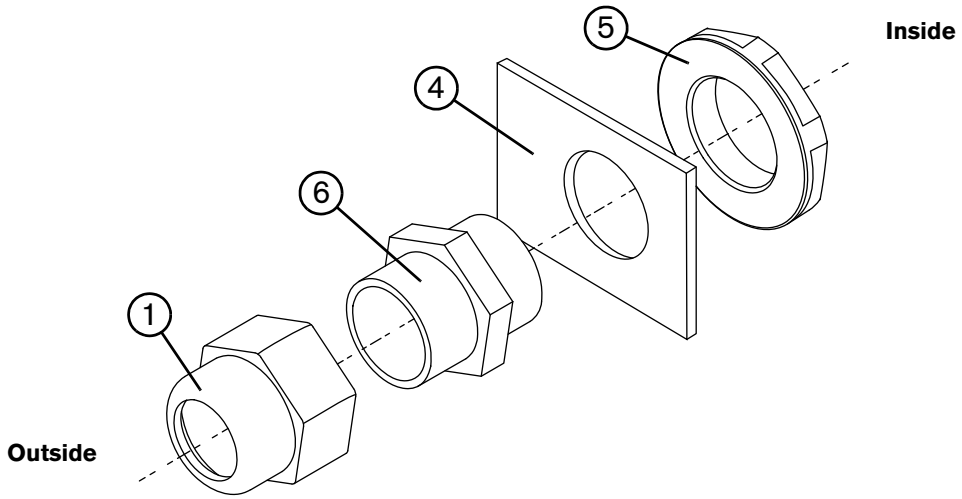
1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. See *Remove the power supply cover* on page 104.
   c. See *Remove the component barrier* on page 106.
   d. See *Detach the front panel* on page 108.
2. Loosen the strain relief nut ① on the work lead ②.
3. Remove and set aside the screw and washer from J22 ③ on the power board (labeled “WORK LEAD”).

Figure 92



4. On the inside of the front panel ④, remove the strain relief's retaining nut ⑤. See *Figure 93*.
5. Pull the work lead through the hole in the front panel.
6. Route the ring terminal on the new work lead through the hole in the front panel and then through the retaining nut.
7. Attach the work lead to the power board at J22 using the screw and washer that you removed in *step 3*. Tighten the screw to 23.0 kg·cm (20 inch·pounds).
8. On the inside of the front panel, tighten the retaining nut onto the strain relief ⑥.

Figure 93



9. Complete the following procedures:
   a. See *Reattach the front panel* on page 109.
   b. See *Install the component barrier* on page 107.
   c. See *Install the power supply cover* on page 105.
   d. Reconnect the power cord, and set the power switch to ON (**I**).

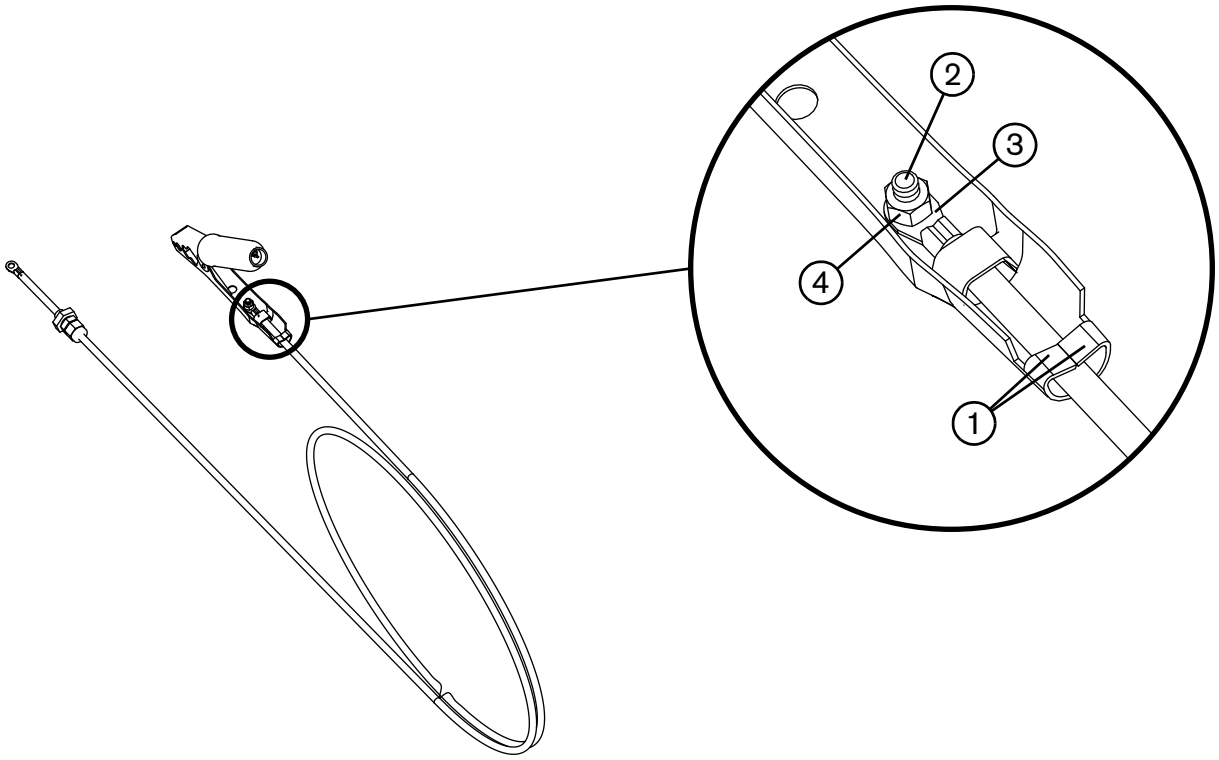
Remove and install the ground clamp

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Slide down the black plastic sleeve on the handle of the clamp where the work lead is connected.
3. Straighten the bent tabs ① that hold the work lead in place. See *Figure 94*.
4. Loosen the screw ② that connects the work lead to the clamp.
5. Remove the work lead from the clamp, and discard the old clamp.
6. On the replacement clamp, slide down the black plastic sleeve on the handle of the clamp where you want to connect the work lead.

   You can attach the work lead to either of the clamp's handles.

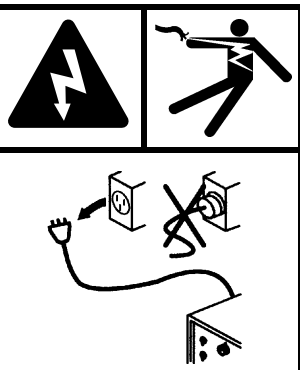
7. Thread the work lead through the plastic sleeve you moved in the previous step and then through the slots inside the handle.
8. Line up the hole in the ring terminal ③ with the hole in the handle of the ground clamp.
9. Insert the screw through the handle and the ring terminal on the end of the lead, and fasten it with the kepnut ④. Tighten the screw to 34.6 kg·cm (30 inch·pounds).
10. Fold the metal tabs over the wire to attach the wire to the handle. See *Figure 94*.
11. Slide the plastic sleeve over the handle of the new ground clamp.

Figure 94



Section 7

Torch Component Replacement



WARNING!

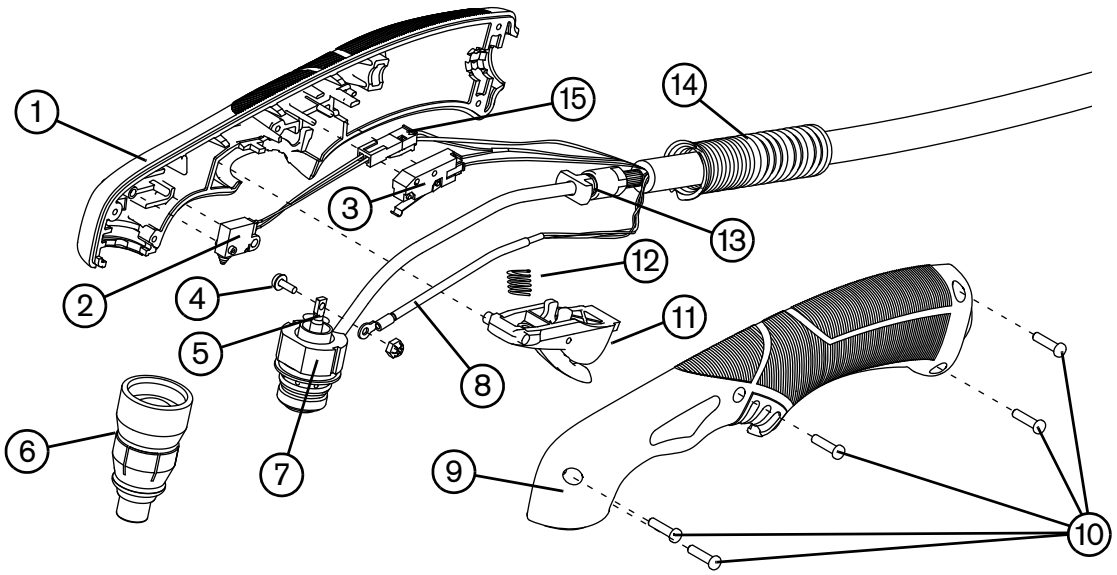
ELECTRIC SHOCK CAN KILL

Disconnect electrical power before performing any maintenance.

See the *Safety and Compliance Manual* (80669C) for more safety precautions.

Torch components

Figure 95



1 Right side of the handle
2 Cap-sensor switch
3 Start switch
4 Plunger screw
5 Plunger
6 Consumables
7 Torch body
8 Torch power wire
9 Left side of the handle
10 Screws (5)
11 Trigger assembly
12 Trigger spring
13 Gas hose fitting's flange
14 Strain relief
15 Cap-sensor wire connector

Replace the handle

Kit	Description
428381	*Kit: Air T30 torch handle (includes handle screws)*

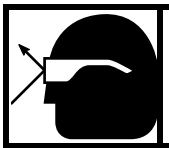
Remove the handle

Many repairs require the removal of the handle and other components. To remove the old handle and install a new handle, you need to remove all components from the handle. Several other procedures in this section reference this procedure.

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the consumables from the torch.
3. Place the torch on a flat surface with the left side of the handle facing up.

   The left side of the handle is the side with the screws.

4. Remove the screws from the torch handle. Set the screws aside.

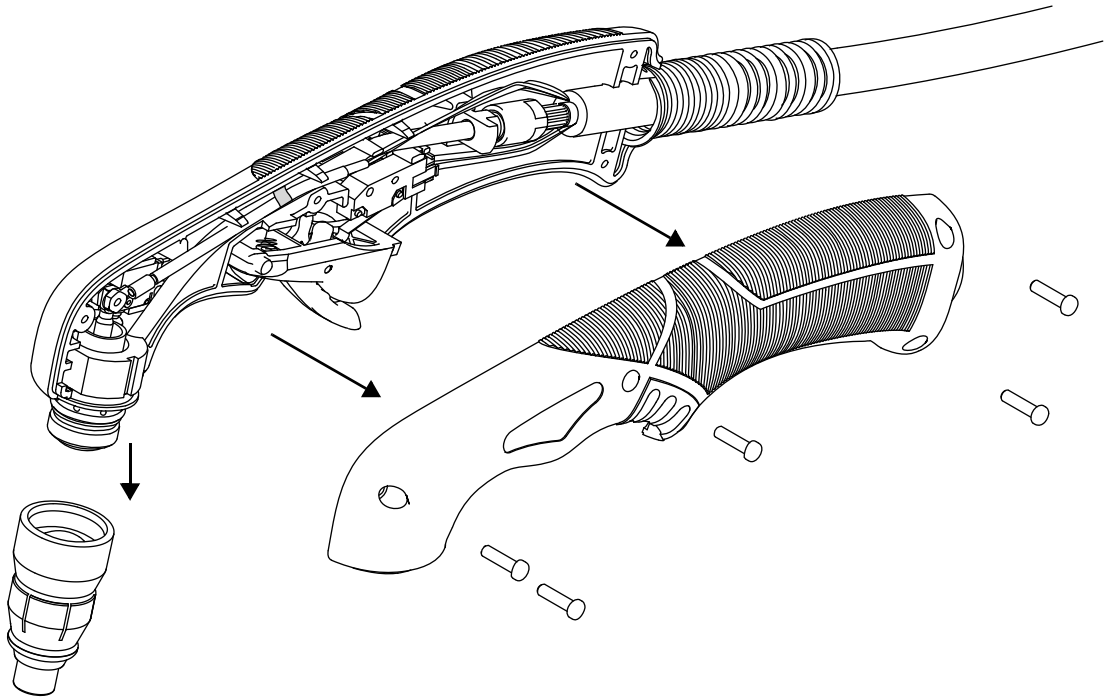


CAUTION!

Wear eye protection, as the trigger spring can launch out of the handle.

5. Being careful to keep the trigger spring from launching out of the handle, carefully pry the left side of the handle away from the torch.

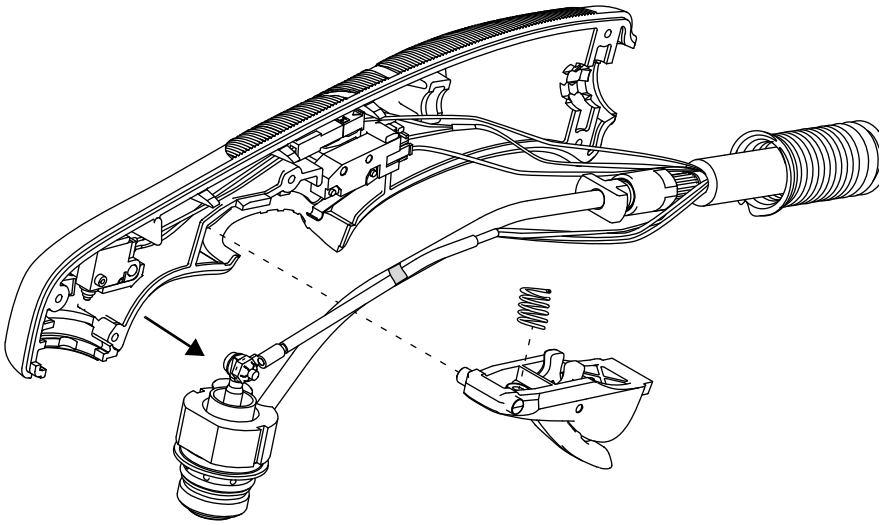
Figure 96



6. While holding the spring in place, slide the trigger and spring up and out of the handle. Set them aside.

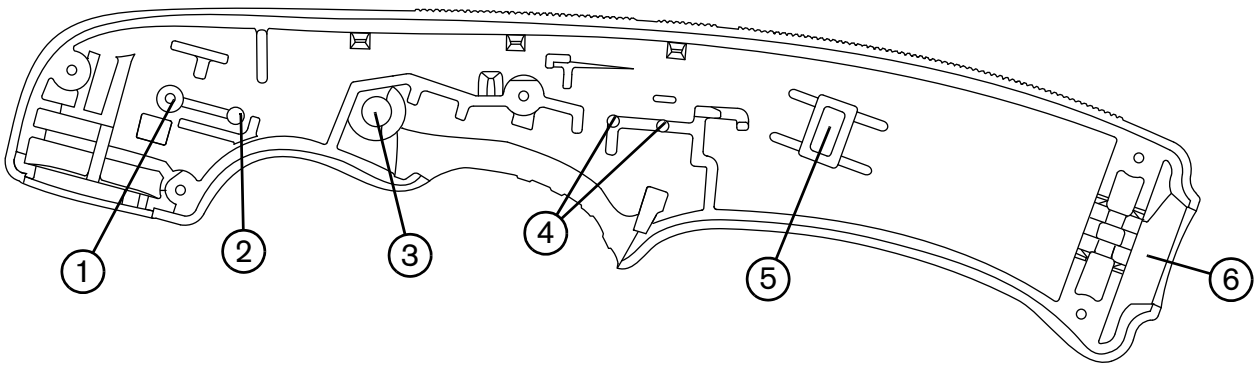
7. The torch body fits snugly into the right side of the handle. While holding the torch body in place, gently press the right side of the handle away from the torch body to remove it.

Figure 97



8. Slide the cap-sensor switch off its mounting post. See *Figure 98* and *Figure 99*.

Figure 98



1 Cap-sensor switch's post hole

2 Cap-sensor switch's mounting post

3 Trigger's pivot hole

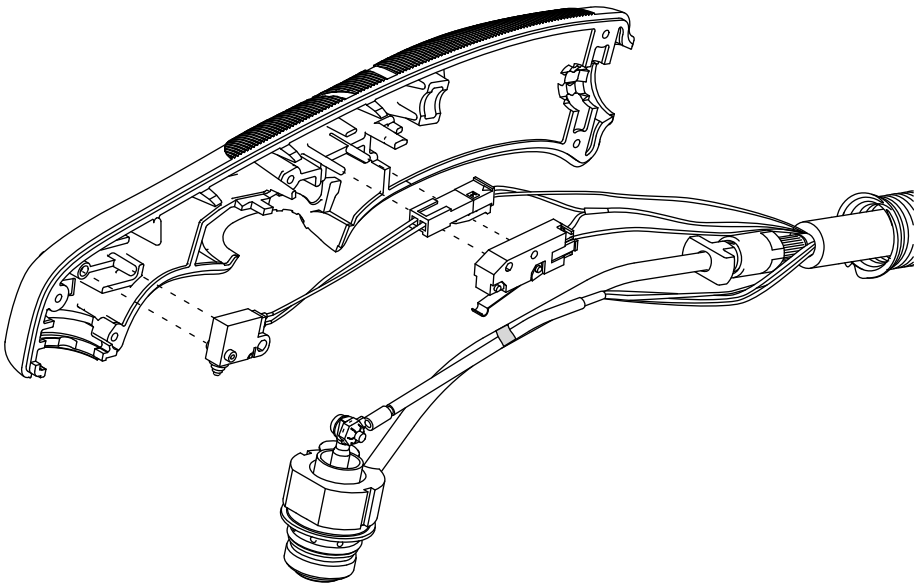
4 Start switch's mounting posts

5 Slot for the gas hose fitting's flange

6 Strain relief slot

9. Slide the start switch off the 2 mounting posts.

Figure 99



Install the handle

1. Lay the right side of the handle on a flat surface with the inside facing up.

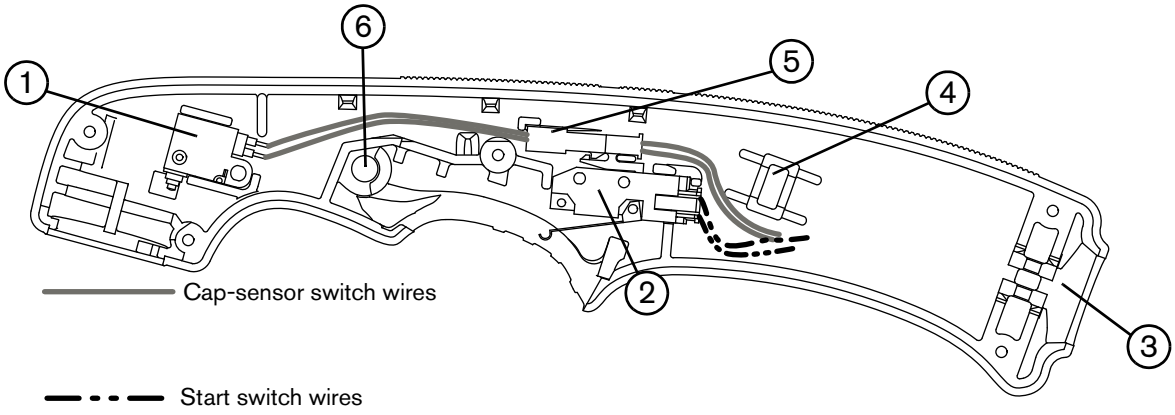
   If you are replacing the handles, apply the Air T30 label to the left side of the torch handle.

2. Press the cap-sensor switch into its post hole and onto its mounting post. See *Figure 98* on page 195.

3. Route the cap-sensor wires as shown in *Figure 100*. Place the connector above the start switch's posts with the wires positioned below the slot for the gas hose fitting's flange as shown.

4. Press the start switch onto the 2 mounting posts and position the wires below the slot for the gas fitting. The start switch should hold the cap-sensor switch connector in place. See *Figure 99* on page 195 and *Figure 100*.

Figure 100

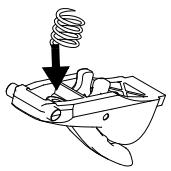


1 Cap-sensor switch
2 Start switch
3 Slot for torch lead strain relief
4 Slot for gas hose fitting's flange
5 Cap-sensor switch connector
6 Trigger's pivot hole

5. Press the torch body into the torch handle with the gas hose fitting's flange aligned with the slot in the handle. Make sure the flange does not pinch any wires.

6. Align the strain relief with the strain relief slot in the handle. See *Figure 100* for the location of the strain relief slot.

7. Compress the trigger spring into the front half of the trigger. Slide the trigger and spring into place.



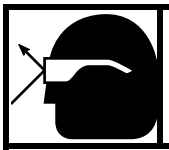
8. Being careful that the handle does not pinch the wires, align the left half of the handle with the right half. Make sure the trigger pivots are both located in the trigger pivot holes. See *Figure 100*.

9. Install the handle screws.
10. Pull the trigger to make sure it is positioned correctly in the torch handle.
11. Install the consumables.
12. Reconnect the power cord, and set the power switch to ON (**I**).

Replace the trigger assembly

Kit	Description
428156	*Kit: Torch trigger and spring*

1. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
2. Remove the consumables from the torch.
3. Place the torch on a flat surface with the left side of the handle facing up.
4. Remove the screws from the torch handle. Set the screws aside.

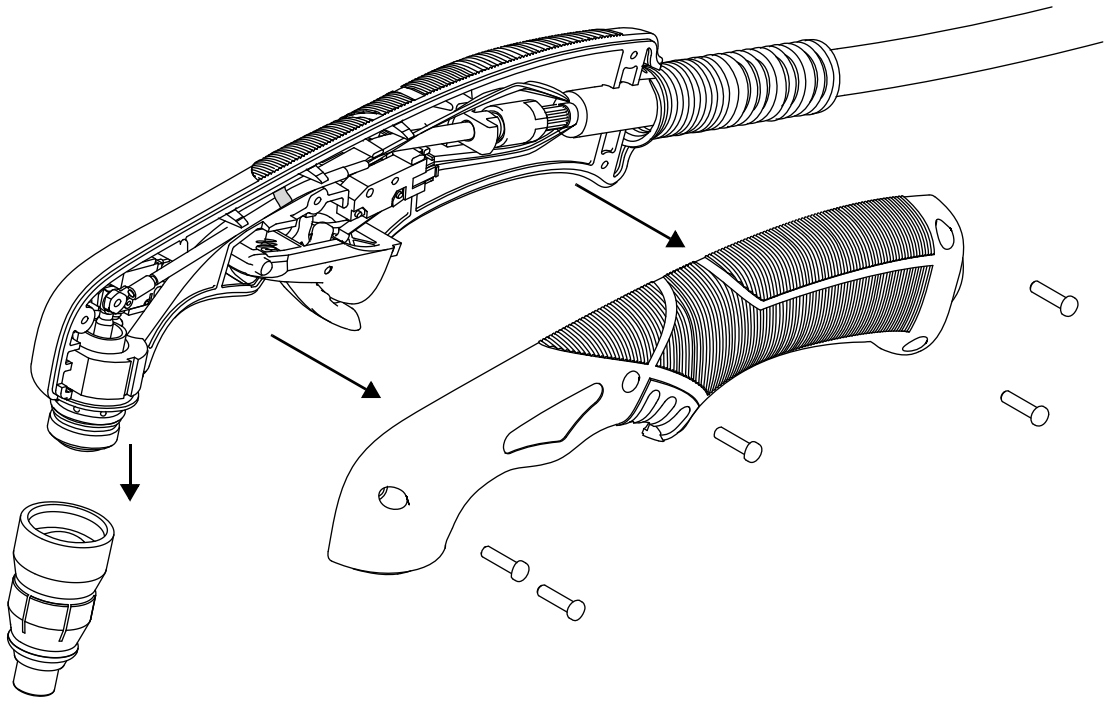


CAUTION!

Wear eye protection, as the trigger spring can launch out of the handle.

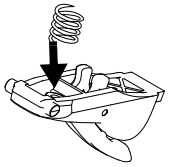
5. Being careful to keep the trigger spring from launching out of the handle, carefully pry the left side of the handle away from the torch.

Figure 101



6. While holding the spring in place, slide the trigger and spring up and out of the handle.

7. Compress the new trigger spring into the front half of the new trigger. Slide the trigger and spring into place.



8. Being careful that the handle does not pinch the wires, align the left half of the handle with the right half. Make sure the trigger pivots are both located in the trigger pivot holes. See *Figure 100* on page 196.

9. Install the handle screws.

10. Pull the trigger to make sure it is positioned correctly in the torch handle

11. Install the consumables.

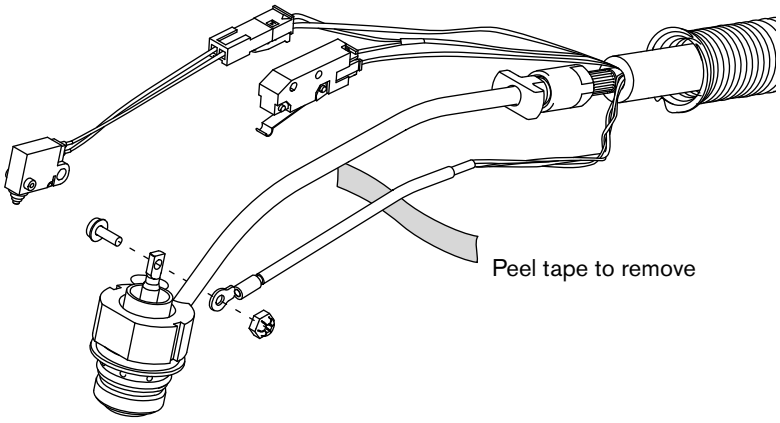
12. Reconnect the power cord, and set the power switch to ON (**I**).

Replace the torch body

Kit	Description
428394	*Kit: Air T30 torch body (includes O-ring)*

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. Remove all components from the torch. See *Remove the handle* on page 193.
2. Remove the screw that attaches the torch power wire to the torch body. Set the nut and screw aside.
3. Peel off the tape that attaches the torch power wire to the torch body.

Figure 102

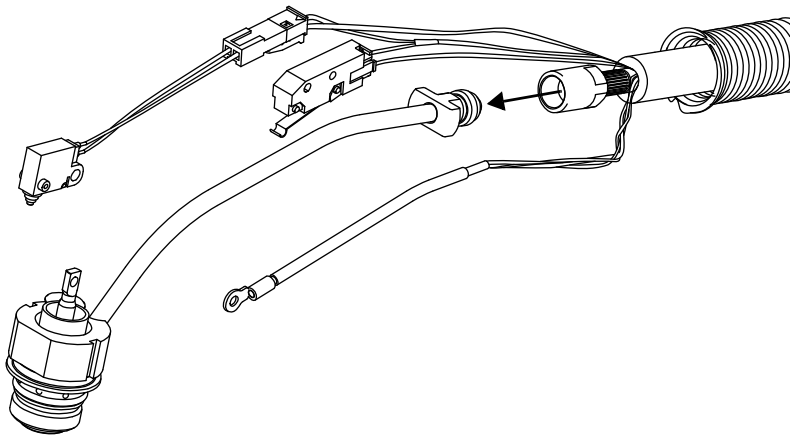


4. Use two wrenches to loosen the gas fitting that attaches the torch body to the torch lead.

CAUTION!

Always use two wrenches to properly loosen and tighten the hex nuts and bolts mentioned in these procedures.

Figure 103



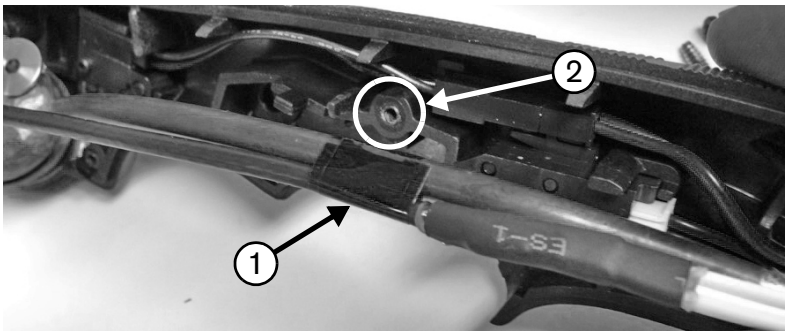
5. Thread the new torch body into the torch lead to finger tight plus 1/4 turn.

6. Tighten the screw that attaches the torch power wire to the torch body until the ring terminal is snug against the plunger. See *Figure 102* on page 199 for the screw installation order. It is important that the screw be installed as shown.

7. Use a small strip of electrical tape to attach the torch power wire to the torch body's gas tube ①. Apply the tape so that it will be above the post hole ② shown in *Figure 104* when the torch body is in the handle. Make sure the wire runs alongside the gas tube, as shown in *Figure 104*.

   The tape holds the power wire in place and prevents the wire from getting pinched. Do not pull the wire too tight when you attach it to the gas tube.

Figure 104

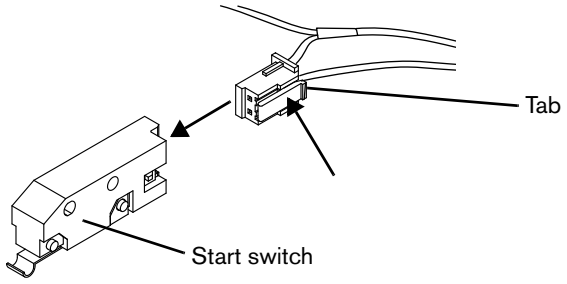


8. Complete the following procedures:
   a. Install all of the torch components that you removed. See *Install the handle* on page 196.
   b. Reconnect the power cord, and set the power switch to ON (**I**).

Replace the start switch

Kit	Description
428162	*Kit: Torch start switch*

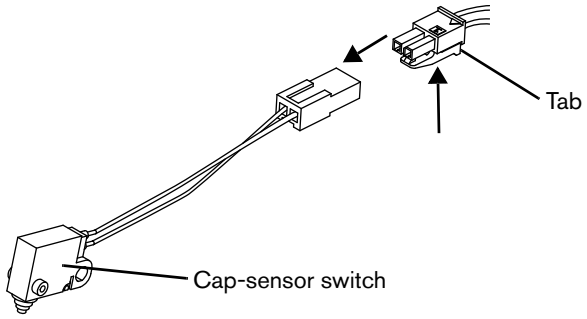
1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. Remove all components from the torch. See *Remove the handle* on page 193.
2. Disconnect the old start switch by pushing on the tab and pulling the start switch away from the connector.
3. Connect the new start switch by pushing the mating plug into the socket.
4. Complete the following procedures:
   a. Install all of the torch components that you removed. See *Install the handle* on page 196.
   b. Reconnect the power cord, and set the power switch to ON (**I**).



Replace the cap-sensor switch

Kit	Description
228109	*Kit: Torch cap-sensor switch*

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. Remove all components from the torch. See *Remove the handle* on page 193.
2. Disconnect the old cap-sensor switch by pressing the tab on the connector and pulling the connector apart.
3. Connect the new cap-sensor switch to the torch lead by pushing the mating plug on the torch lead wires into the socket.
4. Complete the following procedures:
   a. Install all of the torch components that you removed. See *Install the handle* on page 196.
   b. Reconnect the power cord, and set the power switch to ON (**I**).



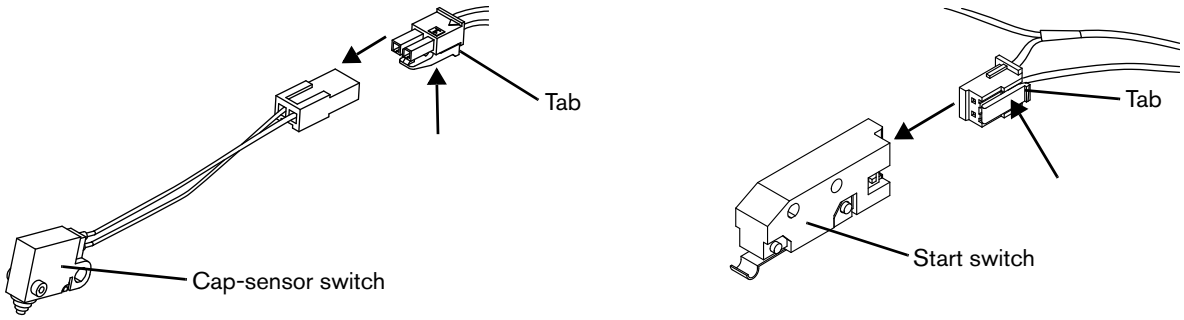
Replace the torch lead

Kit	Description
428176	*Kit: Air T30 torch lead, 4.6 m (15 feet), with strain relief*

For details on how to remove an old torch lead from the power supply and connect a new lead, refer to *Replace the torch lead and strain relief* on page 150.

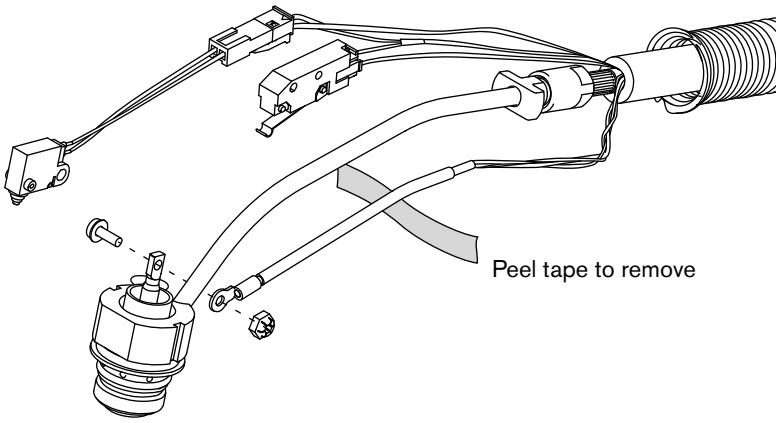
1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), and disconnect the power cord from the power source.
   b. Remove all components from the torch. See *Remove the handle* on page 193.
2. Disconnect the cap-sensor switch and start switch.

Figure 105



3. Remove the screw that attaches the torch power wire to the torch body. Set the nut and screw aside.
4. Peel off the tape that attaches the torch power wire to the torch body.

Figure 106

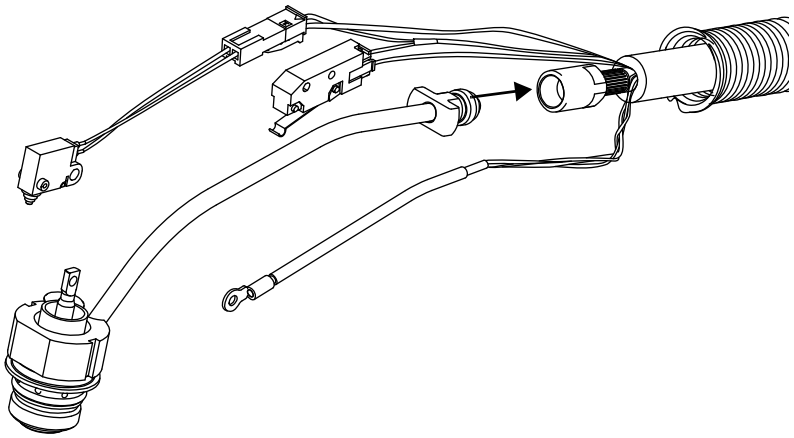


5. Use 2 wrenches to loosen the gas fitting that attaches the torch body to the torch lead.

CAUTION!

Always use two wrenches to properly loosen and tighten the hex nuts and bolts mentioned in these procedures.

Figure 107



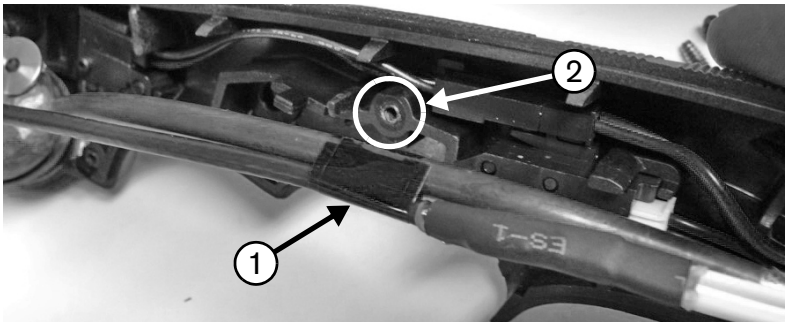
6. Thread the torch body into the new torch lead to finger tight plus 1/4 turn.

7. Tighten the screw that attaches the torch power wire to the torch body until the ring terminal is snug against the plunger. See *Figure 106* on page 203 for the screw installation order. It is important that the screw be installed as shown.

8. Use a small strip of electrical tape to attach the torch power wire to the torch body's gas tube ①. Apply the tape so that it will be above the post hole ② shown in *Figure 108* when the torch body is in the handle. Make sure the wire runs alongside the gas tube, as shown in *Figure 108*.

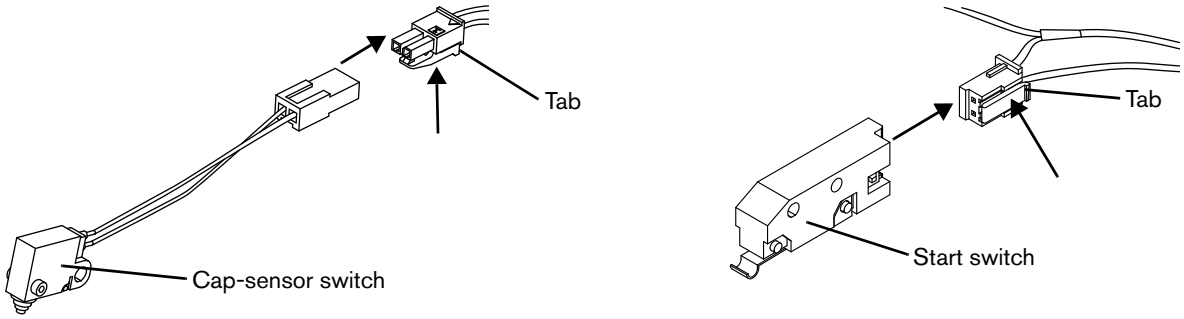
The tape holds the power wire in place and prevents the wire from getting pinched. Do not pull the wire too tight when you attach it to the gas tube.

Figure 108



9. Connect the cap-sensor switch and start switch.

Figure 109



10. Complete the following procedures:

a. Install all of the torch components that you removed. See *Install the handle* on page 196.

b. Reconnect the power cord, and set the power switch to ON (**I**).

Section 8
Parts

Use the part numbers and kit numbers in this section to order consumables, accessories, and replacement parts for your power supply and hand torch.

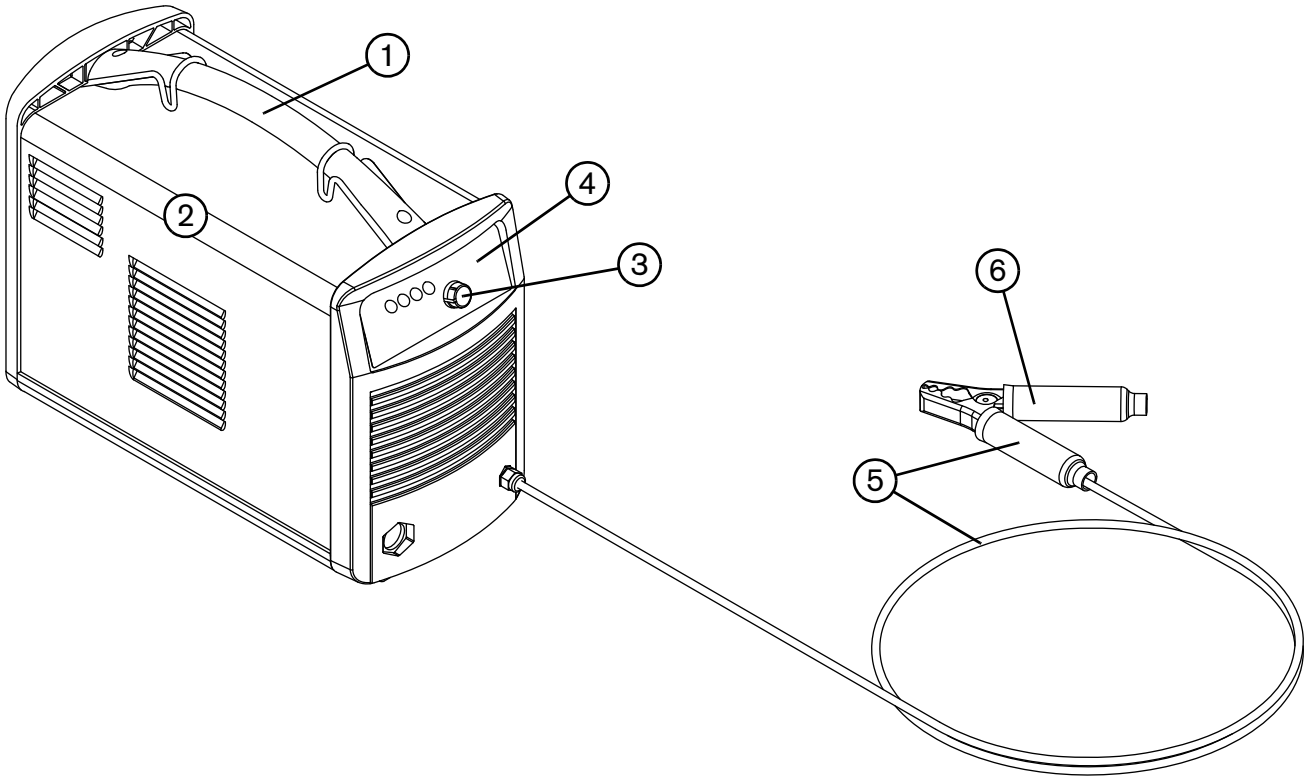
You can find procedures explaining how to install these kits in:

- *Power Supply Component Replacement* on page 103
- *Torch Component Replacement* on page 191

For instructions on installing the consumables in the hand torch, see *Step 1 – Install the consumables* on page 43.

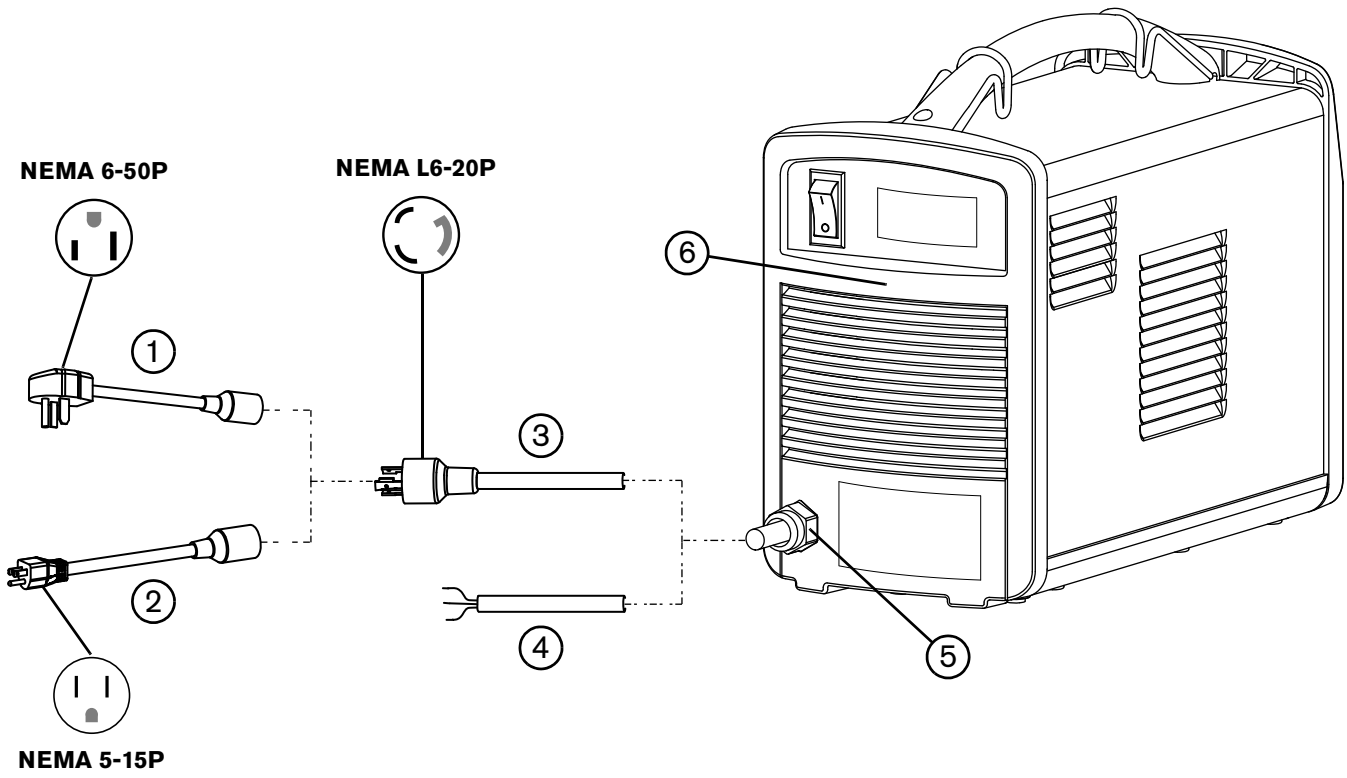
Power supply parts

Exterior, front



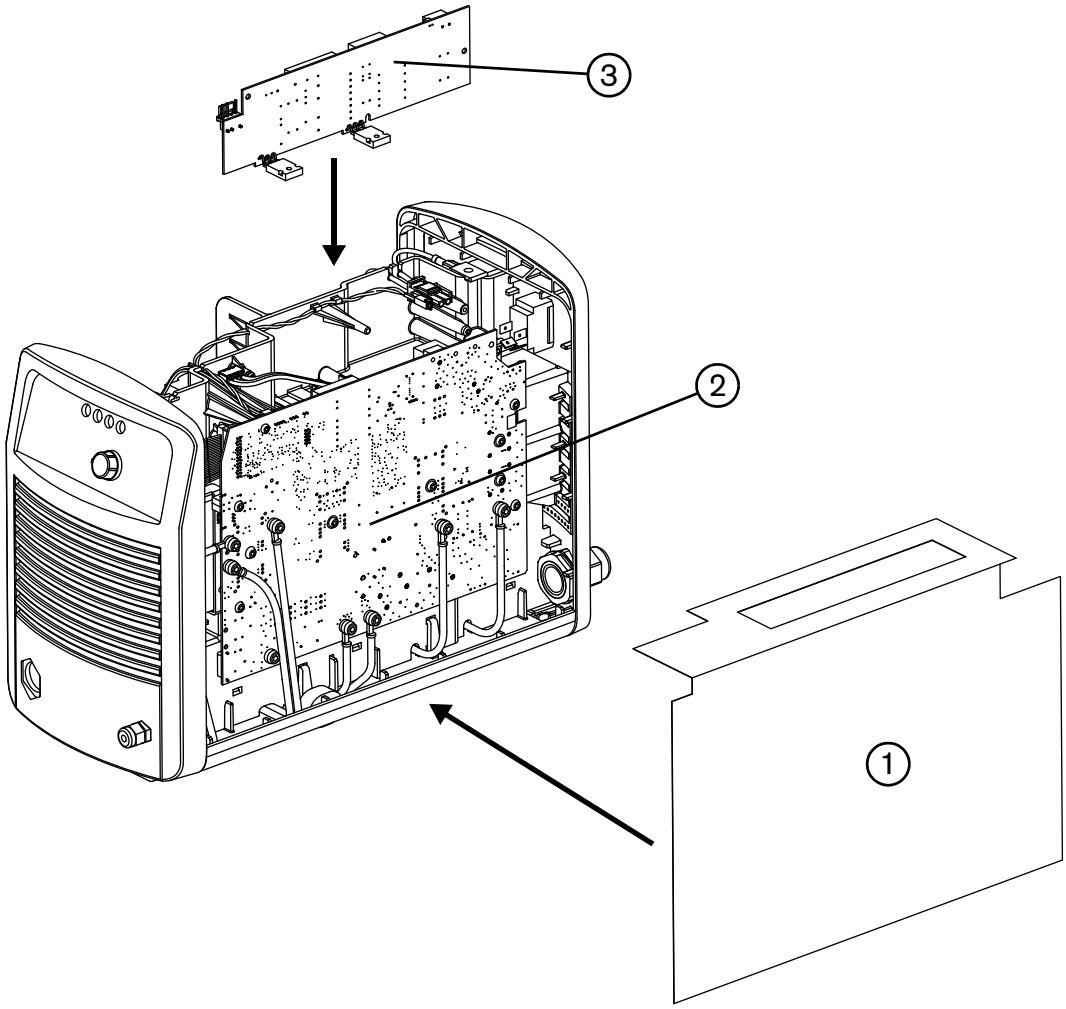
Item	Kit number	Description
	228096	Kit: Screws kit (not shown): ❑ Screws for power supply handle (2) ❑ Retaining screws for front and rear panels (2)
1	228267	Kit: Power supply handle (includes screws and shoulder strap clips)
2	428396	Kit: Power supply cover with labels, CSA
2	428398	Kit: Power supply cover with labels, CSA, Built in America
2	428397	Kit: Power supply cover with labels, CE
2	428225	Kit: Power supply cover with labels, CCC
3	428226	Kit: Current adjustment knob
4	428389	Kit: Front panel (does not include current adjustment knob)
5	428388	Kit: Work lead, 4.6 m (15 feet), with ground clamp
6	228561	Kit: Ground clamp

Exterior, rear



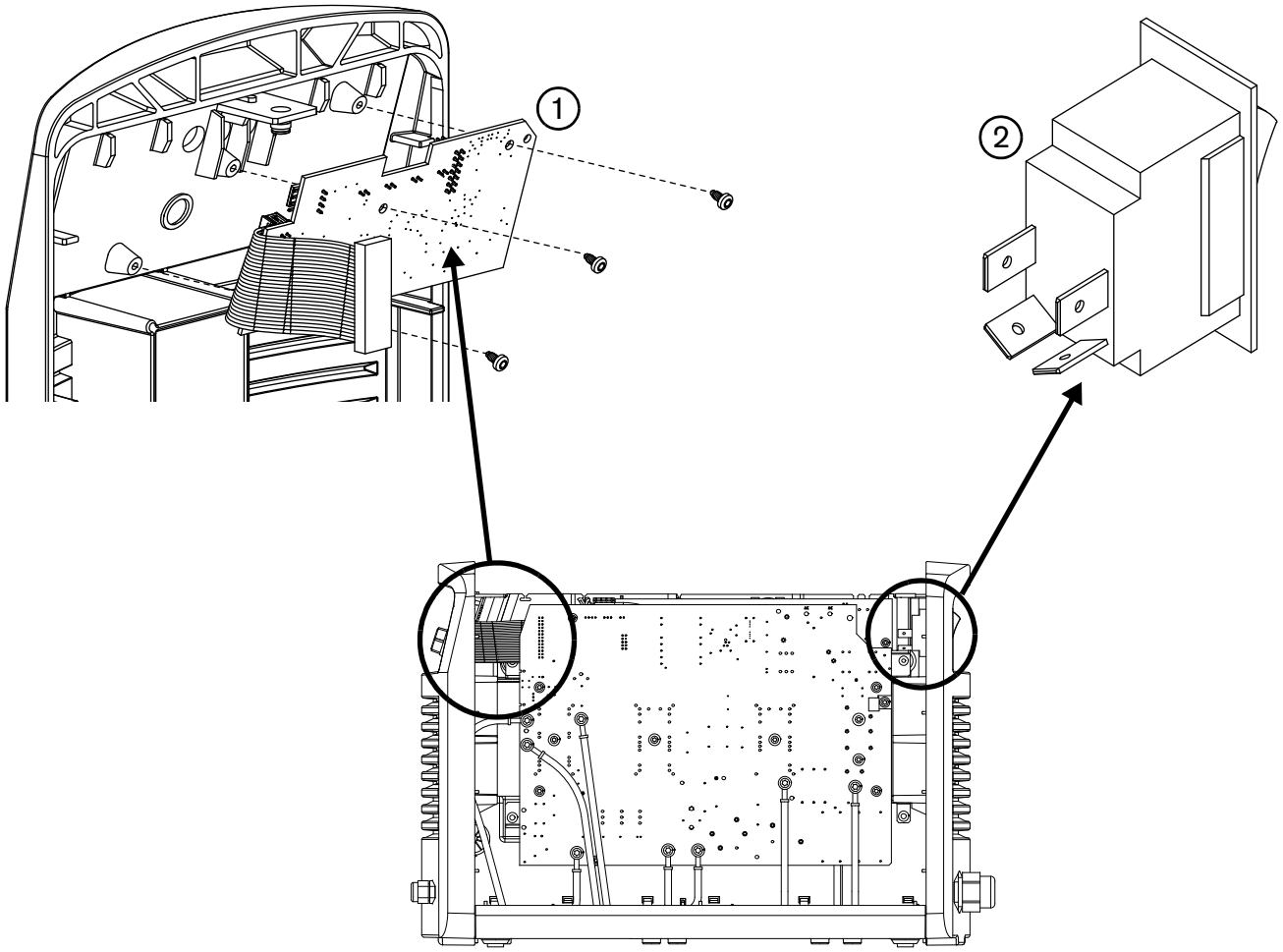
Item	Kit number	Description
1	229133	CSA power cord extension: 240 V / 20 A plug adapter
2	229132	CSA power cord extension: 120 V / 15 A plug adapter
3	228210	Kit: CSA power cord with NEMA twist lock-style 240 V / 20 A plug, 1-phase, 3.0 m (10 feet) (strain relief not included)
4	428390	Kit: CE power cord, 1-phase, 3.0 m (10 feet) (plug and strain relief not included)
4	428231	Kit: CCC power cord, 1-phase, 3.0 m (10 feet) (plug and strain relief not included)
5	228143	Kit: Power cord strain relief
6	428391	Kit: Rear panel (includes data plate and consumables label)

Interior, power board side



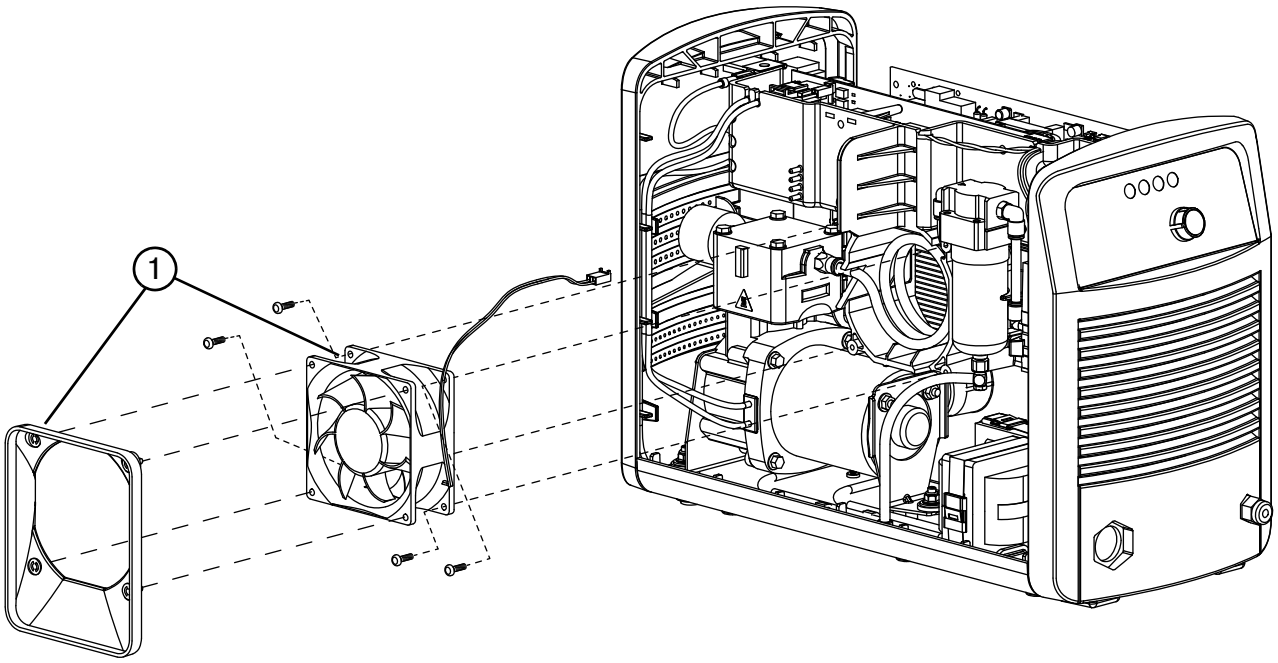
Item	Kit number	Description	Designator
1	428395	Kit: Component barrier	
2	428402	Kit: Power board, CSA (141351)	PCB2
2	428403	Kit: Power board, CE and CCC (141357)	PCB2
3	428401	Kit: Compressor-driver board (includes thermal strips and polyimide tape) (141298)	PCB3
	428406	Kit: Replacement clips (not shown): ❑ Replacement clip and screws for snubber resistor on power board ❑ Replacement clips and screws for MOSFET and diode on compressor-driver board	
	428411	Kit: Replacement hex nut standoffs (5) for mounting power board to heatsink (not shown)	

Interior, control board and power switch



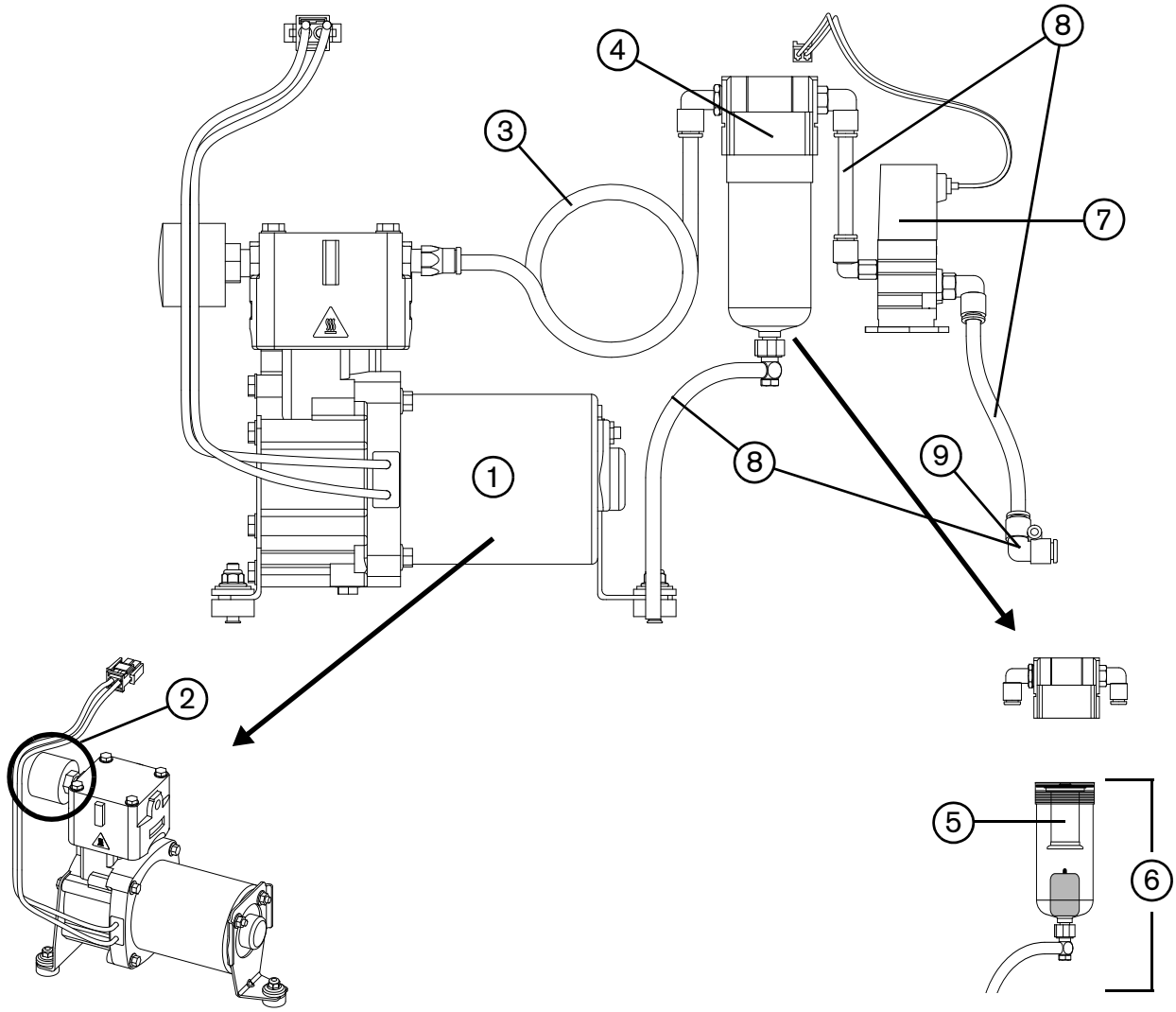
Item	Kit number	Description	Designator
1	428404	Kit: Control board (141365)	PCB1
2	428235	Kit: Power switch	S1

Interior, fan assembly



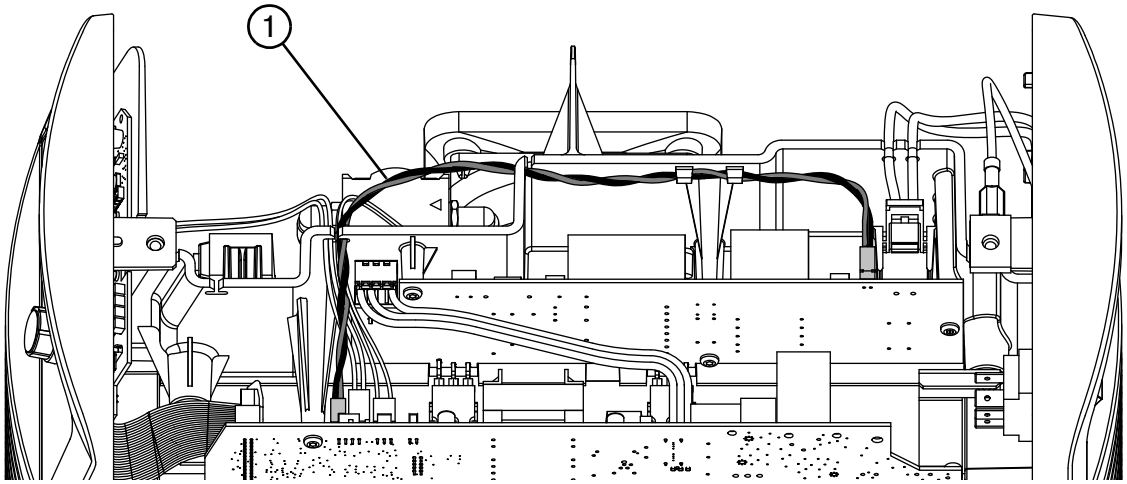
Item	Kit number	Description	Designator
1	428236	Kit: Fan assembly with plenum	M1

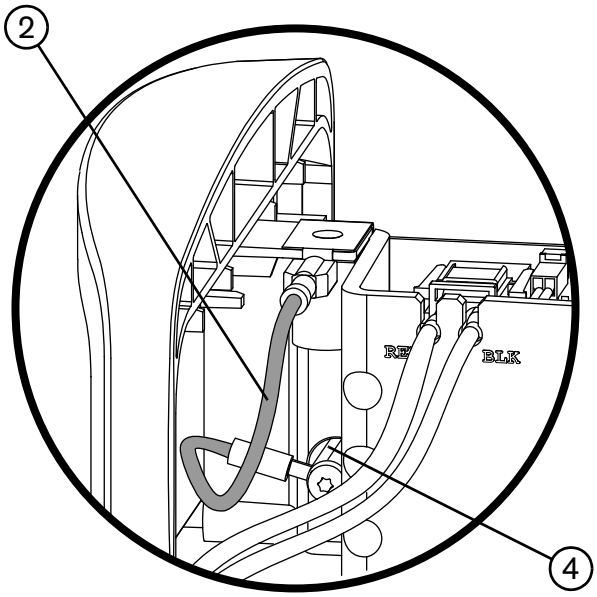
Interior, pneumatics (fan side)

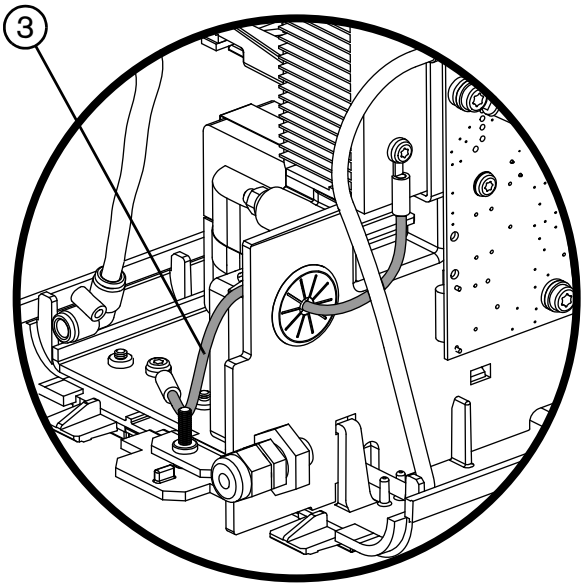


Item	Kit number	Description	Designator
1	428377	Kit: Internal compressor (includes air inlet filter and exhaust fitting)	
2	428379	Kit: Air inlet filter for internal compressor	
3	428376	Kit: Heat exchange coil (includes elbow fitting for air filter and exhaust fitting for internal compressor)	
4	428375	Kit: Air filter assembly (includes gas hose, drain tube, and elbow fittings)	
5	428378	Kit: Air filter element	
6	428380	Kit: Air filter bowl (includes air filter element, O-ring, and drain hose)	
7	428374	Kit: Solenoid valve (includes gas hoses and elbow fittings)	V1
8, 9	428373	Kit: Drain hose, 2 gas supply hoses, elbow fitting	
9	428238	Kit: Replacement elbow fitting for torch lead	

Interior, wires

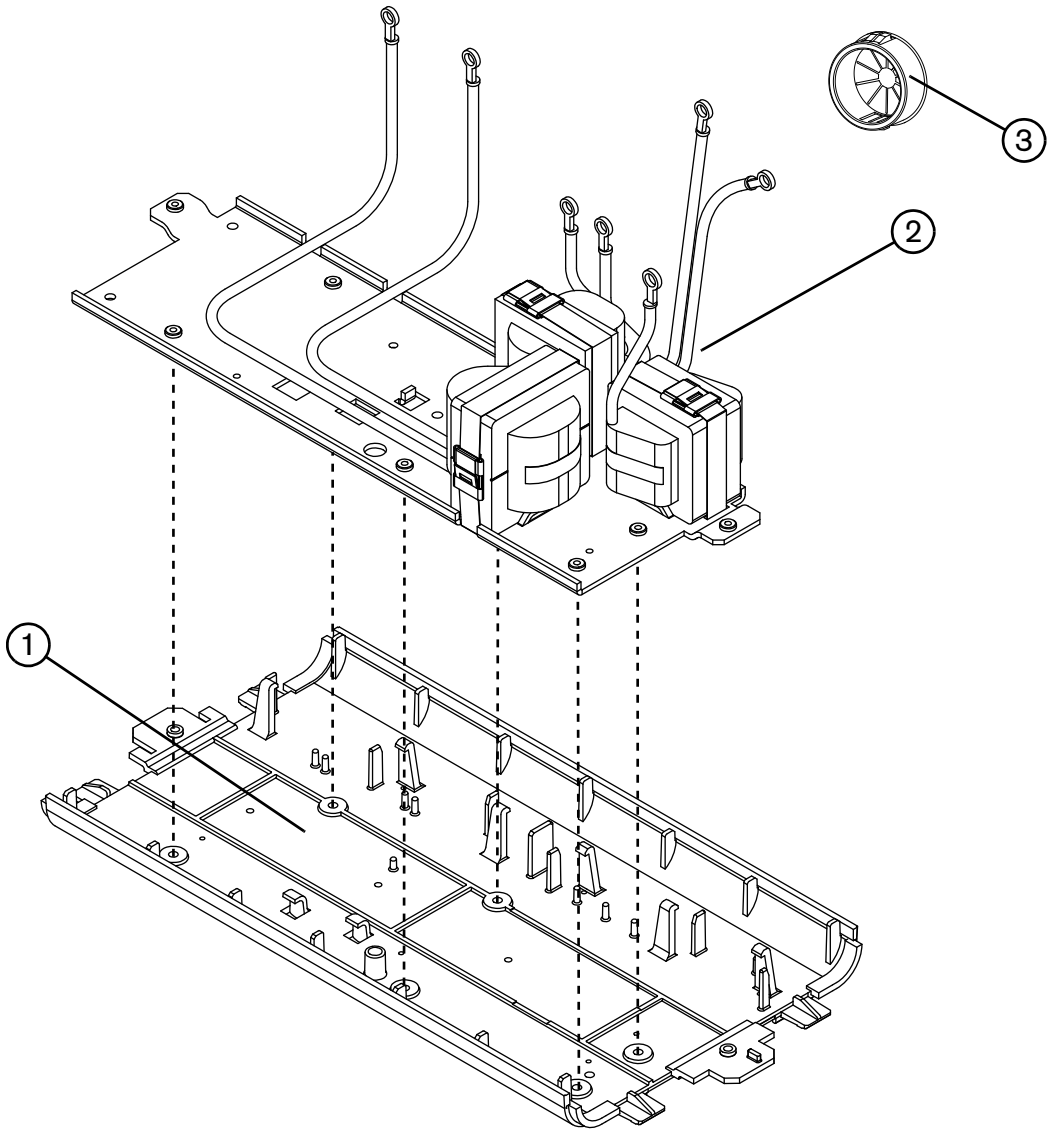






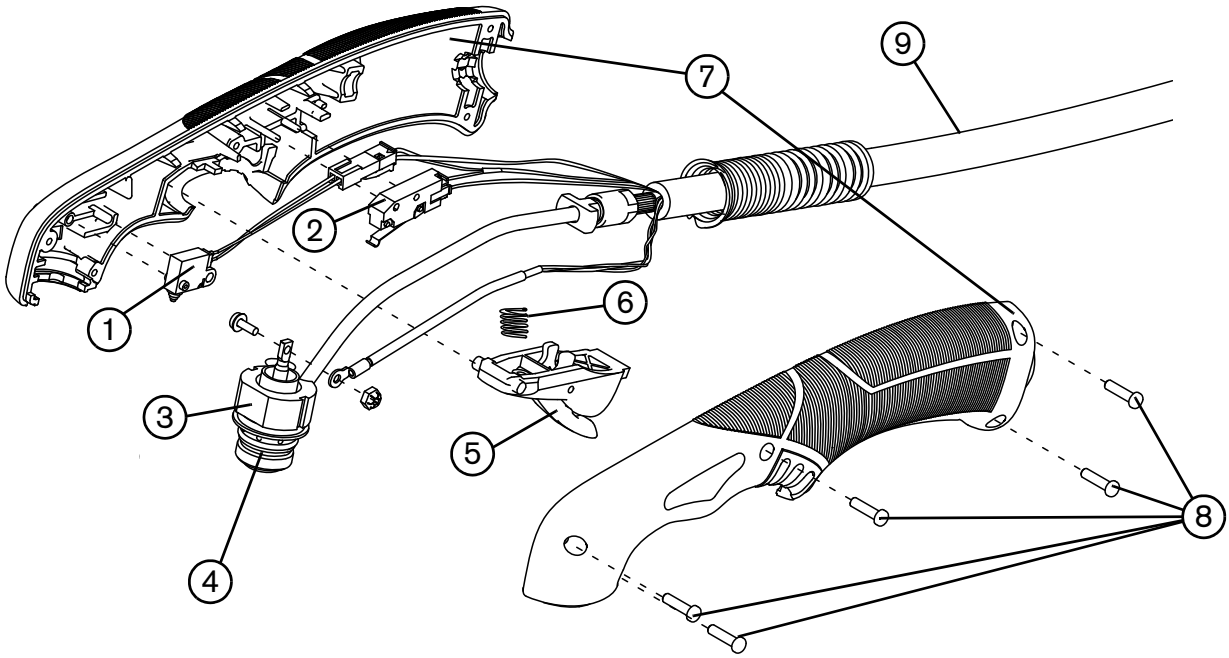
Item	Kit number	Description
	428405	Kit: Wire group:
1		❑ Power board (J9) to compressor-driver board (J1) twisted pair wires (red and black)
2		❑ Ground clip wire from rear panel to center panel (green)
3		❑ Ground wire from heatsink to magnetics assembly (green)
4	428413	Kit: Replacement hex nut standoff (5) for attaching ground clip wire to center panel

Power supply base and magnetics



Item	Kit number	Description
1	428399	Kit: Plastic base (includes rubber bumpers, or “feet”)
	428392	Kit: Replacement bumpers (“feet”) for bottom of plastic base (4) (not shown)
2	428400	Kit: Magnetics assembly
3	428407	Kit: Replacement grommet for center panel (5)

Hand torch parts



You can replace the entire hand torch and lead assembly, or you can replace individual torch components.

Item	Kit number	Description
	428393*	Kit: Air T30 hand torch assembly with 4.6 m (15 foot) lead
1	228109	Kit: Torch cap-sensor switch
2	428162	Kit: Torch start switch
3	428394	Kit: Air T30 torch body (includes O-ring)
4	428179	Kit: Replacement O-rings (5) for torch body
5	428156	Kit: Torch trigger and spring
6	428182	Kit: Replacement springs (5) for torch trigger
7	428381	Kit: Air T30 torch handle (includes handle screws)
8	428181	Kit: Air T30 torch replacement screws for handle
9	428176	Kit: Air T30 torch lead, 4.6 m (15 feet), with strain relief

* The torch assembly includes one set of consumables:

- ❑ Electrode (420132)†
- ❑ Swirl ring (420133)
- ❑ Nozzle (420134)†
- ❑ Retaining cap (420135)
- ❑ Deflector (420399)

† You can also order nozzles and electrodes together using kit 428350. This kit contains 2 nozzles and 2 electrodes. Replace the nozzle and electrode at the same time.

Hand torch consumables

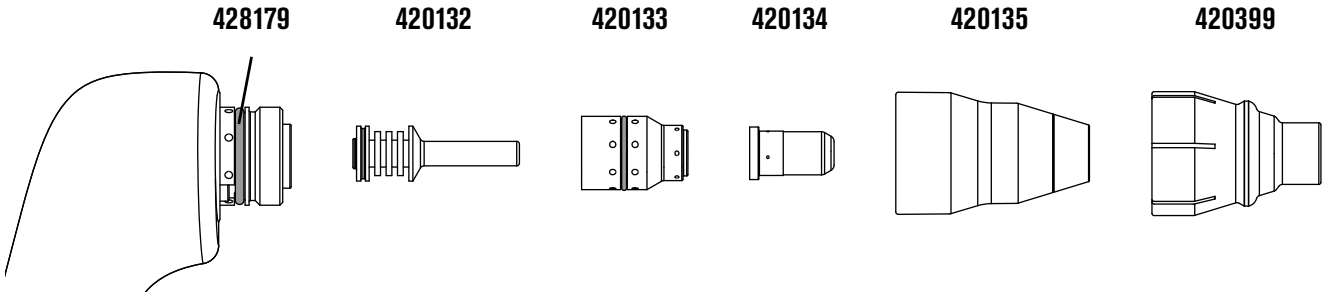
To order consumables for your Air T30 torch, use the following part numbers.

You can order individual packages of nozzles and electrodes, or you can order them combined as a kit:

- Use **420134** to order a package of 5 nozzles.
- Use **420132** to order a package of 5 electrodes.
- Use **428350** to order a kit of 2 nozzles and 2 electrodes.

These consumables are designed specifically for use with the Powermax30 AIR power supply and Air T30 hand torch. They cannot be used with any other Powermax system or torch.

Individual consumables



Kit: electrode (2) + nozzle (2)

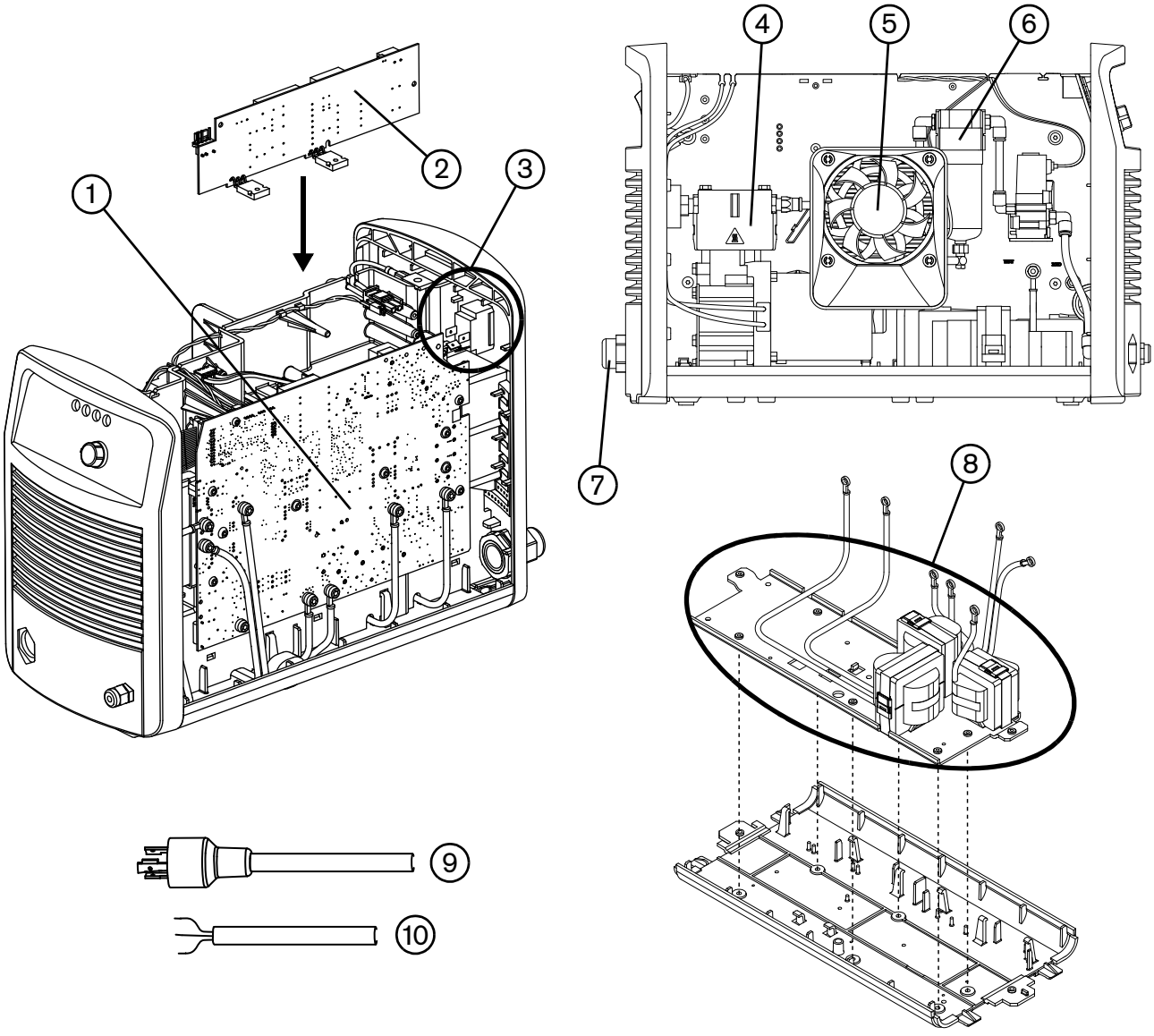
428350

Accessory parts

Part number	Description
127102	Basic plasma (circle) cutting guide
027668	Deluxe plasma (circle) cutting guide
127144	Dust cover
024548	Leather torch lead cover, brown, 7.6 m (25 feet)
024877	Leather torch lead cover, black with Hypertherm logo, 7.6 m (25 feet)
127217	Shoulder strap
127169	Leather cutting gloves
127416	Protective glasses, shade 5 lens
128836	Thermal grease, 1/8 ounce
027055	Silicone lubricant, 1/4 ounce
428643	Air pressure test gauge kit (for troubleshooting – see page 98)

Safety-critical parts

Genuine Hypertherm parts are factory-recommended parts for your Hypertherm system. Any damage caused by the use of parts that are not from Hypertherm may not be covered by the Hypertherm warranty. In addition, the following parts are safety-critical parts that must be replaced only with genuine Hypertherm parts to maintain the warranty and system certifications, including CE, CCC, and CSA certification.



Item	Kit number	Description
1	428402	Kit: Power board (CSA) and subcomponents
1	428403	Kit: Power board (CE and CCC) and subcomponents
2	428401	Kit: Compressor-driver board
3	428235	Kit: Power switch

Item	Kit number	Description
4	428377	Kit: Internal air compressor
5	428236	Kit: Fan assembly with plenum
6	428375	Kit: Air filter assembly (includes gas hose, drain tube, and elbow fittings)
7	228143	Kit: Power cord strain relief
8	428400	Kit: Magnetics assembly
9	228210	Kit: CSA power cord with NEMA twist lock-style 240 V/20 A plug, 1-phase, 3.0 m (10 feet)
10	428390	Kit: CE power cord, 1-phase, 3.0 m (10 feet) (plug not included)
10	428231	Kit: CCC power cord, 1-phase, 3.0 m (10 feet) (plug not included)

Recommended spare parts

Hypertherm recommends that service centers keep the following spare parts on hand for repairs because these parts are critical or are usually exposed to heavy and repeated wear. You may find that you need to revise or expand this list for your customers, based on the conditions and work environments in your region.

Kit Number	Description	Reference
428226	Kit: Current adjustment knob	page 208
228561	Kit: Ground clamp	page 208
428388	Kit: Work lead, 4.6 m (15 feet) (includes ground clamp)	page 208
428402	Kit: Power board, CSA	page 210
428403	Kit: Power board, CE and CCC	page 210
428401	Kit: Compressor-driver board	page 210
428404	Kit: Control board	page 211
428235	Kit: Power switch	page 211
428377	Kit: Internal air compressor	page 213
428376	Kit: Heat exchange coil	page 213
428375	Kit: Air filter assembly (includes gas hose, drain tube, and elbow fittings)	page 213
428378	Kit: Air filter element	page 213
428374	Kit: Solenoid valve (includes gas hoses and elbow fittings)	page 213
428179	Kit: Replacement O-rings for torch body	page 216
428381	Kit: Air T30 torch handle (includes handle screws)	page 216
428181	Kit: Air T30 torch handle screws	page 216
428156	Kit: Torch trigger and spring	page 216
428182	Kit: Spring for torch trigger	page 216
428162	Kit: Torch start switch	page 216
228109	Kit: Torch cap-sensor switch	page 216
428393	Kit: Air T30 hand torch assembly with 4.6 m (15 foot) lead	page 216
428176	Kit: Air T30 torch lead, 4.6 m (15 feet)	page 216
128836	Thermal grease, 1/8 ounce	page 218
027055	Silicone lubricant, 1/4 ounce	page 218

Power supply labels

Kit number	Description
428408	Kit: Powermax30 AIR labels, CSA
428410	Kit: Powermax30 AIR labels, CSA, Built in America
428409	Kit: Powermax30 AIR labels, CE/CCC

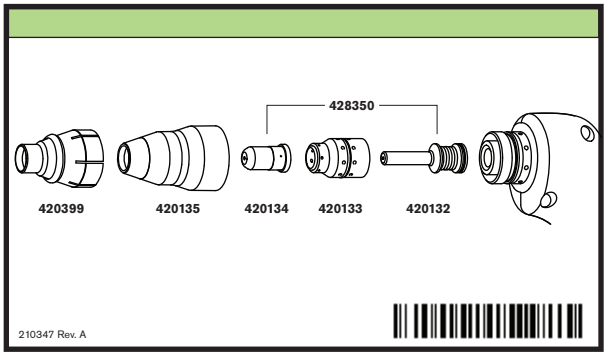
The label kits include:

- Consumables label
- Appropriate warning labels
- Front and side decals

The following illustrations show the consumables label and warning labels.

Consumables label

The consumables label is affixed to the power supply's rear panel. It shows the correct consumables to use with this system and torch and how to install them.



CSA warning label

This warning label is affixed to some power supplies. It is important that the operator and maintenance technician understand the intent of these warning symbols as described.

	WARNING	AVERTISSEMENT
Read and follow these instructions, employer safety practices, and material safety data sheets. Refer to ANS Z49.1, "Safety in Welding, Cutting and Allied Processes" from American Welding Society (http://www.aws.org) and OSHA Safety and Health Standards, 29 CFR 1910 (http://www.osha.gov).	Plasma cutting can be injurious to operator and persons in the work area. Consult manual before operating. Failure to follow all these safety instructions can result in death.	Le coupage plasma peut être préjudiciable pour l'opérateur et les personnes qui se trouvent sur les lieux de travail. Consulter le manuel avant de faire fonctionner. Le non respect des ces instructions de sécurité peut entraîner la mort.
1 (1.1, 1.2, 1.3)	**1. Cutting sparks can cause explosion or fire.** 1.1 Do not cut near flammables. 1.2 Have a fire extinguisher nearby and ready to use. 1.3 Do not use a drum or other closed container as a cutting table.	**1. Les étincelles de coupage peuvent provoquer une explosion ou un incendie.** 1.1 Ne pas couper près des matières inflammables. 1.2 Un extincteur doit être à proximité et prêt à être utilisé. 1.3 Ne pas utiliser un fût ou un autre contenant fermé comme table de coupage.
2 (2.1, 2.2, 2.3)	**2. Plasma arc can injure and burn; point the nozzle away from yourself. Arc starts instantly when triggered.** 2.1 Turn off power before disassembling torch. 2.2 Do not grip the workpiece near the cutting path. 2.3 Wear complete body protection.	**2. L'arc plasma peut blesser et brûler; éloigner la buse de soi. Il s'allume instantanément quand on l'amorce.** 2.1 Couper l'alimentation avant de démonter la torche. 2.2 Ne pas saisir la pièce à couper de la trajectoire de coupage. 2.3 Se protéger entièrement le corps.
3 (3.1, 3.2, 3.3)	**3. Hazardous voltage. Risk of electric shock or burn.** 3.1 Wear insulating gloves. Replace gloves when wet or damaged. 3.2 Protect from shock by insulating yourself from work and ground. 3.3 Disconnect power before servicing. Do not touch live parts.	**3. Tension dangereuse. Risque de choc électrique ou de brûlure.** 3.1 Porter des gants isolants. Remplacer les gants quand ils sont humides ou endommagés. 3.2 Se protéger contre les chocs en s'isolant de la pièce et de la terre. 3.3 Couper l'alimentation avant l'entretien. Ne pas toucher les pièces sous tension.
4 (4.1, 4.2, 4.3)	**4. Plasma fumes can be hazardous.** 4.1 Do not inhale fumes. 4.2 Use forced ventilation or local exhaust to remove the fumes. 4.3 Do not operate in closed spaces. Remove fumes with ventilation.	**4. Les fumées plasma peuvent être dangereuses.** 4.1 Ne pas inhaler les fumées. 4.2 Utiliser une ventilation forcée ou un extracteur local pour dissiper les fumées. 4.3 Ne pas couper dans des espaces clos. Chasser les fumées par ventilation.
5 (5.1)	**5. Arc rays can burn eyes and injure skin.** 5.1 Wear correct and appropriate protective equipment to protect head, eyes, ears, hands, and body. Button shirt collar. Protect ears from noise. Use welding helmet with the correct shade of filter.	**5. Les rayons d'arc peuvent brûler les yeux et blesser la peau.** 5.1 Porter un bon équipement de protection pour se protéger la tête, les yeux, les oreilles, les mains et le corps. Boutonner le col de la chemise. Protéger les oreilles contre le bruit. Utiliser un masque de soudeur avec un filtre de nuance appropriée.
6, 7	**6. Become trained.** Only qualified personnel should operate this equipment. Use torches specified in the manual. Keep non-qualified personnel and children away. **7. Do not remove, destroy, or cover this label.** Replace if it is missing, damaged, or worn.	**6. Suivre une formation.** Seul le personnel qualifié a le droit de faire fonctionner cet équipement. Utiliser exclusivement les torches indiquées dans le manual. Le personnel non qualifié et les enfants doivent se tenir à l'écart. **7. Ne pas enlever, détruire ni couvrir cette étiquette.** La remplacer si elle est absente, endommagée ou usée.

CE/CCC warning label

This warning label is affixed to some power supplies. It is important that the operator and maintenance technician understand the intent of these warning symbols as described. The numbered text corresponds to the numbered boxes on the label.

1. Cutting sparks can cause explosion or fire.

1.1 Do not cut near flammables.

1.2 Have a fire extinguisher nearby and ready to use.

1.3 Do not use a drum or other closed container as a cutting table.

2. Plasma arc can injure and burn; point the nozzle away from yourself. Arc starts instantly when triggered.

2.1 Turn off power before disassembling torch.

2.2 Do not grip the workpiece near the cutting path.

2.3 Wear complete body protection.

3. Hazardous voltage. Risk of electric shock or burn.

3.1 Wear insulating gloves. Replace gloves when wet or damaged.

3.2 Protect from shock by insulating yourself from work and ground.

3.3 Disconnect power before servicing. Do not touch live parts.

4. Plasma fumes can be hazardous.

4.1 Do not inhale fumes.

4.2 Use forced ventilation or local exhaust to remove the fumes.

4.3 Do not operate in closed spaces. Remove fumes with ventilation.

5. Arc rays can burn eyes and injure skin.

5.1 Wear correct and appropriate protective equipment to protect head, eyes, ears, hands, and body. Button shirt collar. Protect ears from noise. Use welding helmet with the correct shade of filter.

6. Become trained. Only qualified personnel should operate this equipment. Use torches specified in the manual. Keep non-qualified personnel and children away.

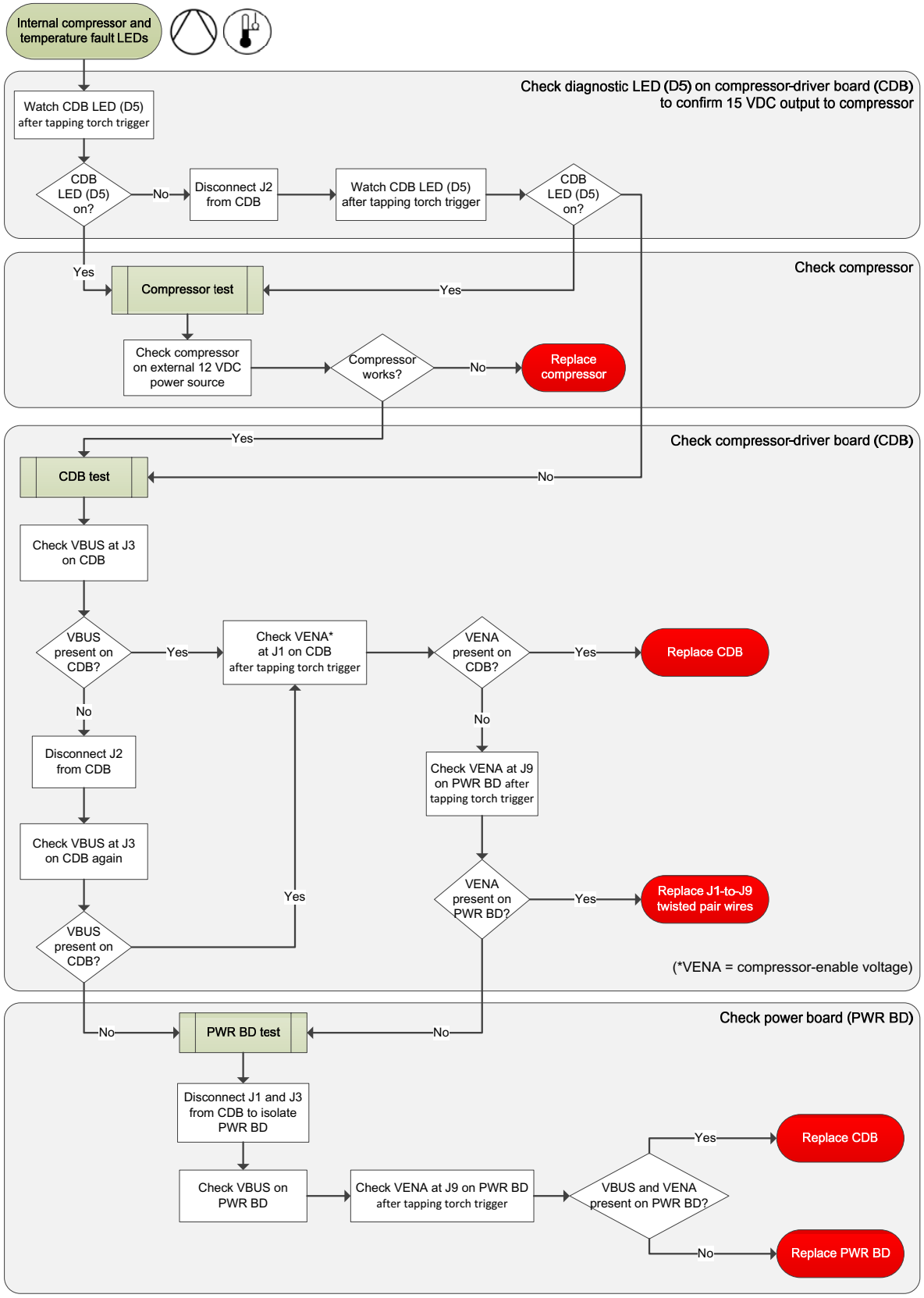
7. Do not remove, destroy, or cover this label. Replace if it is missing, damaged, or worn.

Section 9
Wiring Diagrams

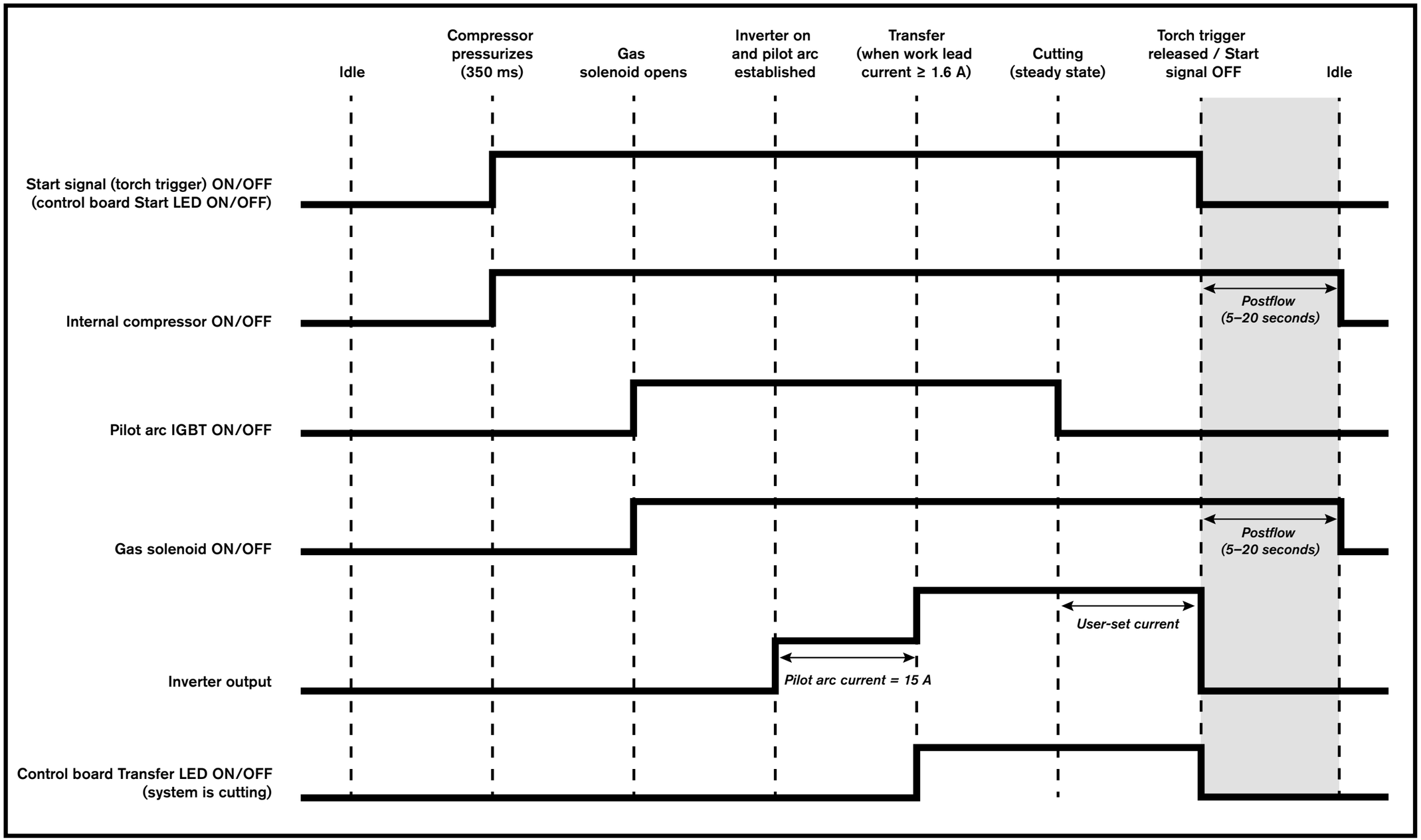
This section contains the following diagrams:

- *Process flow for troubleshooting internal compressor and temperature fault LEDs*
- *Timing chart for torch start*
- *Powermax30 AIR schematic*

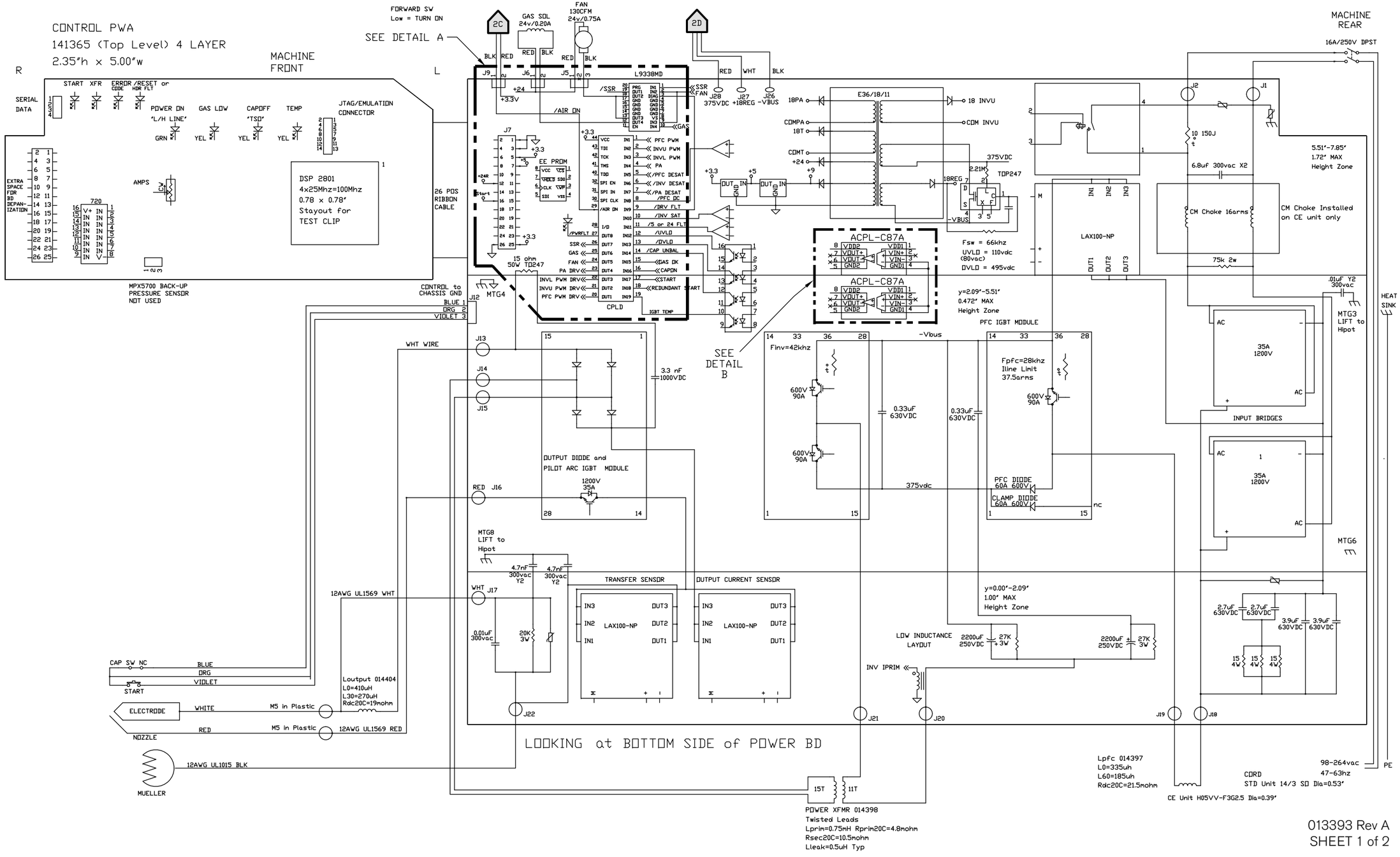
Process flow for troubleshooting internal compressor and temperature fault LEDs



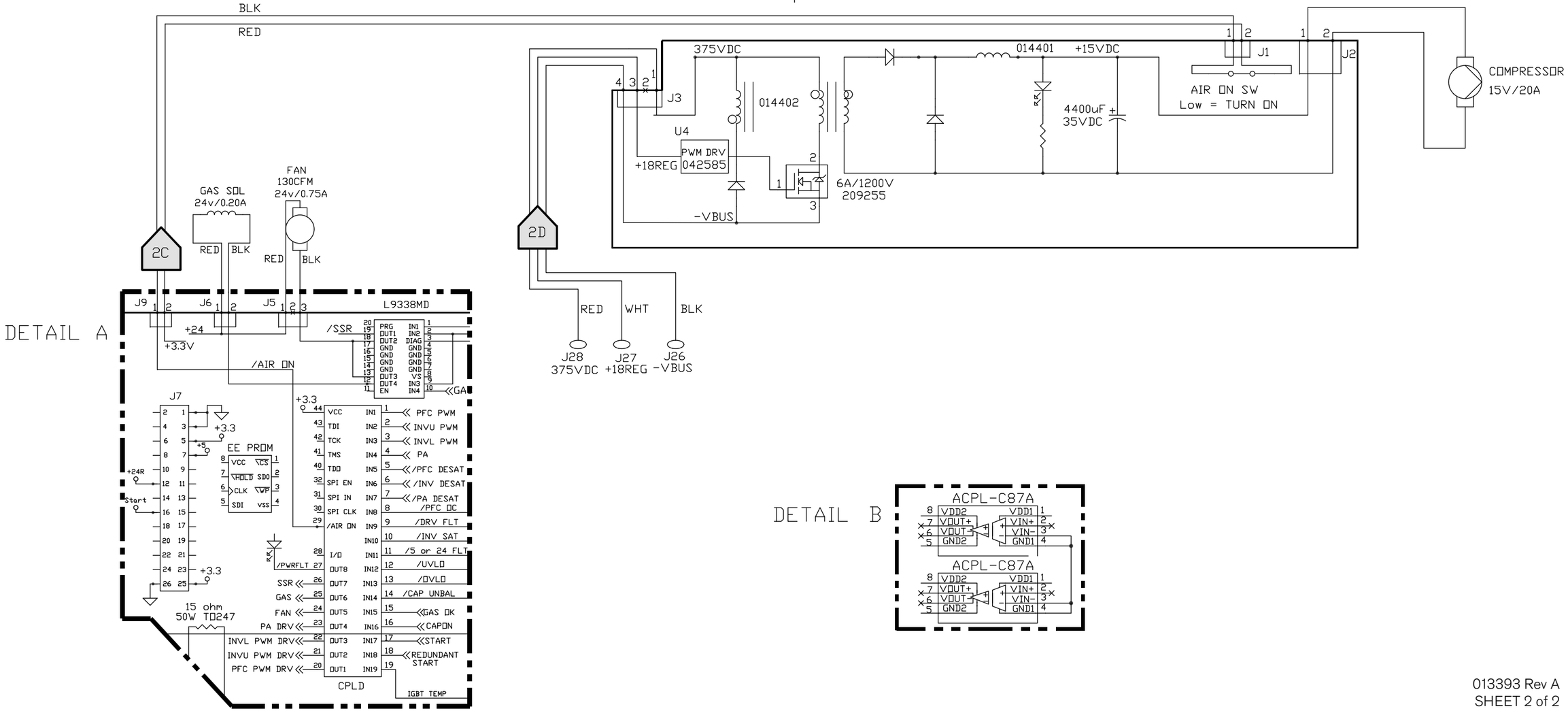
Timing chart for torch start



Powermax30 AIR schematic



Compressor Driver PWA
141298 (Top Level)



DETAIL B

013393 Rev A
SHEET 2 of 2