HYPERTHERM®
A Hypertherm Associates Brand

Powermax30/33 XP®

Plasma Arc Cutting System



Service Manual

808150 | Revision 2 | English

Register your new Hypertherm system

Benefits of registration

- ☑ **Safety:** Registration allows us to contact you in the unlikely event a safety or quality notification is required.
- ☑ **Education:** Registration gives you free access to online product training content via the Hypertherm Cutting Institute.
- ☑ **Confirmation of ownership:** Registration can serve as proof of purchase in case of an insurance loss.

Go to **www.hypertherm.com/registration** for easy and fast registration.

If you experience any problems with the product registration process, please contact registration@hypertherm.com.

For your records

Serial number: _____

Purchase date: _____

Distributor: _____

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Maintenance notes: _____

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Powermax30/33 XP

Service Manual

808150
Revision 2

English

December 2025

Hypertherm, Inc.
Hanover, NH 03755 USA
www.hypertherm.com

Warranty information

You can find warranty information for your product at www.hypertherm.com/warranty.

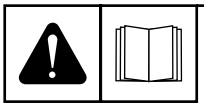
Recycling information

You can find recycling information for your product at www.hypertherm.com/resources/system-support/recycling.

Contact us

hypertherm.com/contactus

Hypertherm, Inc.
21 Great Hollow Road, P.O. Box 5010
Hanover, NH 03755 USA



ENGLISH

WARNING! Before operating any Hypertherm equipment, read the safety instructions in your product's manual, the *Safety and Compliance Manual* (80669C), *Waterjet Safety and Compliance Manual* (80943C), and *Radio Frequency Warning Manual* (80945C). Failure to follow safety instructions can result in personal injury or in damage to equipment.

Copies of the manuals can come with the product in electronic and printed formats. Electronic copies are also on our website. Many manuals are available in multiple languages at www.hypertherm.com/docs.

BG (БЪЛГАРСКИ/BULGARIAN)

ПРЕДУПРЕЖДЕНИЕ! Преди да работите с което и да е оборудване Hypertherm, прочетете инструкциите за безопасност в ръководството на вашия продукт, „Инструкция за безопасност и съответствие“ (80669C), „Инструкция за безопасност и съответствие на Waterjet“ (80943C) и „Инструкция за предупреждение за радиочестота“ (80945C).

Продуктът може да е съпроводен от копия на ръководствата в електронен и в печатен формат. Тези в електронен формат са достъпни също на уебсайта ни. Много ръководства са налице на няколко езика на адрес www.hypertherm.com/docs.

CS (ČESKY/CZECH)

VAROVÁNÍ! Před uvedením jakéhokoli zařízení Hypertherm do provozu si přečtěte bezpečnostní pokyny v příručce k produktu a v *Manuálu pro bezpečnost a dodržování předpisů* (80669C), *Manuálu pro bezpečnost a dodržování předpisů při řezání vodním paprskem* (80943C) a *Manuálu varování ohledně rádiových frekvencí* (80945C).

Kopie příruček mohou být součástí dodávky produktu, a to v elektronické i tištěné formě. Elektronické kopie jsou k dispozici i na našich webových stránkách. Mnoho příruček je k dispozici v různých jazycích na stránce www.hypertherm.com/docs.

DA (DANSK/DANISH)

ADVARSEL! Inden Hypertherm udstyr tages i brug skal sikkerhedsinstruktionerne i produktets manual og i *Manual om sikkerhed og overholdelse af krav* (80669C), *Manual om sikkerhed og overholdelse af krav for vandstråleskæring* (80943C), og *Manual om radiofrekvensadvarsel* (80945C), gennemlæses.

Kopier af manualerne kan leveres med produktet i elektronisk og trykt format. Elektroniske kopier findes også på vores hjemmeside. Mange manualer er tilgængelige på flere sprog på www.hypertherm.com/docs.

DE (DEUTSCH/GERMAN)

WARNUNG! Bevor Sie ein Hypertherm-Gerät in Betrieb nehmen, lesen Sie bitte die Sicherheitsanweisungen in Ihrer Bedienungsanleitung, das *Handbuch für Sicherheit und Übereinstimmung* (80669C), das *Handbuch für Sicherheit und Compliance bei Wasserstrahl-Schneidanlagen* (80943C) und das *Handbuch für Hochfrequenz-Warnung* (80945C).

Bedienungsanleitungen und Handbücher können dem Gerät in elektronischer Form oder als Druckversion beiliegen. In elektronischer Form liegen sie auch auf unserer Website vor. Viele Handbücher stehen in verschiedenen Sprachen auf www.hypertherm.com/docs zur Verfügung.

ES (ESPAÑOL/SPANISH)

¡ADVERTENCIA! Antes de operar cualquier equipo Hypertherm, lea las instrucciones de seguridad del manual de su producto, del *Manual de seguridad y cumplimiento* (80669C), del *Manual de seguridad y cumplimiento en corte con chorro de agua* (80943C) y del *Manual de advertencias de radiofrecuencia* (80945C).

El producto puede incluir copias de los manuales en formato digital e impreso. Las copias digitales también están en nuestra página web. Hay diversos manuales disponibles en varios idiomas en www.hypertherm.com/docs.

ET (EESTI/ESTONIAN)

HOIATUS! Enne Hyperthermi mis tahes seadme kasutamist lugege läbi toote kasutusjuhendis olevad ohutusjuhised ning *Ohutus- ja vastavusjuhend* (80669C), *Veejoa ohutuse ja vastavuse juhend* (80943C) ja *Raadiosageduse hoiatusjuhend* (80945C). Ohutusjuhiste eiramine võib põhjustada vigastusi ja kahjustada seadmeid.

Juhiste koopiad võivad tootega kaasas olla elektrooniliselt või trükituna. Elektroonilised koopiad on saadaval ka meie veebilehel. Paljud kasutusjuhendid on erinevates keeltes saadaval veebilehel www.hypertherm.com/docs.

FI (SUOMI/FINNISH)

VAROITUS! Ennen minkään Hypertherm-laitteen käyttöä lue tuotteen käyttöoppaassa olevat turvallisuusohjeet, *turvallisuuden ja vaatimustenmukaisuuden käsikirja* (80669C), vesileikkauksen *turvallisuuden ja vaatimustenmukaisuuden käsikirja* (80943C) ja *radiotaajuusvaroitusten käsikirja* (80945C).

Käyttöoppaiden kopiot voivat olla tuotteen mukana sähköisessä ja tulostetussa muodossa. Sähköiset kopiot ovat myös verkkosivustollamme. Monet käyttöoppaat ovat myös saatavissa useilla kielillä www.hypertherm.com/docs.

FR (FRANÇAIS/FRENCH)

AVERTISSEMENT! Avant d'utiliser tout équipement Hypertherm, lire les consignes de sécurité du manuel de votre produit, du *Manuel de sécurité et de conformité* (80669C), du *Manuel de sécurité et de conformité du jet d'eau* (80943C) et du *Manuel d'avertissement relatif aux radiofréqunces* (80945C).

Les exemplaires des manuels qui accompagnent le produit peuvent être sous forme électronique ou papier. Les manuels sous forme électronique se trouvent également sur notre site Internet. Plusieurs manuels sont offerts en plusieurs langues à www.hypertherm.com/docs.

GR (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), στο *εγχειρίδιο ασφάλειας και συμμόρφωσης του waterjet* (80943C) και στο *εγχειρίδιο προειδοποιήσεων για τις ραδιοσυχνότητες* (80945C).

Το προϊόν μπορεί να συνοδεύεται από αντίγραφα των εγχειριδίων σε ηλεκτρονική και έντυπη μορφή. Τα ηλεκτρονικά αντίγραφα υπάρχουν επίσης στον ιστότοπό μας. Πολλά εγχειρίδια είναι διαθέσιμα σε διάφορες γλώσσες στο www.hypertherm.com/docs.

HU (MAGYAR/HUNGARIAN)

VIGYÁZAT! Mielőtt bármilyen Hypertherm berendezést üzemeltetne, olvassa el a biztonsági információkat a termék kézikönyvében, a *Biztonsági és szabálykövetési kézikönyvben* (80669C), a *Vízsugaras biztonsági és szabálykövetési kézikönyvben* (80943C) és a *Rádiófrekvenciás figyelmeztetéseket tartalmazó kézikönyvben* (80945C).

A termékhez a kézikönyv példányai elektronikus és nyomtatott formában is mellékelve lehetnek. Az elektronikus példányok webhelyünkön is megtalálhatók. Számos kézikönyv áll rendelkezésre több nyelven a www.hypertherm.com/docs weboldalon.

ID (BAHASA INDONESIA/INDONESIAN)

PERINGATAN! Sebelum mengoperasikan peralatan Hypertherm, bacalah petunjuk keselamatan dalam manual produk Anda, *Manual Keselamatan dan Kepatuhan* (80669C), *Manual Keselamatan dan Kepatuhan Jet Air* (80943C), dan *Manual Peringatan Frekuensi Radio* (80945C). Kegagalan mengikuti petunjuk keselamatan dapat menyebabkan cedera pribadi atau kerusakan pada peralatan.

Produk mungkin disertai salinan manual atau petunjuk dalam format elektronik maupun cetak. Salinan elektronik juga tersedia di situs web kami. Berbagai manual tersedia dalam beberapa bahasa di www.hypertherm.com/docs.

IT (ITALIANO/ITALIAN)

AVVERTENZA! Prima di usare un'attrezzatura Hypertherm, leggere le istruzioni sulla sicurezza nel manuale del prodotto, nel *Manuale sulla sicurezza e la conformità* (80669C), nel *Manuale sulla sicurezza e la conformità Waterjet* (80943C) e nel *Manuale di avvertenze sulla radiofrequenza* (80945C).

Copie del manuale possono accompagnare il prodotto in formato cartaceo o elettronico. Le copie elettroniche sono disponibili anche sul nostro sito web. Molti manuali sono disponibili in diverse lingue all'indirizzo www.hypertherm.com/docs.

JA (日 本語/JAPANESE)

警告！Hypertherm 機器を操作する前に、この製品説明書にある安全情報、「安全とコンプライアンスマニュアル」(80669C)、「ウォータージェットの安全とコンプライアンス」(80943C)、「高周波警告」(80945C) をお読みください。

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。電子コピーは当社ウェブサイトにも掲載されています。説明書の多くは www.hypertherm.com/docs にて複数の言語でご用意しています。

KO (한국어/KOREAN)

경고! Hypertherm 장비를 사용하기 전에 제품 설명서와 안전 및 규정 준수 설명서(80669C), 워터젯 안전 및 규정 준수 설명서(80943C) 그리고 무선 주파수 경고 설명서(80945C)에 나와 있는 안전 지침을 읽으십시오.

전자 형식과 인쇄된 형식으로 설명서 사본이 제품과 함께 제공될 수 있습니다. 전자 사본도 Hypertherm 웹사이트에서 보실 수 있으며 설명서 사본은 www.hypertherm.com/docs 에서 여러 언어로 제공됩니다.

NE (NEDERLANDS/DUTCH)

WAARSCHUWING! Lees voordat u Hypertherm-apparatuur gebruikt de veiligheidsinstructies in de producthandleiding, in de *Veiligheids- en nalevingshandleiding* (80669C) in de *Veiligheids- en nalevingshandleiding voor waterstralen* (80943C) en in de *Waarschuwingshandleiding radiofrequentie* (80945C).

De handleidingen kunnen in elektronische en gedrukte vorm met het product worden meegeleverd. Elektronische versies zijn ook beschikbaar op onze website. Veel handleidingen zijn in meerdere talen beschikbaar via www.hypertherm.com/docs.

NO (NORSK/NORWEGIAN)

ADVARSEL! Før du bruker noe Hypertherm-utstyr, må du lese sikkerhetsinstruksjonene i produktets håndbok, *håndboken om sikkerhet og samsvar* (80669C), *håndboken om vannjet sikkerhet og samsvar* (80943C), og *håndboken om radiofrekvensadvarsler* (80945C).

Eksemplarer av håndbøkene kan følge med produktet i elektronisk og trykt form. Elektroniske eksemplarer finnes også på nettstedet vårt. Mange håndbøker er tilgjengelig i flere språk på www.hypertherm.com/docs.

PL (POLSKI/POLISH)

OSTRZEŻENIE! Przed rozpoczęciem obsługi jakiegokolwiek systemu firmy Hypertherm należy się zapoznać z instrukcjami bezpieczeństwa zamieszczonymi w podręczniku produktu, w p*odręczniku bezpieczeństwa i zgodności* (80669C), *podręczniku bezpieczeństwa i zgodności systemów strumienia wody* (80943C) oraz *podręczniku z ostrzeżeniem o częstotliwości radiowej* (80945C).

Do produktu mogą być dołączone podręczniki użytkownika w formie elektronicznej i drukowanej. Kopie elektroniczne znajdują się również w naszej witrynie internetowej. Wiele podręczników jest dostępnych w różnych językach pod adresem www.hypertherm.com/docs.

PT (PORTUGUÊS/PORTUGUESE)

ADVERTÊNCIA! Antes de operar qualquer equipamento Hypertherm, leia as instruções de segurança no manual do seu produto, no *Manual de Segurança e de Conformidade* (80669C), no *Manual de Segurança e de Conformidade do Waterjet* (80943C) e no *Manual de Advertência de radiofrequência* (80945C).

Cópias dos manuais podem vir com o produto nos formatos eletrônico e impresso. Cópias eletrônicas também são encontradas em nosso website. Muitos manuais estão disponíveis em vários idiomas em www.hypertherm.com/docs.

RO (ROMÂNĂ/ROMANIAN)

AVERTIZARE! Înainte de utilizarea oricărui echipament Hypertherm, citiți instrucțiunile de siguranță din manualul produsului, *manualul de siguranță și conformitate* (80669C), *manualul de siguranță și conformitate Waterjet* (80943C) și din *manualul de avertizare privind radiofrecvența* (80945C).

Produsul poate fi însoțit de copii ale manualelor în format tipărit și electronic. Exemplarele electronice sunt disponibile și pe site-ul nostru web. Numeroase manuale sunt disponibile în mai mult limbi la adresa: www.hypertherm.com/docs.

RU (РУССКИЙ/RUSSIAN)

БЕРЕГИСЬ! Перед работой с любым оборудованием Hypertherm ознакомьтесь с инструкциями по безопасности, представленными в руководстве, которое поставляется вместе с продуктом, в *Руководстве по безопасности и соответствию* (80669C), в *Руководстве по безопасности и соответствию для водоструйной резки* (80943C) и *Руководстве по предупреждению о радиочастотном излучении* (80945C).

Копии руководств, которые поставляются вместе с продуктом, могут быть представлены в электронном и бумажном виде. Электронные копии также доступны на нашем веб-сайте. Целый ряд руководств доступны на нескольких языках по ссылке www.hypertherm.com/docs.

SK (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), *Manuáli o bezpečnosti a súlade s normami pre systém rezania vodou* (80943C) a v *Manuáli s informáciami o rádiofrekvencii* (80945C).

Návod na obsluhu sa dodáva spolu s produktom v elektronickej a tlačenej podobe. Jeho elektronický formát je dostupný aj na našej webovej stránke. Mnohé z návodov na obsluhu sú dostupné vo viacjazyčnej mutácii na stránke www.hypertherm.com/docs.

SL (SLOVENŠČINA/SLOVENIAN)

OPOZORILO! Pred uporabo katerekoli Hyperthermove opreme preberite varnostna navodila v priročniku vašega izdelka, v *Priročniku za varnost in skladnost* (80669C), v P*riročniku za varnost in skladnost sistemov rezanja z vodnim curkom* (80943C) in v *Priročniku Opozorilo o radijskih frekvencah* (80945C).

Izvodi priročnikov so lahko izdelku priloženi v elektronski in tiskani obliki. Elektronski izvodi so na voljo tudi na našem spletnem mestu. Številni priročniki so na voljo v različnih jezikih na naslovu www.hypertherm.com/docs.

SR (SRPSKI/SERBIAN)

UPOZORENJE! Pre rukovanja bilo kojom Hyperthermovom opremom pročitajte uputstva o bezbednosti u svom priručniku za proizvod, *Priručniku o bezbednosti i usaglašenosti* (80669C), *Priručniku o bezbednosti i usaglašenosti Waterjet tehnologije* (80943C) i *Priručniku sa upozorenjem o radio-frekvenciji* (80945C).

Уз производ се испоручују копије приручника у електронском или штампаном формату. Електронске копије су такође доступне на нашем веб-сајту. Многи приручници су доступни на више језика на адреси www.hypertherm.com/docs.

SV (SVENSKA/SWEDISH)

VARNING! Läs häftet säkerhetsinformationen i din produkts *säkerhets- och efterlevnadsmanual* (80669C), *säkerhets- och efterlevnadsmanualen för Waterjet* (80943C) och *varningsmanualen för radiofrekvenser* (80945C) för viktig säkerhetsinformation innan du använder eller underhåller Hypertherm-utrustning.

Kopior av manualerna kan medfölja produkten i elektroniskt och tryckt format. Elektroniska kopior finns också på vår webbplats. Många manualer finns på flera språk på www.hypertherm.com/docs.

TH (ภาษาไทย/THAI)

คำเตือน! ก่อนการใช้งานอุปกรณ์ของ Hypertherm ทั้งหมด โปรดอ่านคำแนะนำด้านความปลอดภัยในคู่มือการใช้สินค้า คู่มือด้านความปลอดภัยและการปฏิบัติตาม (80669C), คู่มือด้านความปลอดภัยและการปฏิบัติตามสำหรับการใช้หัวตัดระบบวอเตอร์เจ็ต (80943C) และ คู่มือคำเตือนเกี่ยวกับความถี่วิทยุ (80945C) การไม่ปฏิบัติตามคำแนะนำด้านความปลอดภัยอาจส่งผลให้เกิดการบาดเจ็บหรือเกิดความเสียหายต่ออุปกรณ์

สำเนาคู่มือทั้งในรูปแบบอิเล็กทรอนิกส์และแบบสิ่งพิมพ์จะถูกแนบมาพร้อมกับผลิตภัณฑ์ สำเนาคู่มือในรูปแบบอิเล็กทรอนิกส์ของผลิตภัณฑ์และสำเนาคู่มือต่าง ๆ ในหลากหลายภาษานั้นยังมีให้บริการบนเว็บไซต์ www.hypertherm.com/docs ของเราอีกด้วย

TR (TÜRKÇE/TURKISH)

UYARI! Bir Hypertherm ekipmanını çalıştırmadan önce, ürününüzün kullanım kılavuzunda, *Güvenlik ve Uyumluluk Kılavuzu'nda* (80669C), *Su Jeti Güvenlik ve Uyumluluk Kılavuzu'nda* (80943C) ve *Radyo Frekansı Uyarısı Kılavuzu'nda* (80945C) yer alan güvenlik talimatlarını okuyun.

Kılavuzların kopyaları, elektronik ve basılı formatta ürünle birlikte verilebilir. Elektronik kopyalar web sitemizde de yer alır. Kılavuzların birçoğu www.hypertherm.com/docs adresinde birçok dilde mevcuttur.

VI (TIẾNG VIỆT/VIETNAMESE)

CẢNH BÁO! Trước khi vận hành bất kỳ thiết bị Hypertherm nào, hãy đọc các hướng dẫn an toàn trong hướng dẫn sử dụng sản phẩm của bạn, *Sổ tay An toàn và Tuân thủ* (80669C), *Sổ tay An toàn và Tuân thủ Tia nước* (80943C), và *Hướng dẫn Cảnh báo Tần số Vô tuyến* (80945C). Không tuân thủ các hướng dẫn an toàn có thể dẫn đến thương tích cá nhân hoặc hư hỏng thiết bị.

Bản sao của sổ tay có thể đi kèm với sản phẩm ở định dạng điện tử và in. Bản điện tử cũng có trên trang web của chúng tôi. Nhiều sổ tay có sẵn bằng nhiều ngôn ngữ tại www.hypertherm.com/docs .

ZH-CN (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、《安全和法规遵守手册》(80669C)、《水射流安全和法规遵守手册》 (80943C) 以及 《射频警告手册》(80945C) 中的安全操作说明。

随产品提供的手册可提供电子版和印刷版两种格式。电子版本同时也在我们的网站上提供。很多手册有多种语言版本，详见 www.hypertherm.com/docs.

ZH-TW (繁 體中文/CHINESE TRADITIONAL)

警告！在操作任何 Hypertherm 設備前，請先閱讀您產品手冊內的安全指示，包括 《安全和法規遵從手冊》(80669C) 、《水刀安全和法規遵從手冊》(80943C)，以及 《無線電頻率警示訊號手冊》(80945C)。

電子版和印刷版手冊複本可能隨產品附上。您也可以前往我們的網站下載電子版手冊。我們的網站上還以多種語言形式提供多種手冊，請造訪 www.hypertherm.com/docs 。

Contents

Introduction SC-13
Installation and use SC-13
Assessment of area SC-13
Methods of reducing emissions SC-13
Mains supply SC-13
Maintenance of cutting equipment SC-13
Cutting cables SC-13
Equipotential bonding SC-13
Earthing of the workpiece SC-14
Screening and shielding SC-14
Attention SC-15
General SC-15
Patent indemnity SC-15
Limitation of liability SC-15
National and local codes SC-15
Liability cap SC-16
Insurance SC-16
Transfer of rights SC-16
Waterjet product warranty coverage SC-16
Product SC-16
Parts coverage SC-16

1 Specifications 17

Safety information 17
System description 17
Power supply dimensions 18
System weights 18
Hypertherm system ratings (30 A) 19
Hypertherm system ratings (33A) 20

Ecodesign requirements 21
China Energy Label 22
Hand torch dimensions 23
Torch weight 23
Cutting specifications 23
Symbols and marks 24
Noise levels 25
IEC symbols 25

2 Power Supply Setup 27
Unpack the plasma system 27
Claims 27
System contents 28
Position the plasma system 29
Prepare the electrical power 29
Voltage configurations 29
Requirements for grounding 30
Power cord considerations 30
CSA power cords and plugs 31
CE and CCC power cords 32
Extension cord recommendations 33
Generator recommendations 33
Prepare the gas supply 34
Connect the gas supply 34
Additional gas filtration 35

3 Torch Setup 37
Introduction 37
Hand torch components 37
Consumable life 38
Choose the consumables 38
Using the cut charts 40
General-purpose (standard) consumables 40
240 V – 30 A/33 A cutting 41
FineCut consumables 43
240 V – 30 A/33 A cutting 44
120 V / 25 A cutting 46
120 V / 30 A cutting 47
HyAccess consumables 48
Cutting at 240 V 48
Cutting at 120 V / 20 A 48

Ordering and replacing 48

4 Operation 51

Controls and indicators 51
Rear controls 51
Front controls and LEDs 52
Operate the plasma system 53
Connect the electrical power and gas supply 53
Install the consumables 54
Attach the ground clamp 56
Power ON the system 56
Adjust the gas pressure and output current 56
Operating the system on a 120 V, 15 A circuit 57
Operating the system on a 120 V, 20 A circuit 57
Operating the system on a 240 V, 20 A circuit 57
Check the indicator LEDs 58
Verify the system is ready 58
Understand duty-cycle limitations 58
System operation guidelines 59
Hand torch operation 60
Safety catch operation 60
Hand torch cutting guidelines 61
Recommendations for cutting at 120 V 61
Edge start on a workpiece 62
Pierce a workpiece 63
Gouge a workpiece 64
Varying the gouge profile 65
Common hand-cutting faults 66
Minimizing dross 66

5 Troubleshooting and System Tests 67

Theory of operation 67
Functional description 67
Sequence of operation 68
Troubleshooting preparation 69
Test equipment 69
Troubleshooting procedures and sequence 69
External inspection 72
Internal inspection 72
Initial resistance check 72
Check the power switch 73

Power supply overview 75
Troubleshooting guide 76
Control board LEDs 82
Use the control board Error and Reset LEDs to troubleshoot 83
Reset LED 83
Error LED 84
System tests 84
Test 1 – voltage input 87
Test 2 – power board voltage checks 89
Test 3 – VBUS and voltage balance 91
Test 4 – solenoid valve 94
Test 5 – torch stuck open or torch stuck closed 95
Test 6 – plasma start 96
Test 7 – torch cap-sensor 98
Test 8 – fan 99
Test 9 – pressure switch 100

6 Power Supply Component Replacement 101

Disconnect the power and gas supply 102
Replacing the power supply cover 102
Replacing the component barrier 104
Detaching and reattaching the front panel 106
Detaching and reattaching the rear panel 109
Replacing the power cord and strain relief 112
Replacing the power switch 120
Replacing the control board 123
Replacing the power board 125
Replacing the fan 132
Replacing the drain hose, gas supply hoses, and 90° fitting 135
Replacing the wire group 139
Replacing the solenoid valve 146
Replacing the torch lead and strain relief 149
Replacing the pressure switch 155
Replacing the air filter/regulator and pressure switch assembly 157
Replacing the air inlet fittings 162
Replacing the air filter bowl and air filter element 164
Replacing the front panel 168
Replacing the rear panel 172
Replacing the base 176
Replacing the magnetics assembly 178
Replacing the work lead and ground clamp 183

7 Torch Component Replacement 187

Disconnect the power, gas supply, and torch 188
Replacing the handle 189
Replacing the trigger assembly 193
Replacing the torch body 194
Replacing the start switch 196
Replacing the cap-sensor switch 197
Replacing the torch lead 198

8 Parts 201

Power supply parts 202
Exterior, front 202
Exterior, rear 203
Interior, power board side 204
Control board and power switch 205
Interior, fan side 206
Air filter/regulator with pressure switch assembly 207
Power supply base and magnetics 208
Duramax LT hand torch parts 209
Duramax LT hand torch consumables 210
General-purpose (standard) consumables 210
FineCut consumables 210
HyAccess consumables 211
Accessory parts 212
Safety-critical parts 213
Recommended spare parts 214
Powermax30/33 XP labels 215

9 Wiring Diagrams 217

Generic timing chart 219
Powermax30 XP/33 XP schematic 220

Electromagnetic Compatibility (EMC)

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.

Electromagnetic Compatibility (EMC)

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.

Warranty

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.

All third-party engines, engine accessories, alternators, and alternator accessories are covered by the respective manufacturers' warranties and not covered by this warranty.

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.

Warranty

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 Powermax33 XP is a highly portable, 33 A, handheld or mechanized plasma cutting system appropriate for a wide range of applications. It uses air or nitrogen to cut electrically conductive metals, such as mild steel, stainless steel, or aluminum. With it you can cut thicknesses up to 20mm (3/4 inches) and pierce thicknesses up to 6 mm (1/4 inch). The Powermax30 XP is a 30 A system and can cut thicknesses up to 16mm (5/8 inches).

The Powermax30/33 XP ships in several different configurations, based on region. Typically all configurations include:

- 1 complete set of general-purpose (standard) consumables (preinstalled on the Duramax™ LT hand torch) for standard cutting:
  - 1 electrode
  - 1 swirl ring
  - 1 nozzle
  - 1 retaining cap
  - 1 shield
- 1 extra general-purpose nozzle
- 1 extra electrode
- FineCut® consumables for detailed cutting:
  - 1 FineCut nozzle
  - 1 FineCut deflector
- 1 region-specific air fitting:
  - Industrial interchange quick-disconnect nipple with 1/4 NPT threads (CSA models)

- British Pipe Thread adapter G-1/4 BSPP with 1/4 NPT threads (CE and CCC models)

- Carrying strap
- Operator Manual
- Product Safety Information Sheet
- Quick Setup Card

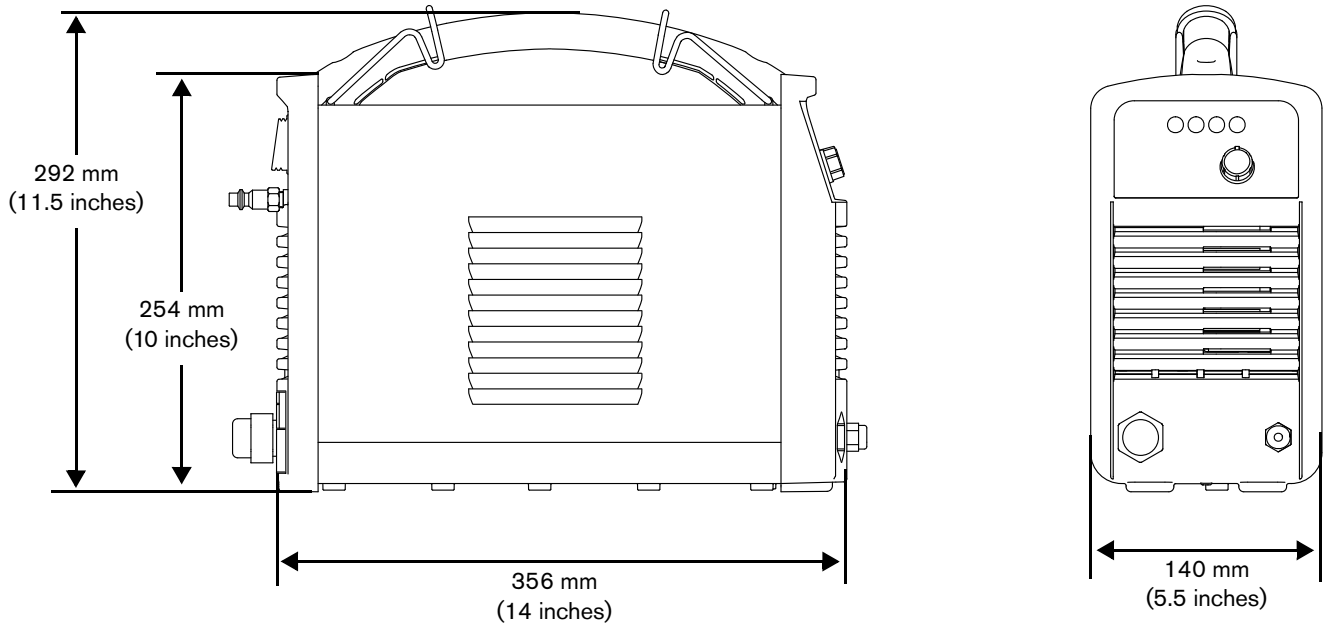
For details on how to select the right set of consumables for a given cutting job, see *Choose the consumables* on page 38.

Additional items may also ship with your system depending on the configuration that you ordered, such as instructional setup materials, a carrying case, leather cutting gloves, or protective glasses.

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 30 for more information.

You can order additional consumables and accessories – such as specialty consumables and a circle cutting guide – from any Hypertherm distributor. See the *Parts* section on page 201 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: 9.7 kg (21.4 pounds)
- CE and CCC systems: 9.5 kg (21.0 pounds)

Hypertherm system ratings (30 A)

Rated open circuit voltage (U_0)	256 VDC	
Rated output current (I_2)	15 A to 30 A[1]	
Rated output voltage (U_2) at U_1 = 120 VAC	83 VDC	
Rated output voltage (U_2) at U_1 = 200 – 240 VAC	125 VDC	
Duty cycle at 40°C, U_1 = 120 VAC (See data plate on power supply for more information on duty cycle and for IEC ratings.)	20% (I_2 = 28 A, U_2 = 83 V) 60% (I_2 = 17 A, U_2 = 83 V) 100% (I_2 = 15 A, U_2 = 83 V)	
Duty cycle at 40°C, U_1 = 200 – 240 VAC (See data plate on power supply for more information on duty cycle and for IEC ratings.)	35% (I_2 = 30 A, U_2 = 125 V) 60% (I_2 = 23 A, U_2 = 125 V) 100% (I_2 = 20 A, U_2 = 125 V)	
Operating temperature	-10° to 40° C (14° to 104° F)	
Storage temperature	-25° to 55° C (-13° to 131° F)	
Power factor (120 V – 240 V)	0.99	
Input voltage (U_1)/ Input current (I_1) at rated output ($U_{2\ MAX}$, $I_{2\ MAX}$) (See *Voltage configurations* on page 29 for more information.)	120 V, 1-phase, 50/60 Hz, 25 A 200 – 240 V, 1-phase, 50/60 Hz, 22.5 – 18.8 A	
Gas type	Air	Nitrogen
Gas quality	Clean, dry, oil-free	99.995% pure
Minimum required gas inlet flow and pressure	99.1 L/min at 4.7 bar (3.5 scfm at 68 psi)	
Recommended gas inlet flow and pressure	113.3 L/min at 5.5 bar (4.0 scfm at 80 psi)	
Maximum gas inlet pressure	9.3 bar (135 psi)	

1.If the power supply is connect to 120VAC, the current is limited to 28A.

Hypertherm system ratings (33A)

Rated open circuit voltage (U_0)	256 VDC
Rated output current (I_2)	18 A to 33 A[1]
Rated output voltage (U_2) at U_1 = 120 VAC	83 VDC
Rated output voltage (U_2) at U_1 = 200 – 240 VAC	125 VDC
Duty cycle at 40°C, U_1 = 120 VAC (See data plate on power supply for more information on duty cycle and for IEC ratings.)	20% (I_2 = 28 A, U_2 = 83 V) 60% (I_2 = 19 A, U_2 = 83 V) 100% (I_2 = 15 A, U_2 = 83 V)
Duty cycle at 40°C, U_1 = 200 – 240 VAC (See data plate on power supply for more information on duty cycle and for IEC ratings.)	35% (I_2 = 33 A, U_2 = 125 V) 60% (I_2 = 25 A, U_2 = 125 V) 100% (I_2 = 20 A, U_2 = 125 V)
Operating temperature	-10° to 40° C (14° to 104° F)
Storage temperature	-25° to 55° C (-13° to 131° F)
Power factor (120 V – 240 V)	0.99
Input voltage (U_1)/ Input current (I_1) at rated output ($U_{2\ MAX}$, $I_{2\ MAX}$) (See *Voltage configurations* on page 29 for more information.)	120 V, 1-phase, 50/60 Hz, 26.9 A 200 – 240 V, 1-phase, 50/60 Hz, 24.6 – 20.5 A
Gas type	Air
Gas quality	Clean, dry, oil-free
Minimum required gas inlet flow and pressure	99.1 L/min at 4.7 bar (3.5 scfm at 68 psi)
Recommended gas inlet flow and pressure	113.3 L/min at 5.5 bar (4.0 scfm at 80 psi)
Maximum gas inlet pressure	9.3 bar (135 psi)

1.If the power supply is connect to 120VAC, the current is limited to 28A.

Ecodesign requirements

Powermax30 XP/33 XP

Idle state power consumption	11 W
Power source efficiency at rated maximum output power	88.4%

Critical raw materials

Critical raw material	Components that contain more than 1 gram
Antimony	Torch leads
Borate	All printed circuit boards
Magnesium	Heatsinks, metal covers
Silicon metal	Heatsinks, metal covers, compressor (Powermax30 AIR only)
Strontium	Fans

China Energy Label



1 Energy efficiency rating. Level 1 is most efficient.

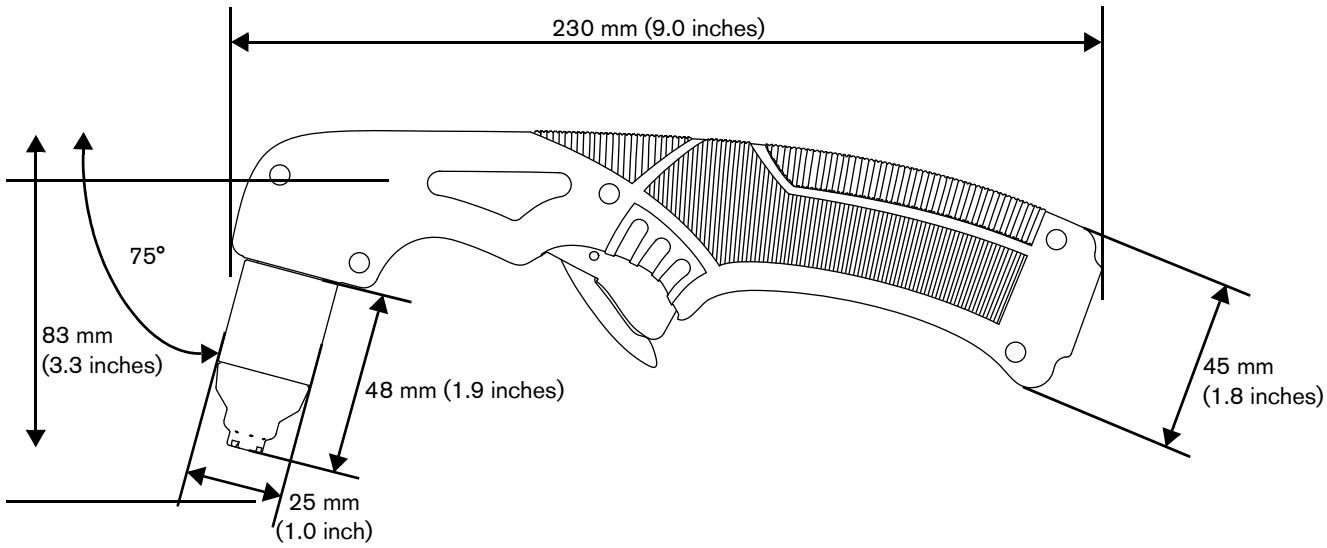
2
- Manufacturer
- Plasma power supply model

3 Energy efficiency (%)

4
- Rated output current
- Power factor under load
- No-load current

Input voltage (V)	Power level	Efficiency (%)	Rated current (A)	Power factor under load	No-load current
220	3	78.5%	30	–	–

Hand torch dimensions



Torch weight

Hand torch with general-purpose (standard) consumables only	0.3 kg (0.75 pounds)
Hand torch with general-purpose (standard) consumables and 4.6 m (15 foot) lead (with strain relief)	1.1 kg (2.35 pounds)

Cutting specifications

240 V (with general-purpose [standard] consumables)		
	30 A	**33 A**
Rated Thickness	10 mm (3/8 in.) at 500 mm/min (20 in/min)	12 mm (1/2 in.) at 400 mm/min (16 in/min)
Maximum Thickness	12 mm (1/2 in.) at 250 mm/min (10 in/min)	16 mm (5/8 in.) at 250 mm/min (10 in/min)
Severance Thickness	16 mm (5/8 in.) at 125 mm/min (5 in/min)	20 mm (3/4 in.) at 125 mm/min (5 in/min)

120 V: Use the FineCut nozzle and deflector for cutting on 120 V input circuits. When you operate the system at the maximum recommended output of 25 A, the cut capacities are:

- 6 mm (1/4 inch) at 480 mm/minute (19 inches/minute)
- 10 mm (3/8 inch) at 200 mm/minute (8 inches/minute)
- 12 mm (1/2 inch) at 75 mm/minute (3 inches/minute)

To understand the differences between the general-purpose and FineCut consumables, and for guidelines on selecting the right set for your cutting applications, see *Choose the consumables* on page 38.

Symbols and marks

Your product may have one or more of the following marks on or near the data plate. Because of 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 comply with European Directives. Applicable directives may include the European Low Voltage Directive, the European Electromagnetic Compatibility (EMC) Directive, the Radio Equipment Directive (RED), and the Restriction of Hazardous Substances (RoHS) Directive. See the European CE Declaration of Conformity for details.



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.



RCM mark

CE versions of products with an 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.



RoHS mark

The RoHS mark indicates that the product meets the requirements of the European Restriction of Hazardous Substances (RoHS) Directive.

United Kingdom Conformity Assessed mark

CE versions of products that include a UKCA mark of conformity meet the product safety, EMC, RF, and RoHS requirements for export to the UK.

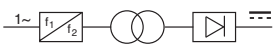
Noise levels

This plasma system can make more than the permitted acoustical noise levels as defined by national and local codes. Always put on correct ear protection when cutting or gouging. Any acoustical noise measurements taken are related to the specific environment in which the system is used. Refer to *Noise can damage hearing* in the *Safety and Compliance Manual* (80669C).

In addition, you can find an *Acoustical Noise Data Sheet* for your system in the document library at www.hypertherm.com/docs. In the search box, enter **data sheet**.

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		Inlet gas pressure 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		

Section 2

Power Supply Setup

Unpack the plasma system

1. Verify 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 28.)

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

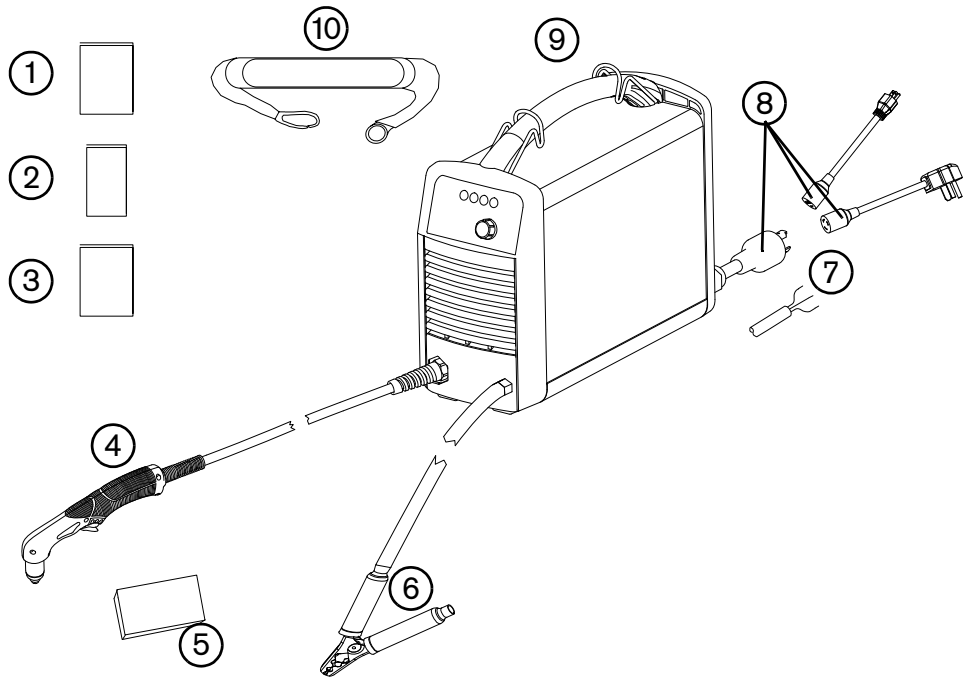
3. Before you set up and operate this system, read the separate *Safety and Compliance Manual* (80669C) included with your system for important safety information.

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. Additional components – such as setup instructions, a carrying case and protective glasses and gloves – may also be included with your system, depending on the configuration you ordered.



1 Operator Manual

2 Quick Setup Card

3 Product Safety Information Sheet

4 Hand torch with lead

5 Consumable kit

6 Ground clamp and work lead

7 Ground clamp and work leadCE/CCC power cord (no power plug included)

8 CSA power cord with power plug adapters

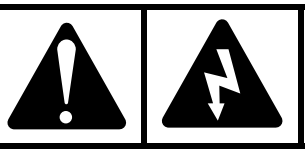
9 Power supply

10 Carrying strap

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

Position the plasma 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.
- Place the power supply on a stable, level surface before using. To avoid toppling, do not set the power supply on an incline greater than 10 degrees.
- Do not use the system in rain or snow.



WARNING!

Never cut under water or submerge the torch in water.

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 59 and *Troubleshooting guide* on page 76.

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 set the amperage adjustment knob to an appropriate output current and verify that an appropriate set of consumables is properly installed in the torch. For more information, see *Adjust the gas pressure and output current* on page 56 and *Install the consumables* on page 54.

The following table shows 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.

Powermax30 XP voltage configuration				
Input voltage circuit*	**Rated output**	**Input current at rated output**	**kVA**	**Recommended consumables†**
120 V, 15 A	20 A, 83 V	16.4 A	2.0	FineCut
120 V, 20 A	25 A, 83 V	20.5 A	2.5	FineCut
120 V, 30 A	28 A, 83 V	25 A	3.0	FineCut
200 V – 240 V, 20 A	30 A, 125 V	22.5 A – 18.8 A	4.5	General-purpose or FineCut

* Input voltages can be+20% / -15% of the values in this table.

† See *Choose the consumables* on page 38 for an explanation of general-purpose (standard) and FineCut consumables.

Powermax33 XP voltage configuration				
Input voltage circuit*	**Rated output**	**Input current at rated output**	**kVA**	**Recommended consumables†**
120 V, 15 A	20 A, 83 V	16.4 A	2.0	FineCut
120 V, 20 A	25 A, 83 V	20.5 A	2.5	FineCut
120 V, 30 A	28 A, 83 V	29 A	3.0	FineCut
200 V – 240 V, 20 A	33 A, 125 V	24.6 A – 18.8 A	5.0	General-purpose or FineCut

* Input voltages can be +20% / -15% of the values in this table.

† See *Choose the consumables* on page 38 for an explanation of general-purpose (standard) and FineCut consumables.

CAUTION!

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

Requirements for grounding

Properly ground the system as follows to ensure personal safety, 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.

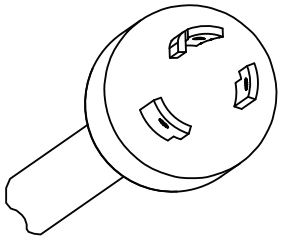
Power cord considerations

This system ships with a CSA, CE, or CCC power cord configuration. See *Exterior, rear* on page 203 for part number information.

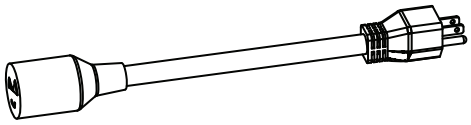
CSA power cords and plugs

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.

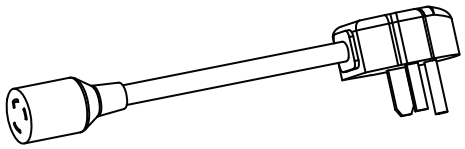


- To operate the system on a lower amperage circuit, attach the female end of the 120 V/15 A (NEMA 5-15P) plug adapter to the power supply's NEMA twist lock-style plug.



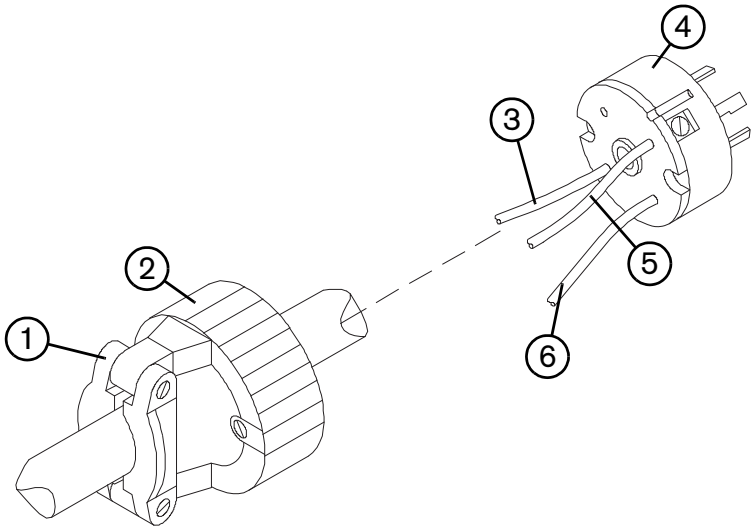
Do not set the amperage adjustment knob above 20 A, or you may trip the circuit breaker. See *Adjust the gas pressure and output current* on page 56.

- 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)

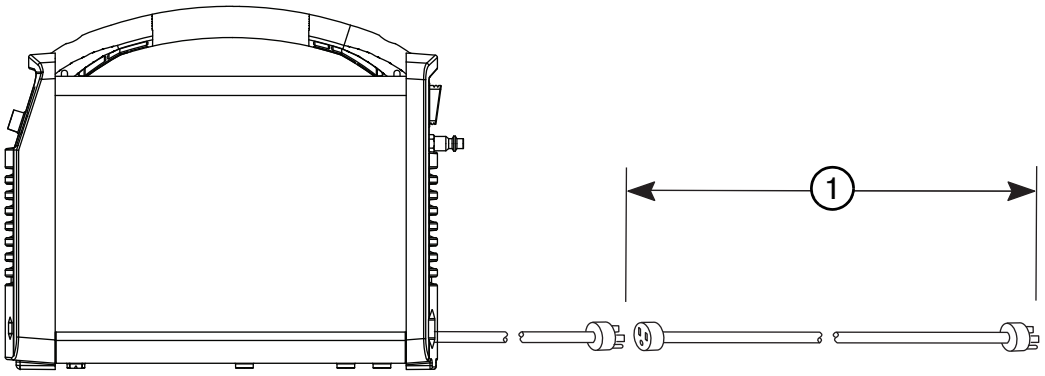
4 220 V (CCC) or 230 V (CE) plug

5 To line 2 terminal (blue)

6 To ground terminal (green/yellow)

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	33 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.

Prepare the gas supply

The gas supply can be shop-compressed or cylinder-compressed. You must use a high-pressure regulator on either type of supply, and the regulator must deliver gas to the filter on the power supply at 99.1 l/min at 4.7 bar (3.5 scfm at 68 psi). To ensure adequate pressure to the power supply, set the regulator between 5.5 and 6.9 bar (80 and 100 psi).

The system contains an internal filter element, but additional filtration may be required depending on the quality of the gas supply. If gas supply quality is poor, cut speeds decrease, cut quality deteriorates, cutting thickness capability decreases, and the life of the consumables shortens. To address these issues, use an optional air filtration system, such as the Hypertherm Eliminizer filter kit (128647). For optimal performance, the gas should have a maximum:

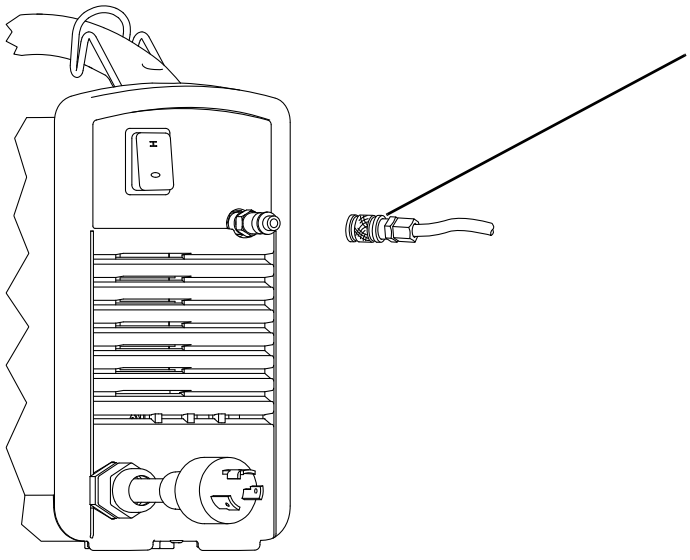
- Particle size of 0.1 micron at a maximum concentration of 0.1 mg/m^3
- Dew point of -40° C (-40° F)
- Oil concentration of 0.1 mg/m^3 (per ISO 8573-1 Class 1.2.2)

Connect the gas supply

Connect the gas supply to the power supply using an inert gas hose with a 6.3 mm (1/4 inch) or greater internal diameter and an industrial interchange quick-disconnect coupler (for CSA models) or a G-1/4 BSPP threaded coupling (for CE and CCC models).

CAUTION!

Some air compressors use synthetic lubricants containing esters that damage the polycarbonates used in the air filter bowl.

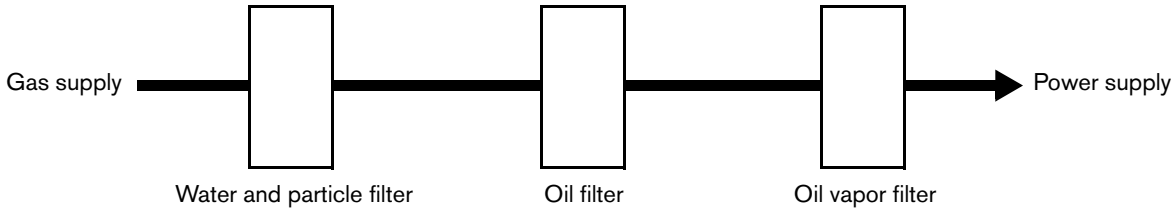


The recommended inlet pressure while gas is flowing is 5.5 – 6.9 bar (80 – 100 psi).

	**WARNING!**
	**The air filter bowl may explode if the gas supply pressure exceeds 9.3 bar (135 psi).**

Additional gas filtration

When site conditions introduce moisture, oil, or other contaminants into the gas line, use a three-stage coalescing filtration system. A three-stage filtering system works as follows to clean contaminants from the gas supply.



Install the filtering system between the quick-disconnect coupler and the power supply.

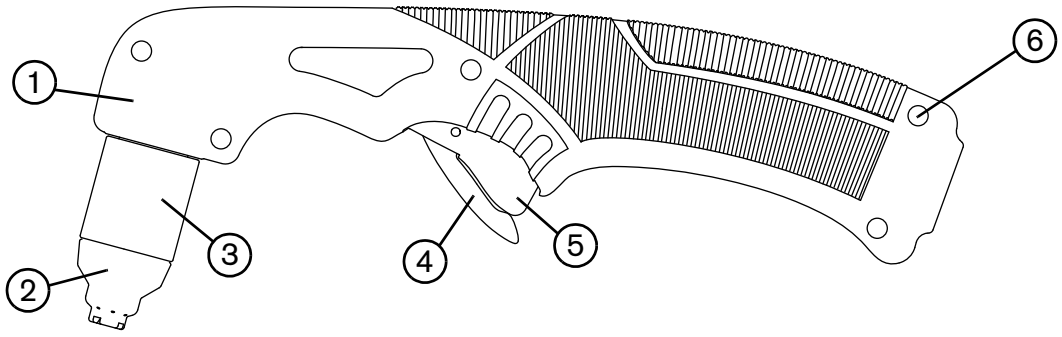
Section 3

Torch Setup

Introduction

The Powermax30/33 XP includes the Duramax LT 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. For information about the Duramax LT Machine torch, refer to the *Duramax LT Machine Torch App Note (*10086166).

Hand torch components



1 Handle

2 Shield (shown) or 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
- Gas supply quality (presence of oil, moisture, or other contaminants)
- Type of cutting (piercing decreases life when compared to edge cutting)
- Pierce height
- Type of consumable (FineCut, general-purpose, or HyAccess™)

Hypertherm does not recommend the use of any other consumables in this hand 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, general-purpose and FineCut consumables last approximately 1 to 2 hours of actual “arc on” time.

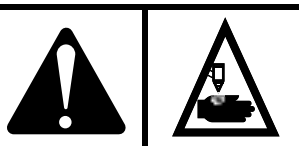
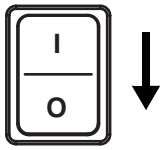
HyAccess consumables are specialty consumables that can be ordered separately. You can typically expect them to last half as long as the general-purpose consumables while delivering the same cut quality. See *HyAccess consumables* on page 48.

If the consumables’ life is shorter than expected or the cut quality is poor, verify that you are using the correct combination of consumables. (See the following topic, *Choose the consumables*.) 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 60 for more information about proper cutting techniques.

Choose the consumables

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

The hand torch ships with general-purpose (standard) consumables installed. The general-purpose consumables are designed for a broad range of cutting applications.

Also included with your system is at least one FineCut nozzle and deflector. The FineCut consumables are designed to achieve more finely detailed results on thin gauge metal.

The retaining cap, swirl ring, and electrode are the same for the general-purpose and FineCut consumables. The HyAccess consumables share the same swirl ring but use a unique nozzle, electrode, and retaining cap.

The consumables that you choose should be determined by the:

- Input power
- Amperage output setting
- Thickness of the metal you plan to cut

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 29.

Although the visual differences between the general-purpose (standard) and FineCut consumable parts are minor, installing the wrong combination of consumables will affect the life of the parts as well as the cut quality.

Hypertherm does not recommend the use of any other consumables in this hand 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.

Figure 1 and Figure 2 illustrate the differences between the general-purpose and FineCut nozzles and between the deflector and the shield. The FineCut consumables have rings or grooves etched onto them (as shown in Figure 2) to help you distinguish them from the general-purpose consumables.

Figure 1 – General-purpose (standard)



General-purpose nozzle

Shield

Figure 2 – FineCut



FineCut nozzle

Deflector

Using the cut charts

The following topics provide cut charts for each set of consumables. Use these cut charts to guide you in selecting the consumables and cutting current 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.

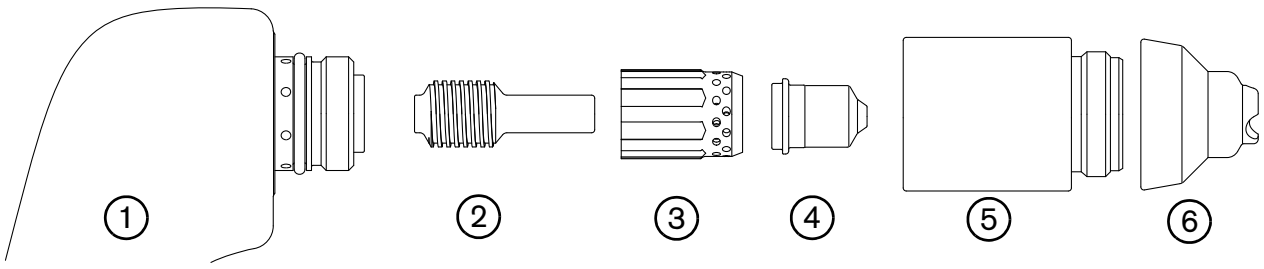
When cutting thin metal – 3 mm (10 gauge) or thinner – you may achieve a higher cut quality by using the FineCut consumables and cut charts.

General-purpose (standard) consumables

Use the general-purpose (or standard) consumables to cut thicker metals that do not require cuts that are as finely detailed. (See *Voltage configurations* on page 29 and *System operation guidelines* on page 59.) This set includes an electrode, swirl ring, general-purpose nozzle, retaining cap, and shield. The general-purpose nozzle must be installed only with the general-purpose shield, not the deflector.

Cutting at 120 V with the general-purpose consumables is not recommended.

Figure 3 – General-purpose (standard) consumable set



1 Torch

2 Electrode (420120)*

3 Swirl ring (420211)

4 Nozzle (420118)*

5 Retaining cap (420114)

6 Shield (420116)

* You can order packs of nozzles or electrodes, or you can order them combined as a kit. To order a kit of 2 general-purpose (standard) nozzles with 2 electrodes, use kit number **428243**. Hypertherm recommends replacing the nozzle and electrode at the same time.

240 V – 30 A/33 A cutting

General-purpose (standard) consumables

Metric

Material thickness (mm)	Material	30 A Maximum cut speed (mm/minute)	33 A Maximum cut speed (mm/minute)
1	Mild steel	10160†	12875†
2		7530	8825
3		4185	4870
5		1835	2080
8		780*	875
12		320*	435*
16		175*	225*
20			150*
1	Stainless steel	8355	9830
2		5635	6620
3		2910	3405
5		1245	1455
8		575*	700
10		360*	435*
13		215*	315*
16			195*
3	Aluminum	3555	4745
5		2115	2745
8		785*	960
10		425*	525*
13		205*	350*
16			300*

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

† Maximum cut speed is limited by the test table's maximum speed (10160 mm/minute or 400 inches/minute).

English

Material thickness (gauge/inches)	Material	30 A Maximum cut speed (mm/minute)	33 A Maximum cut speed (mm/minute)
18 GA	Mild steel	400†	470†
10 GA		110	125
1/4		40	45
3/8		22*	25
1/2		10*	15*
5/8		7*	9*
3/4			6*
18 GA	Stainless steel	306	360
10 GA		70	48
1/4		31	38
3/8		15*	18*
1/2		9*	13*
5/8			8*
1/8	Aluminum	135	180
1/4		45	55
3/8		18*	22*
1/2		9*	14*
5/8			12*

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

† Maximum cut speed is limited by the test table's maximum speed (10160 mm/minute or 400 inches/minute).

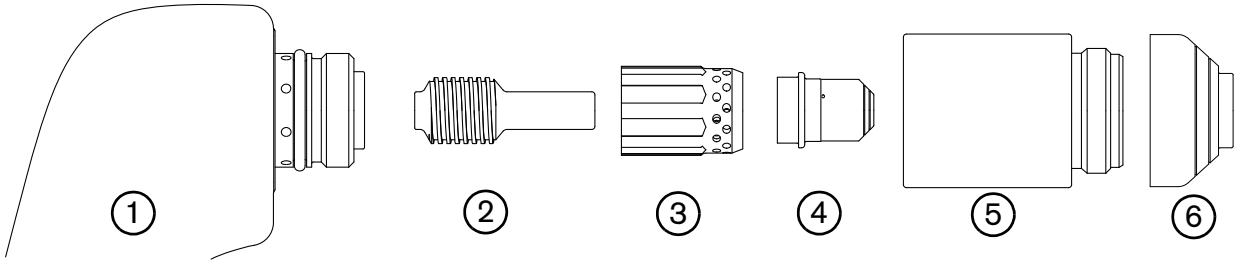
FineCut consumables

Use the FineCut consumables for detailed cutting on thin gauge metal. The FineCut consumable set uses a FineCut nozzle and a deflector with the same electrode, swirl ring, and retaining cap used in the general-purpose consumable set.

The FineCut nozzle must be installed only with the deflector, not the shield. Using the shield results in poor cut quality and increased power demand because the torch-to-work distance is too great.

For guidelines on cutting with 120 V input, see *Recommendations for cutting at 120 V* on page 61.

Figure 4 – FineCut consumable set



1 Torch

2 Electrode (420120)*

3 Swirl ring (420211)

4 Nozzle (420117)*

5 Retaining cap (420114)

6 Deflector (420115)

* You can order packs of nozzles or electrodes, or you can order them combined as a kit. To order a set of 2 FineCut nozzles with 2 electrodes, use kit number **428244**. Hypertherm recommends replacing the nozzle and electrode at the same time.

240 V – 30 A/33 A cutting

FineCut consumables

Metric

Material thickness (mm)	Material	30 A Maximum cut speed (mm/minute)	33 A Maximum cut speed (mm/minute)
1	Mild steel	10160†	12785†
2		6175	7635
3		2420	3275
5		1300	1840
8		535*	650
10		280*	365*
13		110*	125*
1	Stainless steel	10025	13715
2		5755	7805
3		2045	2460
5		1135	1320
8		410*	535
10		170*	330*
1	Aluminum	10215	12770
2		6805	8375
3		3285	4055
5		1455	1985
8		375*	620
10		150*	140*

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

† Maximum cut speed is limited by the test table's maximum speed (10160 mm/minute or 400 inches/minute).

English

Material thickness (gauge/inches)	Material	30 A Maximum cut speed (mm/minute)	33 A Maximum cut speed (mm/minute)
22 GA	Mild steel	400†	510†
18 GA		400	490
12 GA		112	140
10 GA		75	115
1/4		31	36
3/8		12*	16
1/2		5*	6*
22 GA	Stainless steel	400	540
18 GA		390	540
12 GA		90	110
10 GA		69	80
1/4		24	28
3/8		9*	15*
1/25	Aluminum	400	500
1/16		325	400
1/8		105	130
1/4		22	40
3/8		8*	10*

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

† Maximum cut speed is limited by the test table's maximum speed (10160 mm/minute or 400 inches/minute).

120 V / 25 A cutting

FineCut consumables

Metric

Material thickness (mm)	Material	Arc current (A)	Maximum cut speed (mm/minute)
1	Mild steel	25	10160†
2			3570
3			1745
5			905
6			590
7*			280
1	Stainless steel	25	8390
2			2860
3			1500
5			825
6			515
7*			205
1	Aluminum	25	10160†
2			5130
3			2170
5			920
7*			120

English

Material thickness (gauge/inches)	Material	Arc current (A)	Maximum cut speed (inches/minute)
18 GA	Mild steel	25	330
16 GA			205
14 GA			150
12 GA			80
10 GA			55
1/4			19
18 GA	Stainless steel	25	260
16 GA			160
14 GA			120
12 GA			65
10 GA			52
1/4			16
1/25	Aluminum	25	400†
1/16			250
1/8			65
1/4			15

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

† Maximum cut speed is limited by the test table's maximum speed (10160 mm/minute or 400 inches/minute).

120 V / 30 A cutting

FineCut consumables

Metric

Material thickness (mm)	Material	Arc current (A)	Maximum cut speed (mm/minute)
1	Mild steel	30	10160†
2			6175
3			2420
5			1300
8*			535
10*			280
13*			110
1	Stainless steel	30	10025
2			5755
3			2045
5			1135
8*			410
10*			170
1	Aluminum	30	10160†
2			6805
3			3285
5			1455
8*			375
10*			150

English

Material thickness (gauge/inches)	Material	Arc current (A)	Maximum cut speed (inches/minute)
22 GA	Mild steel	30	400†
18 GA			400†
12 GA			112
10 GA			75
1/4			31
3/8*			12
1/2*			5
22 GA	Stainless steel	30	400†
18 GA			390
12 GA			90
10 GA			69
1/4			24
3/8*			9
1/25	Aluminum	30	400†
1/16			325
1/8			105
1/4			22
3/8*			8

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

† Maximum cut speed is limited by the test table's maximum speed (10160 mm/minute or 400 inches/minute).

HyAccess consumables

You can use HyAccess consumables with your hand torch to achieve greater reach and visibility. HyAccess consumables extend the reach of the general-purpose (standard) consumables by approximately 7.5 cm (3 inches).

HyAccess consumables do not ship with the system. They are specialty consumables that can be ordered separately.

Cutting at 240 V

Operating at 240 V, you can expect to achieve approximately the same cut thicknesses and cut quality as with the general-purpose consumables. You may need to reduce your cut speed slightly to achieve the same cut quality.

Cutting at 120 V / 20 A

If you are operating the system on a 120 V / 20 A circuit, you can use the HyAccess consumables to cut thicknesses up to 3 mm (10 GA).

Hypertherm does not recommend using the HyAccess consumables when you operate the system on a 120 V / 15 A circuit.

Ordering and replacing

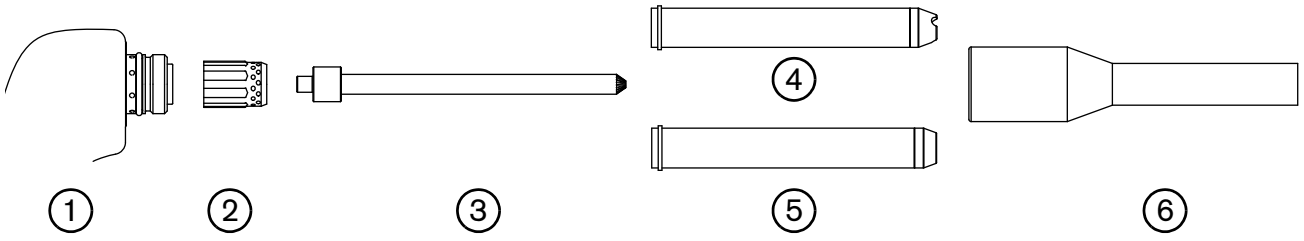
Typically, you can expect HyAccess consumables to last about half as long as the general-purpose (standard). See *HyAccess consumables* on page 211 for the part numbers to order HyAccess consumables.

Two HyAccess nozzles are available:

- One standard nozzle designed for a broad range of cutting applications
- One gouging nozzle designed specifically for gouging

When the tip of either nozzle wears out, replace the entire nozzle.

Figure 5 – HyAccess consumables



1 Torch
2 Swirl ring
3 Electrode
4 Standard nozzle
5 Gouging nozzle
6 Retaining cap



WARNING!

CHANCE OF ELECTRIC SHOCK

Replace the retaining cap immediately if the end of the cap becomes torn or frayed.

Touching an exposed nozzle when operating the system will result in electric shock.

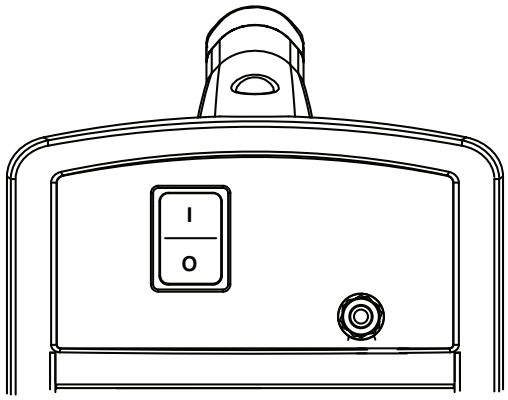
Section 4

Operation

Controls and indicators

Refer to the following topics to become familiar with the controls and LED indicators on the system before you begin cutting.

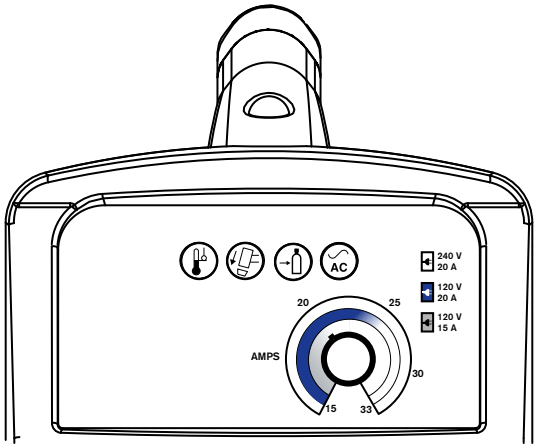
Rear controls





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

Front controls and LEDs



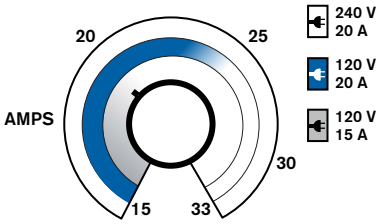
Power ON LED (green) – When illuminated, this LED indicates that the power switch has been set to ON (**I**) and that the safety interlocks are satisfied.

Gas pressure LED (yellow) – When illuminated, this LED indicates that the inlet gas pressure is below 2.8 bar (40 psi).

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 one or more of the LEDs to blink. For information on what these fault conditions are and how to clear them, see *Troubleshooting guide* on page 76.



Amperage adjustment knob – Use this knob to set the output current between 15 A and 33[1] A.

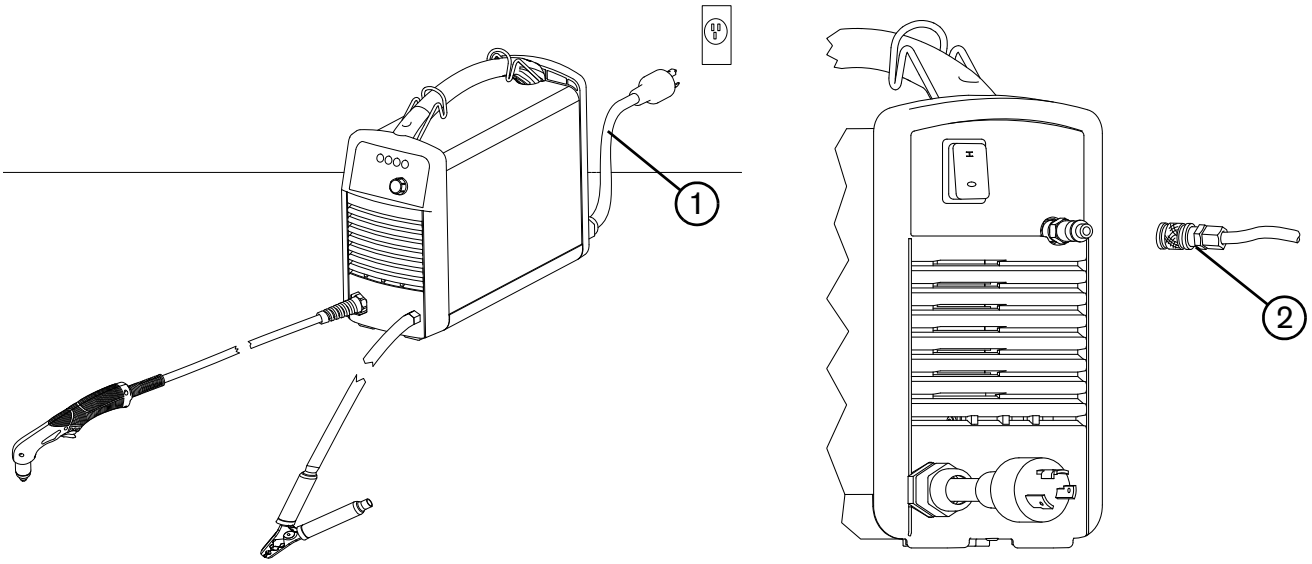
1. 30 A if using a Powermax30 XP Plasma power supply.

Operate the plasma system

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

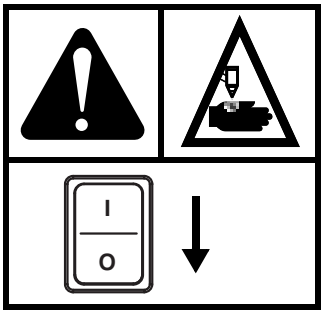
Connect the electrical power and gas supply

Plug in the power cord ① and connect the gas supply line ②.



- For information on connecting the gas supply to the power supply, see *Prepare the gas supply* on page 34.
- For information on connecting the proper plug to the power cord, see *Power cord considerations* on page 30.
- To understand which consumables to use and what cutting capacity to expect based on input voltage, see *Choose the consumables* on page 38.
- For information on electrical requirements and gas supply requirements for this system, see *Power Supply Setup* on page 27.

Install the consumables



WARNING!

INSTANT-ON TORCHES
PLASMA ARC CAN CAUSE INJURY AND BURNS

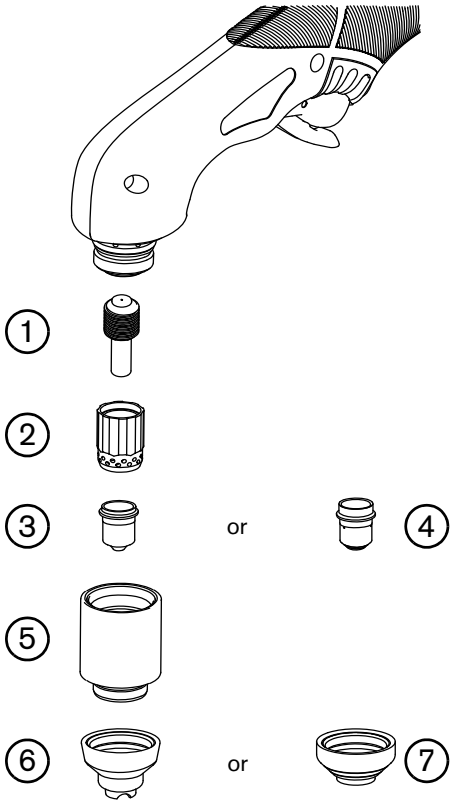
The plasma arc ignites immediately when you press the torch trigger. Make sure the power is OFF before changing consumables.

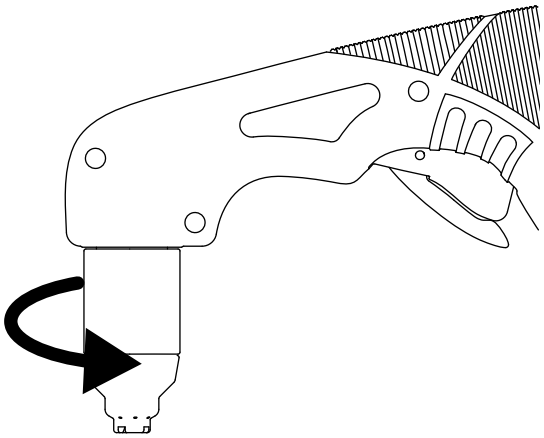
To operate the Duramax LT torch, first verify:

1. The power switch is in the OFF (**O**) position.
2. A complete set of consumables is installed as shown in Figure 6.
3. You use only the general-purpose shield (420116) with the general-purpose (standard) nozzle (420118).

To understand the differences between the general-purpose and FineCut consumables, and for guidelines on selecting the right set for your cutting applications, see *Choose the consumables* on page 38.

Figure 6





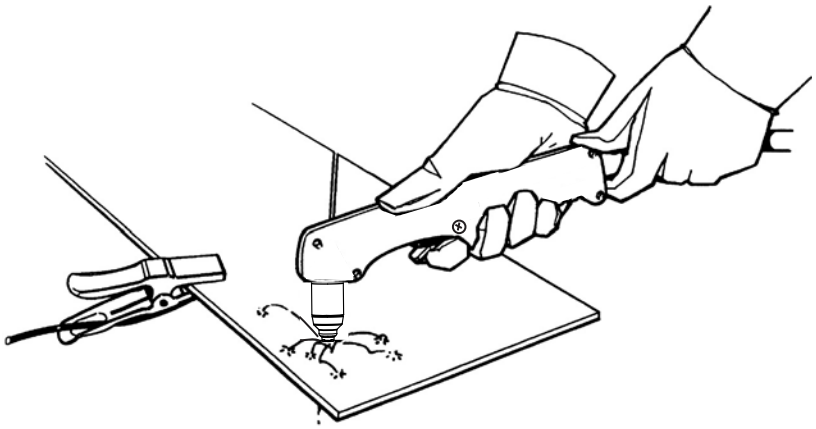
Tighten only to finger tight.

1 Electrode
2 Swirl ring
3 Nozzle (general-purpose)
4 Nozzle (FineCut)
5 Retaining cap
6 Shield (general-purpose)
7 Deflector (FineCut)

Attach the ground clamp

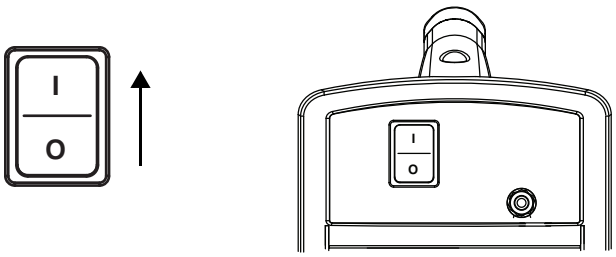
Attach the ground clamp to the workpiece.

- Verify that 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.**



Power ON the system

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

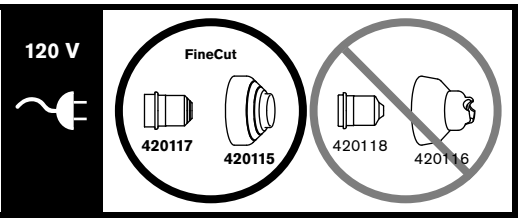


Adjust the gas pressure and output current

The power ON LED and the gas pressure LED illuminate when there is insufficient gas pressure to the system. Use a high-pressure regulator that is capable of delivering gas to the filter on the power supply at 99.1 L/min at 4.7 bar (3.5 scfm at 68 psi). For more information on attaching the gas supply, see *Prepare the gas supply* on page 34.

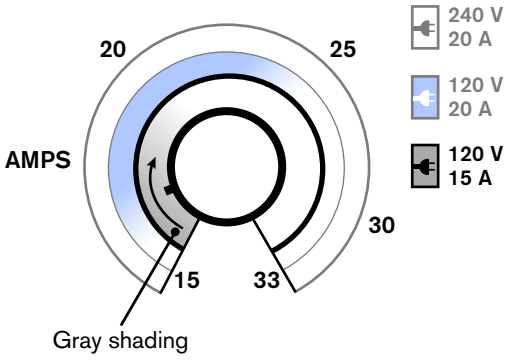
1. For cutting, set the regulator between 5.5 and 6.9 bar (80 and 100 psi).
2. Turn the amperage knob to the desired output current based on the input voltage, circuit size, and consumables.

Use only the FineCut consumables when operating the system on a 120 V input circuit.



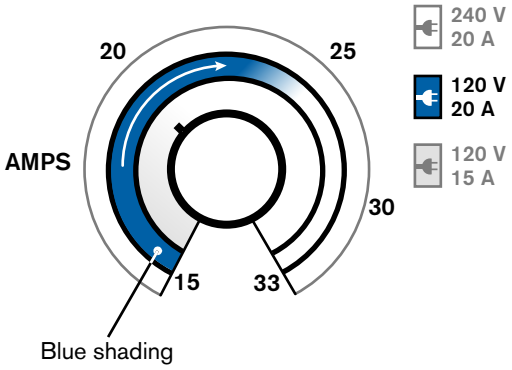
Operating the system on a 120 V, 15 A circuit

- Set the amperage below 20 A, as indicated by the gray shading around the knob (the inner ring).
- Use only the FineCut nozzle (420117) and deflector (420115).
- Do not use the general-purpose (standard) nozzle (420118) or shield (420116).
- Do not use the HyAccess consumables.
- Verify that nothing else is drawing power from the circuit.



Operating the system on a 120 V, 20 A circuit

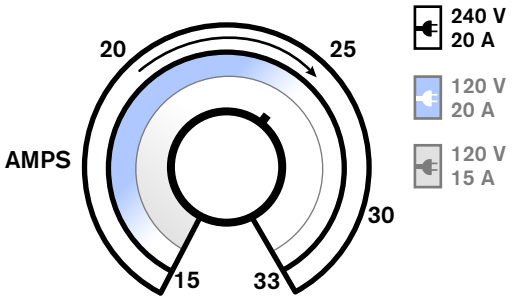
- Set the amperage below 25 A, as indicated by the blue shading around the knob (the middle ring).
- Use only the FineCut nozzle (420117) and deflector (420115).
- Do not use the general-purpose (standard) nozzle (420118) or shield (420116).
- Verify that nothing else is drawing power from the circuit.



Operating the system on a 240 V, 20 A circuit

- Set the amperage between 15 – 33 A.
- Use either the general-purpose (standard) or the FineCut consumables.

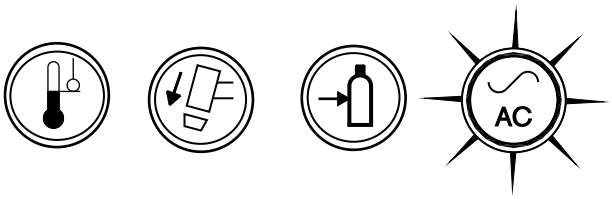
Do not mix the general-purpose and FineCut consumables. Use one set or the other.



See *Voltage configurations* on page 29 for more information.

Check the indicator LEDs

Verify that 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 gas pressure LEDs illuminate or blink, or if the power ON LED blinks, correct the fault condition before continuing. See *Troubleshooting guide* on page 76 section for more information.

Verify the system is ready

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.

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).

With input power of 120 V:

- At 28 A, the arc can remain on for 2.0 minutes out of 10 minutes without causing the unit to overheat (20% duty cycle).
- At 119 A, the arc can remain on for 6 minutes out of 10 (60%).
- At 15 A, the arc can remain on for 10 minutes out of 10 (100%).

With input power of 240 V:

- At 33 A, the arc can remain on for 3.5 minutes out of 10 (35% duty cycle).
- At 25 A, the arc can remain on for 6 minutes out of 10 (60%).
- At 20 A, the arc can remain on for 10 minutes out of 10 (100%).

When the duty cycle is exceeded, the system overheats, 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 fan may run during normal operation of the system.

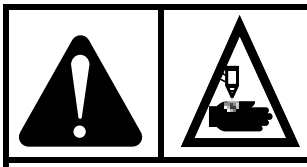
System operation guidelines

- To achieve the highest level of performance:
  - Operate the system at an input power of 240 VAC whenever possible.
  - 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 33.

- If you are operating your system on a 120 V, 15 A circuit, do not set the amperage higher than 20 A. See *Voltage configurations* on page 29.
- For best results when operating your system on a 120 V, 15 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 with the general-purpose (standard) consumables 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 29.
- 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 62.

Hand torch operation



WARNING!

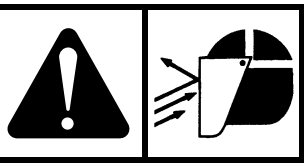
INSTANT-ON TORCHES
PLASMA ARC CAN CAUSE INJURY AND BURNS

Plasma arc ignites immediately when you press 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.



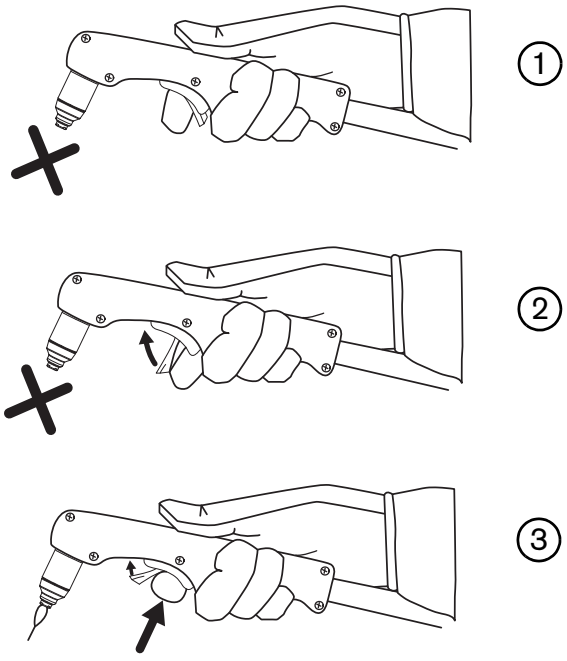
WARNING!

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 hand 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 press the red torch trigger.

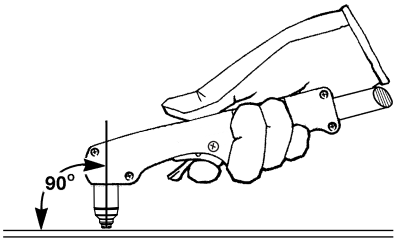


Hand torch cutting guidelines

- With any set of consumables, drag the torch tip lightly on the workpiece to maintain a steady cut speed.

  Sometimes the torch sticks slightly to the workpiece when you cut with the FineCut consumables.

- 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.



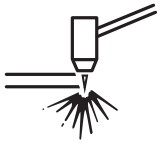
- Pulling the torch toward you along the cut is easier than pushing it or moving from side-to-side.
- For straight-line cuts, use a straight edge as a guide. To cut circles, use a template or a radius cutter attachment (a circle cutting guide). See *Accessory parts* on page 212 for the Hypertherm plasma 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

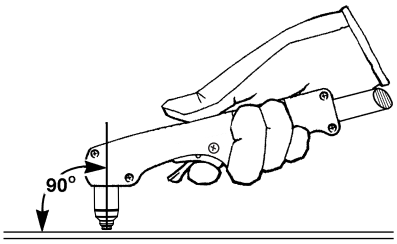
- Use only the FineCut consumables.
  - If you cut at 120 V with the HyAccess consumables, operate the system on a 120 V / 20 A circuit. Cutting with the HyAccess consumables while operating on a 120 V / 15 A circuit is not recommended.
- Do not use an extension cord.
- Verify nothing else is drawing power from the circuit.
- Turn down the current adjustment knob to avoid tripping the breaker.

Edge start on a workpiece

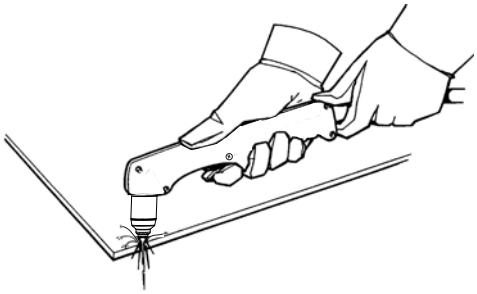


When cutting material thicker than 6 mm (1/4 inch), start the torch at the edge of the workpiece to prolong consumable life.

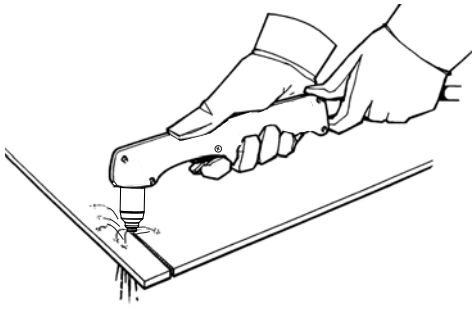
1. With the ground clamp attached to the workpiece, hold the torch perpendicular (90°) to the workpiece and on the edge.



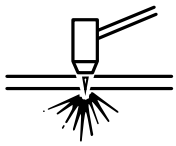
2. Press the torch trigger to start the arc. You may need to pause at the edge until the arc has cut completely through the workpiece.



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



Pierce a workpiece



If the metal is thinner than 6 mm (1/4 inch), use piercing to cut an interior feature. Piercing shortens the life of the consumables.

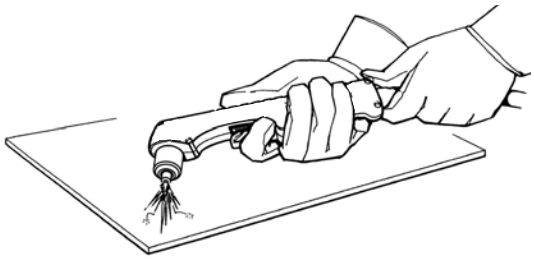
The type of pierce to perform depends on the thickness of the metal.

- **Straight pierce** – For cutting metal that is thinner than 3 mm (1/8 inch).
- **Rolling pierce** – For cutting metal that is 3 mm (1/8 inch) or thicker.

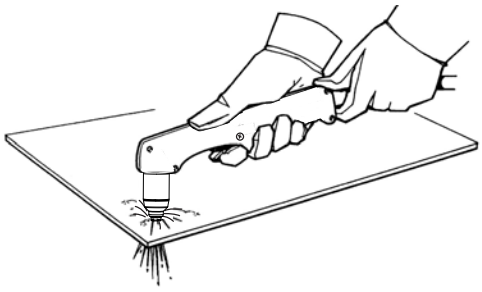
1. Attach the ground clamp to the workpiece.
2. **Straight pierce:** Hold the torch perpendicular (90°) to the workpiece.

   Rolling pierce: Hold the torch at an approximate 30° angle to the workpiece with the torch tip within 1.5 mm (1/16 inch) of it before firing the torch.
3. **Straight pierce:** Press the torch trigger to start the arc.

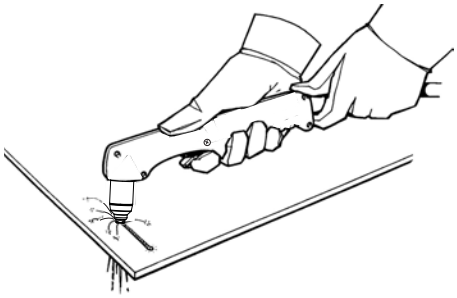
   Rolling pierce: Press the torch trigger to start the arc while still at an angle to the workpiece, then rotate the torch to the perpendicular (90°) position.



4. Hold the torch in place while continuing to press 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.



Gouge a workpiece

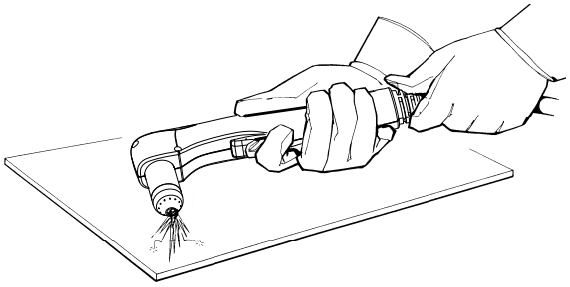


You can use this system with the general-purpose (standard) consumables for light gouging applications, such as the removal of spot welds and tack welds.

The system does not require a dedicated set of consumables or a special mode setting for gouging. However, do not use the FineCut consumables for gouging applications.

1. Hold the torch so that the torch tip is slightly above the workpiece before firing the torch.

2. Hold the torch at a 45° angle to the workpiece with a small gap between the torch tip and the workpiece. Press the trigger to obtain a pilot arc. Transfer the arc to the workpiece.

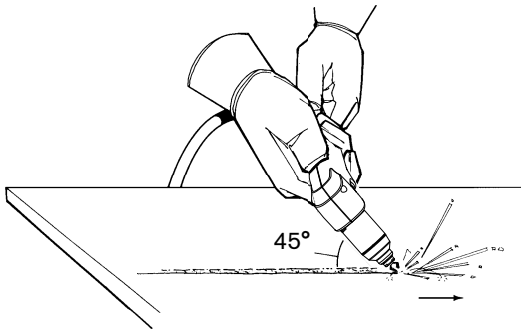


3. Maintain an approximate 45° angle to the workpiece as you feed into the gouge.

   Push the plasma arc in the direction of the gouge you want to create. Keep a small distance between the torch tip and the molten metal to avoid reducing consumable life or damaging the torch.

   You can vary the gouge profile by varying the:

   - Speed of the torch over the workpiece
   - Torch-to-work standoff distance
   - Angle of the torch to the workpiece
   -



Varying the gouge profile

Follow these recommendations to change the gouge profile as needed:

- **Increasing the speed** of the torch will **decrease width** and **decrease depth**.
- **Decreasing the speed** of the torch will **increase width** and **increase depth**.
- **Increasing the standoff** of the torch will **increase width** and **decrease depth**.
- **Decreasing the standoff** of the torch will **decrease width** and **increase depth**.
- **Increasing the angle** of the torch (more vertical) will **decrease width** and **increase depth**.
- **Decreasing the angle** of the torch (less vertical) will **increase width** and **decrease depth**.
-

Common hand-cutting faults

For more information on faults, see *Troubleshooting guide* on page 76.

- 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
  - Low gas pressure or low gas flow rate
- 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:
  - Moisture in the gas supply
  - Low gas pressure
  - Incorrect installation of the consumables
  - Installation of the wrong consumables

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 bridge 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 and the flyback circuit power supply (DC to DC converter) on the power board (PCB2). The power board provides noise suppression and spike protection. A “soft start” is implemented via the power board resistor and relay (K1).

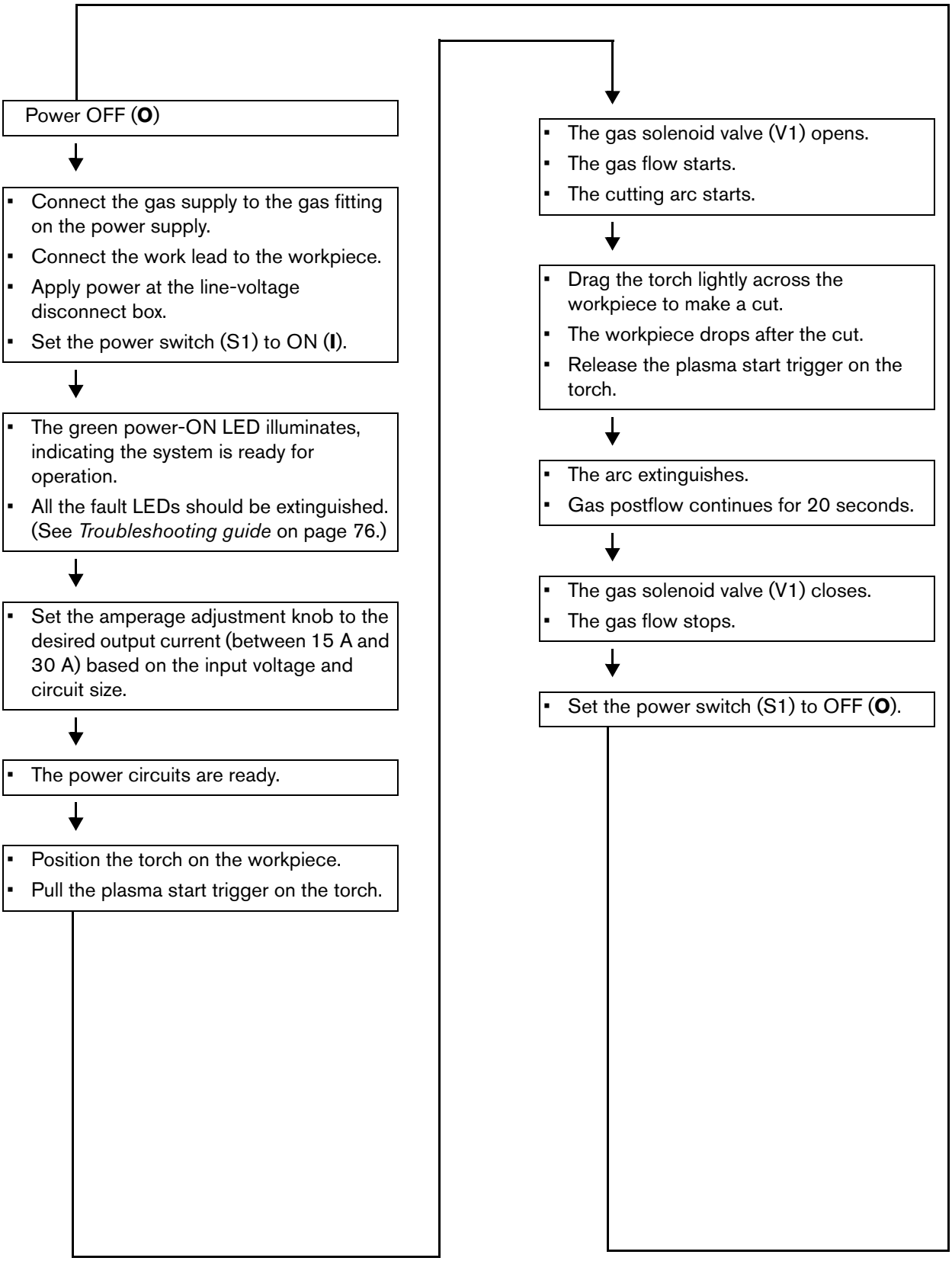
The PFC boost converter consists of an insulated gate bipolar transistor (IGBT Q1), choke, and control circuit. It provides a 375 VDC bus voltage when the input AC voltage is between 120 and 240 VAC.

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



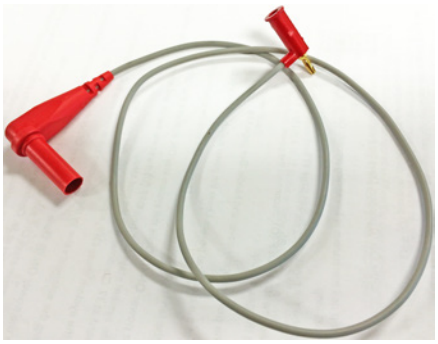
Troubleshooting preparation

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 technical services team listed in the front of this manual.

Test equipment

- Multimeter with a variety of test leads. Most power boards contain test points with a diameter of 2.25 mm (0.09 inches) that accept miniature banana plugs (for example, Pamona® 2945 plugs). Earlier-style power boards contain larger test point openings that require the use of test hooks. See page 91.

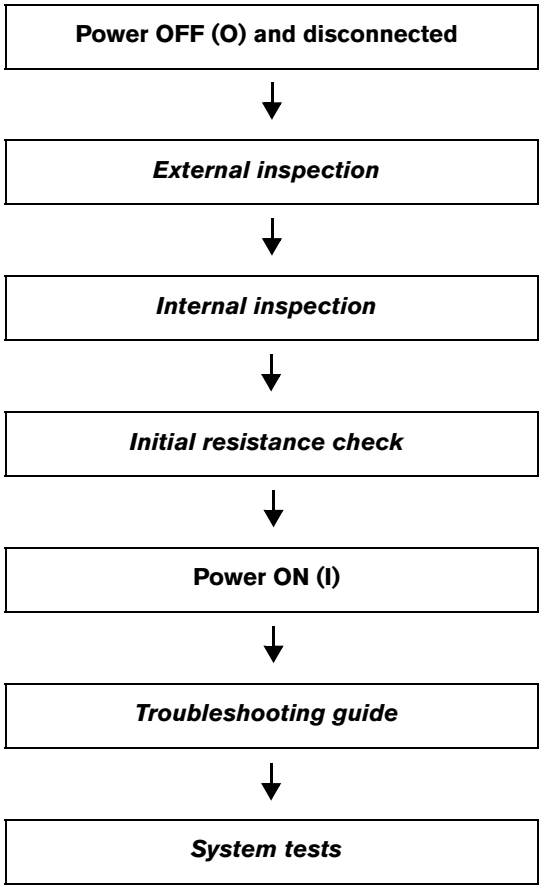


Troubleshooting procedures and sequence

When performing the troubleshooting procedures, refer to:

- *Safety and Compliance Manual* (80669C) for detailed safety information.
- *Wiring Diagrams* on page 217 for the system's electrical schematic.
- *Power Supply Component Replacement* on page 101 or *Torch Component Replacement* on page 187 for replacement procedures.

- *Parts* on page 201 for power supply components and torch components.



After the problem has been located and repaired, refer to *Sequence of operation* on page 68 to test the power supply for proper operation.

	**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! 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 or control board. Do not cut away or remove any protective conformal coating from either board. 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.**

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 power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power supply handle and cover. (See *Remove the power supply cover* on page 102.)
3. Remove the component barrier. (See *Remove the component barrier* on page 104.)
4. Inspect the inside of the power supply, especially the side with the power board. Look for broken or loose wiring connections, burn and char marks, damaged components, and so on.
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.

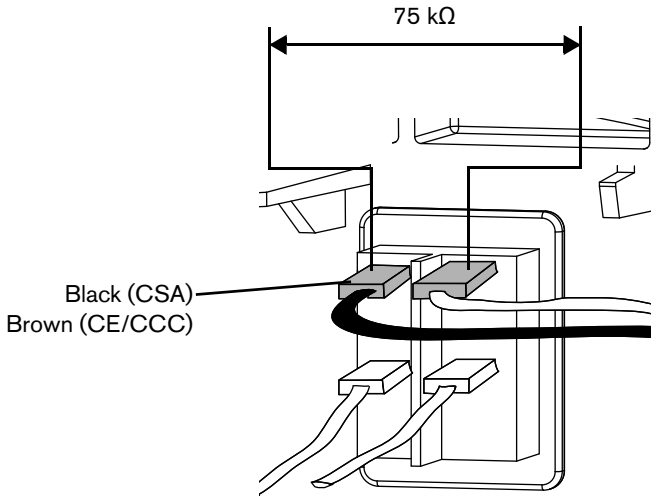
- The type of multimeter you use significantly affects the results of the tests in this section. The resistance values in this manual are intended as a general reference point.
- If resistance values indicate a problem based on the range of values provided in this section, isolate the problem by removing 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 68 to test the power supply for proper operation.

Check the power switch

1. Set 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.

Figure 7



3. Check the resistance from the input leads to ground to verify that 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.

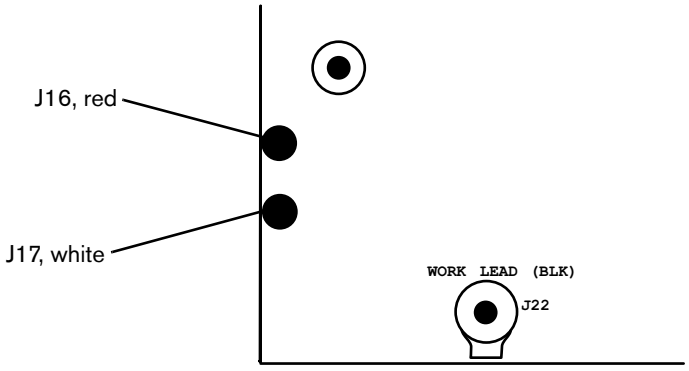
4. Remove the consumables from the torch. If you do not remove the consumables, the resistance values will not read correctly.

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 8* for locations on the back side of the power board.

Measure resistance from	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

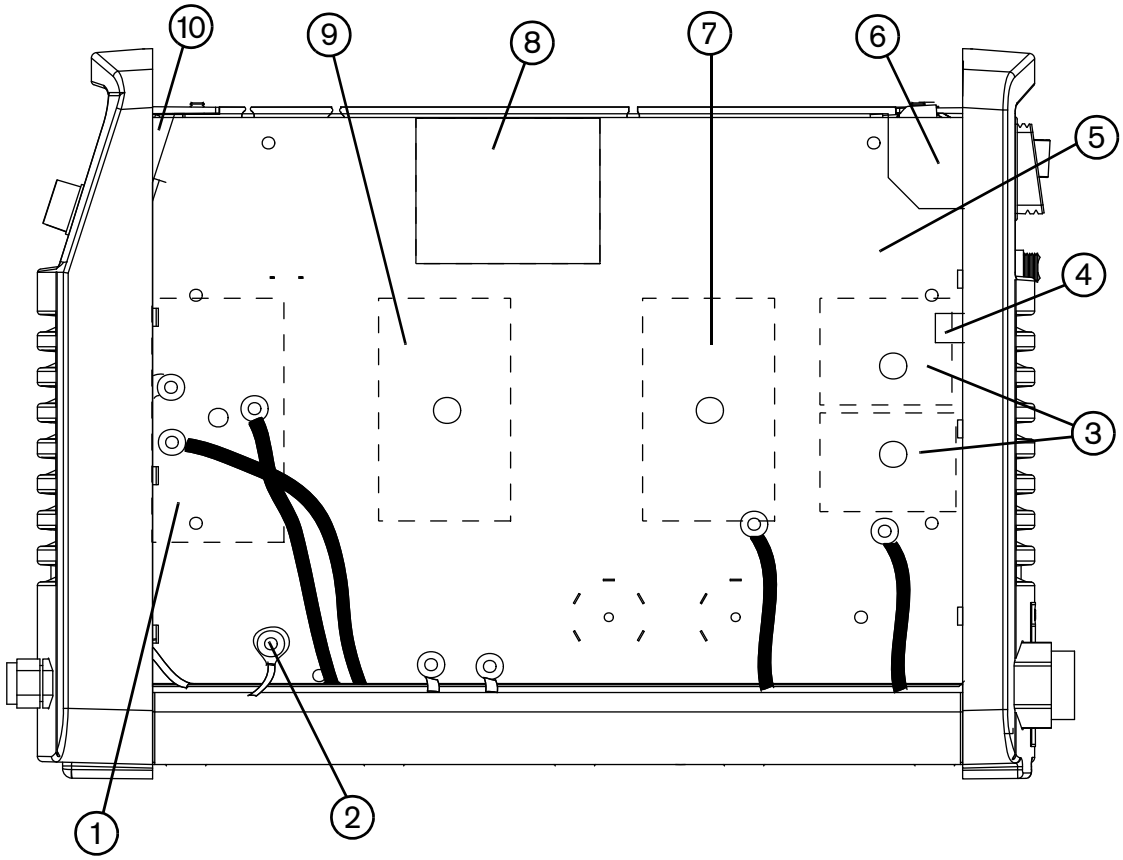
Figure 8



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 76.

Power supply overview

Figure 9

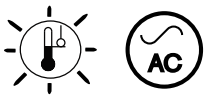
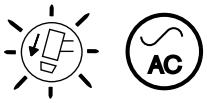


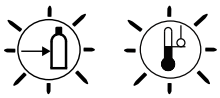
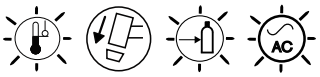
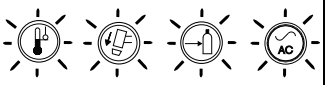
1 Output diode and pilot arc IGBT module (D27)
2 Work lead connection (J22)
3 Input diode bridges (D24, D30)
4 PE (ground)
5 Power board (PCB2)
6 Power switch (S1)
7 PFC IGBT (Q1)
8 Flyback circuit
9 Inverter IGBT (Q2)
10 Control board (PCB1)

Troubleshooting guide

This guide provides the most probable causes and solutions. Study the *Powermax30 XP/33 XP* schematic on page 220 and understand the *Theory of operation* on page 67 before troubleshooting. Before purchasing any major replacement component, verify the problem with technical service or the nearest Hypertherm repair facility . See *System tests* on page 84 for detailed test procedures.

Problem	This may mean	Possible cause(s)	Possible solution(s)
The power switch is set to ON (**I**), but the power ON LED is not illuminated.	▪ There is insufficient voltage to the control circuits or a short-circuited power component.	▪ The system has no incoming voltage or an improper incoming voltage. ▪ The power board is faulty.	▪ Verify that the electrical power is connected to an appropriately sized circuit. ▪ Verify that the system did not trip the circuit breaker. ▪ Perform *Test 1 – voltage input* on page 87.
The power ON LED and the gas pressure LED illuminate. 	▪ There is insufficient gas pressure to the system.	▪ The gas supply line is not attached to the system. ▪ The gas supply line has a restriction. ▪ The air filter element is dirty. ▪ The pressure switch is not reading at least 2.8 bar (40 psi) on the gas supply line.	▪ Attach the gas supply. ▪ Inspect the gas supply line for restrictions or damage, and repair or replace if necessary. ▪ Inspect the air filter element, and replace if necessary. (See *Replacing the air filter bowl and air filter element* on page 164.) ▪ Perform *Test 9 – pressure switch* on page 100.
The power ON LED and the temperature LED illuminate. 	▪ The system overheated. ▪ The system is too cold to operate.	▪ You have exceeded the duty cycle. (See *Understand duty-cycle limitations* on page 58.) ▪ The ambient temperature is too low.	▪ Inspect the area around the system to make sure that the gas flow is not blocked. ▪ Let the system cool before using it. ▪ Perform *Test 8 – fan* on page 99. ▪ Let the system warm up before using it.

Problem	This may mean	Possible cause(s)	Possible solution(s)
The power ON LED illuminates and the temperature LED blinks. 	▪ The system overheated.	▪ The system is continuously drawing too much input current for too long. ▪ You are operating the system on a 120 VAC input circuit while using the general-purpose nozzle and shield.	▪ Let the system cool for approximately 3 minutes before using it. ▪ Turn down the cutting current. See *Adjust the gas pressure and output current* on page 56. ▪ Use only the FineCut consumables when operating the system on a 120 VAC input circuit. See *Choose the consumables* on page 38. ▪ 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 62. ▪ 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 33.
The power ON LED blinks. 	▪ The incoming voltage is not correct.	▪ The incoming voltage is below 90 VAC or above 285 VAC.	▪ Perform *Test 1 – voltage input* on page 87.
The power ON LED and the torch cap LED illuminate. 	▪ The cap-sensing circuit is open.	▪ The consumables are loose, incorrectly installed, or missing. ▪ The cap-sensor switch is faulty.	▪ Verify that the consumables are installed correctly. ▪ Perform *Test 7 – torch cap-sensor* on page 98.
The power LED illuminates and the torch cap LED blinks. 	▪ The consumables are stuck in an open or closed position. ▪ The nozzle and electrode are not touching when the torch trigger is pulled.	▪ The consumables are installed incorrectly, worn, or damaged. ▪ The torch plunger is stuck. ▪ The torch or torch lead has a broken wire.	▪ Verify that the consumables are installed correctly. ▪ Inspect the consumables for wear, and replace if necessary. ▪ Perform *Test 5 – torch stuck open or torch stuck closed* on page 95.

Problem	This may mean	Possible cause(s)	Possible solution(s)
The gas pressure and temperature LEDs blink when the system is powered ON (**I**). 	▪ The system was powered on while the plasma start signal was being sent.	▪ 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 turn it ON (**I**) again. ▪ Perform *Test 6 – plasma start* on page 96.
The temperature, gas pressure, and power ON LEDs blink, and the torch cap LED illuminates. 	▪ The inverter is saturated.	▪ The inverter is in an over-current condition. ▪ The torch was repeatedly fired with worn out consumables.	▪ 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.
All four LEDs blink when the system is powered ON (**I**). 	▪ A major fault has occurred in the power supply.	▪ The fan, solenoid valve, control board, or power board is 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 82.
The power-ON LED illuminates but no fault LEDs illuminate, and no gas flows when you pull the torch trigger. 	▪ The start signal is not reaching the control board.	▪ The torch or torch lead is damaged. ▪ The power board is faulty. ▪ The control board is faulty.	▪ Inspect the torch and torch lead, and replace if necessary. ▪ Verify that the control board start LED illuminates when you pull the trigger. If it does not, perform *Test 6 – plasma start* on page 96.
Gas flows when the system is powered ON (**I**).	▪ The incoming gas pressure is too high.	▪ The gas pressure from the compressor or cylinder is too high. ▪ The gas solenoid valve is faulty.	▪ Verify that the gas supply does not exceed 9.3 bar (135 psi), and reduce the pressure if necessary. ▪ Perform *Test 4 – solenoid valve* on page 94.

Problem	This may mean	Possible cause(s)	Possible solution(s)
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.	▪ The consumables, torch, or torch lead are not functioning correctly. ▪ The gas pressure is too low. ▪ The gas supply quality is poor. ▪ There is a voltage imbalance on the power board.	▪ The consumables are worn or damaged. ▪ The torch or torch lead is damaged. ▪ The gas supply line is restricted. ▪ The air filter element is dirty. ▪ The power board is faulty.	▪ Inspect the consumables, torch, and torch lead, and replace if necessary. ▪ Inspect the gas supply line for restrictions or damage. ▪ Inspect the air filter element, and replace if necessary. (See *Replacing the air filter bowl and air filter element* on page 164.) ▪ Verify that the gas supply is providing at least 4.5 bar (65 psi). ▪ Perform *Test 3 – VBUS and voltage balance* on page 91.
Arc goes out while cutting or intermittently will not fire.	▪ The work lead connection is poor.	▪ The work lead is 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.
When you pull the torch trigger, the pilot arc starts but then extinguishes before the normal 5-second timeout period.	▪ The consumables, torch, or torch lead is not functioning correctly. ▪ The gas pressure is too low. ▪ The gas supply quality is poor. ▪ There is a voltage imbalance on the power board.	▪ The consumables are worn or damaged. ▪ The torch or torch lead is damaged. ▪ The gas supply line is restricted. ▪ The air filter element is dirty. ▪ The power board is faulty.	▪ Inspect the consumables, torch, and lead, and replace if necessary. ▪ Inspect the gas supply line for restrictions or damage. ▪ Inspect the air filter element, and replace if necessary. (See *Replacing the air filter bowl and air filter element* on page 164.) ▪ Verify that the gas supply is providing at least 4.5 bar (65 psi). ▪ Perform *Test 3 – VBUS and voltage balance* on page 91.

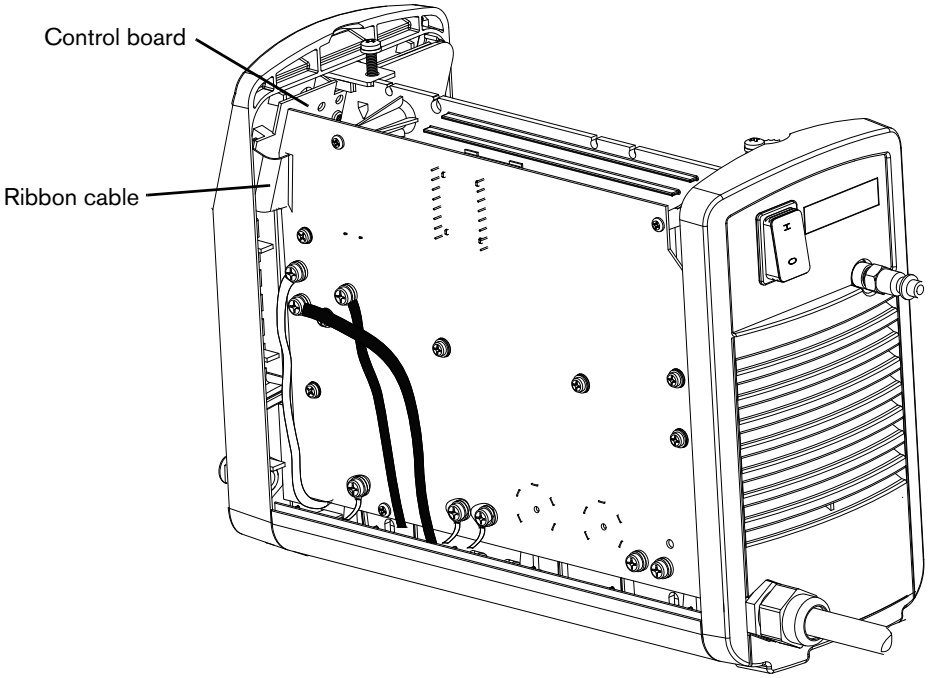
Problem	This may mean	Possible cause(s)	Possible solution(s)
The cut quality is poor, or the cut does not sever the metal.	▪ The consumables are not functioning correctly. ▪ There is a poor work lead connection. ▪ The output from the power supply is too low. ▪ The power board is producing low current. ▪ The extension cord is not delivering sufficient power to the power supply.	▪ The consumables are worn or damaged. ▪ The work lead is damaged or not properly connected to the workpiece. ▪ The amperage adjustment knob is set too low. ▪ The power board is 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. ▪ Inspect the work lead and replace if necessary. ▪ Reposition the work lead on the workpiece. ▪ Clean the workpiece surface to make a better connection with the work lead. ▪ If your input circuit allows, turn the amperage adjustment knob to a higher setting. ▪ 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 33.
The pilot arc extinguishes when you move the plasma arc off the workpiece while still pulling the torch trigger.	▪ The continuous pilot arc is not functioning correctly.	▪ The power board or the control board is faulty.	▪ Perform *Test 2 – power board voltage checks* on page 89 and *Test 3 – VBUS and voltage balance* on page 91.

Problem	This may mean	Possible cause(s)	Possible solution(s)
The circuit breaker trips frequently while you are cutting.	▪ The output from the power supply is too high. ▪ The wrong consumables are being used. ▪ The power supply is not receiving enough input power. ▪ The operator is stretching the arc while cutting. ▪ The extension cord is not delivering sufficient power to the power supply.	▪ The amperage adjustment knob is set too high for the input circuit. ▪ The general-purpose nozzle and shield are being used with an input circuit of 120 VAC. ▪ The input circuit is not delivering sufficient power to the power supply. ▪ The operator is 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 *Adjust the gas pressure and output current* on page 56. ▪ Use only the FineCut consumables when operating the system on a 120 VAC input circuit. See *Choose the consumables* on page 38. ▪ 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 62. ▪ 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 33. ▪ Verify nothing else is drawing power on the same circuit.

Control board LEDs

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

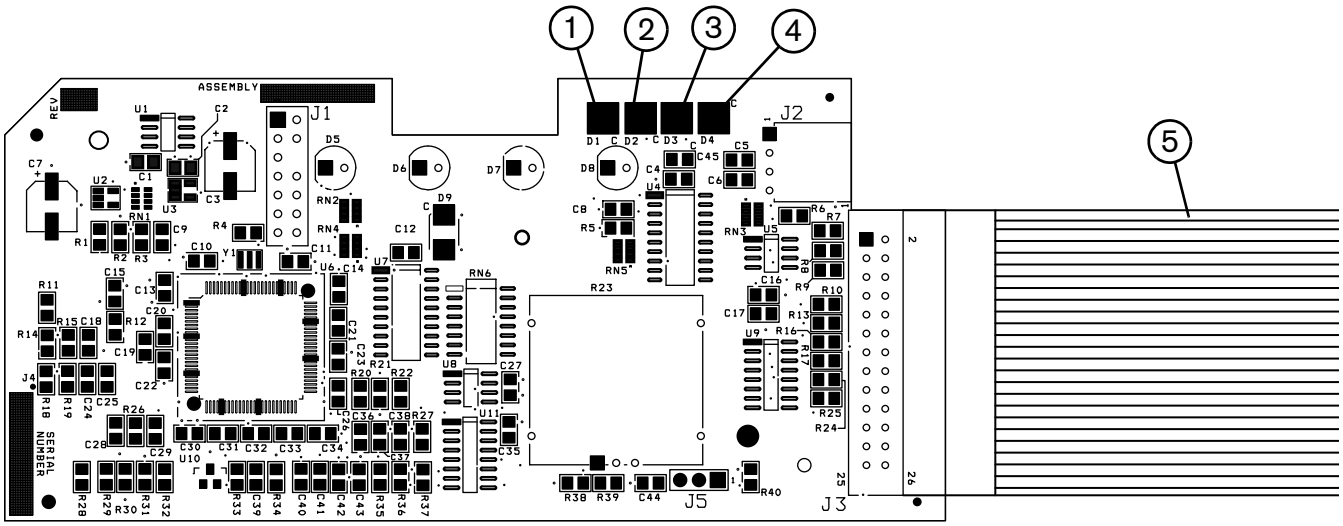
Figure 10



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 83.
- **Error** – This LED illuminates when the gas pressure, 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 11



1 Reset/watchdog
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 Error and Reset 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 the following table 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 89.)

- 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. (See *Replacing the control board* on page 123.) Otherwise, replace the power board. (See *Remove the power board* on page 125.)

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* on page 84 for detailed test procedures.

Number of blinks	Problem	Solution
3	Faulty power board	▪ Perform *Test 3 – VBUS and voltage balance* on page 91. If any of the values are incorrect, replace the power board. ▪ Perform *Test 2 – power board voltage checks* on page 89. 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. ▪ When performing *Test 2 – power board voltage checks* on page 89, if the values for pins *5*, 7, or *12* are correct, but any other values are incorrect, replace the power board.
4	Faulty fan or solenoid valve	▪ Perform *Test 4 – solenoid valve* on page 94 and *Test 8 – fan* on page 99. 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 or the ground screw on the heatsink (marked by the ground symbol on the power board) for any tests that require the multimeter to be attached to ground. See *Figure 12* for both grounding options.

Figure 12

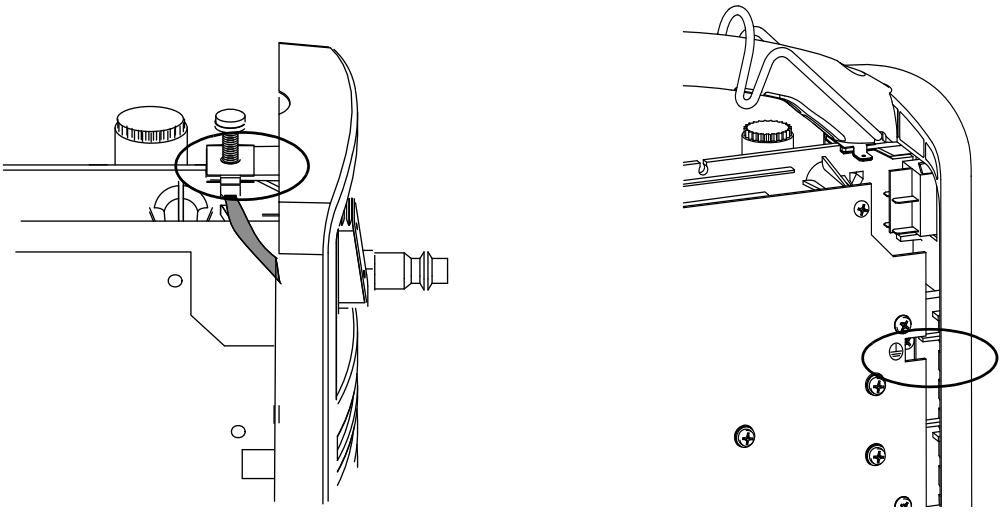
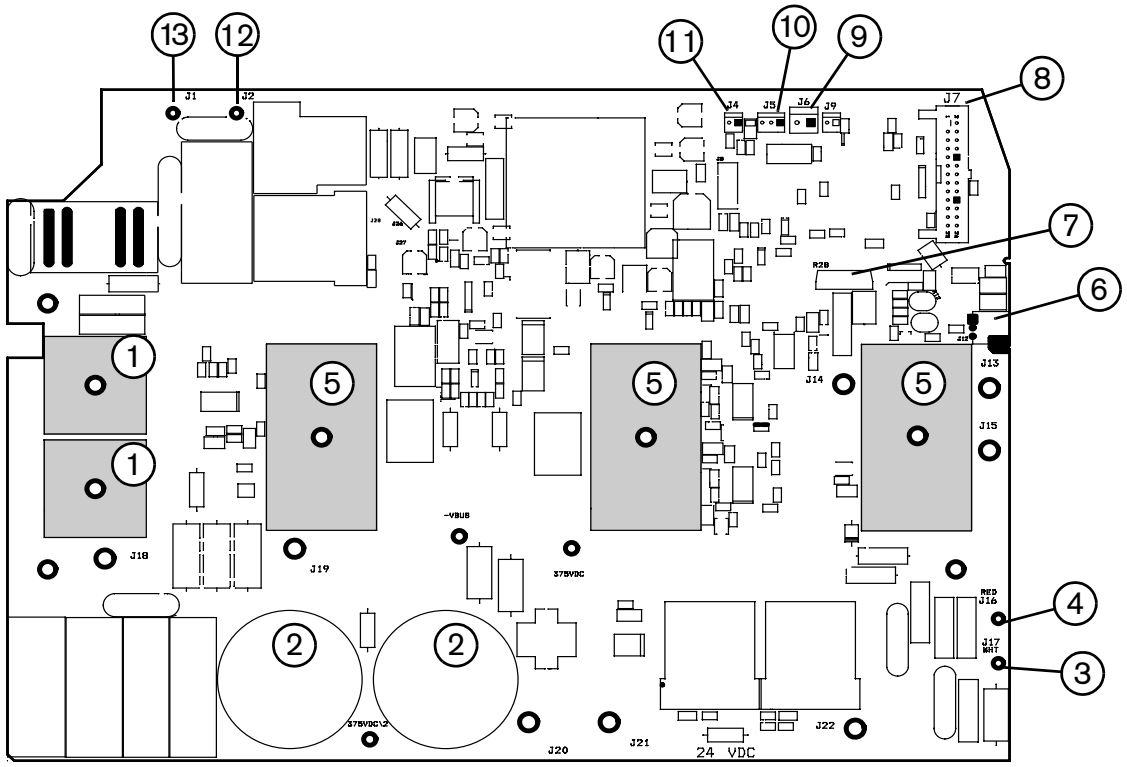


Figure 13



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)

9 J6

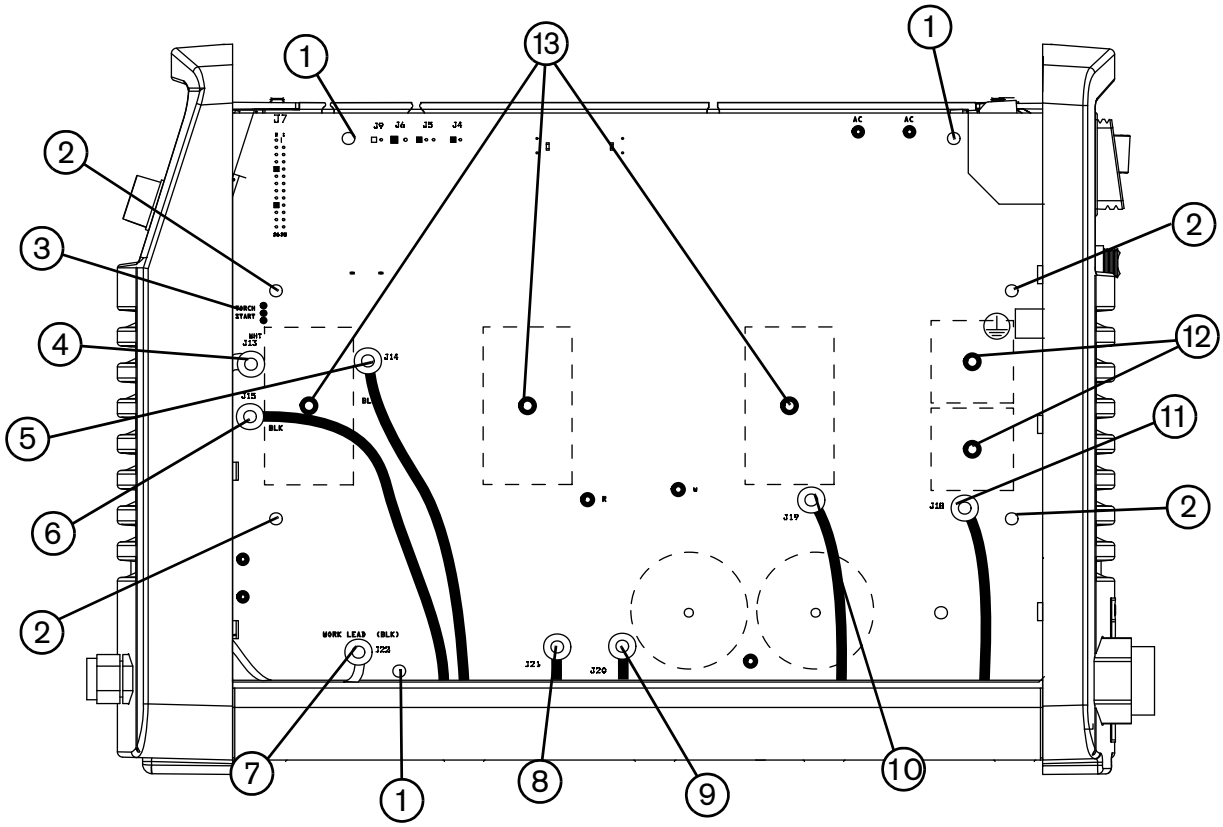
10 J5

11 J4

12 J2

13 J1

Figure 14



1 Retaining screw (3)

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)

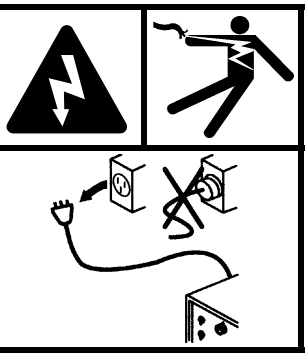
WARNING!

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.

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**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power supply handle and cover. (See *Remove the power supply cover* on page 102.)
3. Remove the component barrier. (See *Remove the component barrier* on page 104.)
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.



WARNING!

ELECTRIC SHOCK CAN KILL

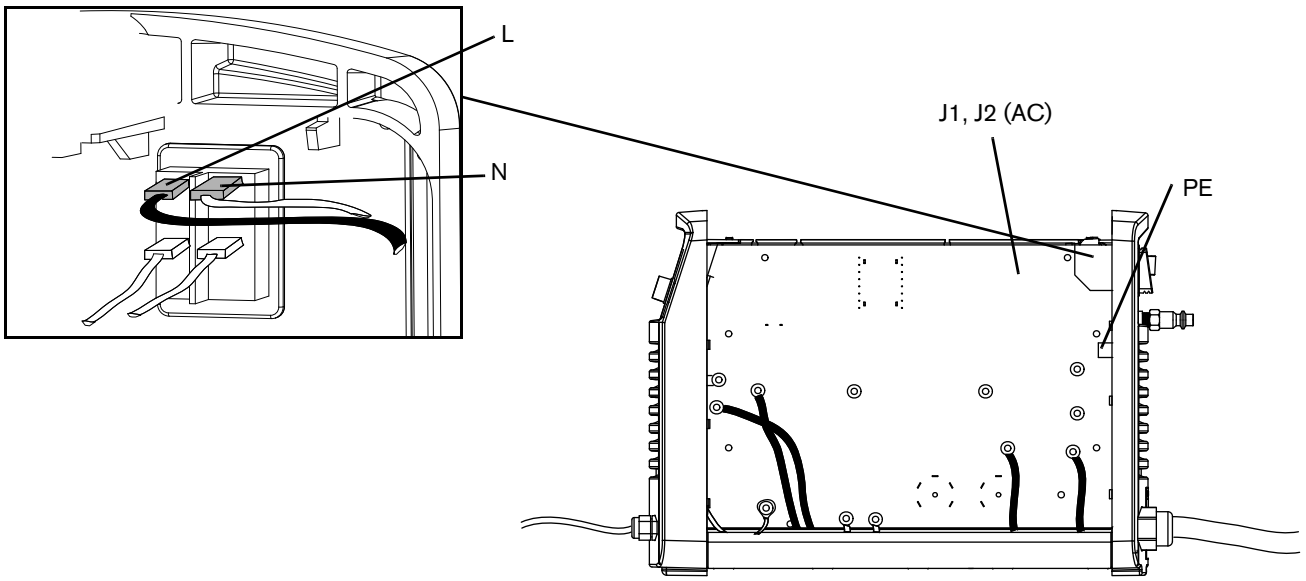
Use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the power supply that can cause serious injury or death.

See the *WARNING!* on page 71 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 15



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

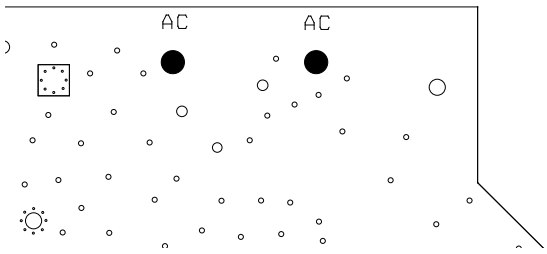
6. If the AC voltage is incorrect, verify that you have power to the unit. If you do have power, inspect the power cord for damage, and replace if necessary. (See *Remove the power cord and strain relief* on page 112.)

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.

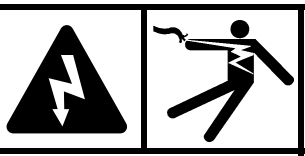
Figure 16



10. If the power-ON LED is still illuminated, perform *Test 2 – power board voltage checks* on page 89.

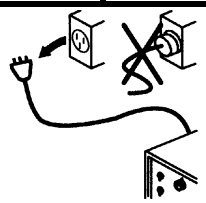
Test 2 – power board voltage checks

1. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power supply handle and cover. (See *Remove the power supply cover* on page 102.)
3. Remove the component barrier. (See *Remove the component barrier* on page 104.)



WARNING!

ELECTRIC SHOCK CAN KILL

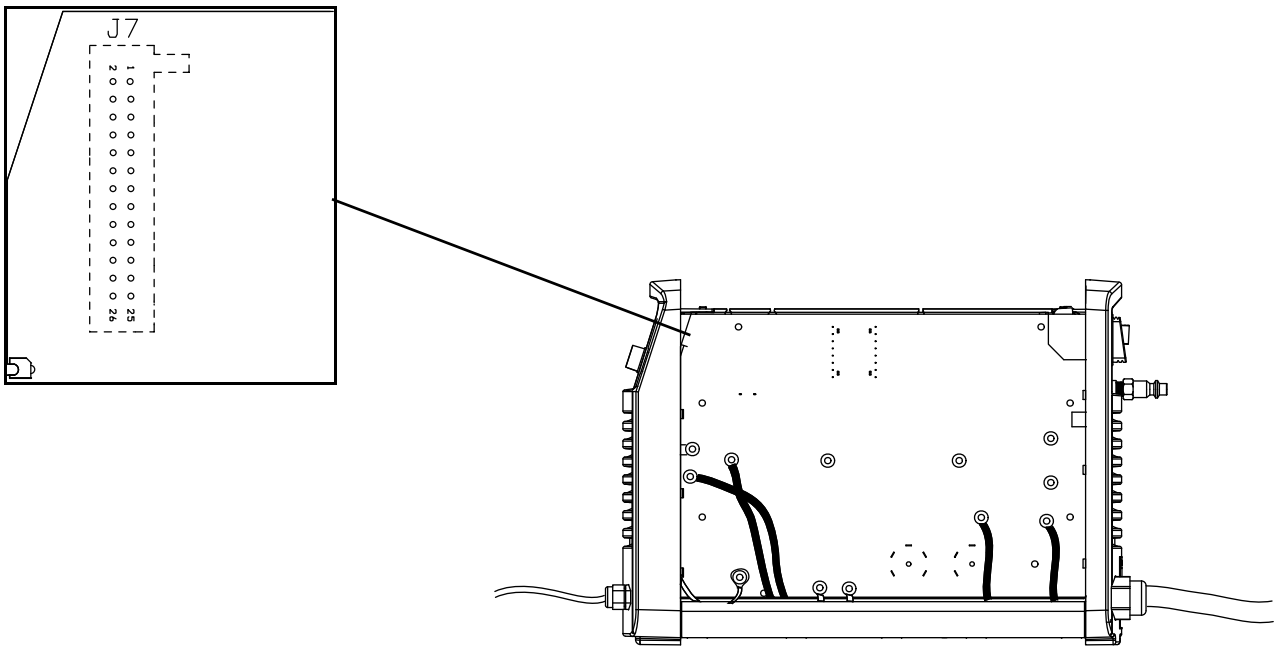


Use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the power supply that can cause serious injury or death.

See the *WARNING!* on page 71 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 the following table to verify the power board is functioning correctly.

Figure 17



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 12* on page 84. If any of the values are incorrect, replace the power board. (See *Remove the power board* on page 125.)

CAUTION!

Do not use -VBUS (test point 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 12* on page 84.)

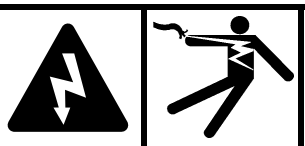
All values can be ±10%.

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
16	Start signal	3.2 VDC closed 0 VDC open

Test 3 – VBUS and voltage balance

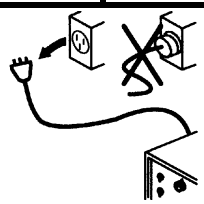
Test the power board to verify that the circuits are balanced. The test points are labeled on the back of the power board, as are the voltages and positive and negative capacitor terminals. See *Figure 18* on page 93 for locations of test points.

1. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power supply handle and cover. (See *Remove the power supply cover* on page 102.)
3. Remove the component barrier. (See *Remove the component barrier* on page 104.)



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 71 before proceeding.

4. Reconnect the electrical power.

5. Use *Table 1* to identify how to attach to the test points on the power board based on the power board design in your system. The test points are labeled **R**, **W**, and **B** on all power boards.

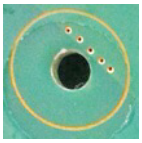
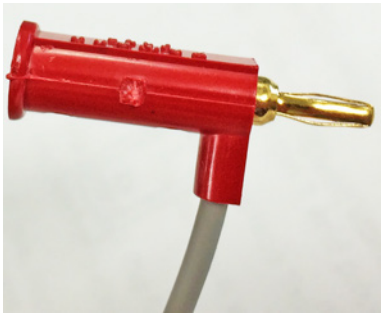
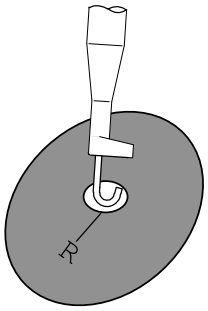
CAUTION!

Use only the test point types identified in *Table 1*. Follow the instructions in this procedure to correctly attach to the test point openings in the power board.

Do not use a multimeter with standard test leads for this test. This can cause a short-circuit between the BUS and the heatsink.

Do not use -VBUS (test point *W*) as ground. Doing so could destroy the power supply.

Table 1 – Identify test point type on power board

Current power board design (revision D and later)	**Prior power board design** (revision C and earlier)
Each test point lined with copper ring 	No metal ring around test points 
Use miniature banana plugs* (Pamona® 2945 plugs or similar) 	Use test hooks 
* If miniature banana plugs are not available, use small test clips that you can attach to the copper contacts in the test point openings on the power board.	

6. Measure the voltage from **W** to **R**. (See *Figure 18*.)

a. Position the banana plugs or test hooks at **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 89.) 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 banana plugs or 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**).

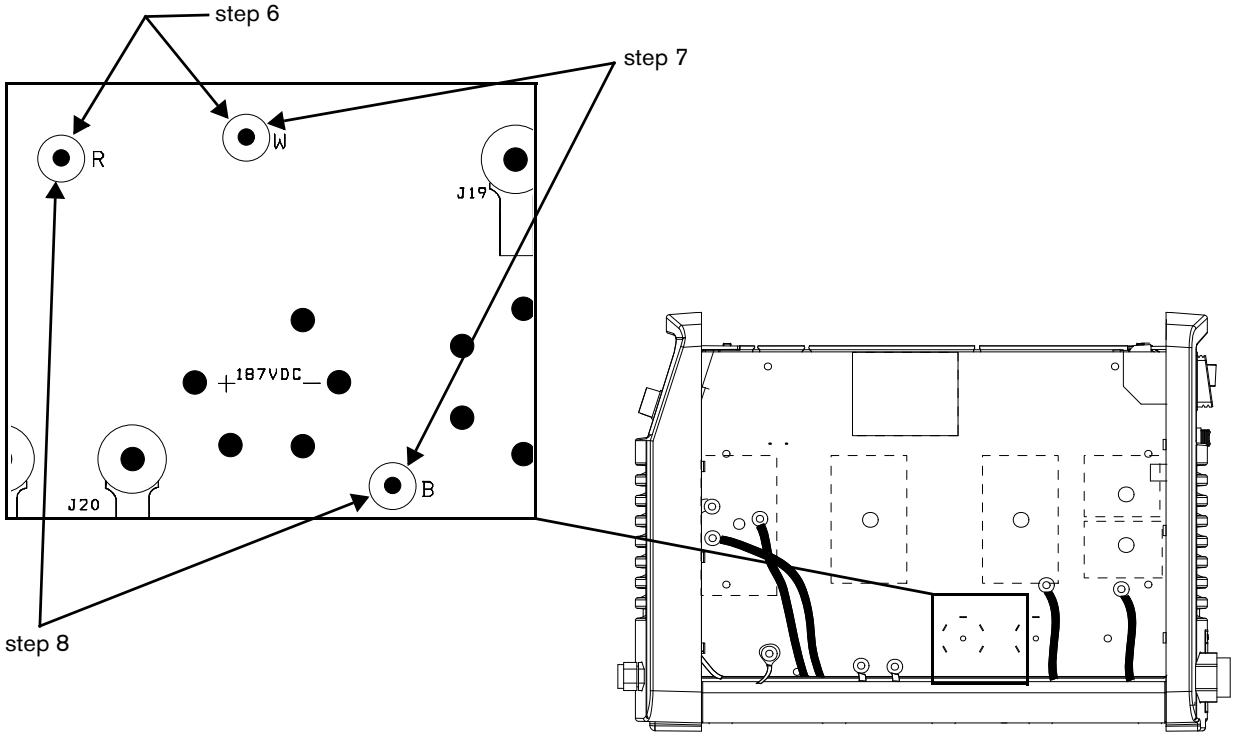
b. Move the banana plugs or test hooks to **R** and **B**.

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.

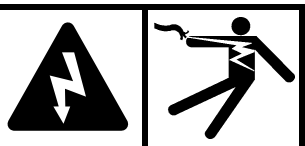
Figure 18



Test 4 – solenoid valve

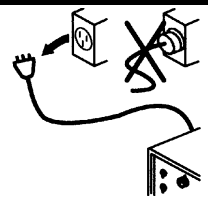
This test verifies the proper operation of the solenoid valve (V1).

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 102.)
3. Remove the component barrier. (See *Remove the component barrier* on page 104.)



WARNING!

ELECTRIC SHOCK CAN KILL

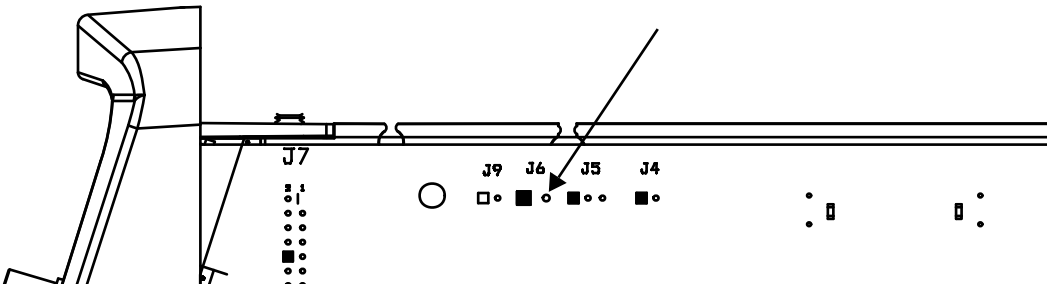


Use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the power supply that can cause serious injury or death.

See the *WARNING!* on page 71 before proceeding.

4. Reconnect the electrical power.
5. Place a jumper from pin 2 of J6 (black wire) on the power board, *Figure 13* on page 85 , to ground. See *Figure 12* on page 84 for grounding options.

Figure 19



6. Turn the power ON (**I**). The valve should click.
7. Remove the valve's connector from J6 on the power board.
8. Measure the voltage between pin 1 of J6 (red wire) and ground.
9. If you do not hear the valve click and the voltage check reads 24 VDC, replace the solenoid valve. (See *Replacing the solenoid valve* on page 146.)

Test 5 – torch stuck open or torch stuck closed

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

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

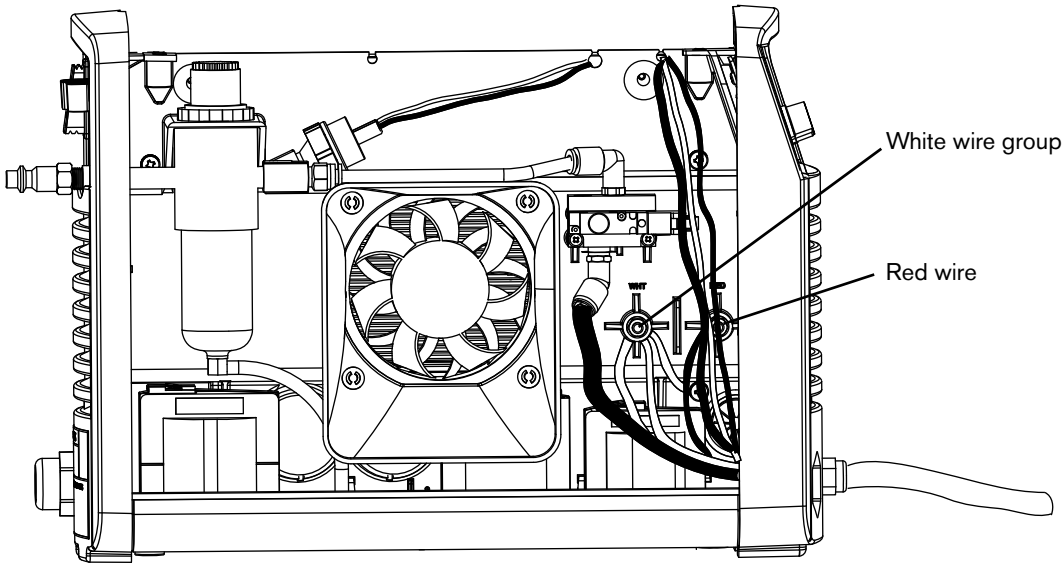
1. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power supply handle and cover. (See *Remove the power supply cover* on page 102.)
3. Remove the component barrier. (See *Remove the component barrier* on page 104.)
4. Make sure the consumables are correctly installed and are not mismatched.

CAUTION!

To avoid causing a short or damage to the multimeter, do not fire the torch with the multimeter connected to the power board.

5. Measure the resistance from the torch lead’s white wire group and red wire. The resistance should read very low, a closed circuit.

Figure 20



6. Turn ON (**I**) the power and measure the resistance between the same points. The resistance should read very low, a closed circuit.
   - If the resistance reads as closed, this indicates the nozzle and electrode are in contact and the wires in the torch are working properly.

- If the resistance reads as open, the nozzle and electrode are not in contact, or one of the wires in the lead is broken.

7.

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

- If yes, replace the torch lead. See *Replacing the torch lead* on page 198.
- If no, replace the torch body. See *Replacing the torch body* on page 194.

9.

10. Because “torch stuck open” and “torch stuck closed” failures can be intermittent, repeat the test several times.

Test 6 – plasma start

Verify that 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.

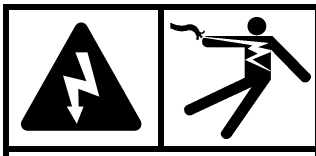
2. Remove the power supply handle and cover. (See *Remove the power supply cover* on page 102.)

3. Remove the component barrier. (See *Remove the component barrier* on page 104.)



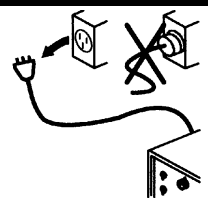
CAUTION!

While testing, avoid any contact with the tip of the torch.



WARNING!

ELECTRIC SHOCK CAN KILL



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See the *WARNING!* on page 71 before proceeding.

4. Connect the electrical power and turn the power ON (**I**).

5. Look at the Start LED on the control board (see *Control board LEDs* on page 82 for the location of the Start LED) and pull the torch trigger. It should illuminate whenever the trigger is pulled.

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

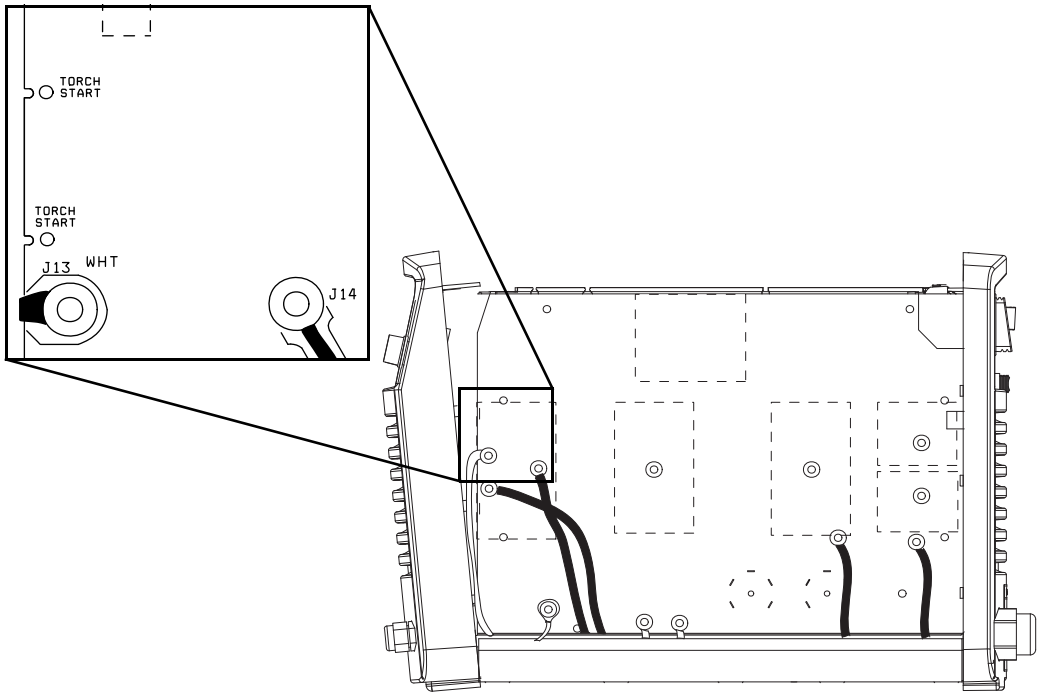
7. Check the resistance at the 2 torch-start test points on the power board.

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.

8. If this test fails, check the torch start-switch and the torch wires.

Figure 21



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

10. Measure pin 16 of J7 to ground. (See *Test 2 – power board voltage checks* on page 89.)

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.

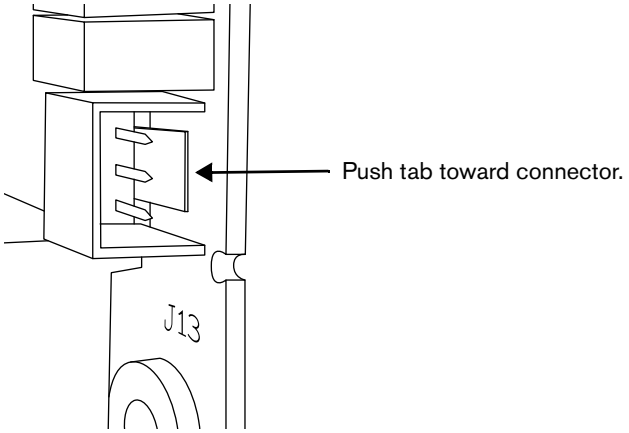
11. If the values are not correct, replace the power board. (See *Remove the power board* on page 125.)

Test 7 – torch cap-sensor

Test the cap-sensor switch and torch leads.

1. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power supply handle and cover. (See *Remove the power supply cover* on page 102.)
3. Remove the component barrier. (See *Remove the component barrier* on page 104.)
4. Detach the front panel. (See *Detach the front panel* on page 106.)
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 22

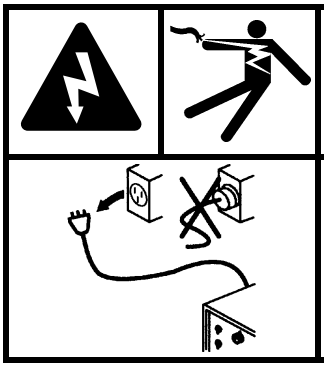


6. Measure the resistance from the orange wire to the blue wire. It should measure less than 10 Ω. If it measures high resistance, the cap-sensor switch circuit is open.
7. Make sure the torch plunger moves smoothly. If it does not, replace the torch body. (See *Replacing the torch body* on page 194.)
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 *Replacing the cap-sensor switch* on page 197 or *Replacing the torch lead* on page 198.)

Test 8 – fan

Test the fan (M1) for proper operation.

1. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power supply handle and cover. (See *Remove the power supply cover* on page 102.)
3. Remove the component barrier. (See *Remove the component barrier* on page 104.)
4. Place a jumper from ground (see *Figure 12* on page 84) to pin 3 of J5 (see *Figure 13* on page 85).



WARNING!

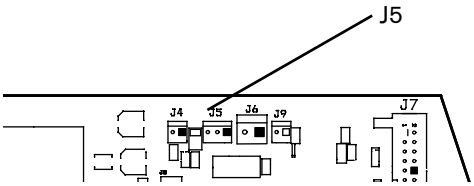
ELECTRIC SHOCK CAN KILL

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 71 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 *Replacing the fan* on page 132.)

Figure 23



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 – pressure switch

Test the pressure switch to verify that the system is receiving the proper gas pressure.

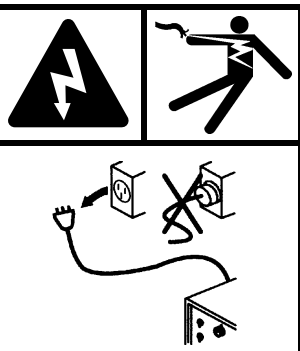
1. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power supply handle and cover. (See *Remove the power supply cover* on page 102.)
3. Remove the component barrier. (See *Remove the component barrier* on page 104.)
4. Measure the resistance between pins 1 and 2 of J4. If there is no gas pressure, it should read approximately 4.7 kΩ. If the gas pressure is within system tolerances as outlined in the *Hypertherm system ratings (30 A)* on page 19, the circuit should read as closed.
5. Replace the pressure switch, if necessary. (See *Replacing the pressure switch* on page 155.)



The minimum acceptable gas pressure varies by torch lead length.

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.

Disconnect the power and gas supply

1. Set the plasma power supply switch to OFF (**O**).
2. Disconnect the power cord from the power source.
3. Disconnect the gas supply hose from the plasma power supply.

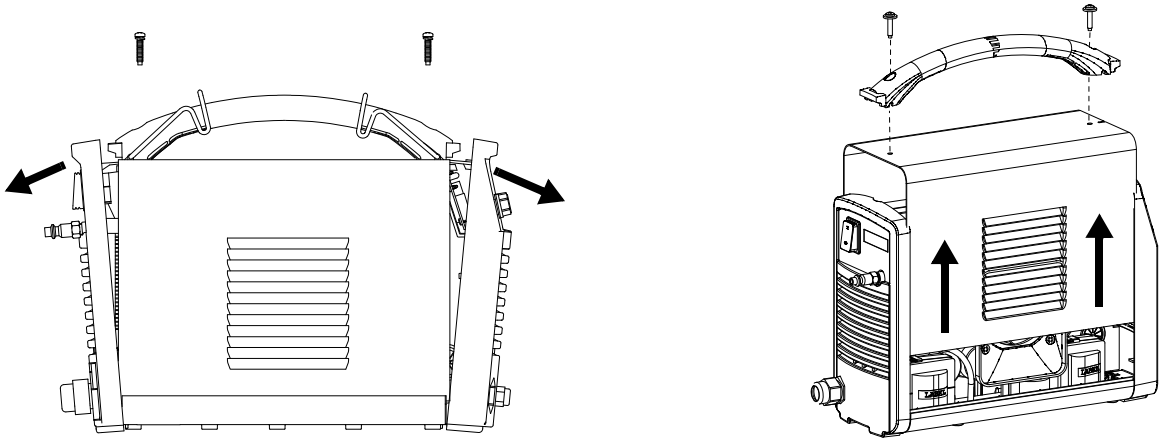
Replacing the power supply cover

Kit number	Description
428221	*Kit: Powermax30 XP Power supply cover with labels, CSA*
428222	*Kit: Power supply cover with labels, CSA, Built in America*
428224	*Kit: Powermax30 XP 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**), disconnect the power cord from the power source, and disconnect the gas supply.
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.

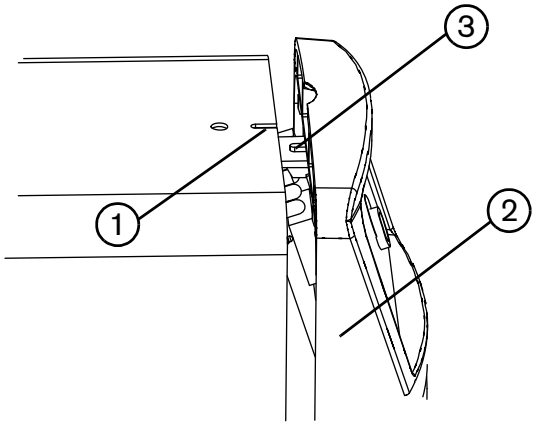
Figure 24



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 with the tab on the front panel so that the louvers in the cover are in front of the fan.

Figure 25



1 Cover slot

2 Front panel

3 Tab

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 is aligned 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.
5. Reinstall the two screws that attach the cover and handle with a torque setting of 23.0 kg-cm (20 inch-pounds).
6. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

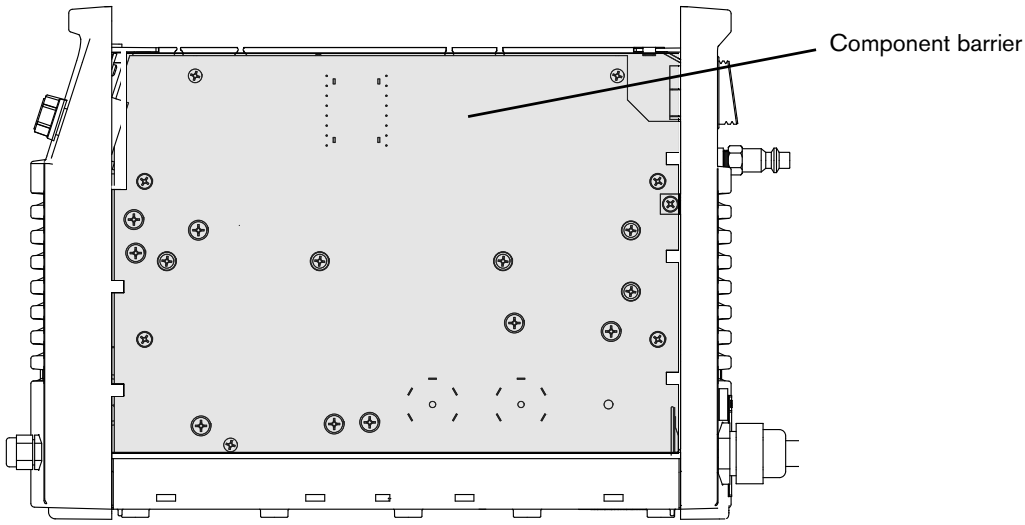
Replacing the component barrier

Kit number	Description
228104	*Kit: Component barrier*

Remove the component barrier

1. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. 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. Hold the component barrier so that the edge with the long cutout and the two notches is closest to the front panel, and the edge with the three notches is closest to the rear panel.

2. A perforated line runs across the top of the barrier, about 25 mm (1 inch) below the top edge. Fold the barrier along this perforation so that the top edge bends away from you.

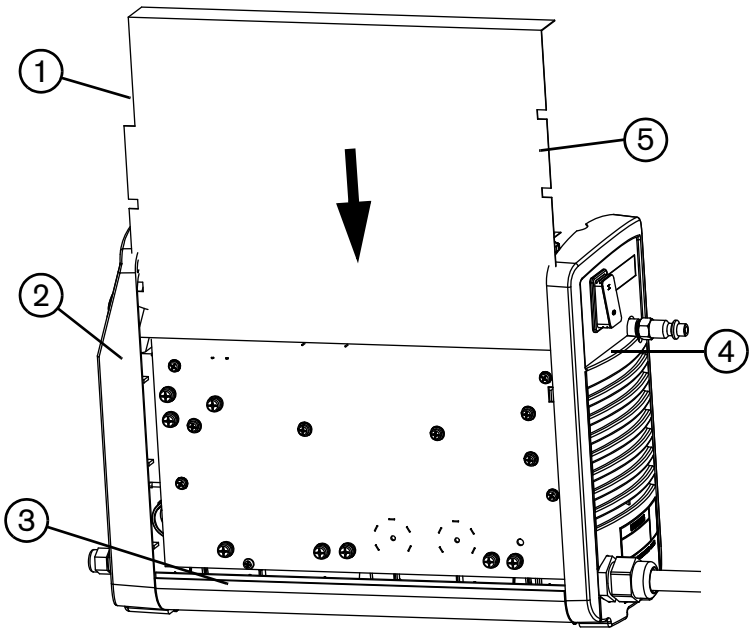
3. Position the barrier so that the folded section will cover the top of the power board. The edge with the long cutout and the two notches should align with the front panel; the edge with the three notches should align with the rear panel.

4. Put the front-panel edge of the barrier in place first, then the rear-panel edge. The notches on each side of the barrier should align with the ribs on the inside of the front and rear panels. As you slide the barrier into place, make sure the bottom edge is between the wires at the bottom of the power board and the side of the plastic base.

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

5. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Figure 27



1 Component barrier edge with long cutout and two notches

2 Front panel

3 Track

4 Rear panel

5 Component barrier edge with three notches

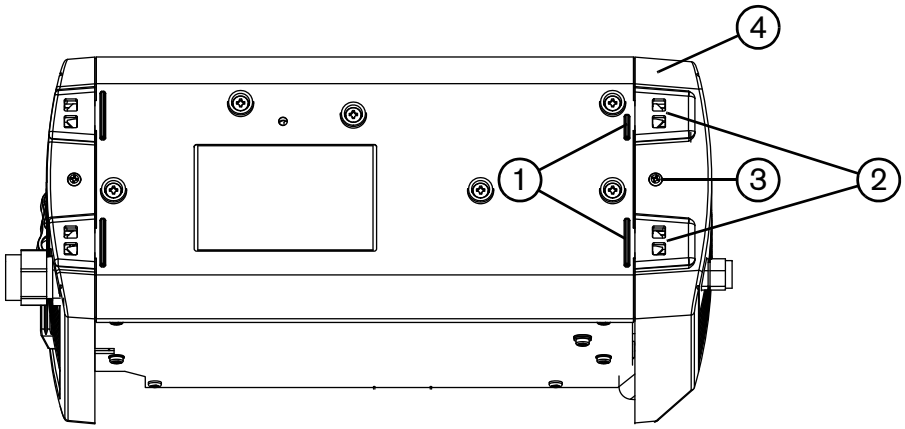
Detaching and reattaching the front panel

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 *Replacing the front panel* on page 168.

Detach the front panel

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

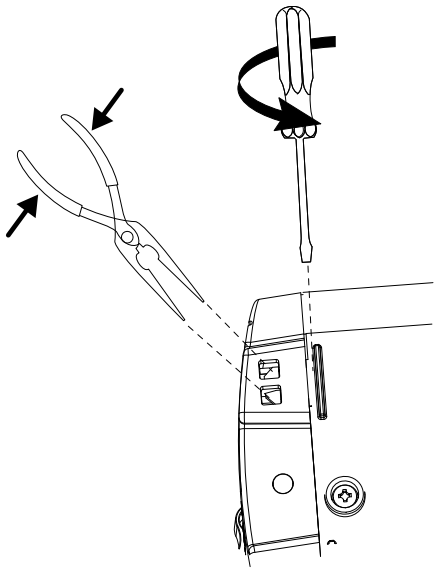
Figure 28



1 Raised rib
2 Snap
3 Retaining screw
4 Front panel

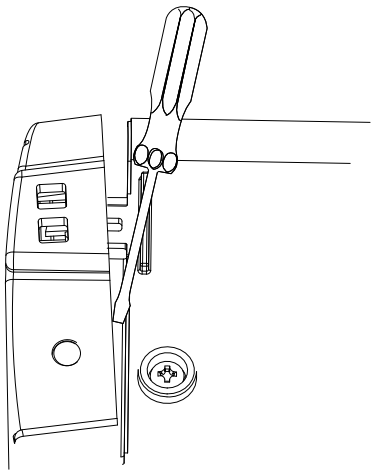
5. Insert needle nose pliers into the opening for one of the snaps, and use the pliers to squeeze it together.
6. Place a blade screwdriver against the raised rib next to the snap, and gently turn the screwdriver to push the panel away from the base.

Figure 29



7. Place another screwdriver or similar object into the opening between the panel and the base to keep the first corner of the panel from re-engaging the snaps when you release the other corner.

Figure 30



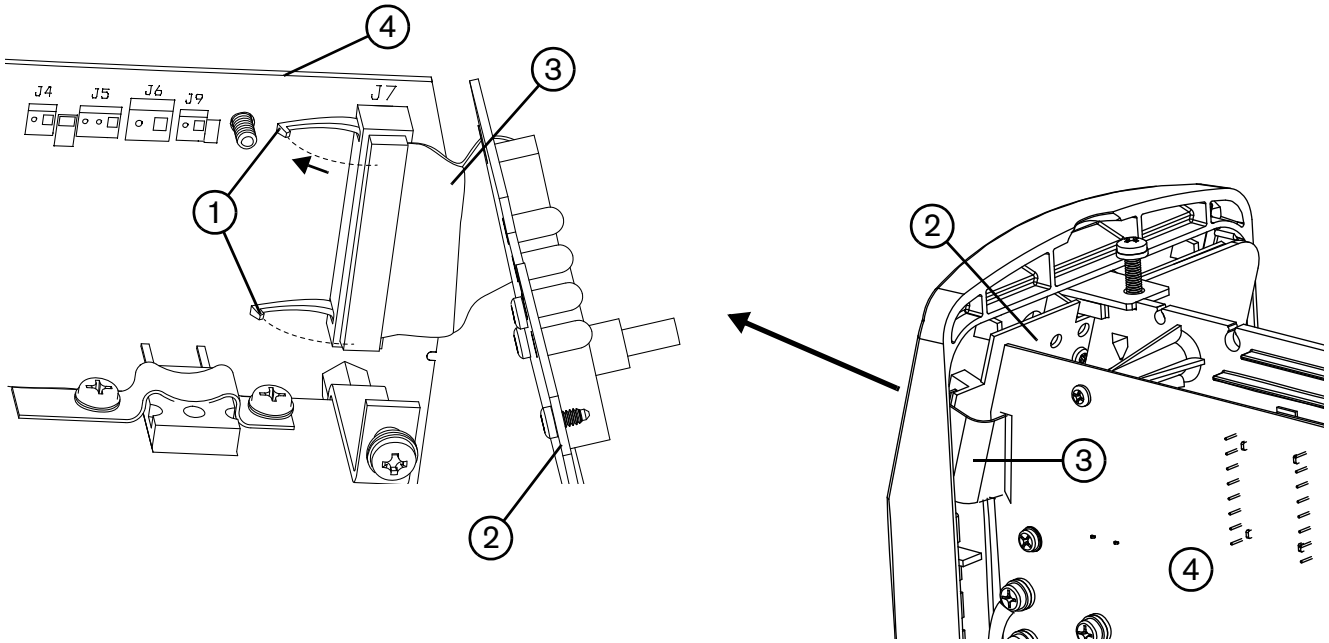
8. Repeat step 5 and step 6 on the other corner of the panel.

9. Disconnect the control panel ribbon cable from the power board by folding the latches back.

In *Figure 31*, the center panel is hidden in the image on the left.

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

Figure 31



1 Latches

2 Control board

3 Ribbon cable

4 Power board

Reattach the front panel

1. Push the front panel into the base of the power supply to re-engage the snaps.
2. Tighten the retaining screw with a torque setting of 17.3 kg-cm (15 inch-pounds). (See *Figure 28* on page 106.)
3. Reconnect the control board's ribbon cable to the power board.
4. Tighten the strain relief nut on the torch lead and work lead. Tighten the strain relief nut for the work lead to 17.3 kg·cm (15 inch·pounds).
5. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

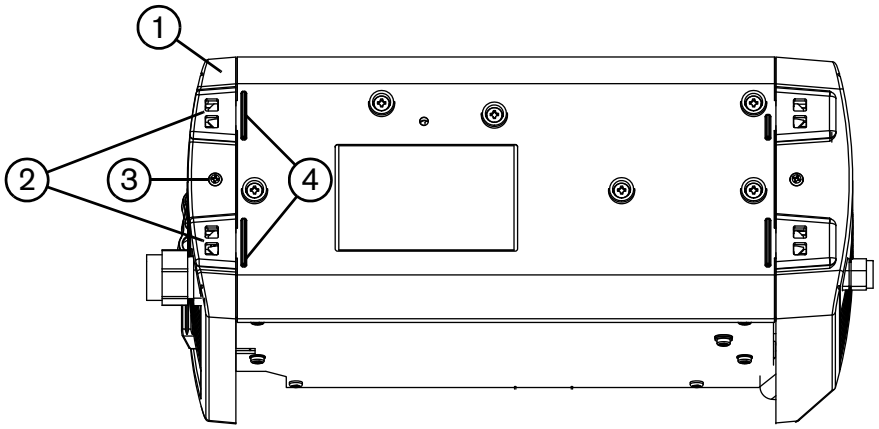
Detaching and reattaching the rear panel

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 *Replacing the rear panel* on page 172.

Detach the rear panel

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

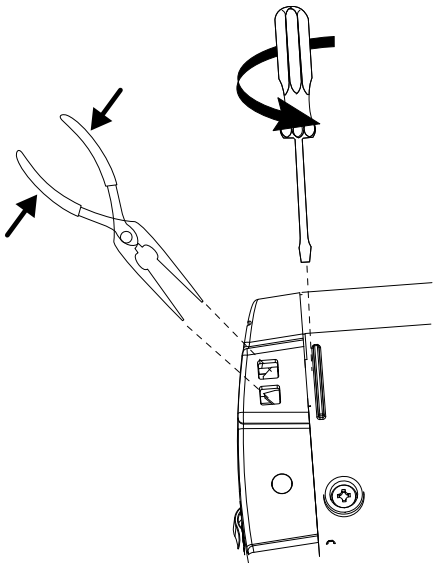
Figure 32



1	Rear panel	**3**	Retaining screw
2	Snap	**4**	Raised rib

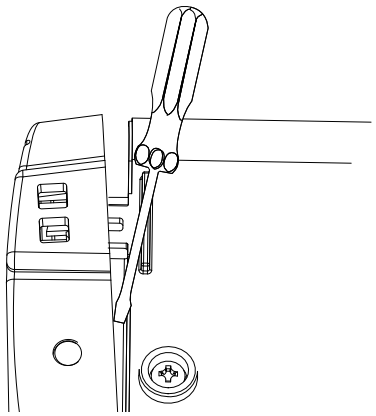
5. Insert needle nose pliers into the opening for one of the snaps and use the pliers to squeeze it together.
6. Place a blade screwdriver against the raised rib next to the snap and gently turn the screwdriver to push the panel away from the base.

Figure 33



7. Place another screwdriver or similar object into the opening between the panel and the base to keep the first corner of the panel from re-engaging the snaps when you release the other corner.

Figure 34

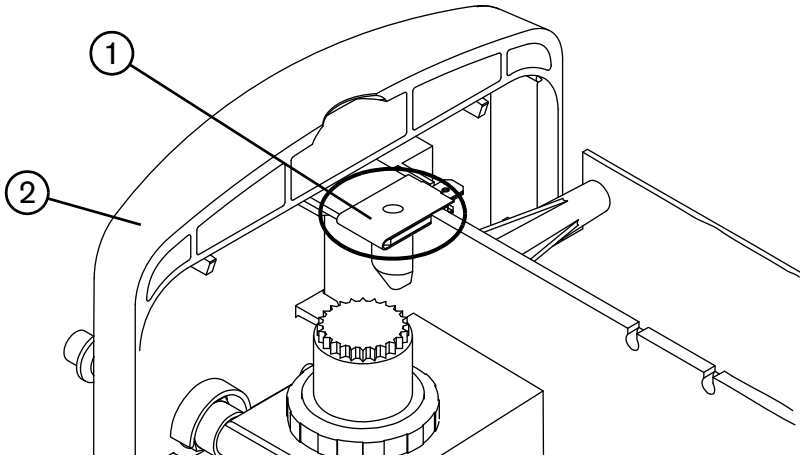


8. Repeat step 5 and step 6 on the other corner of the panel.

9. Disconnect the ground wire from the ground wire clip near the top of the rear panel. (See *Figure 35*.)

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

Figure 35



1 Ground wire clip

2 Rear panel

Reattach the rear panel

1. Push the rear panel into the base to re-engage the snaps.
2. Verify the hole in the ground wire clip is aligned with the screw holes in the rear panel and the power supply. (See *Figure 35*.)
3. Tighten the retaining screw with a torque setting of 17.3 kg-cm (15 inch-pounds). (See *Figure 32* on page 109.)
4. Reconnect the ground wire to the ground wire clip.
5. Tighten the strain relief nut on the power cord.
6. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Replacing 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)*
228140	*Kit: CE power cord, 1-phase, 3.0 m (10 feet) (plug not included)*
428231	*Kit: CCC power cord, 1-phase, 3.0 m (10 feet) (plug 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**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
   c. See *Remove the component barrier* on page 104.
   d. See *Detach the rear panel* on page 109.
2. Remove the black and white wires from the top of the power switch.

Figure 36

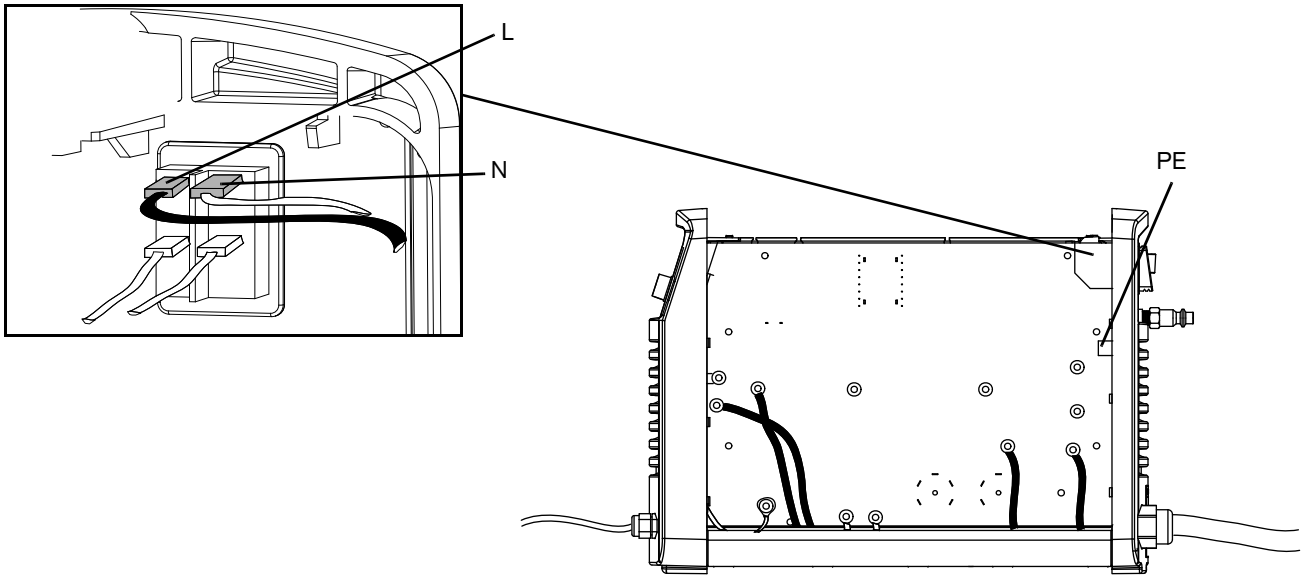


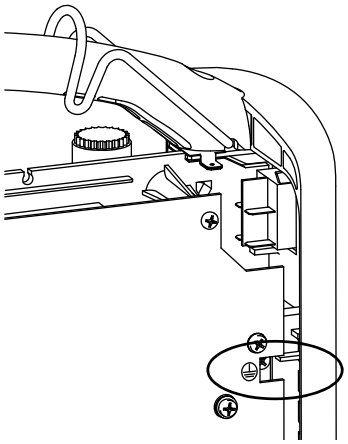
Table 2 – Single-phase CSA power cord wires

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 37*.)

Figure 37



4. On the outside of the power supply, loosen the strain relief nut so that the wires move freely. From outside of the power supply, pull the wires through the strain relief and through the hole in the rear panel to remove the power cord.

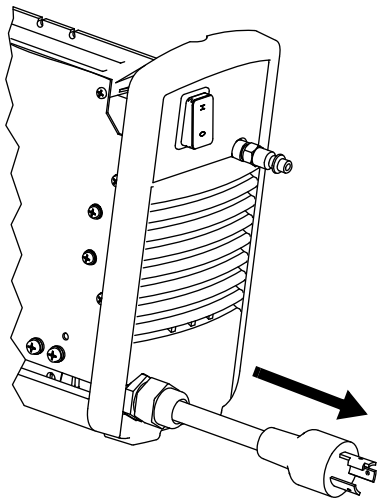
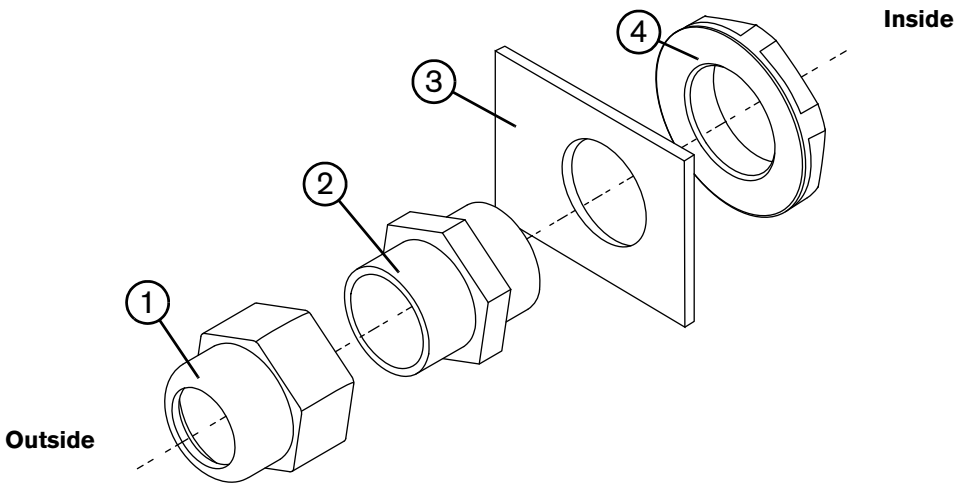


Figure 38



1 Strain relief nut (outside the power supply)

2 Strain relief

3 Rear panel

4 Retention nut (inside the power supply)

5. Are you replacing the strain relief?

- ❑ If yes, use an adjustable wrench to unscrew the retention nut on the inside of the power supply and remove the strain relief from the rear panel.
- ❑ If no, continue with *Install the power cord and strain relief* on page 118.

CE and CCC power cords

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
   c. See *Remove the component barrier* on page 104.
   d. See *Detach the rear panel* on page 109.

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.
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 39

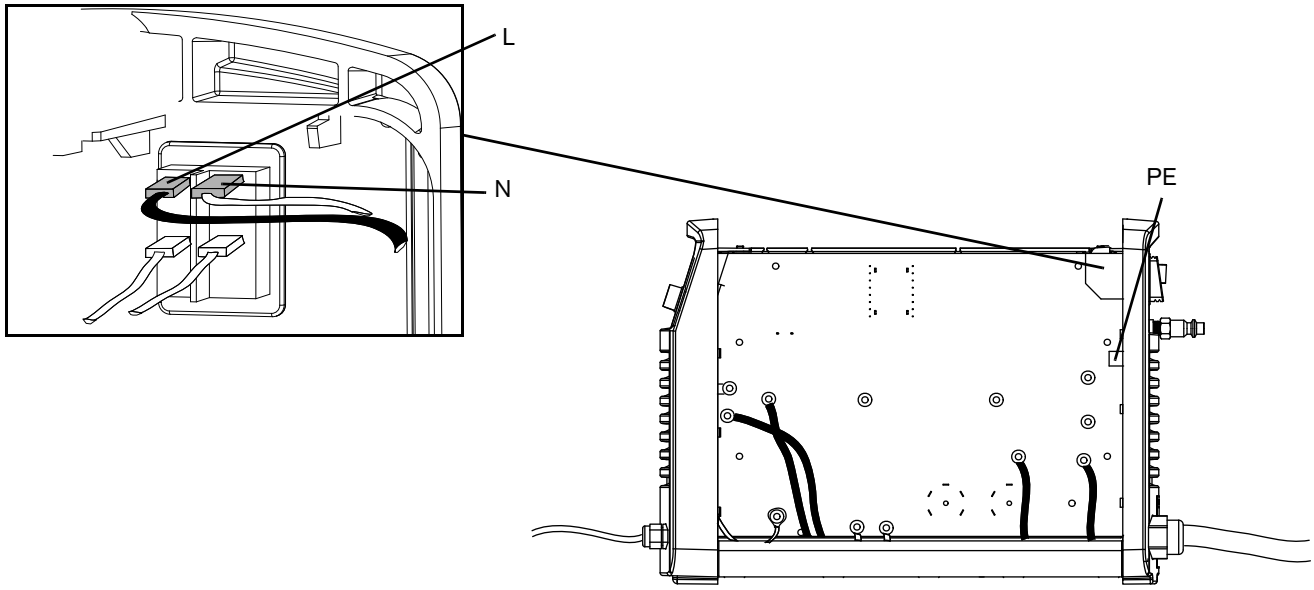


Table 3 – Single-phase CE and CCC power cord wires

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

4. On the outside of the power supply, loosen the strain relief nut 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 and the hole in the rear panel. (You cannot remove the wires from outside the power supply because of the ferrite core installed on the wires.)

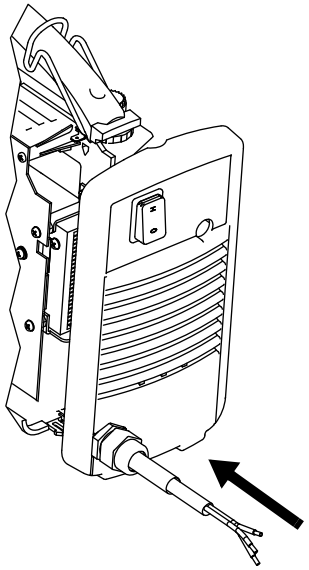
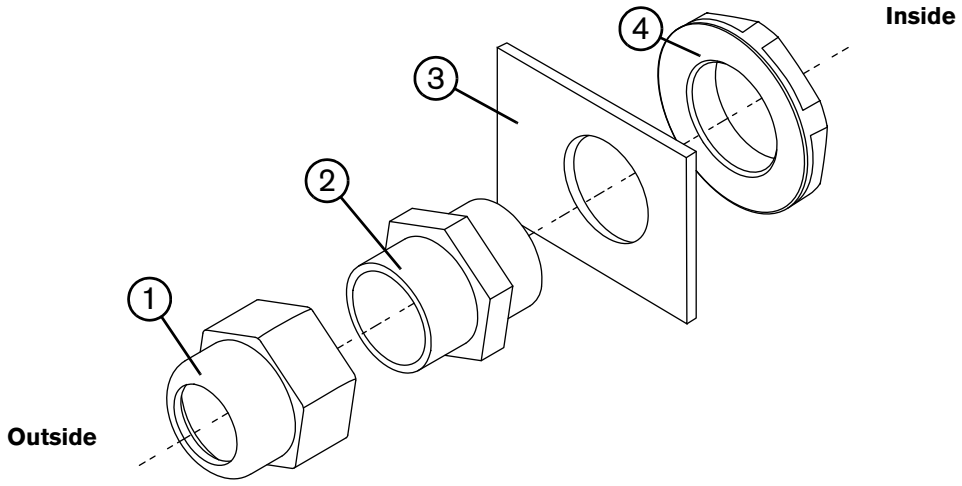


Figure 40



1 Strain relief nut (outside the power supply)

2 Strain relief

3 Rear panel

4 Retention nut (inside the power supply)

7. Are you replacing the strain relief?

- ❑ If yes, use an adjustable wrench to unscrew the retention nut on the inside of the power supply and remove the strain relief from the rear panel.
- ❑ If no, continue with *Install the power cord and strain relief* on page 118.

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 through the strain relief nut and strain relief.
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 with a torque setting of 17.3 kg-cm (15 inch-pounds).
6. Position the 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 111.
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 105.
   b. See *Install the power supply cover* on page 103.
   c. Reconnect the gas supply and 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 with a torque setting of 17.3 kg-cm (15 inch-pounds).
6. Position the wires in the wire chase up the side of the 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 111.
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 105.
   - **b.** See *Install the power supply cover* on page 103.
   - **c.** Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

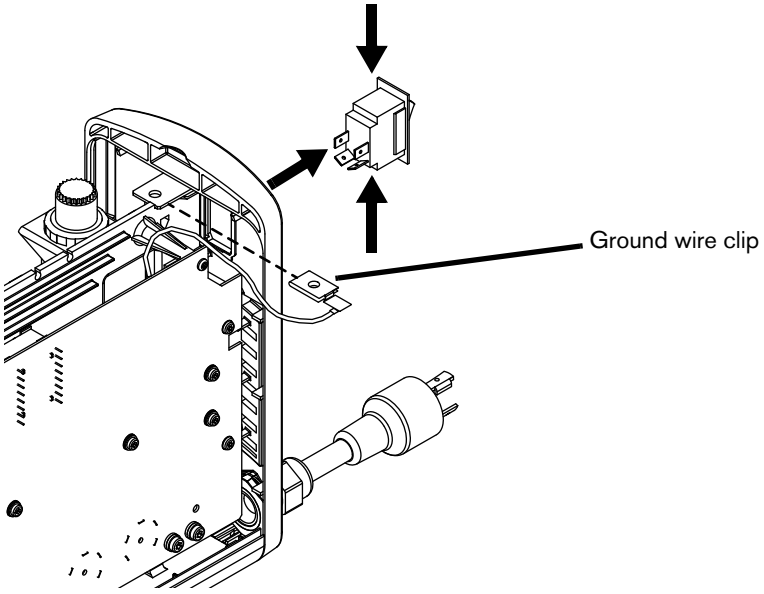
Replacing the power switch

Kit number	Description
428235	*Kit: Power switch*

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
   c. See *Remove the component barrier* on page 104.
2. Move the ground wire clip off of the tab that is near the top of the rear panel. See *Figure 41*.
3. 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.

   CE models: If necessary, remove the gas inlet adapter from the gas inlet nozzle in the rear panel. Use a 19 mm wrench.
4. Using a small blade screwdriver, press down one of the tabs on the top of the power switch, and push that corner of the switch out of the rear panel.
5. Press down the other tab on the top 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.
6. Repeat the previous two steps on the bottom of the power switch to push the bottom of the switch out of the rear panel. Remove the switch completely from the panel.

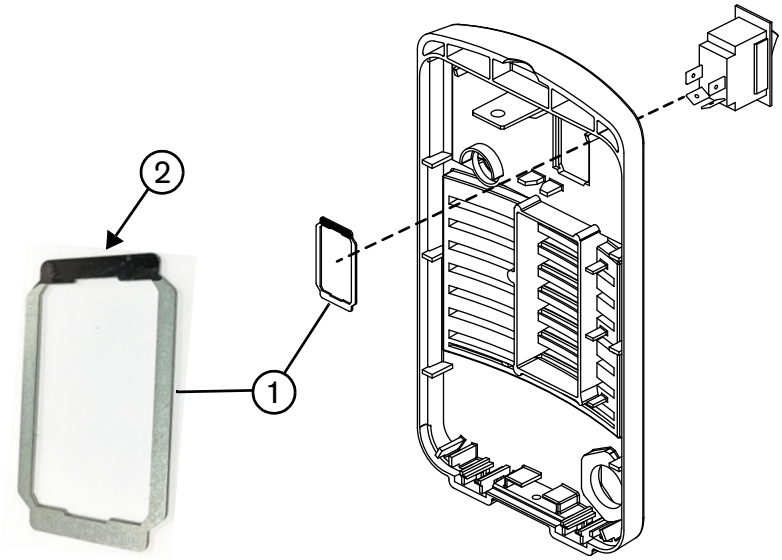
Figure 41



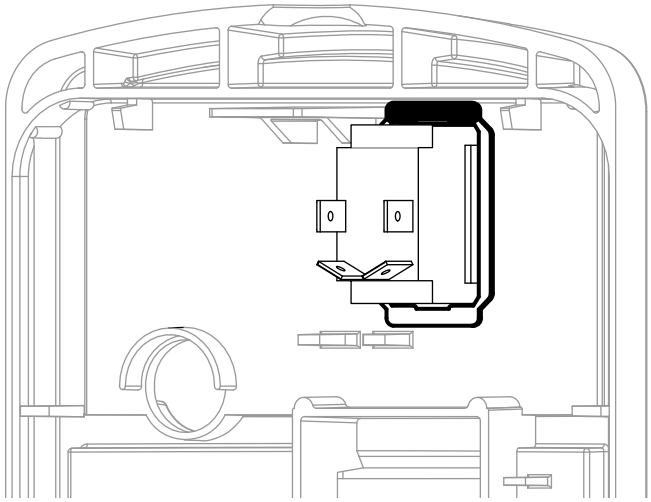
7. Press the new power switch into the rear panel with the ON (**I**) label at the top of the switch. You should hear it snap into place.

8. From the inside of the rear panel, push the retaining bracket ① over the power switch as follows:

   a. Make sure that the colored side ② of the bracket points to the inside of the plasma power supply, as shown.

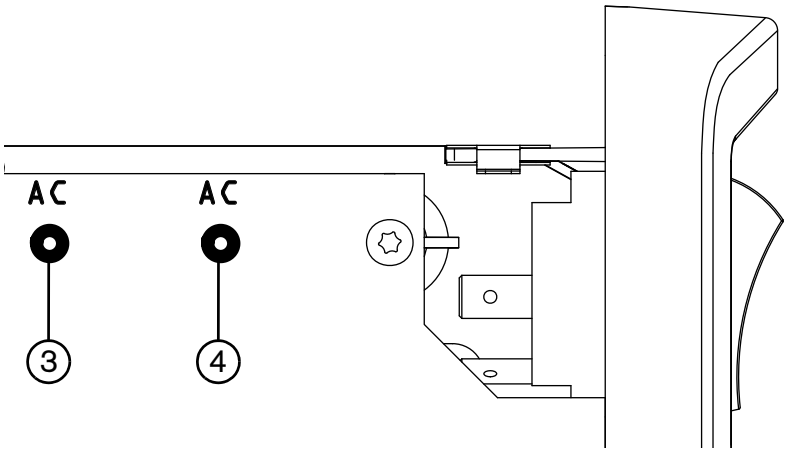


   b. Install the bracket so that it is flat against the rear panel. Use a blade screwdriver if necessary to push the bracket up to the panel.



9. Push the connectors for the two white wires that are attached to the power board at "AC" onto the bottom two pins of the power switch. The left "AC" wire ③ connects to the bottom-left pin on the power switch; the right "AC" wire ④ connects to the bottom-right pin on the power switch. See *Figure 42* and *Figure 43*.

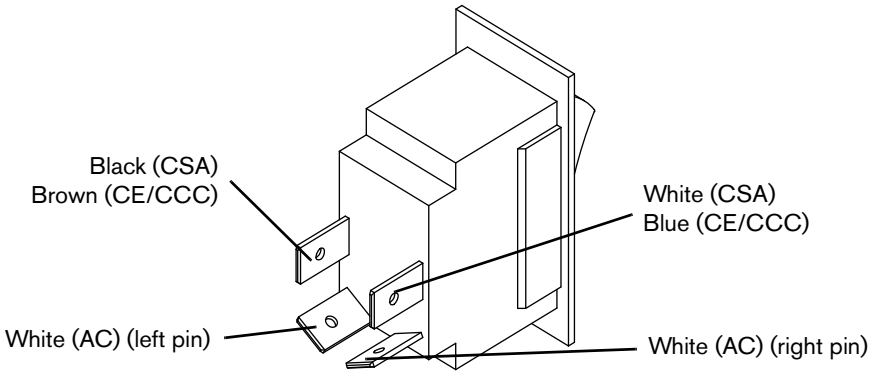
Figure 42



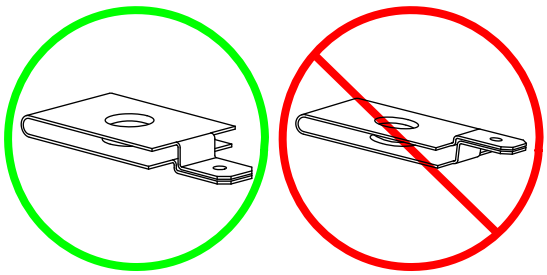
10. Press the connector for the black (CSA) or brown (CE/CCC) wire onto the pin on the upper left side of the power switch.

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

Figure 43



12. Put the ground wire clip back on the tab near the top of the rear panel. Make sure that the ground wire is at the bottom of the clip.



If the ground wire clip is turned so that the ground wire is at the top of the clip, the cover for the plasma power supply will not install correctly.

13. **CE models:** If you removed the gas inlet adapter, install it on the gas inlet nozzle. Use a 19 mm wrench to tighten.

14. Complete the following procedures:

a. See *Install the component barrier* on page 105.

b. See *Install the power supply cover* on page 103.

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

Replacing the control board

Kit number	Description
428232	*Kit: 30 XP Control board (141336)*
429298	*429298*

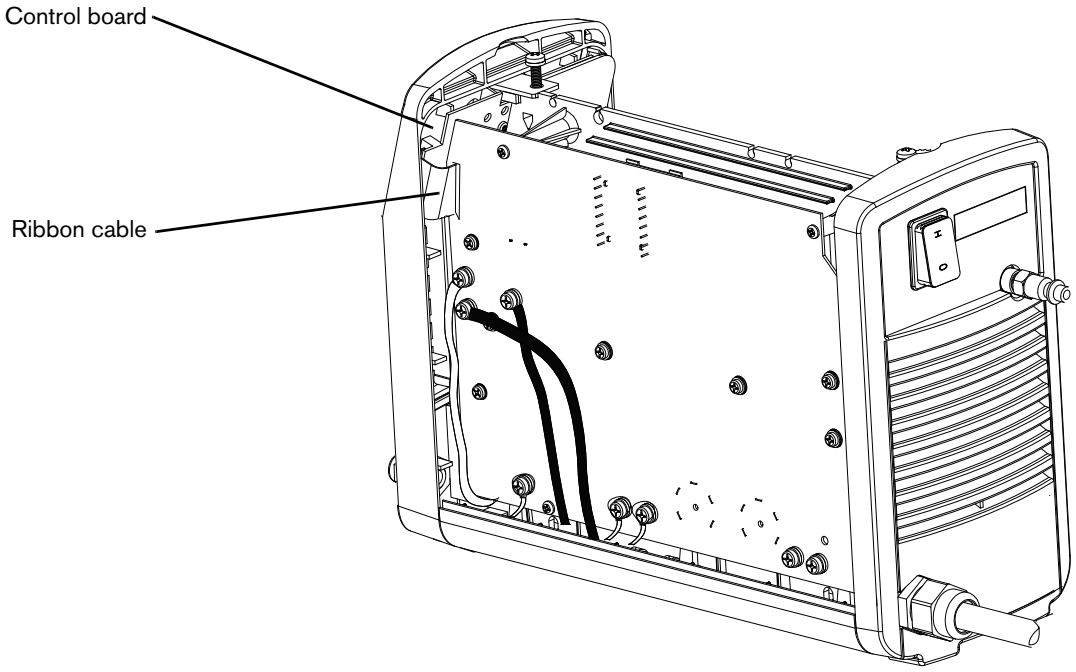
	**CAUTION!**
	**Static electricity can damage circuit boards. Use proper precautions when handling printed circuit boards.** **Store PC boards in anti-static containers.** **Wear a grounded wrist strap when handling PC boards.**

1. Complete the following procedures:
   - **a.** Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   - **b.** See *Remove the component barrier* on page 104.
   - **c.** See *Remove the power supply cover* on page 102.
   - **d.** See *Detach the front panel* on page 106.
2. Verify the control board ribbon cable is disconnected from the power board. See *Figure 44*.

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

3. Test the new control board before installing it.
   - **a.** Attach control board's ribbon cable to the power board.
   - **b.** Reconnect the power cord to the power source, and turn the system ON.
   - **c.** Verify that the Start LED on the control board is the only LED illuminated. Also, the fault LEDs on the front panel should be extinguished.

Figure 44

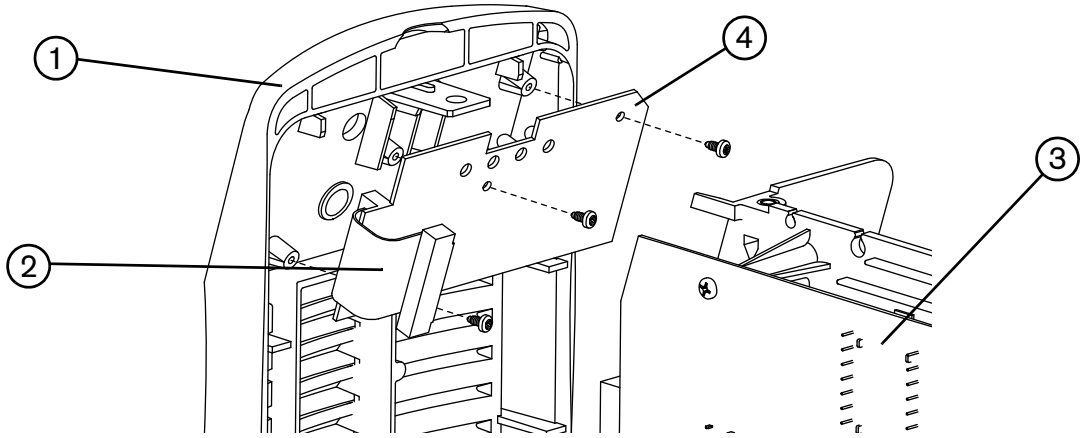


4. Disconnect the power cord from the power source, disconnect the ribbon cable, and set the new control board aside.

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

6. Remove the 3 retaining screws from the control board, and lift it out of the front panel.

Figure 45



1 Front panel

2 Ribbon cable

3 Power board

4 Control board

7. Slide the new control board into place, and attach it to the front panel with the three retaining screws.
8. Connect the ribbon cable to the power board, and fold the latches up to hold it 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 108.
    b. See *Install the component barrier* on page 105.
    c. See *Install the power supply cover* on page 103.
    d. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Replacing the power board

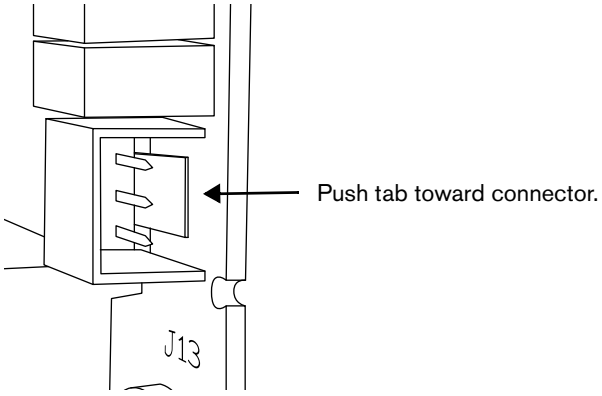
Kit number	Description
428233	*Kit: Power board, CSA (141304)*
428234	*Kit: Power board, CE and CCC (141309)*

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.

Remove the power board

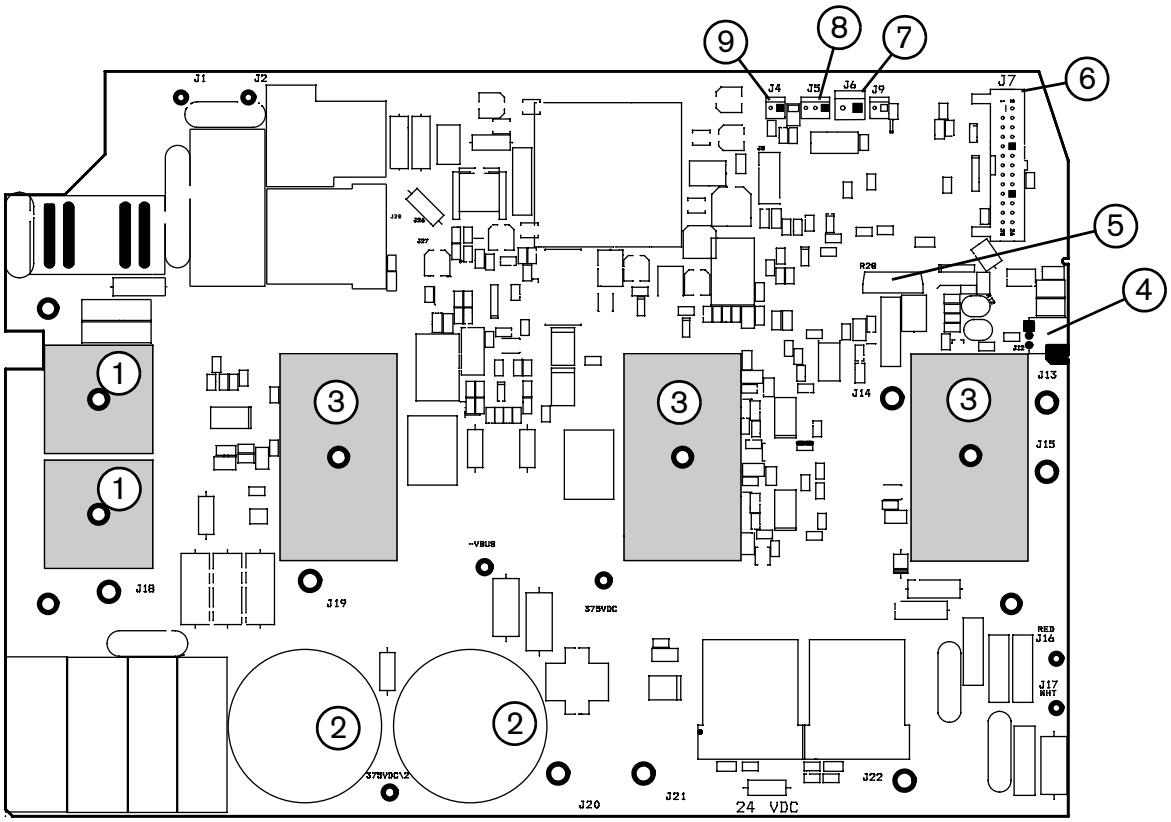
1. Complete the following procedures:
    a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
    b. See *Remove the power supply cover* on page 102.
    c. See *Remove the component barrier* on page 104.
    d. See *Detach the front panel* on page 106.
2. Remove the TORCH START connector (J12) on the component side of the power board (see *Figure 47* on page 126) by pushing the tab on the connector toward the plug and pulling the plug out.

Figure 46



3. Remove the connectors at J4, J5, and J6 on the component side of the power board. (See *Figure 47*.)

Figure 47



1 Input diode bridges

2 Capacitors

3 IGBTs

4 Connector TORCH START (J12)

5 Snubber resistor

6 Ribbon cable connector (J7)

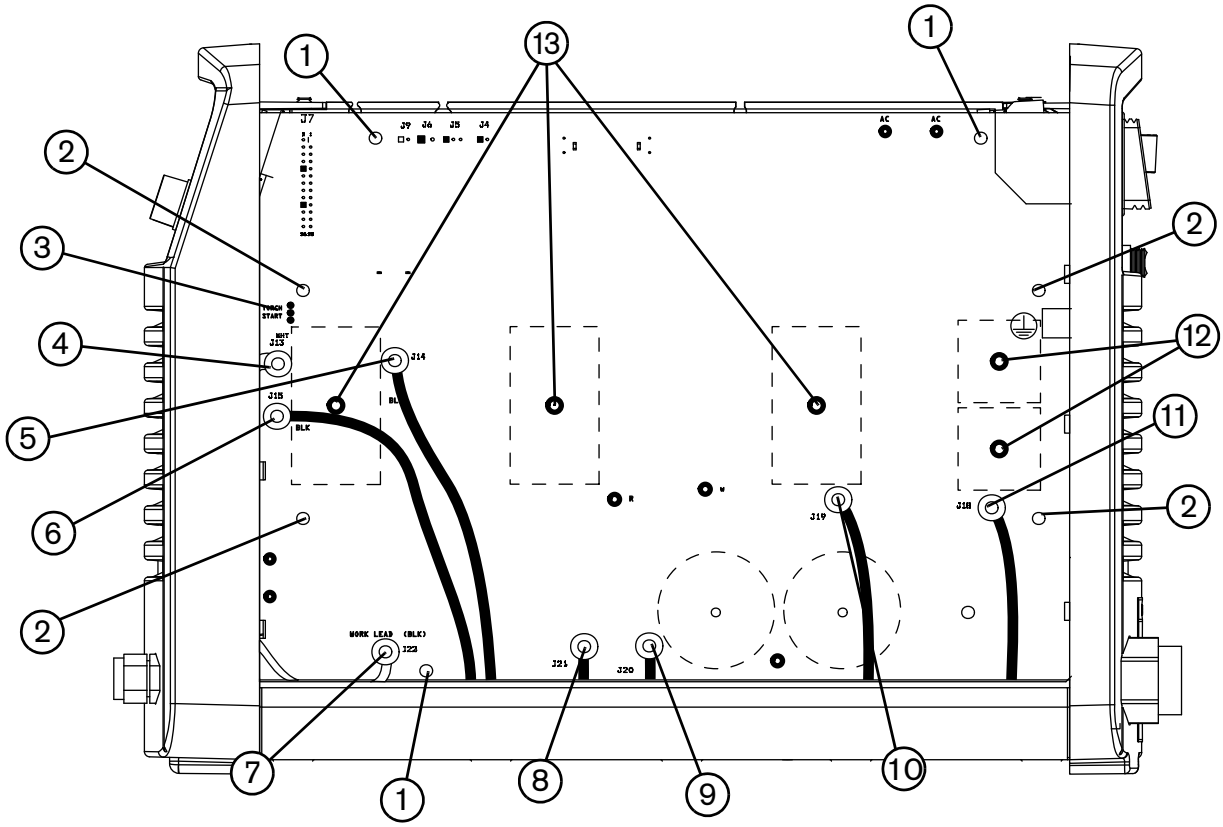
7 J6

8 J5

9 J4

4. On the back of the power board, remove the wire connectors for the transformers and inductors. (See *Figure 48*.)
   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.
5. Remove the work lead ring terminal from J22.
6. Remove the 3 retaining screws and the 4 heatsink assembly screws.
7. 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.

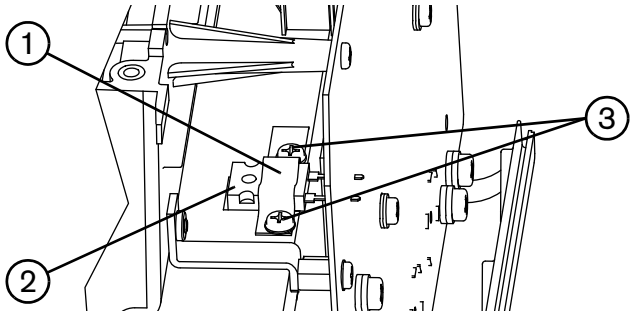
Figure 48



1 Retaining screws (3)
2 Heatsink assembly screws (4)
3 Connector TORCH START (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)

8. Remove the 2 screws from the snubber resistor spring clip on the top of the heatsink, and remove the spring clip.

Figure 49



1 Spring clip

2 Snubber resistor

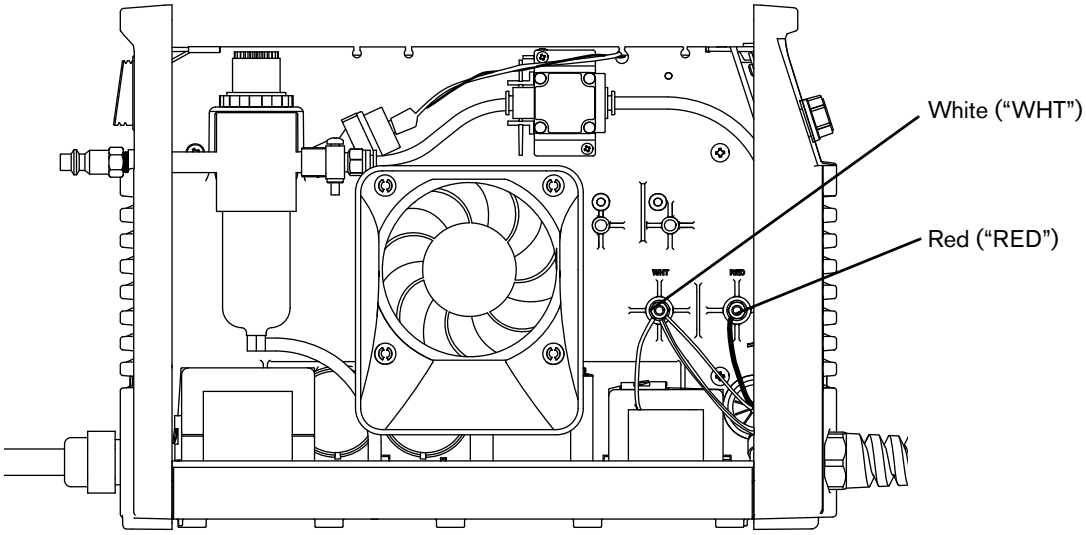
3 Snubber resistor screws

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

10. 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.”

11. Pull the red and white wires through the hole in the center panel of the power supply.

Figure 50



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

13. Pull the board straight out from the power supply and set it aside.

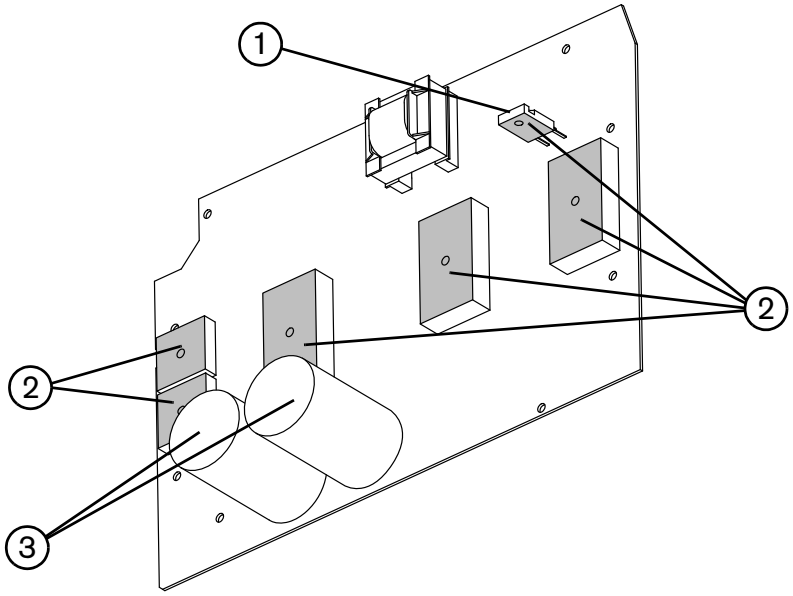
Install the power board

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

- The replacement kit number for a CSA power board is 428233.
- The replacement kit number for a CE/CCC power board is 428234.

1. Being careful not to scratch the heatsink, use a clean 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. (See *Figure 51*.)

Figure 51



1 Snubber resistor
2 Thermal grease
3 Capacitors

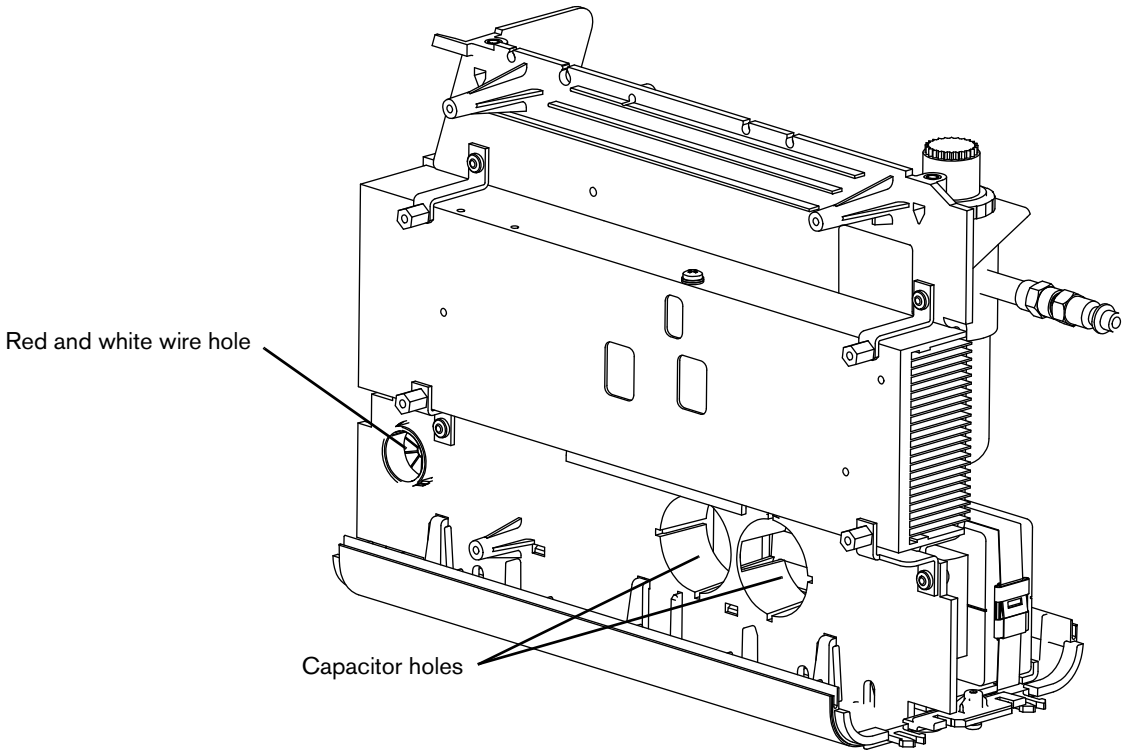
4. Push the red and white wires on the new power board through the hole in the center panel from the power board side of the power supply to the fan side of the power supply.

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 51* and *Figure 52*.)

7. Push the power board straight in.

Figure 52



8. Reconnect the 2 white wires to the power switch.

9. Replace the 4 heatsink assembly screws and the 3 retaining screws. Tighten these 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 these screws to 17.3 kg-cm (15 inch-pounds).

11. Replace the 2 screws and the spring clip that you removed from the snubber resistor. Tighten the screws to 23 kg-cm (20 inch-pounds). See *Figure 49* on page 128.

CAUTION!

A torque setting higher than 23 kg-cm (20 inch-pounds) can damage the resistor.

12. 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).

13. On the component side of the power board, reconnect the connector TORCH START (J12) and the connectors at J4, J5, and J6.

14. Reconnect the ribbon cable from the control board to the power board (J7).

15. On the fan side of the power supply, reconnect the ring connectors for the red and white wires to the studs labeled “RED” and “WHT,” and reinstall the nuts.

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

16. Complete the following procedures:

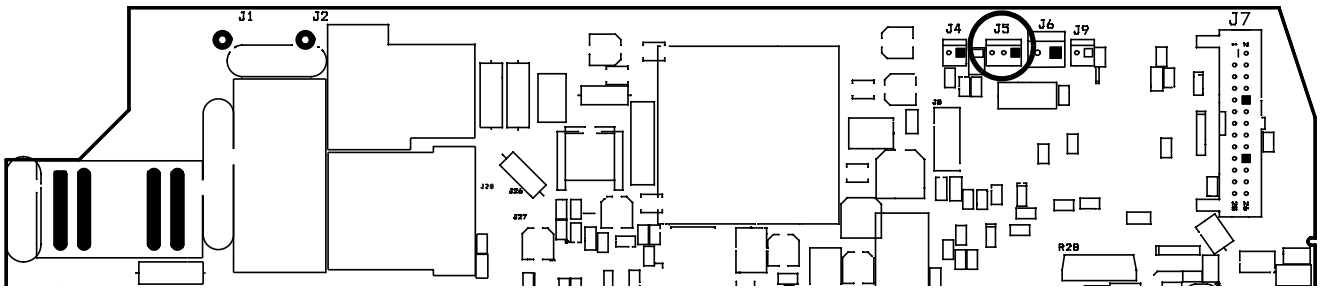
- **a.** See *Reattach the front panel* on page 108.
- **b.** See *Install the component barrier* on page 105.
- **c.** See *Install the power supply cover* on page 103.
- **d.** Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Replacing the fan

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

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
2. Detach the connector from J5 on the power board. (See *Figure 53*.) You may have to lift the top edge of the component barrier to see the connector.

Figure 53



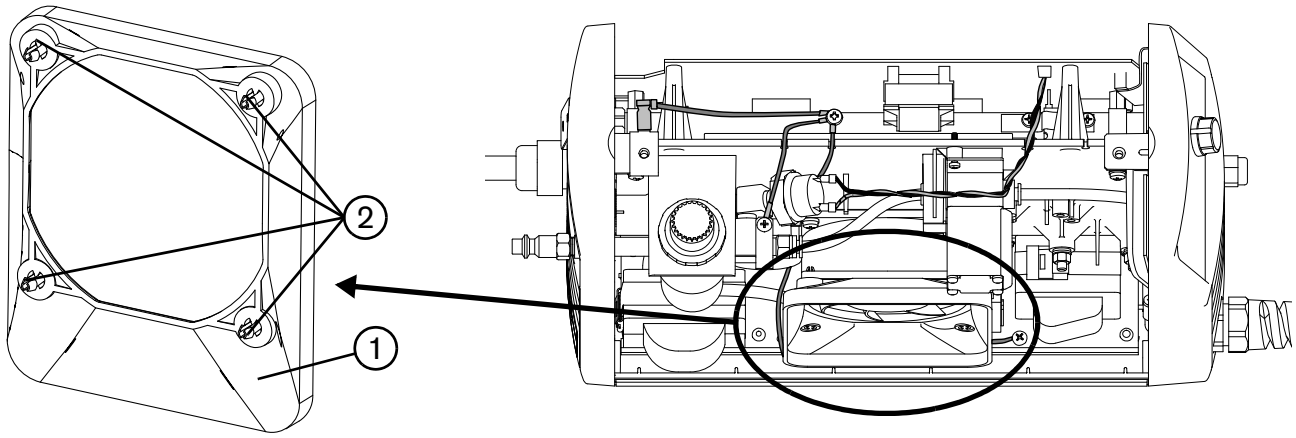
3. Carefully pull the fan plenum ① straight off the fan casing to release the 4 clips ② at each corner of the plenum. See *Figure 54*.

If necessary, use needle nose pliers to compress and release the plenum's top 2 corner clips first before working the bottom two 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.

Figure 54



4. Remove the retaining screw from each corner of the fan.

5. Slide the old fan out of the power supply and set it aside.

6. Slide the new fan into place. Orient the fan so that the red-and-black wires are at the upper left corner of the fan (the side closest to the rear panel).

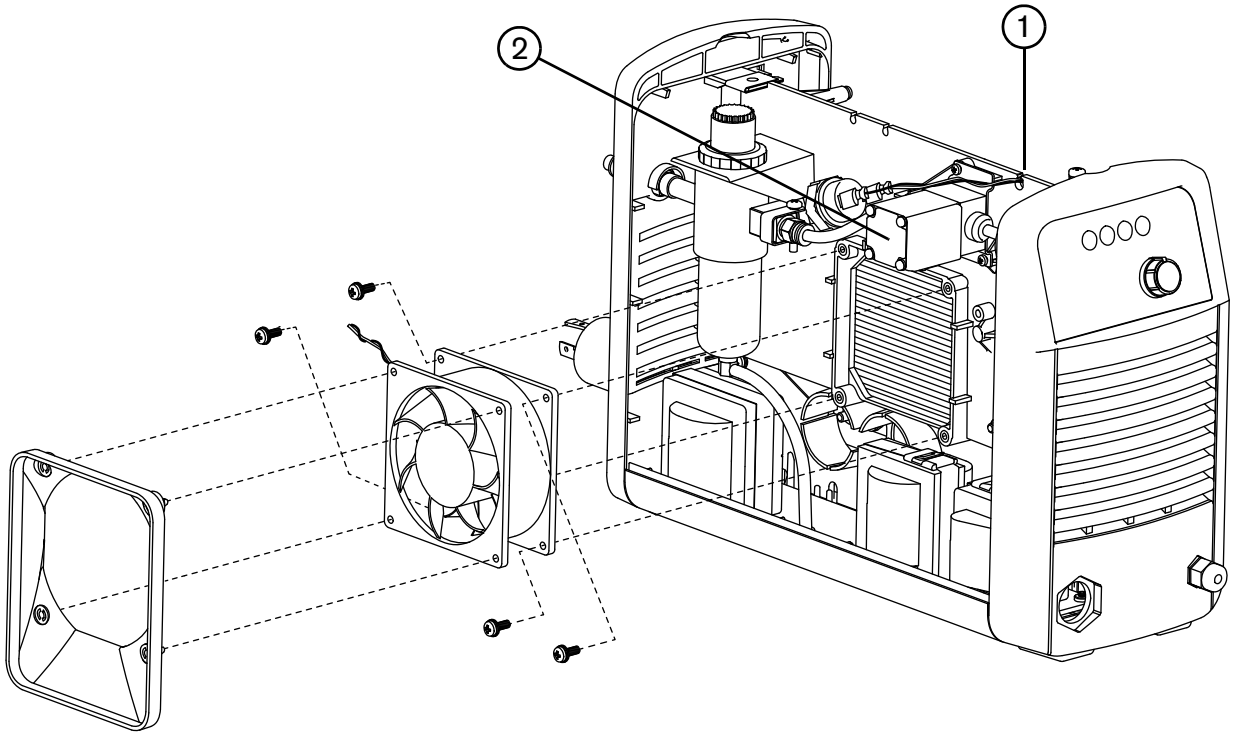
7. Reinstall the four retaining screws and tighten them to 11.5 kg-cm (10 inch-pounds). Use the new screws included in the kit if needed (075711).

8. Orient the new fan plenum so that the wider end is at the bottom, and snap it into place. (See *Figure 55*.)

9. Route the fan's red-and-black wires through the notch in the top of the center panel that is nearest the solenoid valve. (See *Figure 55*.)

10. Attach the connector for the red-and-black wires to J5 on the power board. (See *Figure 53* on page 132.)

Figure 55



1 Red-and-black wire pass-through notch in the center panel

2 Solenoid valve

11. Complete the following procedures:

a. See *Install the power supply cover* on page 103.

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

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

Kit number	Description
228095	*Kit: Hoses: drain hose, two gas supply hoses, elbow fitting*

The power supply contains a drain hose and two gas supply hoses that can be replaced. (See *Figure 57*.)

- 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/regulator 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.

Figure 56 – How to use push-to-connect fittings

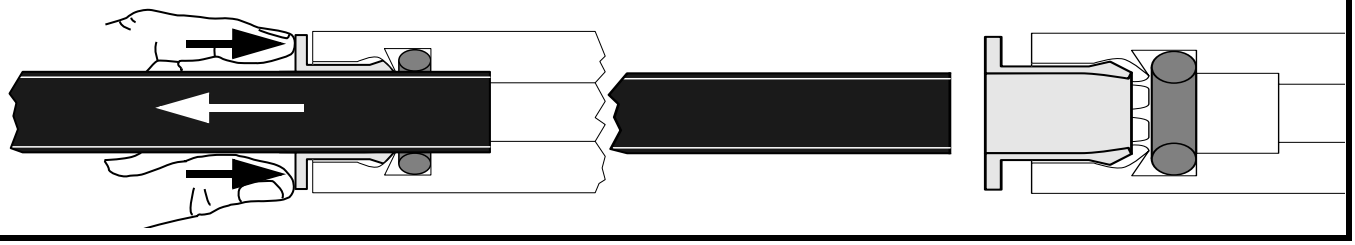
Push-to-Connect

- 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

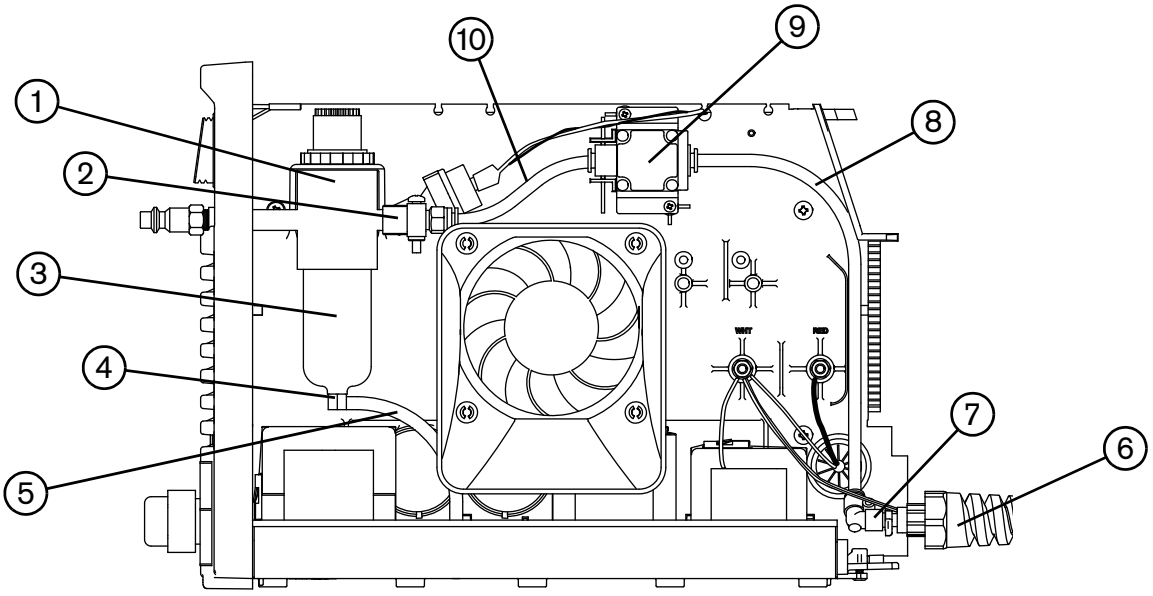
- To release, push the fitting collet toward the fitting, and pull the hose away from the fitting.



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

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
2. Remove one end of the drain hose from the hole in the base of the power supply.
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 that connects to the air filter/regulator and the solenoid valve:
   a. Push-to-disconnect the gas supply hose from the air filter/regulator's brass "T" fitting. (See *Figure 56* on page 135.)
   b. Push-to-disconnect the gas supply hose from the fitting on the rear-panel side of the solenoid valve.
5. Remove the gas supply hose and the plastic 90° fitting that connect the solenoid valve to the torch lead:
   a. Push-to-disconnect the gas supply hose from the fitting on the front-panel side of the solenoid valve.
   b. Push-to-disconnect the plastic 90° fitting from the torch lead's brass gas supply fitting inside the front panel of the power supply.
   c. Push-to-disconnect the gas supply hose from the top of the plastic 90° fitting.

Figure 57



1 Air filter/regulator

2 Brass “T” fitting

3 Air filter bowl

4 Fitting

5 Drain hose

6 Torch lead

7 Plastic 90° fitting for torch lead

8 Gas supply hose from solenoid valve to torch lead

9 Solenoid valve

10 Gas supply hose from air filter/regulator to solenoid valve

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

Be careful not to kink any of the hoses as you install them.

1. Push one end of the new drain hose onto the fitting on the bottom of the air filter bowl. See *Figure 57* on page 137.
2. Insert the other end of the drain hose into the hole in the base of the power supply.
3. Install the new gas supply hose that connects to the air filter/regulator and the solenoid valve:
   a. Push-to-connect one end of the new hose into the air filter/regulator's brass "T" fitting. (See *Figure 56* on page 135.)
   b. Push-to-connect the other end of the new hose into the fitting on the rear-panel side of the solenoid valve.

   This kit contains 1 extra gas supply hose not used in the power supply.
4. Install the new gas supply hose and the plastic 90° fitting that connect the solenoid valve to the torch lead:
   a. Push-to-connect one end of the new hose into the fitting on the front-panel side of 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. Reconnect the gas supply, and check for leaks at each fitting and hose connection point on the air filter/regulator assembly.

CAUTION!

Gas supply pressures not within the specifications in the *Specifications* section can cause poor cut quality, poor consumable life, and operational problems.

If the purity level of the gas is too low, or if there are leaks in the supply hoses or connections:

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

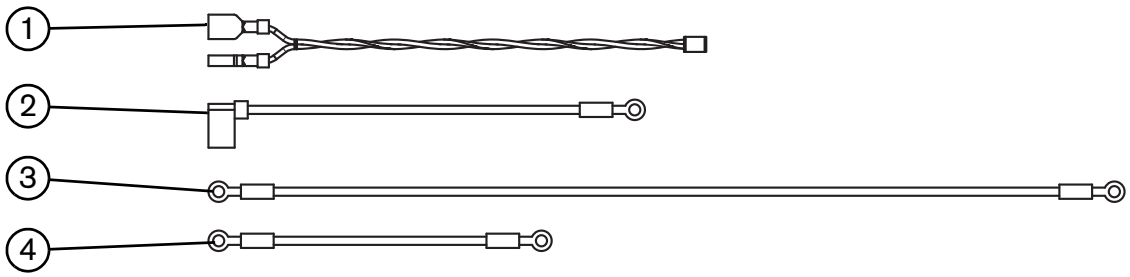
6. Complete the following procedures:
   a. See *Install the power supply cover* on page 103.
   b. Reconnect ~~the gas supply and~~ power cord, and set the power switch to ON (**I**).

Replacing the wire group

Kit number	Description
228103	*Kit: Wire group: pressure switch wire pair, 3 ground wires*

The wire group kit for the power supply includes the following 4 wires:

Figure 58



1 Pressure switch to J4 wire pair (black wire pair)

2 Ground clip wire from heatsink to rear panel (green)

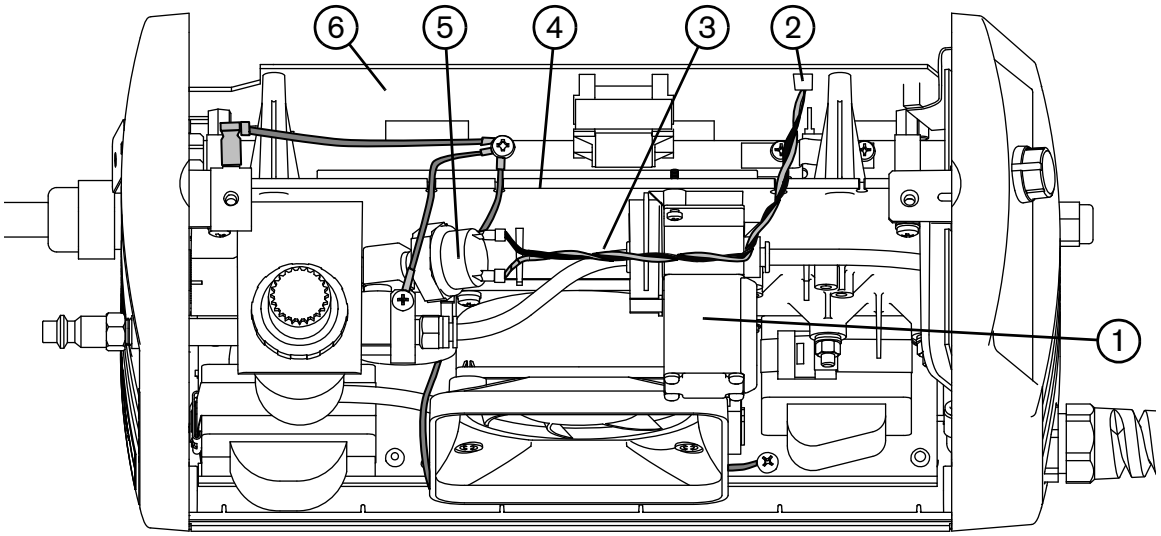
3 Ground wire from heatsink to magnetics assembly (green)

4 Ground wire from heatsink to air filter/regulator ground clip (green)

Remove and install the pressure switch to J4 wires

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
2. Remove the black wires from the pressure switch.
3. The other end of the black wire pair is connected to the power board at J4. (See *Figure 59*.) Lift the top edge of the component barrier and disconnect the wire pair by pulling the connector straight back away from the board.
4. Connect the new wire to the power board at J4, and route the wires through the notch in the center panel that is nearest the solenoid valve. (See *Figure 59*.)
5. Press one of the black wire connectors onto the pressure switch pin that is nearest the center panel.
6. Press the other black wire connectors onto the pressure switch pin that is farthest from the center panel.
7. Complete the following procedures:
   a. See *Install the power supply cover* on page 103.
   b. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Figure 59



1 Solenoid valve
2 J4 connector on the power board
3 Pressure switch to J4 wire pair
4 Center panel
5 Pressure switch
6 Power board

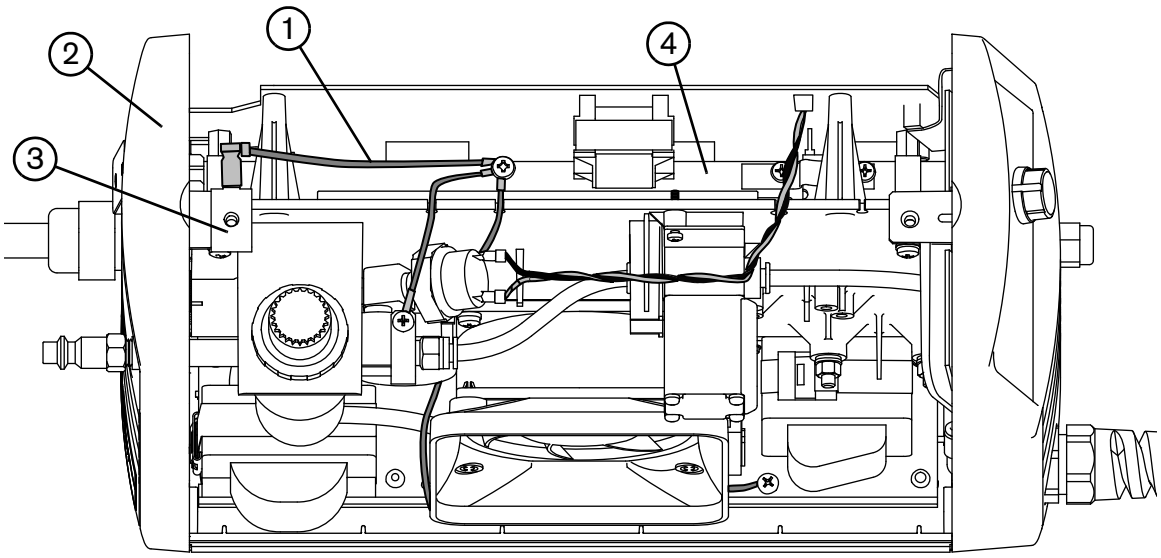
Remove and install the ground clip wire from the heatsink to the rear panel

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
2. Detach the connector from the ground clip on the rear panel. (See *Figure 60*.)
3. Remove the ground wire's ring terminal from the screw that attaches it to the heatsink.
4. Tighten the new ground wire's ring terminal to the heatsink to a torque setting of 23.0 kg-cm (20 inch-pounds).

   Be sure to reattach the ring terminals for the other two ground wires that connect to the heatsink using the same screw.

5. Press the connector on the other end of the wire onto the rear panel's ground clip. (See *Figure 60*.)
6. Complete the following procedures:
   a. See *Install the power supply cover* on page 103.
   b. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Figure 60



1 Ground clip wire from heatsink to rear panel
2 Rear panel
3 Rear panel ground clip
4 Heatsink

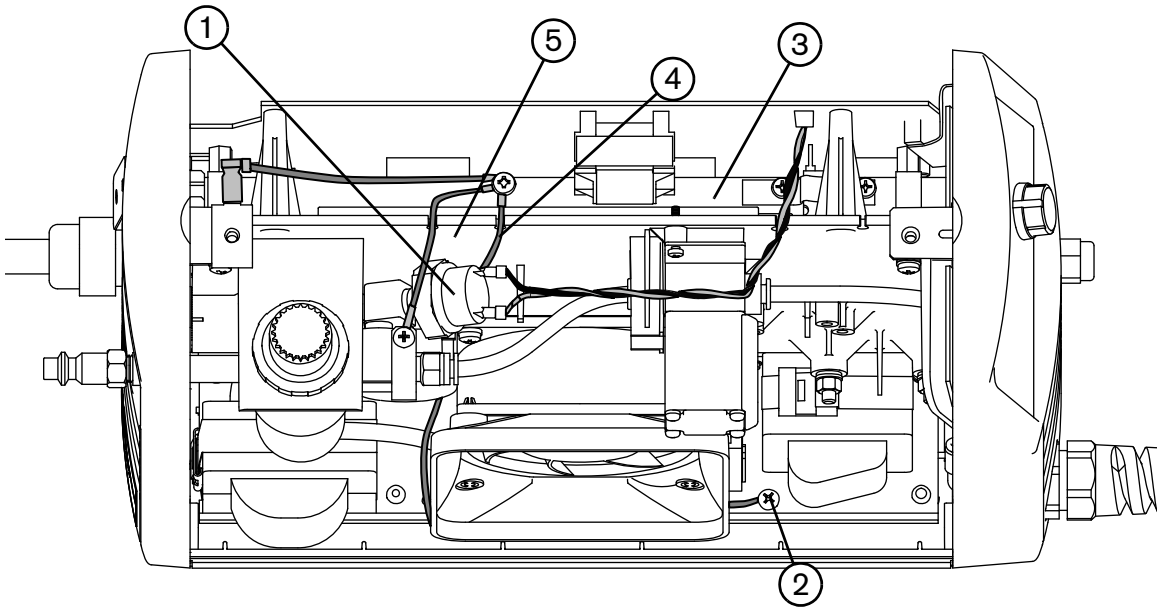
Remove and install the ground wire from the heatsink to the magnetics assembly

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
2. Remove the ground wire's ring terminal from the screw that attaches it to the heatsink.
3. The ring terminal on the other end of the wire is attached to the metal base plate of the magnetics assembly. (See *Figure 61*.) The connection point is just below the bottom right corner of the fan. The wire is routed behind the pressure switch and down along the left side of the fan housing. Remove the ring terminal from the screw that attaches it to the metal base plate.
4. Tighten the new ground wire's ring terminal to the heatsink to a torque setting of 23.0 kg-cm (20 inch-pounds).

   Be sure to reattach the ring terminals for the other two ground wires that connect to the heatsink using the same screw.

5. Route the new ground wire through the notch in the center panel above the pressure switch, behind the pressure switch, along the left side of the fan, and then along the metal base plate of the magnetics assembly to the screw below the bottom right corner of the fan. (See *Figure 61*.)
6. Use the screw to attach the ring terminal for the new wire to the metal base plate of the magnetics assembly with a torque setting of 17.3 kg-cm (15 inch-pounds).
7. Complete the following procedures:
   a. See *Install the power supply cover* on page 103.
   b. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Figure 61



1 Pressure switch

2 Screw on the metal base plate of the magnetics assembly that attaches the ground wire

3 Heatsink

4 Ground wire from heatsink to magnetics assembly

5 Center panel

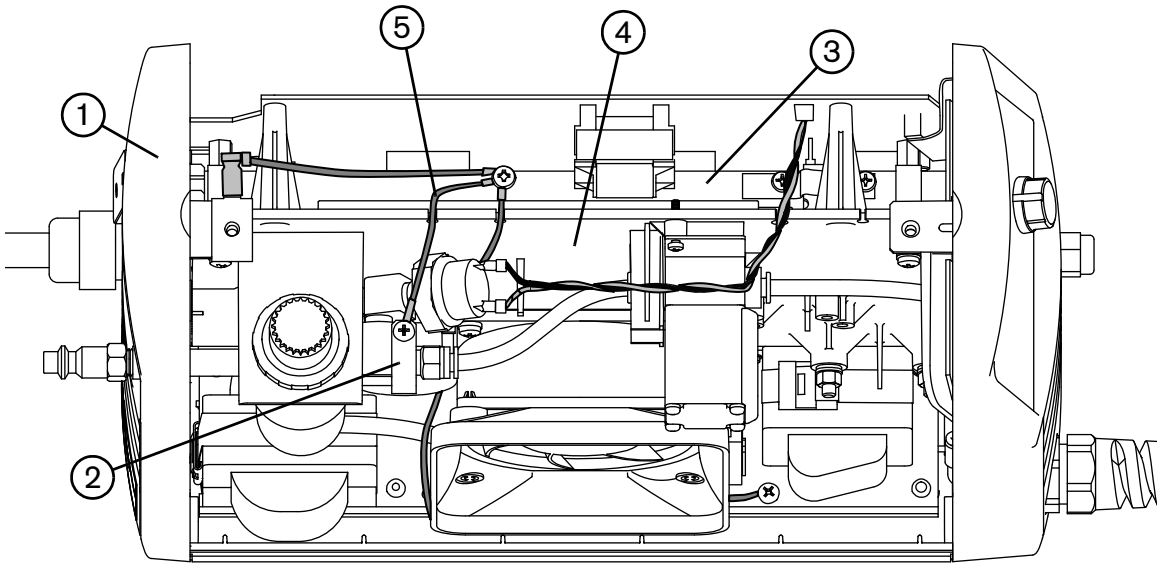
Remove and install the ground wire from the heatsink to the air filter/regulator ground clip

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
2. Remove the ground wire's ring terminal from the screw that attaches it to the heatsink.
3. The ring terminal on the other end of the wire is attached to the ground clip on the air filter/regulator's brass "T" fitting. (See *Figure 62*.) Unscrew the old ground wire from the ground clip.
4. Attach the new ground wire's ring terminal to the heatsink with a torque setting of 23.0 kg-cm (20 inch-pounds).

   Be sure to reattach the ring terminals for the other two ground wires that connect to the heatsink using the same screw.

5. Route the new ground wire through the notch in the center panel that is nearest the rear panel.
6. Use the screw to attach the wire to the air filter/regulator ground clip with a torque setting of 11.5 kg-cm (10 inch-pounds). (See *Figure 62*.)
7. Complete the following procedures:
   a. See *Install the power supply cover* on page 103.
   b. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Figure 62



1 Rear panel

2 Ground clip on air filter/regulator's brass "T" fitting

3 Heatsink

4 Center panel

5 Ground wire from heatsink to air filter/regulator ground clip

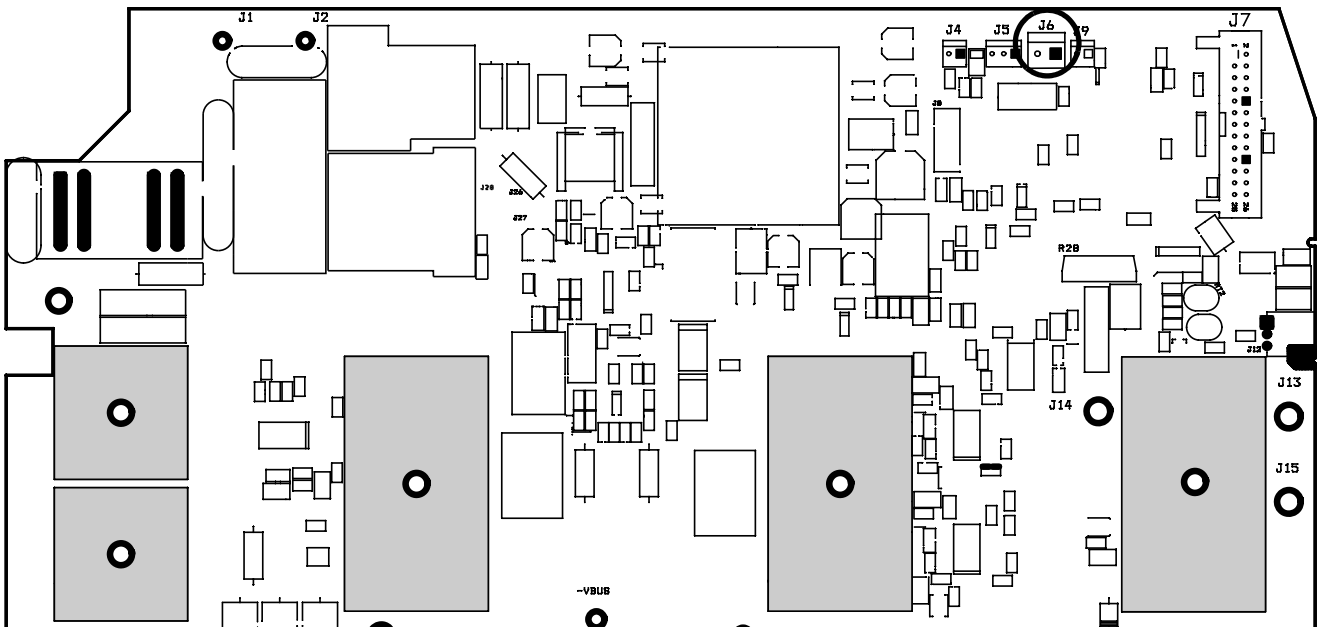
Replacing the solenoid valve

Kit number	Description
428173	*Kit: Solenoid valve*

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
2. Detach the connector from J6 on the power board by pulling it straight back away from the board. (See *Figure 63*.)

If needed, lift the top edge of the component barrier that protects the power board to better access the J6 connector.

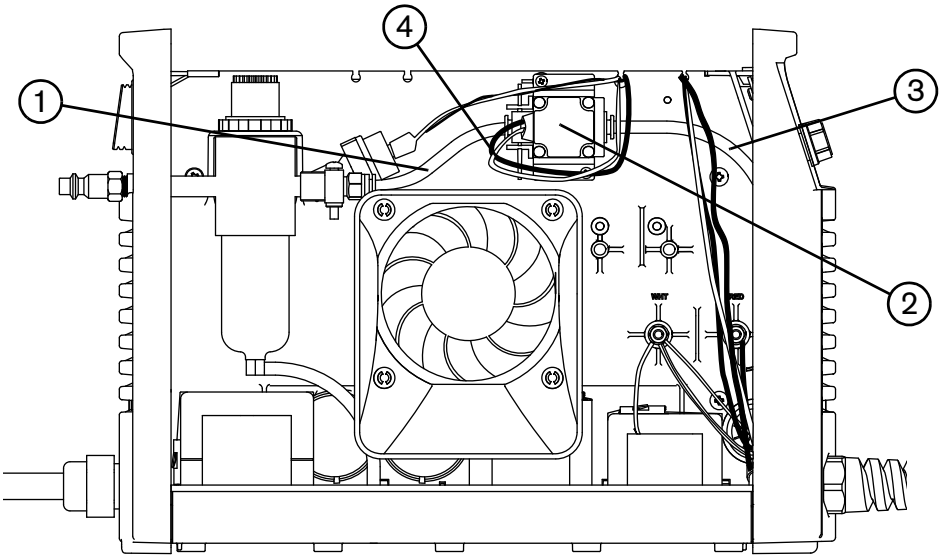
Figure 63



3. Push-to-disconnect the gas supply hose from the fitting on the rear-panel side of the solenoid valve. (See *Figure 56* on page 135.)

4. Push-to-disconnect the gas supply hose from the fitting on the front-panel side of the solenoid valve.

Figure 64



1 Gas supply hose (rear-panel side)

2 Solenoid valve

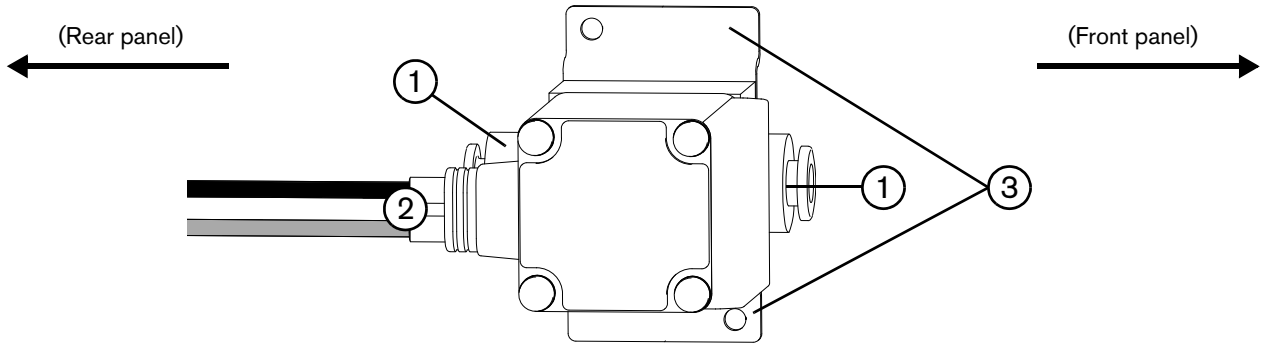
3 Gas supply hose (front-panel side)

4 J6 wire pair

5. Remove the 2 screws that attach the solenoid valve's bracket to the center panel.

6. Orient the new solenoid valve so that the pink-and-gray J6 wire pair is on the rear-panel side of the valve.

Figure 65



1 Push-to-connect fitting

2 Pink-and-gray J6 wire pair

3 Solenoid valve bracket

7. Line up the holes in the valve's bracket with the holes in the center panel and attach it to the center panel using the 2 screws with a torque setting of 11.5 kg-cm (10 inch-pounds).

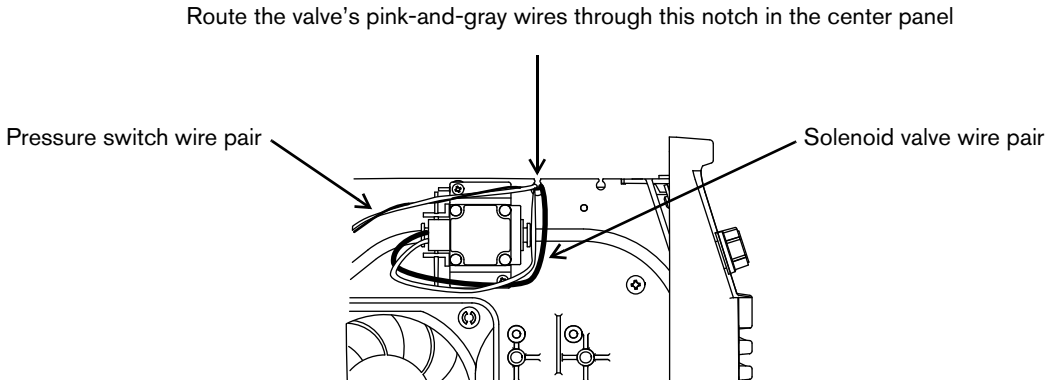
8. Push-to-connect the gas supply hose you removed in step 3 on page 147 into the fitting on the rear-panel side of the solenoid valve. (See *Figure 56* on page 135.)

Be careful not to kink the hoses as you reconnect them.

9. Push-to-connect the gas supply hose you removed in step 4 on page 147 into the fitting on the front-panel side of the solenoid valve.

10. Connect the valve's pink-and-gray wire pair to the power board at J6. (See *Figure 63* on page 146.) Route the wires through the notch in the center panel that is nearest the solenoid valve.

Figure 66



11. Reconnect the gas supply, and check for leaks at each fitting and hose connection point on the air filter/regulator assembly.

CAUTION!

Gas supply pressures not within the specifications in the *Specifications* section can cause poor cut quality, poor consumable life, and operational problems.

If the purity level of the gas is too low, or if there are leaks in the supply hoses or connections:

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

12. Complete the following procedures:
    a. See *Install the power supply cover* on page 103.
    b. Reconnect the power cord, and set the power switch to ON (**I**).

Replacing the torch lead and strain relief

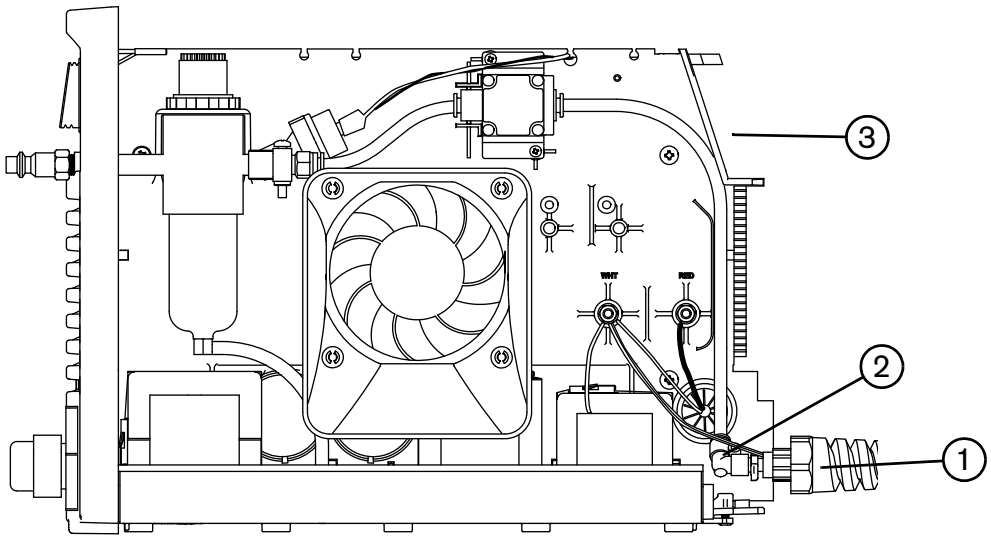
Kit number	Description
428176	*Kit: Duramax LT torch lead, 4.6 m (15 feet), with strain relief*

Remove the torch lead and strain relief

If you are replacing just the torch lead cable, not the whole torch assembly, refer to *Replacing the torch lead* on page 198 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**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
   c. See *Detach the front panel* on page 106.
2. Push-to-disconnect the plastic 90° fitting from the torch lead's brass gas supply fitting inside the front panel of the power supply. (See *Figure 56* on page 135.)

Figure 67



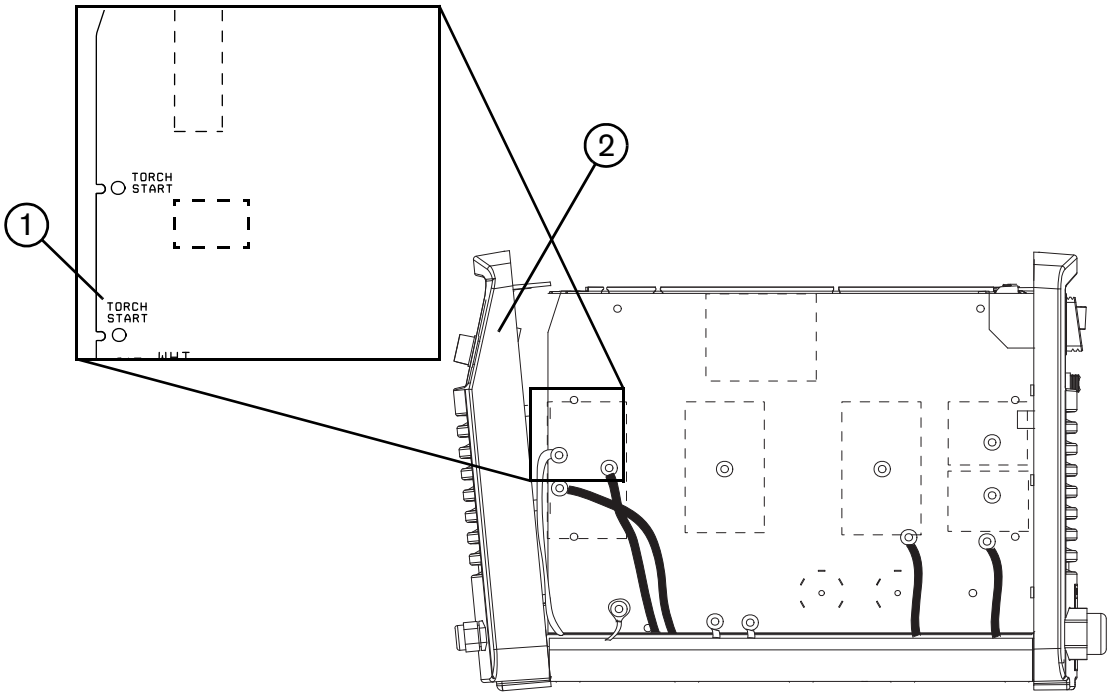
1 Torch lead

2 Plastic 90° fitting connected to brass gas supply fitting

3 Front panel (hidden)

3. Locate the 3-pin connector at the TORCH START slot (J12) on the power board (on the side facing the heatsink) where the orange, blue, and purple wires from the torch lead connect.

Figure 68

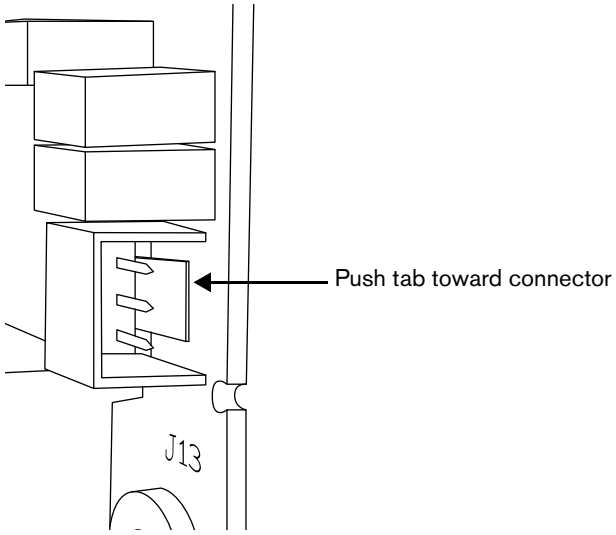


1 TORCH START slot (J12)

2 Front panel

4. Remove the connector at J12 by pressing up on the tab in the connection slot with a small blade screwdriver and then pulling the connector out toward the power supply's front panel.

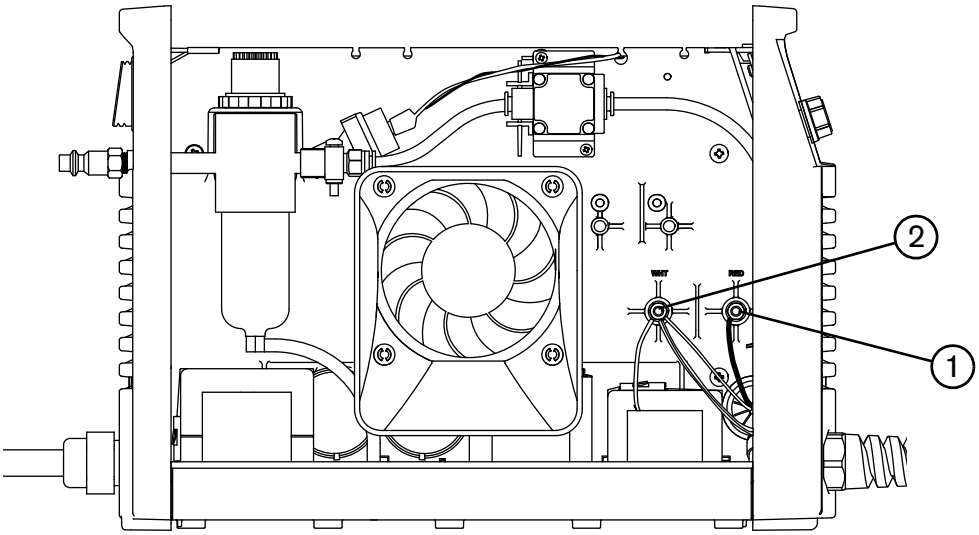
Figure 69



5. Locate the studs that attach the white wire group and the red wire 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.

Figure 70



1 Red wire

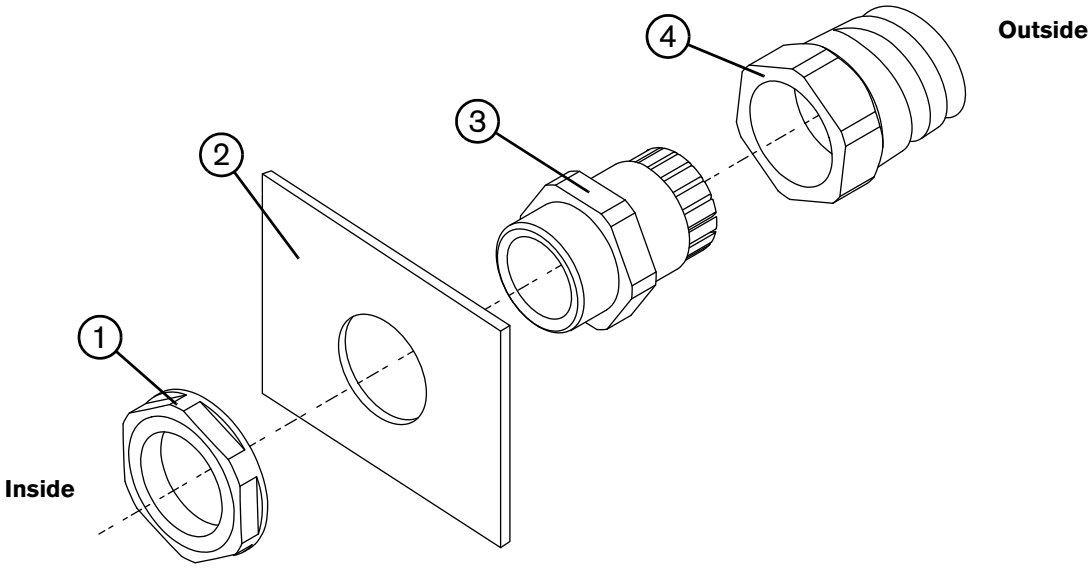
2 White wire group

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

8. On the inside of the front panel, unscrew the retention nut on the torch lead's strain relief so that the torch lead moves freely. (See *Figure 71* on page 152.)

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

Figure 71



1 Retention nut (inside power supply)

2 Front panel

3 Strain relief

4 Strain relief nut

Install the torch lead and strain relief

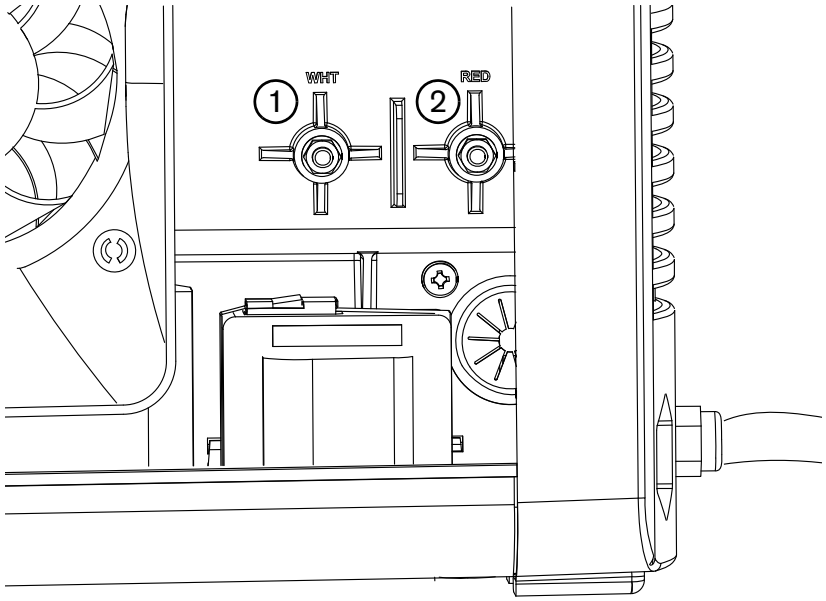
If you are replacing just the torch lead cable, not the whole torch assembly, refer to *Replacing the torch lead* on page 198 for details on how to connect the new lead to the torch.

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

   If you removed any other wires from the WHT and RED studs, reinstall them.

5. Use an 8 mm (5/16 inch) nut driver to tighten the nut on each stud with a torque setting of 23.0 kg-cm (20 inch-pounds).

Figure 72



1 WHT wire connection stud

2 RED wire connection stud

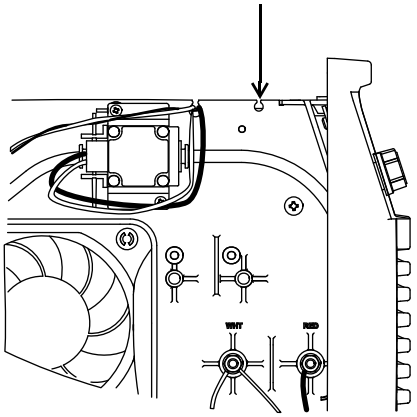
6. Push-to-connect the plastic 90° fitting onto the new torch lead’s brass gas supply fitting.

7. Route the orange, blue, and purple wire group over the center panel, with the wires resting in the notch in the panel that is closest to the front of the power supply. (See *Figure 73* on page 154.)

8. Press the connector into the TORCH START slot (J12) on the power board. (See *Figure 69* on page 151.)

Figure 73

Route the torch lead's orange, blue, and purple wires through this notch in the center panel



9. 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.

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 108.

11. Complete the following procedures:
    a. See *Install the power supply cover* on page 103.
    b. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Replacing the pressure switch

Kit number	Description
228688	*Kit: Pressure switch*

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
2. Disconnect the ground wire that is attached to the clip on the air filter/regulator's brass "T" fitting.
3. Disconnect the red and black wires from the pins on the pressure switch.
4. Use a 1-1/16 inch wrench or large adjustable wrench to remove the pressure switch from the brass elbow fitting on the air filter/regulator assembly. (See *Figure 74* on page 156.)
5. Apply a small drop of thread sealant to the middle threads of the new pressure switch. Do not apply thread sealant to the threads at the end of the pressure switch that will be inserted into the air filter/regulator assembly.

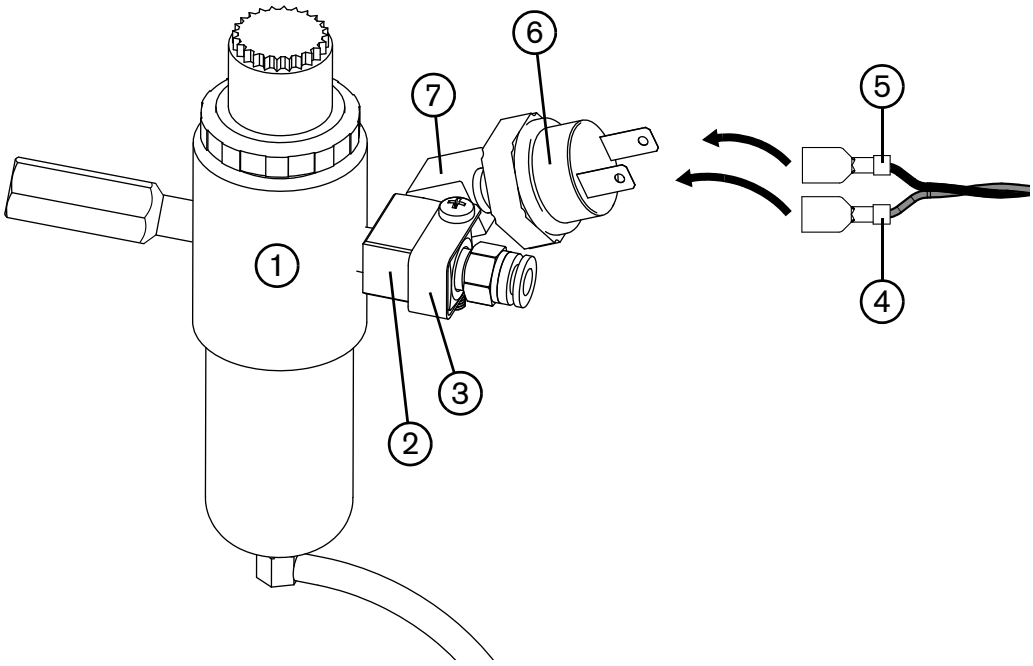
If applied too heavily, excess amounts of thread sealant can contaminate the gas line.

CAUTION!

Never use PTFE tape on any joint preparation. Use only a liquid or paste thread sealant on male threads.

6. Tighten the new pressure switch into the brass elbow fitting. Turn the pressure switch until its pins are horizontally aligned. Verify the pressure switch is angled up at approximately 45°. (See *Figure 74* on page 156.)
7. Press the black wire's connector onto the pressure switch pin that is nearest the center panel.
8. Press the red wire's connector onto the pressure switch pin that is farthest from the center panel.
9. Reconnect the ground wire to the clip on the brass "T" fitting with a torque setting of 11.5 kg-cm (10 inch-pounds).
10. Complete the following procedures:
    a. See *Install the power supply cover* on page 103.
    b. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Figure 74



1 Air filter/regulator assembly
2 Brass “T” fitting
3 Ground wire clip
4 Red wire
5 Black wire
6 Pressure switch
7 Brass elbow fitting

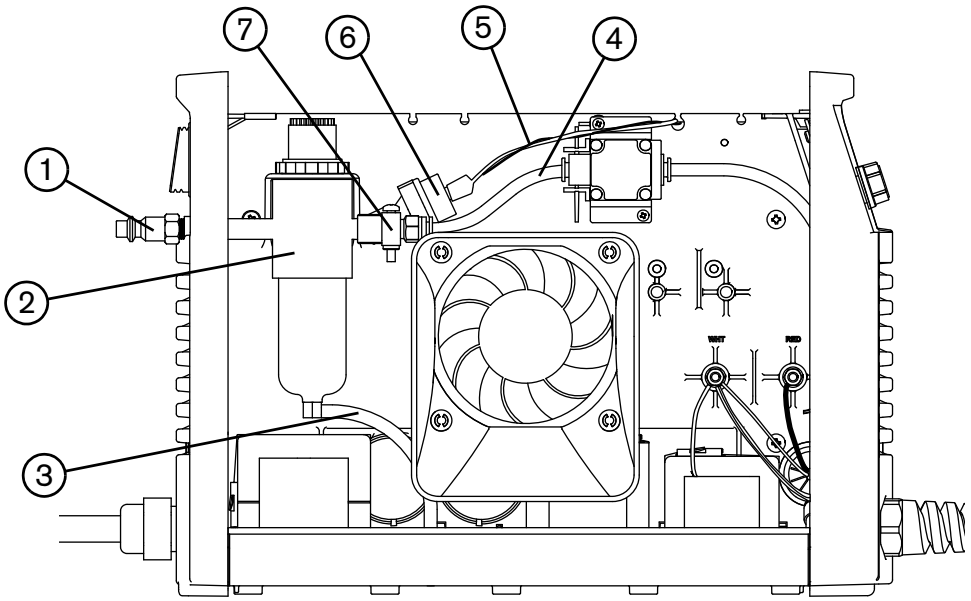
Replacing the air filter/regulator and pressure switch assembly

Kit number	Description
228106	*Kit: 30 XP Air filter/regulator with pressure switch*
429298	*429298*

Remove the air filter/regulator and pressure switch assembly

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
2. Use 2 wrenches to remove the air fitting from the brass hex adapter that connects the fitting to the air filter/regulator. See *Figure 75*.
   - **CSA models:** Use a 9/16 inch wrench for the air fitting and a 5/8 inch wrench for the hex adapter.
   - **CE/CCC models:** Use a 19 mm wrench for the air fitting adapter and a 5/8 inch wrench for the hex adapter.
3. Disconnect the drain hose from the hole in the bottom of the power supply's base. See *Figure 75*.
4. Disconnect the red and black wires from the pins on the pressure switch.
5. Push-to-disconnect the gas supply hose from the air filter/regulator's brass "T" fitting. (See *Figure 56* on page 135.)
6. Disconnect the ground wire that is attached to the clip on the air filter/regulator's brass "T" fitting. Set the clip aside.

Figure 75



1 Air fitting (CSA) or air fitting adapter (CE/CCC)

2 Air filter/regulator

3 Drain hose

4 Gas supply hose

5 Red and black pressure switch wires

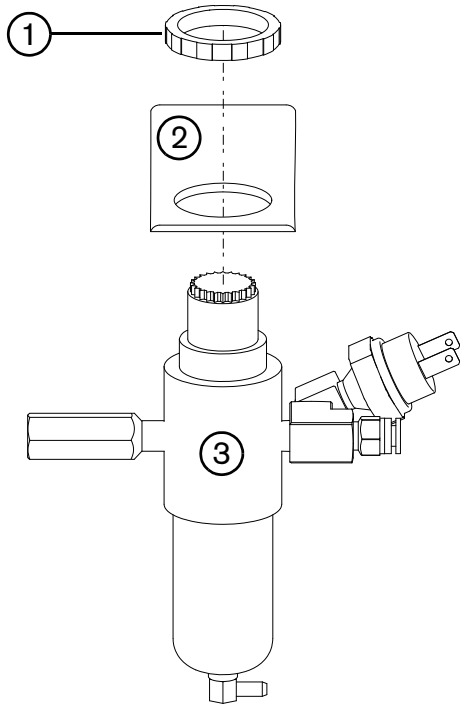
6 Pressure switch

7 Ground wire clip on the “T” fitting

7. Unscrew the retainer nut that holds the air filter/regulator in the bracket on the center panel. See *Figure 76*.

8. Tip the bottom of the air filter/regulator and pressure switch assembly away from the power supply, and slide the assembly out of the bracket. Gently tilt the top of the rear panel away from the power supply as you remove the assembly, if needed.

Figure 76



1 Retainer nut

2 Center panel bracket

3 Air filter/regulator

Install the air filter/regulator and pressure switch assembly

This kit contains two fittings that are not used in this power supply: a brass coupler (015550) and a brass pipe (015618).

CAUTION!

The regulator inside the power supply is a red (30 XP) or blue (33 XP) locknut and is pre-set at the factory. Do not adjust this setting.

1. Locate the new brass hex adapter fitting (015846) in the kit. See *Figure* 77 on page 161. Is thread sealant preapplied to the threads on the fitting?
   - ❑ If yes, skip to the next step.
   - ❑ If no, apply a small drop of thread sealant to the middle threads of the fitting.

     If applied too heavily, excess amounts of thread sealant can contaminate the gas line.

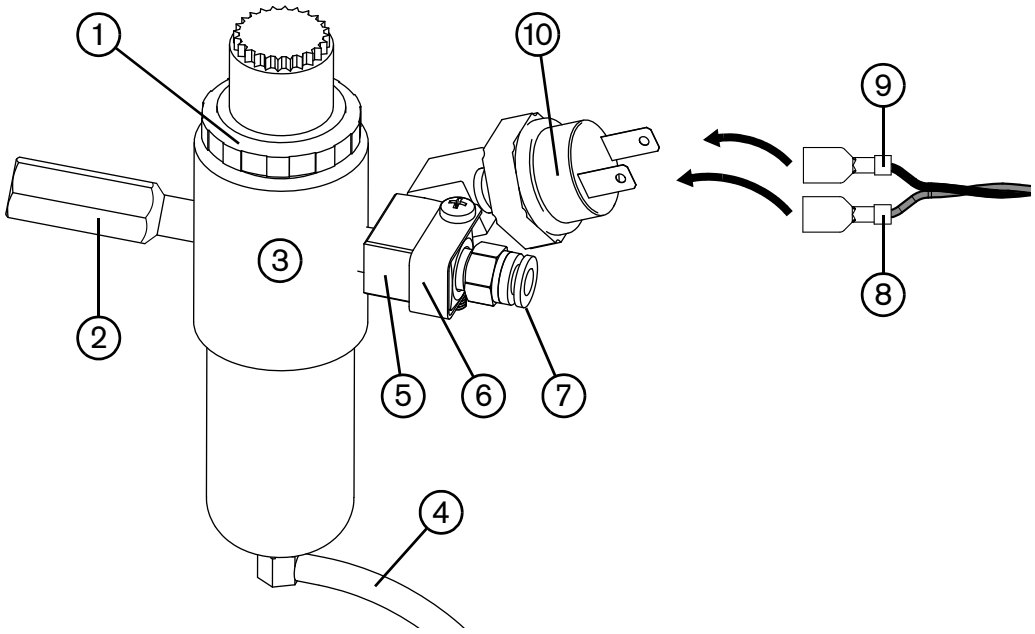
CAUTION!

Never use PTFE tape on any joint preparation. Use only a liquid or paste thread sealant on male threads.

2. Screw the hex adapter fitting into the side of the air filter/regulator, and use a 5/8 inch wrench to tighten.
3. Position the new air filter/regulator assembly in the bracket on the center panel of the power supply. Hand-tighten the retainer nut plus a quarter turn.

   Do not overtighten the retainer nut.
4. Route the drain hose through the hole in the base of the power supply.
5. Connect the red and black wires to the pins on the pressure switch (see *Figure* 77):
   - **a.** Press the black wire's connector onto the pressure switch pin that is nearest the center panel.
   - **b.** Press the red wire's connector onto the pressure switch pin that is farthest from the center panel.
6. Push-to-connect the gas supply hose to the fitting on the new air filter/regulator. Be careful not to kink the hose as you reconnect it.
7. Using the clip you removed in step 6 on page 157, connect the ground wire to the air filter/regulator's brass "T" fitting.
8. Reconnect the air fitting (CSA models) or air fitting adapter (CE/CCC models) to the brass hex adapter in the air filter/regulator assembly.

Figure 77



1 Retainer nut
2 Brass hex adapter
3 Air filter/regulator assembly
4 Drain hose
5 Brass “T” fitting
6 Ground wire clip
7 Push-to-connect fitting for gas supply hose
8 Red wire
9 Black wire
10 Pressure switch

9. Reconnect the gas supply, and check for leaks at each fitting and hose connection point on the air filter/regulator assembly.

CAUTION!

Gas supply pressures not within the specifications in the *Specifications* section of your system’s manual can cause poor cut quality, poor consumable life, and operational problems.

If the purity level of the gas is too low, or if there are leaks in the supply hoses or connections:

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

10. Complete the following procedures:

a. See *Install the power supply cover* on page 103.

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

Replacing the air inlet fittings

Kit number	Description
428171	*Kit: Air inlet fittings, CSA*
428172	*Kit: Air inlet fittings, CE/CCC*

Each of these kits contains two fittings that are not used in this system: a brass coupler (015550) and a brass pipe (015618).

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
2. **CSA models:** Are you replacing the quick-connect air fitting? (See *Figure 78* on page 163.)
   - If yes, continue with the next step.
   - If no, remove the quick-connect air fitting from the brass hex adapter. Use a 5/8 inch wrench for the hex adapter and a 9/16 inch wrench for the air fitting. Set the fitting aside.

   CE/CCC models: Are you replacing the air fitting adapter? (See *Figure 78* on page 163.)
   - If yes, continue with the next step.
   - If no, remove the air fitting adapter from the brass hex adapter. Use a 5/8 inch wrench for the hex adapter and a 19 mm wrench for the air fitting adapter. Set the air fitting adapter aside.
3. Grip the air filter/regulator with your right hand to hold it steady. With your left hand, remove the brass hex adapter from the air filter/regulator using a 5/8 inch wrench.

1. Locate the new brass hex adapter fitting (015846) in the kit. See *Figure 78*. Is thread sealant preapplied to the threads on the fitting?
   - ❑ If yes, skip to the next step.
   - ❑ If no, apply a small drop of thread sealant to the middle threads of the new brass hex adapter.

     If applied too heavily, excess amounts of thread sealant can contaminate the gas line.

CAUTION!

Never use PTFE tape on any joint preparation. Use only a liquid or paste thread sealant on male threads.

2. Screw the brass hex adapter into the air filter/regulator. Use a 5/8 inch wrench to tighten.
3. **CSA models:** If thread sealant is not preapplied, apply a small drop of thread sealant to the middle threads of the quick-connect air fitting (015152 or 015337). Screw the fitting into the brass hex adapter. Use a 9/16 inch wrench to tighten.

CE models: If thread sealant is not preapplied, apply a small drop of thread sealant to the middle threads on the smaller end of the air fitting adapter (015145 or 015301). Screw the air fitting adapter into the brass hex adapter. Use a 19 mm wrench to tighten.

If applied too heavily, excess amounts of thread sealant can contaminate the gas line.

4. Reconnect the gas supply, and check for leaks at each fitting and hose connection point on the air filter/regulator assembly.

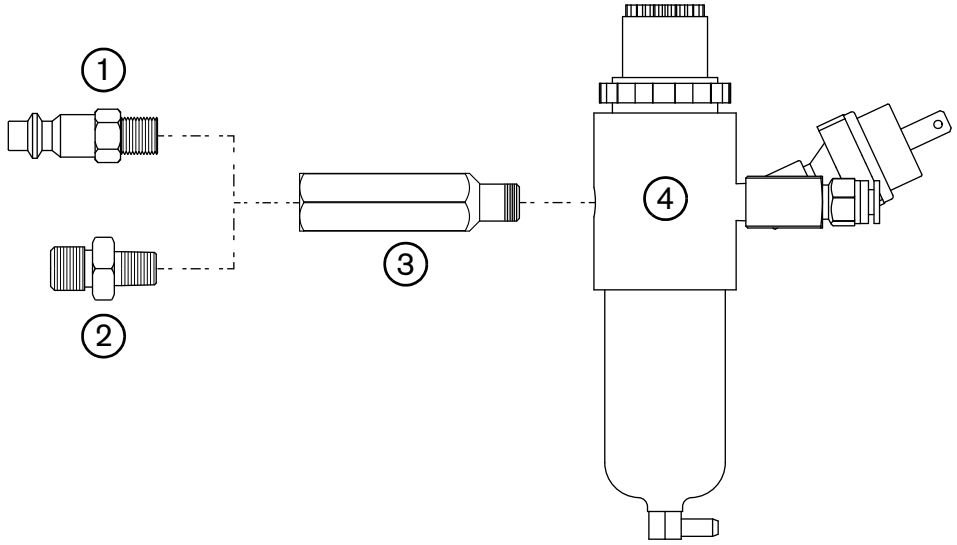
CAUTION!

Gas supply pressures not within the specifications in the *Specifications* section of your system's manual can cause poor cut quality, poor consumable life, and operational problems.

If the purity level of the gas is too low, or if there are leaks in the supply hoses or connections:

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

Figure 78



1 CSA quick-connect air fitting

2 CE/CCC air fitting adapter

3 Brass hex adapter

4 Air filter/regulator

5. Complete the following procedures:
   a. See *Install the power supply cover* on page 103.
   b. Reconnect power cord, and set the power switch to ON (**I**).

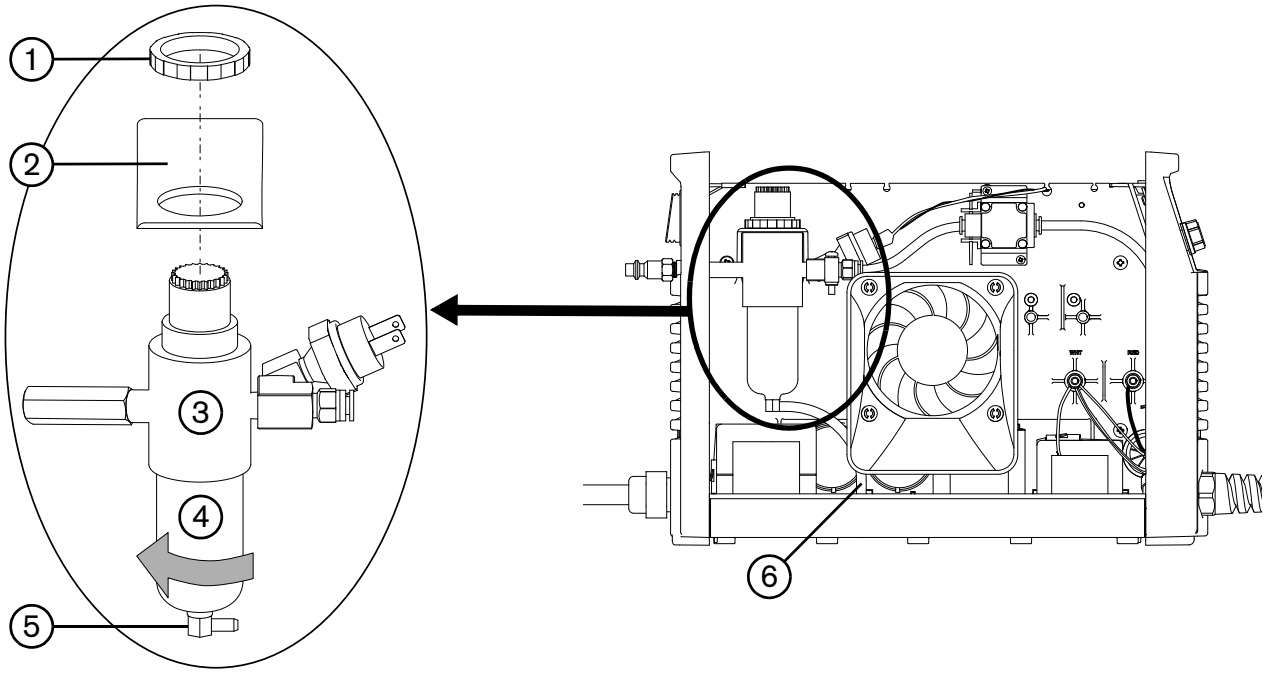
Replacing the air filter bowl and air filter element

Kit number	Description
428237	*Kit: Air filter element*
428246	*Kit: Air filter bowl*

Remove the air filter bowl and air filter element

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
2. From the fan side of the power supply, disconnect the drain hose from the hole in the bottom of the base.
3. Remove the other end of the drain hose from the brass fitting at the bottom of the air filter bowl. Set the drain hose aside.
4. Unscrew the plastic retainer nut that holds the air filter/regulator in the bracket on the center panel.
5. Tilt the bottom of the air filter/regulator assembly towards you with one hand.
6. With your other hand, unscrew the air filter bowl to remove it from the air filter/regulator assembly.

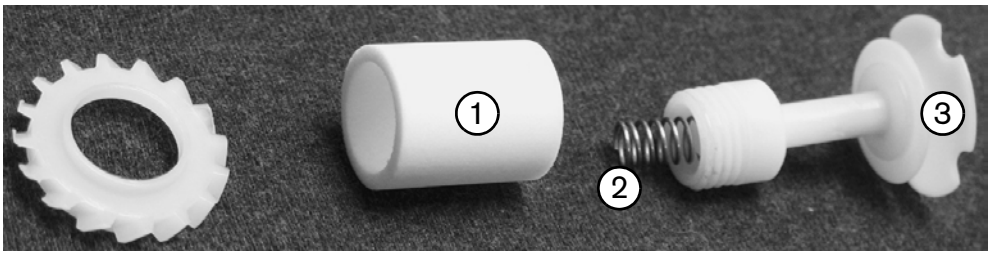
Figure 79



1 Plastic retainer nut (red)
2 Center panel bracket
3 Air filter/regulator
4 Air filter bowl
5 Brass fitting
6 Drain hose

7. Does the air filter element need to be replaced?
   - ❑ If yes, unscrew the plastic retaining nut that attaches the air filter element, being careful not to lose the spring that is compressed between the retaining nut and the air filter/regulator. Do not allow the air filter element to rotate as you remove the nut. Remove the air filter element from the plastic retaining nut.
   - ❑ If no, continue with step 3 on page 166.

Figure 80



1 Air filter element
2 Spring
3 Retaining nut

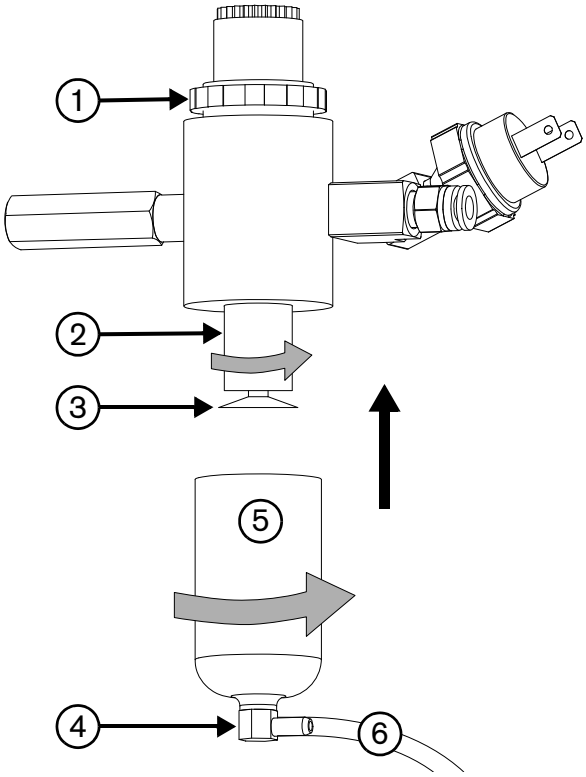
Install the air filter element and air filter bowl

1. Place the new air filter element on the plastic retaining nut. Verify that the spring is in place.
2. Install the new air filter element. Tighten the retaining nut to finger-tight.
3. Does the air filter bowl need to be replaced?
   - ❑ If yes, install the new filter bowl.
   - ❑ If no, clean the bowl before reinstalling it by wiping away any oil, dirt, or other contaminants.

   Tighten the filter bowl to finger-tight.
4. Connect the drain hose to the fitting at the bottom of the filter bowl. Verify the drain hose extends towards the front of the power supply.
5. Position the air filter/regulator assembly in the bracket on the center panel of the power supply, and attach it using the plastic retainer nut. Hand-tighten the retainer nut plus a quarter turn.

   Do not overtighten the retainer nut.
6. Route the drain hose through the hole in the base of the power supply.

Figure 81



1 Plastic retainer nut (red)
2 Air filter element
3 Air filter element retaining nut (white)
4 Brass fitting
5 Air filter bowl
6 Drain hose

7. Reconnect the gas supply, and check for leaks at each fitting and hose connection point on the air filter/regulator assembly.

CAUTION!

Gas supply pressures not within the specifications in the *Specifications* section of this manual can cause poor cut quality, poor consumable life, and operational problems.

If the purity level of the gas is too low, or if there are leaks in the supply hoses or connections:

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

8. Complete the following procedures:
   a. See *Install the power supply cover* on page 103.
   b. Reconnect power cord, and set the power switch to ON (**I**).

Replacing the front panel

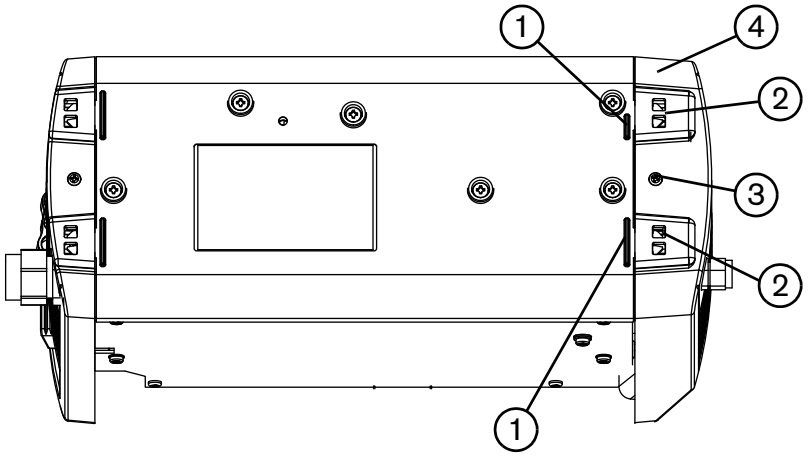
Kit number	Description
428219	*Kit: Powermax30 XP Front panel*
429298	*Kit: Powermax33 XP cover with labels, CSA*

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 106 and *Reattach the front panel* on page 108.

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
   c. See *Remove the component barrier* on page 104.
2. Lay the power supply on its side.
3. Remove the retaining screw from the bottom of the front panel.

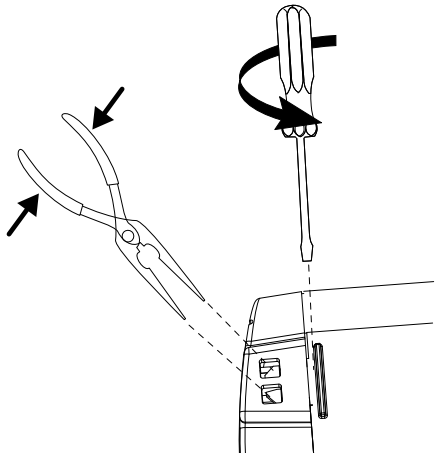
Figure 82



1 Rib
2 Snap
3 Retaining screw
4 Front panel

4. Insert needle nose pliers into the opening for one of the snaps and use the pliers to squeeze it together.

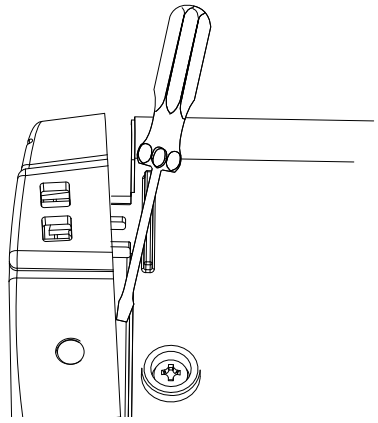
Figure 83



5. Place a blade screwdriver against the raised rib next to the snap and gently turn the screwdriver to push the panel away from the base.

6. Place another screwdriver or similar object into the opening between the panel and the base to keep the first corner of the panel from re-engaging the snaps when you release the other corner.

Figure 84

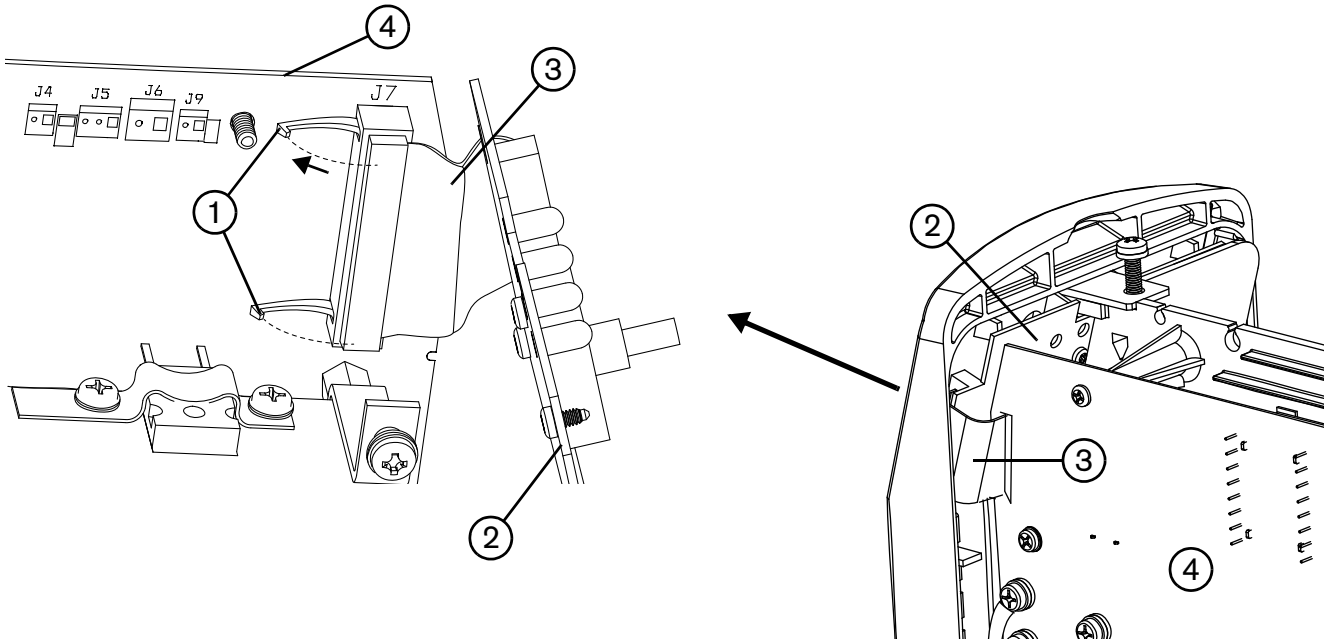


7. Repeat step 4 and step 5 on the other corner of the panel.

8. Disconnect the control panel ribbon cable from the power board by folding the latches back.

In *Figure 85*, the center panel is hidden in the image on the left.

Figure 85



1 Latches

2 Control board

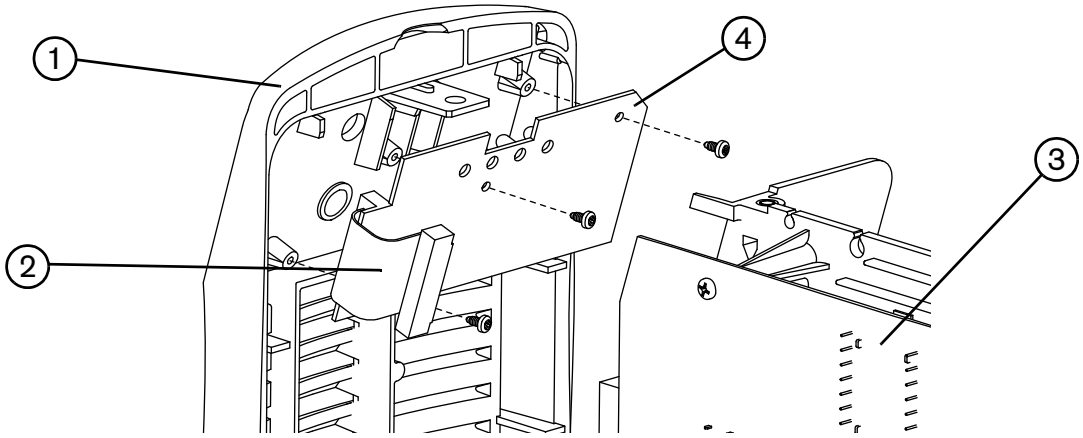
3 Ribbon cable

4 Power board

9. 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.

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

Figure 86



1	Front panel	**3**	Power board
2	Ribbon cable	**4**	Control board

11. Disconnect the torch lead from the power supply. See *Remove the torch lead and strain relief* on page 149.

12. Disconnect the work lead from the power supply. See *Remove and install the work lead* on page 183.

Install the front panel

1. Push the new front panel into the power supply base to re-engage the snaps.

2. Tighten the retaining screw to a torque setting of 17.3 kg-cm (15 inch-pounds).

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

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

5. Reinstall the work lead and the torch lead. See *Remove and install the work lead* on page 183 and *Install the torch lead and strain relief* on page 153.

6. Connect the control panel ribbon cable to the power board, and fold the latches up to hold it in place.

7. Complete the following procedures:
   a. See *Install the component barrier* on page 105.
   b. See *Install the power supply cover* on page 103.
   c. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Replacing the rear panel

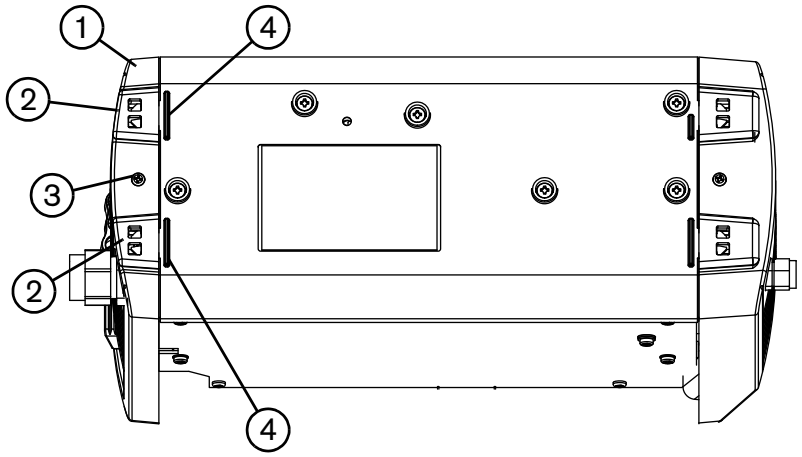
Kit number	Description
428220	*Kit: Rear panel*

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 109 and *Reattach the rear panel* on page 111.

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
   c. See *Remove the component barrier* on page 104.
2. Lay the power supply on its side.

Figure 87

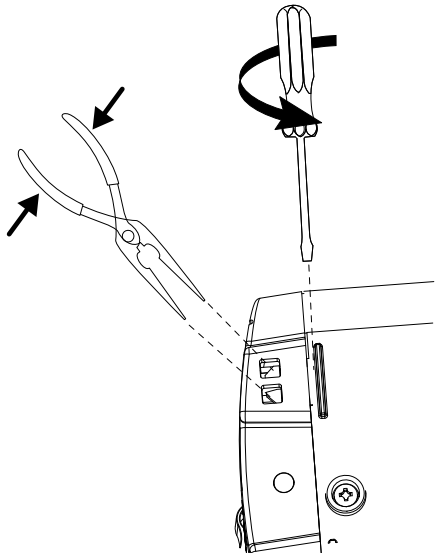


1 Rear panel
2 Snap
3 Retaining screw
4 Rib

3. Remove the retaining screw from the bottom of the rear panel.

4. Insert needle nose pliers into the opening for one of the snaps and use the pliers to squeeze it together.

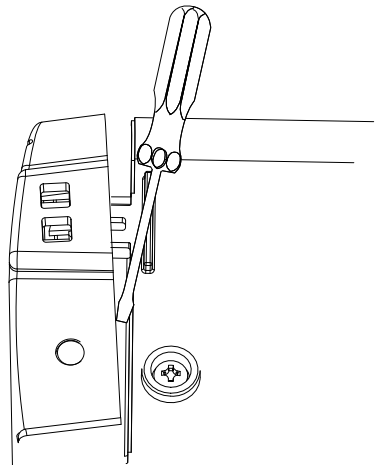
Figure 88



5. Place a blade screwdriver against the raised rib next to the snap and gently turn the screwdriver to push the panel away from the base.

6. Place another screwdriver or similar object into the opening between the panel and the base to keep the first corner of the panel from re-engaging the snaps when you release the other corner.

Figure 89



7. Repeat step 4 and step 5 on the other corner of the panel.

8. Disconnect the ground wire from the ground wire clip near the top of the rear panel. See *Figure 90*.

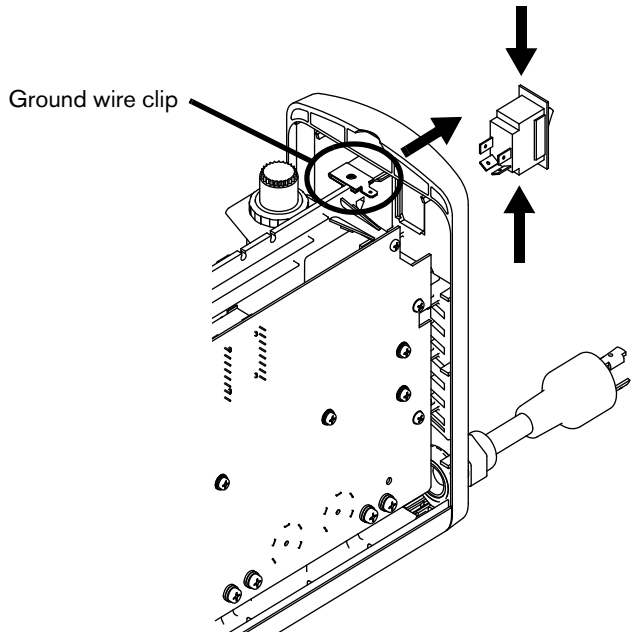
9. Disconnect the 4 wires from the back of the power switch.

10. Using a small blade screwdriver, press down one of the tabs on the top of the power switch, and push that corner of the switch out of the rear panel.

11. Press down the other tab on the top 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.

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

Figure 90



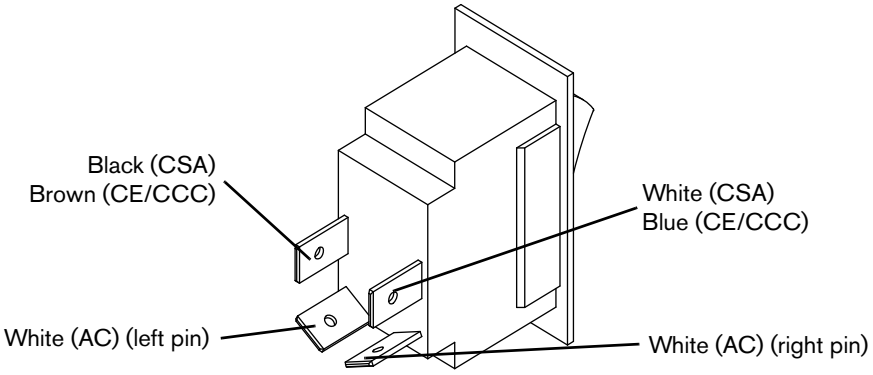
13. Disconnect the power cord from the power supply. See *Remove the power cord and strain relief* on page 112.

Install the new rear panel

1. Reinstall the power cord through the new rear panel. See *Install the power cord and strain relief* on page 118.
2. Push the new rear panel into the base to re-engage the snaps.
3. Tighten the retaining screw to 17.3 kg-cm (15 inch-pounds). Make sure that the hole in the ground clip is aligned with the screw holes in the panel and the power supply before attempting to insert the retaining screw.
4. Press the power switch into the new rear panel with the ON (**I**) label at the top of the switch.

   You should hear the switch snap into place.
5. Push the connectors for the two white wires that are attached to the power board at AC onto the bottom two pins of the power switch. The left “AC” wire connects to the bottom-left pin on the power switch; the right “AC” wire connects to the bottom-right pin on the power switch. See *Figure 91*.
6. Press the connector for the black (CSA) or brown (CE/CCC) wire onto the pin on the upper left side of the power switch.
7. Press the connector for the white (CSA) or blue (CE/CCC) wire onto the pin on the upper right side of the power switch.

Figure 91



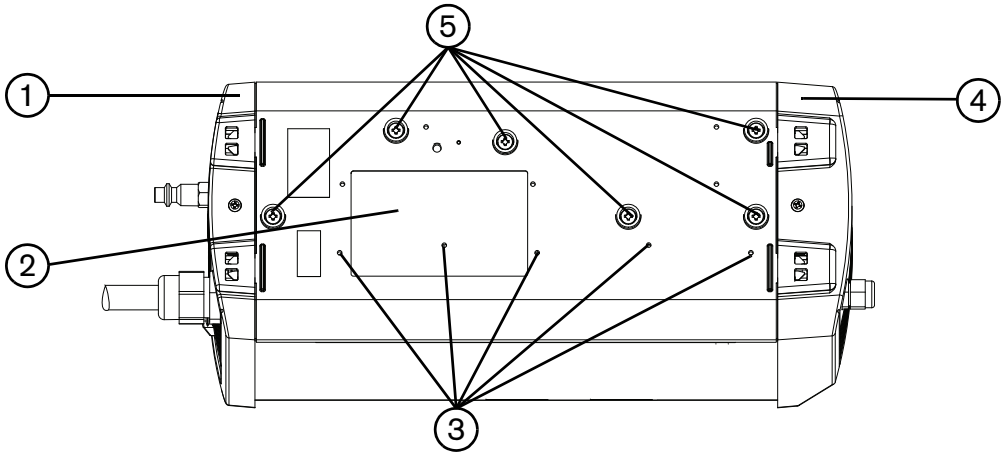
8. Reconnect the ground wire to the ground wire clip on the rear panel.
9. Complete the following procedures:
   a. See *Install the component barrier* on page 105.
   b. See *Install the power supply cover* on page 103.
   c. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Replacing the base

Kit number	Description
228139	*Kit: Plastic base*

1. Verify that the serial number on the bottom of the old base matches the one on the new base. 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**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
   c. See *Remove the component barrier* on page 104.
   d. See *Detach the front panel* on page 106.
   e. See *Detach the rear panel* on page 109.
3. On the fan side of the power supply, disconnect the air filter/regulator's drain hose from the hole in the bottom of the base.
4. Lay the power supply on its side, with the fan side facing up.
5. Remove the six screws that attach the plastic base to the components at the bottom of the power supply.
6. Place the wooden end of a swab, a stiff wire, or other similar item with a 0.23 cm (0.092-inch) diameter in each of the five holes 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 92



1 Rear panel
2 Data plate location
3 Holes
4 Front panel
5 Bottom component screws

7. 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.

8. Press the plastic base into the power supply until it snaps into place.

9. Attach the plastic base to the bottom components using the six screws.

10. Reconnect the air filter/regulator's drain hose to the hole in the bottom of the base.

11. Complete the following procedures:
    a. See *Reattach the front panel* on page 108.
    b. *See Reattach the rear panel* on page 111.
    c. See *Install the component barrier* on page 105.
    d. See *Install the power supply cover* on page 103.
    e. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

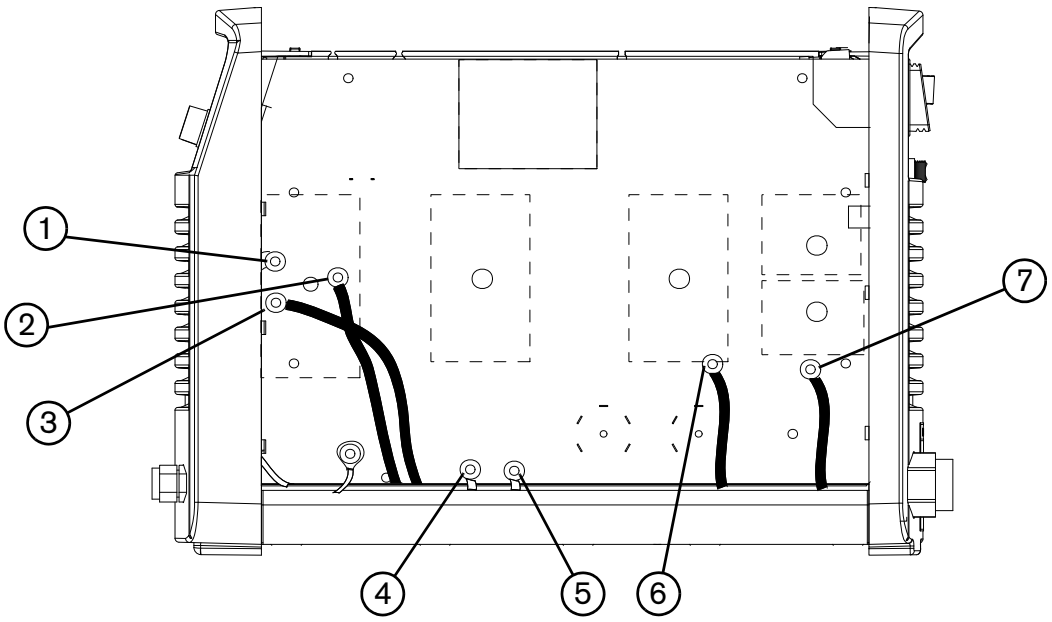
Replacing the magnetics assembly

Kit number	Description
428230	*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.

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
   c. See *Remove the component barrier* on page 104.
   d. See *Detach the front panel* on page 106.
   e. See *Detach the rear panel* on page 109.
2. From the power board side of the power supply, remove the wires for the transformers and inductors. (See *Figure 93*.)
   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.

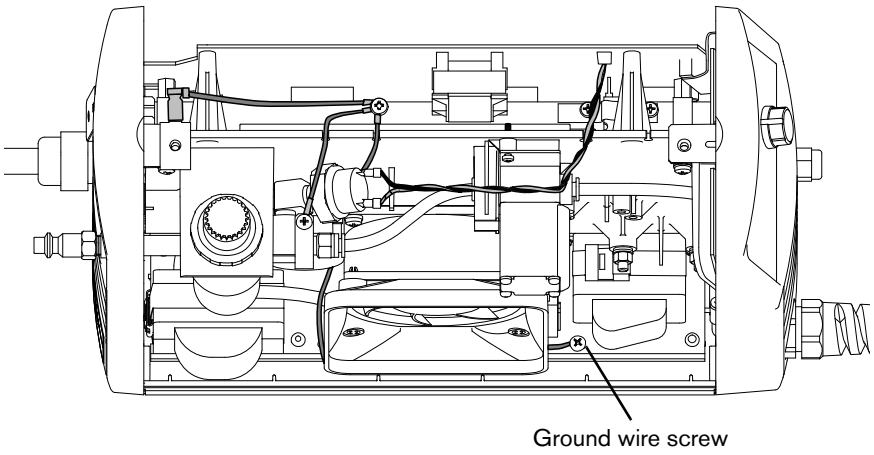
Figure 93



1 J13
2 J14
3 J15
4 J21
5 J20
6 J19
7 J18

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

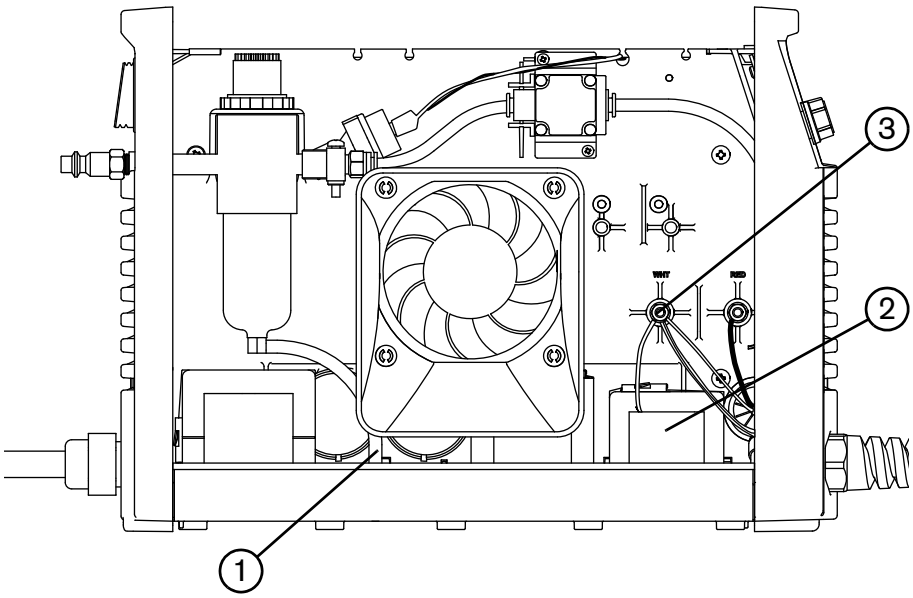
Figure 94



4. Disconnect the air filter/regulator's drain hose from the hole in the base of the power supply.

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

Figure 95



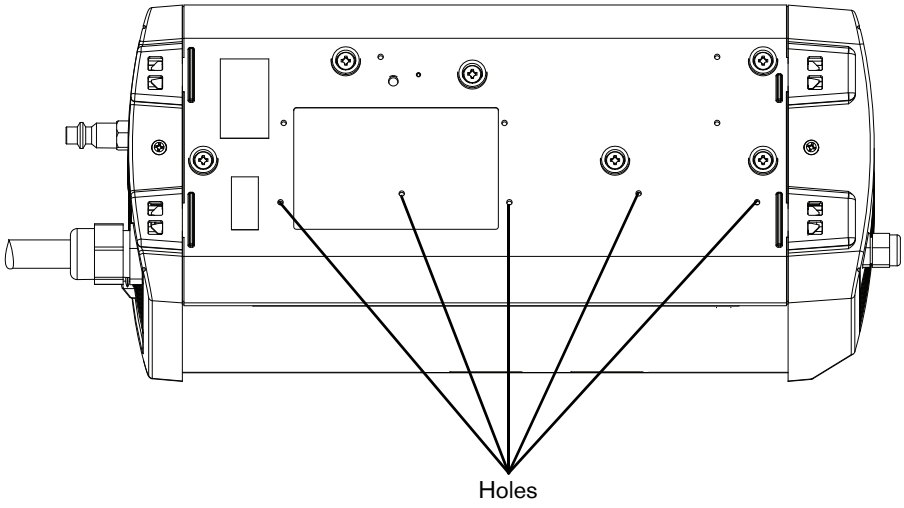
1 Drain hose

2 Output inductor

3 White wire stud ("WHT")

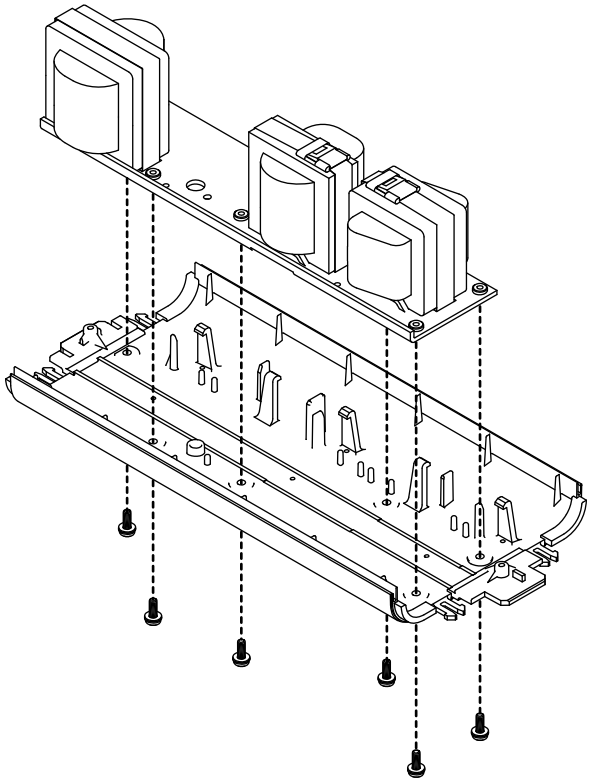
6. Place the wooden end of a swab, a stiff wire, or other similar item with a 0.23 cm (0.092 inch) diameter in each of the five holes on the power board side of the base. Press each one in until the clips release and you can pull the base and the attached magnetics away from the center panel.

Figure 96



7. Remove the six screws that hold the magnetics' metal mounting plate in place. Remove the plate and the magnetics.

Figure 97



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

9. Attach the new magnetics to the plastic base using the six screws.

10. Align the wires from the magnetics with the notches in the center panel so that the wires do not get pinched.

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

12. On the fan side of the power supply, attach the ring connector for the output inductor's white wire to the stud labeled "WHT" using a 8 mm (5/16 inch) nut driver. See *Figure 95* on page 180.

    If you removed any other wires from the WHT stud, reinstall them.

13. Reconnect the air filter/regulator's drain hose to the hole in the bottom of the base.

14. Using the screw you removed in step 3 on page 179, attach the ground wire to the metal base plate of the magnetics assembly with a torque setting of 17.3 kg-cm (15 inch-pounds). See *Figure 94* on page 179.

15. 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). See *Figure 93* on page 179.

16. Complete the following procedures:
    a. See *Reattach the front panel* on page 108.
    b. *See Reattach the rear panel* on page 111.
    c. See *Install the component barrier* on page 105.
    d. See *Install the power supply cover* on page 103.
    e. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

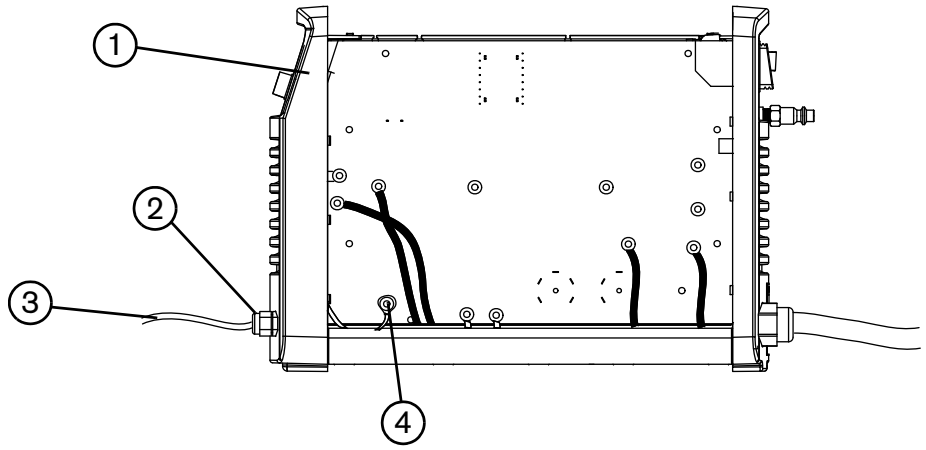
Replacing the work lead and ground clamp

Kit number	Description
428239	*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**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. See *Remove the power supply cover* on page 102.
   c. See *Remove the component barrier* on page 104.
   d. See *Detach the front panel* on page 106.
2. Loosen the strain relief nut on the work lead.
3. Remove and set aside the screw and washer from J22 on the power board (labeled “WORK LEAD”) that attaches the lead to the board.

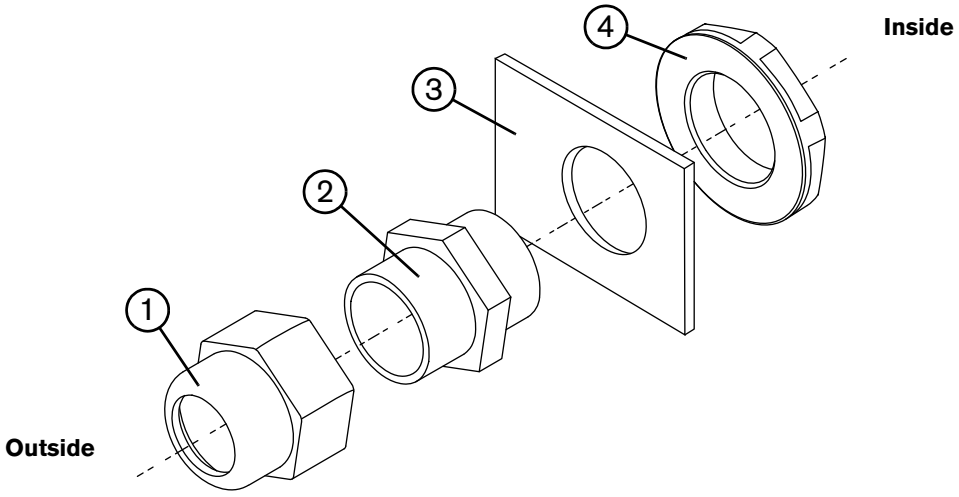
Figure 98



1 Front panel
2 Strain relief nut
3 Work lead
4 Work lead connection to power board (J22)

4. On the inside of the front panel, remove the strain relief's retaining nut.
5. Pull the work lead through the hole in the front panel.
6. Route the connector end of the new work lead through the hole in the front panel and then through the retaining nut.
7. On the inside of the front panel, tighten the retaining nut onto the strain relief. Tighten the retaining nut to 11.5 kg·cm (10 inch·pounds).

Figure 99



1 Strain relief nut (outside the power supply)
2 Strain relief
3 Front panel
4 Retaining nut (inside the power supply)

8. Attach the work lead to the power board at J22 using the screw and washer that you removed in step 2. Tighten to 23.0 kg-cm (20 inch-pounds).
9. Complete the following procedures:
   a. See *Reattach the front panel* on page 108.
   b. See *Install the component barrier* on page 105.
   c. See *Install the power supply cover* on page 103.
   d. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

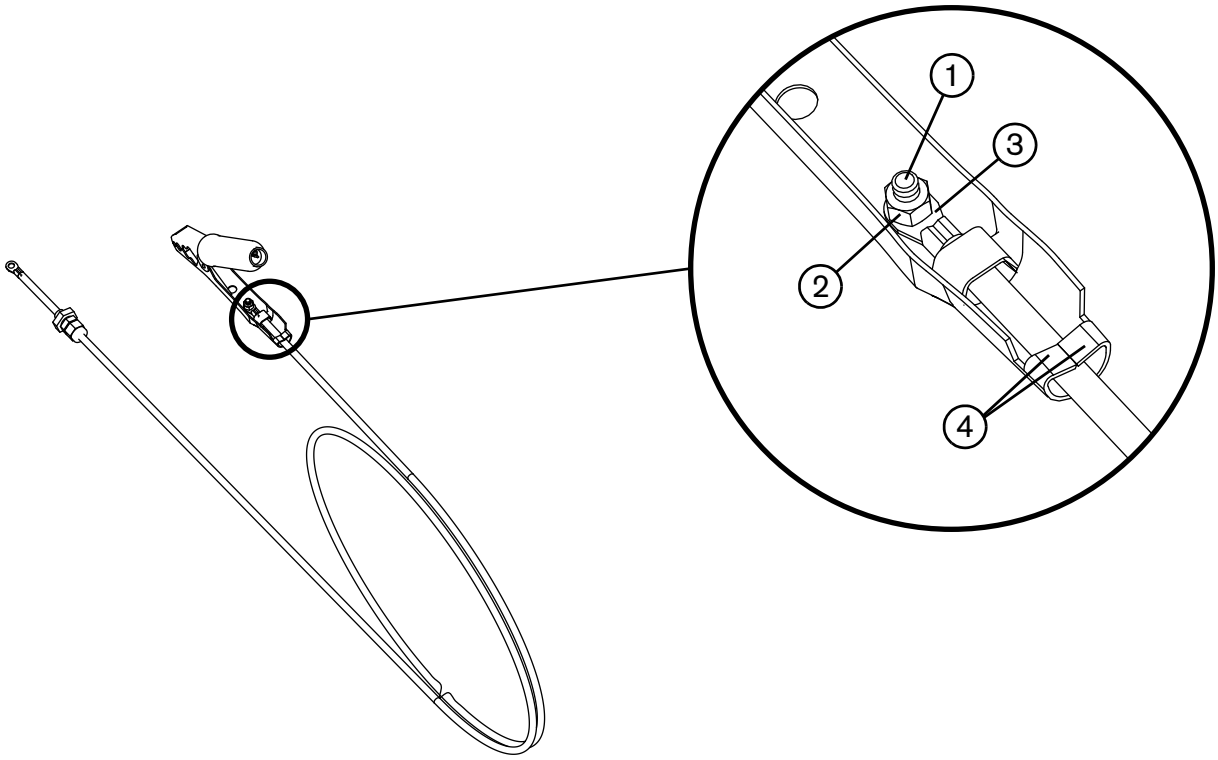
Remove and install the ground clamp

1. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Slide down the black plastic sleeve on the handle of the clamp where the work lead is connected.
3. Straighten out the bent tabs that hold the work lead in place. See *Figure 100*.
4. Loosen the screw 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 removed in the previous step and then through the slots inside the handle that act as a strain relief.
8. Line up the hole in the wire terminal 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. 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 100*.
11. Slide the plastic sleeve over the handle of the new ground clamp.

Figure 100



1 Screw through handle and work lead

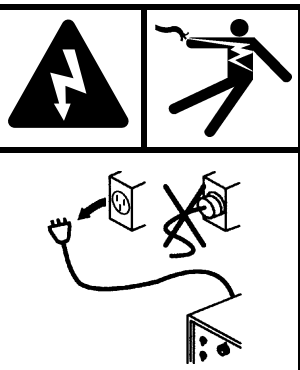
2 Kepnut

3 Ring terminal

4 Strain relief tabs

Section 7

Torch Component Replacement



WARNING!

ELECTRIC SHOCK CAN KILL

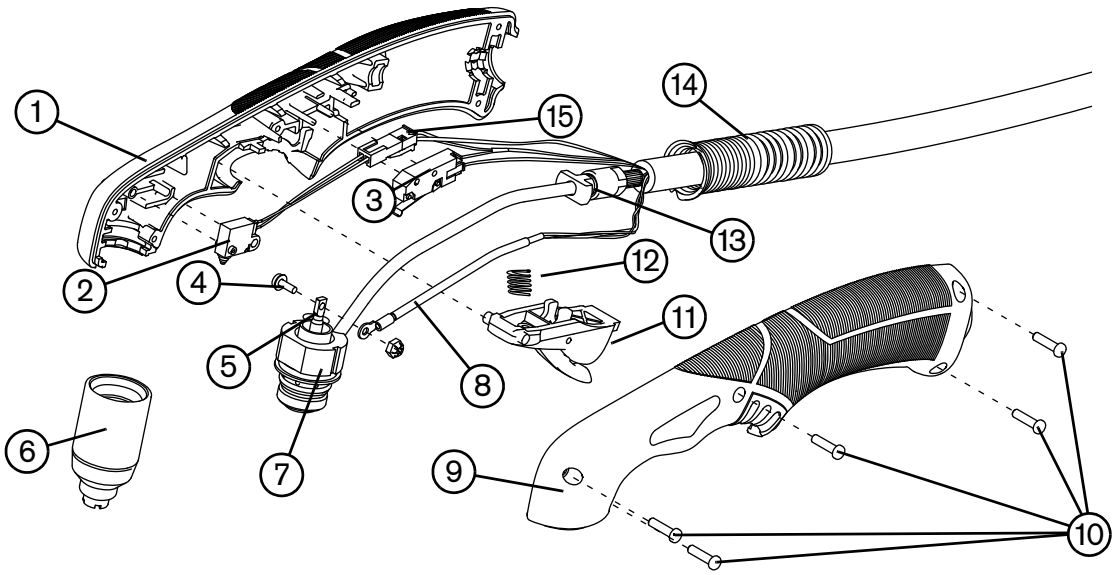
Disconnect electrical power before performing any maintenance.

See the *Safety and Compliance Manual* (80669C) for more safety precautions.

Disconnect the power, gas supply, and torch

1. Turn the plasma power supply switch to OFF (**O**).
2. Disconnect the power cord from the power source.
3. Disconnect the gas supply hose from the plasma power supply.

Figure 101



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

Replacing the handle

Kit	Description
428177	Kit: Duramax LT torch handle (includes handle screws)

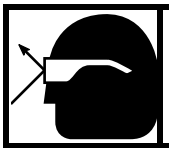
Remove the handle

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**), disconnect the power cord from the power source, and disconnect the gas supply.
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.

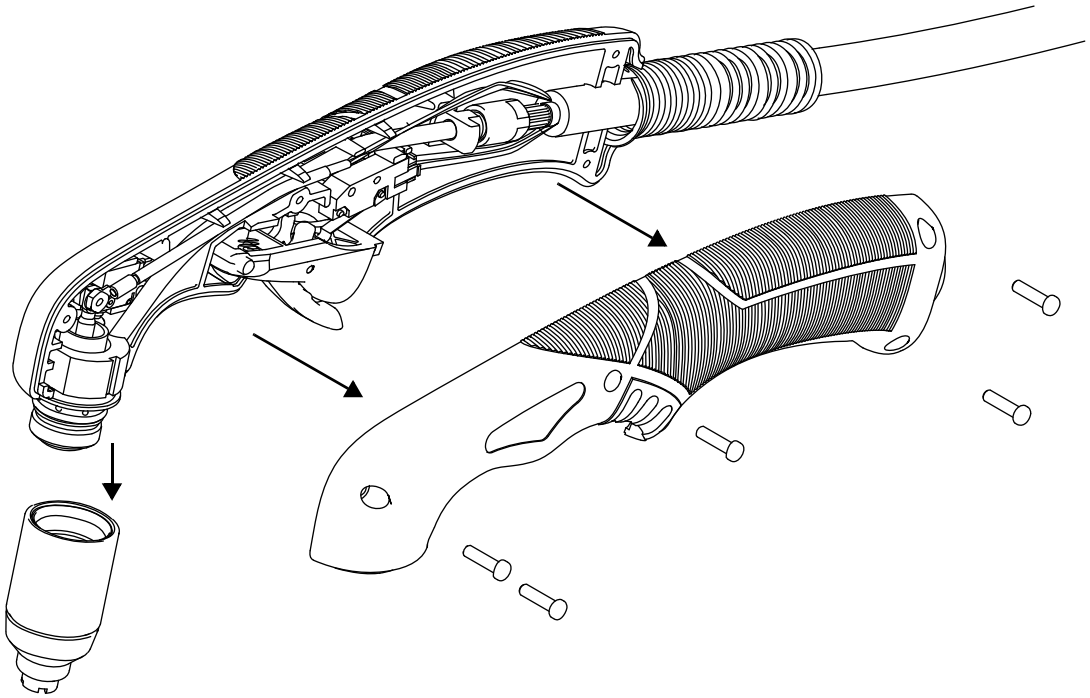


CAUTION!

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, lift the left side of the handle away from the torch.

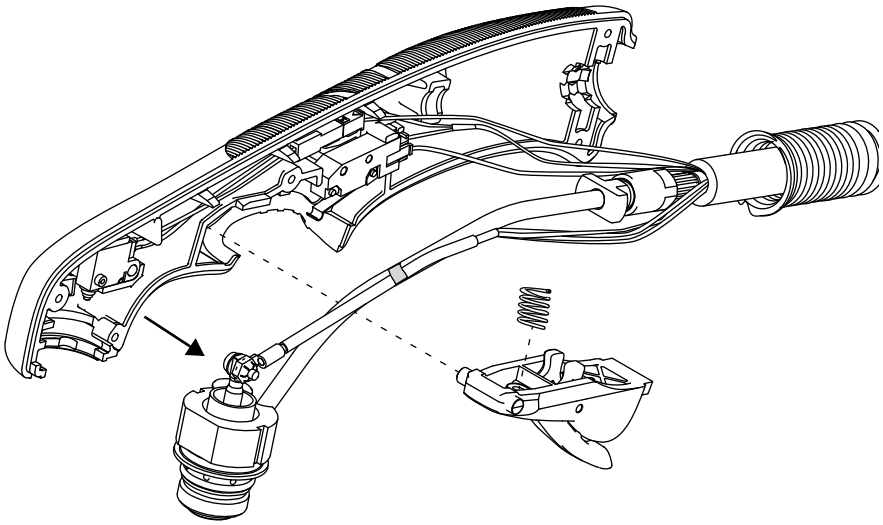
Figure 102



6. While holding the spring in place, slide the trigger and spring up and out of the handle. Set them aside.

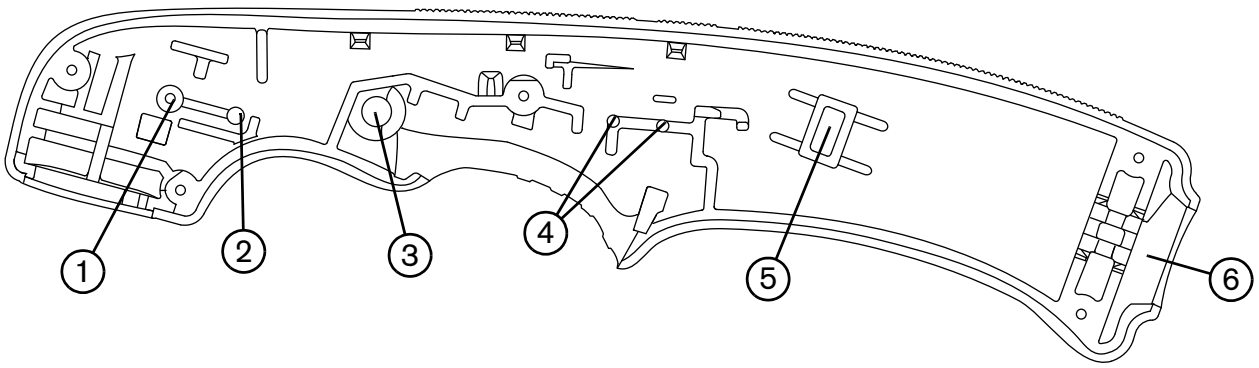
7. The torch body fits snugly into the right side of the handle. While holding the torch body in place, gently press the right side of the handle away from the torch body to remove it.

Figure 103



8. Slide the cap-sensor switch off its mounting post. (See Figure 105.)

Figure 104



1 Cap-sensor switch's post hole

2 Cap-sensor switch's mounting post

3 Trigger's pivot hole

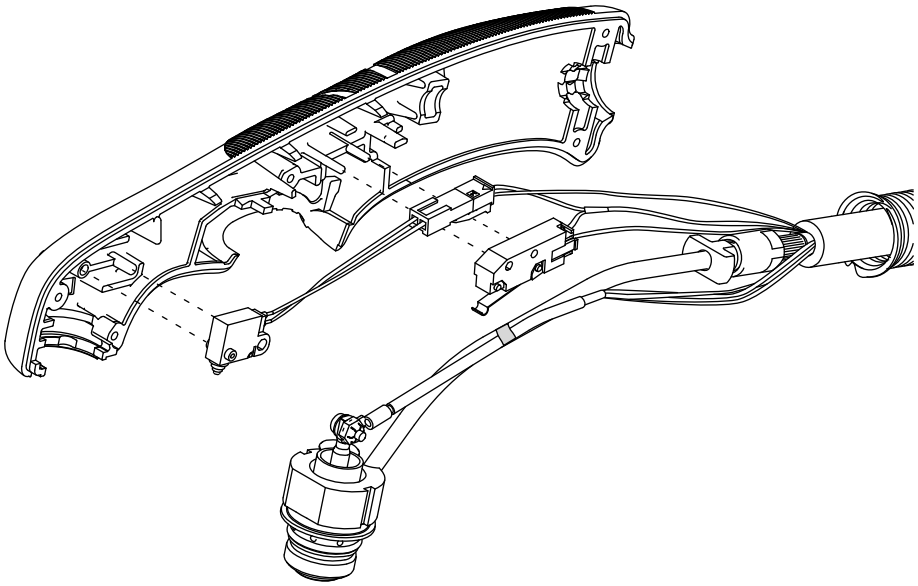
4 Start switch's mounting posts

5 Slot for the gas hose fitting's flange

6 Strain relief slot

9. Slide the start switch off the two mounting posts.

Figure 105



Install the handle

1. Lay the right side of the handle on a flat surface with the inside facing up.

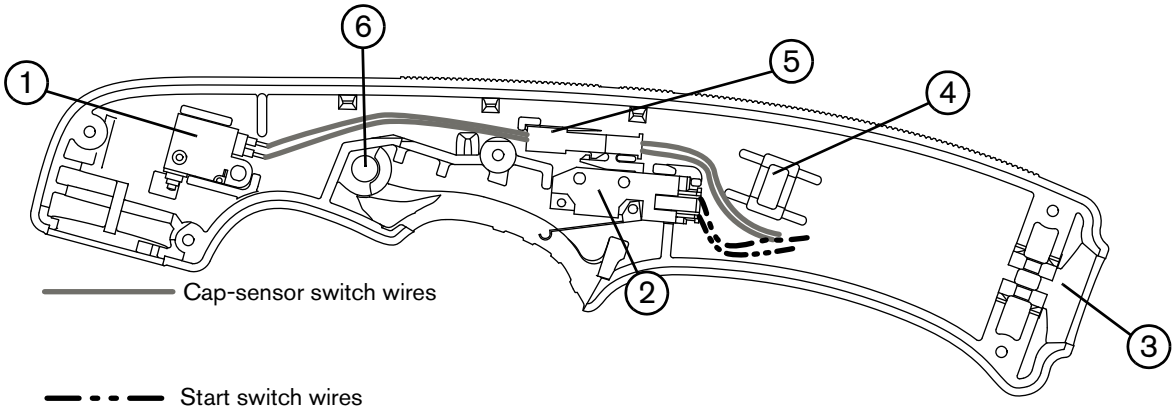
   If replacing the handles, apply the Duramax LT label to the left side of the torch handle.

2. Press the cap-sensor switch into its post hole and onto its mounting post. (See Figure 105.)

3. Route the cap-sensor wires as shown in Figure 106. 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 two 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 105 and Figure 106.)

Figure 106

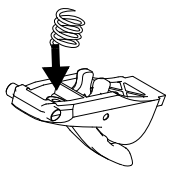


1 Cap-sensor switch
2 Start switch
3 Slot for torch lead strain relief
4 Slot for gas hose fitting's flange
5 Cap-sensor switch connector
6 Trigger's pivot hole

5. Press the torch body into the torch handle with the gas hose fitting's flange aligned with the slot in the handle.

6. Align the strain relief with the strain relief slot in the handle. (See Figure 106 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. Verify that the trigger pivots are both located in the trigger pivot holes. (See Figure 106.)

9. Install the handle screws.

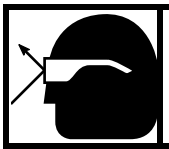
10. Install the consumables.

11. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Replacing the trigger assembly

Kit	Description
428156	Kit: Torch trigger and spring

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

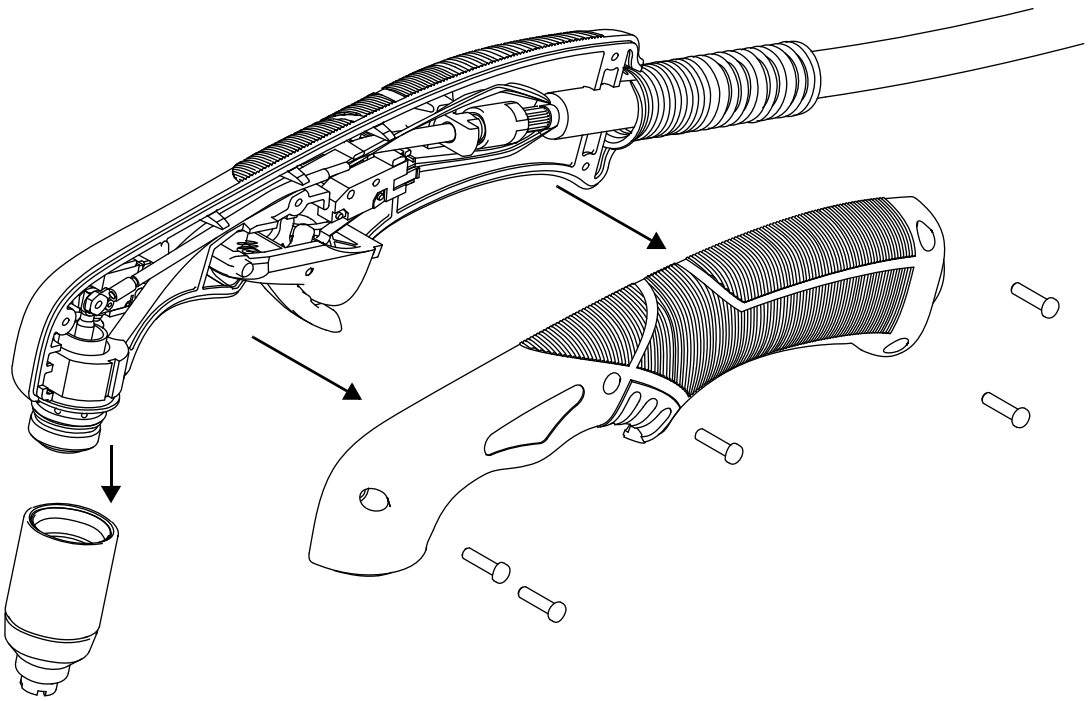


CAUTION!

Wear eye protection, as the trigger spring can launch out of the handle.

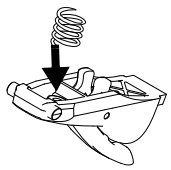
5. Being careful to keep the trigger spring from launching out of the handle, lift the left side of the handle away from the torch.

Figure 107



6. While holding the spring in place, slide the trigger and spring up and out of the handle. Set them aside.

7. Compress the trigger spring into the front half of the trigger. Slide the trigger and spring into place.



8. Making sure that the handle does not pinch the wires, align the left half of the handle with the right half. Verify that the trigger pivots are both located in the trigger pivot holes. (See Figure 106 on page 192.)

9. Install the handle screws.

10. Install the consumables.

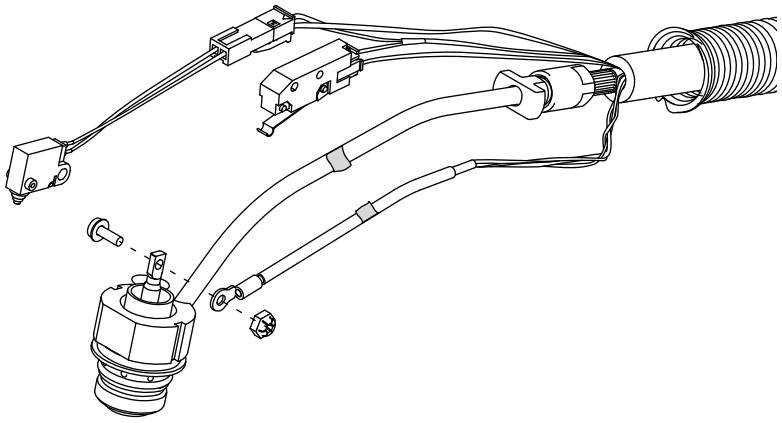
11. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Replacing the torch body

Kit	Description
428178	Kit: Duramax LT torch body (includes O-ring)

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. Remove all components from the torch. See Remove the handle on page 189.
2. Remove the screw that attaches the torch power wire to the torch body. Set the nut and screw aside.
3. Carefully cut the tape that binds the torch power wire to the torch body. Remove and discard the tape.

Figure 108



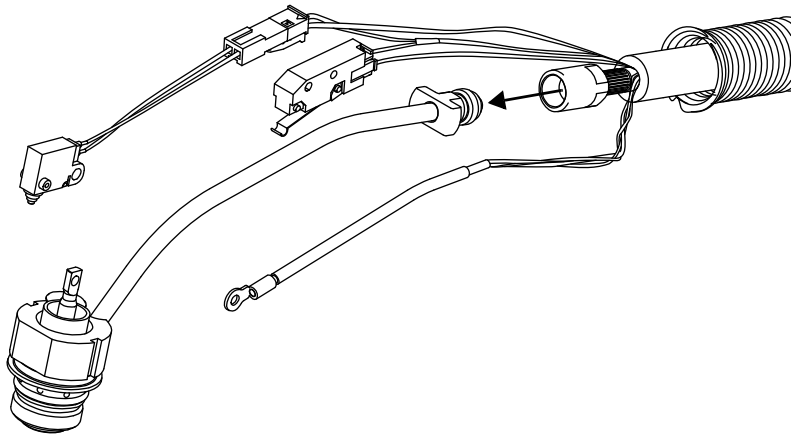
4. Use two wrenches to loosen the gas fitting that attaches the torch body to the torch lead.



CAUTION!

Always use two wrenches to properly loosen and tighten the hex nuts and bolts mentioned in these procedures.

Figure 109



5. Thread the 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 terminal is snug against the plunger. (See Figure 108 on page 194 for the screw installation order. It is important that the screw be installed as shown.)

7. Using the tape provided in the kit, bind the torch power wire to the torch body above the start switch. Make sure the wire runs next to the torch body, not above or below it.

8. Complete the following procedures:

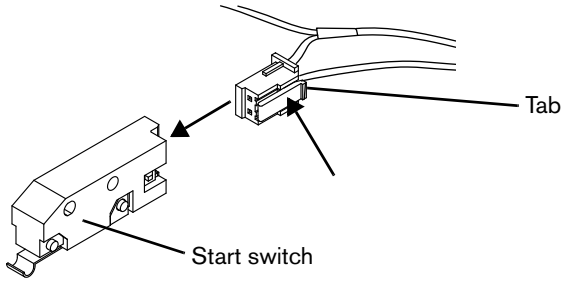
   a. Install all of the torch components that you removed. See Install the handle on page 192.

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

Replacing the start switch

Kit	Description
428162	Kit: Torch start switch

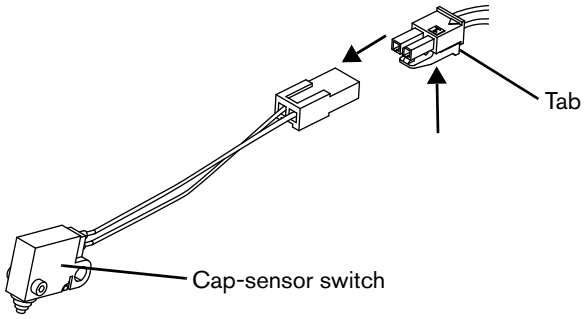
1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. Remove all components from the torch. See Remove the handle on page 189.
2. Disconnect the old start switch by pushing on the tab and 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 192.
   b. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).



Replacing 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**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. Remove all components from the torch. See Remove the handle on page 189.
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 192.
   b. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

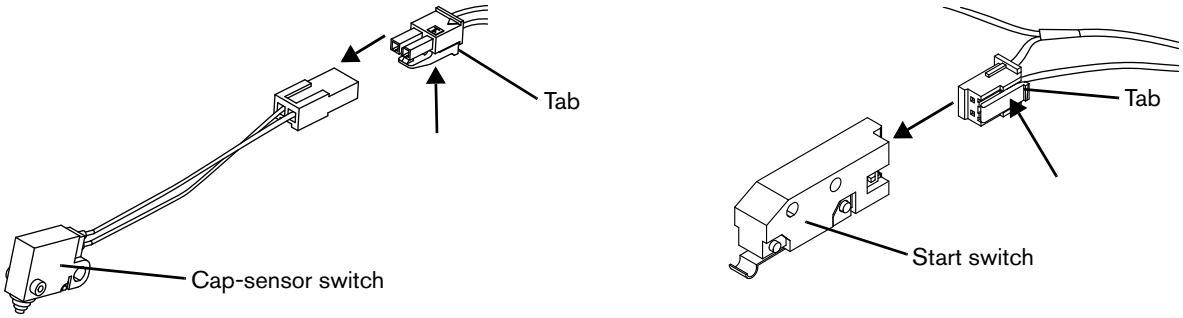


Replacing the torch lead

Kit	Description
428176	Kit: Duramax LT torch lead, 4.6 m (15 feet), with strain relief

1. Complete the following procedures:
   a. Set the power switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
   b. Remove all components from the torch. See Remove the handle on page 189.
2. Disconnect the cap-sensor switch and start switch.

Figure 110



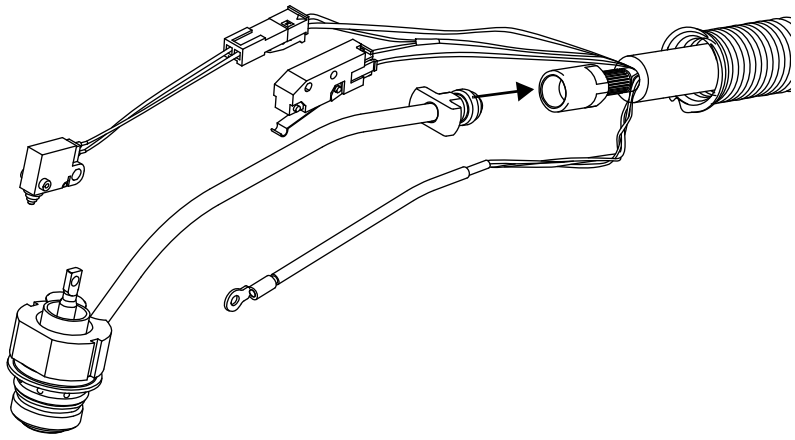
3. Remove the screw that attaches the torch's torch power wire to the torch body. Set the nut and screw aside. (See Figure 108 on page 194 for the location of the screw.)
4. Carefully cut the tape that binds the torch power wire to the torch body. Remove and discard the tape.
5. Use 2 wrenches to loosen 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 111



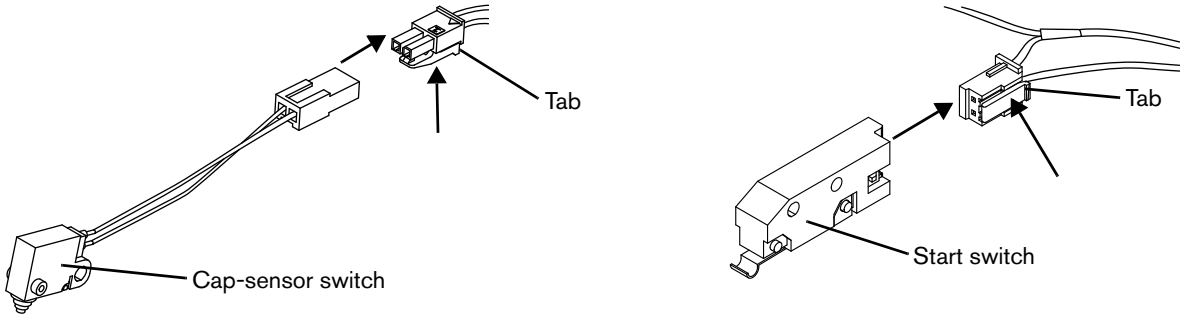
6. Thread the torch body into the new torch lead to finger tight plus 1/4 turn.

7. Tighten the screw that attaches the torch power wire to the torch body until the terminal is snug against the plunger. (See Figure 108 on page 194 for the screw position.)

8. Using the tape provided in the kit, bind the torch power wire to the torch body above the start switch. Make sure the wire runs next to the torch body, not above or below it.

9. Connect the cap-sensor switch and start switch.

Figure 112



10. Complete the following procedures:
    a. Install all of the torch components that you removed. See Install the handle on page 192.
    b. Reconnect the gas supply and power cord, and set the power switch to ON (**I**).

Section 8

Parts

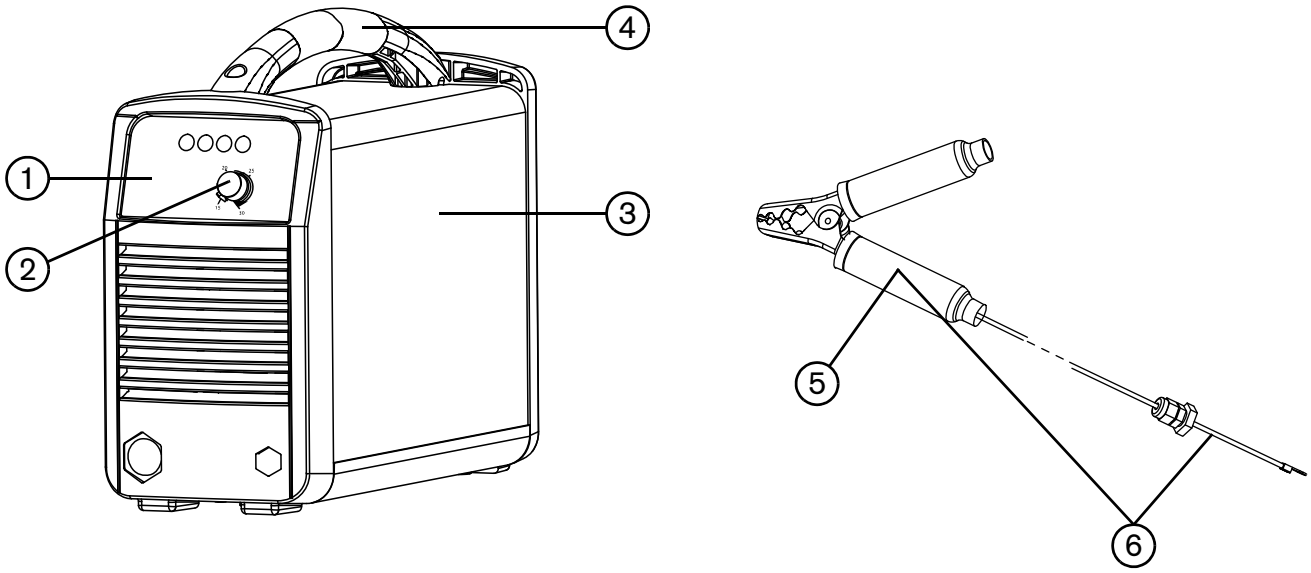
Use the Hypertherm kit and part numbers in this section to order replacement parts, consumables, and accessories for your Powermax30/33 XP power supply and Duramax LT hand torch.

You can find procedures explaining how to install these kits in *Power Supply Component Replacement* on page 101 and *Torch Component Replacement* on page 187.

For instructions on installing the consumables in the Duramax LT hand torch, see *Install the consumables* on page 54.

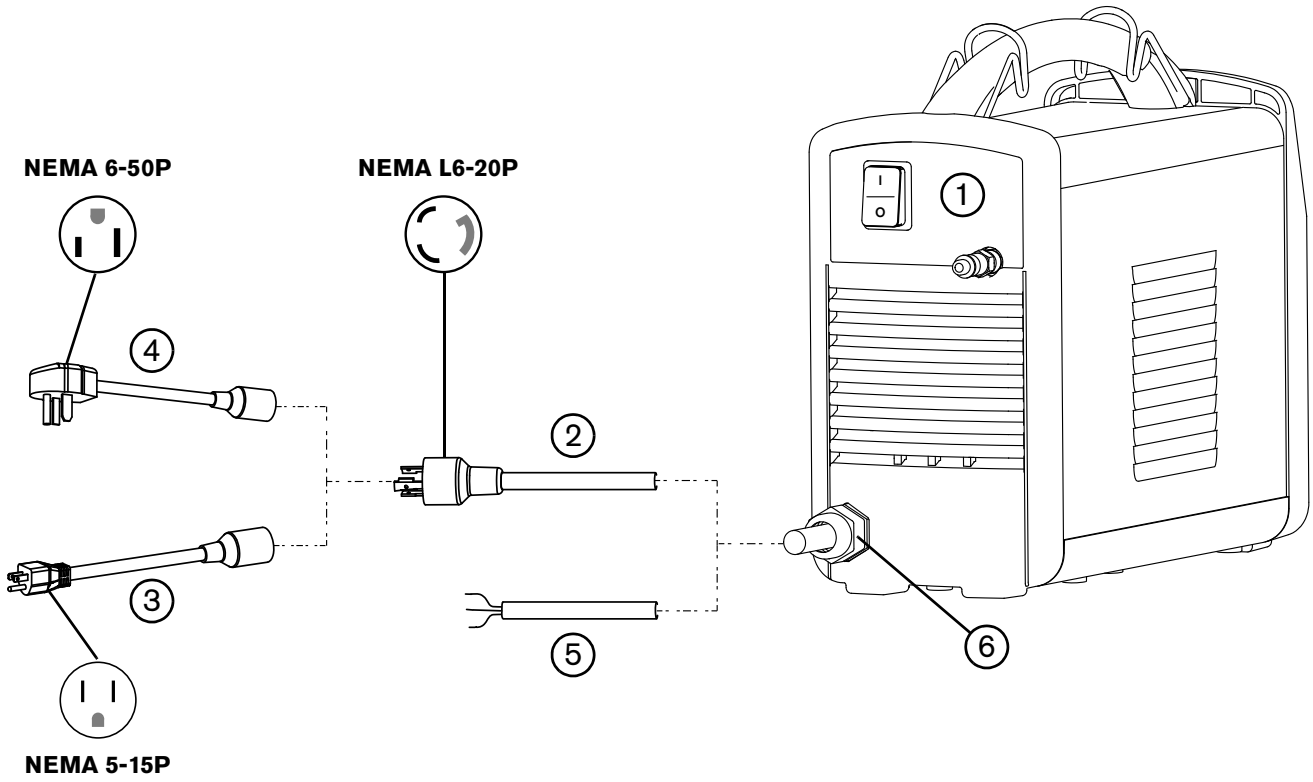
Power supply parts

Exterior, front



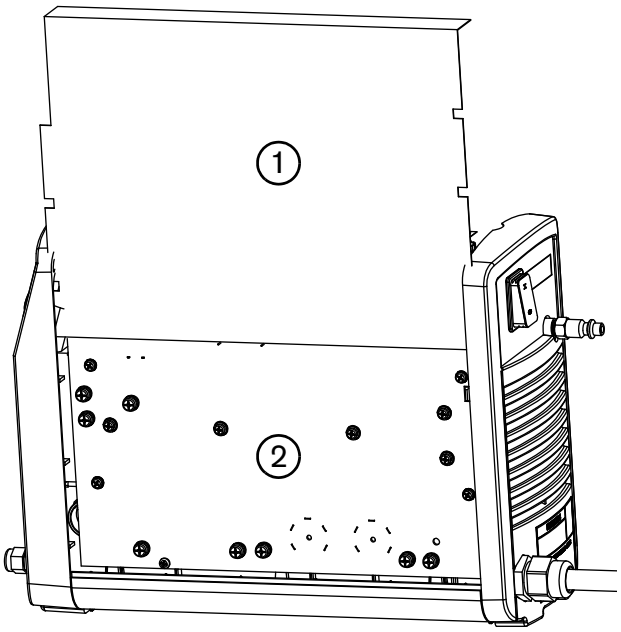
Item	Kit number	Description
	228096	Kit: Screws for the power supply cover and handle (not shown)
1	428219	Kit: Powermax30 XP Front panel
1	429298	Kit: Powermax33 XP front panel
2	428226	Kit: Current adjustment knob
3	428221	Kit: Powermax30 XP Power supply cover with labels, CSA
3	429296	Kit: Powermax33 XP cover with labels, CSA
3	428222	Kit: Power supply cover with labels, CSA, Built in America
3	428224	Kit: Powermax30 XP Power supply cover with labels, CE
3	429297	Kit: Powermax33 XP cover with labels, CE
3	428225	Kit: Power supply cover with labels, CCC
4	228099	Kit: Handle with screws
5	228561	Kit: Ground clamp
6	428239	Kit: Work lead, 4.6 m (15 feet), with ground clamp

Exterior, rear



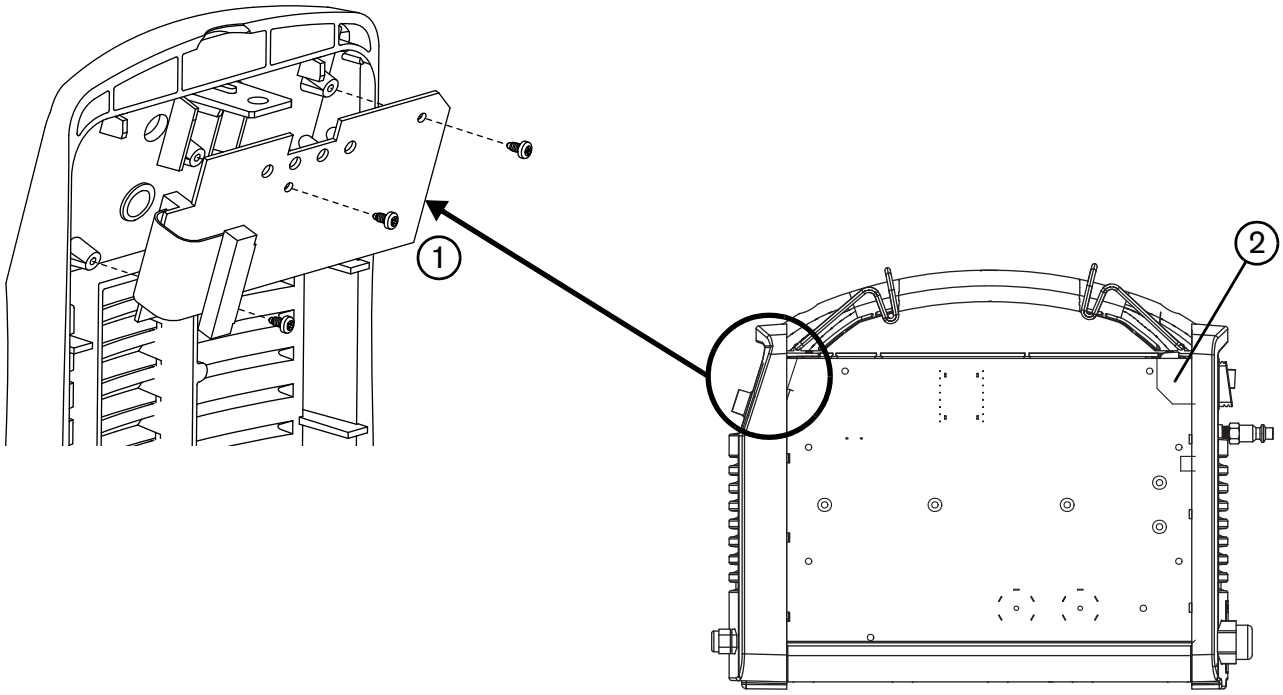
Item	Kit number	Description
1	428220	Kit: Rear panel
2	228210	Kit: CSA power cord with NEMA twist lock-style 240 V / 20 A plug, 1-phase, 3.0 m (10 feet)
3	229132	CSA power cord extension: 120 V / 15 A plug adapter
4	229133	CSA power cord extension: 240 V / 20 A plug adapter
5	228140	Kit: CE power cord, 1-phase, 3.0 m (10 feet) (plug not included)
5	428231	Kit: CCC power cord, 1-phase, 3.0 m (10 feet) (plug not included)
6	228143	Kit: Power cord strain relief

Interior, power board side



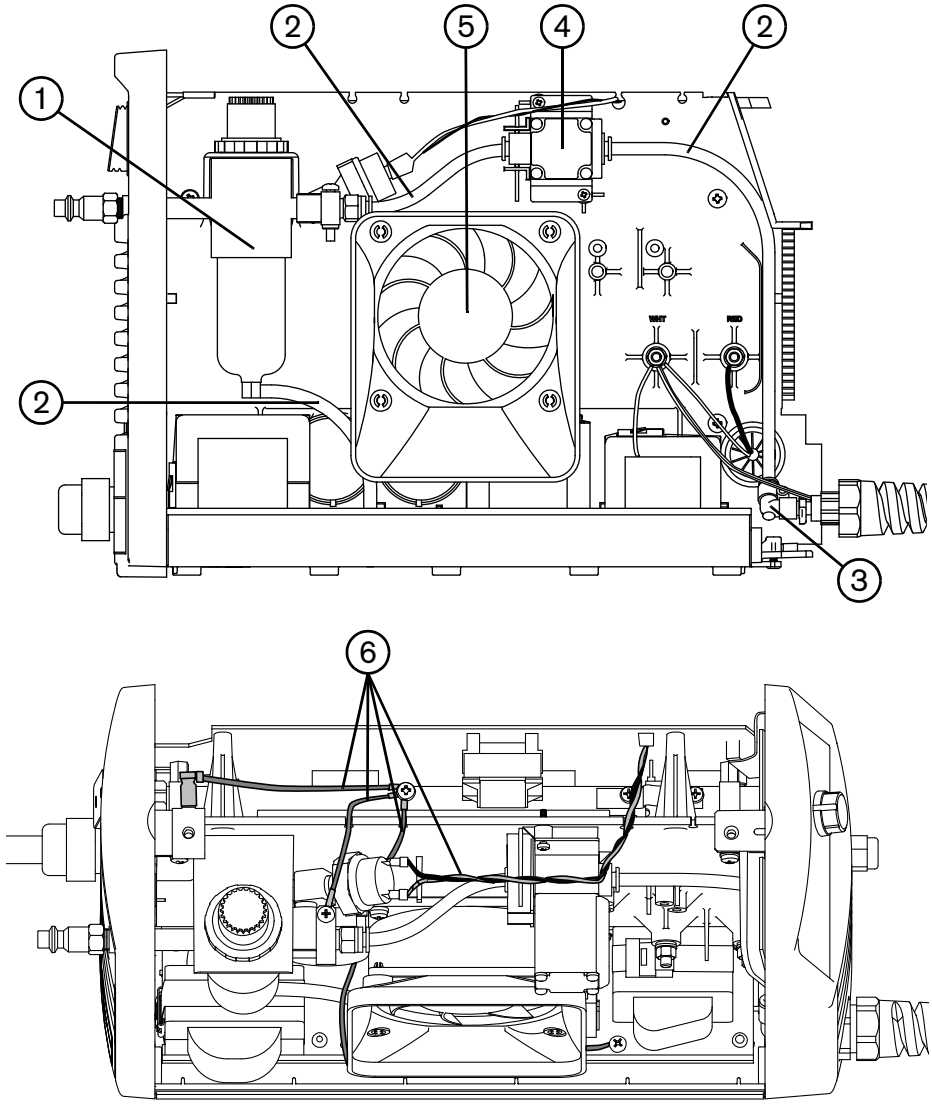
Item	Kit number	Description	Designator
1	228104	Kit: Component barrier	
2	428233	Kit: Power board, CSA (141304)	PCB2
2	428234	Kit: Power board, CE and CCC (141309)	PCB2
	428411	Kit: Replacement hex nut standoffs (5) for mounting power board to heatsink (not shown)	

Control board and power switch



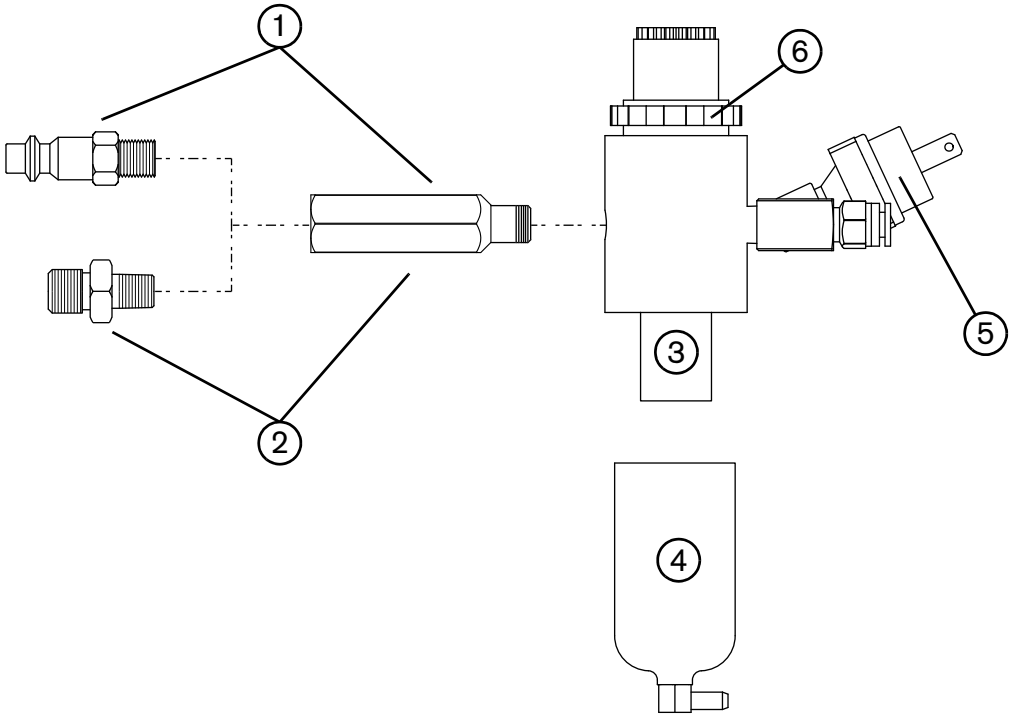
Item	Kit number	Description	Designator
1	428232	Kit: 30 XP Control board (141336)	PCB1
	429300	Kit: 33 XP Control board (10087783)	
2	428235	Kit: Power switch	S1

Interior, fan side



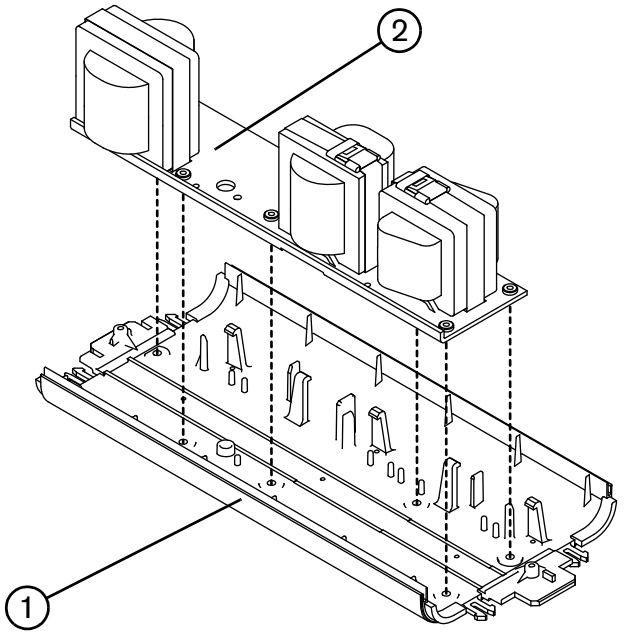
Item	Kit number	Description	Designator
1	228106	Kit: 30 XP Air filter/regulator with pressure switch	
	429295	Kit: 33 XP Air filter/regulator with pressure switch	
2, 3	228095	Kit: Hoses: drain hose, two gas supply hoses, elbow fitting	
3	428238	Kit: Replacement elbow fittings	
4	428173	Kit: Solenoid valve	V1
5	428236	Kit: Fan assembly with plenum	M1
6	228103	Kit: Wire group: pressure switch wire pair, 3 ground wires	

Air filter/regulator with pressure switch assembly



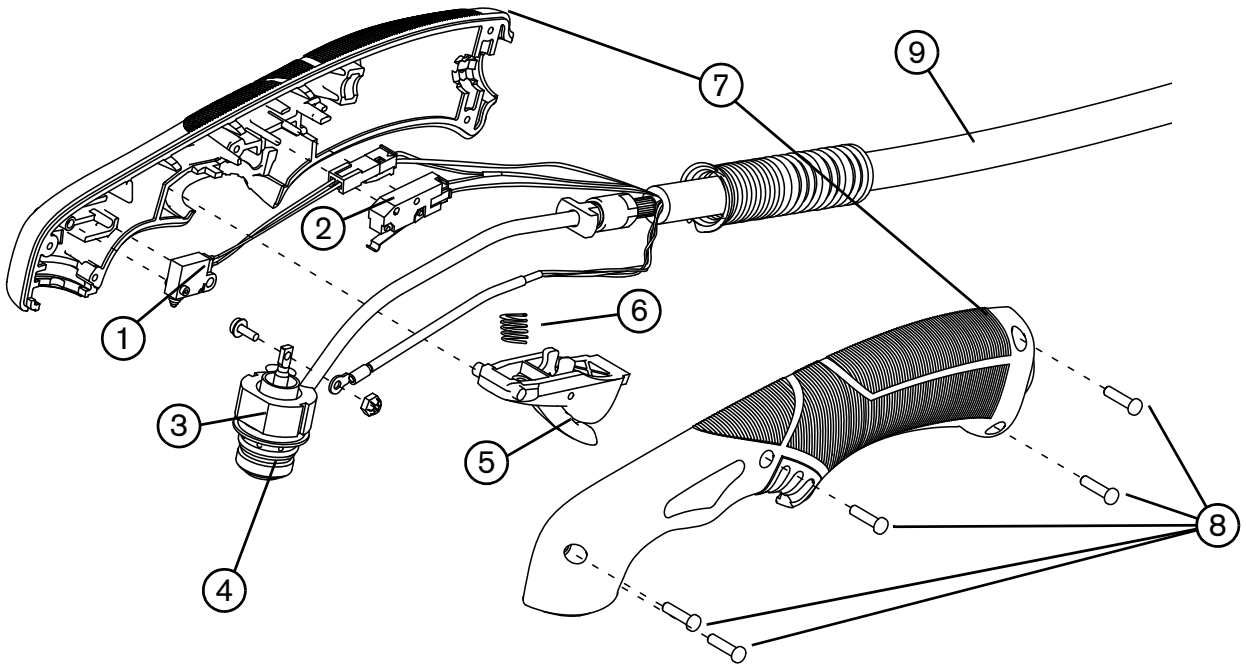
Item	Kit number	Description
	228106	Kit: 30 XP Air filter/regulator with pressure switch assembly
	429295	Kit: 33 XP Air filter/regulator with pressure switch assembly
1	428171	Kit: Air inlet fittings, CSA
2	428172	Kit: Air inlet fittings, CE/CCC
3	428237	Kit: Air filter element
4	428246	Kit: Air filter bowl
5	228688	Kit: Pressure switch
6	428262	Kit: Air filter retaining nut

Power supply base and magnetics



Item	Kit number	Description
1	228139	Kit: Plastic base
2	428230	Kit: Magnetics assembly

Duramax LT hand torch parts



You can replace the entire hand torch and lead assembly, or you can replace individual torch components.

Item	Kit number	Description
	428174*	Kit: Duramax LT hand torch assembly with 4.6 m (15 foot) lead
1	228109	Kit: Torch cap-sensor switch
2	428162	Kit: Torch start switch
3	428178	Kit: Duramax LT torch body (includes O-ring)
4	428179	Kit: Replacement O-rings for torch body
5	428156	Kit: Torch trigger and spring
6	428182	Kit: Replacement springs for torch trigger
7	428177	Kit: Duramax LT torch handle (includes handle screws)
8	428181	Kit: Duramax LT torch replacement handle screws
9	428176	Kit: Duramax LT torch lead, 4.6 m (15 feet), with strain relief

* The torch assembly includes one set of general-purpose (standard) consumables:

- Electrode (420120)
- Swirl ring (420211)
- Retaining cap (420114)
- Nozzle (420118)
- Shield (420116)

Duramax LT hand torch consumables

To order consumables for your Duramax LT torch, use the following part numbers.

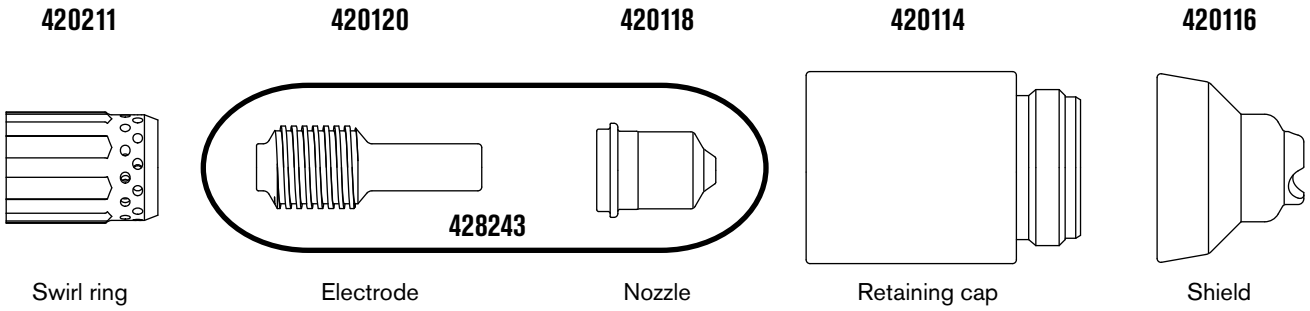
You can order packs of nozzles or electrodes, or you can order them combined as a kit:

- Use **420120** to order a pack of electrodes
- Use **420118** to order a pack of general-purpose (standard) nozzles
- Use **420117** to order a pack of FineCut nozzles
- Use **428243** to order a kit of 2 general-purpose (standard) nozzles with 2 electrodes
- Use **428244** to order a kit of 2 FineCut nozzles with 2 electrodes

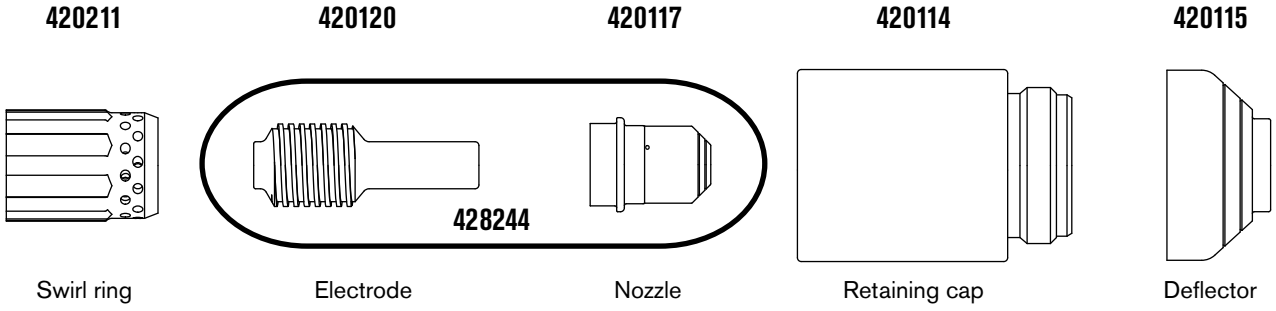
Replace the nozzle and electrode at the same time.

Use the same electrode, swirl ring, and retaining cap for both general-purpose (standard) and FineCut applications. Do not use the general-purpose nozzle with the deflector; do not use the FineCut nozzle with the shield.

General-purpose (standard) consumables



FineCut consumables



HyAccess consumables

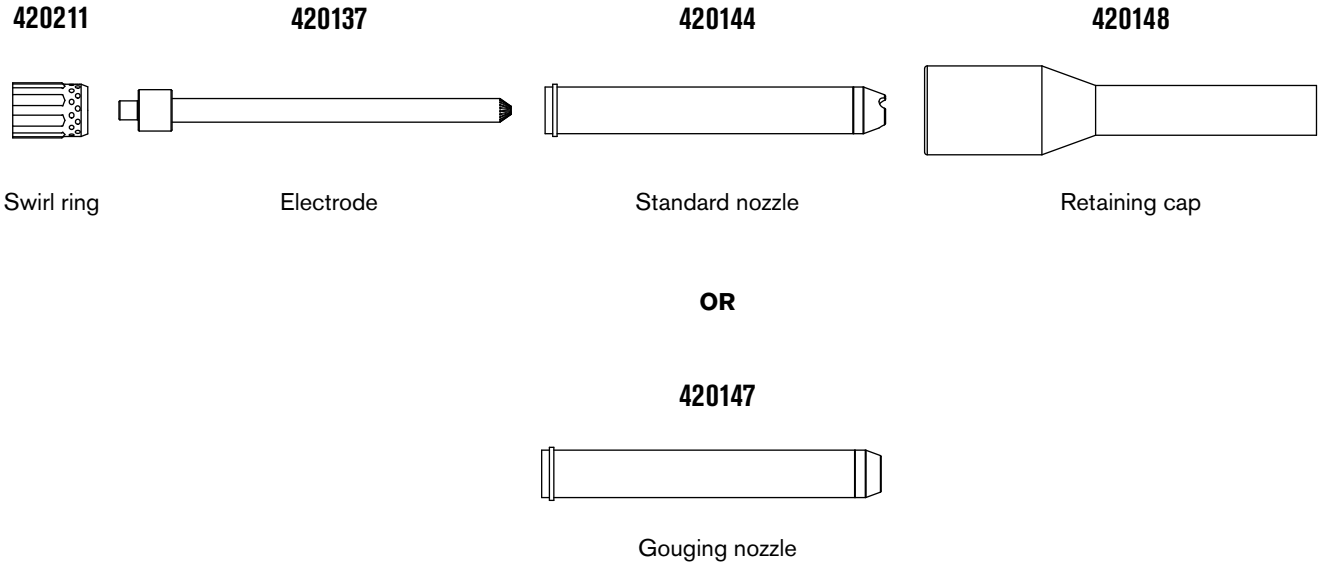
HyAccess consumables do not ship with the system. You can order each one separately or in a starter kit. They extend the reach of the general-purpose (standard) consumables by approximately 7.5 cm (3 inches).

Two HyAccess nozzles are available:

- **420144** – Standard nozzle designed for a broad range of cutting applications
- **420147** – Gouging nozzle designed specifically for gouging

When the tip of the nozzle wears out, replace the entire nozzle.

Replace the nozzle and electrode at the same time.



The **428337** starter kit contains:

- 2 HyAccess electrodes
- 1 HyAccess cutting nozzle
- 1 HyAccess gouging nozzle
- 1 swirl ring
- 1 HyAccess retaining cap

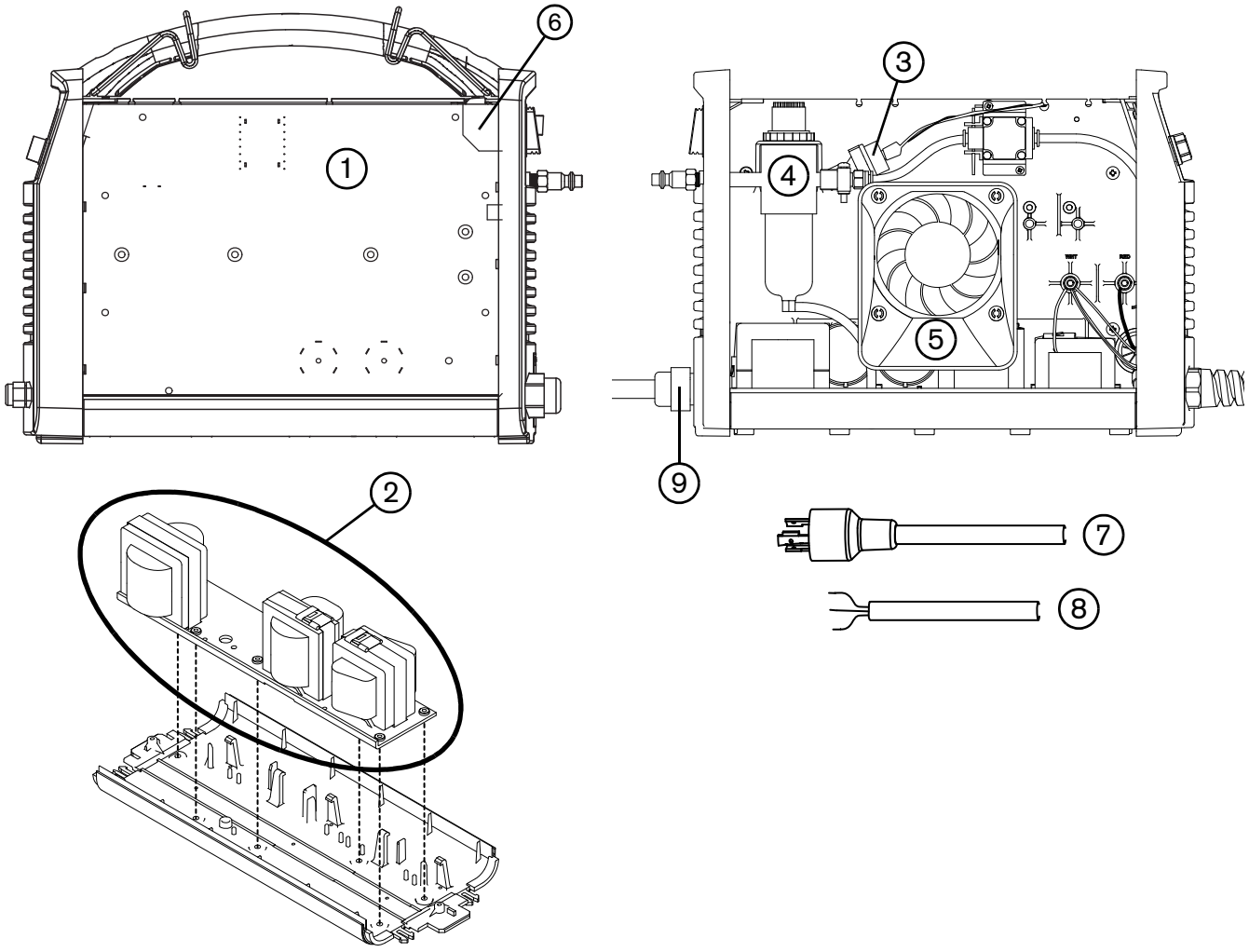
The standard Powermax30/33 XP swirl ring is compatible with the HyAccess consumables.

Accessory parts

Part number	Description
127102	Basic plasma (circle) cutting guide
027668	Deluxe plasma (circle) cutting guide
127144	Dust cover
127410	Carrying case
428337	Kit: HyAccess consumables starter kit
024877	Leather torch lead cover, black with Hypertherm logo, 7.6 m (25 feet)
127217	Shoulder strap
128647	Kit: Eliminizer air filtration
127169	Leather cutting gloves
127416	Protective glasses, shade 5 lens
127103	Face shield, shade 8 lens
127239	Face shield, shade 6 lens
127105	Replacement lens for face shield, shade 8
127243	Replacement lens for face shield, shade 6
128836	Thermal grease, 1/8 ounce
027055	Silicone lubricant, 1/4 ounce

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, CSA, and CCC certification.



Item	Kit number	Description
1	428233	Kit: Power board (CSA) and subcomponents
1	428234	Kit: Power board (CE and CCC) and subcomponents
2	428230	Kit: Magnetics assembly
3	228688	Kit: Pressure switch
4	228106	Kit: Air filter/regulator with pressure switch
5	428236	Kit: Fan assembly (includes plenum)
6	428235	Kit: Power switch

Item	Kit number	Description
7	228210	Kit: CSA power cord with NEMA twist lock-style 240 V/20 A plug, 1-phase, 3.0 m (10 feet)
8	228140	Kit: CE power cord, 1-phase, 3.0 m (10 feet) (plug not included)
8	428231	Kit: CCC power cord, 1-phase, 3.0 m (10 feet) (plug not included)
9	228143	Kit: Power cord strain relief

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 202
228561	Kit: Ground clamp	page 202
428239	Kit: Work lead, 4.6 m (15 feet) (includes ground clamp)	page 202
428235	Kit: Power switch	page 204
428232	Kit: 30XP Control board	page 204
429300	Kit: 33 XP Control board (10087783)	page 204
428233	Kit: Power board, CSA	page 204
428234	Kit: Power board, CE and CCC	page 204
428173	Kit: Solenoid valve	page 206
228688	Kit: Pressure switch	page 206
228106	Kit: 30XP Air filter/regulator with pressure switch	page 206
429295	Kit: 33XP Air filter/regulator with pressure switch	page 202
428237	Kit: Air filter element	page 206
428179	Kit: Replacement O-rings for torch body	page 209
428177	Kit: Duramax LT torch handle	page 209
428181	Kit: Duramax LT torch handle screws	page 209
428156	Kit: Torch trigger and spring	page 209
428182	Kit: Spring for torch trigger	page 209
428162	Kit: Torch start switch	page 209
228109	Kit: Torch cap-sensor switch	page 209
428174	Kit: Duramax LT hand torch assembly with 4.6 m (15 foot) lead	page 209
428176	Kit: Duramax LT torch lead, 4.6 m (15 feet)	page 209

128836	Thermal grease, 1/8 ounce	page 212
027055	Silicone lubricant, 1/4 ounce	page 212

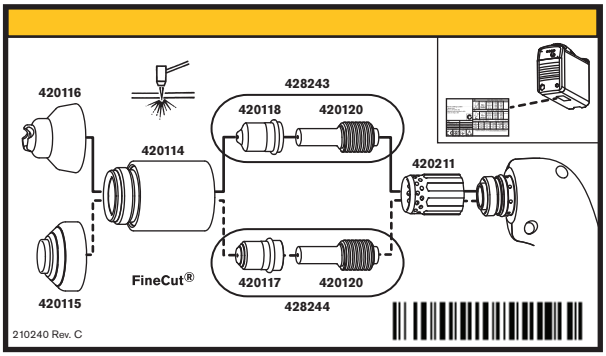
Powermax30/33 XP labels

Kit number	Description
428215	Kit: Powermax30 XP labels, CSA
428217	Kit: Powermax30 XP labels, CE
428218	Kit: Powermax30 XP labels, CCC
429273	Kit: Powermax33 XP labels, CSA
429274	Kit: Powermax33 XP labels, CE

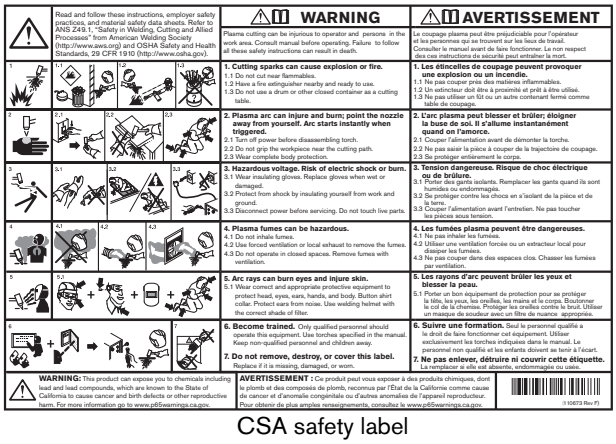
The label kits include:

- Consumables label
- Appropriate safety labels
- Front and side decals

The following illustrations show the consumables label and safety labels.



Consumables label



CSA safety label



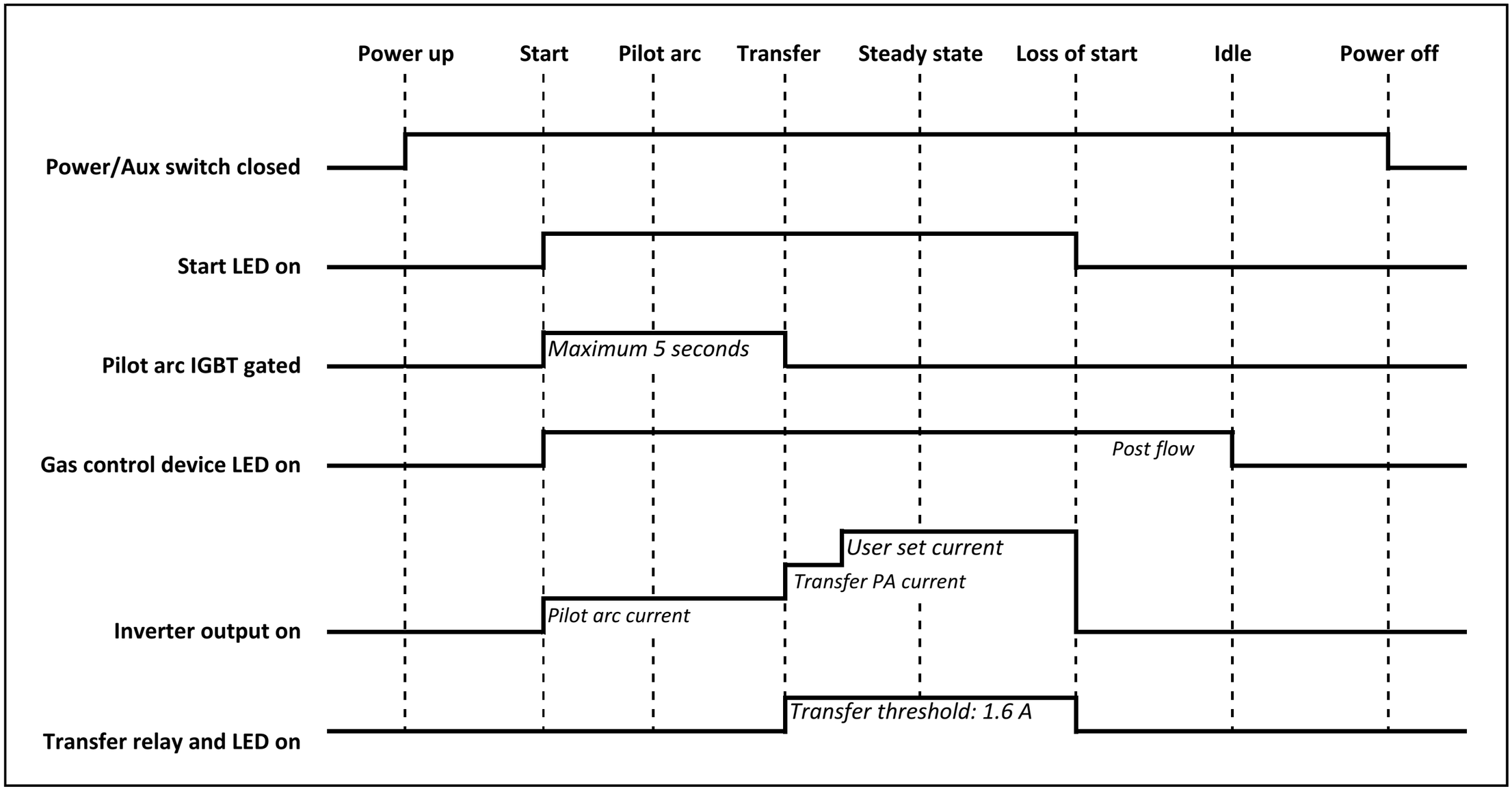
CE/CCC safety label

Section 9
Wiring Diagrams

This section contains the following diagrams:

- Generic timing chart
- Powermax30 XP/33 XP schematic

Generic timing chart



Powermax30 XP/33 XP schematic

