Hypertherm®

Powermax65/85 SYNC™

Service Parts and Procedures Guide



810440 – REVISION 0.1

ENGLISH



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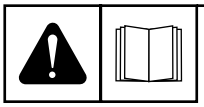
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For training and education resources, go to the Hypertherm Cutting Institute (HCI) online at www.hypertherm.com/hci.



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

1 Before You Begin 11

2 Service Parts 13

Plasma power supply exterior, front 14
Work leads 15
Powermax65 SYNC 15
Powermax85 SYNC 16
Plasma power supply exterior, rear 17
Power cord and strain relief 18
Rear panel 19
Plasma power supply interior, rear 20
Plasma power supply interior, fan side 21
Fan and fan shroud 23
Plasma power supply interior, front 24
Front panel 25
Plasma power supply interior, power PCB side 26
Capacitors and DSP PCB 27
Plasma power supply interior, heatsink 28
65 A/85 A heatsink diode bridges 28
65 A/85 A heatsink IGBTs and thermal sensor 30
IGBT tester 31
65 A/85 A heatsink resistors 32
Power supply interior, magnetics 33

Machine interface and RS-485 serial interface upgrade kits 35
External cables for machine interface receptacle and RS-485 serial interface receptacle .. 36
Machine interface cables 36
RS-485 serial interface cables 37
Powermax65/85/105 SYNC labels 38
Cartridge labels 38
CSA warning label 39
Descriptions of warning label icons 40
Parts necessary for safety 41
Recommended spare parts 42
Find replacement parts by part number 44

3 Service Procedures for the Cover, Panels, and Connectors 47

Tools necessary for this section 48
More tools necessary for some procedures 48
Replace the plasma power supply cover and component barrier 49
Remove the plasma power supply cover and component barrier 49
Install the component barrier and plasma power supply cover 51
Replace the end panel bracket 53
Remove the end panel bracket 53
Install the end panel bracket 54
Loosen and attach the front panel 55
Loosen the front panel 55
Attach the front panel 56
Loosen and attach the rear panel 57
Loosen the rear panel 57
Attach the rear panel of the plasma power supply 58
Replace the front panel 59
Remove the front panel 59
Install the front panel 59
Replace the rear panel 60
Remove the rear panel 60
Install the rear panel 63
Replace the work lead connector 67
Remove the work lead connector 67
Install the work lead connector 67
Replace the work lead receptacle 69
Remove the work lead receptacle 69
Install the work lead receptacle 70
Replace the torch quick-disconnect receptacle 71
Remove the torch quick-disconnect receptacle 71
Install the torch quick-disconnect receptacle 73

Replace the power switch 75
Remove the power switch 75
Install the power switch 76

4 Service Procedures for the Gas Line 79

Tools necessary for this section 80
More tools necessary for some procedures 80
Replace the air filter bowl and filter element 81
Remove the air filter bowl and filter element 81
Replace the air filter bowl, O-ring, and filter element 82
Install the air filter bowl and filter element 83
Replace the air filter assembly 83
Remove the air filter assembly 83
Install the air filter assembly 84
Replace the fan and fan shroud 85
Remove the fan and fan shroud 85
Install the fan and fan shroud 87
Replace the solenoid valve 88
Remove the solenoid valve 88
Install the solenoid valve 89
Replace the gas tubes 91
Remove the gas tubes 91
Install the gas tubes 91
Replace the 90° gas tube fitting 92

5 Service Procedures for the PCBs and Related Components 93

Tools necessary for this section 94
More tools necessary to for some procedures 94
Replace the DSP PCB 95
Replace the control PCB and the ribbon cable 96
Remove the control PCB and the ribbon cable 96
Install the control PCB and the ribbon cable 97
Replace the power PCB 98
Remove the power PCB 98
Install the power PCB 101
Replace the heatsink components 105
Replace the output diode bridge 106
Replace the input diode bridge 108
Replace the pilot arc IGBT 110
Replace the inverter IGBT and the thermal sensor 112

Replace the PFC IGBT 114
Replace the snubber resistors and the damper resistor 116
How to clean the heatsink and apply thermal grease to the heatsink components 118
Remove the grease from the heatsink 118
Apply the grease to the heatsink component 118
Replace the power PCB capacitors 119
Replace the bulk capacitors 121
Remove the bulk capacitors 121
Install the bulk capacitors 123

6 Service Procedures for the Magnetics 125

Tools necessary for this section 126
Replace the output inductor 127
Remove the output inductor 127
Install the output inductor 128
Replace the transformer 130
Remove the transformer 130
Install the transformer 131
Replace the PFC inductor 134
Remove the PFC inductor 134
Install the PFC 135

1 Before You Begin

This manual has service parts and procedures for the plasma power supply only. For torch service parts and procedures, refer to *SmartSYNC™ Service Parts and Procedures Guide* (810460).

This manual helps you do the following:

- **Install replacement parts that you already have**
  - Refer to Service Procedures for the Cover, Panels, and Connectors on page 47.
  - Refer to Service Procedures for the Gas Line on page 79.
  - Refer to Service Procedures for the PCBs and Related Components on page 93.
  - Refer to Service Procedures for the Magnetics on page 125.
- **Find the part number that you need to order**
  - Refer to Service Parts on page 13.
  - Refer to Find replacement parts by part number on page 44.

For assistance with repairing or replacing internal components, do the following:

1. Get the serial number for your system from the data plate that is on the rear panel of the plasma power supply.
2. Contact your Hypertherm distributor or authorized repair facility.
3. Contact the nearest Hypertherm office shown in the front of this manual.

For related information, refer to the following documents:

- *Powermax65/85/105 SYNC Troubleshooting Guide* (810430)
- *SmartSYNC™ Service Parts and Procedures Guide* (810460) (hand torches and mechanized torches for Powermax SYNC)

The most recent revisions of technical documentation are available at www.hypertherm.com/docs.

Technical documentation is current as of the date of its release. Subsequent revisions are possible.

2 Service Parts

NOTICE

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.

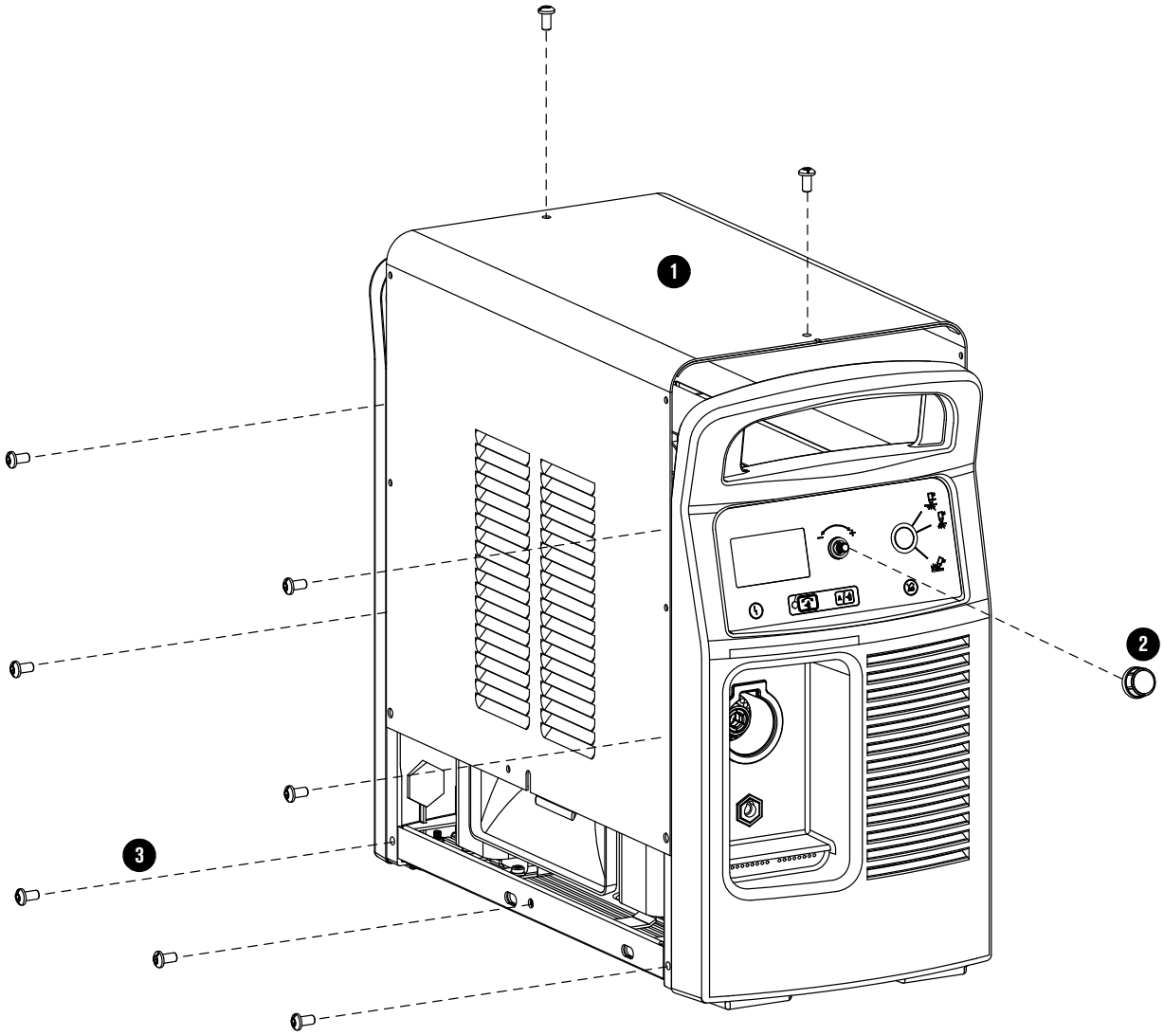
This section gives a list of service parts for the plasma power supply. Many parts come as a kit that contains 2 or more items.

To find part numbers with kit contents, by location, refer to the following:

- Plasma power supply exterior, front on page 14
- Plasma power supply exterior, rear on page 17
- Plasma power supply interior, rear on page 20
- Plasma power supply interior, fan side on page 21
- Plasma power supply interior, front on page 24
- Plasma power supply interior, power PCB side on page 26
- Plasma power supply interior, heatsink on page 28
- Power supply interior, magnetics on page 33
- Machine interface and RS-485 serial interface upgrade kits on page 35
- Powermax65/85/105 SYNC labels on page 38

To see a list of parts in order by part number, refer to Find replacement parts by part number on page 44.

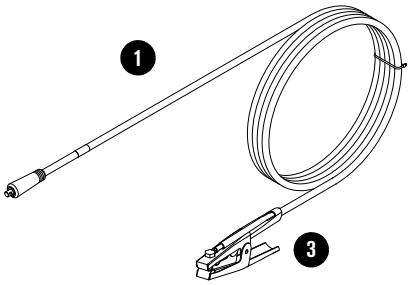
Plasma power supply exterior, front



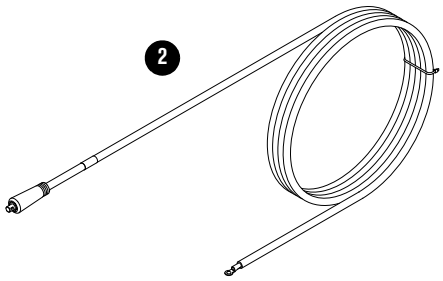
Item	Part number	Description
1	528009	Kit: Powermax65 SYNC plasma power supply cover with labels, CSA (no screws included)
1	528010	Kit: Powermax65 SYNC plasma power supply cover with labels, CE/CCC (no screws included)
1	528011	Kit: Powermax85 SYNC plasma power supply cover with labels, CSA (no screws included)
1	528012	Kit: Powermax85 SYNC plasma power supply cover with labels, CE/CCC (no screws included)
2	428143	Kit: Adjustment knob only
3	428141	Kit: Replacement screws (16) for plasma power supply cover

For replacement procedures, refer to Replace the plasma power supply cover and component barrier on page 49.

Work leads



Hand clamp



Ring terminal

NOTICE

Work leads are approved for specific amperages, lengths, and connectors. Make sure that you use a work lead that is approved for your plasma power supply. The amperage of a work lead is identified near the rubber boot of the work lead connector.

Powermax65 SYNC

Item	Part number	Description
1	223125	65 A work lead with hand clamp, 7.6 m (25 foot)
1	223126	65 A work lead with hand clamp, 15 m (50 foot)
1	223033	65 A / 85 A work lead with hand clamp, 23 m (75 foot)
2	223200	65 A work lead with ring terminal, 7.6 m (25 foot)
2	223201	65 A work lead with ring terminal, 15 m (50 foot)
2	223211	65 A / 85 A work lead with ring terminal, 23 m (75 foot)
3	008337	Ground hand clamp: 300 A
	228709	Kit: Work lead connector

You can make a work lead for the Powermax65 SYNC and Powermax85 SYNC by installing the 008337 hand clamp on the approved amperage ring terminal work lead from Hypertherm. Make sure that you use a work lead that is the correct amperage for your plasma power supply.

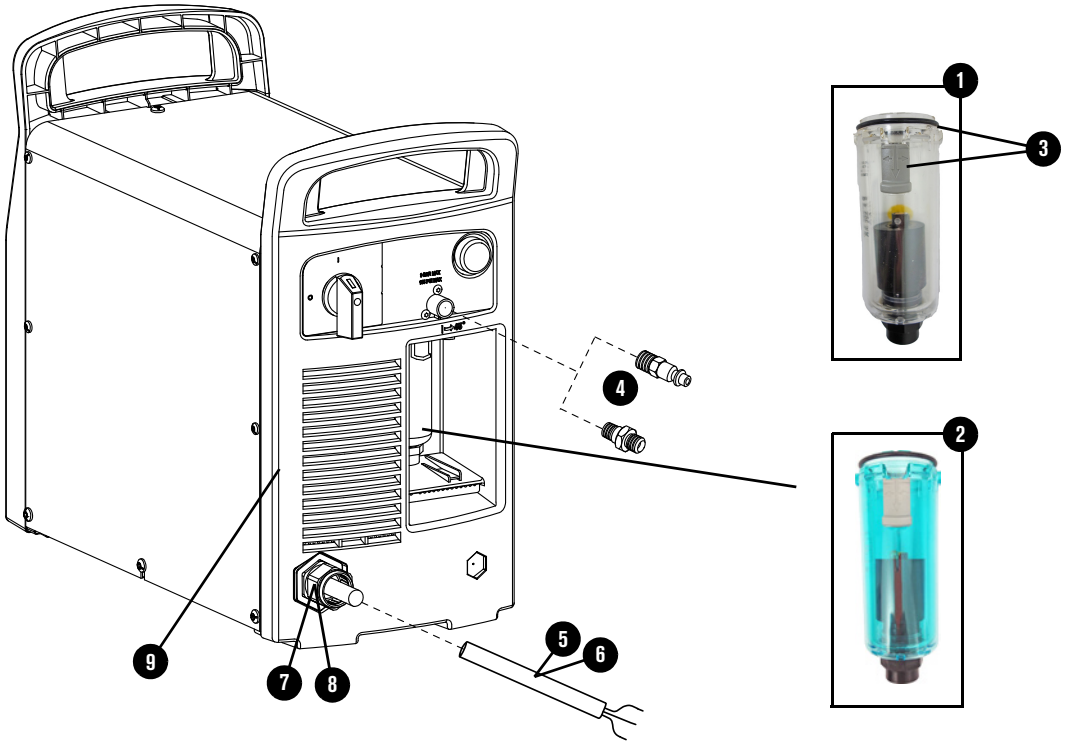
Powermax85 SYNC

Item	Part number	Description
1	223035	85 A work lead with hand clamp, 7.6 m (25 foot)
1	223034	85 A work lead with hand clamp, 15 m (50 foot)
1	223033	65 A / 85 A work lead with hand clamp, 23 m (75 foot)
3	223209	85 A work lead with ring terminal, 7.6 m (25 foot)
3	223210	85 A work lead with ring terminal, 15 m (50 foot)
3	223211	65 A / 85 A work lead with ring terminal, 23 m (75 foot)
4	008337	Ground hand clamp: 300 A
	228709	Kit: Work lead connector

You can make a work lead for the Powermax65 SYNC and Powermax85 SYNC by installing the 008337 hand clamp on the approved amperage ring terminal work lead from Hypertherm. Make sure that you use a work lead that is the correct amperage for your plasma power supply.

For replacement procedures, refer to Replace the work lead connector on page 67.

Plasma power supply exterior, rear

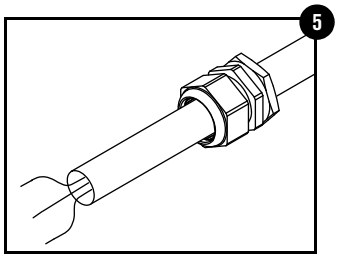


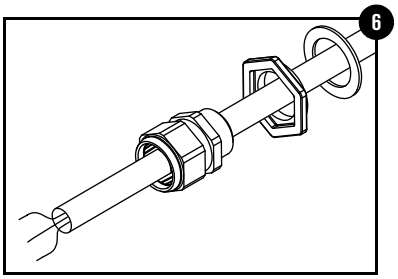
Item	Part number	Description and kit contents	
1	428352	Kit: Air filter bowl, polycarbonate (comes with plasma power supply, includes the O-ring but not the filter element)	
		011124	Air filter bowl, polycarbonate
2*	428415	Kit: Air filter bowl, nylon (optional – for work sites with oily air) (includes the O-ring but not the filter element)	
		011128	Air filter bowl, nylon
3	228695	Kit: Air filter element and O-ring (compatible with both filter bowl types)	
		011093	Air filter element
		011125	O-ring
4	428685	Kit: Gas inlet fittings	
		015145	British Pipe Thread adapter G-1/4 BSPP with 1/4 NPT threads
		015337	Industrial interchange quick-disconnect nipple with 1/4 NPT threads
	027055	Silicone lubricant, 0.25 ounces	

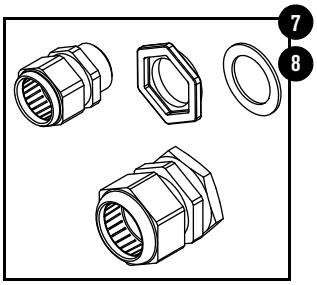
* The polycarbonate filter bowl that comes with the plasma power supply is compatible with most gas supply systems, but it is important to keep the gas line clean. Organic solvents, chemicals, cutting oil, synthetic oil, alkali, and thread lock solutions can cause damage to the polycarbonate filter bowl over time. You can use the optional nylon bowl (428415) if conditions at your work site make it difficult to prevent harsh chemicals from getting into the gas line.

For replacement procedures, refer to Replace the air filter bowl and filter element on page 81.

Power cord and strain relief

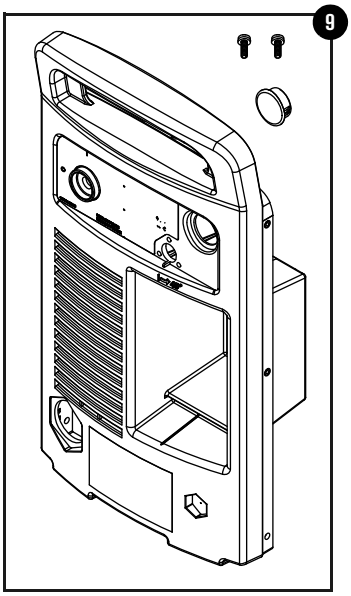






Item	Part number	Description and kit contents	
5	228691	Kit: Powermax65/85 SYNC power cord with strain relief, CSA models, 3 m (10 foot)	
		229290	Power cord assembly 65 A/85 A CSA
		108795	Strain relief 65 A/85 A CSA
6	528015	Kit: Powermax65 SYNC power cord with strain relief, CE/CCC models, 3 m (10 foot)	
		229950	Power cord assembly 65 A CE/CCC
		108676	Strain relief 65 A/85 A CE
		104456	Strain relief adapter
		075765	Aluminum washer
6	528016	Kit: Powermax85 SYNC power cord with strain relief, CE/CCC models, 3 m (10 foot)	
		229957	Power cord assembly 85 A CE/CCC
		108676	Strain relief 65 A/85 A CE
		104456	Strain relief adapter
		075765	Aluminum washer
7, 8	228680	Kit: Strain relief for Powermax65/85 SYNC power cords (all models)	
		108795	Strain relief 65 A/85 A CSA
		108676	Strain relief 65 A/85 A CE
		104456	Strain relief adapter 65 A/85 A CE
		075765	Aluminum washer

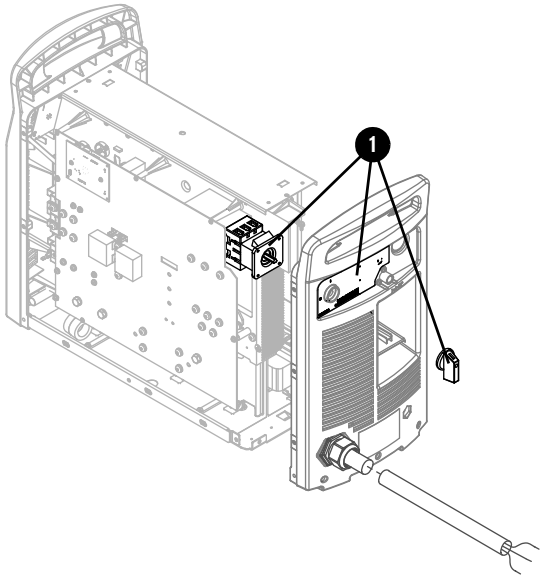
Rear panel

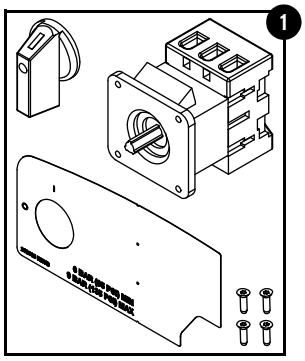


Item	Part number	Description and kit contents	
9	528001	Kit: Powermax65/85 SYNC plasma power supply rear panel with screws and CPC port cover	
		010586	Label: Protect earth
		075524	Screw: M5 X 16, pan head (2)
		101033	Plasma power supply rear panel
		104497	Self adhesive foam strip
		108867	CPC port cover
		110711	Label: Power switch 65 A/85 A
			CSA, CE, or CCC data plate for Powermax65 SYNC or Powermax85 SYNC (preapplied)

For replacement procedures, refer to Replace the rear panel on page 60.

Plasma power supply interior, rear

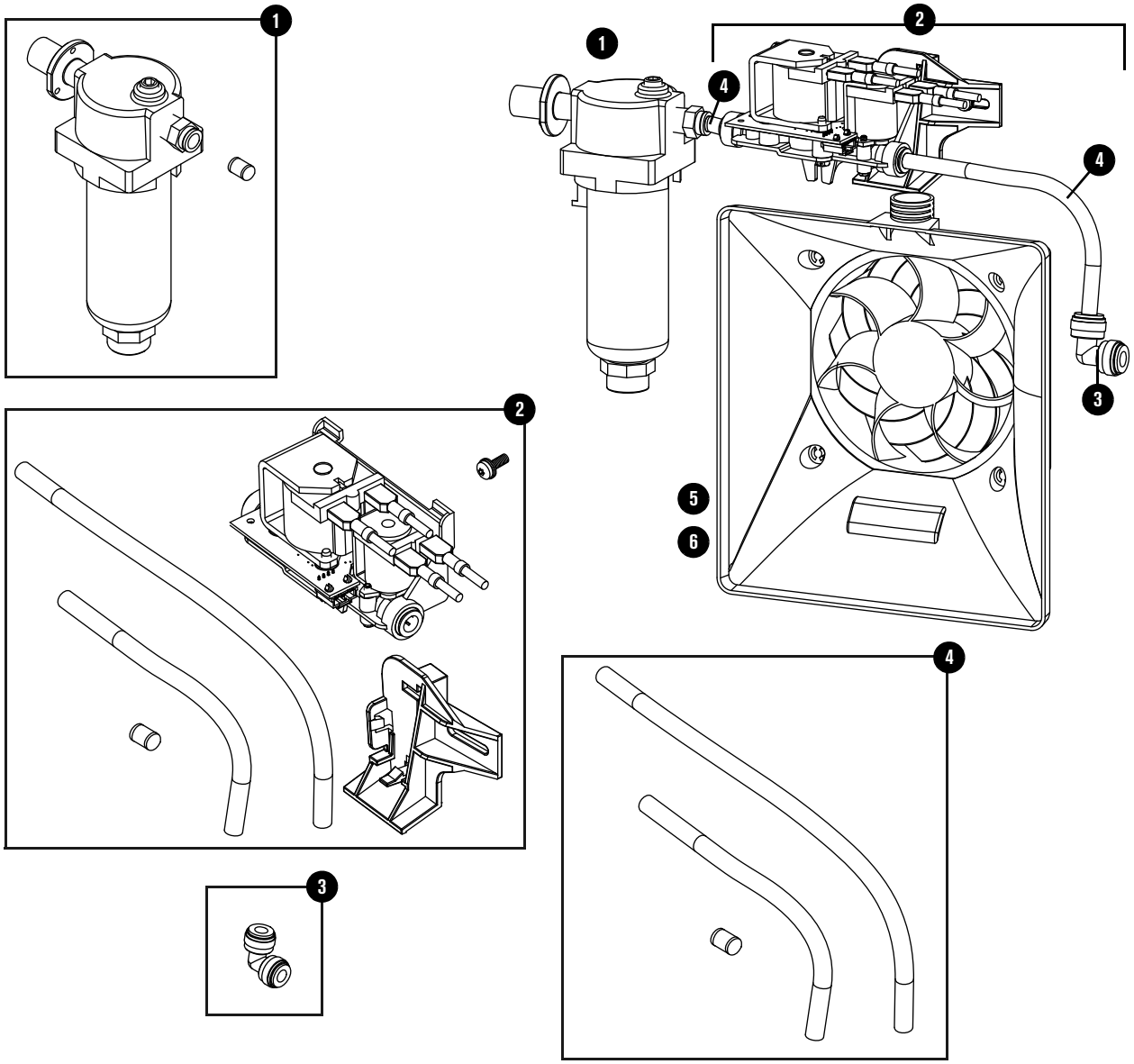




Item	Part number	Description and kit contents	
1	228644	Kit: Powermax65 SYNC power switch CSA	
		005257	Power switch
		075760	Screw:#8 X 1/2, flat head (4)
		108858	Power switch handle
		110711	Label: Power switch 65 A/85 A
1	228655	Kit: Powermax85 SYNC power switch CSA	
		003206	Power switch
		075760	Screw: #8 X 1/2, flat head (4)
		108858	Power switch handle
		110711	Label: Power switch 65 A/85 A
1	228671	Kit: Powermax65/85 SYNC power switch CE/CCC	
		005650	Power switch
		075760	Screw: #8 X 1/2, flat head (4)
		108858	Power switch handle
		110711	Label: Power switch 65 A/85 A

For replacement procedures, refer to Replace the power switch on page 75.

Plasma power supply interior, fan side



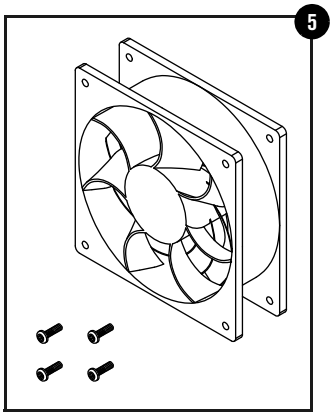
Item	Part number	Description and kit contents	
1	428942	Kit: Air filter assembly (includes air filter, air filter bowl, air filter element, and O-ring)	
		429017	Air filter assembly
		104990	Tubing: 8 mm outer diameter X 1.75 inches
		104487	Tubing: 8 mm outer diameter X 3.3 inches (optional – not shown)

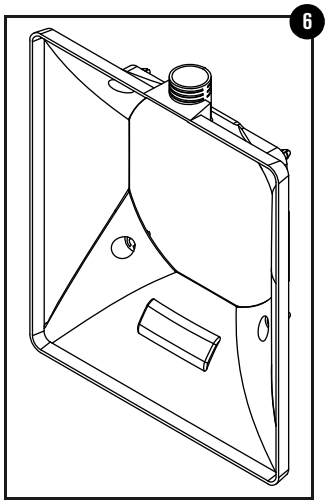
Item	Part number	Description and kit contents	
2	528053	Kit: Solenoid valve (includes gas tubes and screws)	
		429061	Solenoid valve
		101508	Bracket
		104488	Tubing: 5/16 inch outer diameter X 7.75 inches
		104632	Tubing: 5/16 inch outer diameter X 12 inches
		104990	Tubing: 8 mm outer diameter X 1.75 inches
		075711	Screw: M4 X 12, pan head
3	528017	Kit: 90° gas tube fitting	
		015921	90° gas tube fitting
4	528065	Kit: Powermax65/85/105 SYNC Gas tubes	
		104487	Tubing: 8 mm outer diameter X 3.3 inches (optional – not shown)
		104488	Tubing: 5/16 inch outer diameter X 7.75 inches
		104632	Tubing: 5/16 inch outer diameter X 12 inches
		104990	Tubing: 8 mm outer diameter X 1.75 inches

For replacement procedures, refer to the following:

- Replace the air filter assembly on page 83
- Replace the solenoid valve on page 88
- Replace the 90° gas tube fitting on page 92
- Replace the gas tubes on page 91

Fan and fan shroud

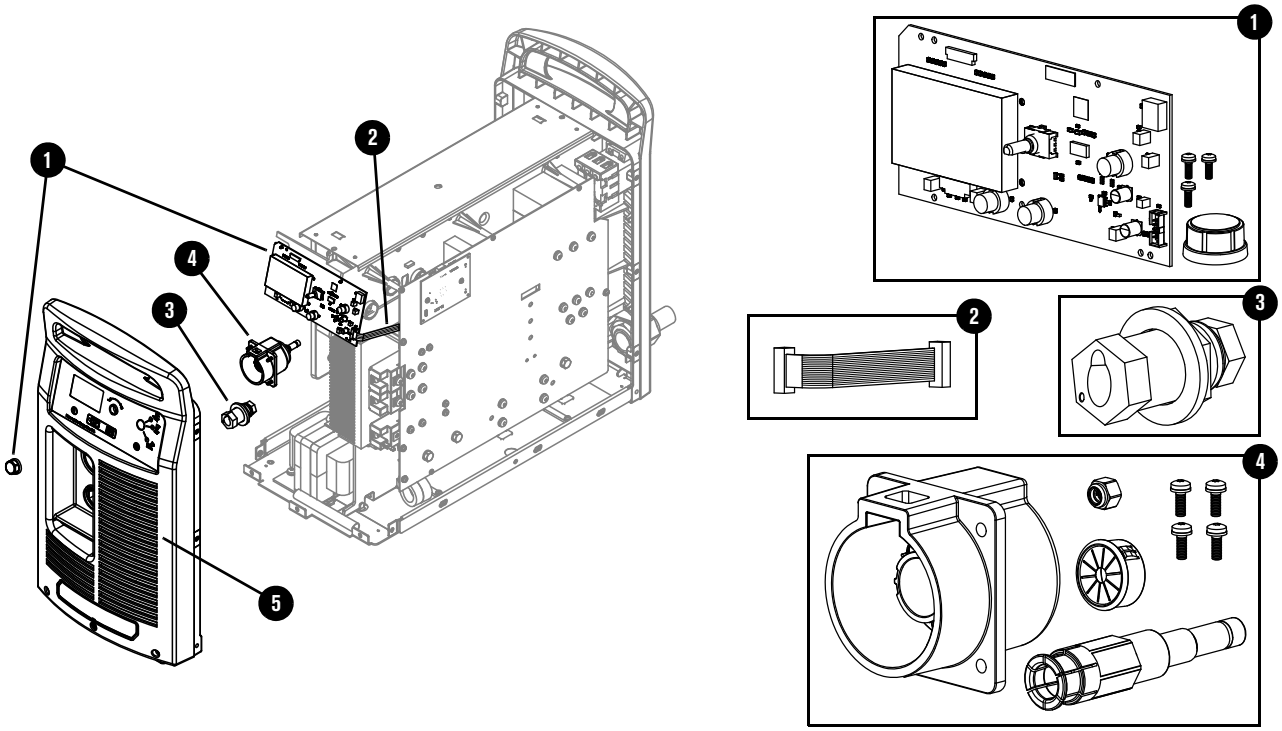




Item	Part number	Description and kit contents	
5	428991	Kit: Powermax65/85 SYNC Fan assembly	
		429078	Fan assembly
		075693	Screw: #6 X 1/2, pan head (4)
6	228694	Kit: Powermax65/85 SYNC Fan shroud	
		101030	Fan shroud

For replacement procedures, refer to Replace the fan and fan shroud on page 85.

Plasma power supply interior, front

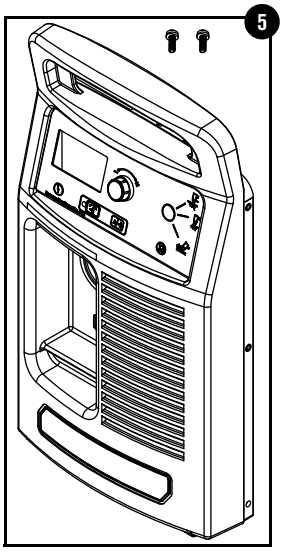


Item	Part number	Description and kit contents	
1	528026	Kit: Control PCB and adjustment knob	
		141472	Control PCB
		108797	Adjustment knob
		075418	Screw: #4 X 1/4, pan head (3)
2	428068	Kit: Ribbon cable for control PCB, 14 cm (5.5 inches)	
		223024	Ribbon cable that connects the control PCB to the DSP PCB
3	428070	Kit: Powermax65/85 SYNC work lead receptacle	
		228364	Work lead receptacle
4	528025	Kit: Powermax65/85/105 SYNC torch quick-disconnect receptacle	
		229885	Torch quick-disconnect receptacle housing
		015920	Torch quick-disconnect receptacle
		075899	Retention nut
		075693	Screw: #6 X 1/2, pan head (4)
		108076	Grommet

For replacement procedures, refer to the following:

- Replace the control PCB and the ribbon cable on page 96
- Replace the work lead receptacle on page 69
- Replace the torch quick-disconnect receptacle on page 71

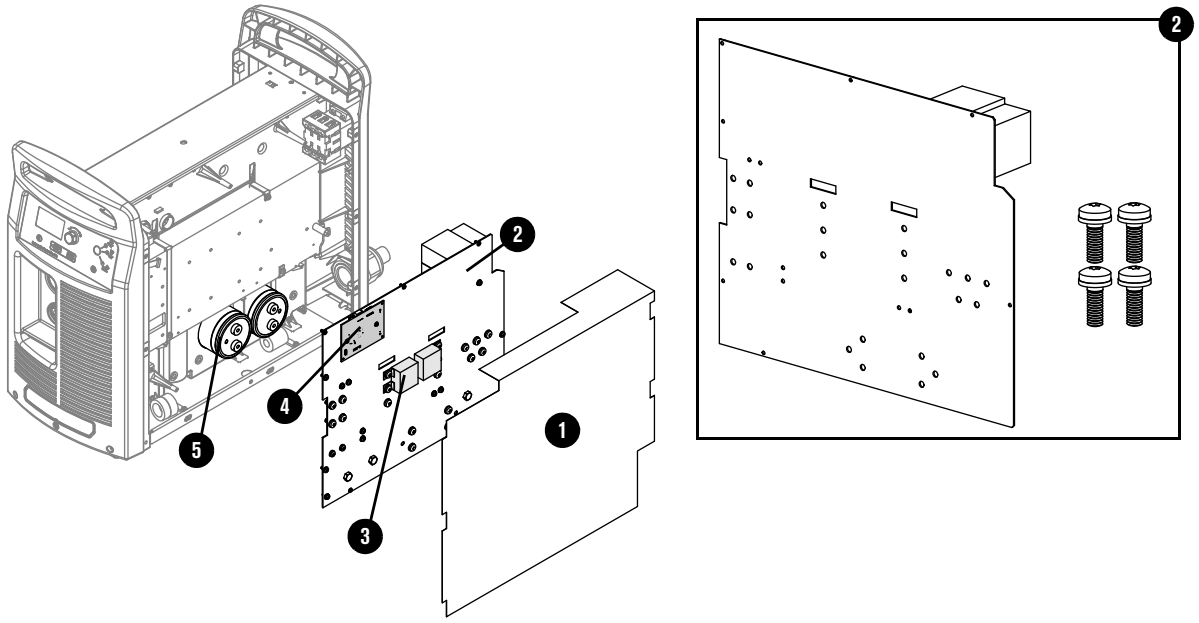
Front panel



Item	Part number	Description and kit contents	
5	528000	Kit: Powermax65/85 SYNC plasma power supply front panel with screws	
		002540	Gasket: LCD 65 A/85 A
		075524	Screw: M5 X 16, pan head (2)
		101063	Panel: Lens 65 A/85 A/105 A/125 A
		101460	Panel: Plasma power supply front
		104497	Foam: Close cell black
		210569	Label: Display panel 65 A/85 A
		210596	Label: Hypertherm logo

For replacement procedures, refer to Replace the front panel on page 59.

Plasma power supply interior, power PCB side

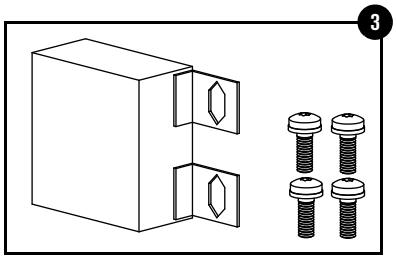


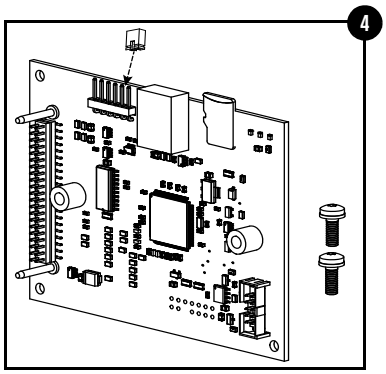
Item	Part number	Description and kit contents	
1	228705	Kit: Powermax65/85 SYNC component barrier	
2	528029	Kit: Powermax65 SYNC power PCB CSA	
		075534	Screw: #6 X 5/16, pan head (4)
		141440	Power PCB, 65 A CSA
2	528030	Kit: Powermax65 SYNC power PCB CE/CCC	
		075534	Screw: #6 X 5/16, pan head (4)
		141477	Power PCB 65 A CE/CCC
2	528031	Kit: Powermax85 SYNC power PCB CSA	
		075534	Screw: #6 X 5/16, pan head (4)
		141443	Power PCB 85 A CSA
2	528032	Kit: Powermax85 SYNC power PCB CE/CCC	
		075534	Screw: #6 X 5/16, pan head (4)
		141453	Power PCB 85 A CE/CCC

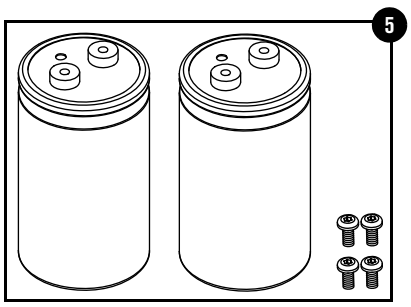
For replacement procedures, refer to the following:

- Replace the plasma power supply cover and component barrier on page 49
- Replace the power PCB on page 98

Capacitors and DSP PCB







Item	Part number	Description and kit contents	
3	428066	Kit: Power PCB capacitor	
		075569	Screw: M6 X 14-12.5, pan head (2)
		075570	Screw: M5 X 14-12, pan head (2)
		109930	Capacitor: 3uF, 850 VDC
4	528028	Kit: DSP PCB	
		075766	Screw: M3 X 16, pan head (2)
		108855	2-pin jumper (preinstalled on PCB)
		141421	DSP PCB
		210775	Label: “Save system data before you install this part” (not shown)
5	228683	Kit: Powermax65 SYNC bulk capacitor CSA	
		075570	Screw: M5 X 14-12, pan head (4)
		109935	Capacitor: 2200uF, 500 VDC (2)
5	228684	Kit: Powermax65 SYNC bulk capacitor CE / CCC	
		075570	Screw: M5 X 14-12, pan head (4)
		109947	Capacitor: 3300uF, 400 VDC (2)
5	228681	Kit: Powermax85 SYNC bulk capacitor CSA	
		075570	Screw: M5 X 14-12, pan head (4)
		109797	Capacitor: 3300uF, 500 VDC (2)
5	228682	Kit: Powermax85 SYNC bulk capacitor CE / CCC	
		075570	Screw: M5 X 14-12, pan head (4)
		109948	Capacitor: 4400uF, 400 VDC (2)

For replacement procedures, refer to the following:

- Replace the power PCB capacitors on page 119
- Replace the DSP PCB on page 95
- Replace the bulk capacitors on page 121

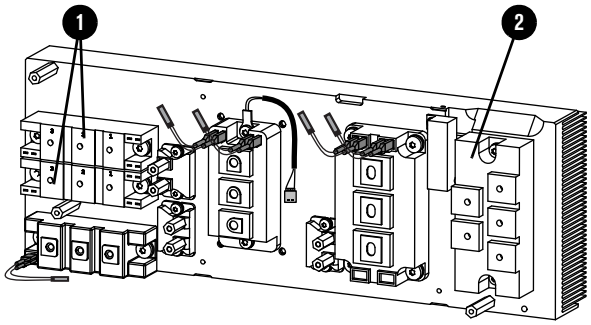
Plasma power supply interior, heatsink

You can purchase thermal grease separately.

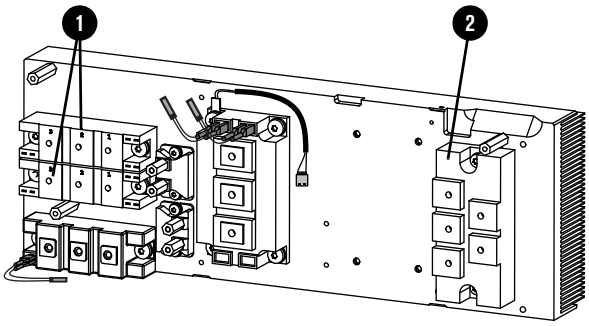
Part number	Description
128836	Thermal grease, 0.125 ounce

For replacement procedures, refer to How to clean the heatsink and apply thermal grease to the heatsink components on page 118.

65 A/85 A heatsink diode bridges



CSA



CE/CCC

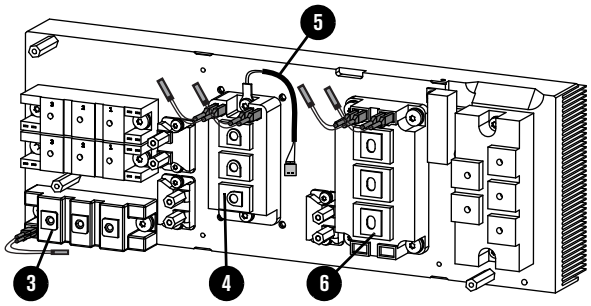
Item	Part number	Description and kit contents	
1	228803	Kit: Powermax65 SYNC output diode bridge	
		109804	Output diode (2)
		075567	Screw: M6 X 16-12.5, pan head (4)
		128836	Thermal grease, 0.125 ounce
1	228804	Kit: Powermax85 SYNC output diode bridge	
		109980	Output diode (2)
		075567	Screw: M6 X 16-12.5, pan head (4)
		128836	Thermal grease, 0.125 ounce
2	228742	Kit: Powermax65 SYNC (all models) and Powermax85 SYNC CE / CCC input diode bridge	
		109931	Input diode bridge
		075524	Screw: M5 X 16, pan head (2)
		075570	Screw: M5 X 14-12, pan head (5)
		128836	Thermal grease, 0.125 ounce

Item	Part number	Description and kit contents	
2	228741	Kit: Powermax85 SYNC CSA input diode bridge	
		109801	Input diode bridge
		075524	Screw: M5 X 16, pan head (2)
		075570	Screw: M5 X 14-12, pan head (5)
		128836	Thermal grease, 0.125 ounce

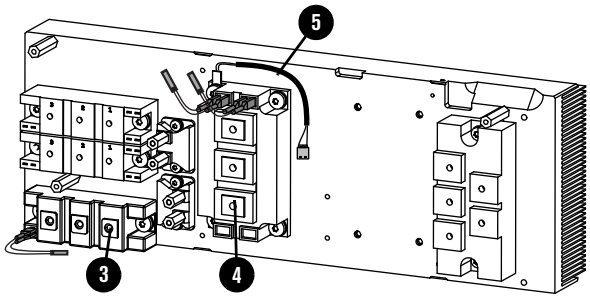
For replacement procedures, refer to the following:

- Replace the output diode bridge on page 106
- Replace the input diode bridge on page 108

65 A/85 A heatsink IGBTs and thermal sensor



CSA



CE/CCC

Item	Part number	Description and kit contents	
3	528042	Kit: Powermax65 SYNC pilot arc IGBT	
		109239	Pilot arc IGBT
		223739	Pilot arc cable
		075567	Screw: M6 X 16-12.5, pan head (2)
		075570	Screw: M5 X 14-12, pan head (2)
		128836	Thermal grease, 0.125 ounce
3	528043	Kit: Powermax85 SYNC pilot arc IGBT	
		109238	Pilot arc IGBT
		223739	Pilot arc cable
		075567	Screw: M6 X 16-12.5, pan head (2)
		075570	Screw: M5 X 14-12, pan head (2)
		128836	Thermal grease, 0.125 ounce
4	528040	Kit: Powermax65 SYNC CE/Powermax85 SYNC CSA inverter IGBT	
		209444	Inverter IGBT
		223738	PFC to inverter cable (2)
		075567	Screw: M6 X 16-12.5, pan head (3)
		075569	Screw: M6 X 14-12.5, pan head (3)
		075851	Screw: M6 X 18.5±0.5 12.5, pan head
		128836	Thermal grease, 0.125 ounce
4	528039	Kit: Powermax65 SYNC CSA inverter IGBT	
		109933	Inverter IGBT
		223738	PFC to inverter cable (2)
		075524	Screw: M5 X 16, pan head (2)
		075570	Screw: M5 X 14-12, pan head (3)
		128836	Thermal grease, 0.125 ounce

Item	Part number	Description and kit contents	
4	528046	Kit: Powermax85 SYNC CE inverter IGBT	
		209445	Pilot arc IGBT
		223738	PFC to inverter cable (2)
		075569	Screw: M6 X 14-12.5, pan head (3)
		075851	Screw: M6 X 18.5±0.5-12.5, pan head (4)
		128836	Thermal grease, 0.125 ounce
5	428990	Kit: Thermal sensor (switch)	
		209569	Transducer
		075524	Screw: M5 X 16, pan head
		075851	Screw: M6 X 18.5±0.5-12.5, pan head
6	528041	Kit: Powermax65 SYNC CSA PFC IGBT	
		109932	PFC IGBT
		223738	PFC to inverter cable (2)
		075567	Screw: M6 X 16-12.5, pan head (4)
		075569	Screw: M6 X 14-12.5, pan head (3)
		128836	Thermal grease, 0.125 ounce
6	528047	Kit: Powermax85 SYNC CSA PFC IGBT	
		109802	PFC IGBT
		223738	PFC to inverter cable (2)
		075567	Screw: M6 X 16-12.5, pan head (4)
		075569	Screw: M6 X 14-12.5, pan head (3)
		128836	Thermal grease, 0.125 ounce

For replacement procedures, refer to the following:

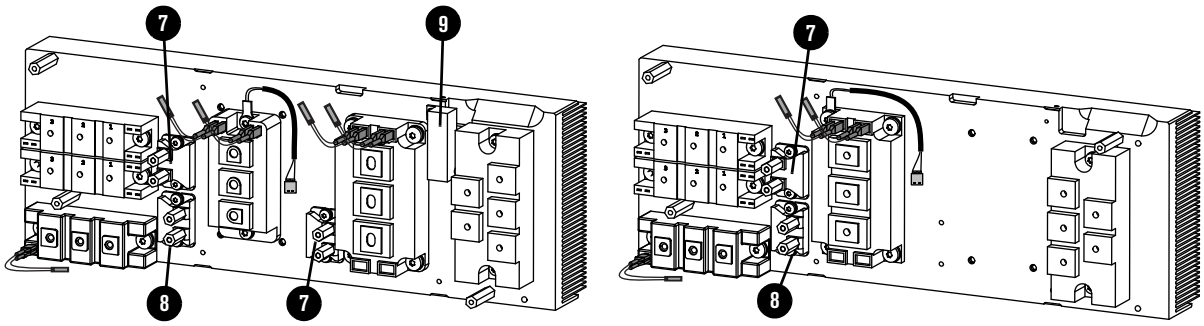
- Replace the pilot arc IGBT on page 110
- Replace the inverter IGBT and the thermal sensor on page 112
- Replace the PFC IGBT on page 114

IGBT tester

You can purchase the IGBT tester separately for troubleshooting.

Part number	Description
128883	IGBT tester

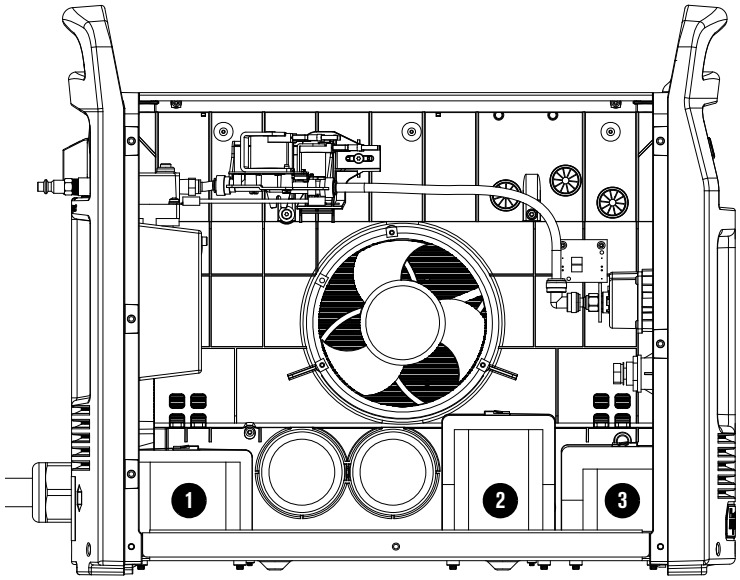
65 A/85 A heatsink resistors



Item	Part number	Description and kit contents	
7	228693	Kit: Snubber resistor, 5 Ω, 120 W	
		109799	Snubber resistor 5 Ω, 120 W
		108868	Standoff (2)
		075526	Screw: M4 X 10, pan head (2)
		128836	Thermal grease, 0.125 ounce
8	228706	Kit: Powermax65/85 SYNC snubber resistor, 15Ω, 120W	
		109950	Snubber resistor, 15Ω, 120W
		108868	Standoff (2)
		075526	Screw: M4 X 10, pan head (2)
		128836	Thermal grease, 0.125 ounce
9	228740	Kit: Powermax65/85 SYNC CSA damper resistor	
		109944	Damper resistor
		075529	Screw: M3 X 10, pan head (2)
		128836	Thermal grease, 0.125 ounce

For replacement procedures, refer to Replace the snubber resistors and the damper resistor on page 116.

Power supply interior, magnetics



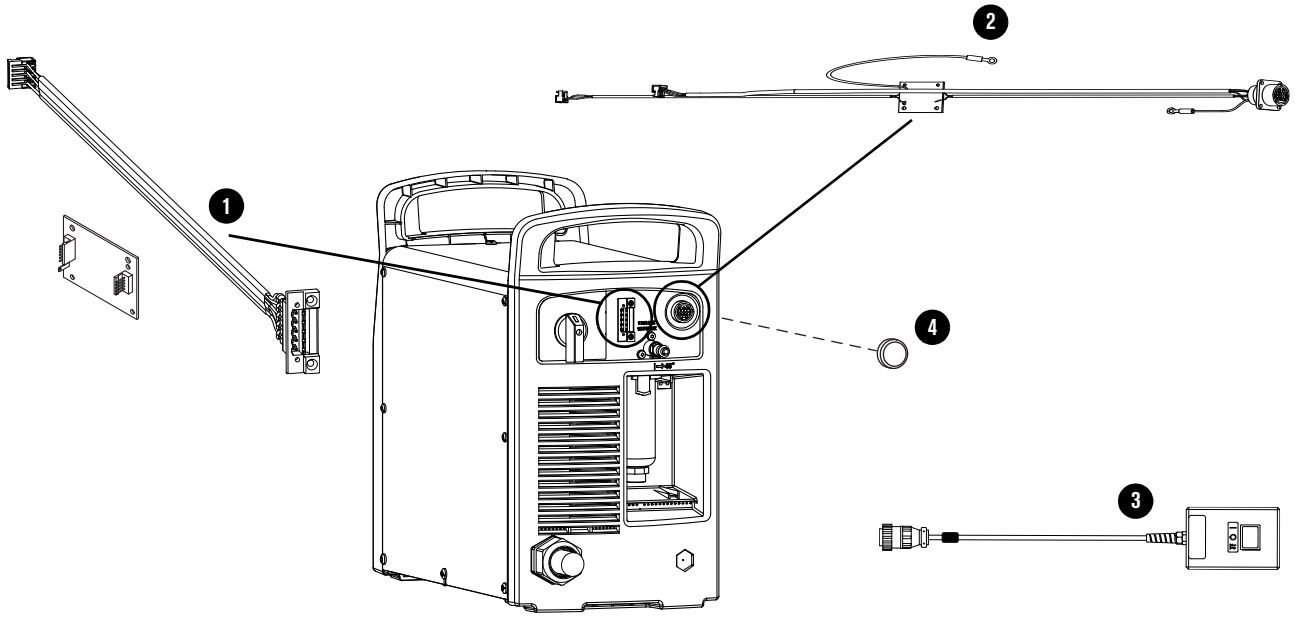
Item	Part number	Description and kit contents	
1	228661	Kit: Powermax65 SYNC PFC inductor CSA	
		014345	Inductor: PFC
		075697	Screw: M5 X 0.8 X 10-10, pan head (2)
1	228670	Kit: Powermax65 SYNC PFC inductor CE / CCC	
		014348	Inductor: PFC
		075697	Screw: M5 X 0.8 X 10-10, pan head (2)
1	228668	Kit: Powermax85 SYNC PFC inductor CSA	
		014337	Inductor: PFC
		075697	Screw: M5 X 0.8 X 10-10, pan head (2)
1	228664	Kit: Powermax85 SYNC PFC inductor CE / CCC	
		014341	Inductor: PFC
		075697	Screw: M5 X 0.8 X 10-10, pan head (2)
2	228663	Kit: Powermax65 SYNC transformer CSA	
		014346	Transformer
		075697	Screw: M5 X 0.8 X 10-10, pan head (2)
2	228669	Kit: Powermax65 SYNC transformer CE / CCC	
		014349	Transformer
		075697	Screw: M5 X 0.8 X 10-10, pan head (2)
2	228667	Kit: Powermax85 SYNC transformer CSA	
		014338	Transformer
		075697	Screw: M5 X 0.8 X 10-10, pan head (2)

Item	Part number	Description and kit contents	
2	228654	Kit: Powermax85 SYNC transformer CE / CCC	
		014342	Transformer
		075697	Screw: M5 X 0.8 X 10-10, pan head (2)
3	528036	Kit: Powermax65 SYNC output inductor	
		014439	Output inductor
		075697	Screw: M5 X 0.8 X 10-10, pan head (2)
3	528037	Kit: Powermax85 SYNC output inductor	
		014440	Output inductor
		075697	Screw: M5 X 0.8 X 10-10, pan head (2)

For replacement procedures, refer to the following:

- Replace the PFC inductor on page 134
- Replace the transformer on page 130
- Replace the output inductor on page 127

Machine interface and RS-485 serial interface upgrade kits



Item	Part number	Description
1	228539	Kit: Serial interface receptacle with internal cables and RS-485 serial interface PCB
2	228697	Kit: Machine interface receptacle with internal cables and voltage divider PCB for Powermax65/85 SYNC (does not include cover for receptacle)
3	128650	Remote start pendant for machine torch, 7.6 m (25 foot)
3	128651	Remote start pendant for machine torch, 15 m (50 foot)
3	128652	Remote start pendant for machine torch, 23 m (75 foot)
3	428755	Remote start pendant for machine torch, 46 m (150 foot)
	428975	Kit: Replacement switch for remote start pendant (not shown)
4	127204	Cover for machine interface receptacle

The remote start pendant connects to the machine interface receptacle.

EDGE® Connect CNC: To connect Hypertherm's EDGE Connect CNC with a Powermax65/85/105 SYNC, refer to the *EDGE Connect Installation and Setup Manual* (809340).

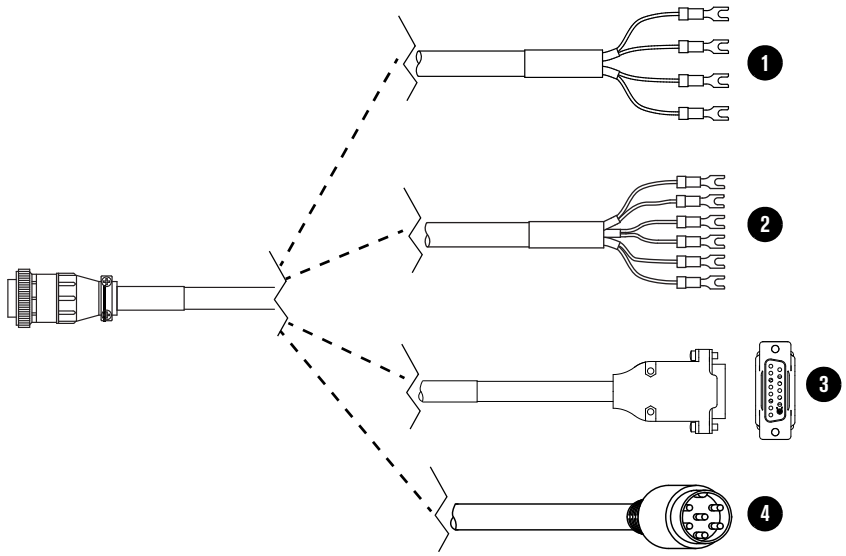
EDGE® Pro CNC: To connect Hypertherm's EDGE Pro CNC with a Powermax65/85/105 SYNC, refer to the *Phoenix Software V9 Series Installation and Setup Manual* (806410).

Technical documentation is available at www.hypertherm.com/docs.

External cables for machine interface receptacle and RS-485 serial interface receptacle

Hypertherm offers a variety of external cables that connect to the machine interface receptacle and the RS-485 serial interface receptacle. For setup information refer to the *Powermax65/85/105 SYNC Mechanized Cutting Guide* (810480).

Machine interface cables



Item	Part number	Description
1	023206	External machine interface cable*, 4 spade connectors, 7.6 m (25 foot)
1	023279	External machine interface cable*, 4 spade connectors, 15 m (50 foot)
2	228350	Kit: External machine interface cable**, 6 spade connectors, 7.6 m (25 foot)
2	228351	Kit: External machine interface cable**, 6 spade connectors, 15 m (50 foot)
3	223354	External machine interface cable**, D-sub connector with screws, 3.0 m (10 foot)
3	223355	External machine interface cable**, D-sub connector with screws, 6.0 m (20 foot)
3	223048	External machine interface cable**, D-sub connector with screws, 7.6 m (25 foot)
3	223356	External machine interface cable**, D-sub connector with screws, 10.7 m (35 foot)
3	123896	External machine interface cable**, D-sub connector with screws, 15 m (50 foot)
4	223733	External machine interface cable† for mechanized cutting systems with a 21.1:1 voltage ratio (for example, PlasmaCAM® systems), 6-pin DIN connector, 4.6 m (15 foot)
4	223734	External machine interface cable† for mechanized cutting systems with a 21.1:1 voltage ratio (for example, PlasmaCAM® systems), 6-pin DIN connector, 6.0 m (20 foot)

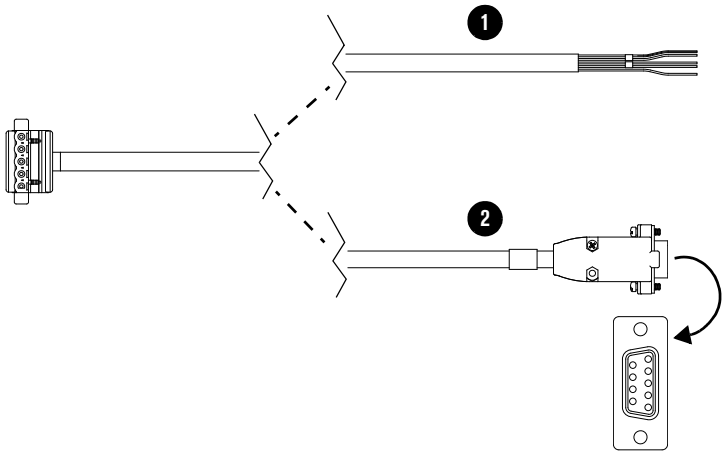
* Communicates start, stop, and arc transfer signals. Uses an **external** voltage divider PCB.

** Communicates start, stop, arc transfer, and divided arc voltage signals. Uses the **internal** voltage divider PCB.

† Communicates start, stop, and divided arc voltage signals. Uses the **internal** voltage divider PCB.

RS-485 serial interface cables

The RS-485 serial interface cables communicate information for controlling operating mode, amperage, and gas pressure and control mode.



Item	Part number	Description
1	223236	External RS-485 cable, unterminated, 7.6 m (25 foot)
1	223237	External RS-485 cable, unterminated, 15 m (50 foot)
2	223239	External RS-485 cable, 9-pin D-sub connector for Hypertherm controls, 7.6 m (25 foot)
2	223240	External RS-485 cable, 9-pin D-sub connector for Hypertherm controls, 15 m (50 foot)

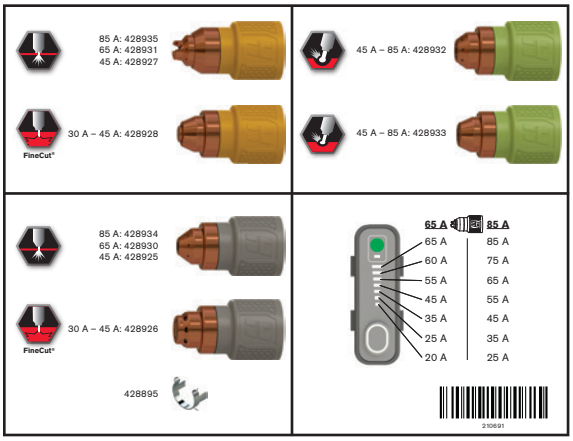
Powermax65/85/105 SYNC labels

Part number	Description
528018	Kit: Powermax65 SYNC labels, CSA
528020	Kit: Powermax85 SYNC labels, CSA
528022	Kit: Powermax105 SYNC labels, CSA
528019	Kit: Powermax65 SYNC labels, CE/CCC
528021	Kit: Powermax85 SYNC labels, CE/CCC
528023	Kit: Powermax105 SYNC labels, CE/CCC

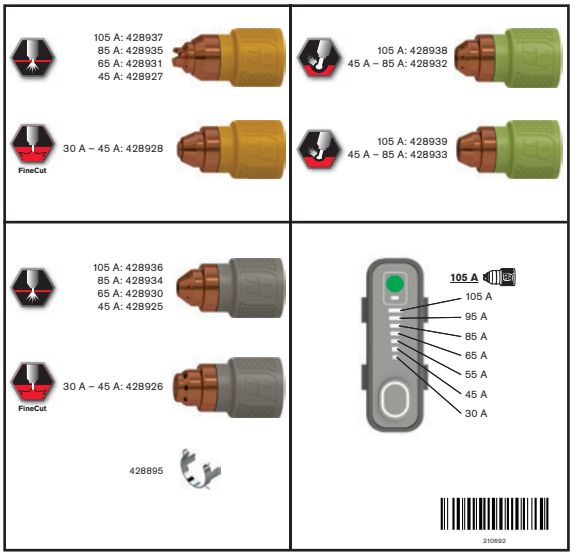
The label kits include:

- Warning label
- Interface decals for the front panel and rear panel
- Product decals
- Cartridge label

Cartridge labels



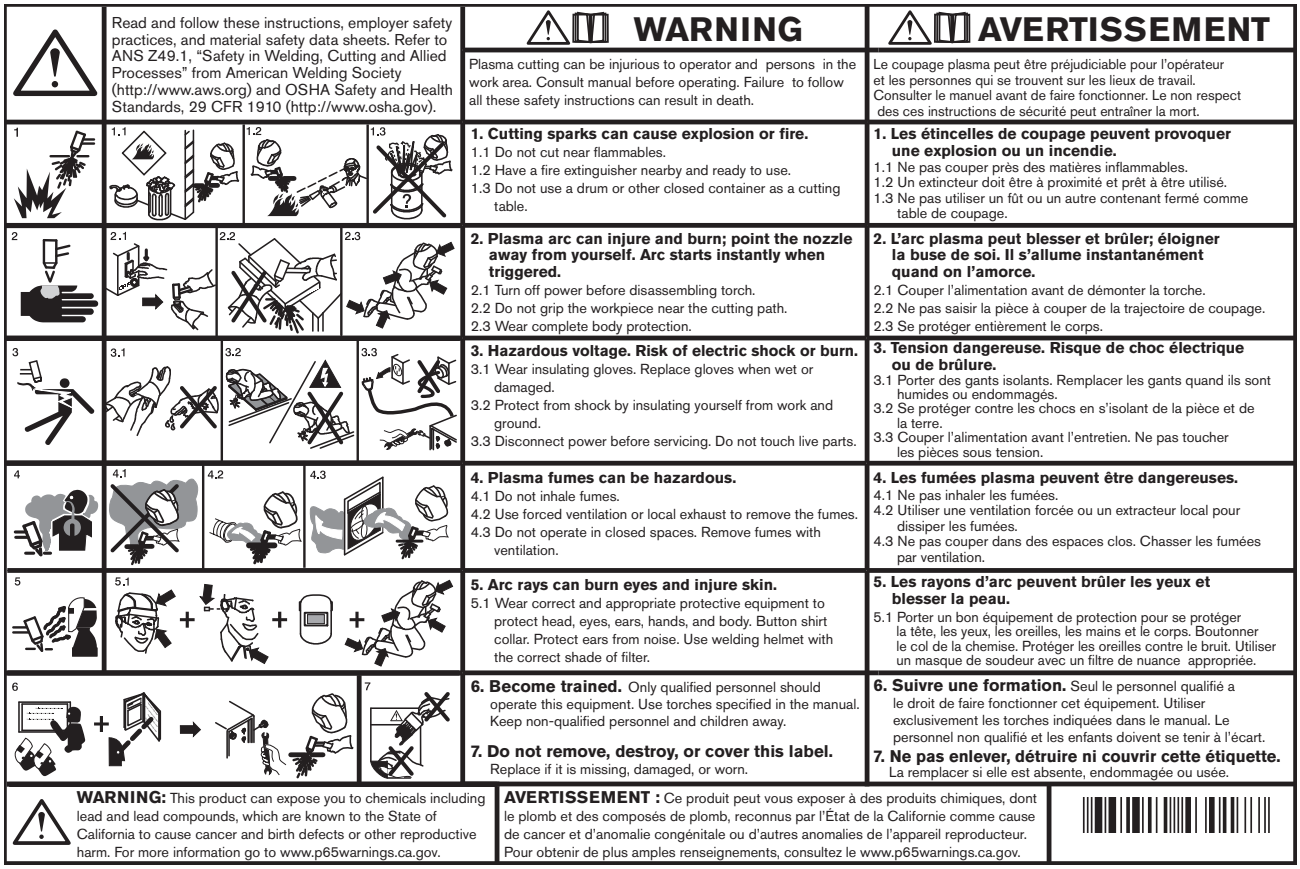
Powermax65/85 SYNC



Powermax105 SYNC

CSA warning label

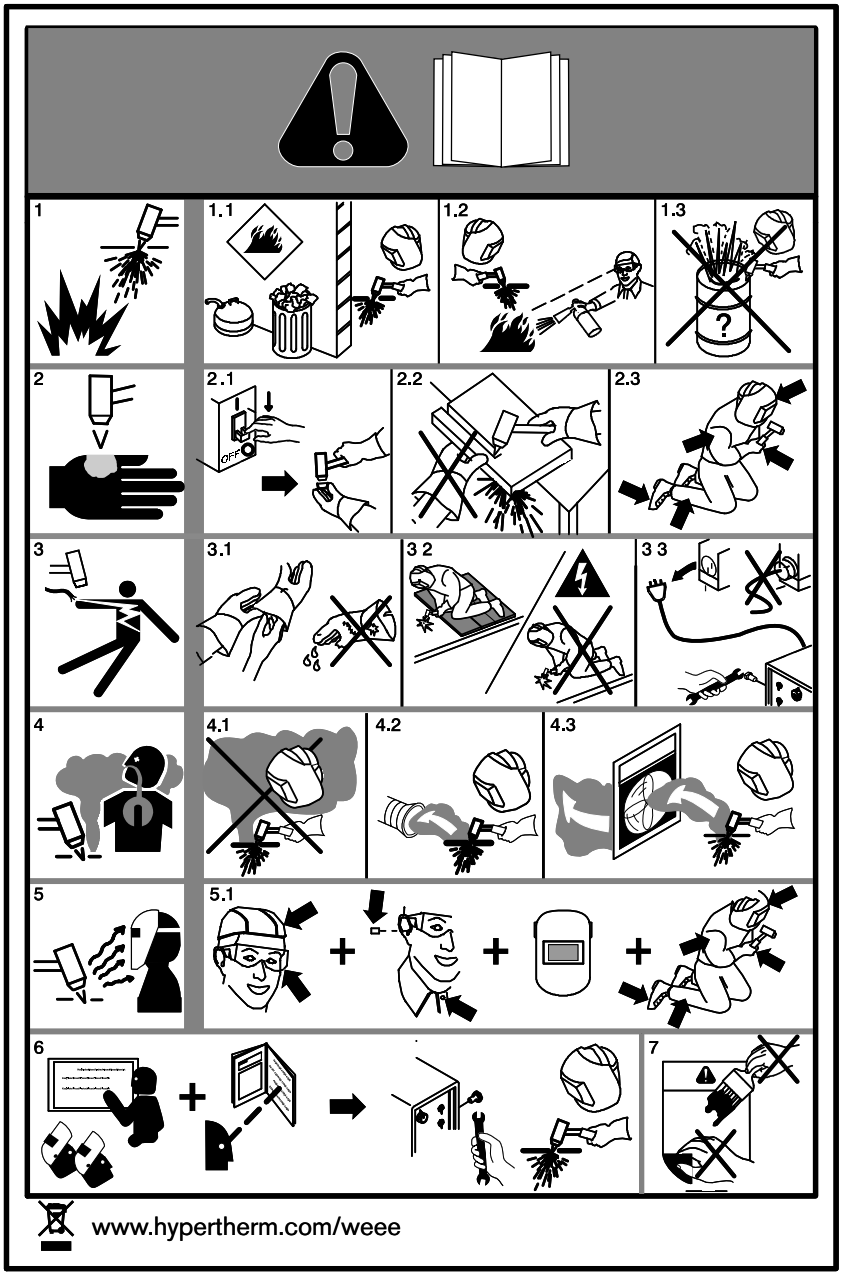
This warning label is affixed to some plasma power supplies. It is important that the operator and maintenance technician understand the intent of these warning symbols as described.



		WARNING	AVERTISSEMENT
	Read and follow these instructions, employer safety practices, and material safety data sheets. Refer to ANS Z49.1, "Safety in Welding, Cutting and Allied Processes" from American Welding Society (http://www.aws.org) and OSHA Safety and Health Standards, 29 CFR 1910 (http://www.osha.gov).	Plasma cutting can be injurious to operator and persons in the work area. Consult manual before operating. Failure to follow all these safety instructions can result in death.	Le coupage plasma peut être préjudiciable pour l'opérateur et les personnes qui se trouvent sur les lieux de travail. Consulter le manuel avant de faire fonctionner. Le non respect des ces instructions de sécurité peut entraîner la mort.
1 1.1 1.2 1.3		**1. Cutting sparks can cause explosion or fire.** 1.1 Do not cut near flammables. 1.2 Have a fire extinguisher nearby and ready to use. 1.3 Do not use a drum or other closed container as a cutting table.	**1. Les étincelles de coupage peuvent provoquer une explosion ou un incendie.** 1.1 Ne pas couper près des matières inflammables. 1.2 Un extincteur doit être à proximité et prêt à être utilisé. 1.3 Ne pas utiliser un fût ou un autre contenant fermé comme table de coupage.
2 2.1 2.2 2.3		**2. Plasma arc can injure and burn; point the nozzle away from yourself. Arc starts instantly when triggered.** 2.1 Turn off power before disassembling torch. 2.2 Do not grip the workpiece near the cutting path. 2.3 Wear complete body protection.	**2. L'arc plasma peut blesser et brûler; éloigner la buse de soi. Il s'allume instantanément quand on l'amorce.** 2.1 Couper l'alimentation avant de démonter la torche. 2.2 Ne pas saisir la pièce à couper de la trajectoire de coupage. 2.3 Se protéger entièrement le corps.
3 3.1 3.2 3.3		**3. Hazardous voltage. Risk of electric shock or burn.** 3.1 Wear insulating gloves. Replace gloves when wet or damaged. 3.2 Protect from shock by insulating yourself from work and ground. 3.3 Disconnect power before servicing. Do not touch live parts.	**3. Tension dangereuse. Risque de choc électrique ou de brûlure.** 3.1 Porter des gants isolants. Remplacer les gants quand ils sont humides ou endommagés. 3.2 Se protéger contre les chocs en s'isolant de la pièce et de la terre. 3.3 Couper l'alimentation avant l'entretien. Ne pas toucher les pièces sous tension.
4 4.1 4.2 4.3		**4. Plasma fumes can be hazardous.** 4.1 Do not inhale fumes. 4.2 Use forced ventilation or local exhaust to remove the fumes. 4.3 Do not operate in closed spaces. Remove fumes with ventilation.	**4. Les fumées plasma peuvent être dangereuses.** 4.1 Ne pas inhaler les fumées. 4.2 Utiliser une ventilation forcée ou un extracteur local pour dissiper les fumées. 4.3 Ne pas couper dans des espaces clos. Chasser les fumées par ventilation.
5 5.1		**5. Arc rays can burn eyes and injure skin.** 5.1 Wear correct and appropriate protective equipment to protect head, eyes, ears, hands, and body. Button shirt collar. Protect ears from noise. Use welding helmet with the correct shade of filter.	**5. Les rayons d'arc peuvent brûler les yeux et blesser la peau.** 5.1 Porter un bon équipement de protection pour se protéger la tête, les yeux, les oreilles, les mains et le corps. Boutonner le col de la chemise. Protéger les oreilles contre le bruit. Utiliser un masque de soudeur avec un filtre de nuance appropriée.
6 7		**6. Become trained.** Only qualified personnel should operate this equipment. Use torches specified in the manual. Keep non-qualified personnel and children away. **7. Do not remove, destroy, or cover this label.** Replace if it is missing, damaged, or worn.	**6. Suivre une formation.** Seul le personnel qualifié a le droit de faire fonctionner cet équipement. Utiliser exclusivement les torches indiquées dans le manual. Le personnel non qualifié et les enfants doivent se tenir à l'écart. **7. Ne pas enlever, détruire ni couvrir cette étiquette.** La remplacer si elle est absente, endommagée ou usée.
WARNING: This product can expose you to chemicals including lead and lead compounds, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.p65warnings.ca.gov.		**AVERTISSEMENT :** Ce produit peut vous exposer à des produits chimiques, dont le plomb et des composés de plomb, reconnus par l'État de la Californie comme cause de cancer et d'anomalie congénitale ou d'autres anomalies de l'appareil reproducteur. Pour obtenir de plus amples renseignements, consultez le www.p65warnings.ca.gov.	

Descriptions of warning label icons

This warning label is affixed to some plasma power supplies. It is important that the operator and maintenance technician understand the intent of these warning symbols as described. The descriptions at right are numbered the same as the symbols on the label.



1. Cutting sparks can cause explosion or fire.

1.1 Do not cut near flammables.

1.2 Have a fire extinguisher nearby and ready to use.

1.3 Do not use a drum or other closed container as a cutting table.

2. Plasma arc can injure and burn; point the nozzle away from yourself. Arc starts instantly when triggered.

2.1 Turn off electrical power before disassembling torch.

2.2 Do not grip the workpiece near the cutting path.

2.3 Wear complete body protection.

3. Hazardous voltage. Risk of electric shock or burn.

3.1 Wear insulating gloves. Replace gloves when wet or damaged.

3.2 Protect from shock by insulating yourself from work and ground.

3.3 Disconnect power before servicing. Do not touch live parts.

4. Plasma fumes can be hazardous.

4.1 Do not inhale fumes.

4.2 Use forced ventilation or local exhaust to remove fumes.

4.3 Do not operate in closed spaces. Remove fumes with ventilation.

5. Arc rays can burn eyes and injure skin.

5.1 Wear correct and approved protective equipment to protect head, eyes, ears, hands, and body. Button shirt collar. Protect ears from noise. Use welding helmet with the correct shade of filter.

6. Become trained. Only qualified personnel should operate this equipment. Use torches specified in the manual. Keep non-qualified personnel and children away.

7. Do not remove, destroy, or cover this label. Replace it if it is missing, damaged, or worn.

Parts necessary for safety

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. Parts that are necessary for safety are parts that must be replaced with only genuine Hypertherm parts to maintain the warranty and system certifications.

Part number	Description	Page
228680	Kit: Strain relief for Powermax65/85 SYNC power cords (all models)	page 18
228691	Kit: Powermax65/85 SYNC power cord with strain relief, CSA models, 3 m (10 foot)	page 18
528015	Kit: Powermax65 SYNC power cord with strain relief, CE/CCC models, 3 m (10 foot)	page 18
528016	Kit: Powermax85 SYNC power cord with strain relief, CE/CCC models, 3 m (10 foot)	page 18
228644	Kit: Powermax65 SYNC power switch CSA	page 20
228655	Kit: Powermax85 SYNC power switch CSA	page 20
228671	Kit: Powermax65/85 SYNC power switch CE/CCC	page 20
428991	Kit: Powermax65/85 SYNC Fan assembly	page 23
528029	Kit: Powermax65 SYNC power PCB CSA	page 26
528030	Kit: Powermax65 SYNC power PCB CE/CCC	page 26
528031	Kit: Powermax85 SYNC power PCB CSA	page 26
528032	Kit: Powermax85 SYNC power PCB CE/CCC	page 26
528028	Kit: DSP PCB	page 27
228683	Kit: Powermax65 SYNC bulk capacitor CSA	page 27
228684	Kit: Powermax65 SYNC bulk capacitor CE / CCC	page 27
228681	Kit: Powermax85 SYNC bulk capacitor CSA	page 27
228682	Kit: Powermax85 SYNC bulk capacitor CE / CCC	page 27
228661	Kit: Powermax65 SYNC PFC inductor CSA	page 33
228670	Kit: Powermax65 SYNC PFC inductor CE / CCC	page 33
228668	Kit: Powermax85 SYNC PFC inductor CSA	page 33
228664	Kit: Powermax85 SYNC PFC inductor CE / CCC	page 33
228663	Kit: Powermax65 SYNC transformer CSA	page 33
228669	Kit: Powermax65 SYNC transformer CE / CCC	page 33
228667	Kit: Powermax85 SYNC transformer CSA	page 33
228654	Kit: Powermax85 SYNC transformer CE / CCC	page 34
528036	Kit: Powermax65 SYNC output inductor	page 34
528037	Kit: Powermax85 SYNC output inductor	page 34

Recommended spare parts

Hypertherm recommends that service centers keep the following spare parts available for repairs because these parts are parts necessary for safety or are usually exposed to continuous wear. Parts that are necessary for safety are parts that must be replaced with only genuine Hypertherm parts to maintain the warranty and system certifications. You may need to revise or expand this list for your customers, based on the conditions and work environments in your region.

Part number	Description	Page
428141	Kit: Replacement screws (16) for plasma power supply cover	page 14
428143	Kit: Adjustment knob only	page 14
223125	65 A work lead with hand clamp, 7.6 m (25 foot)	page 15
223200	65 A work lead with ring terminal, 7.6 m (25 foot)	page 15
223035	85 A work lead with hand clamp, 7.6 m (25 foot)	page 16
223209	85 A work lead with ring terminal, 7.6 m (25 foot)	page 16
228695	Kit: Air filter element and O-ring (compatible with both filter bowl types)	page 17
428352	Kit: Air filter bowl, polycarbonate (comes with plasma power supply, includes the O-ring but not the filter element)	page 17
027055	Silicone lubricant, 0.25 ounces	page 17
228644	Kit: Powermax65 SYNC power switch CSA	page 20
228655	Kit: Powermax85 SYNC power switch CSA	page 20
228671	Kit: Powermax65/85 SYNC power switch CE/CCC	page 20
428942	Kit: Air filter assembly (includes air filter, air filter bowl, air filter element, and O-ring)	page 21
528017	Kit: 90° gas tube fitting	page 22
528053	Kit: Solenoid valve (includes gas tubes and screws)	page 22
528065	Kit: Powermax65/85/105 SYNC Gas tubes	page 22
228694	Kit: Powermax65/85 SYNC Fan shroud	page 23
428991	Kit: Powermax65/85 SYNC Fan assembly	page 23
528026	Kit: Control PCB and adjustment knob	page 24
428068	Kit: Ribbon cable for control PCB, 14 cm (5.5 inches)	page 24
528029	Kit: Powermax65 SYNC power PCB CSA	page 26
528030	Kit: Powermax65 SYNC power PCB CE/CCC	page 26
528031	Kit: Powermax85 SYNC power PCB CSA	page 26
528032	Kit: Powermax85 SYNC power PCB CE/CCC	page 26
228683	Kit: Powermax65 SYNC bulk capacitor CSA	page 27
228684	Kit: Powermax65 SYNC bulk capacitor CE / CCC	page 27
228681	Kit: Powermax85 SYNC bulk capacitor CSA	page 27
228682	Kit: Powermax85 SYNC bulk capacitor CE / CCC	page 27
128836	Thermal grease, 0.125 ounce	page 28

Part number	Description	Page
228693	Kit: Snubber resistor, 5 Ω, 120 W	page 32
228661	Kit: Powermax65 SYNC PFC inductor CSA	page 33
228670	Kit: Powermax65 SYNC PFC inductor CE / CCC	page 33
228668	Kit: Powermax85 SYNC PFC inductor CSA	page 33
228664	Kit: Powermax85 SYNC PFC inductor CE / CCC	page 33
228663	Kit: Powermax65 SYNC transformer CSA	page 33
228669	Kit: Powermax65 SYNC transformer CE / CCC	page 33
228667	Kit: Powermax85 SYNC transformer CSA	page 33
228654	Kit: Powermax85 SYNC transformer CE / CCC	page 34
528036	Kit: Powermax65 SYNC output inductor	page 34
528037	Kit: Powermax85 SYNC output inductor	page 34

Find replacement parts by part number

Use this list to find the page number for a part number in Service Parts on page 13.

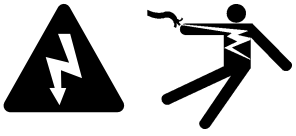
Part number	Page
008337	15, 16
023206	36
023279	36
027055	17
123896	36
127204	35
128650	35
128651	35
128652	35
128836	28
128883	31
223033	15, 16
223034	16
223035	16
223048	36
223125	15
223126	15
223194	15
223200	15
223201	15
223209	16
223210	16
223211	15, 16
223236	37
223237	37
223239	37
223240	37
223354	36
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228350	36
228351	36
228539	35
228644	20
228654	34

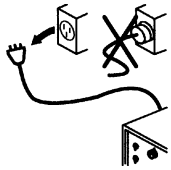
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228695....17
228697....35
228705....26
228706....32
228709....15, 16
228740....32
228741....29
228742....28
228803....28
228804....28
228805....31
428066....27
428068....24
428070....24
428141....14
428143....14
428352....17
428415....17
428685....17
428755....35
428942....21
428975....35
428990....31
428991....23

528000....25
528001....19
528009....14
528010....14
528011....14
528012....14
528015....18
528016....18
528017....22
528018....38
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528020....38
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528022....38
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528026....24
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528036....34
528037....34
528039....30
528040....30
528041....31
528042....30
528043....30
528046....31
528047....31
528053....22
528065....22

3 Service Procedures for the Cover, Panels, and Connectors

⚠ WARNING





ELECTRIC SHOCK CAN KILL

Disconnect electric power before doing installation or maintenance. You can get a serious electric shock if electric power is not disconnected. Electric shock can seriously injure or kill you.

All work that requires removal of the plasma power supply outer cover or panels must be done by a qualified technician.

Refer to the *Safety and Compliance Manual* (80669C) for more safety information.

NOTICE



Static electricity can cause damage to printed circuit boards (PCBs). Use correct precautions when you touch PCBs.

Keep PCBs in antistatic containers.

Put on a grounded wrist strap when you touch PCBs.

Tools necessary for this section

- Assorted Phillips®, TORX®, and blade screwdrivers
- Assorted Phillips® offset screwdrivers
- Adjustable wrench
- Grounded wrist strap (or similar grounding accessory)

More tools necessary for some procedures

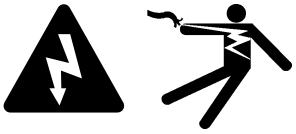
- Cable ties are necessary for Replace the rear panel on page 60.
- Cable cutters are necessary for Replace the work lead connector on page 67.

Replace the plasma power supply cover and component barrier

For kit contents, refer to Plasma power supply interior, power PCB side on page 26.

Remove the plasma power supply cover and component barrier

⚠ WARNING

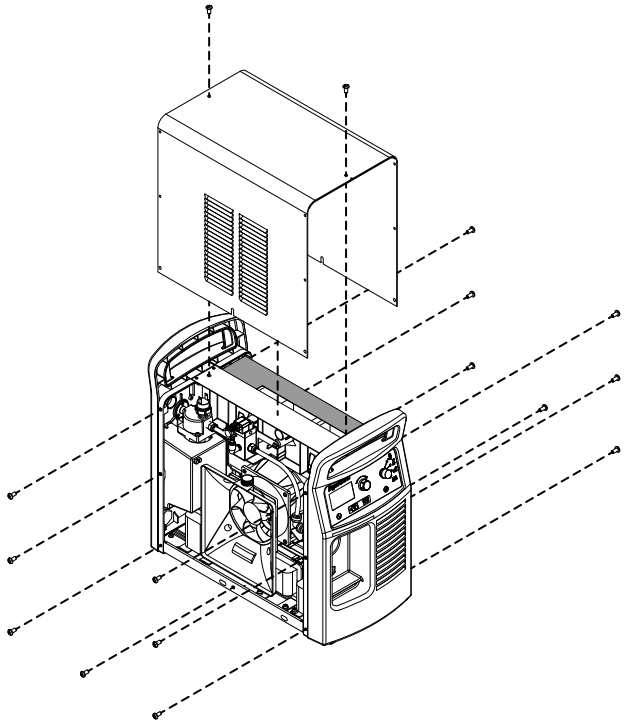


STORED ENERGY HAZARD

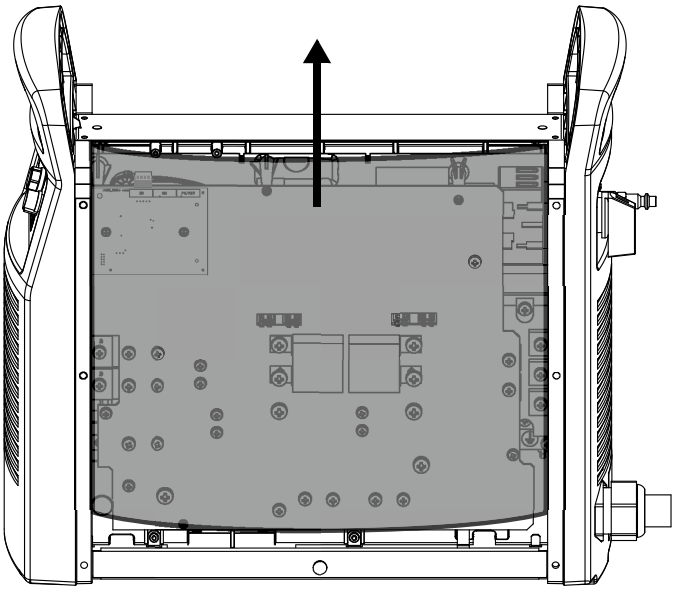
You can get a serious electric shock from the uncontrolled release of stored energy in capacitors. Electric shock can seriously injure or kill you.

Before you remove the plasma power supply cover, disconnect electrical input power and wait 1 minute to allow stored energy to discharge.

1. Set the power switch on the plasma power supply to OFF (**O**), disconnect the power cord, and disconnect the gas supply.
2. Remove the 16 screws from the plasma power supply cover.
3. Remove the plasma power supply cover.

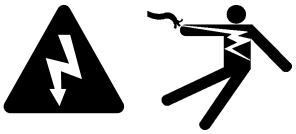


4. Remove the component barrier from the power-PCB side of the plasma power supply.



Install the component barrier and plasma power supply cover

⚠ WARNING

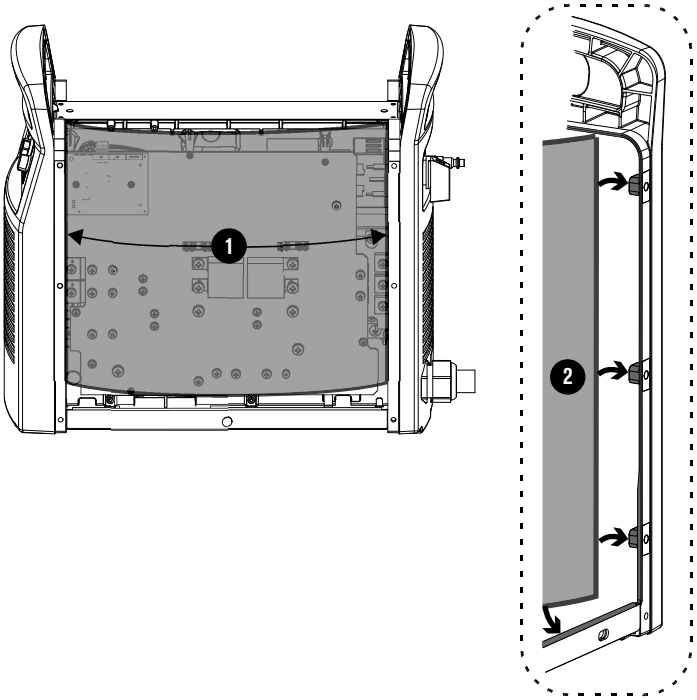


SHOCK HAZARD

You can get a serious electric shock if you touch exposed plasma power supply components. Electric shock can seriously injure or kill you.

You must install the component barrier and the plasma power supply cover. Never operate the plasma power supply unless the component barrier and the plasma power supply cover are in position.

1. Push in the sides ❶ of the component barrier so that the component barrier bends out slightly down the center.
2. Put the sides of the component barrier inside the plasma power supply frame ❷.

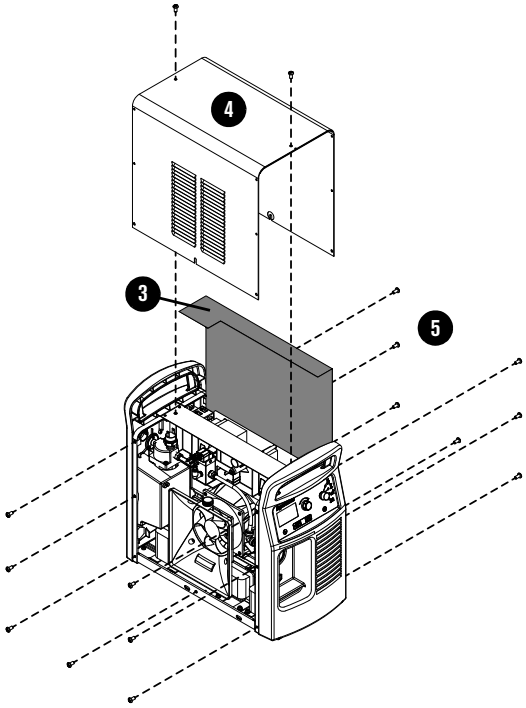


3. Fold the top of the component barrier ❸ onto the top edge of the power PCB, inside the plasma power supply frame and under the end panel bracket.

4. Make sure that all of the wires that are connected to the power PCB are behind the component barrier.

5. Put the cover ❹ on the plasma power supply. Do not pinch any wires.

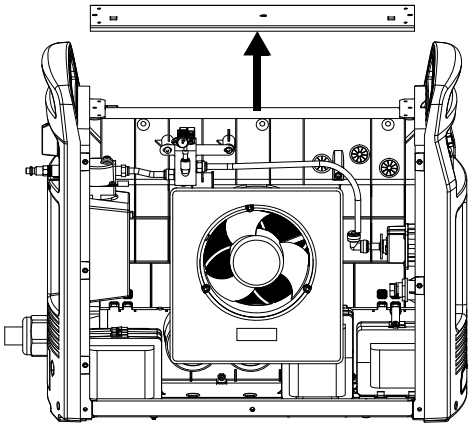
6. Install the 16 screws ❺ on the plasma power supply cover. Tighten the screws to 1.7 N·m (15 lbf·in).



Replace the end panel bracket

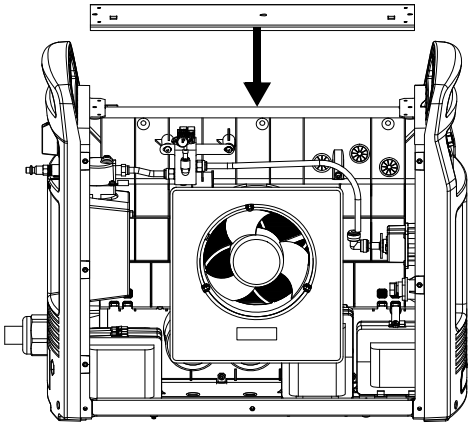
Remove the end panel bracket

1. Set the power switch on the plasma power supply to OFF (**O**), disconnect the power cord, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Lift the end panel bracket off of the plasma power supply.



Install the end panel bracket

1. Put the end panel bracket on the top of the plasma power supply.



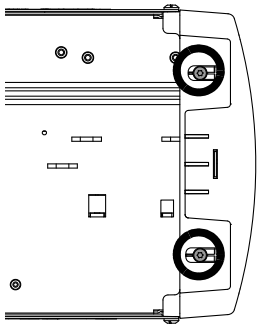
2. Install the plasma power supply cover and the component barrier. Refer to page 51.

Loosen and attach the front panel

Loosen the front panel

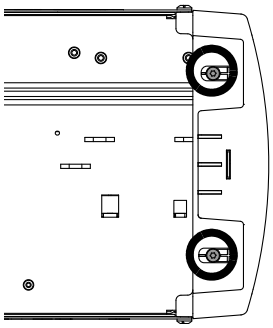
Some repairs are easier to make if you first loosen the front panel from the plasma power supply. To replace an old front panel with a new one, complete this procedure, then continue with step 3 in Replace the front panel on page 59.

1. Set the power switch on the plasma power supply to OFF (**O**), disconnect the power cord, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Remove the end panel bracket. Refer to page 53.
4. Put the fan side of the plasma power supply on a clean, dry, and flat surface.
5. Remove the screws that attach the front panel to the bottom of the plasma power supply.
6. Move the bottom of the front panel off of the bottom of the plasma power supply. Use a blade screwdriver to carefully pry the front panel away from the bottom of the plasma power supply.
7. Put the plasma power supply in an upright position.



Attach the front panel

1. Put the fan side of the plasma power supply on a clean, dry, and flat surface.
2. Push the front panel onto the bottom of the plasma power supply.
3. Install the screws that attach the front panel to the bottom of the plasma power supply. Tighten the screws to 2.3 N·m (20 lbf·in).
4. Put the plasma power supply upright position.
5. Install the end panel bracket. Refer to page 54.

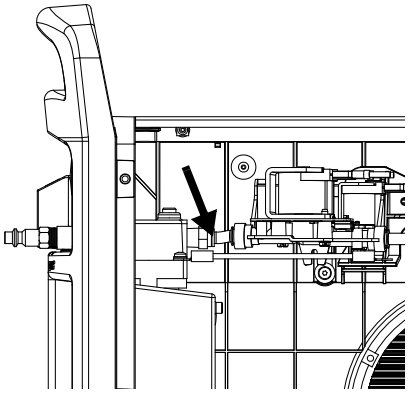


Loosen and attach the rear panel

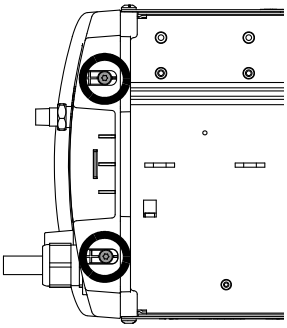
Loosen the rear panel

Some repairs are easier to make if you first loosen the rear panel from the plasma power supply. To replace an old rear panel with a new one, complete this procedure, then continue with step 3 in Replace the rear panel on page 60.

1. Set the power switch on the plasma power supply to OFF (**O**), disconnect the power cord, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Remove the end panel bracket. Refer to page 53.
4. Push-to-disconnect the gas tube from the air filter.
5. Put the fan side of the plasma power supply on a clean, dry, and flat surface.

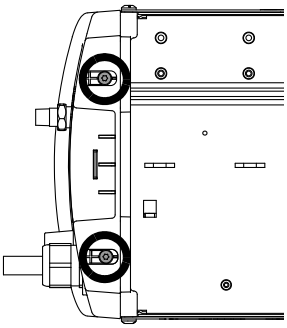


6. Remove the screws that attach the rear panel to the bottom of the plasma power supply.
7. Move the bottom of the rear panel off of the bottom of the plasma power supply. Use a blade screwdriver to carefully pry the rear panel away from the bottom of the plasma power supply.
8. Put the plasma power supply in an upright position.

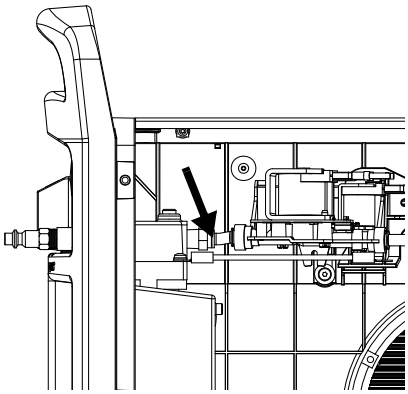


Attach the rear panel of the plasma power supply

1. Put the fan side of the plasma power supply on a clean, dry, and flat surface.
2. Push the rear panel onto the bottom of the plasma power supply.
3. Install the screws that attach the rear panel to the bottom of the plasma power supply. Tighten the screws to 2.3 N·m (20 lbf·in).
4. Put the plasma power supply in an upright position.



5. Push-to-connect the gas tube to the air filter.
6. Install the end panel bracket. Refer to page 54.

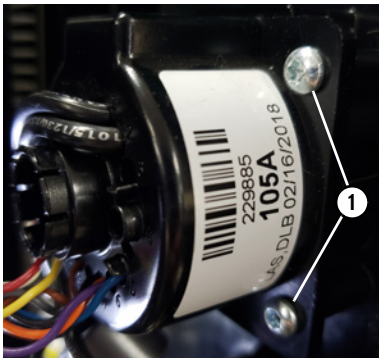


Replace the front panel

For kit contents, refer to Front panel on page 25.

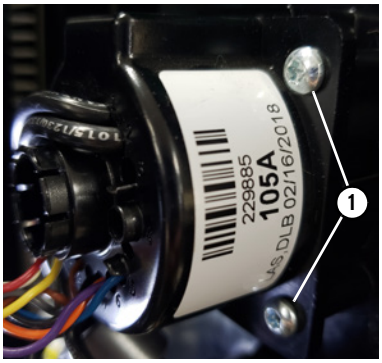
Remove the front panel

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Loosen the front panel. Refer to page 55.
3. Remove the 4 mounting screws ① from the torch quick-disconnect receptacle housing.
4. Remove the torch quick-disconnect receptacle housing from the front panel.
5. Remove the work lead receptacle. Refer to page 69.
6. Remove the control PCB and disconnect the ribbon cable. Refer to page 96.
7. Remove the front panel from the plasma power supply.



Install the front panel

1. Push the front panel onto the body of the plasma power supply.
2. Install the control PCB and ribbon cable. Refer to page 97.
3. Install the work lead receptacle. Refer to page 70.
4. Attach the torch quick-disconnect receptacle to the inside of the front panel with the 4 mounting screws. Tighten the screws to 1.7 N·m (15 lbf·in) ①.
5. Attach the front panel. Refer to page 56.
6. Install the plasma power supply cover and the component barrier. Refer to page 51.

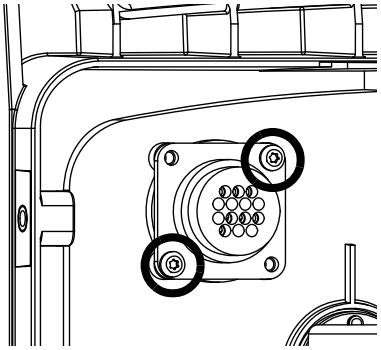


Replace the rear panel

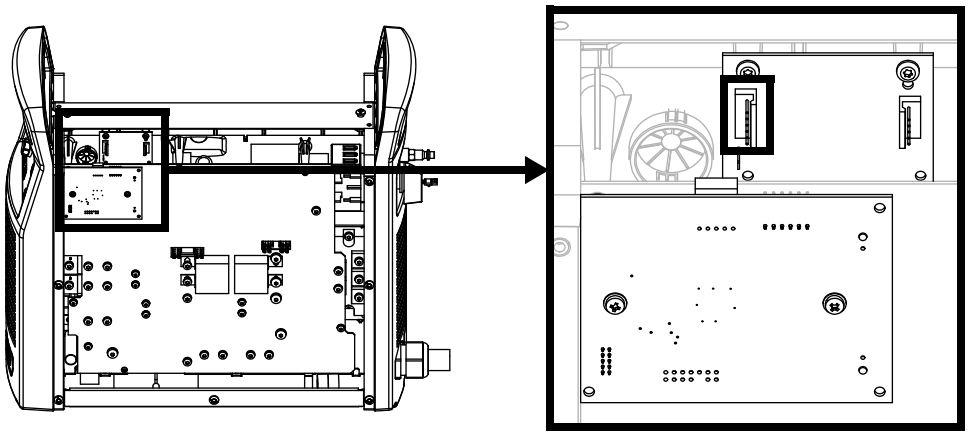
For kit contents, refer to Rear panel on page 19.

Remove the rear panel

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Loosen the rear panel. Refer to page 57.
3. Remove the air filter assembly and gas inlet fitting. Refer to page 83.
4. If a machine interface receptacle is installed, remove the 2 screws from the machine interface receptacle.

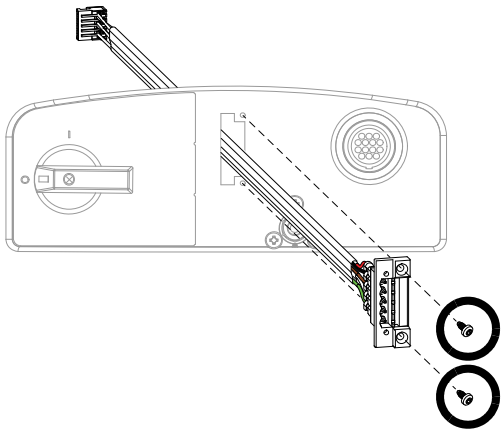


5. If an RS-485 serial interface receptacle is installed, do the following:
   a. Remove the RS-485 serial interface cable connector from J1 on the RS-485 PCB.



   b. Cut the cable tie that holds the cable.

c. Remove the 2 mounting screws from the RS-485 serial interface receptacle.



d. Remove the RS-485 serial interface receptacle and cable from the rear panel.

6. Remove the power switch. Refer to page 75.

7. Remove the power cord:

> For the procedure to replace the power cord and strain relief, refer to the *Power Cord and Strain Relief Replacement* Field Service Bulletin (807020). Download the file at www.hypertherm.com/docs.

a. Remove the screw that attaches the ground wire to the heatsink.

b. On the outside of the plasma power supply, remove the strain relief retention nut from the strain relief. Move the retention nut away from the plasma power supply.

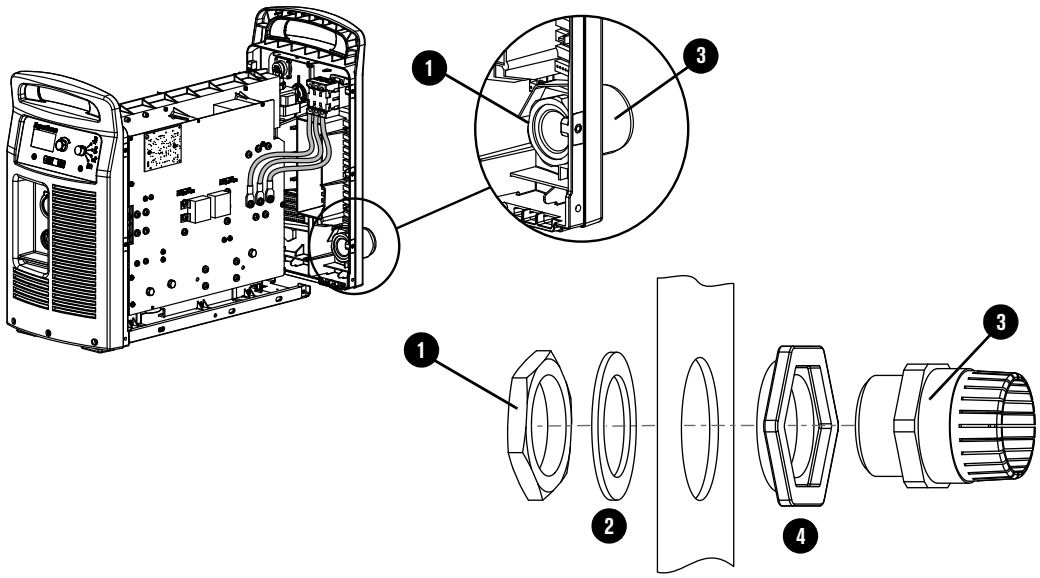
c. Remove the power cord.

- **CSA:** From the outside of the plasma power supply, pull the power cord and power wires through the strain relief in the rear panel.
- **CCC/CE:** From the inside of the plasma power supply, pull the power wires and the power cord through the strain relief in the rear panel.

> CCC/CE models have ferrite cores on the power wires and the ground wire. To maintain CCC/CE certification, install a CCC/CE power cord.

8. Remove the rear panel from the plasma power supply.

9. Remove the strain relief from the rear panel:



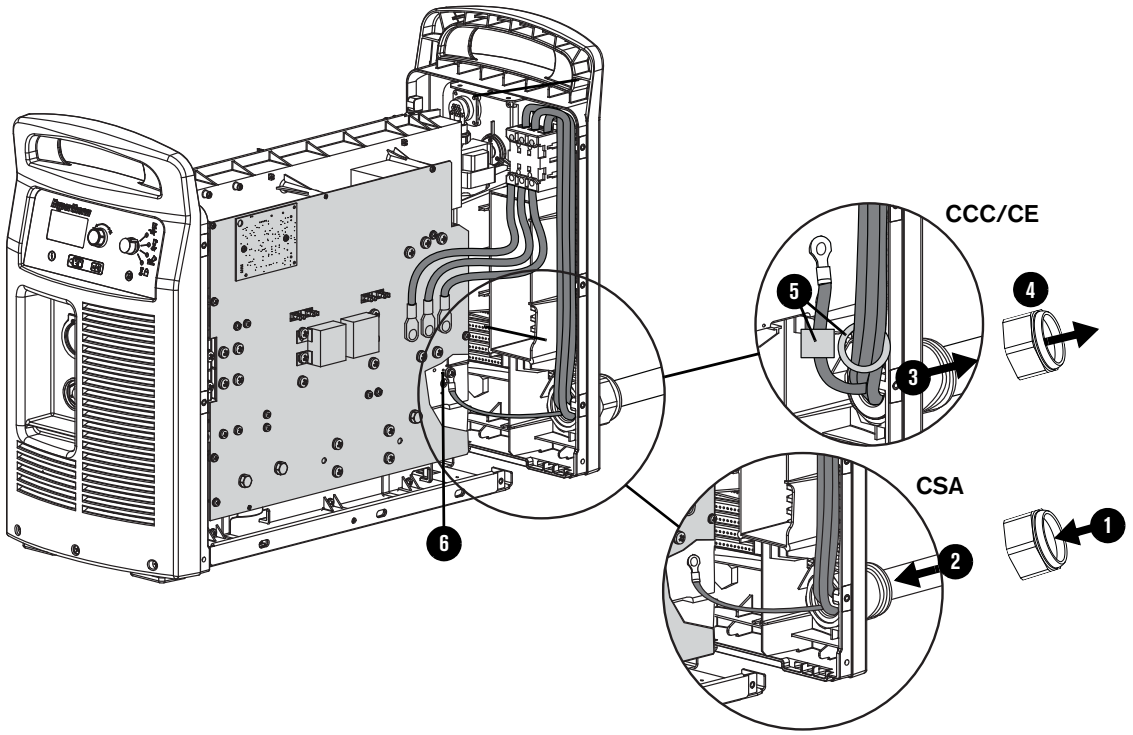
a. On the inside of the plasma power supply, remove the nut ❶. For some models, also remove the ❷ washer.

b. On the outside of the plasma power supply, remove the strain relief ❸. For some models, also remove the strain relief adapter ❹.

Install the rear panel

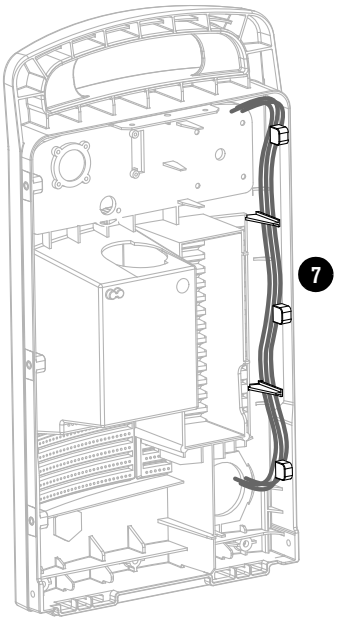
1. Install the strain relief into the new rear panel:
   - **a.** On the outside of the plasma power supply, put the strain relief in the hole in the rear panel of the plasma power supply. If your model has a strain relief adapter, first put the strain relief in the adapter.
   - **b.** On the inside of the plasma power supply, install the nut on the strain relief. If your model has a washer, first put the washer on the strain relief. Tighten the nut with your hand.
2. Put the power cord in the strain relief:
   - **CSA**: From the outside of the plasma power supply, put the power wires and ground wire through the retention nut ❶. Then put the power wires and ground wire through the strain relief ❷.
   - **CCC/CE**: From the inside of the plasma power supply, put the wires at the line-disconnect end of the power cord through the strain relief ❸. From the outside of the plasma power supply, pull the power cord through the strain relief. Then put the wires at the line-disconnect end of the power cord through the retention nut ❹.

     CCC/CE models have ferrite cores ❺ on the power wires and the ground wire. To maintain CCC/CE certification, install a CCC/CE power cord.

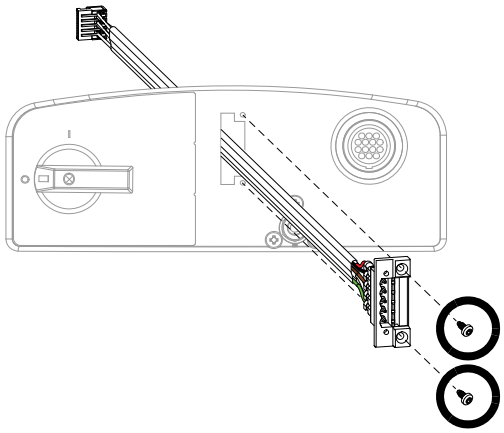


3. Attach the ground wire to the heatsink with the screw ❻ you removed previously. Tighten the screw to 4 N·m (35 lbf·in).

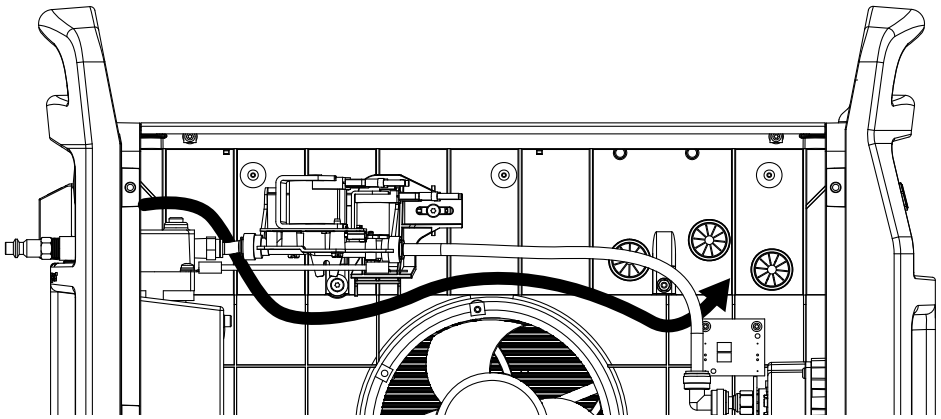
4. Push the 3 power wires into the inside edge of the rear panel using the guide posts ❼. Make sure that the routing of the wires is correct.



5. From the outside of the rear panel, tighten the strain relief retention nut on the strain relief with your hand plus a quarter turn with a wrench.
6. Put fan side of the plasma power supply on a clean, dry, and flat surface.
7. Push the rear panel onto the body of the plasma power supply.
8. Put the plasma power supply in an upright position.
9. Install the power switch. Refer to page 76.
10. If you have an RS-485 serial interface receptacle, do the following:
    a. Put the RS-485 serial interface cable through the hole in the rear panel.
    b. Attach the RS-485 serial interface receptacle to the rear panel with the 2 mounting screws. Tighten the screws to 0.8 N·m (7 lbf·in).



c. Put the RS-485 serial interface cable behind the gas tubes and below the solenoid valve.

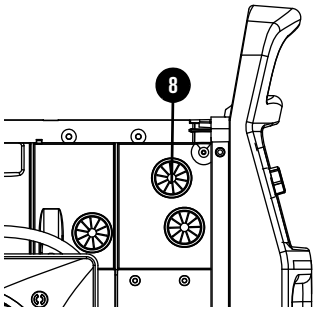


NOTICE

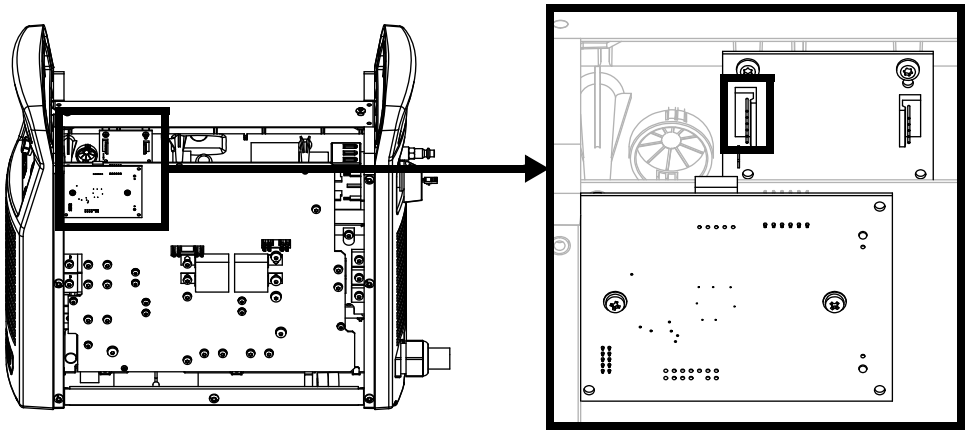
Do not put the RS-485 serial interface cable below the fan. This can cause the wires to be pinched by the fan. If any wires get pinched by the fan, this can damage the wires and prevent the fan from operating correctly.

d. Bundle the RS-485 serial interface cable with the cables that are already in the plasma power supply with a new cable tie.

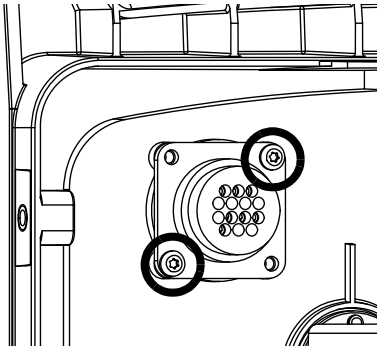
e. Put the RS-485 serial interface cable through the upper grommet ❽ on the center panel.



f. Connect the RS-485 serial interface cable connector to J1 on the RS-485 PCB.



11. If you have a machine interface receptacle, install the 2 mounting screws that attach the machine interface receptacle to the rear panel. Tighten the screws to 1.1 N·m (10 lbf·in).



12. Install the air filter assembly and gas inlet fitting. Refer to page 84.

13. Attach the rear panel. Refer to page 58.

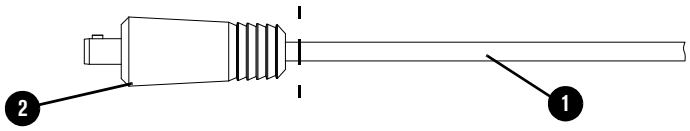
14. Install the plasma power supply cover and the component barrier. Refer to page 51.

Replace the work lead connector

For kit contents, refer to Work leads on page 15.

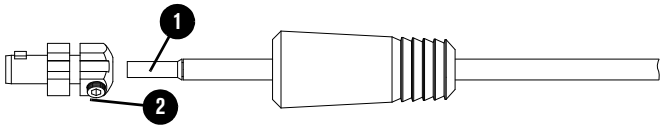
Remove the work lead connector

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Use cable cutters to cut the work lead cable ❶ close to the rubber boot ❷.

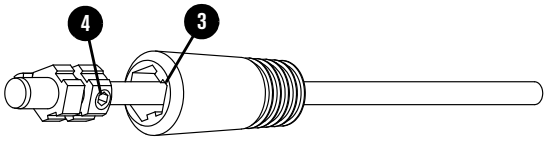


Install the work lead connector

1. Put the new rubber boot over the work lead cable.
2. Move the rubber boot back along the work lead cable.
3. Strip 13 mm (0.5 inches) off the end of the work lead cable.
4. Put the stripped end ❶ of the work lead cable into the new work lead connector.
5. Tighten the set screw ❷ to 11.3 N·m (100 lbf·in).



6. Align the tabs ❸ in the rubber boot with the slots ❹ in the work lead connector.



⚠ CAUTION



INCORRECTLY INSTALLED WORK LEAD CONNECTORS CAN OVERHEAT

To prevent damage and risk of burns, make sure that the face of the work lead connector is flush with the face of the rubber boot.

7. Align the face ❺ of the rubber boot with the face ❻ of the work lead connector. If the face of the work lead connector is below the face of the rubber boot, the work lead can overheat which can cause damage and risk of burns.

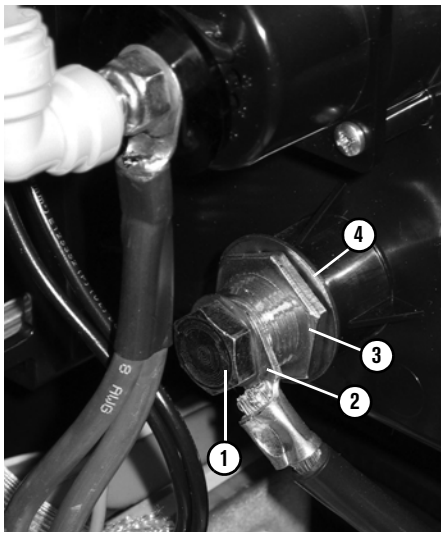


Replace the work lead receptacle

For kit contents, refer to Plasma power supply interior, front on page 24.

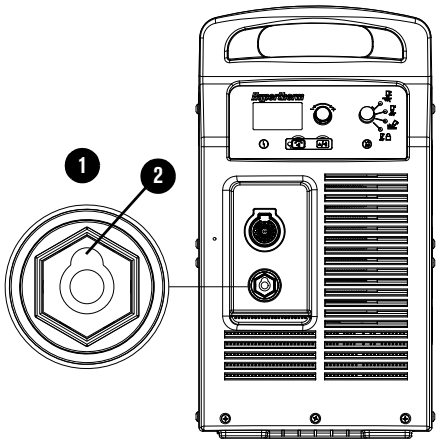
Remove the work lead receptacle

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Remove the bolt ① from the work lead receptacle.
4. Remove the ring terminal ② from the work lead receptacle.
5. Remove the nut ③ and washer ④ from the work lead receptacle.
6. Remove the work lead receptacle. Push the work lead receptacle in the direction of the front panel.

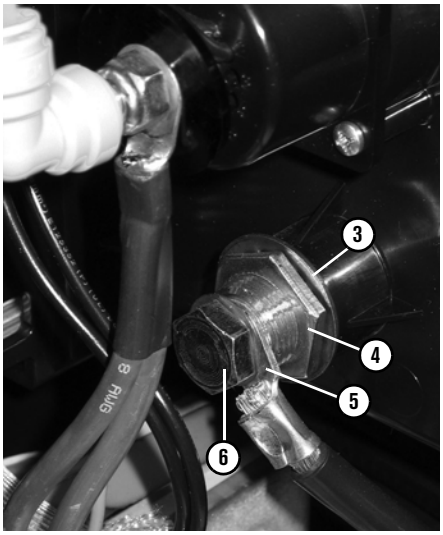


Install the work lead receptacle

1. Push the new work lead receptacle into the hole ❶ in the front panel. Position the receptacle so that the key way ❷ points up.



2. From inside the plasma power supply, put the washer ③ on the work lead receptacle.
3. Install the nut ④ onto the work lead receptacle. Tighten the nut to 9 N·m (80 lbf·in).
4. Put the ring terminal ⑤ on the work lead receptacle.
5. Install the bolt ⑥ on the work lead receptacle. Tighten the bolt to 13.6 N·m (120 lbf·in).
6. Install the plasma power supply cover and the component barrier. Refer to page 51.

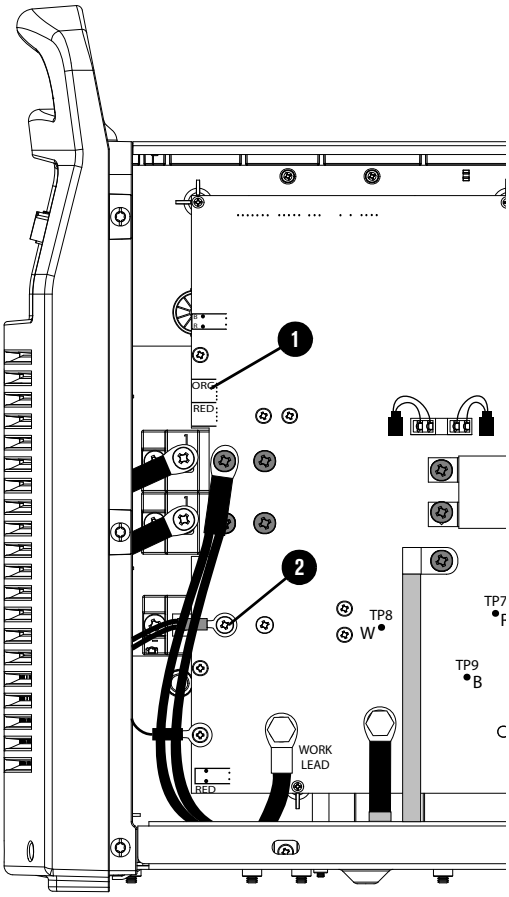


Replace the torch quick-disconnect receptacle

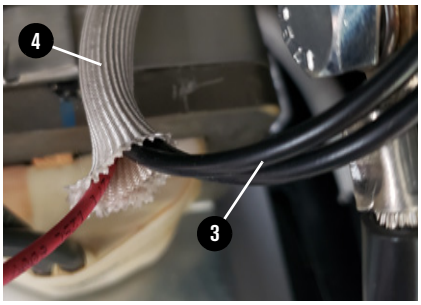
For kit contents, refer to Plasma power supply interior, front on page 24.

Remove the torch quick-disconnect receptacle

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Loosen the front panel. Refer to page 55.
4. Remove the torch interface cable connector from J20 ❶ on the power PCB.
5. From the fan side, pull the torch interface cable through the grommet.
6. Remove the nozzle wires ❷ from the power PCB.



7. Pull the wires ❸ through the protective sheath ❹.

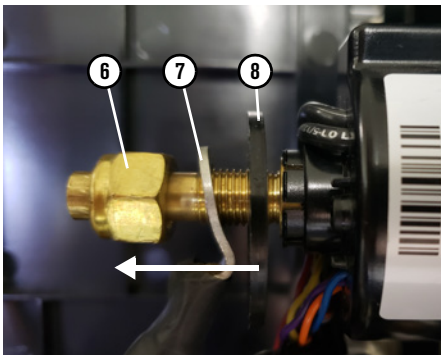


8. Push-to-disconnect the 90° gas inlet fitting ❺ from the torch quick-disconnect receptacle.



9. Remove the following components from the torch quick-disconnect receptacle:

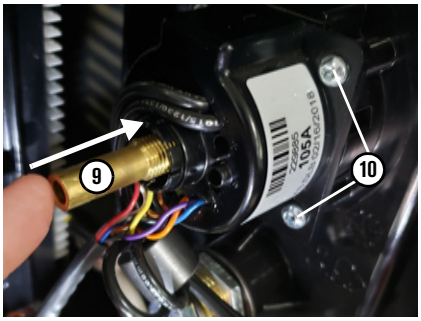
- Retention nut ⑥
- Ring terminal ⑦
- Washer ⑧



10. Push the torch quick-disconnect receptacle ⑨ out through the torch quick-disconnect receptacle housing.

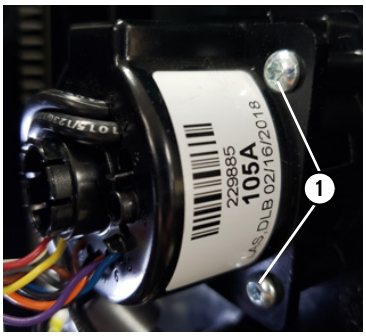
11. Remove the 4 screws ⑩ from the torch quick-disconnect receptacle housing.

12. Remove the torch quick-disconnect receptacle housing from the front panel.



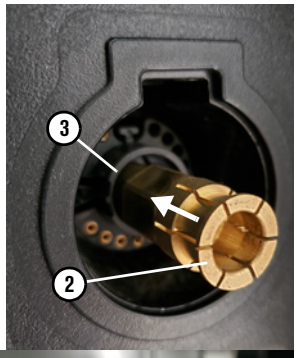
Install the torch quick-disconnect receptacle

1. Use the 4 new screws ① to install the new torch quick-disconnect receptacle into the front panel. Tighten the screws to 1.7 N·m (15 lbf·in).



2. From the front panel, put the small end of the new torch quick-disconnect receptacle into the center hole of the receptacle housing. Align the hexagonal flats on the receptacle with the hexagonal flats on the receptacle housing.

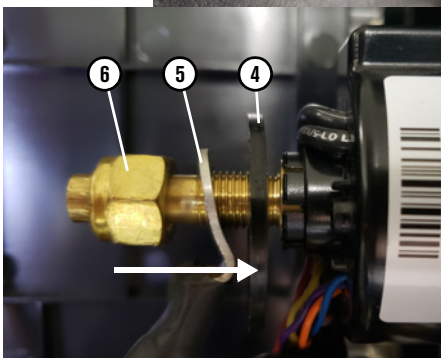
3. Push the receptacle in until the front ② is flush with the plastic receptacle housing ③.



4. Push the washer ④ onto the hub of the torch quick-disconnect receptacle until the washer makes a click.

5. Put the ring terminal ⑤ on the torch quick-disconnect receptacle.

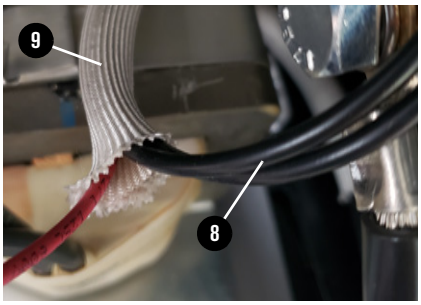
6. Put the new retention nut ⑥ onto the torch quick-disconnect receptacle. Tighten the retention nut to 14.7 N·m (130 lbf·in).



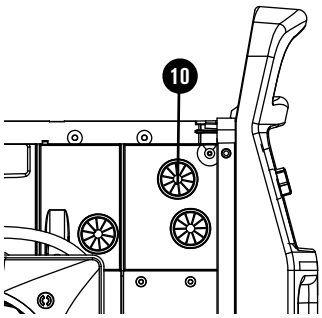
7. Push-to-connect the 90° gas inlet fitting ❼.



8. Put the nozzle wires ❽ through the protective sheath ❾ in the center panel.



9. Put the torch interface cable through the upper grommet ❿ on the center panel.

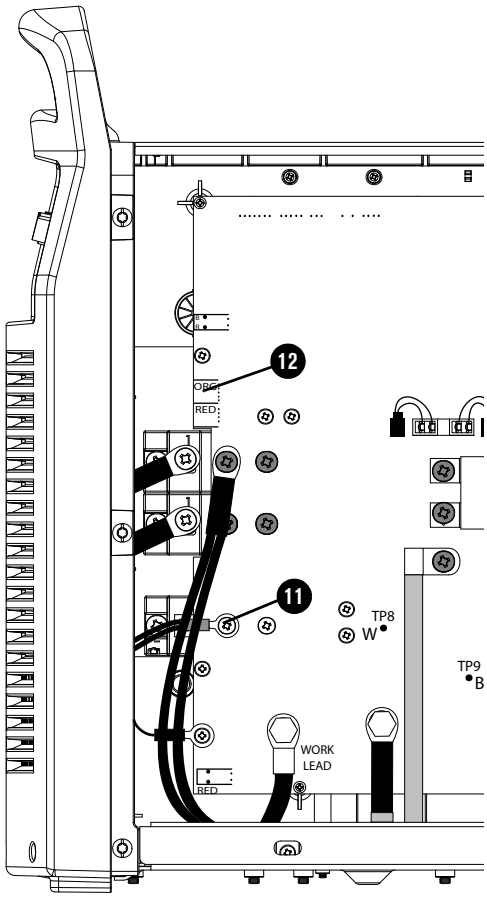


10. From the power PCB side, attach the nozzle wires ⓫ to the power PCB. Tighten the screw to 2.3 N·m (20 lbf·in).

11. Connect the torch interface cable connector to J20 ⓬ on the power PCB.

12. Attach the front panel. Refer to page 56.

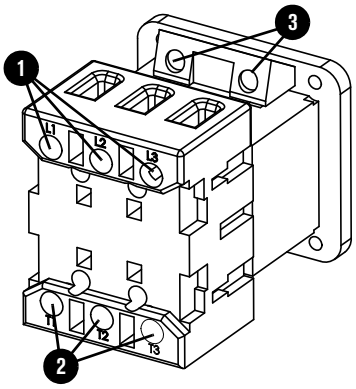
13. Install the plasma power supply cover and the component barrier. Refer to page 51.



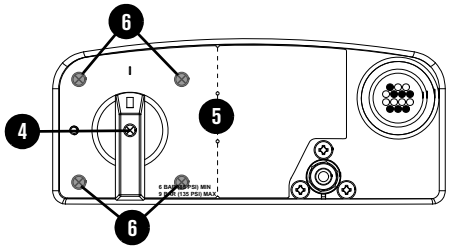
Replace the power switch

For kit contents, refer to Plasma power supply interior, rear on page 20.

Remove the power switch

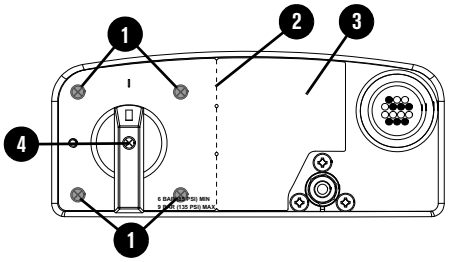


1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Loosen the rear panel. Refer to page 57.
3. Use an offset Phillips screwdriver to loosen the set screws ❶ that attach the 3 power wires to the top of the power switch.
4. Pull the 3 power wires from the power switch.
5. Make a note of which AC input wires are attached to T1, T2, and T3.
6. Use an offset Phillips screwdriver to loosen the set screws ❷ that attach the 3 AC input wires to the bottom of the power switch.
7. Pull the 3 power wires from the power switch.
8. Loosen the set screws ❸ on the auxiliary switch.
9. Pull the 2 wires from the auxiliary switch.
10. Remove the power switch handle screw ❹.
11. Pull the power switch handle straight off the post.
12. Use a blade screwdriver to pry up the edge of the label ❺.
13. Peel off the label.
14. Remove the 4 power switch mounting screws ❻.
15. Remove the power switch from the plasma power supply.



Install the power switch

1. Put the power switch into the plasma power supply.
2. Push the power switch post through the hole in the rear panel.
3. Attach the power switch to the rear panel with the 4 mounting screws ❶. Tighten the screws to 1.7 N·m (15 lbf·in).



4. If the optional RS-485 receptacle is not installed:
   a. Peel the protective cover off the new label.
   b. Carefully align the hole in the label with the correct hole in the rear panel.
   c. Push the label onto the rear panel.
5. If the optional RS-485 receptacle is installed:
   a. Bend the new label at the perforation ❷ and tear the label in half. Discard the right half ❸.
   b. Peel the protective cover off the left half of the new label.
   c. Carefully align the hole in the label with the correct hole in the rear panel.
   d. Push the label onto the rear panel.
6. Put the power switch handle onto the post.
7. Install the screw ❹ into the power switch handle. Tighten the screw to 0.8 N·m (7 lbf·in).

8. Put the auxiliary wires in the auxiliary switch. Tighten the screws ❺ to 1.1 N·m (10 lbf·in).

9. Put the AC input wires into the bottom of the power switch. Tighten the set screws ❻ to 2.3 N·m (20 lbf·in) for CSA models or 0.8 N·m (7 lbf·in) for CE/CCC models.

10. Put the 3 power wires into the top of the power switch. Tighten the set screws ❼ to 2.3 N·m (20 lbf·in) for CSA models or 0.8 N·m (7 lbf·in) for CE/CCC models.

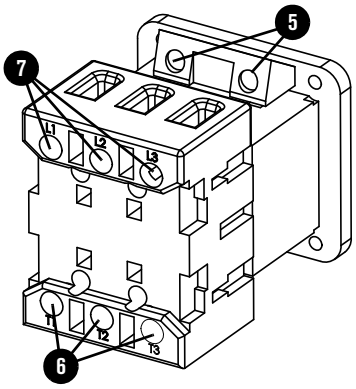


Table 1

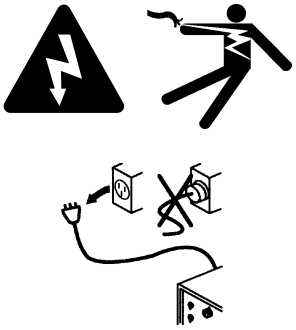
	Color	
Power Wire Position	**CSA**	**CE/CCC**
L1	Black	Brown
L2	White	Black
L3	Red	Grey

11. Attach the rear panel. Refer to page 58.

12. Install the plasma power supply cover and the component barrier. Refer to page 51.

4 Service Procedures for the Gas Line

⚠ WARNING



ELECTRIC SHOCK CAN KILL

Disconnect electric power before doing installation or maintenance. You can get a serious electric shock if electric power is not disconnected. Electric shock can seriously injure or kill you.

All work that requires removal of the plasma power supply outer cover or panels must be done by a qualified technician.

Refer to the *Safety and Compliance Manual* (80669C) for more safety information.

NOTICE



Static electricity can cause damage to printed circuit boards (PCBs). Use correct precautions when you touch PCBs.

Keep PCBs in antistatic containers.

Put on a grounded wrist strap when you touch PCBs.

Tools necessary for this section

- Assorted Phillips®, TORX®, and blade screwdrivers
- Assorted TORX® offset screwdrivers
- Adjustable wrench
- Grounded wrist strap (or similar grounding accessory)

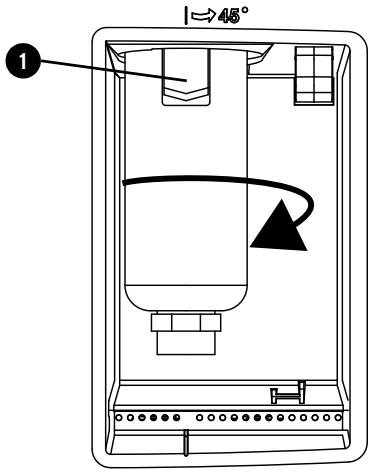
More tools necessary for some procedures

- Cable ties are necessary for Replace the fan and fan shroud on page 85 and Replace the solenoid valve on page 88.

Replace the air filter bowl and filter element

For kit contents, refer to Plasma power supply exterior, rear on page 17.

Remove the air filter bowl and filter element

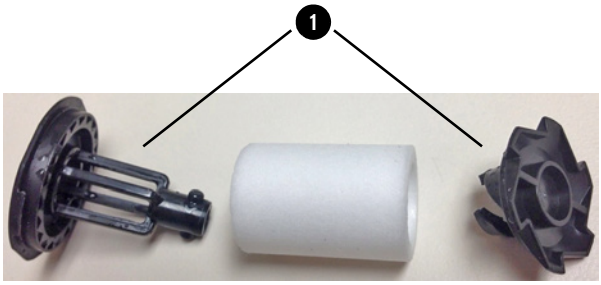


1. Set the power switch on the plasma power supply to OFF (**O**).
2. Disconnect the power cord from electrical power.
3. Disconnect the gas supply from the rear of the plasma power supply.
4. Hold the filter bowl with your right hand. With the index finger of your left hand, push down the latch ❶ and turn the filter bowl approximately 45 degrees to the right.
5. Pull the filter bowl straight down to remove.
6. Gently turn and pull the filter element ❷ out of the filter bowl. Be careful not to damage the O-ring ❸ at the top of the bowl.



Replace the air filter bowl, O-ring, and filter element

1. To replace the filter element, twist and pull the plastic fittings ❶ away from the filter element, approximately a 1/4 turn. Set the fittings aside. Discard the used filter element.



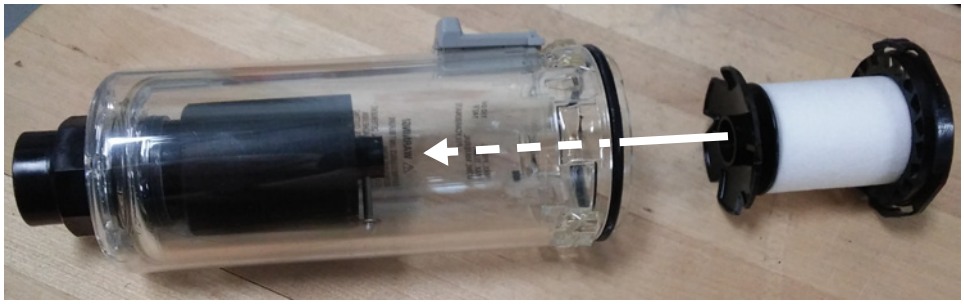
2. Put the new air filter element in the plastic fittings. Twist the plastic fittings until they lock together, approximately a 1/4 turn.

3. If the air filter bowl will not be replaced:
   - Clean the bowl and O-ring of any oil, dirt, or other contamination. Apply a thin layer of silicone lubricant on the O-ring.
   - To replace the O-ring, discard the used O-ring. Put the thick O-ring ❷ at the top of the filter bowl.



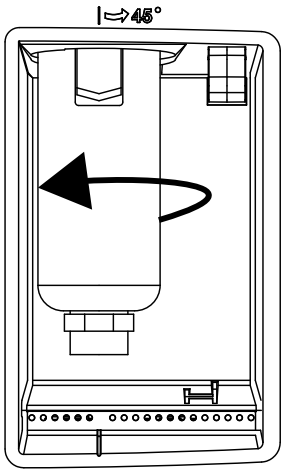
4. To replace the air filter bowl, discard the old air filter bowl.

5. Put the filter element inside the air filter bowl. Push down on the top plastic fitting until you hear a click.



Install the air filter bowl and filter element

1. Vertically align the filter bowl and push it up into the receptacle in the rear panel.
2. Turn the filter bowl 45 degrees to the left until you hear a click.



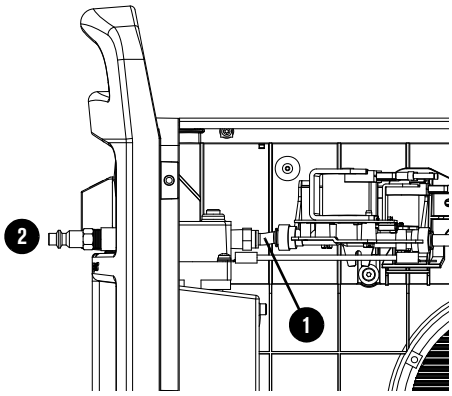
Replace the air filter assembly

For kit contents, refer to Plasma power supply interior, fan side on page 21.

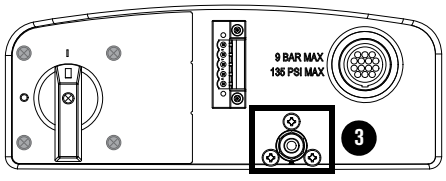
This kit contains an extra gas tube. This procedure uses the shortest gas tube in the kit.

Remove the air filter assembly

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Loosen the rear panel. Refer to page 57.
4. Remove the air filter bowl and air filter element. Refer to page 81.
5. Push-to-disconnect both ends of the gas tube ❶.
6. From the outside of the rear panel, remove the gas fitting ❷ from the air filter assembly.

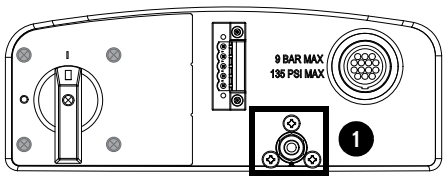


7. Remove the 3 screws ❸ from the rear panel.
8. Remove the air filter assembly from the plasma power supply.



Install the air filter assembly

1. Remove the new air filter bowl and air filter element from the new air filter assembly.
2. Put the new air filter assembly into the plasma power supply.
3. Install the 3 screws ❶ on the rear panel. Tighten the screws to 1.7 N·m (15 lbf·in).
4. Apply a small amount of thread sealant to the threads of the gas fitting.
   - Too much thread sealant can contaminate the gas line.

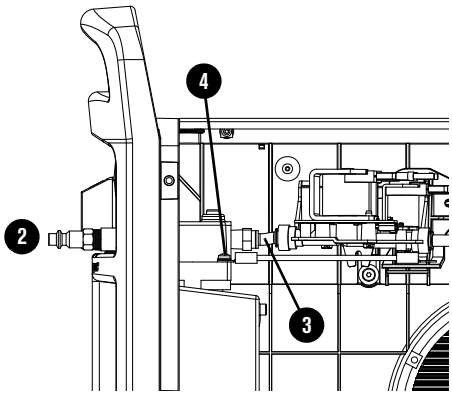


NOTICE

PTFE TAPE CAN CAUSE CLOGGED VALVES, REGULATORS, AND TORCHES

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

5. Install the gas fitting ❷ onto the air filter assembly.
   - **CSA models:** Tighten the 1/4 NPT quick-disconnect nipple to 10.2 N·m (90 lbf·in).
   - **CE/CCC models:** Tighten the G-1/4 BSPP adapter to 12.4 N·m (110 lbf·in).
6. Use the shortest gas tube in the kit. Push-to-connect the new gas tube ❸ into the new air filter assembly and solenoid valve.
7. Attach the ground wires with the ground screw ❹. Tighten the screw to 2.8 N·m (25 lbf·in).



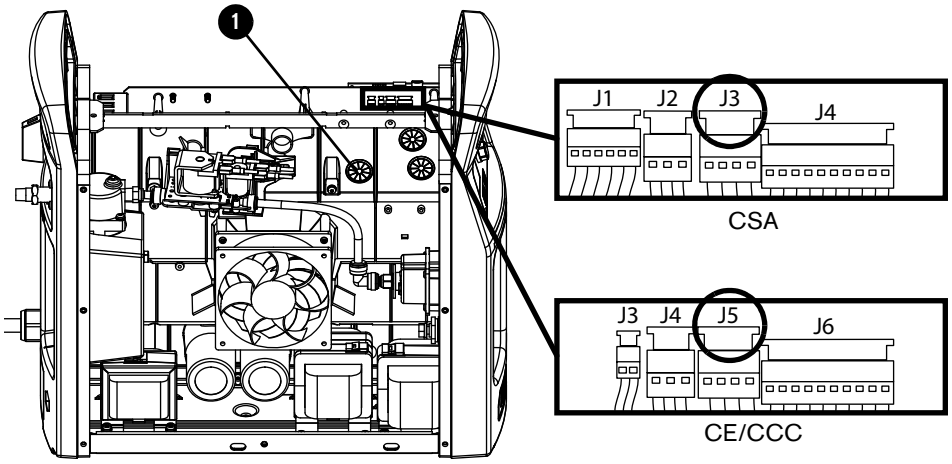
8. Install the new air filter bowl and air filter element. Refer to page 83.
9. Attach the rear panel. Refer to page 58.
10. Install the component barrier and the plasma power supply cover. Refer to page 51.

Replace the fan and fan shroud

For kit contents, refer to Plasma power supply interior, fan side on page 21.

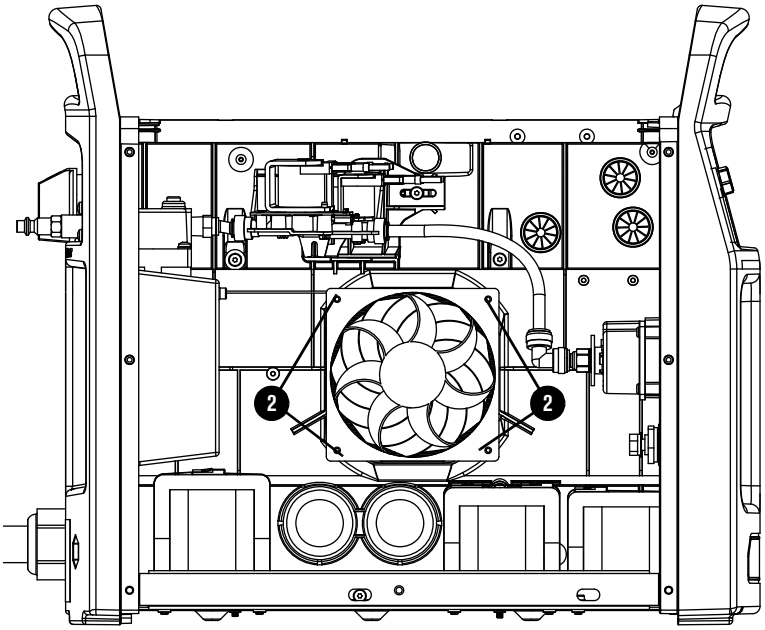
Remove the fan and fan shroud

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Remove the end panel bracket. Refer to page 53.
4. Pull the fan shroud straight off of the fan.
5. Cut the cable tie that holds the fan wires.
6. Disconnect the fan wire connector from J3 (CSA) or J5 (CE/CCC) near the top of the power PCB.



7. From the fan side, pull the fan wire through the grommet.

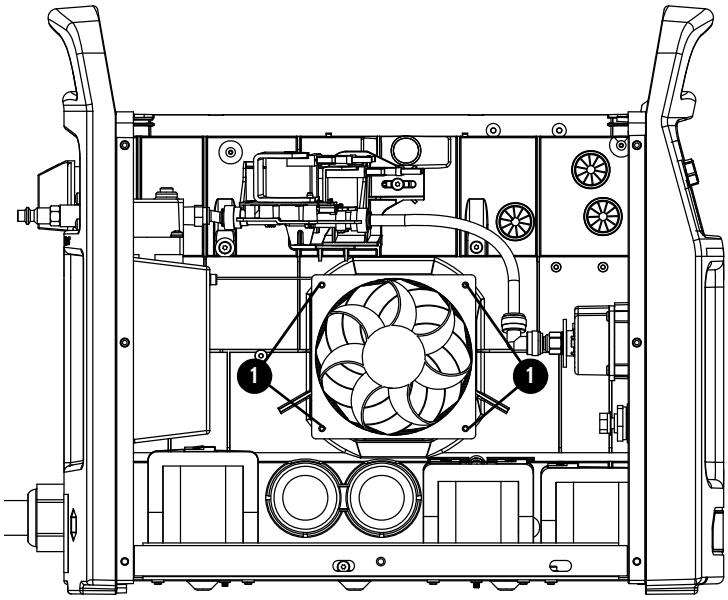
8. Use an offset TORX screwdriver to remove the 4 screws ❷ from fan.



9. Remove the old fan.

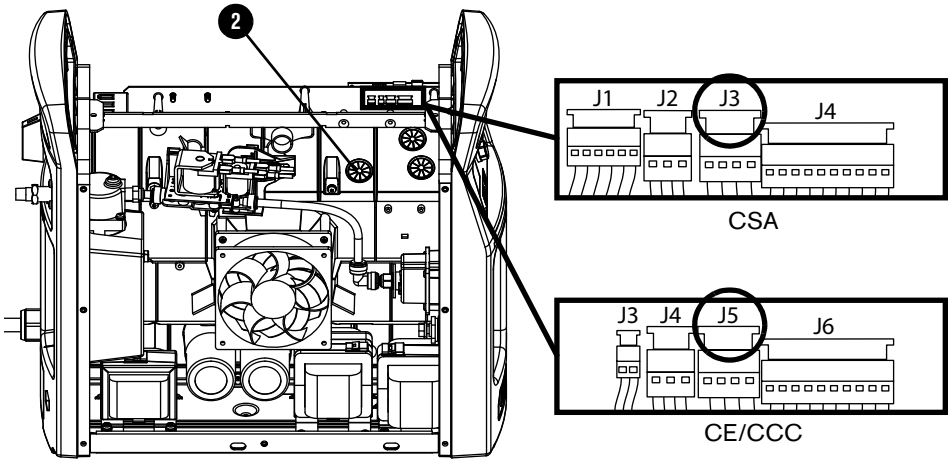
Install the fan and fan shroud

1. Attach the new fan to the center panel with the 4 supplied screws ❶.Tighten the screws to 1.1 N·m (10 in·lbf).



2. Put the fan wire through the lower left grommet ❷.

3. Connect the fan wire connector to J3 (CSA) or J5 (CE/CCC) near the top of the power PCB



4. Bundle the fan and solenoid valve wires with a new cable tie.

5. Align the plastic posts on the fan shroud with the related holes in the fan.

6. Push the fan shroud straight onto the fan.

7. Install the end panel bracket. Refer to page 54.

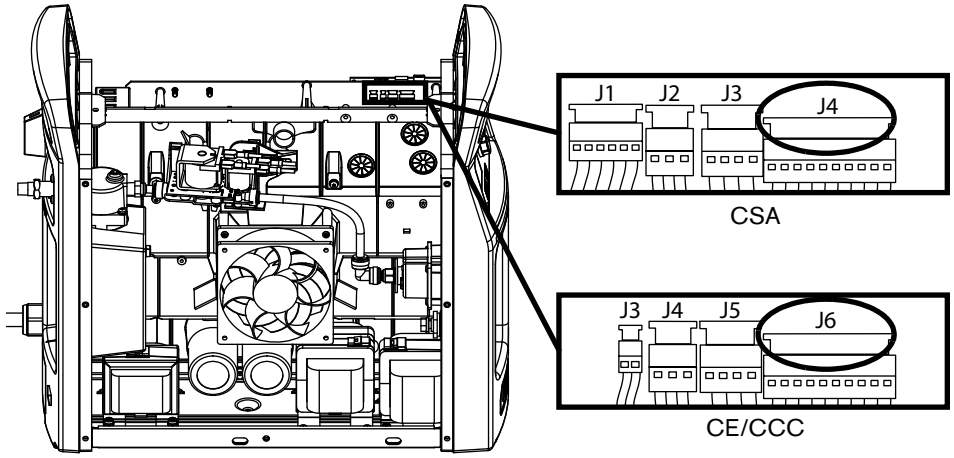
8. Install the component barrier and the plasma power supply cover. Refer to page 51.

Replace the solenoid valve

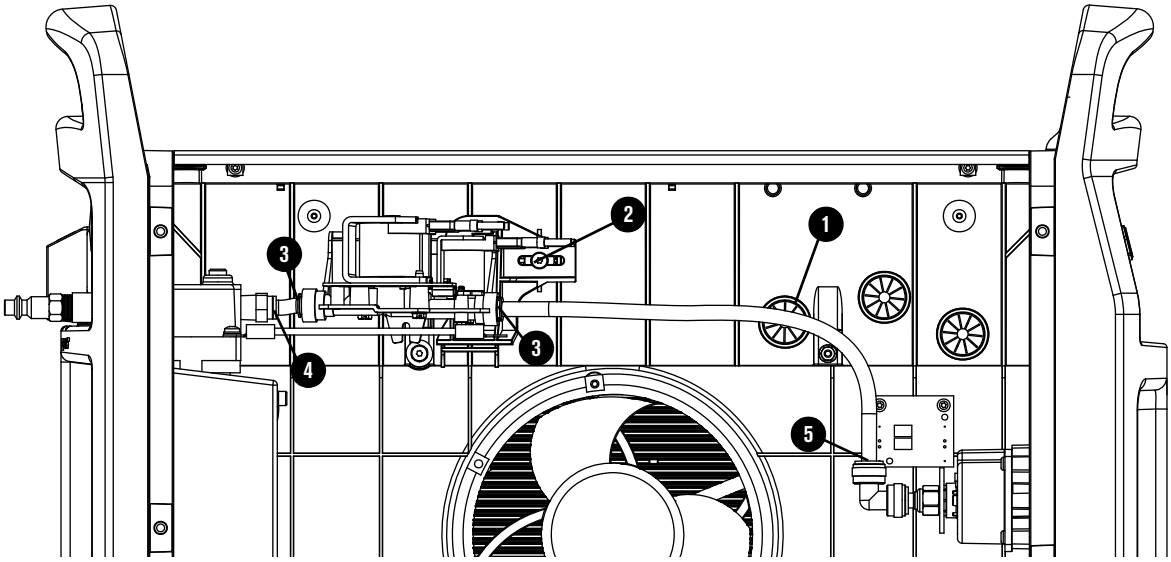
For kit contents, refer to Plasma power supply interior, fan side on page 21.

Remove the solenoid valve

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Remove the end panel bracket. Refer to page 53.
4. Cut the cable tie that holds the solenoid valve wires.
5. Disconnect the solenoid valve wire connector from J4 (CSA) or J6 (CE/CCC) near the top of the power PCB.



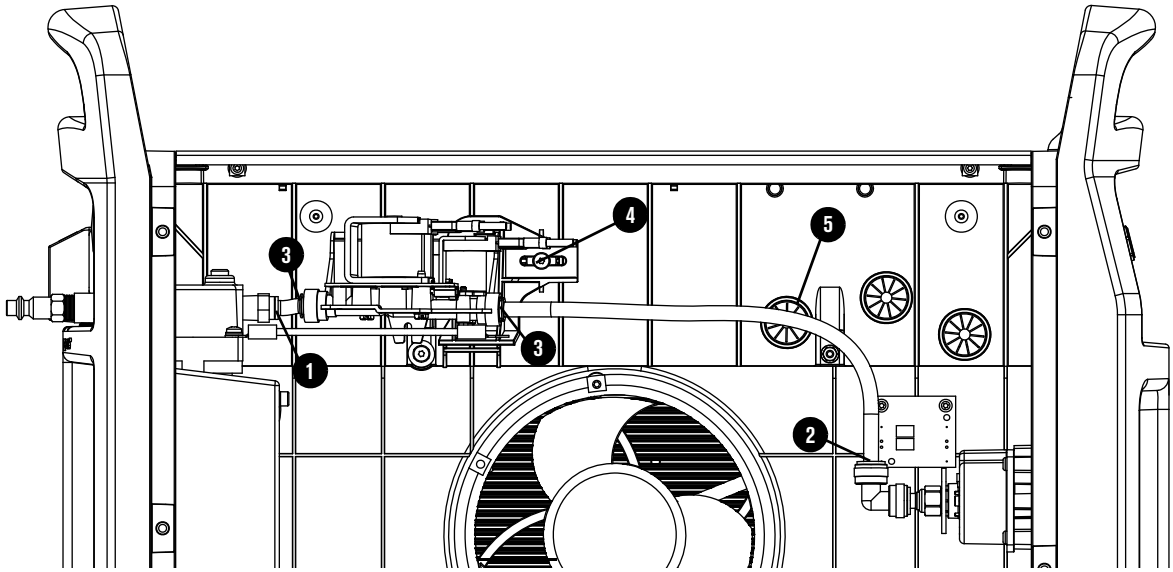
6. From the fan side, pull the solenoid valve wires through the grommet ❶.



7. Remove the mounting screw ❷ from the bracket.
8. Push-to-disconnect the short gas tube and long gas tube from the solenoid valve ❸.
9. Remove the solenoid valve and bracket.
10. Push-to-disconnect the short gas tube from the air filter assembly ❹.
11. Push-to-disconnect the long gas tube from elbow fitting ❺.

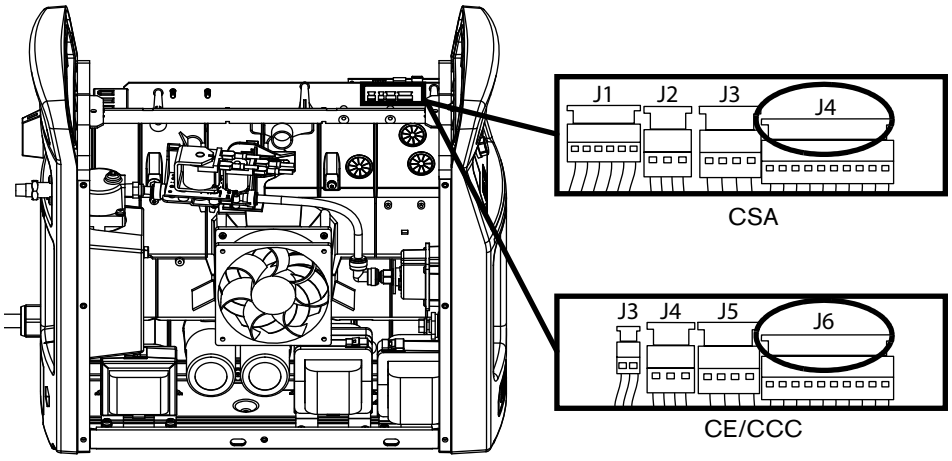
Install the solenoid valve

1. Push-to-connect the shortest gas tube supplied into the air filter assembly ❶.
2. Push-to-connect the middle length gas tube supplied into the elbow fitting ❷.
3. If necessary, snap the new bracket onto the new solenoid valve.
4. Hold the solenoid valve and bracket in position, and push-to-connect the short gas tube and long gas tube to the solenoid valve ❸.



5. Attach the new solenoid valve to the center panel with the supplied screw ❹. Tighten the screw to 2.2 N·m (20 lbf·in).
6. Put the solenoid valve wires through the lower left grommet ❺.

7. Connect the solenoid valve wire connector to J4 (CSA) or J6 (CE/CCC) near the top of the power PCB.



8. Bundle the fan and solenoid valve wires with a new cable tie.

9. Install the end panel bracket. Refer to page 54.

10. Install the component barrier and the plasma power supply cover. Refer to page 51.

Replace the gas tubes

For kit contents, refer to Plasma power supply interior, fan side on page 21.

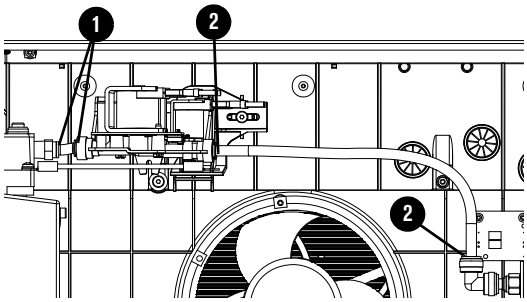
This kit contains an extra gas tube.

NOTICE

Do not make kinks or bend the gas tubes. This will damage the gas tubes.

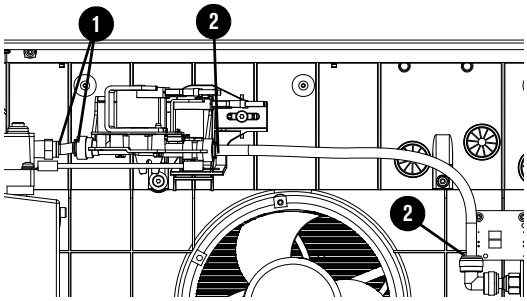
Remove the gas tubes

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Remove the end panel bracket. Refer to page 53.
4. Push-to-disconnect both ends of the short gas tube ❶.
5. Push-to-disconnect both ends of the long gas tube ❷.



Install the gas tubes

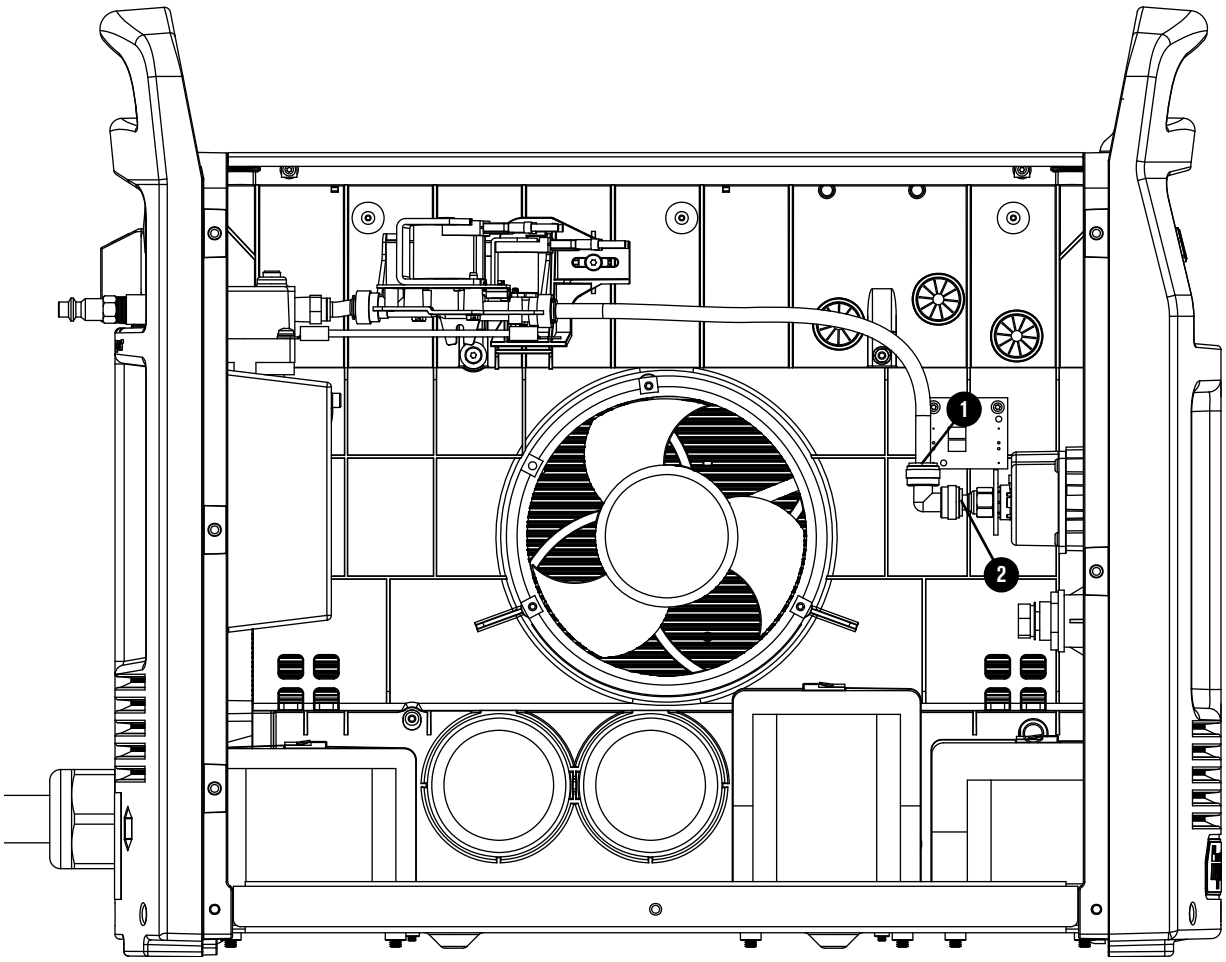
1. Use the 44.5 mm (1.75 inch) gas tube in the kit. Push-to-connect both ends of the gas tube ❶.
2. Use the 196.9 mm (7.75 inch) gas tube in the kit. Push-to-connect both ends of the gas tube ❷.
3. Install the end panel bracket. Refer to page 54.
4. Install the component barrier and the plasma power supply cover. Refer to page 51.



Replace the 90° gas tube fitting

For kit contents, refer to Plasma power supply interior, fan side on page 21.

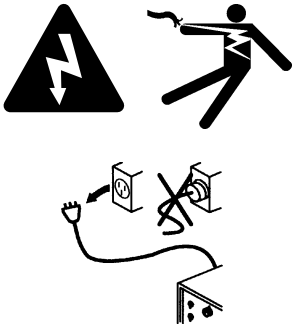
1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Push-to-disconnect the long gas tube ❶ from the 90° degree gas inlet fitting.
4. Push-to-disconnect the 90° gas inlet fitting from the torch quick-disconnect receptacle ❷.
5. Push-to-connect the new 90° gas inlet fitting to the torch quick-disconnect receptacle.
6. Push-to-connect the long gas tube into the new 90° gas inlet fitting.



5

Service Procedures for the PCBs and Related Components

⚠ WARNING



ELECTRIC SHOCK CAN KILL

Disconnect electrical power before doing installation or maintenance.

The line-disconnect switch must REMAIN in the OFF position until all installation or maintenance steps are complete.

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

NOTICE



Static electricity can cause damage to printed circuit boards (PCBs). Use correct precautions when you touch PCBs.

Keep PCBs in antistatic containers.

Put on a grounded wrist strap when you touch PCBs.

Tools necessary for this section

- Assorted Phillips®, TORX®, and blade screwdrivers
- Assorted offset screwdrivers
- Assorted hexagonal socket wrenches
- Needle nose pliers
- Grounded wrist strap (or similar grounding accessory)
- Anti-static container to store printed circuit boards (PCBs)

More tools necessary to for some procedures

The following tools are necessary for Replace the heatsink components on page 105:

- Plastic scraper
- Isopropyl alcohol
- Paper towels
- Lint-free cloth

Replace the DSP PCB

For kit contents, refer to Plasma power supply interior, front on page 24.

For the procedure to replace the DSP PCB, refer to the *DSP PCB Replacement and Power Supply Data Backup* Field Service Bulletin (810950). Download the file at www.hypertherm.com/docs.

NOTICE

POSSIBLE LOSS OF DATA

You can lose system-level cut data if you do not save that data before you install the new DSP PCB.

Use the procedure in the 810950 Field Service Bulletin to save the system-level cut data from the old DSP PCB to the new DSP PCB.

NOTICE

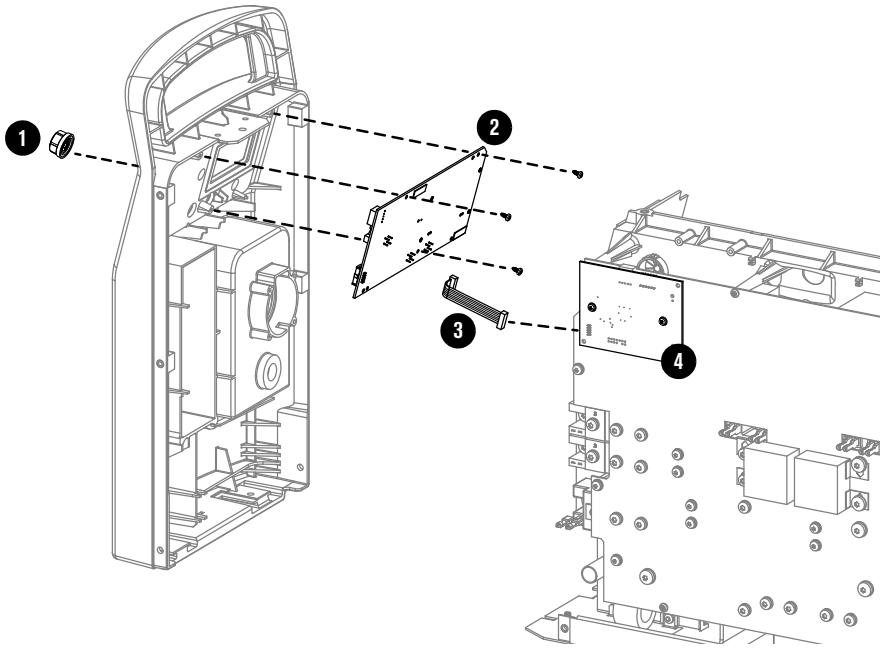
SYSTEM CANNOT CUT

The 2-pin jumper (108855) in this kit is necessary to save system data to the new DSP PCB. But it prevents the torch from firing a plasma arc if you keep it on the DSP PCB.

Make sure that you remove the 2-pin jumper from the new DSP PCB before you try to cut.

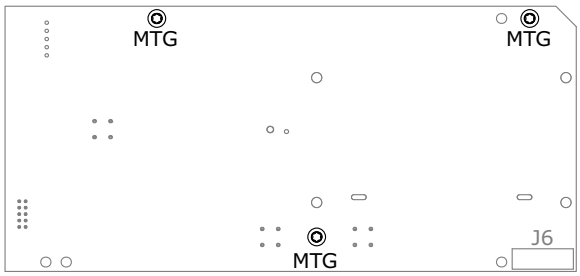
Replace the control PCB and the ribbon cable

For kit contents, refer to Plasma power supply interior, front on page 24. The control PCB and the ribbon cable are sold as different kits. The control PCB does not come with a ribbon cable.



Remove the control PCB and the ribbon cable

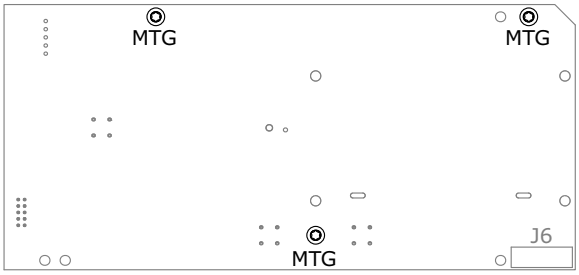
1. Set the power switch on the plasma power supply to OFF (**O**), disconnect the power cord, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Loosen the front panel. Refer to page 55.
4. Pull the adjustment knob ❶ off of its post on the front panel. If necessary, use a blade screwdriver to carefully pry the knob off of the post.
5. Remove the 3 mounting screws from the control PCB ❷. Use an offset TORX screwdriver. The screws have the label MTG.
6. From the power PCB side of the plasma power supply, remove the control PCB from the front panel.
7. Disconnect the ribbon cable ❸ from J6 on the control PCB.



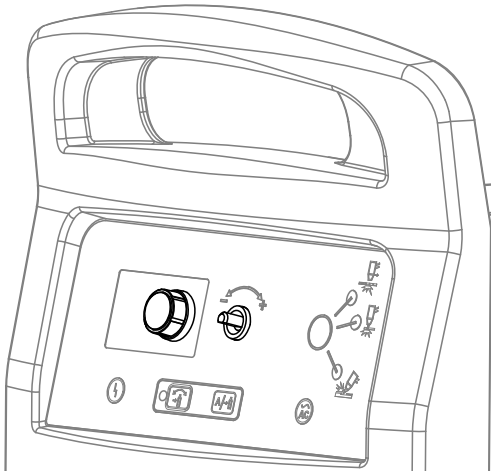
8. Is it necessary to replace the ribbon cable?
   - If yes, go to the next step.
   - If no, continue with Install the control PCB and the ribbon cable.
9. Remove the left mounting screw from the DSP PCB ❹.
10. Disconnect the ribbon cable from J6 on the DSP PCB.

Install the control PCB and the ribbon cable

1. Connect the ribbon cable ❸ to the J6 connector on the new control PCB ❷.
2. From the power PCB side of the plasma power supply, put the control PCB into position in the front panel as follows:
   a. Tilt the bottom of the control PCB towards the front panel until it is on the plastic tabs in the panel.
   b. Push the post on the control PCB through the hole in the front panel.
3. Attach the control PCB to the front panel with the 3 mounting screws. Tighten the screws to 0.6 N·m (5 lbf·in).



4. Push the adjustment knob ❶ onto the post in the front panel.



5. Attach the front panel. Refer to page 56.
6. Did you install a new ribbon cable?
   - If yes, go to the next step.
   - If no, continue with step 9.
7. Connect the ribbon cable to J6 on the DSB PCB ❹.
8. Install the left mounting screw in the DSP PCB. Tighten the screw to 1.1 N·m (10 lbf·in).
9. Install the component barrier and the plasma power supply cover. Refer to page 51.

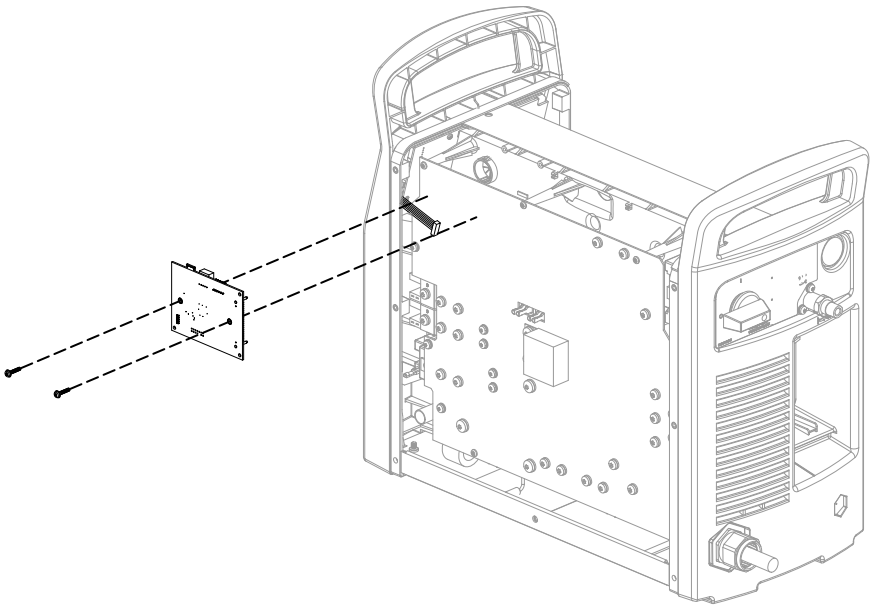
Replace the power PCB

For kit contents, refer to Plasma power supply interior, power PCB side on page 26.

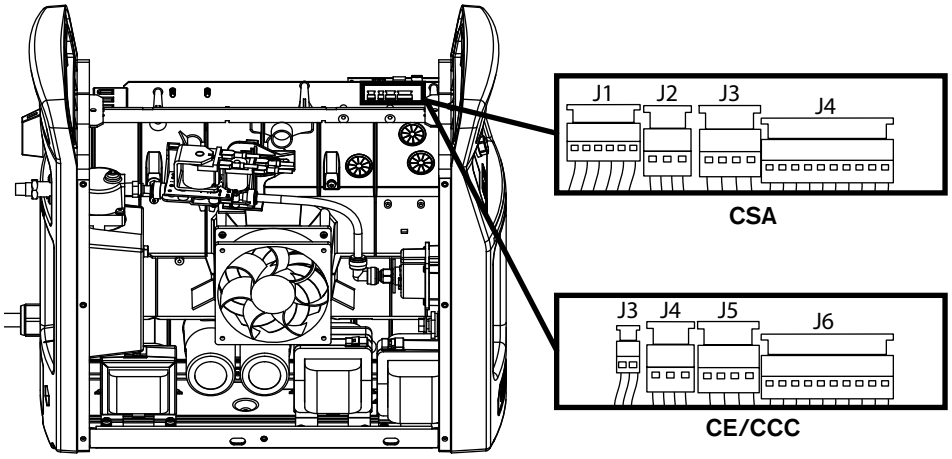
Refer to page 100 through page 100 for an image of your power PCB.

Remove the power PCB

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Remove the end panel bracket. Refer to page 53.
4. Get a photograph of the power PCB so that you have a record of how all the screws and wires are attached.
5. Remove the DSP PCB, as follows:
   a. If you are using a serial connection, remove the DSP connector from J7 at the top of the DSP PCB.
   b. Remove the 2 mounting screws from the DSP PCB.
   c. Be careful not to bend the pins as you pull the DSP PCB away from the power PCB.
   d. Disconnect the ribbon cable from J6 on the DSP PCB.
   e. Set aside the DSP PCB in an anti-static bag.



6. Disconnect the 4 wire connectors near the top of the power PCB.



For step 7 through step 15, refer to Figure 1 and Figure 2.

7. Remove the 3 µF capacitors ❶ from near the center of the power PCB. The number of capacitors is different for each system. Set aside the capacitors and the screws.

8. Disconnect the gate drive wire connectors ❷.

9. CSA models: Disconnect the PFC temperature sensor wire connector ❸.

10. CE/CCC models: Disconnect the MOV assembly ❹ from the right side of the power PCB. Set aside the MOV assembly and the screws.

11. Remove all of the remaining screws that attach the power PCB to the heatsink components and to the center panel. Make sure that you identify where the screws go so that you know where to install them on the new power PCB.

12. Disconnect the **J12** and **J20** connectors from the left side of the power PCB.

13. If you are using a machine interface connection, disconnect the **J21** and **J32** (CSA) or **J33** (CE/CCC) connectors from the left side of the power PCB.

14. Pull the right edge of the power PCB forward, and push the gate drive wires and PFC temperature sensor wire through the openings in the PCB.

15. Carefully remove the power PCB and set it aside in an anti-static bag.

Figure 1 – Powermax65/85 SYNC CSA power PCB

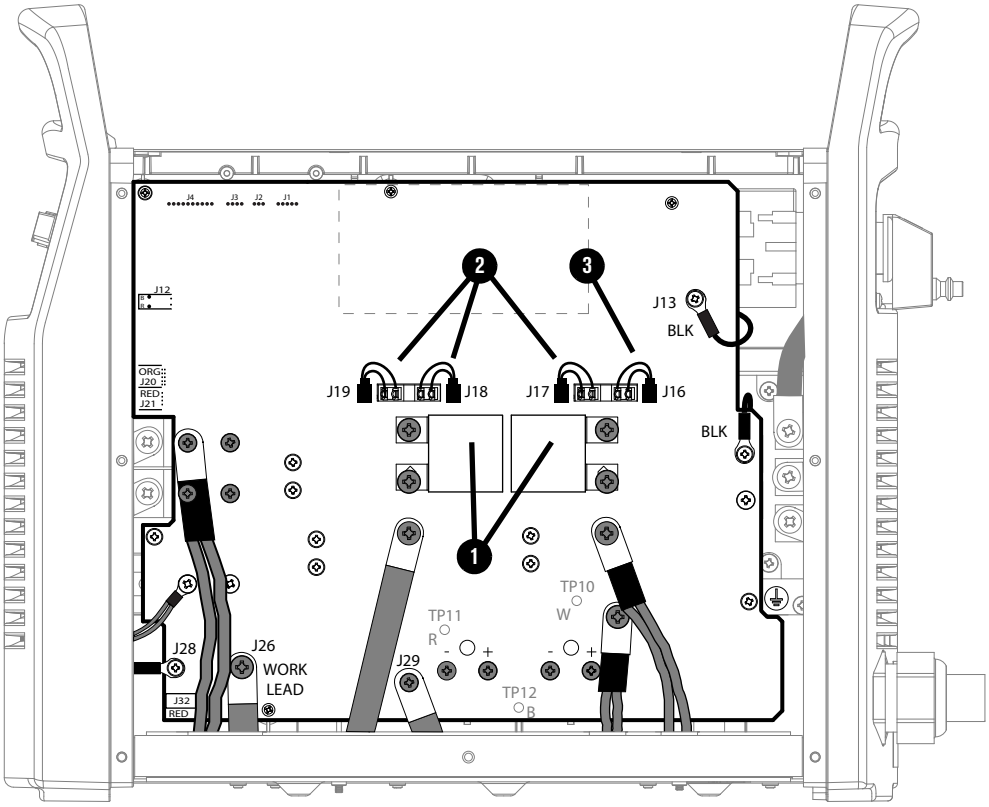
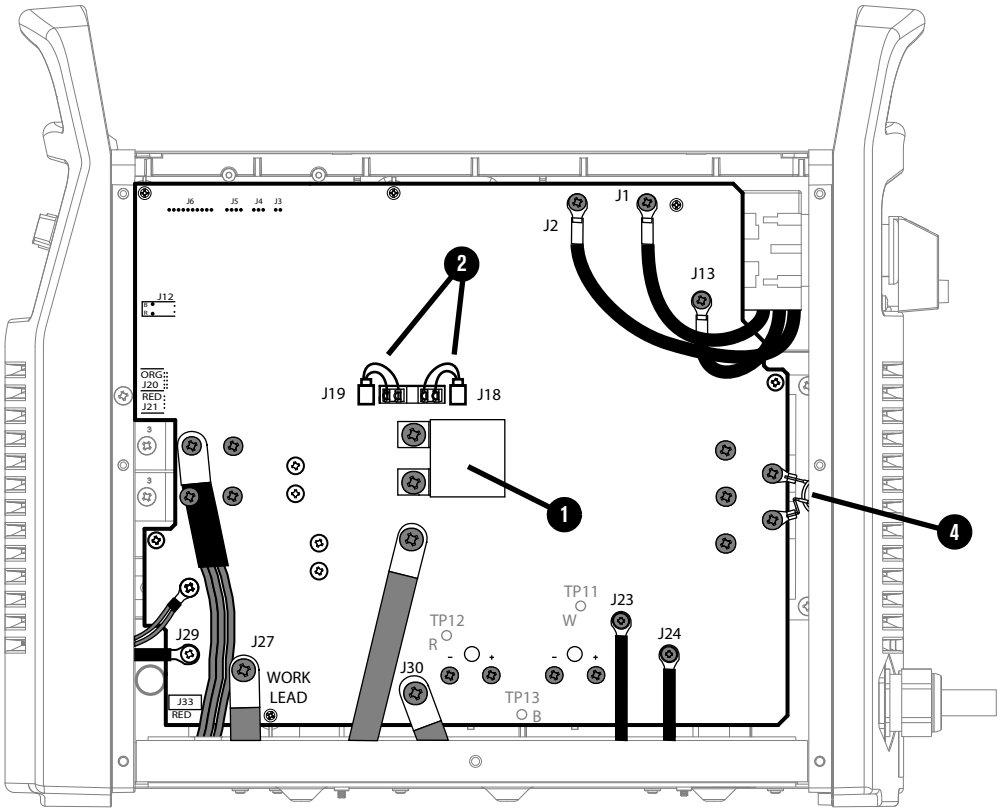


Figure 2 – Powermax65/85 SYNC CE/CCC power PCB



Install the power PCB

1. Make sure that you have the correct power PCB for your system, as follows:
   - **Powermax65 SYNC CSA models:** Use power PCB 141440 (kit 528029).
   - **Powermax65 SYNC CE/CCC models:** Use power PCB 141477 (kit 528030).
   - **Powermax85 SYNC CSA models:** Use power PCB 141443 (kit 528031).
   - **Powermax85 SYNC CE/CCC models:** Use power PCB 141453 (kit 528032).

For step 2 through step 8, refer to Figure 3 and Figure 4. Install the screws shown with gray shading first, then install the unshaded screws.

2. Connect the **J12** and **J20** connectors to the left side of the power PCB.

3. If you are using a machine interface connection, connect the **J21** and **J32** (CSA) or **J33** (CE/CCC) connectors to the left side of the power PCB.

4. Put the gate drive wires and PFC temperature sensor wire through the openings in the power PCB.

5. Make sure that all of the wires that are disconnected from the power PCB are in front of the power PCB. Make sure none of the wires are pinched.

6. Install the following screws first. These screws are **gray** in Figure 3 and Figure 4. Refer to these figures to make sure that the wires are attached in the correct location and position.
   a. Install the 3 µF capacitors ❶ near the center of the power PCB. Tighten the screws to 4.0 N·m (35 lbf·in).
   b. Install the 4 screws for the bulk capacitors ❷. Tighten the screws to 2.3 N·m (20 lbf·in).
   c. CE/CCC models: Install the screws that attach the power switch wires ❸ to the power PCB. Tighten the screws to 2.3 N·m (20 lbf·in).
   d. CE/CCC models: Connect the MOV assembly ❹ to the right side of the power PCB with 2 screws. Tighten the screws to 2.3 N·m (20 lbf·in)
   e. Attach the following wires to the power PCB. Tighten the screws for these wires to 4.0 N·m (35 lbf·in).
      - ❑ Attach the longer transformer wire near the middle of the power PCB, below the 3 µF capacitors.
      - ❑ **CSA models:** Attach the PFC inductor wires ❺.
      - ❑ Attach the shorter transformer wire at J29 (CSA) or J30 (CE/CCC).
      - ❑ Attach the work lead wire at J26 (CSA) or J27 (CE/CCC).
   f. Install the remaining larger screws across the middle of the power PCB. Tighten the screws to 2.3 N·m (20 lbf·in).

7. Install all of the remaining screws on the power PCB. These screws are **unshaded** in Figure 3 and Figure 4. Refer to these figures to make sure that the wires are attached in the correct location and position. Tighten the screws to 1.7 N·m (15 lbf·in).
   - ❑ Install the 4 mounting screws ❻ last. Tighten these screws to 1.1 N·m (10 lbf·in).

8. Carefully connect the following wire connectors to the power PCB. Make sure that you do not bend or damage the connectors.
   - **All models:** Connect the gate drive wires at J19 and J18.
   - **CSA models:** Connect the gate drive wire at J17 and the PFC temperature sensor at J16.

Figure 3 – Powermax65/85 SYNC CSA power PCB

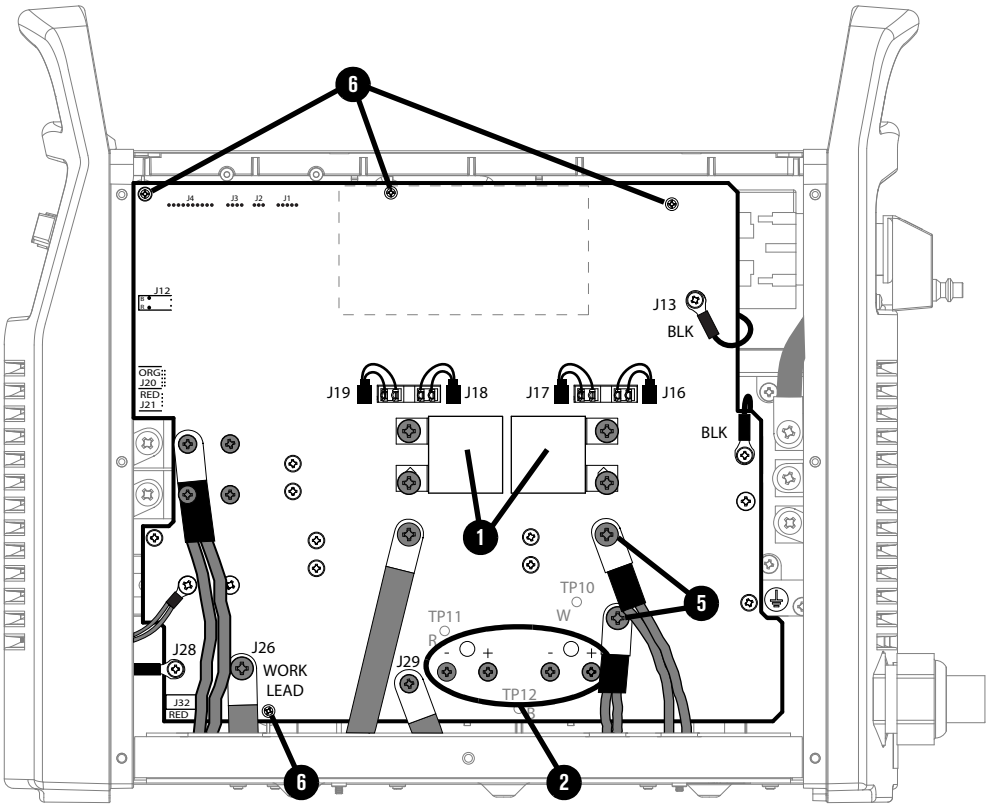
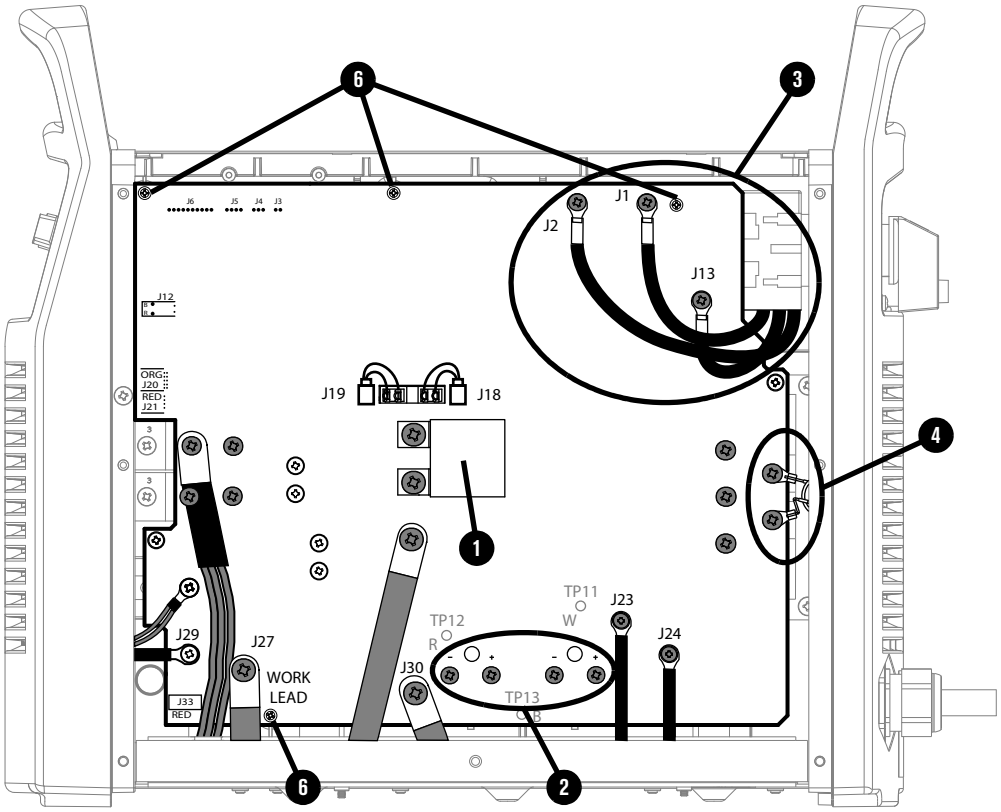
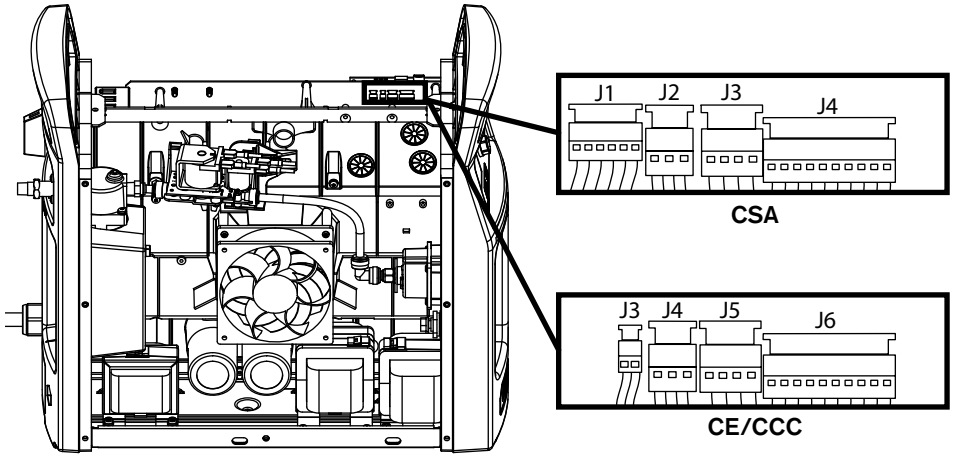


Figure 4 – Powermax65/85 SYNC CE/CCC power PCB



9. Connect the 4 wire connectors near the top of the power PCB.



10. Install the DSP PCB, as follows:

a. Connect the ribbon cable to J6 on the DSP PCB.

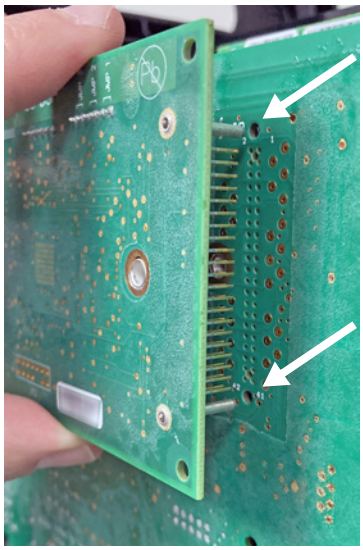
b. Align the 2 posts with the related holes in the power PCB.

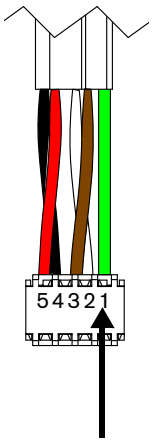
c. Carefully push the DSP PCB onto the power PCB. Do not bend the pins.

d. Attach the DSP PCB to the power PCB with the 2 mounting screws. Tighten the screws to 1.1 N·m (10 lbf·in).

e. If there is an RS-485 serial communication PCB installed, connect the DSP connector to J7 at the top of the DSP PCB.

Make sure that the connector is in the correct position. The green wire (pin 1) must be at the right.





11. Make sure that all of the wires are correctly attached to the power PCB. Refer to the picture from step 4 on page 98.

12. Make sure that all of the screws on the power PCB are fully tightened.

13. Install the end panel bracket. Refer to page 54.

14. Install the plasma supply cover and component barrier. Refer to page 51.

Replace the heatsink components

For kit contents, refer to Plasma power supply interior, heatsink on page 28.

Refer to the following procedures for instructions on how to replace each heatsink component:

- Replace the output diode bridge on page 106
- Replace the input diode bridge on page 108
- Replace the pilot arc IGBT on page 110
- Replace the inverter IGBT and the thermal sensor on page 112
- Replace the PFC IGBT on page 114
- Replace the snubber resistors and the damper resistor on page 116

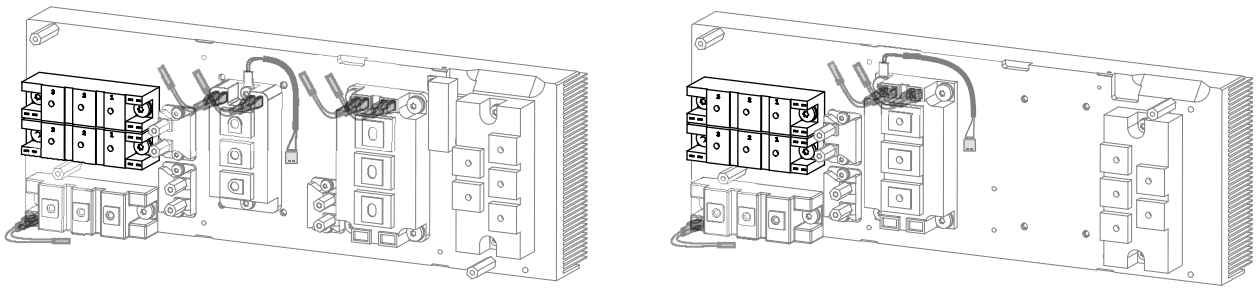
NOTICE

It is very important to correctly clean the heatsink and to apply thermal grease to the new component before you install it.

Refer to How to clean the heatsink and apply thermal grease to the heatsink components on page 118.

Replace the output diode bridge

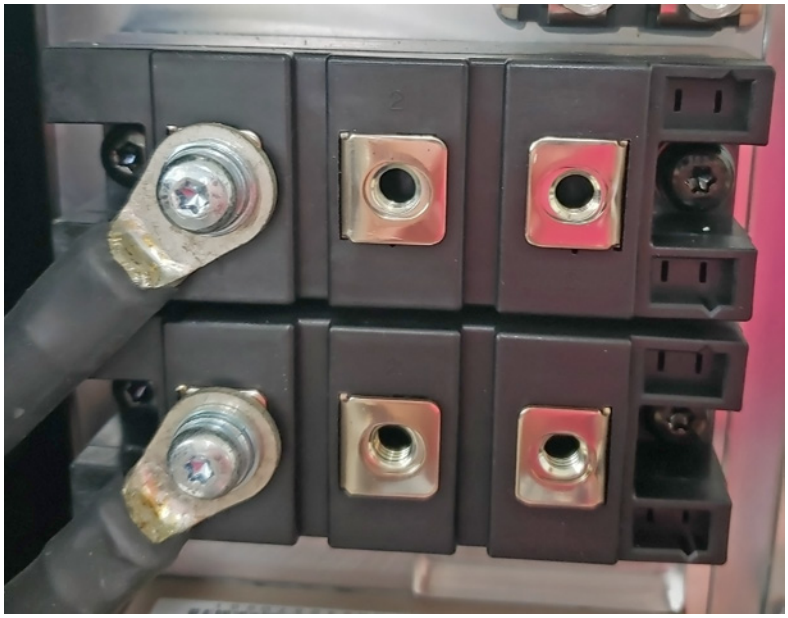
Figure 5 — Output diode bridge on heatsink



CSA CE/CCC

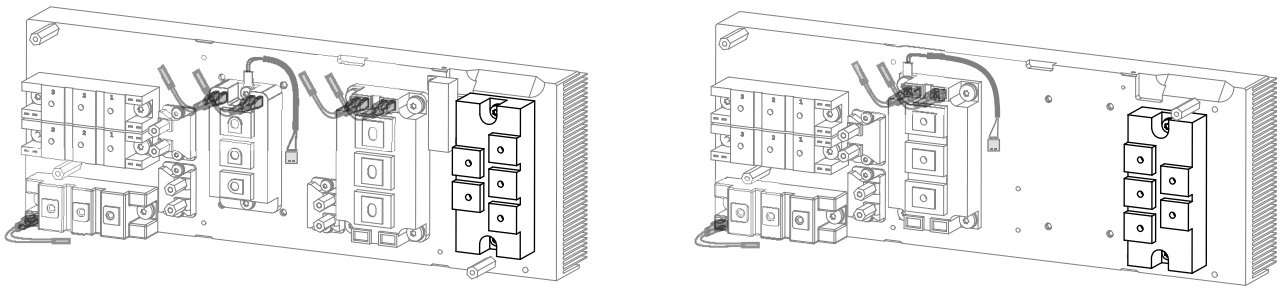
1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power PCB. Refer to page 98. Make sure that you put the power PCB in an anti-static bag until you are prepared to install it.
3. Remove the 2 transformer output cables. Set aside the 2 screws.
4. Remove the 4 mounting screws to remove both output diode bridges from the heatsink.
5. **Correctly clean the heatsink and apply thermal grease to the new component before you install it.** Refer to How to clean the heatsink and apply thermal grease to the heatsink components on page 118.
6. Position the new output diode bridges correctly. Refer to Figure 6.
7. Attach the output diode bridges to the heatsink with 4 mounting screws. Tighten the screws to 4.0 N·m (35 lbf·in).
8. Attach the 2 transformer output cables to the output diode bridges as shown in Figure 6. Tighten the screws to 2.3 N·m (20 lbf·in).
9. If there is too much thermal grease around the edges of the new component, carefully remove it. Make sure that the heatsink is clean.
10. Install the power PCB. Refer to page 98.

Figure 6



Replace the input diode bridge

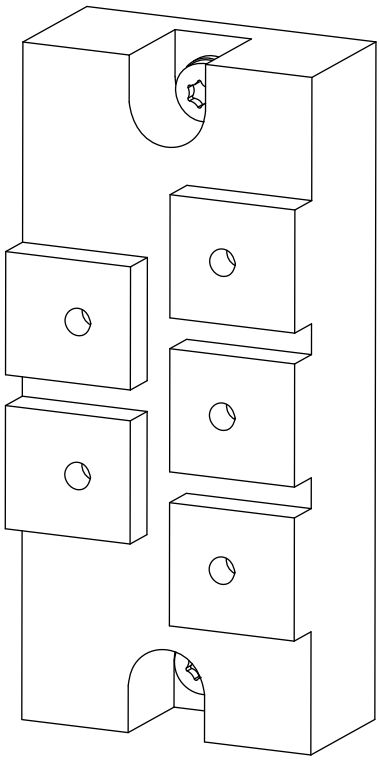
Figure 7 — Input diode bridge on heatsink



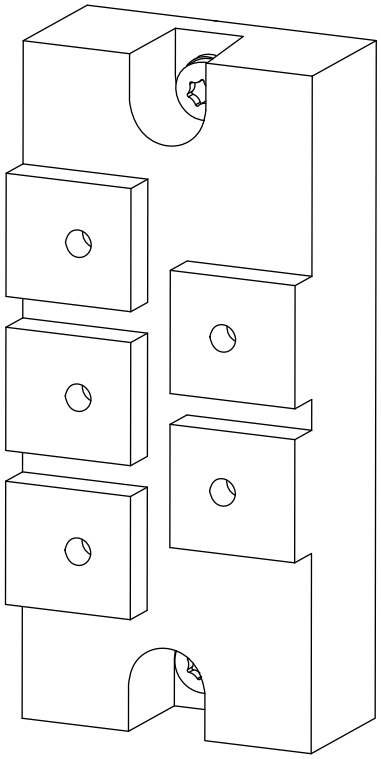
CSA CE/CCC

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power PCB. Refer to page 98. Make sure that you put the power PCB in an anti-static bag until you are prepared to install it.
3. Remove the 2 mounting screws to remove the input diode bridge from the heatsink.
4. **Correctly clean the heatsink and apply thermal grease to the new component before you install it.** Refer to How to clean the heatsink and apply thermal grease to the heatsink components on page 118.
5. Position the new input diode bridge correctly. Refer to Figure 8. It has a different position in CE/CCC systems than it does in CSA systems.
6. Attach the input diode bridge to the heatsink with the 2 mounting screws. Tighten the screws to 2.3 N·m (20 lbf·in).
7. If there is too much thermal grease around the edges of the new component, carefully remove it. Make sure that the heatsink is clean.
8. Install the power PCB. Refer to page 98.

Figure 8



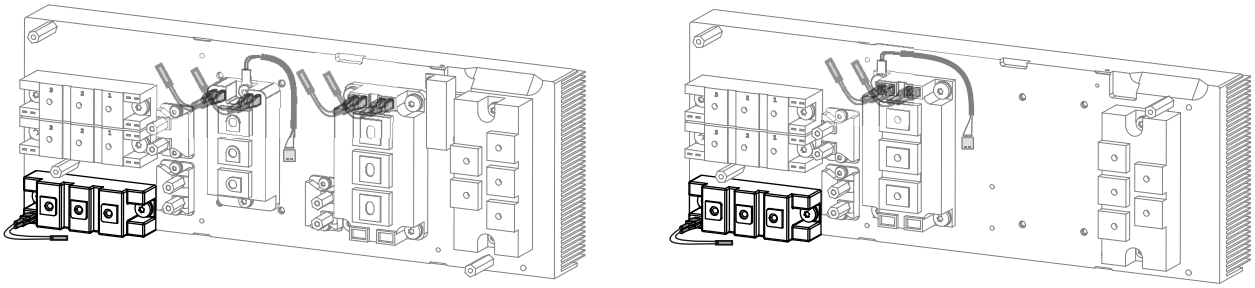
CSA



CE/CCC

Replace the pilot arc IGBT

Figure 9 — Pilot arc IGBT on heatsink

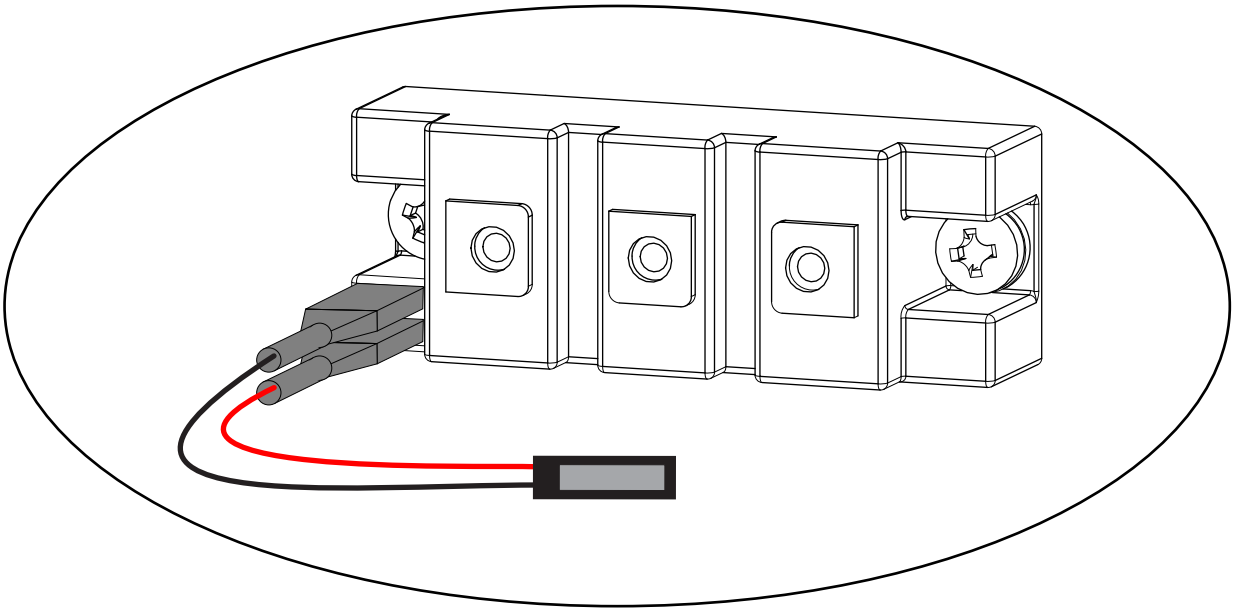


CSA CE/CCC

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power PCB. Refer to page 98. Make sure that you put the power PCB in an anti-static bag until you are prepared to install it.
3. Remove the 2 mounting screws to remove the pilot arc IGBT from the heatsink.
4. **Correctly clean the heatsink and apply thermal grease to the new component before you install it.** Refer to How to clean the heatsink and apply thermal grease to the heatsink components on page 118.
5. Position the new pilot arc IGBT correctly. Refer to Figure 10.
6. Attach the pilot arc IGBT to the heatsink with the 2 mounting screws. Tighten the screws to 4.0 N·m (35 lbf·in).
7. Connect the new gate drive wires to the terminals on the pilot arc IGBT with the correct polarity, as follows. Do not use the old gate drive wires on the new pilot arc IGBT.
   a. Connect the black wire to the top terminal (**E2** or **7**).
   b. Connect the red wire to the bottom terminal (**G2** or **6**).
   c. Make sure that the gate drive wire connectors are fully installed on the terminals. Use needle nose pliers if necessary to install them correctly.
8. If there is too much thermal grease around the edges of the new component, carefully remove it. Make sure that the heatsink is clean.
9. Install the power PCB. Refer to page 98.

Figure 10

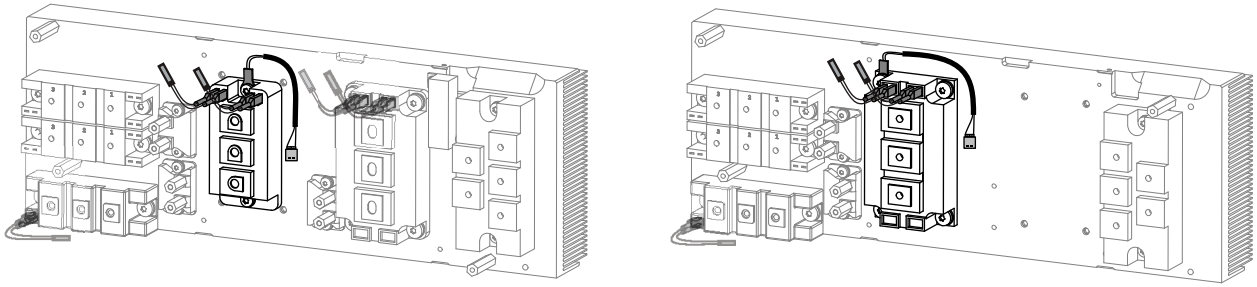
Black wire on **top** terminal.
Red wire on **bottom** terminal.



Replace the inverter IGBT and the thermal sensor

The inverter IGBT and the thermal sensor are sold as different kits. The thermal sensor does not come with the inverter IGBT. Refer to page 105.

Figure 11 — Inverter IGBT and thermal sensor on heatsink



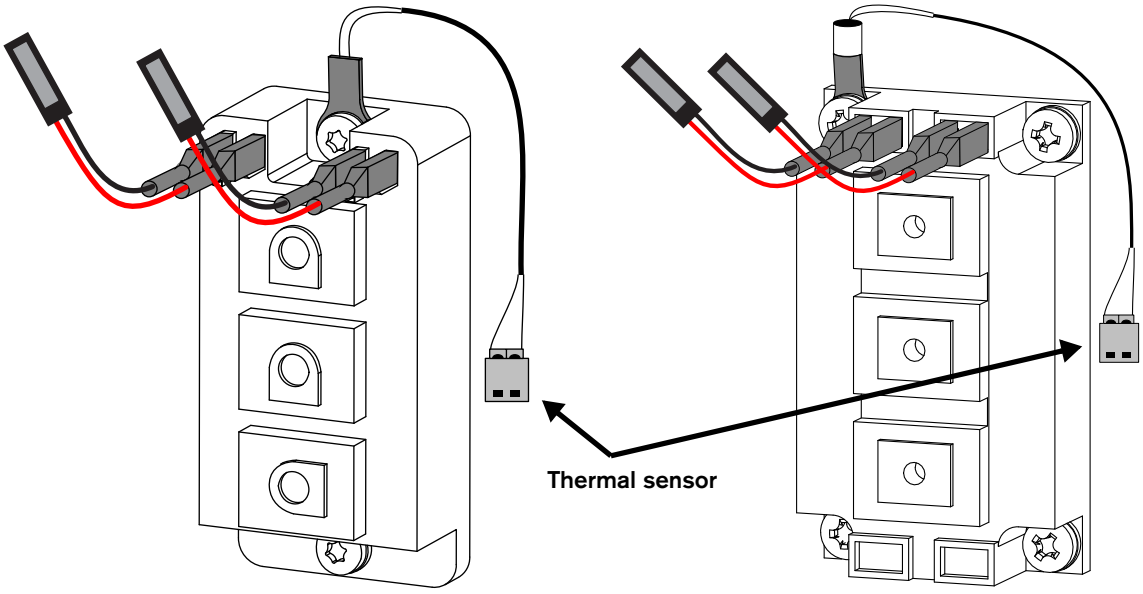
CSA CE/CCC

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power PCB. Refer to page 98. Make sure that you put the power PCB in an anti-static bag until you are prepared to install it.
3. Remove the 4 mounting screws to remove the inverter IGBT from the heatsink. Set aside the thermal sensor if you are not replacing it.
4. **Correctly clean the heatsink and apply thermal grease to the new component before you install it.** Refer to How to clean the heatsink and apply thermal grease to the heatsink components on page 118.
5. Position the new inverter IGBT correctly. Refer to Figure 12.
6. Attach the inverter IGBT to the heatsink with the mounting screws, as follows. Tighten the screws to 4.0 N·m (35 lbf·in).
   - Install 1 mounting screw in the top right corner.
   - 65 A CSA models: Install 1 mounting screw at the bottom of the IGBT.
   - 85 A CSA models and 65 A/85 A CE/CCC models: Install 2 mounting screws in the 2 bottom corners.
   - Use the last mounting screw to attach the ring-terminal end of the thermal sensor to the top left corner of the inverter IGBT. Refer to Figure 12.

7. Connect the new gate drive wires to the terminals on the inverter IGBT with the correct polarity, as follows. Do not use the old gate drive wires on the new inverter IGBT.
   a. For the gate wires on the left, connect the black wire to the left terminal (**6** or **G2**) and the red wire to the right terminal (**7** or **E2**).
   b. For the gate drive wires on the right, connect the black wire to the left terminal (**5** or **E1**) and the red wire to the right terminal (**4** or **G1**).
   c. Make sure that the gate drive wire connectors are fully installed on the terminals. Use needle nose pliers if necessary to install them correctly.
8. If there is too much thermal grease around the edges of the new component, carefully remove it. Make sure that the heatsink is clean.
9. Install the power PCB. Refer to page 98.

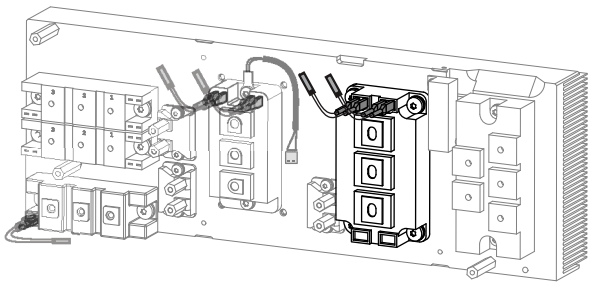
Figure 12

Black wires on **left** terminals.
Red wires on **right** terminals.



Replace the PFC IGBT

Figure 13 — PFC IGBT on heatsink

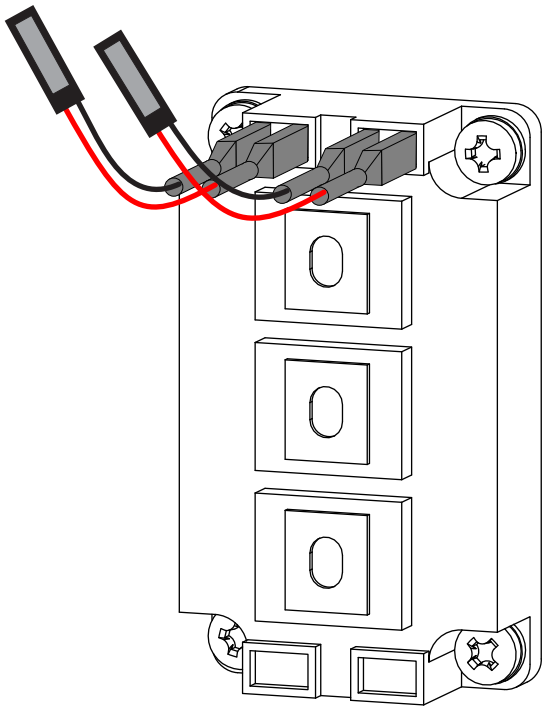


CSA only

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power PCB. Refer to page 98. Make sure that you put the power PCB in an anti-static bag until you are prepared to install it.
3. Remove the 4 mounting screws to remove the PFC IGBT from the heatsink.
4. **Correctly clean the heatsink and apply thermal grease to the new component before you install it.** Refer to How to clean the heatsink and apply thermal grease to the heatsink components on page 118.
5. Position the new PFC IGBT correctly. Refer to Figure 14.
6. Attach the PFC IGBT to the heatsink with the 4 mounting screws. Tighten the screws to 4.0 N·m (35 lbf·in).
7. If there is too much thermal grease around the edges of the new component, carefully remove it. Make sure that the heatsink is clean.
8. Connect the new gate drive wires to the terminals on the PFC IGBT with the correct polarity, as follows. Do not use the old gate drive wires on the new PFC IGBT.
   a. For the gate wires on the left, connect the black wire to the left terminal (**G2**) and the red wire to the right terminal (**E2**).
   b. For the gate drive wires on the right, connect the black wire to the left terminal (**E1**) and the red wire to the right terminal (**G1**).
   c. Make sure that the gate drive wire connectors are fully installed on the terminals. Use needle nose pliers if necessary to install them correctly.
9. Install the power PCB. Refer to page 98.

Figure 14

Black wires on **left** terminals.
Red wires on **right** terminals.



Replace the snubber resistors and the damper resistor

The resistors are sold individually. Snubber resistors can look the same but have different resistance ratings. Refer to page 105 for the correct replacement part numbers.

Only CSA models have damper resistors.

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the power PCB. Refer to page 98. Make sure that you put the power PCB in an anti-static bag until you are prepared to install it.
3. Identify the resistors to replace. Refer to Figure 15 and Figure 16.
4. To remove a snubber resistor and its 2 standoffs, remove the 2 mounting screws.
5. To remove the damper resistor, remove the 2 mounting screws.
6. **Correctly clean the heatsink and apply thermal grease to the new component before you install it.** Refer to How to clean the heatsink and apply thermal grease to the heatsink components on page 118.
7. Attach the snubber resistors to the heatsink with the mounting screws. Tighten the screws to 2.3 N·m (20 lbf·in). Each resistor has 2 mounting screws. Refer to Figure 15 and Figure 16.
8. For each new snubber resistor, put the 2 standoffs into the holes in the snubber resistor. Tighten the standoffs to 1.1 N·m (10 lbf·in).
9. Attach the damper resistor to the heatsink with the 2 mounting screws. Tighten the screws to 1.1 N·m (10 lbf·in).
10. If there is too much thermal grease around the edges of the new component, carefully remove it. Make sure that the heatsink is clean.
11. Install the power PCB. Refer to page 98.

Figure 15 — CSA models: Snubber resistors and damper resistor

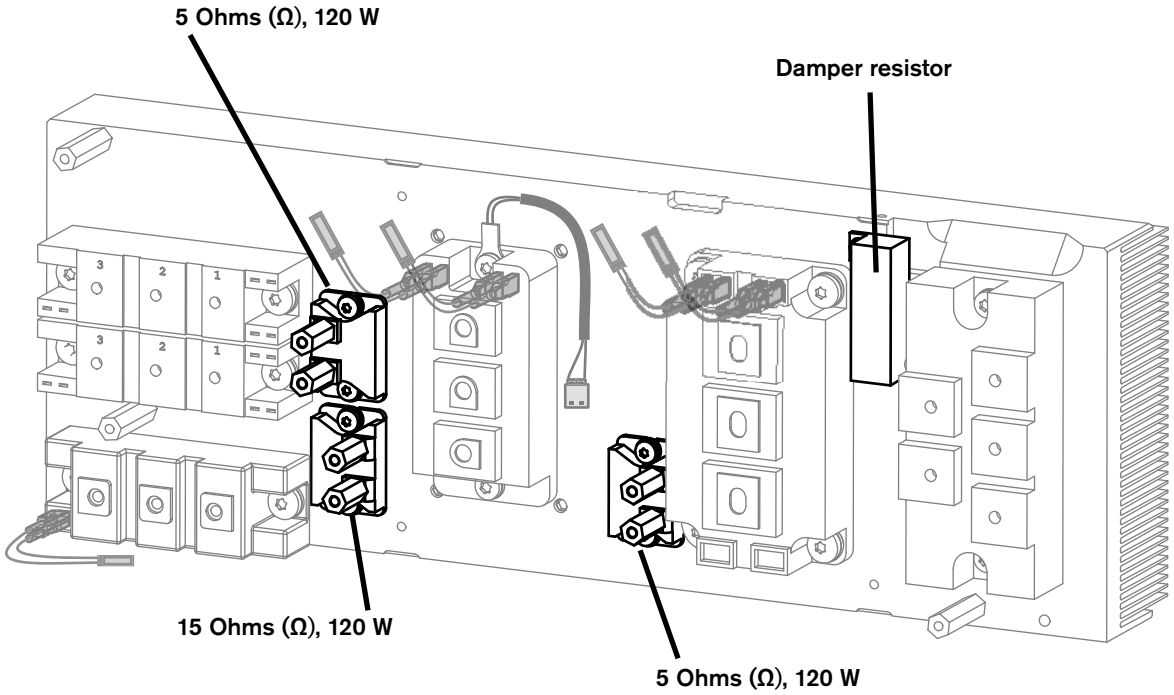
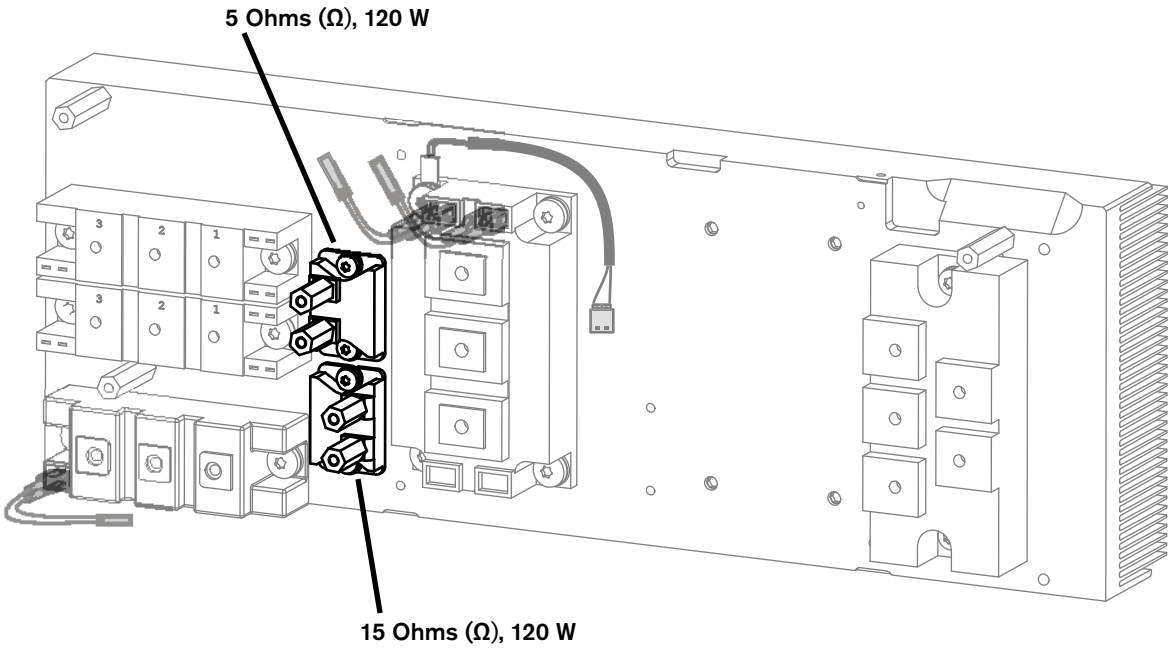


Figure 16 — CE/CCC models: Snubber resistors



How to clean the heatsink and apply thermal grease to the heatsink components

NOTICE

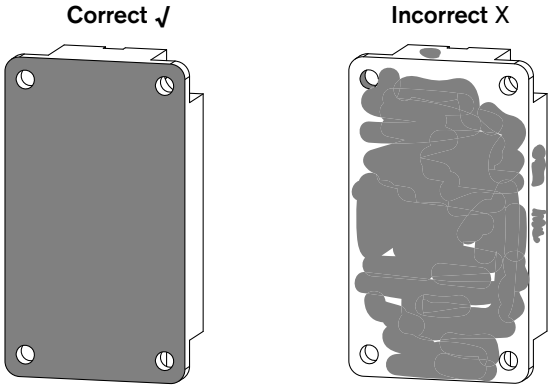
Only use the thermal grease that is supplied by Hypertherm.

The amount of thermal grease that is supplied is enough for many heatsink components. Do not use a full container of thermal grease on a single heatsink component.

Remove the grease from the heatsink

1. Put a small amount of isopropyl alcohol onto a paper towel.
2. Clean the grease off of the heatsink with the paper towel. Make sure that there is no grease or other debris on the heatsink.
3. Dry the heatsink with a lint-free cloth. Make sure that there is no debris from the towel on the heatsink. The heatsink must be completely dry before you install a heatsink component.

Apply the grease to the heatsink component

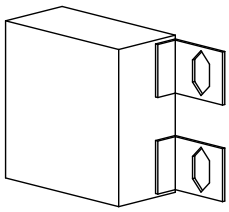


1. Use a small plastic scraper to put a small amount of thermal grease onto the rear of the new heatsink component.
2. Use the plastic scraper to apply a very thin layer of grease to every edge of the heatsink component. **Make sure that the grease is spread evenly.** If necessary, use something more flexible to apply a smooth, level layer of grease, such as a credit card or an index card.
3. Clean the screw holes of the heatsink component with a cotton swab.
4. Use a paper towel with isopropyl alcohol to clean any unwanted grease from the edges of the heatsink component. The thermal grease must only be on the rear of the heatsink component.

Replace the power PCB capacitors

For kit contents, refer to Plasma power supply interior, power PCB side on page 26.

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. From the power PCB side, remove the 2 screws from the 3 µF capacitor ❶ to be replaced. Refer to Figure 17 and Figure 18.



4. Attach the new power PCB capacitor ❶ to the power PCB with the 2 mounting screws.
   - **65 A CSA models:** Use the M5 screws (075570) in the kit.
   - **65 A CE/CCC models and all 85 A models:** Use the M6 screws (075569) in the kit.
   - Tighten the screws to 4.0 N·m (35 lbf·in).
5. Install the component barrier and plasma power supply cover. Refer to page 51.

Figure 17 – Capacitors in CSA models

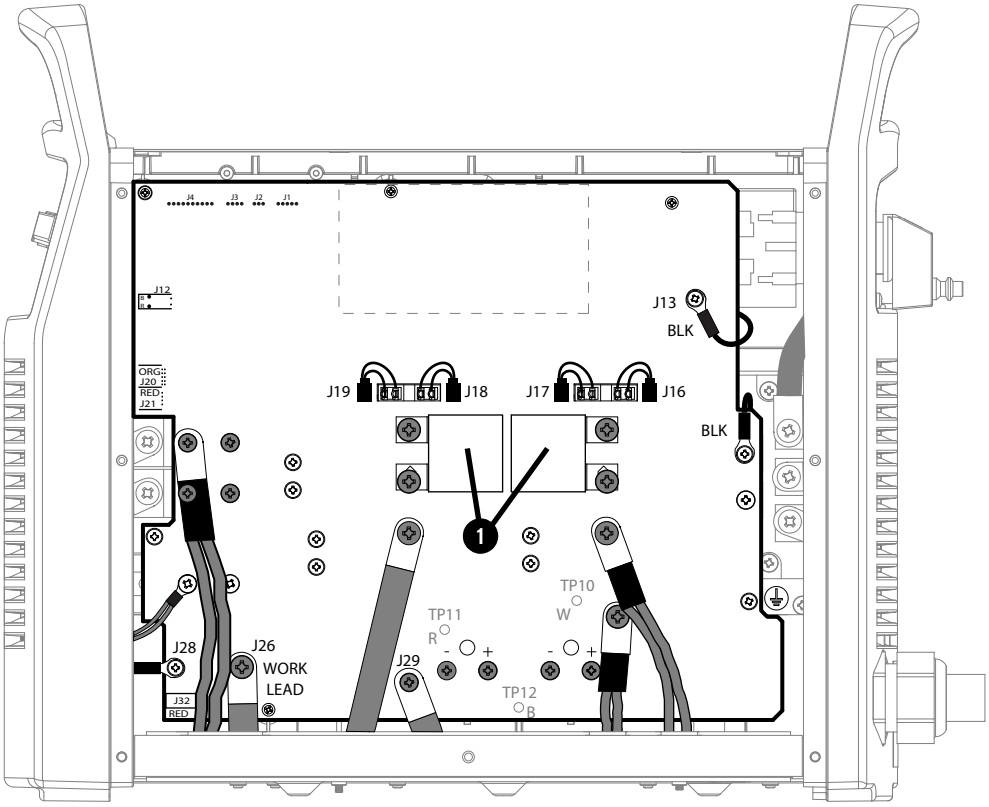
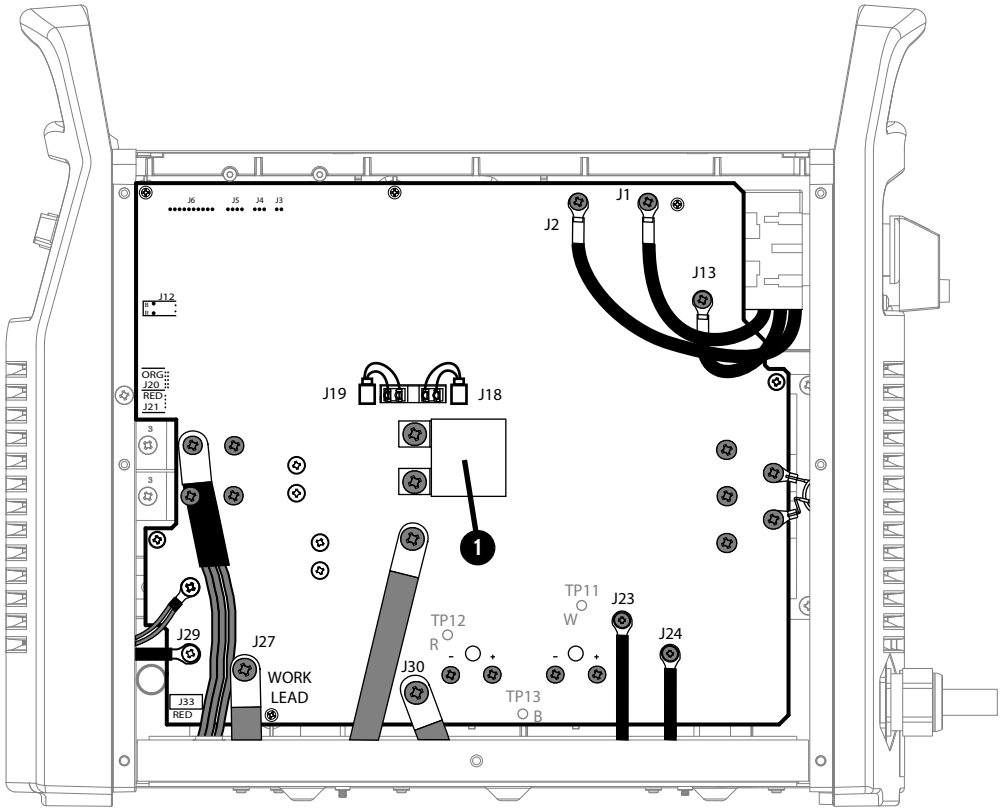


Figure 18 – Capacitor in CE/CCC models



Replace the bulk capacitors

For kit contents, refer to Plasma power supply interior, power PCB side on page 26.

Remove the bulk capacitors

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. From the power PCB side, remove the 4 bulk capacitor mounting screws.

Figure 19 – Bulk capacitor screws in CSA models

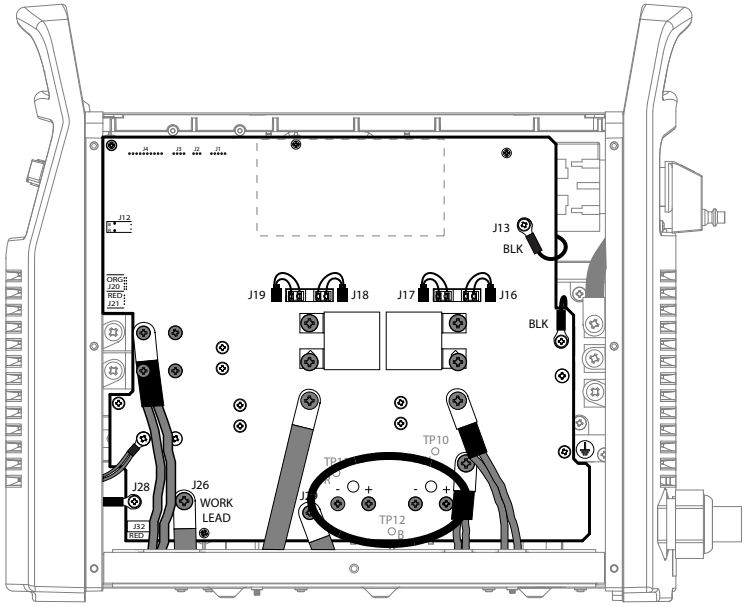
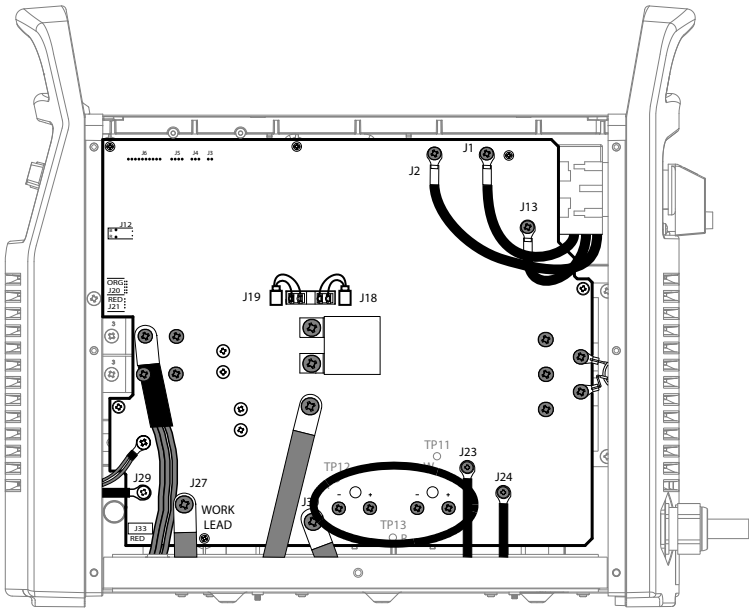
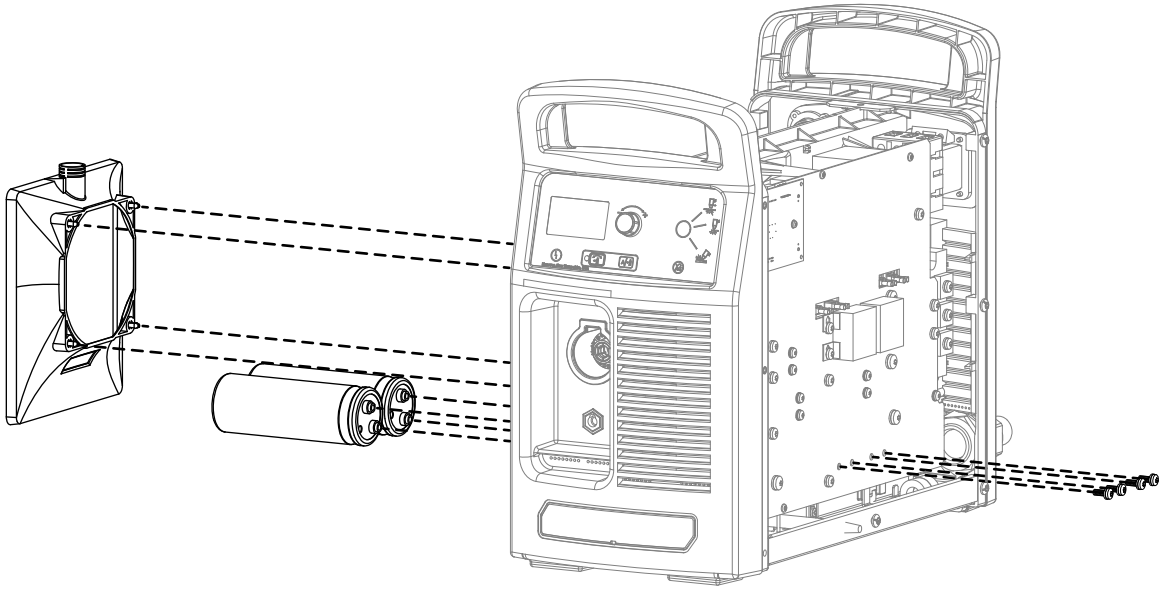


Figure 20 – Bulk capacitor screws in CE/CCC models



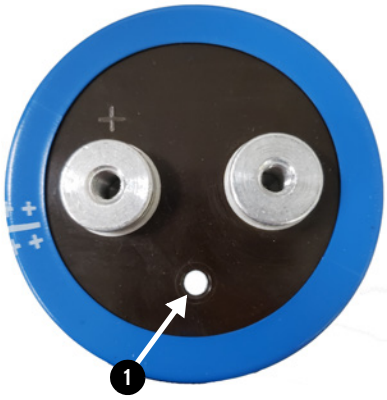
4. From the fan side, remove the fan shroud by pulling it straight off of the fan.

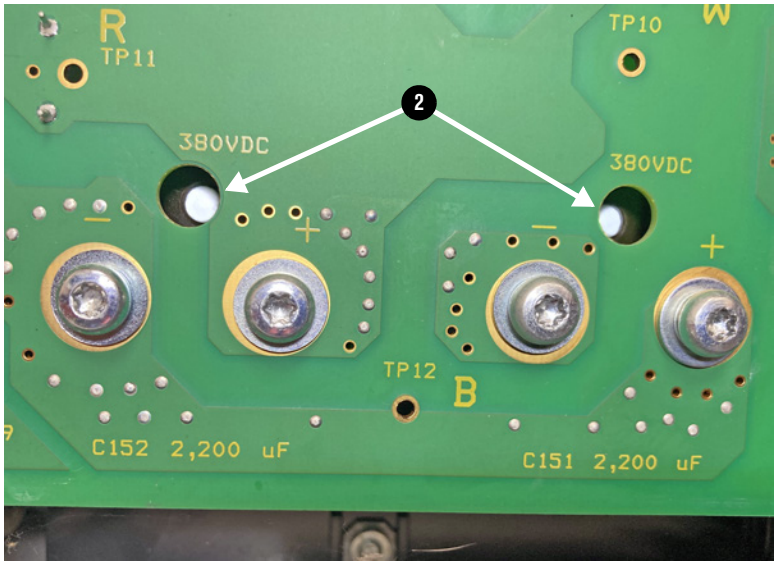
5. Remove the 2 bulk capacitors by pulling them straight out of the plasma power supply.



Install the bulk capacitors

1. Install the new bulk capacitors from the fan side of the plasma power supply.
2. Position each capacitor so that the gray polarity dot ❶ on the capacitor aligns with the viewing hole ❷ on the power PCB.

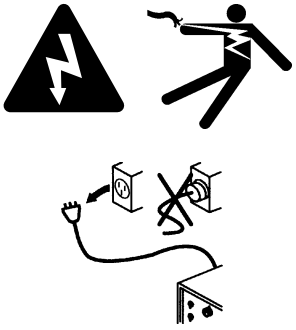




3. From the power PCB side, attach the bulk capacitors to the power PCB with the 4 mounting screws. Install the screws by hand first. Tighten the screws to 2.3 N·m (20 lbf·in).
4. Install the fan shroud on the fan.
5. Install the plasma supply cover and component barrier. Refer to page 51.

6 Service Procedures for the Magnetics

⚠ WARNING



ELECTRIC SHOCK CAN KILL

Disconnect electric power before doing installation or maintenance. You can get a serious electric shock if electric power is not disconnected. Electric shock can seriously injure or kill you.

All work that requires removal of the plasma power supply outer cover or panels must be done by a qualified technician.

Refer to the *Safety and Compliance Manual* (80669C) for more safety information.

NOTICE



Static electricity can cause damage to printed circuit boards (PCBs). Use correct precautions when you touch PCBs.

Keep PCBs in antistatic containers.

Put on a grounded wrist strap when you touch PCBs.

Tools necessary for this section

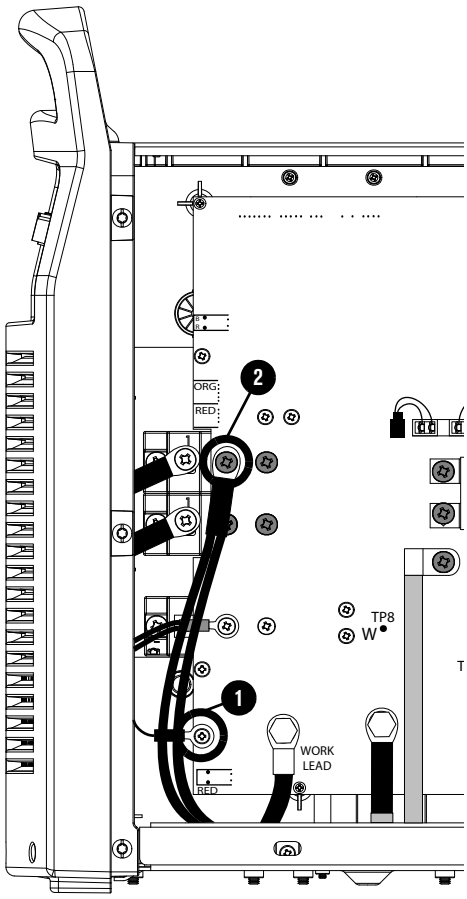
- Assorted Phillips®, TORX®, and blade screwdrivers
- Adjustable wrench
- Grounded wrist strap (or similar grounding accessory)

Replace the output inductor

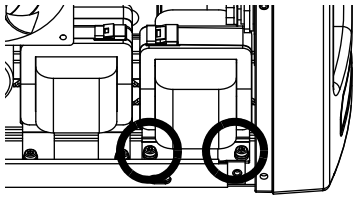
For kit contents, refer to Power supply interior, magnetics on page 33.

Remove the output inductor

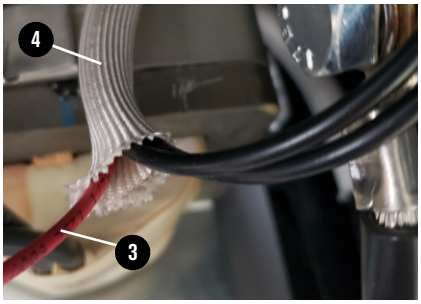
1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Remove the end panel bracket. Refer to page 53.
4. Loosen the front panel. Refer to page 55.
5. Remove the electrode wire screw ❶ from the power PCB.
6. Remove the output inductor wires screw ❷ from the power PCB.



7. Remove the 2 mounting screws from the output inductor.



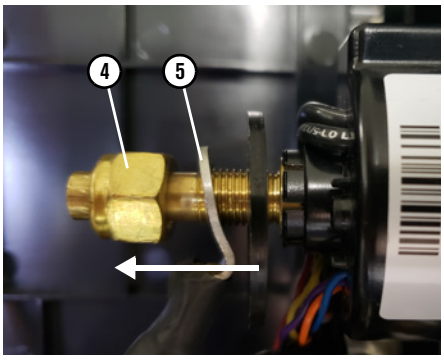
8. Pull the electrode wire ❸ through the protective sheath ❹.



9. Push-to-disconnect the 90° gas inlet fitting ❸ from the torch quick-disconnect receptacle.



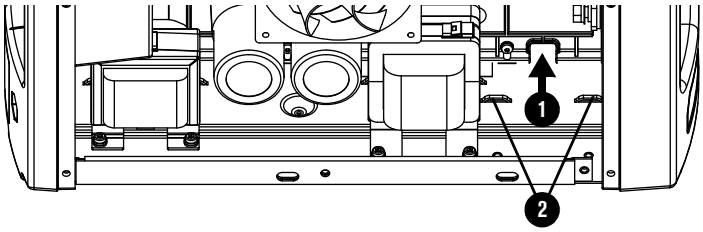
10. Remove the following components from the torch quick-disconnect receptacle:
    - Retention nut ④
    - Ring terminal ⑤



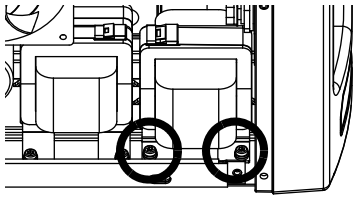
11. Remove the output inductor.

Install the output inductor

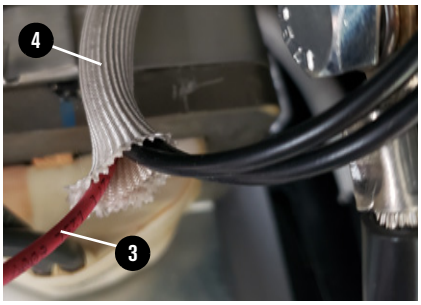
1. Put the output inductor wires through the open space ❶ in the bottom of the center panel.
2. Put the tabs on the rear of the output inductor into the slots ❷ on the bottom of the plasma power supply.



3. Attach the output inductor to the plasma power supply with the 2 supplied mounting screws. Tighten screws to 2.3 N·m (20 lbf·in).

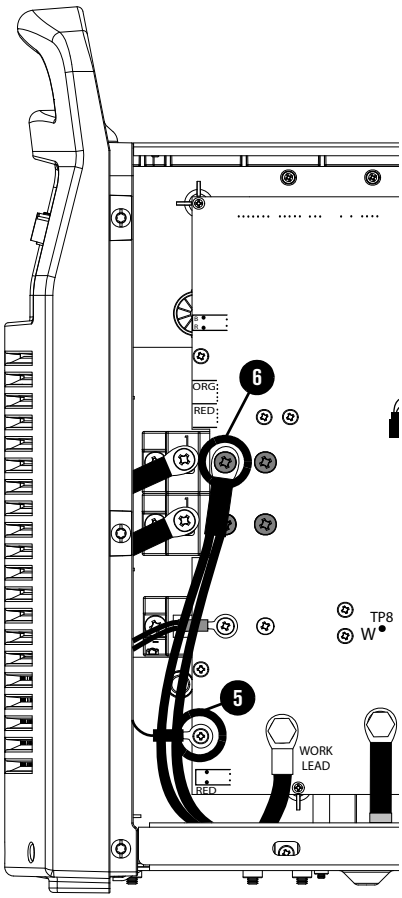


4. Pull the electrode wire ❸ through the protective sheath ❹.



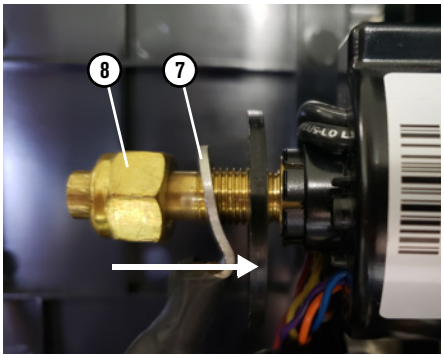
5. Attach the electrode wire ❺ to the power PCB. Tighten the screw to 2.3 N·m (20 lbf·in).

6. Attach the output inductor wires ❻ to the power PCB. Tighten the screw to 2.3 N·m (20 lbf·in).



7. Put the output inductor ring terminal ⑦ over the torch quick-disconnect receptacle.

8. Put the retention nut ⑧ onto the torch quick-disconnect receptacle. Tighten the nut to 46.1 kg·cm (40 lbf·in).



9. Push-to-connect the 90° gas fitting ❾ onto the torch quick-disconnect receptacle.



10. Attach the front panel. Refer to page 56.

11. Install the end panel bracket. Refer to page 54.

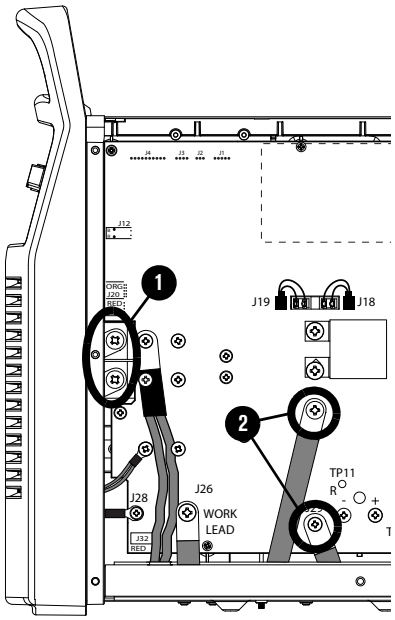
12. Install the component barrier and the plasma power supply cover. Refer to page 51.

Replace the transformer

For kit contents, refer to Power supply interior, magnetics on page 33.

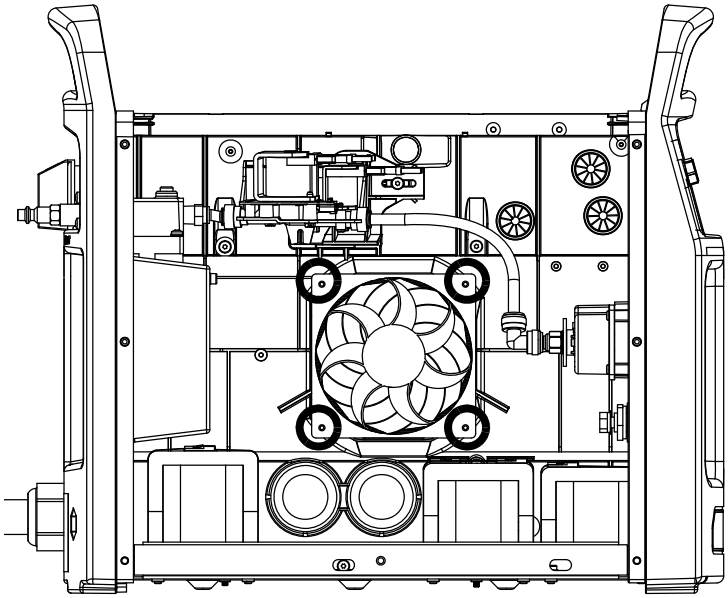
Remove the transformer

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Remove the end panel bracket. Refer to page 53.
4. Remove the 2 screws ❶ that attach transformer wires from the output bridge diodes.
5. Remove the 2 screws ❷ that attach transformer wires from the power PCB.

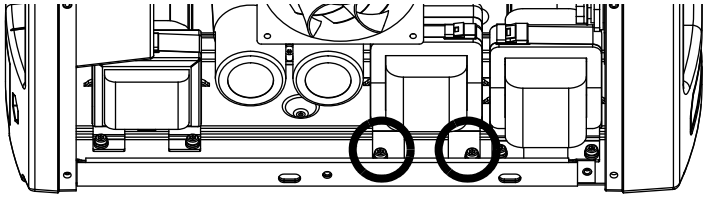


6. Pull the fan shroud straight off of the fan.

7. Use an offset TORX screwdriver to remove the 4 screws from fan.



8. Remove the 2 mounting screws from the transformer.

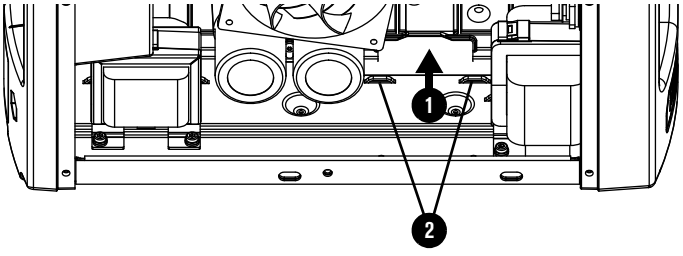


9. Remove the transformer.

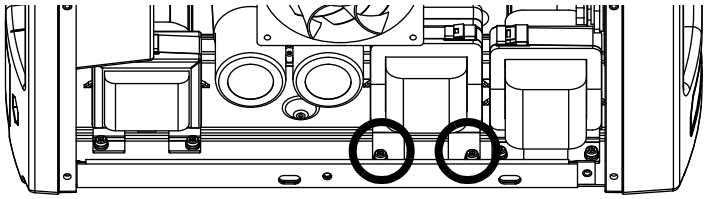
Install the transformer

1. Put the transformer cables through the open space ❶ in the bottom of the center panel.

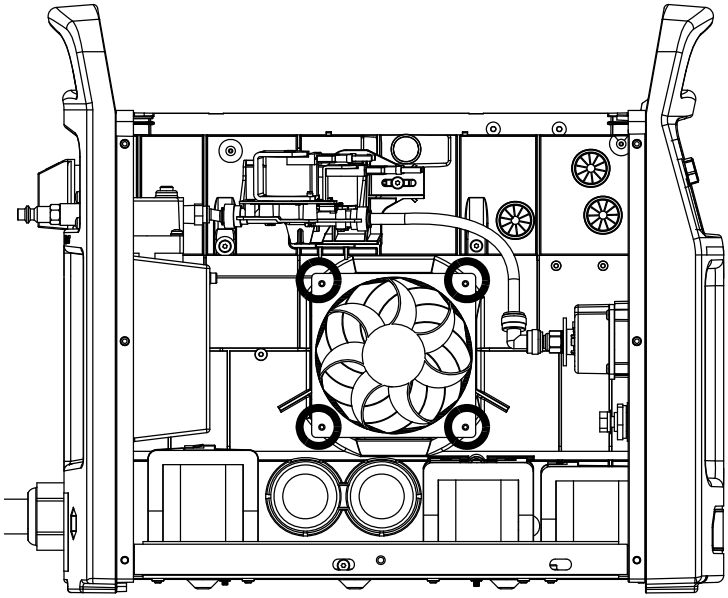
2. Put the tabs on the rear of the transformer into the slots ❷ on the bottom of the plasma power supply.



3. Attach the transformer to the plasma power supply with the 2 supplied mounting screws. Tighten screws to 2.3 N·m (20 lbf·in).



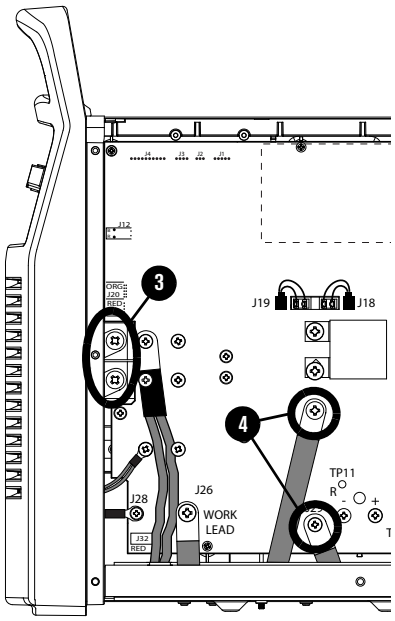
4. Attach the fan to the center panel with the screws. Tighten the screws to 1.1 N·m (10 in·lbf).



5. Push the fan shroud straight onto the fan.

6. Attach the 2 long cables ❸ from the transformer to the output bridge diode. Tighten the screws to 2.3 N·m (20 lbf·in).

7. Attach the 2 short transformer cables ❹ to the power PCB. Tighten the screws to 2.3 N·m (20 lbf·in).



8. Install the end panel bracket. Refer to page 54.

9. Install the component barrier and the plasma power supply cover. Refer to page 51.

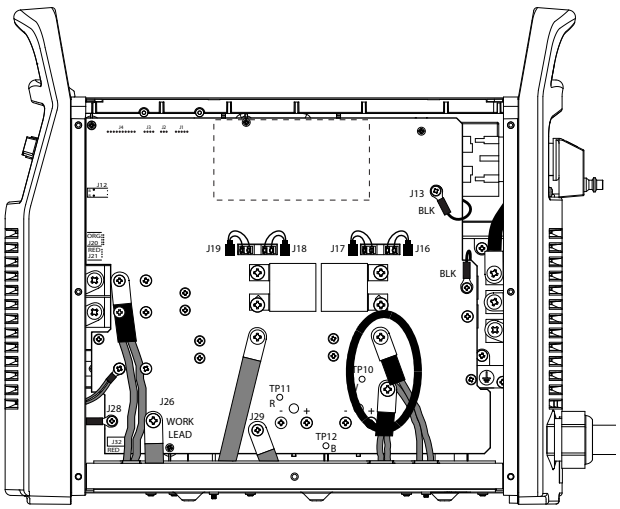
Replace the PFC inductor

For kit contents, refer to Power supply interior, magnetics on page 33.

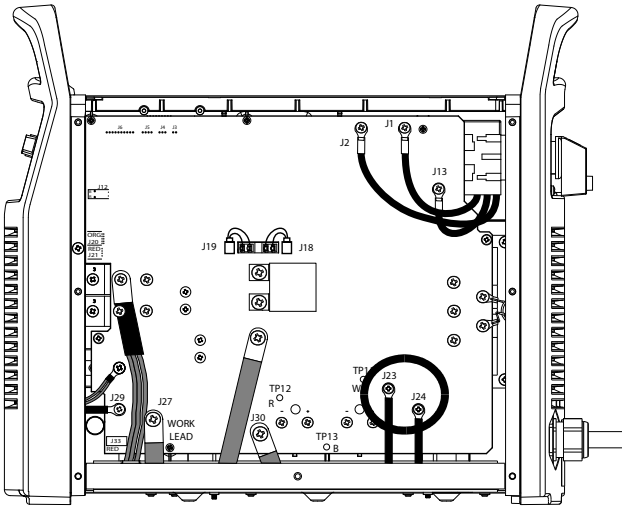
Remove the PFC inductor

1. Set the plasma power supply switch to OFF (**O**), disconnect the power cord from the power source, and disconnect the gas supply.
2. Remove the plasma power supply cover and the component barrier. Refer to page 49.
3. Remove the end panel bracket. Refer to page 53.
4. Loosen the rear panel. Refer to page 57.
5. Remove the 2 screws that attach the PFC inductor wires to the power PCB.

Figure 21 – Powermax65/85 SYNC PFC inductor wires

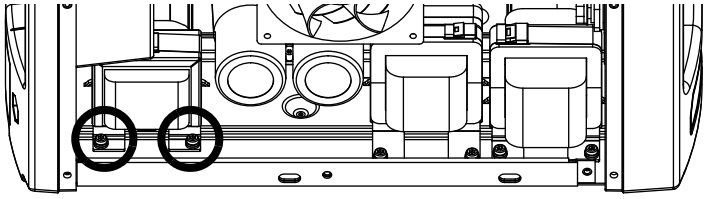


CSA models



CE/CCC models

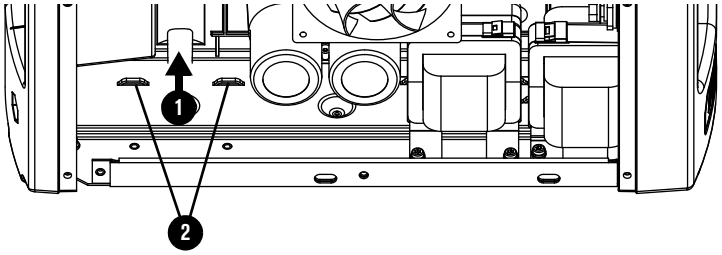
6. Remove the 2 mounting screws from the PFC inductor.



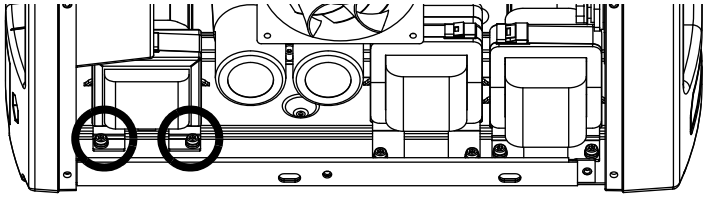
7. Remove the PFC inductor.

Install the PFC

1. Put the PFC inductor wires through the open space ❶ in the bottom of the center panel.
2. Put the tabs on the rear of the PFC inductor into the slots ❷ on the bottom of the plasma power supply.



3. Attach the PFC inductor to the plasma power supply with the 2 supplied mounting screws. Tighten screws to 2.3 N·m (20 lbf·in).



4. Attach the 2 PFC inductor wires to the power PCB. Tighten the screws to 2.3 N·m (20 lbf·in). Refer to Figure 21 – Powermax65/85 SYNC PFC inductor wires on page 134.
5. Attach the rear panel. Refer to page 58.
6. Install the end panel bracket. Refer to page 54.
7. Install the component barrier and the plasma power supply cover. Refer to page 51.