Hypertherm®

Freedom 38 PPA™

Large Autonomous Plasma Cutting System

Operator Manual

808940 | Revision 1 | English

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Freedom 38 PPA

Operator Manual

808940
Revision 1

English

January 2016

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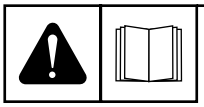


ENGLISH

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

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

DEUTSCH / GERMAN

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

Bedienungsanleitungen und Handbücher können dem Gerät in elektronischer Form oder als Druckversion beiliegen. Sie können alle Handbücher und Anleitungen in den jeweils verfügbaren Sprachen eines bestimmten Handbuchs auch in der „Download-Bibliothek" unter www.hypertherm.com herunterladen.

FRANÇAIS / FRENCH

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

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

ESPAÑOL / SPANISH

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

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

ITALIANO / ITALIAN

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

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

NEDERLANDS / DUTCH

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

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

DANSK / DANISH

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

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

PORTUGUÊS / PORTUGUESE

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

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

日本語 / JAPANESE

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

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

简体中文 / CHINESE (SIMPLIFIED)

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

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

NORSK / NORWEGIAN

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

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

SVENSKA / SWEDISH

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

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

한국어 / KOREAN

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

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

ČESKY / CZECH

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

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

POLSKI / POLISH

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

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

РУССКИЙ / RUSSIAN

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

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

SUOMI / FINNISH

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

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

БЪЛГАРСКИ / BULGARIAN

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

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

ROMÂNĂ / ROMANIAN

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

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

TÜRKÇE / TURKISH

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

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

MAGYAR / HUNGARIAN

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

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

ΕΛΛΗΝΙΚΑ / GREEK

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

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

繁體中文 / CHINESE (TRADITIONAL)

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

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

SLOVENŠČINA / SLOVENIAN

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

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

SRPSKI / SERBIAN

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

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

SLOVENSKÝ / SLOVAK

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

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

Contents

Attention

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

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

General

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

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

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

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

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

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

Patent indemnity

Except only in cases of products not manufactured by Hypertherm or manufactured by a person other than Hypertherm not in strict conformity with Hypertherm's specifications and in cases of designs, processes, formulae, or combinations not developed or purported to be developed by Hypertherm, Hypertherm will have the right to defend or settle, at its own expense, any suit or

proceeding brought against you alleging that the use of the Hypertherm product, alone and not in combination with any other product not supplied by Hypertherm, infringes any patent of any third party. You shall notify Hypertherm promptly upon learning of any action or threatened action in connection with any such alleged infringement (and in any event no longer than fourteen (14) days after learning of any action or threat of action), and Hypertherm's obligation to defend shall be conditioned upon Hypertherm's sole control of, and the indemnified party's cooperation and assistance in, the defense of the claim.

Limitation of liability

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

National and local codes

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

Liability cap

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

Insurance

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

Transfer of rights

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

Section 1
Specifications

System description

The Freedom 38 PPA™ is a powerful, autonomous engine-driven plasma cutting system that enables you to cut electrically conductive metals – such as mild steel, stainless steel, and aluminum – in virtually any environment. It combines a Powermax125® plasma cutter with a diesel-powered engine/generator set and on-board air compressor.

The Freedom 38 PPA enables you to take the Powermax125 to remote job sites for plasma cutting, gouging, and beveling applications. You can use the Freedom 38 PPA for both handheld and mechanized plasma cutting.

The Freedom 38 PPA does not ship with a plasma torch, torch lead, consumables, or work lead. You can order these parts, as well as additional accessories, from any Hypertherm distributor. See *Parts* on page 135.

The Freedom 38 PPA ships in 2 configurations:

- Standard configuration (062005)
- Emergency air intake shutoff valve configuration (062006)

System components

The Freedom 38 PPA consists of the following primary components:

- Powermax125 plasma cutting system from Hypertherm®
- 38 kW generator from Stadco® that consists of:
  - Diesel engine from Deutz®
  - STAMFORD® alternator from Cummins Generator Technologies®
  - Digital controller from Dynagen®
- Air compressor from Chicago Pneumatic®

Hypertherm provides the system's enclosure and other parts used to integrate the primary internal components.

Documentation and safety information

Before operating the Freedom 38 PPA, carefully read the safety precautions in *Setup and Safety Guidelines* on page 25 for proper setup and operation of the system. Also carefully read the *Safety and Compliance Manual* that ships with the system for safety precautions specific to plasma cutting.

Material Safety Data Sheets (MSDS) for this system are available online. See *Material Safety Data Sheets (MSDS)* on page 21.

For your reference, the following additional documentation ships with the Freedom 38 PPA in printed or electronic format:

- Hypertherm's *Getting Started Guide* for the Freedom 38 PPA (808930)
- Hypertherm's *Quick Setup Card* for the Powermax125 (808210)
- Hypertherm's *Powermax125 Operator Manual* (808080)
- Stadco's *Operation and Maintenance Manual* for its generator
- Deutz's *Operation Manual* for its engine

The Stadco manual includes sections on the Cummins Generator Technologies alternator and the Dynagen digital controller. Use part number 896800 to order electronic replacement copies of the Stadco manual.

Specifications

Dimensions	Width: 91 cm (35.8 inches) Length: 178 cm (70 inches) Height: ❑ Base to top panel: 103 cm (40.4 inches) ❑ Base to top of exhaust pipe: 119 cm (46.7 inches)
System weight	938 kg (2,068 pounds)
Weight with fuel tank full	996 kg (2,196 pounds)
Auxiliary power outlets	2 120 V, 1-phase, 20 A GFCI receptacles 1 480 V, 3-phase receptacle, 60 A*
Lift points	Top lift eye Lift truck slots
Lift eye weight rating	1,134 kg (2,500 pounds) maximum
System noise level under load, with torch running	116.0 db(A) at 1 m (3.3 feet)
Engine and generator noise level at idle	91.5 dB(A) at 1 m (3.3 feet)
Operating temperature	-20°C to 40°C (-4°F to 104°F)
Storage temperature	-25°C to 55°C (-13°F to 131°F)
Ingress Protection (IP) rating	IP23CS This system is designed for outdoor use. It may be stored indoors†, but it is not intended for cutting outside during precipitation unless sheltered.

* In addition to this auxiliary outlet, the system provides 480 V, 3-phase power to the on-board plasma cutting system. Powering a device using the 480 V auxiliary outlet while running the plasma cutting system at full output is not recommended. This can trip the system's main circuit breaker.

† Drain the fuel tank of any remaining diesel fuel before you store the system indoors. Store the fuel in an appropriate container, safely removed from any flammable or explosive materials.

Component specifications and ratings

Component	Engine/generator set	Engine	Alternator	Air Compressor	Plasma cutting system
Manufacturer	Stadco (subsidiary of Stauffer Diesel®, Inc.)	Deutz	Cummins Generator Technologies	Chicago Pneumatic	Hypertherm
Model	CD40T4-H	TD2011L04o T4i turbo diesel†	STAMFORD P0/P1 4 Pole Industrial I144H	QRS 3.7 kW (5 hp) Rotary screw compressor‡	Powermax125 (480 V CSA)
Specifications and ratings	▪ **38 kW peak output** at recommended maximum 25% duty cycle, limited to 15 min/hour ▪ **35 kW continuous output** at 100% duty cycle ▪ 480 V, 3-phase power to plasma cutting system ▪ 480 V, 3-phase, 60 A auxiliary power, 1 receptacle* (4-pole, 5-wire) ▪ 120 V, 20 A auxiliary power, 2 GFCI receptacles (neutral bonded to frame) ▪ Governed to 1800 RPM ▪ 60 Hz ▪ Digital controller: Dynagen TG410 (TOUGH Series)	▪ 63.4 peak hp ▪ Turbocharged ▪ 4 cylinders ▪ 4-stroke ▪ Oil cooled ▪ Battery capacity: 750 cold cranking amperes (CCA) ▪ Displacement: 3.62 L (221 cubic inches) ▪ Electrical system: 12 V negative earth	▪ 14 VDC / 55 A ▪ Electronic regulated ▪ 4-pole ▪ Brushless AC alternator	▪ 470 L/min (16.6 scfm, 996 scfh) at 10 bar (145 psi) ▪ Air tank: 19 L (5 gallon)	▪ Rated output: *(125 A)(175 VDC)* = **21.9 kW** ▪ 100% duty cycle at 125 A, 480 V, 3-phase, 50/60 Hz ▪ 31 A input current at 21.9 kW rated output

* To connect to the 480 V auxiliary outlet, use a power plug that is compatible with Hubbell® HBL560RS1W receptacles, such as the Hubbell® HBL560PS1W plug.

† This engine complies with Tier 4 interim emission standards.

‡ The air compressor is mechanically driven and draws approximately 5 kW (7 hp) from the engine. The air compressor cannot be disconnected from the engine or turned off.

Oil and fuel requirements

CAUTION!

When changing the oil and filters in the engine and air compressor, always use the correct type of oil. Do not mix different types of oil. Use only Original Equipment Manufacturer (OEM) oil and filters. Use only synthetic oil in the air compressor.

See *Parts* on page 135 for the part numbers to use for ordering filters for the engine and air compressor.

Engine		
Fuel	Fuel tank capacity	64 L (17 gallons)
	Fuel requirement	Use only ultra-low-sulfur diesel fuel: ❑ ASTM D975–96, 2D red or 2D clear ❑ Maximum sulfur content: 15 parts per million (ppm) (or 0.0015%)
	Fuel consumption	12.5 L (3.3 gallons) per hour at 100% continuous load 6.4 L (1.7 gallons) per hour at 50% continuous load
	Fuel filter	Use only Deutz-brand fuel filters.
Oil	Oil capacity*	14 L (14.8 quarts)
	Oil requirement	Use only Deutz-brand engine oil or Shell ROTELLA® T Triple Protection® engine oil in this system. The system ships with SAE 15W-40 grade engine oil. Refer to Stadco's *Operation and Maintenance Manual* for information on when to use other oil viscosities.
	Oil filter	Use only Deutz-brand oil filters.
Air compressor		
Oil	Oil capacity	2.5 L (2.6 quarts)
	Oil requirement	Use only Chicago Pneumatic Rotair Plus synthetic oil. (This is what ships with the system.) Do not mix different types of oil.
	Oil filter	Use only Original Equipment Manufacturer (OEM) oil filters.
	Oil separation filter	Use only Original Equipment Manufacturer (OEM) oil separation filters.

* Because the engine in this system is oil-cooled, it uses more oil than engines cooled by other means.

Plasma cutting specifications

Handheld cut capacity (material thickness)	
Recommended cut capacity at 457 mm/min (18 in/min)*	38 mm (1-1/2 inches)
Recommended cut capacity at 250 mm/min (10 in/min)*	44 mm (1-3/4 inches)
Severance capacity at 125 mm/min (5 in/min)*	57 mm (2-1/4 inches)
Pierce capacity (material thickness)	
Pierce capacity for handheld cutting, or mechanized cutting with programmable torch height control	25 mm (1 inch)
Pierce capacity for mechanized cutting without programmable torch height control	22 mm (7/8 inch)
Maximum cut speed† (mild steel)	
6 mm (1/4 inch)	7160 mm/min (282 in/min)
10 mm (3/8 inch)	4390 mm/min (173 in/min)
12 mm (1/2 inch)	2950 mm/min (116 in/min)
16 mm (5/8 inch)	2110 mm/min (83 in/min)
20 mm (3/4 inch)	1470 mm/min (58 in/min)
22 mm (7/8 inch)	1170 mm/min (46 in/min)
25 mm (1 inch)	940 mm/min (37 in/min)
32 mm (1-1/4 inches)	610 mm/min (24 in/min)
38 mm (1-1/2 inches)	457 mm/min (18 in/min)
Gouging capacity	
Metal removal rate on mild steel (125 A)	12.5 kg/hour (27 pounds/hour)

* Cut capacity speeds are not necessarily maximum speeds. They are the speeds that must be achieved to be rated at that thickness.

† Maximum cut speeds are the results of Hypertherm's laboratory testing. Actual cutting speeds may vary based on different cutting applications.

Material Safety Data Sheets (MSDS)

This system contains oils and other substances that pose potential health or environmental risks. These substances must be handled and disposed of carefully.

You can find Material Safety Data Sheets (MSDS) for these substances in the Hypertherm downloads library at www.hypertherm.com:

1. Click “Downloads library.”
2. Select a product from the “Product type” menu.
3. Select “Material Safety Data Sheets” from the “Category” menu.

Noise levels

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

In addition, you can find an *Acoustical Noise Data Sheet* for your system in the Hypertherm downloads library at www.hypertherm.com:

1. Click “Downloads library.”
2. Select a product from the “Product type” menu.
3. Select “Regulatory” from the “Category” menu.
4. Select “Acoustical Noise Data Sheets” from the “Sub Category” menu.

Symbols on the system

The following symbols may appear on the system's control labels and switches. *Figure 1* on page 23 identifies the symbols used on the system's data plate.

Refer to the *Specifications* section in the *Powermax125 Operator Manual* for definitions of the symbols that appear on the plasma supply.

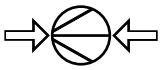
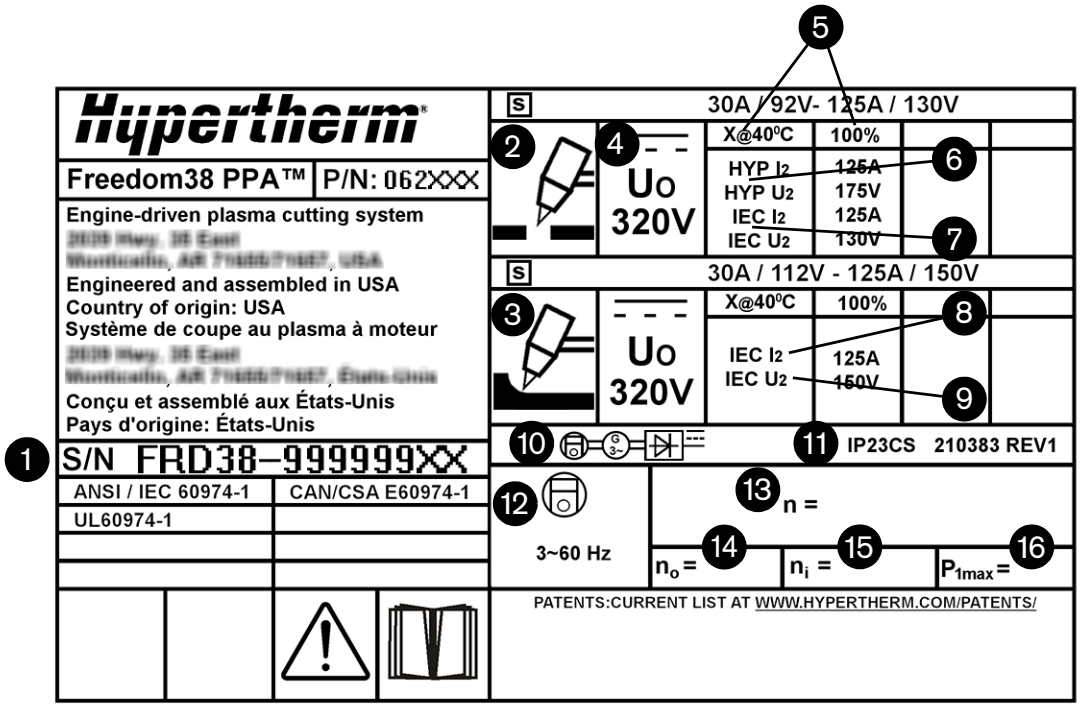
I	Switch is ON
O	Switch is OFF
	Emergency shut-off
	Electrical power, accessories
	Circuit breaker
	Battery charging condition
	Air pressure
	Protective earth (PE) or grounding terminal

Figure 1 – Data plate



1 ***S/N*** = serial number

2 Symbol for plasma cutting

3 Symbol for plasma gouging

4 U_0 = Rated no load voltage (V)

5 ***X*** = Duty cycle (%)

6 ***HYP*** = Hypertherm internal rating

7 ***IEC*** = International Electrotechnical Commission (IEC) rating

8 I_2 = Conventional welding current (A)

9 U_2 = Conventional welding voltage (V)

10 Symbol for engine/generator-driven input power where alternating current (AC) is converted to direct current (DC)

11 Ingress Protection (IP) rating

12 Power source = 3-phase, 60 Hz generator

13 ***n*** = Rated speed with load (min^{-1})

14 n_0 = Rated speed with no load (min^{-1})

15 n_i = Rated speed when idle (min^{-1})

16 P_{1max} = Maximum power consumption (kW)

Section 2

Setup and Safety Guidelines

Examine the system

1. Examine the system for damage that may have occurred during shipment. If you find evidence of damage, see *Claims*, below. All communications regarding this equipment must include the model number and the serial number located on the data plate.

2. Before you operate this system, carefully read the safety information in this section to ensure safe handling of all equipment. Also read the separate *Safety and Compliance Manual* (80669C) included with the system for important safety information specific to plasma cutting.

Claims

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

Position the system

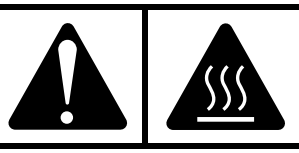
DANGER!

TOXIC GAS CAN BE FATAL

DO NOT OPERATE THIS SYSTEM INDOORS!

Exhaust from the generator contains carbon monoxide, which is an invisible, odorless gas. Inhaling too much carbon monoxide will result in serious injury or death.

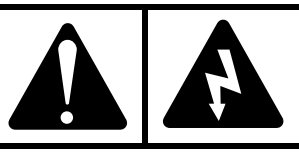
Only operate this system outdoors, away from windows and vents.



WARNING!

RISK OF SEVERE BURNS

Do not touch the exhaust pipe or the area around it when you operate the system. This area gets extremely hot when the engine is running.



WARNING!

RISK OF ELECTRIC SHOCK

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

- Position the system so that it can be grounded properly. See *Ground the generator* on page 29.
- Make sure the system has adequate ventilation. Do not block the ventilation screens or louvers.
- Position the system on a flat, level surface before operating it.
- Do not operate the system in rain or snow.
- Do not place any objects on the top panel when you operate the system.
- Use only compressed air with the on-board plasma cutting system. Never use other types of gas to cut with this system.
- You can operate the system from the open bed of an appropriately sized truck or trailer. See *Mount the system in a vehicle or trailer* on page 32.
- When positioning the system, be aware that condensate from the air compressor's air/oil separation tank exits through a small hose at a bottom corner of the rear panel. See *Drain the condensate from the air compressor's air/oil separation tank* on page 103.

Lift the system safely

WARNING!

HEAVY EQUIPMENT CAN CAUSE SERIOUS INJURY IF DROPPED – LIFT CAREFULLY

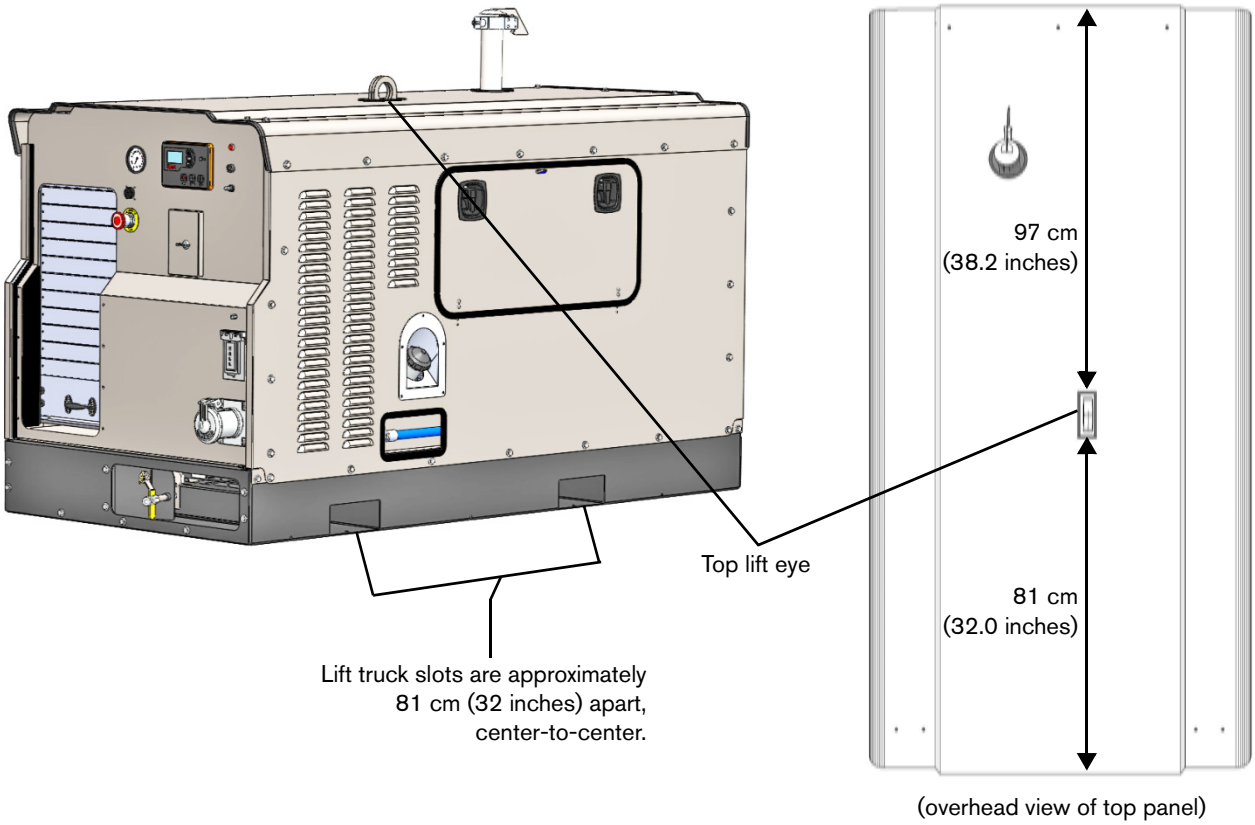
When lifting or moving this system:

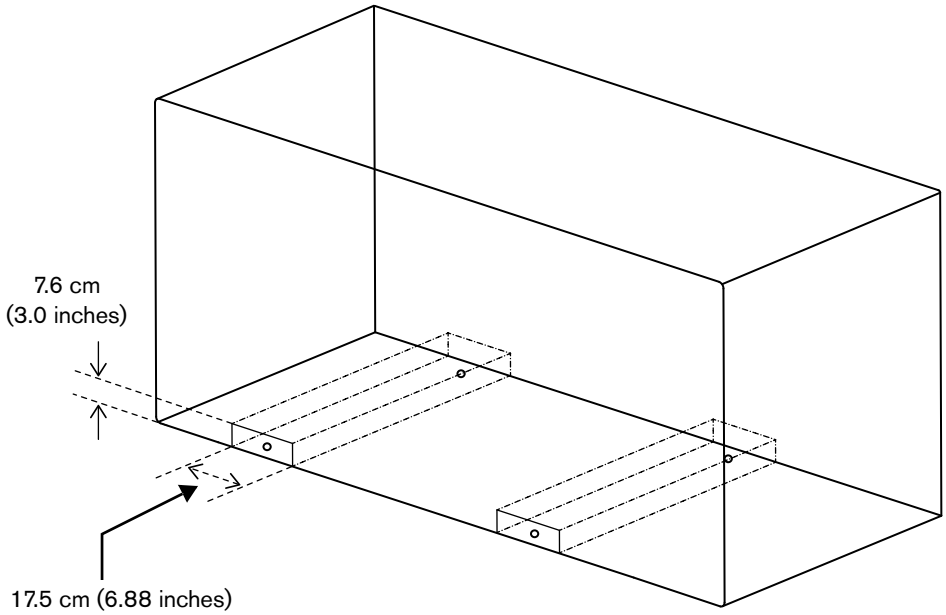
- **Clear the area of all cables, wires, and other potential obstacles that can get caught on the system while it is being moved.**
- **Only use equipment with sufficient capability to safely lift and support the entire system.**
- **Use the top lift eye to lift the system from above. Do not exceed the maximum lift eye rating. See *Specifications* on page 17.**
- **Use a lift truck whose forks extend beyond the other side of the system. Use the lift truck slots located on either side of the system.**
- **Make sure the area is clear before setting the system down.**
- **Set the system down gently. Do not drop it from any height.**

The system is equipped with 2 lift points. Use only these lift points to lift and move the system. See *Figure 2*.

- Top lift eye on the top panel.
  - Use the top lift eye to lift the system from above, such as when placing the system in the bed of a truck. Your lifting equipment must be rated for 1,134 kg (2,500 pounds).
- Lift truck slots on the sides of the system.
  - Use the slots on the sides of the system to lift and move the system with a lift truck.
  - Make sure the lift truck's forks:
    - Are not greater than 17.5 cm (6.88 inches) wide or 7.6 cm (3.0 inches) high.
    - Extend beyond the other side of the system before lifting.

Figure 2 – Top lift eye and lift truck slots





Ground the generator

WARNING!

ELECTRIC SHOCK CAN KILL

Make sure the equipment remains properly grounded at all times in compliance with local and national regulations. Failure to follow proper grounding techniques can result in serious personal injury or death.

On premises

If you keep the system stationary and operate it near a home, workshop, or other building, ground the system to the building's earth ground to prevent electric shock.

To ground the system, connect a 10 mm^2 (8 AWG) insulated copper ground wire from the grounding terminal on the Freedom 38 PPA's front panel to the building's ground rod. Make sure there is a secure, metal-to-metal connection at each end of the grounding wire.

On a truck or trailer

If you operate this system while it is in the bed of a truck or in a trailer, ground the system to the metal frame of the truck or trailer to prevent electric shock.

To ground the system, connect 10 mm^2 (8 AWG) insulated copper ground wire from the grounding terminal on the Freedom 38 PPA's front panel to the metal frame of the truck or trailer.

Location of grounding terminal on front panel

Make sure there is a secure, metal-to-metal connection at each end of the grounding wire. Do not connect the ground wire to a plastic bed liner or to any other non-metal part of the frame.

For more information on how to safely ground the system, refer to the American Welding Society's *Safety and Health Fact Sheet Number 29: Grounding of Portable and Vehicle Mounted Welding Generators*.

GFCI protection on the 120 V auxiliary outlet

The 120 V auxiliary outlet on the generator is GFCI-protected. GFCI (ground fault circuit interrupter) outlets protect the operator from electric shock in case a machine plugged into one of the receptacles experiences a ground fault.

The GFCI outlet provides protection only for ground faults. A chance of electric shock is still present if a short circuit occurs.

The transformer circuit breaker on the front panel must be turned ON (**I**) in order to use the 120 V auxiliary outlet.

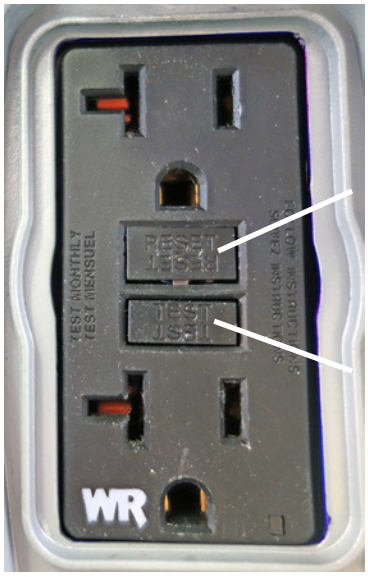
In the 120 V GFCI outlet, the neutral conductor is bonded to the frame.

CAUTION!

Always test and reset the GFCI outlet with the engine at load (RUN mode). Testing or resetting GFCI protection when the engine is at idle can damage the GFCI outlet.

Test the GFCI outlet

Test the GFCI protection on the 120 V auxiliary outlet once per month:



1. Unplug any external tools from the 120 V auxiliary receptacles.
2. Set the power switch to the ON (**I**) position, then press the **RUN** button on the system controller.
3. Set the main circuit breaker and the transformer circuit breaker on the front panel to the ON (**I**) position.

   The transformer circuit breaker provides power to the 120 V auxiliary outlet. It must be turned ON to perform this test.

4. Press the **Test** button on the GFCI outlet.
5. Did the GFCI **Reset** button extrude?
   - ❑ If yes, press the **Reset** button. GFCI protection is working properly.
   - ❑ If no, have an authorized service technician replace the GFCI outlet.

Reset the GFCI outlet

When a ground fault occurs, the **Reset** button on the GFCI auxiliary outlet extrudes and power from that receptacle is disconnected. To reset the GFCI outlet:

1. Turn OFF the system. See *Step 5 – Shut down the system* on page 55.
2. Unplug the external tool. Examine its power cord and plug. Make sure they are dry and undamaged.
3. Set the power switch on the front panel to the ON (**I**) position.
4. Press the **RUN** button on the system controller.
5. Set the main circuit breaker and the transformer circuit breaker on the front panel to the ON (**I**) position.

   The transformer circuit breaker provides power to the 120 V auxiliary outlet. It must be turned ON for the outlet to work.

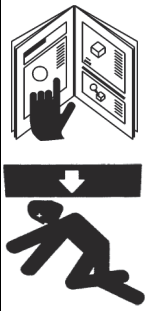
6. Press the **Reset** button on the GFCI outlet.
7. Plug in the external tool to one of the 120 V auxiliary receptacles. It should operate normally. If the GFCI **Reset** button extrudes again, examine the external tool for damage. It may need to be repaired or replaced.

Mount the system in a vehicle or trailer

If you plan to operate this system from the bed of a pickup truck or from an open trailer, make sure the vehicle or trailer is rated for a load of this size. See *Specifications* on page 17.

To safely operate the system from the bed of a truck or from a trailer, make sure:

- The system is properly grounded to the truck or trailer. See *Ground the generator* on page 29.
- The bed of the truck or the trailer is open – no surrounding enclosure that has a roof.
- The system has adequate ventilation. Do not block the ventilation screens or louvers. Do not wedge equipment or other objects between the system and the walls of the truck bed or trailer.
- Nothing sits on top of the system while it is running.
- The system is securely mounted to cross-support beams in the truck bed or trailer. See *Bolt the system to cross-support beams in the truck bed or trailer* on page 33.

	**WARNING!**
	**TOXIC GAS CAN KILL** ■ **Never operate the system from an enclosed trailer or a truck bed with a roof! This can result in a build-up of toxic carbon monoxide gas. It can also cause damage to the system due to overheating.**
	**ELECTRIC SHOCK CAN KILL** ■ **Properly ground the system by connecting it to the metal frame of the vehicle or trailer. See *Ground the generator* on page 29.**
	**COMPLY WITH ALL LOCAL AND NATIONAL REGULATIONS WHEN MOUNTING AND TRANSPORTING THIS SYSTEM** ■ **Mount this system only in vehicles and trailers that are rated for loads of this size.** ■ **Consult the manufacturer's instructions for the vehicle or trailer. Do not exceed the specified weight limit for key components such as axles, tires, shocks, and struts.** ■ **Distribute the weight load to ensure the vehicle or trailer remains properly balanced and stable while driving.** ■ **Mount the system securely to cross-support beams within the frame of the vehicle or trailer to prevent shifting of weight when navigating turns and inclines.**

Bolt the system to cross-support beams in the truck bed or trailer

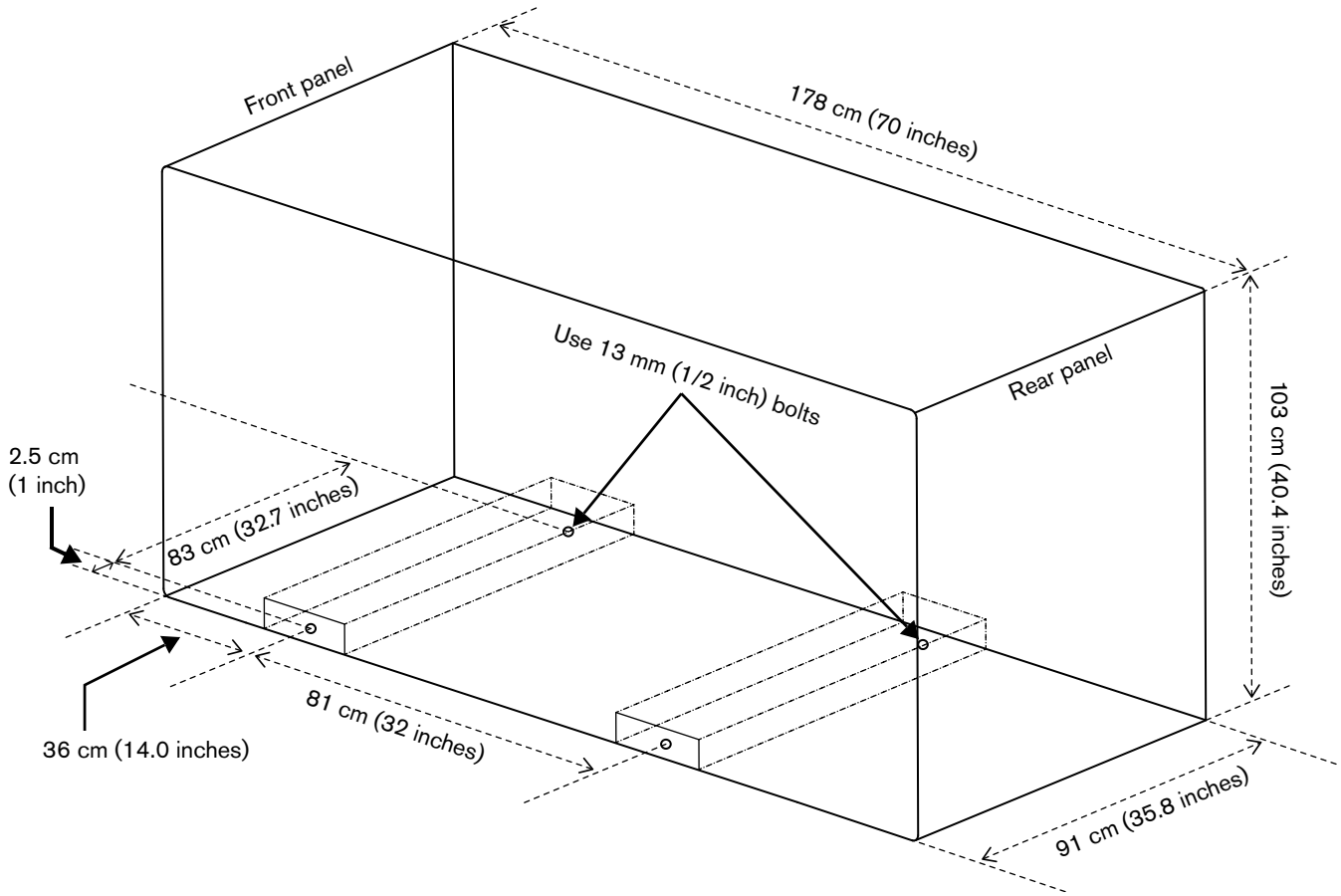
CAUTION!

Always mount the system to cross-support beams. Do not bolt the system directly to the trailer or truck bed. The bolts cannot support the full weight of the system.

To transport and operate this system from a trailer or the bed of a pickup truck:

- Properly secure the system in compliance with all local and national regulations.
- Use the 4 bolt holes on the bottom of the lift truck slots, as shown in *Figure 3*. Use 13 mm or 1/2 inch bolts.
- Mount the system to cross-support beams in the trailer or truck bed. Do not bolt the system directly to the trailer or truck bed.
- Keep the system level when it is in use, not at an incline.

Figure 3 – Mounting holes inside the lift truck slots



Long-term storage

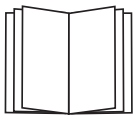
If the system will not be used for an extended period of time:

- Store it in a clean, dry environment. If it will be stored outdoors, make sure it is covered and protected from rain, snow, and other forms of moisture.
- Remove the engine's battery. Store it indoors, safely removed from any flammable or explosive materials. Make sure the battery is covered to protect it from dust, debris, and other contaminants.
- Drain the fuel tank of any remaining diesel fuel. Store the fuel in an appropriate container, safely removed from any flammable or explosive materials.

If the system sits unused for an extended period of time, use the hand pump to prime the engine before starting it. See *Use the hand pump to vent the fuel system* on page 70.

Safety guidelines

General safety precautions

WARNING!

To ensure personal safety, carefully read the safety information in this section and in Hypertherm's *Safety and Compliance Manual* before operating the Freedom 38 PPA.


WARNING!

RECOGNIZE AND FOLLOW SAFETY INSTRUCTIONS

- **If you are performing any maintenance on the system, familiarize yourself with all warning labels on the system components.**
- **Make sure all warning labels can be easily seen.**
- **Clean warning labels when needed with a soft cloth, water, and gentle soap. Do not use solvents, gasoline, or harsh chemicals.**
- **Replace any warning labels that are damaged or missing. The component manufacturers can provide new labels:**
  - **Contact Hypertherm for warning labels on the plasma supply, the system's panels and doors, and other system components.**
  - **Contact Stadco for warning labels on the engine/generator set.**
- **Wear protective equipment that is appropriate for operating or maintaining the system.**
- **Keep the engine free from debris and other foreign material.**
- **Do not allow unauthorized personnel to operate the system.**

Toxic fumes and plasma arcs

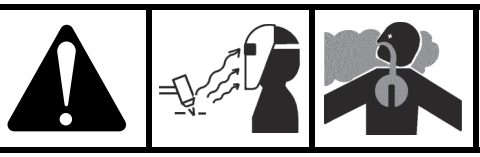
DANGER!

TOXIC GAS CAN BE FATAL

DO NOT OPERATE THIS SYSTEM INDOORS!

Exhaust from the generator contains carbon monoxide, which is an invisible, odorless gas. Inhaling too much carbon monoxide will result in serious injury or death.

Only operate this system outdoors, away from windows and vents.



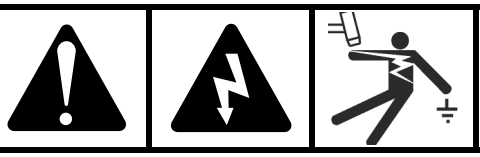
WARNING!

PLASMA ARC RAYS AND TOXIC FUMES CAN CAUSE INJURY

- **Plasma arcs produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.**
- **The plasma arc is not a source of toxic fumes. However, the material being cut can be a source of toxic fumes or gases that deplete oxygen.**

Refer to Hypertherm's *Safety and Compliance Manual* for guidelines on how to set up and operate plasma cutting equipment safely.

Electrical hazards



WARNING!

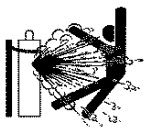
ELECTRIC SHOCK CAN KILL

- **Do not touch live electrical parts! If power is required for servicing, use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the system that can cause serious injury or death.**
- **Make sure the equipment remains properly grounded at all times, in compliance with local and national regulations. See *Ground the generator* on page 29.**
- **When cutting or gouging, wear insulated gloves and boots. Keep your body and clothing dry.**
- **Do not wear jewelry when working on electrical components.**
- **Do not start the generator when there is an electrical load already applied.**
- **Always turn OFF the power to the system before examining, cleaning, or changing plasma torch parts.**

For other important guidelines on avoiding electrical hazards with the use of plasma cutting equipment, refer to Hypertherm's *Safety and Compliance Manual*.

Fire and explosion hazards

WARNING!



IMPROPER USE OF EQUIPMENT CAN CAUSE FIRE OR EXPLOSION

- **Most fuels, lubricants, and other fluids in the engine, generator, and air compressor are flammable. Watch carefully for any signs of these fluids leaking or spilling onto hot surfaces in the system or onto electrical components. Fires can result, causing injury and damage to property.**
- **Do not remove the engine crankcase within 15 minutes of an emergency stop. A flash fire can result.**
- **Make sure a fully charged fire extinguisher is nearby at all times. Familiarize yourself with how to operate the fire extinguisher.**
- **This system can produce sparks that can cause fires in dry vegetation. Contact local fire authorities for safety requirements.**
- **Keep the engine clean from all flammable, combustible materials and conductive materials, such as oil, fuel, and metallic debris. Do not allow combustible or conductive materials to accumulate on the engine.**
- **Remove all flammable materials within 10 m (35 feet) of the cutting area.**
- **Store fuel and oil in clearly marked containers. Keep away from unauthorized personnel.**
- **Store flammable materials, such as oily rags, in protective containers.**
- **Use caution when you add fuel to the engine:**
  - **Stop the engine and allow it to cool before adding fuel.**
  - **Keep the fuel nozzle in contact with the fuel tank when adding fuel.**
  - **Do not add fuel near open flames or sparks.**
  - **Do not smoke cigarettes when you handle engine fuel.**
  - **Do not overfill the fuel tank. Clean up any spilled fuel before starting the engine.**
- **Do not use starting fluids. They can result in fire that causes injury or damage to property.**
- **Do not use plasma to cut:**
  - **Containers that contain flammable fluids.**
  - **Pressurized cylinders, pipes, or other closed containers.**
  - **Aluminum underwater. Do not cut aluminum that is in contact with water in any way. An explosion can result from using plasma to cut aluminum that is in contact with water.**
  - **In the presence of explosive dust or vapors. Ventilate potentially flammable environments before cutting or gouging with plasma.**

Refer to Hypertherm's *Safety and Compliance Manual* for more guidelines on setting up a safe environment for plasma cutting.

Battery hazards

WARNING!

RISK OF FIRE OR EXPLOSION – WEAR PROTECTIVE CLOTHING

- **Turn OFF the engine before performing any battery checks or maintenance.**
- **Avoid contact with sulfuric acid from the engine's battery. It can cause serious injury if it comes in contact with eyes or skin.**
- **Always wear protective glasses, gloves, and clothing when servicing the battery.**
- **Wash your hands thoroughly after touching the battery and its connectors.**
- **Examine the battery regularly to make sure:**
  - **All electrical connections are clean and secure. Loose connections can cause sparks that result in a fire. See *Check the battery and cable connectors* on page 106.**
  - **None of the electrical wires are frayed. Replace any frayed wires before starting the engine.**
- **When the battery is charged or discharged, an explosive chemical change occurs. Avoid all conditions that can ignite this explosive gas:**
  - **Keep any open flames or sparks away from the top of the battery.**
  - **Do not smoke cigarettes near a battery that is being charged.**
  - **Never place a metal object across the battery's terminal posts to check its charging status. Instead, use a voltmeter or hydrometer.**
  - **Never charge a frozen battery.**
  - **Never charge a battery in an enclosed room that lacks proper ventilation.**
  - **Never disconnect any charging unit circuit or battery circuit cable from the battery while it is being charged. Doing so can produce dangerous sparks.**
- **Apply the cable connections correctly if you jump-start the battery. Attach the negative (-) ground cable last, and remove it first. See *Jump-start the battery* on page 71.**
- **Always dispose of old batteries in compliance with local and national regulations.**
- **Examine the chassis ground strap connection regularly. Without a solid ground strap connection, electrical discharge can damage the engine and electrical system.**

Chemical hazards



WARNING!

CAREFULLY DRAIN AND DISPOSE OF FLUIDS

- **Read all Material Safety Data Sheets (MSDS) for this system. Follow the manufacturers' instructions for proper handling and disposal of all oils, fuels, and other system fluids. See *Material Safety Data Sheets (MSDS)* on page 21.**
- **Carefully release hydraulic pressure (with the engine OFF) before you remove or disassemble any hydraulic components.**
  - **Pressure can remain trapped in the hydraulic circuit long after the engine is turned off. If this pressure is released suddenly, hydraulic fluid can escape rapidly and with force, causing severe injury.**
  - **If hydraulic fluid that was under pressure pierces your skin, seek medical treatment immediately.**
- **Always drain oil and other fluids into appropriate containers. Never use glass containers for these fluids.**
- **Drain fluids carefully to avoid spillage.**
- **Dispose of old oil, filters, and other fluids in compliance with local and national regulations.**

California Proposition 65 warnings

WARNING!

CALIFORNIA PROPOSITION 65 WARNINGS

DIESEL ENGINES

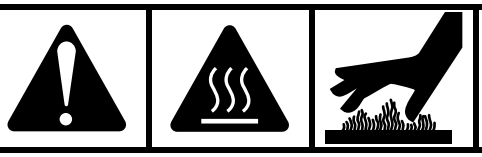
Diesel engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.

LEAD-ACID BATTERIES

This product contains chemicals, including lead, known to the state of California to cause cancer, birth defects, or other reproductive harm. Wash your hands after use.

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer, birth defects, or other reproductive harm. Wash your hands after handling.

Burn hazards and hot surface hazards



WARNING!

ALLOW COMPONENTS TO COOL

- **Do not place any objects on top of the system. Parts of the top panel can become very hot while the engine is running.**
- **Before performing any maintenance on the engine and generator:**
  - **Allow engine components to cool. Avoid contact with hot components or hot oil.**
  - **Do not remove the pressure cap from the radiator while the engine is still hot.**
  - **Relieve all pressure in the air system, the hydraulic system, the lubrication system, the fuel system, or the cooling system before disconnecting any hoses, tubes, or fittings in those systems.**
- **Metal cut with plasma is very hot. Allow cut metal to cool before handling, or touch the metal only with tongs or protective gloves. Never touch the workpiece while you are still cutting or gouging.**

Mechanical hazards

WARNING!

HEAVY EQUIPMENT CAN CAUSE SERIOUS INJURY

- **Keep hands and feet clear when the system is being lifted or moved.**
- **Use lifting equipment with sufficient capability to safely lift and move the system.**
- **Secure equipment to the truck or trailer before moving to prevent shifting when accelerating, braking, or turning.**

MOVING PARTS CAN CAUSE INJURY

- **Keep hands, clothing, jewelry, and tools away from moving parts.**
- **Keep your hands away from the engine's fan.**
- **Do not wear loose clothing or jewelry that can catch on moving parts.**
- **Always keep the service panels closed and safety guards installed while the engine is running.**

Operator protection guidelines

Elevated work areas

WARNING!

ESTABLISH A SAFE WORK ENVIRONMENT

If you cut metal from an elevated work area, make sure the work area is safe to avoid injury or damage to property.

- **Wear appropriate safety equipment, such as a harness, to prevent injury in case of a fall.**
- **Clear under and around the area where you will be plasma cutting. Make sure no flammable or explosive materials are present. Sparks may fall within a wide radius under the cutting site.**

Magnetic field hazards

CAUTION!

PACEMAKER AND HEARING AID OPERATION CAN BE AFFECTED

The high currents emitted by this system can produce magnetic fields that interfere with pacemaker or hearing aid operation. Consult a doctor before operating plasma cutting equipment.

Refer to Hypertherm's *Safety and Compliance Manual* for more information.

Section 3
Operation

System components

Figure 4, *Figure 5*, and *Figure 6* identify the primary components used to operate this system. These components are described in more detail on the following pages.

Familiarize yourself with all of the controls before operating the system. Follow the steps in this section to ensure proper start-up and shut-down of the system.

Figure 4 – Front panel

1 Plasma supply

2 Plasma torch connection

3 Work lead connection

4 Air pressure gauge

5 Machine interface (CPC) connection

6 **Emergency Stop** button

7 System controller

8 Main circuit breaker (60 A) and transformer circuit breaker (10 A)*

9 Alternator lamp

10 12 V circuit breaker (**RESET** button)

11 ON (**I**)/OFF (**O**) power switch

12 Circuit breaker to reset 120 V auxiliary outlet

13 120 V auxiliary – 2 GFCI receptacles (1-phase, 20 A) (neutral bonded to frame)

14 480 V auxiliary – 1 receptacle (3-phase, 60 A, 4-pole, 5-wire)

15 Lever to drain condensate from air tank

16 Auxiliary air hose connector

* The main circuit breaker provides power to the on-board plasma cutting system and the 480 V auxiliary outlet. The transformer circuit breaker provides power to the 120 V auxiliary outlet.

Figure 5 – Plasma side

1 Oil fill level for air compressor

2 Service panel

3 Lift truck slots

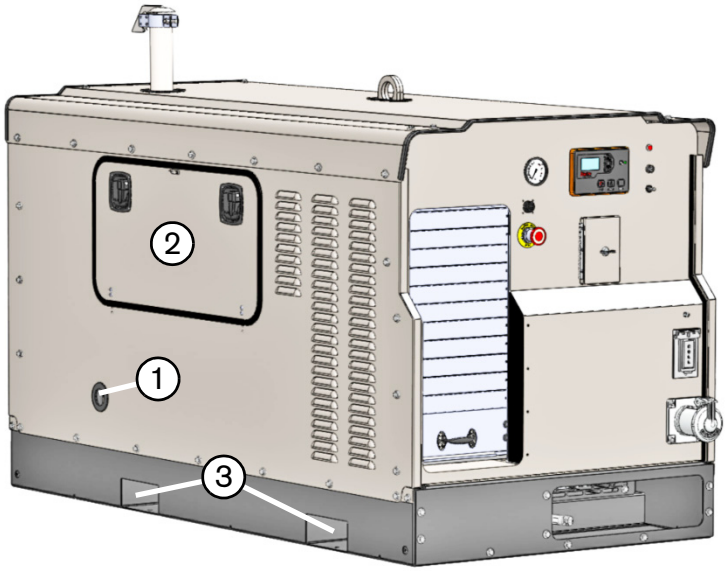


Figure 6 – Generator side

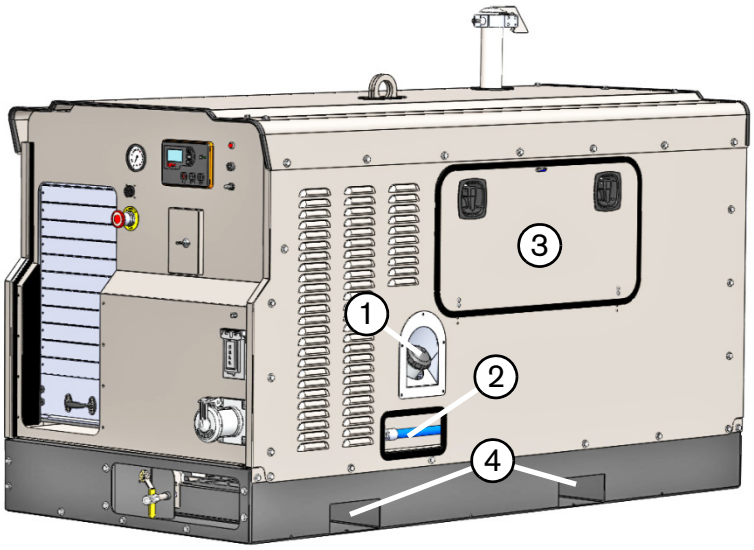
1 Fuel fill cap (diesel fuel only)

2 Oil drain hose caps for:

- Oil pan drain hose
- Heat exchanger drain hose

3 Service panel

4 Lift truck slots



Controls and indicators

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

System controller

Figure 7 – Primary system controls

1 LCD screen

Use the LCD screen to view engine and generator operating information as well as warning and failure notifications. From this screen you can view, navigate, and update system status, engine parameters, and settings.

2 Navigation buttons

Use the **UP** and **DOWN** arrow buttons to navigate through menus on the LCD screen, to change the values for some settings, and to change the parameter screen.

Use the **ENTER** button to display the menu system on the LCD screen and to confirm settings you changed. You can also use this button to lock the LCD screen when you view parameters.

3 System status LED indicator

The LED indicator displays the current status of the system:

- Solid **green** = engine is running
- Solid **amber** = warning
- Solid **red** = failure

For example, the LED indicator displays **amber** if the engine oil approaches its maximum temperature. If the engine oil exceeds its maximum temperature, the LED indicator displays **red**, and the engine shuts off.

For information on how to clear faults, see *System faults* on page 62.

4 OFF button

Use the **OFF** button to turn OFF the engine.

5 AUTO button

Use the **AUTO** button to view engine status details without turning on the engine, such as fuel remaining, oil pressure, engine hours, engine temperature, and battery voltage.

The **AUTO** button does not start the engine. Press the **OFF** button to exit AUTO mode.

6 RUN button

Use the **RUN** button to start the engine. When you press the **RUN** button, the engine continues to run until you press the **OFF** button or activate an emergency stop, or until a failure occurs.

7 Alternator lamp

The alternator lamp monitors the charging current of the engine's battery. This lamp illuminates if the alternator is not properly charging the system.

8 12 V circuit breaker (RESET button)

The 12 V (10 A) circuit breaker protects DC circuits against shorted or overloaded circuits.

When the breaker is tripped, the **RESET** button in the center of the circuit breaker extrudes. Correct the fault condition, then press the **RESET** button to reset the circuit breaker.

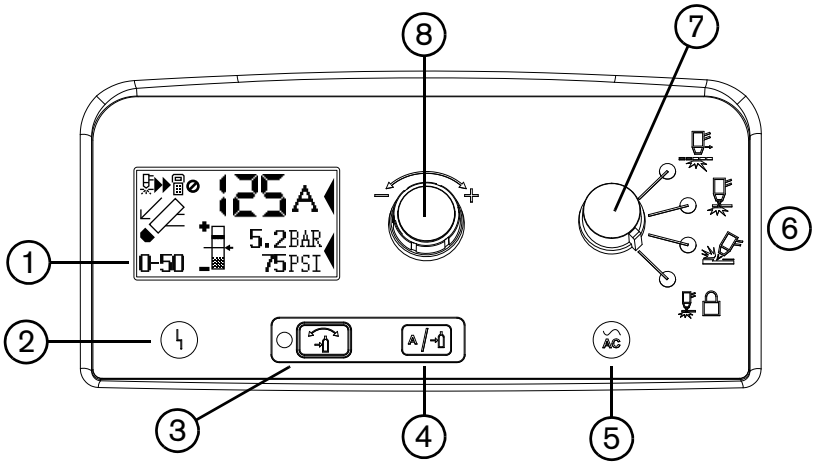
9 ON/OFF power switch

Use the power switch to turn ON (**I**) and OFF (**O**) 12 VDC power to control the system. You cannot start the engine when the power switch is in the OFF (**O**) position.

Plasma cutting system

Figure 8 shows the controls and indicators for the plasma cutting system. For an explanation of these controls, refer to the *Basic System Operations* section in the *Powermax125 Operator Manual*.

Figure 8 – Plasma cutting system controls



1 Status screen

2 Fault LED (yellow)

3 Automatic/manual pressure setting mode selector

4 Current/gas selector

5 Power ON LED (green)

6 Operating modes

7 Operating mode switch

8 Adjustment knob

Operate the system

DANGER!

TOXIC GAS CAN BE FATAL

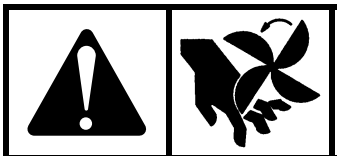
DO NOT OPERATE THIS SYSTEM INDOORS!

Exhaust from the generator contains carbon monoxide, which is an invisible, odorless gas. Inhaling too much carbon monoxide will result in serious injury or death.

Only operate this system outdoors, away from windows and vents.

The following topics explain how to turn ON the system, begin cutting with the plasma cutting component, and properly shut down the system.

Step 1 – Perform safety inspection and check oil levels



WARNING!

MOVING PARTS CAN CAUSE INJURY

Always keep the service panels closed while the engine is running. Make sure the service panels remain in good condition. Repair or replace the panels if they are damaged or if they will not stay in place as designed.

1. Inspect the system and the area around it to make sure it is safe to operate. Make sure:
   - ❑ The system is properly grounded. See *Ground the generator* on page 29.
   - ❑ The area around the system allows for proper ventilation. Do not block the ventilation screens or louvers.
   - ❑ Nothing is on top of the system. The top panel can get very hot when the engine is running, especially near the exhaust pipe.
   - ❑ The system is protected from rain and snow.
   - ❑ Both service panels are installed.
   - ❑ The fuel cap is securely in place on the fuel tank.
   - ❑ The system is positioned on a flat, level surface.
   - ❑ There are no signs of damage to the plasma torch, torch lead, or work lead.
2. Check the engine's oil level. See page 100.
3. Check the air compressor's oil level. See page 101.

Step 2 – Install consumables and attach the torch lead and work lead

WARNING!

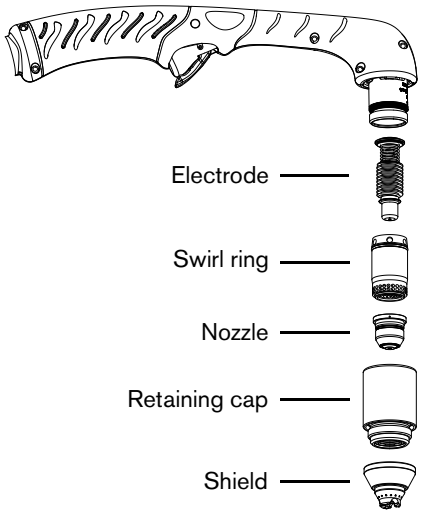
INSTANT-ON TORCHES
PLASMA ARC CAN CAUSE INJURY AND BURNS

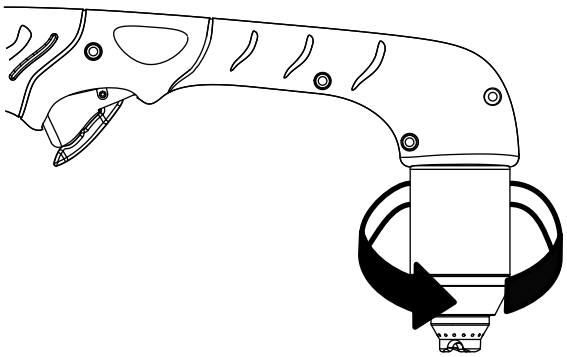
The plasma arc comes on immediately when the torch trigger is activated. Make sure the system is OFF before changing consumables.

Install the consumables in the plasma torch

To operate the hand torch, a complete set of consumable parts must be installed: shield, retaining cap, nozzle, electrode, and swirl ring. Torches ship without consumables installed. Pull off the vinyl cap before installing your consumables.

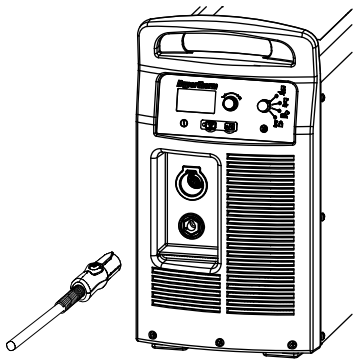
With the system turned OFF, install the hand torch consumables as shown.



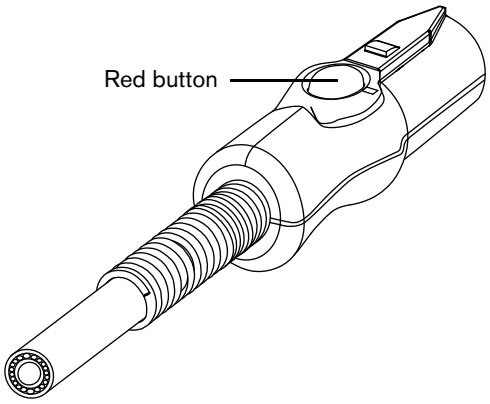


Attach the torch lead

The plasma cutting system is equipped with FastConnect™, a quick-disconnect system for connecting and disconnecting handheld and machine torch leads. When connecting or disconnecting a torch, first turn OFF the system. To connect the torch, push the connector into the receptacle on the front of the plasma supply.



To remove the torch, press the red button on the connector and pull the connector out of the receptacle.



You can also use machine torches with this plasma cutting system. For more information, refer to the *Machine Torch Setup* and *Mechanized Cutting* sections in the *Powermax125 Operator Manual*.

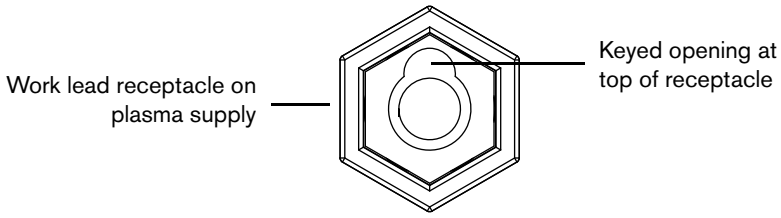
Attach the work lead

CAUTION!

Make sure you use a work lead that is appropriate for your plasma supply. Use a 125 A work lead with the Powermax125. The amperage is marked near the rubber boot of the work lead connector.

1. Insert the work lead connector into the receptacle on the front of the plasma supply.

   The receptacle is keyed. Align the key on the work lead connector with the opening at the top of the receptacle on the plasma supply.



2. Push the work lead connector all the way into the receptacle on the plasma supply and turn clockwise, approximately 1/4 turn, until the connector is fully seated against the stop in order to achieve an optimal electrical connection.

   A loose connection will overheat the connector. Frequently check the work lead for a reliable electrical connection.

CAUTION!

Make sure the work lead is fully seated in the receptacle to prevent overheating.

Step 3 – Check fuel, start the engine, and build air pressure

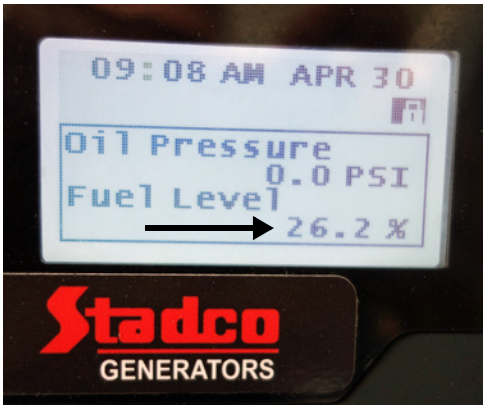
CAUTION!

ETHER WILL DAMAGE ENGINE

Do not use ether to help start the engine in extremely cold temperatures. Doing so can result in severe damage to the engine.

1. Make sure the main circuit breaker and the transformer circuit breaker on the front panel are turned OFF (**O**).
2. Turn ON (**I**) the power switch to activate the control system.
3. Check the fuel level. Press the **AUTO** button to display engine status information on the LCD screen, including the percentage of fuel remaining.

   Add diesel fuel, if needed. Do not overfill the fuel tank. Do not allow any water to enter the fuel tank or any of the containers you use to store fuel.

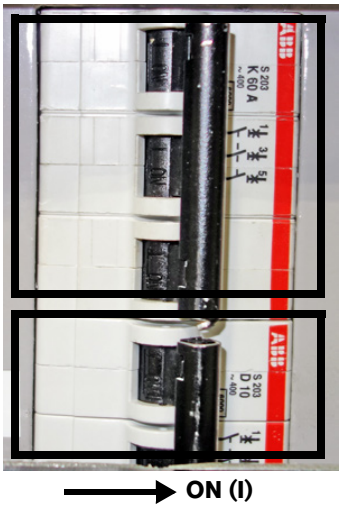


4. Press the **RUN** button on the system controller. This initiates the start-up procedure:
   - **a.** The engine preheats for a calculated period of time based on ambient conditions.
   - **b.** The engine controller cranks the engine until it starts.
   - **c.** The LCD screen displays “RUNNING,” and the LED indicator illuminates solid green.

   The alternator is mechanically coupled to the engine. It increases to 480 VAC at 60 Hz as the engine comes up to speed. No current is present until you draw power from the system.

5. Turn ON (**I**) the main circuit breaker (top) and the transformer circuit breaker (bottom).

   The main circuit breaker provides power to the on-board plasma cutting system and the 480 V auxiliary outlet. The transformer circuit breaker provides power to the 120 V auxiliary outlet.



6. Wait 15–30 seconds to allow the air pressure to increase. The pressure must be a minimum of 7 bar (100 psi) to use the plasma cutting system.

   The drain valves on the air compressor’s air tank and air/oil separation tank must be closed in order to build pressure in the air compressor.

Once the engine and generator are started, they continue to operate until the system is powered OFF or a fault condition occurs.

If the engine fails to start, refer to *Engine will not start* on page 68 for troubleshooting guidelines.

WARNING!

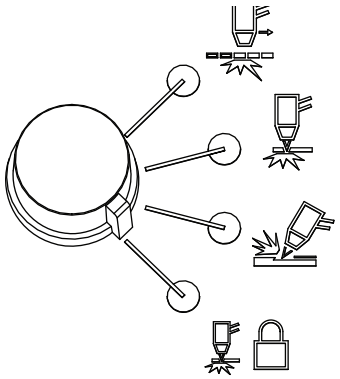
RISK OF SEVERE BURNS

Do not touch the exhaust pipe or the area around it when you operate the system. This area gets extremely hot when the engine is running.

Step 4 – Select the plasma cutting settings, attach the ground clamp, and start to cut

Select the operating mode for the plasma cutting system

Use the operating mode switch on the plasma supply to select the type of work you want to perform.



For cutting expanded metal, grates, metal containing holes, or any job that requires a continuous pilot arc. Using this mode to cut standard metal plate reduces consumable life.

For cutting or piercing metal. This is the standard setting for normal drag-cutting and for mechanized cutting.

For gouging metal.

Using this mode while cutting results in poor cut quality.

For locking the hand torch in the ON (fire) position. With this option selected, press the trigger to fire the torch. The trigger will remain on when you release the trigger. The arc will go out when transfer is lost or you press the trigger again.

Check the indicators

Before you begin to cut, examine the controls on the front of the plasma supply to make sure:

- The green power ON LED is illuminated.
- The Fault LED is *not* illuminated.
- No error icons appear in the status screen.

If a fault icon appears in the status screen, the Fault LED is illuminated, or the power ON LED is blinking, correct the fault condition before continuing. See *Plasma cutting system fault codes and solutions* on page 79.

Adjust the gas pressure (optional)

By default, the plasma cutting system is set to automatic gas mode, which automatically adjusts the gas pressure as you operate the system. Automatic gas mode uses Smart Sense™ technology to adjust the gas pressure according to the selected cutting mode and torch lead length for optimum cutting.

If you need to adjust the gas pressure, you can use manual mode to do so. Manual mode should be used by experienced users who need to optimize the gas setting (override the automatic gas setting) for a specific cutting application. For more information, refer to the *Basic System Operations* section in the *Powermax125 Operator Manual*.

Adjust the current (amperage)

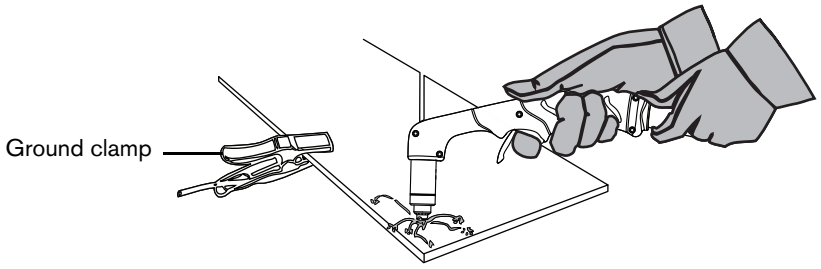
Turn the adjustment knob on the plasma supply to adjust the current for your particular cutting application. You can set the current to a maximum of 125 A.

If the plasma cutting system is in manual mode, press the current/gas selector until the selection cursor is opposite the amperage setting in the status screen before you can turn the adjustment knob to set the current.

Attach the ground clamp to the workpiece

- The ground clamp must be connected to the workpiece while you are cutting.
- Make sure that the ground clamp and the workpiece make good metal-to-metal contact. Remove rust, dirt, paint, coatings, and other debris to ensure the work lead makes proper contact with the workpiece.
- For the best cut quality, attach the ground clamp as close as possible to the area being cut.

If you are using a machine torch with a cutting table, you can connect the work lead directly to the table instead of attaching the ground clamp to the workpiece. See your table manufacturer's instructions.



CAUTION!

Do not attach the ground clamp to the portion of the workpiece to be cut away.

Start to cut

You are ready to cut when:

- The system is powered ON and no fault LEDs or notifications display on the system controller or on the plasma supply.
- The correct consumables are installed in the torch.
- The torch lead and work lead are connected to the plasma supply.
- The air pressure is a minimum of 7 bar (100 psi).
- The ground clamp is attached to the workpiece.
- The operating mode and current are correctly set on the plasma cutting system.

For general plasma cutting guidelines and for guidelines on piercing and gouging, refer to the *Hand Cutting* section in the *Powermax125 Operator Manual*.

For cut charts and details on using the plasma cutting system with automated equipment, refer to the *Mechanized Cutting* section in the *Powermax125 Operator Manual*.

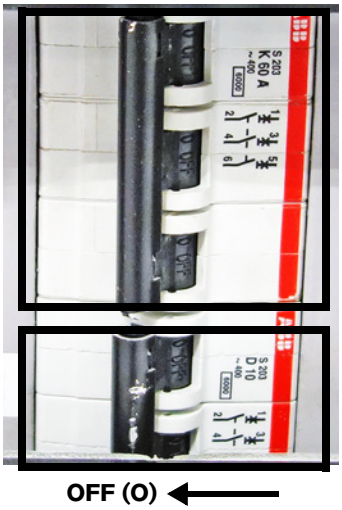

CAUTION!

Powering a device using the 480 V auxiliary outlet while you are running the on-board plasma cutting system at full output is not recommended. This can trip the system's circuit breaker.

Step 5 – Shut down the system

Carefully follow these steps in the order listed to properly shut down the system:

1. Turn OFF (**O**) the main circuit breaker (top) and the transformer circuit breaker (bottom) on the front panel to disengage the engine load.
2. Allow the engine to run without load (or with a light load) for 3 minutes. This provides a sufficient cool-down cycle.
3. Press the **OFF** button on the system controller to turn off the engine.
4. Turn OFF (**O**) the power switch to turn off the control system.



The engine cannot be started when the power switch is in the OFF (**O**) position.

0-60 fault code on the plasma cutting system

It is normal to see the 0-60 fault code display on the plasma cutting system when you turn OFF (**O**) the main circuit breaker and transformer circuit breaker while the engine and generator are running. Wait approximately 1 minute to allow the fault to clear on its own before turning ON (**I**) the circuit breakers and starting to cut again.

Emergency stop

Press the **Emergency Stop** button to immediately shut down the engine and generator. **Use this button only in emergency situations.**

Pull out the **Emergency Stop** button to reset the system.

	CAUTION!
Regularly using the Emergency Stop button for normal engine shut down can lead to engine overheating and to engine components wearing out prematurely.	

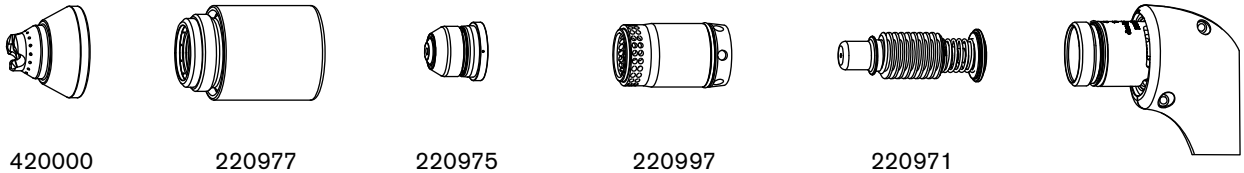
Figure 9 – Emergency Stop button

Choose consumables for the plasma hand torch

Use the following consumables on Hypertherm's Duramax® Hyamp 85° and 15° hand torches. Hand torches use shielded consumables. Therefore, you can drag the torch tip along the metal as you cut.

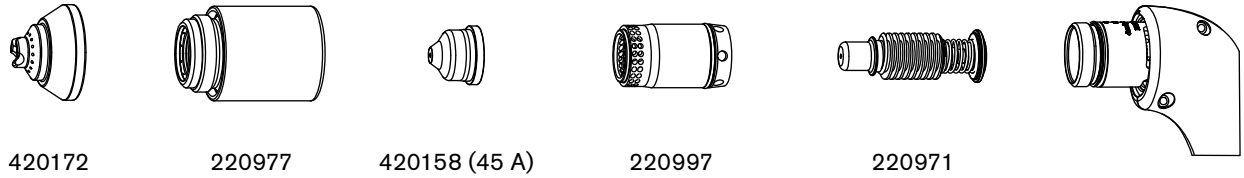
If you are using a Duramax Hyamp machine torch, use the consumables listed in the *Machine Torch Setup* section of the *Powermax125 Operator Manual*.

Drag-cutting 105/125 A consumables



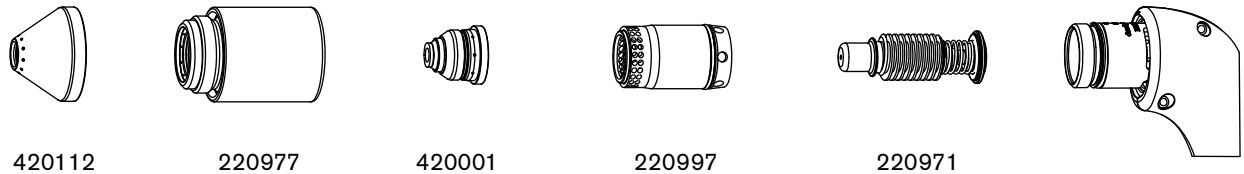
420000 Shield | 220977 Retaining cap | 220975 Nozzle | 220997 Swirl ring | 220971 Electrode

Drag-cutting 45 A and 65 A consumables



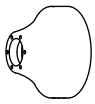
420172 Shield | 220977 Retaining cap | 420158 (45 A) 420169 (65 A) Nozzle | 220997 Swirl ring | 220971 Electrode

Gouging consumables – maximum removal

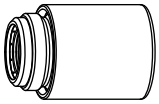


420112 Shield | 220977 Retaining cap | 420001 Nozzle | 220997 Swirl ring | 220971 Electrode

Gouging consumables – maximum control

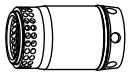


420509
Shield

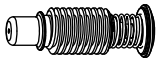


220977
Retaining cap

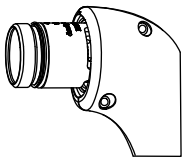
420001
Nozzle



220997
Swirl ring

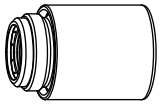


220971
Electrode



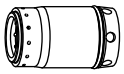
FineCut consumables

420152
Shield

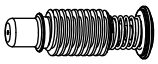


220977
Retaining cap

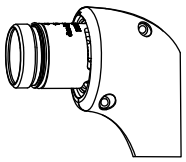
420151
Nozzle



420159
Swirl ring



220971
Electrode



Section 4

Troubleshooting

This section provides an overview of the most common problems that may arise when using this system and explains how to solve them.

Where to go for help

If you cannot fix the problem by following the troubleshooting guidelines in this section, or if you need further assistance:

1. Call your authorized Hypertherm Freedom 38 PPA distributor or repair facility.
2. For engine support, locate the nearest authorized Deutz service dealer at www.deutzamericas.com.
3. Call the nearest Hypertherm office listed in the front of this manual.
4. For warranty claims or questions:
   - ❑ Contact Hypertherm regarding claims for the plasma supply.
   - ❑ Contact Hypertherm regarding system-level claims and claims for the air compressor, alternator, and digital controller. Hypertherm will connect you to the proper manufacturer, if needed.
   - ❑ Contact Deutz regarding claims for the engine:
     - Telephone: 770-564-7100
     - Website: www.deutzamericas.com

DANGER!

TOXIC GAS CAN BE FATAL

DO NOT OPERATE THIS SYSTEM INDOORS!

Exhaust from the generator contains carbon monoxide, which is an invisible, odorless gas. Inhaling too much carbon monoxide will result in serious injury or death.

Only operate this system outdoors, away from windows and vents.

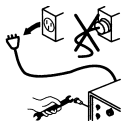
WARNING!

ELECTRIC SHOCK CAN KILL

Turn OFF the power before removing the cover from the system. In the U.S., use a "lock-out / tag-out" procedure until the service or maintenance work is complete. In other countries, follow appropriate national or local safety procedures.

Before servicing the engine or generator, turn OFF the system, wait for 30 seconds, then disconnect the battery's negative (-) ground cable.

Do not touch live electrical parts! If power is required for servicing, use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the system that can cause serious injury or death.



Do not attempt to repair printed circuit boards. Do not cut away or remove any protective conformal coating from circuit boards. To do so will risk a short circuit between the AC input circuit and the output circuit and may result in serious injury or death.

HOT PARTS CAN CAUSE SEVERE BURNS

Allow the system's internal components to cool before servicing.

Do not remove the pressure cap from the radiator while the engine is still hot.

MOVING PARTS CAN CAUSE INJURY

Use extreme caution if you need to work on a running engine.

- **Keep hands, clothing, jewelry, and tools away from moving parts.**
- **Keep your hands away from the engine's fan.**
- **Do not wear loose clothing or jewelry that can catch on moving parts.**
- **Remove safety guards only when necessary. Replace the safety guards as soon as maintenance is complete.**
- **Close the service panels when maintenance is complete. Repair or replace the panels if they are damaged.**

STATIC ELECTRICITY CAN DAMAGE CIRCUIT BOARDS

Put on a grounded wrist strap before handling printed circuit boards.

Check engine and generator status

Several engine and generator status details display on the system controller's LCD screen when the engine is running, such as:

- Total operating hours for the engine
- Oil pressure
- Percentage of fuel remaining
- Battery voltage
- Engine temperature
- Total time the engine has been running since it was started
- Generator current (A)

  The transformer circuit breaker must be ON (**I**) in order to view the output current on the system controller. See page 51.

- Generator voltage (V)
- AC frequency (Hz)

You can also view the following engine status details without starting the engine by pressing the **AUTO** button:

- Total operating hours for the engine
- Oil pressure
- Percentage of fuel remaining
- Battery voltage
- Engine temperature

Press the **OFF** button to exit AUTO mode.

Reset the control system

When a system fault condition occurs, the engine shuts OFF and the LED indicator on the front panel illuminates solid red.

To clear the fault, reset the control system:

1. Examine the LCD screen for the notification that describes why the engine shut down. Correct the fault before continuing.
2. Press the **OFF** button on the system controller.
3. Press the **RUN** button to start the engine.
4. If the control system still needs to be reset, turn the main power switch OFF (**O**) and then back ON (**I**).

System faults

Active faults and cleared faults

Active faults display on the system controller's LCD screen when they occur. The fault notification remains on the LCD screen until the fault is cleared.

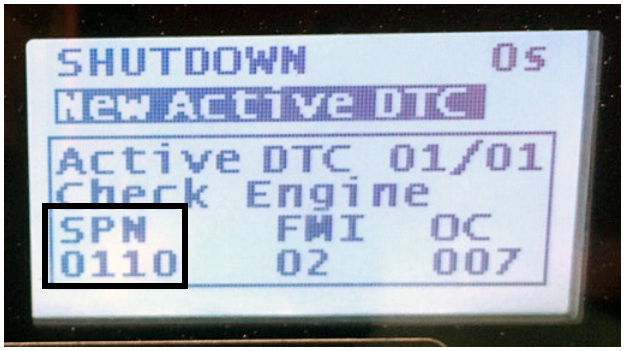
Engine-related faults may include a numeric fault code called an SPN code (or suspect parameter number). Make note of this code when it displays. You may be asked to provide the SPN code if you contact an authorized Deutz service dealer for support.

Non-active faults, or faults that have been cleared, are saved in the system's events history. For instructions on how to view faults that occurred in the past, see *Find system fault codes in events history* on page 66.

In some cases, you may see a combination of fault notifications. For example, if the temperature sensor in the engine is faulty, you may first see a "Check Engine" fault with SPN code 0110. The system continues to operate until the engine reaches a predefined temperature. At that point, the system shuts off, and the "High Engine Temp" fault message displays. See *Figure 10*.

- For more information on predefined conditions that trigger faults, see *System faults triggered by predefined thresholds* on page 63.
- For more information on SPN codes, see *Engine faults (SPN codes)* on page 65.

Figure 10 – Active faults



Active fault with SPN code

Fault message that displays after system shuts off

System faults triggered by predefined thresholds

Several preset thresholds are programmed into the system to define acceptable operating parameters.

- When the system reaches a **warning** threshold:
  - A warning message displays.
  - The LED indicator illuminates solid **amber**.
  - You can continue to operate the system.
- When the system reaches a **failure** threshold:
  - A fault message displays.
  - The LED indicator illuminates solid **red**.
  - The system shuts off.

The following table lists the conditions that trigger these warning and failure notifications and suggests how to clear each fault:

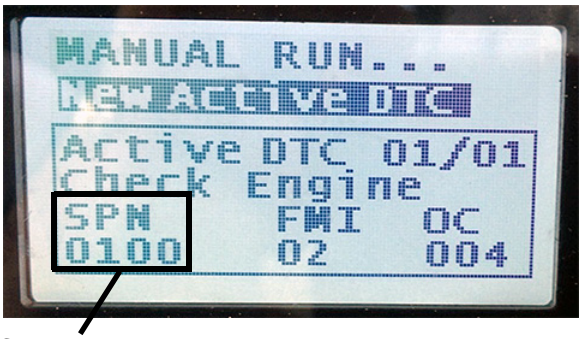
Fault condition	Warning threshold	System failure threshold	Solutions
`Air compressor overheated`	None	110°C (230°F)	▪ Turn the system OFF, and allow the air compressor components to cool. ▪ Make sure the air compressor has enough oil. See page 101. ▪ Change the oil and oil filter in the air compressor. See page 115. ▪ Have an authorized service technician examine the temperature switch for the air compressor and repair or replace it as needed.
`Crank failed`	2 failed attempts	None	▪ This warning message displays when the system fails to start the engine after 2 consecutive attempts. See *Engine will not start* on page 68.
`High battery voltage`	15 V	None	▪ Turn the system OFF. Replace the battery. See page 129. ▪ If a new battery does not clear the fault, have an authorized service dealer examine the alternator.
`High engine temperature`	127°C (260°F)	129°C (265°F)	▪ Make sure the system has adequate ventilation. Do not block the ventilation screens or louvers. ▪ Change the oil and oil filter in the engine. See page 107. ▪ Service the engine air cleaner. Install new air filters, if needed. See page 113. ▪ If the problem persists, have an authorized Deutz service dealer examine the engine.

Fault condition	Warning threshold	System failure threshold	Solutions
`Low battery voltage`	11 V	None	▪ Check the connections on the battery. Clean and tighten the connectors as needed. See page 106. ▪ Jump-start or charge the battery. See page 71. ▪ Replace the battery. See page 129. ▪ If a new battery does not clear the fault, have an authorized service dealer examine the alternator.
`Low fuel level`	25%	None	▪ Add clean, low-sulfur diesel fuel. Do not overfill the fuel tank.
`Loss of ECM communication`	Communication with the electronic control module (ECM) was interrupted	6 seconds after loss of ECM communication	▪ Have an authorized service technician examine the system.
`Low oil pressure`	1.4 bar (20 psi)	1 bar (15 psi)	▪ Make sure the engine has enough oil. See page 100. ▪ Install a new Deutz-brand oil filter. See *Change the oil and oil filter in the engine* on page 107. ▪ If the problem persists, have an authorized Deutz service dealer examine the engine.
`Over current`	55 AAC	None	▪ The generator's amperes alternating current (AAC) is too high. See *Troubleshoot power-related issues (generator/alternator)* on page 76.
`Over speed`	1,980 RPM	2,160 RPM	▪ This fault can be triggered by excess air entering the fuel line. Use the hand pump to prime the engine. See page 70. ▪ If the problem persists, have an authorized Deutz service dealer examine the engine.
`Under speed`	1,620 RPM	1,530 RPM	▪ This fault can be triggered by a low fuel level. Add clean, low-sulfur diesel fuel. Do not overfill the fuel tank. ▪ If the problem persists, have an authorized Deutz service dealer examine the engine.

Engine faults (SPN codes)

An SPN code (or suspect parameter number) in a fault notification indicates that the fault is engine-related. The following table lists a few common SPN codes and suggests how to clear each fault.

If you see an SPN code not listed in this table, have an authorized Deutz service dealer examine the system.



SPN code

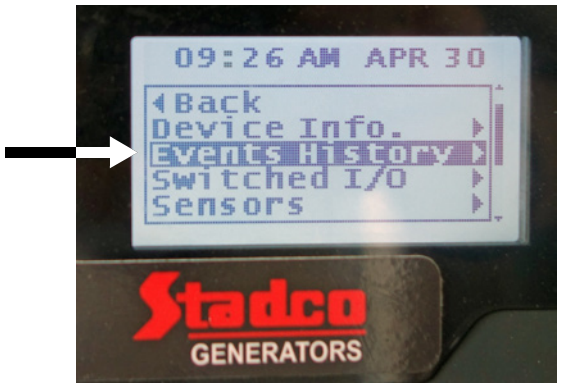
Fault code (SPN number)	Description	Solutions
100	Oil pressure warning. The oil pressure is too low, or the oil pressure sensor is faulty.	▪ Check the oil level in the engine. Add oil as needed. See page 100. ▪ Change the oil and oil filter in the engine. See page 107. ▪ Have an authorized Deutz service dealer examine the oil pressure sensor and its cable and repair or replace as needed.
108	Atmospheric pressure warning. The atmospheric pressure is too high or too low.	▪ Turn OFF the system. Allow the system to cool. Turn ON the system. If the fault persists, have an authorized Deutz service dealer examine the engine.
110	Coolant temperature warning. The coolant temperature is too high, or the coolant sensor is faulty.	▪ This engine is oil-cooled, so first check the oil level in the engine. Add oil as needed. See page 100. ▪ Change the oil and oil filter in the engine. See page 107. ▪ Have an authorized Deutz service dealer examine the oil pressure sensor and its cable and repair or replace as needed.
524287	No fault present.	▪ No active faults are still present. Reset the control system if needed. See page 61.

Find system fault codes in events history

The system records and saves faults that occur – even those that cause the engine to shut off. You can access the fault details via the system controller's LCD screen when you need that information for troubleshooting.

1. Turn ON (**I**) the power switch.
2. Press the **ENTER** button to display the menu commands on the LCD screen.

   If AUTO mode is enabled on the system controller, press the **OFF** button. Then press the **ENTER** button to display the menu commands.

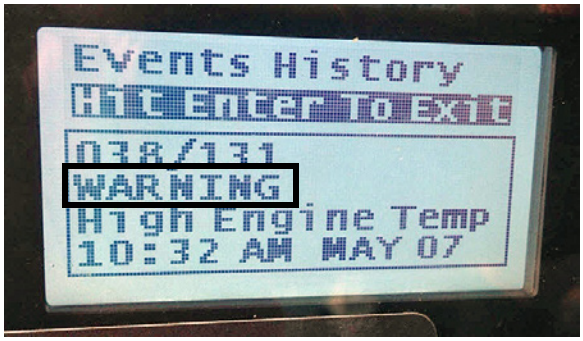


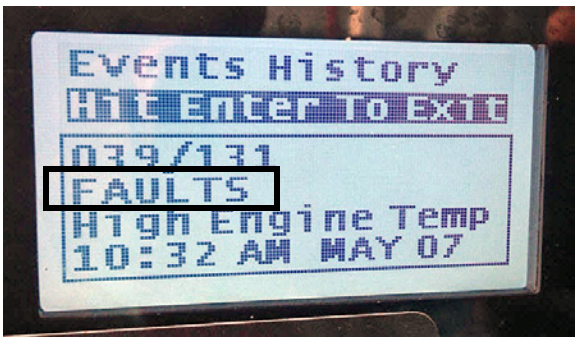
3. Use the arrow buttons to navigate to the **Events History** command.
4. Press the **ENTER** button to display the system's events history, which includes fault notifications. The most recent events are listed first. Use the arrow buttons to scroll through the list.

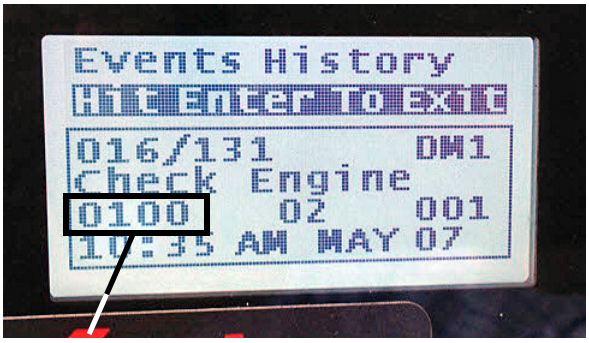
   As shown in *Figure 11*, 2 types of fault notifications display in events history:

   - **WARNING** and **FAULTS** notifications represent predefined operating thresholds that were met or exceeded. See *System faults triggered by predefined thresholds* on page 63.
   - **Check Engine** notifications include an SPN code and are specific to the engine. See *Active faults and cleared faults* on page 62 and *Engine faults (SPN codes)* on page 65.

Figure 11 – Faults recorded in events history







SPN code

Troubleshoot engine issues

Reset emergency air intake shutoff valve (some configurations)

Your system may include an emergency air intake shutoff valve that stops the flow of air to the engine in case of a "runaway engine."

If the air intake shutoff valve was engaged (closed), use the following procedure to reset (open) the valve:

1. Make sure the system is OFF.
2. Remove the service panel on the plasma side of the system.
3. Pull down the black handle at the bottom of the shutoff valve, and hold it in place. Turn the **RESET** switch at the top of the valve 90° counterclockwise. Release the black handle.
4. Put the service panel back in place.

Figure 12 – Air intake shutoff valve CLOSED

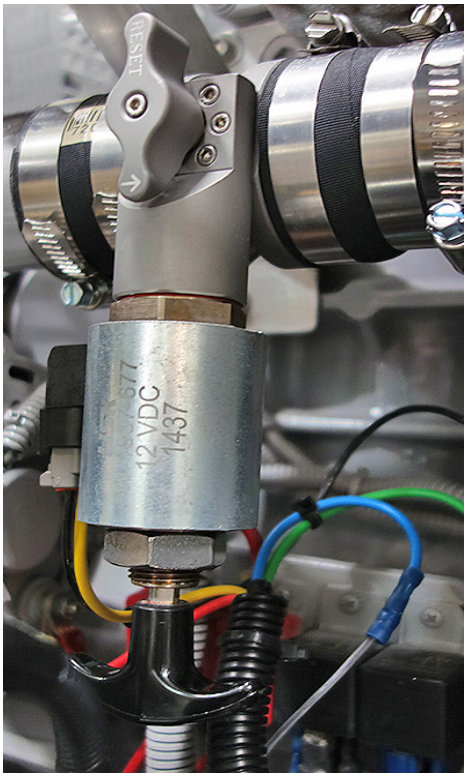
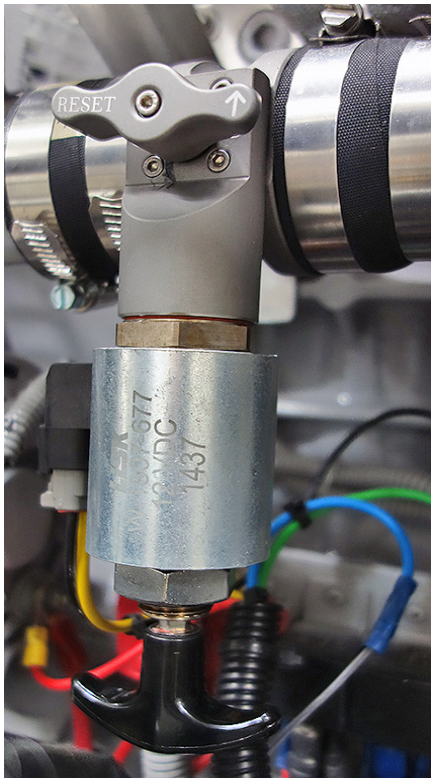


Figure 13 – Air intake shutoff valve OPEN



Engine will not start

By default, the system cranks for 15 seconds, then pauses for 15 seconds before it tries to start the engine again.

If the engine fails to start at the end of a second consecutive 15-second crank cycle:

- The engine stops cranking.
- The “Crank failed” warning notification displays on the LCD screen.

When this fault condition occurs, the control system must be reset. See *Reset the control system* on page 61.

If the engine still will not start, do the following checks in the order listed:

1. Does the engine crank but not start, or does the engine make a clicking sound and not crank at all?
   - ❑ If the engine cranks but does not start, continue with the next step.
   - ❑ If the engine makes a clicking sound and does not crank (and voltage is present), the starter may be faulty. First clean and tighten the connections on the battery, then jump-start the battery. See page 71. If the engine still does not crank, have an authorized Deutz service dealer examine the starter.
2. Are you trying to start the engine in very cold temperatures?
   - ❑ If yes, use winter-grade diesel fuel. Summer-grade fuel can “gel” and clog the fuel filter. Install a new Deutz-brand fuel filter, if needed. See *Change the fuel filter in the engine* on page 110.

     Do not use ether to help start the engine in extremely cold temperatures. Doing so can result in severe damage to the engine.
   - ❑ If no, continue with the next step.
3. Make sure the engine has enough fuel. Add clean, low-sulfur diesel fuel as needed. Do not overfill the fuel tank.

   The “Under Speed” fault notification can indicate that the engine is low on fuel.
4. Does the system controller turn ON?
   - ❑ If yes, continue with the next step.
   - ❑ If no, check the 12 V circuit breaker on the front panel to see if it tripped. Reset the circuit breaker by pressing the extruded **RESET** button in the center of the circuit breaker.

5. Do any fault notifications display on the system controller’s LCD screen?
   - ❑ If yes, clear the fault condition before starting the engine. Some faults cause the engine to shut off (for example, if the engine temperature is too high or the oil pressure is too low). See *System faults* on page 62.
   - ❑ If no, continue with the next step.
6. Check the electrical connectors on the battery. Tighten as needed. See page 106.
7. Does the battery have enough power (12 V) to start the engine?
   - ❑ If yes, continue with the next step.
   - ❑ If no, jump-start or replace the battery. See *Jump-start the battery* on page 71 or *Replace the battery* on page 129.

8. Use the hand pump to vent (or prime) the fuel system. See page 70.
9. Check the fuel filter. If it is clogged or damaged, install a new one. See page 110.
10. Clean the fuel pump screen. See page 112.
11. If none of these steps resolve the issue, have an authorized Deutz service dealer examine the engine.

Keep the fuel system clean

Many common problems with diesel engines are caused by the following fuel-related problems:

- Using the wrong fuel

  Bio-diesel fuel is not recommended for this engine.

- Using poor quality fuel
- Allowing water to enter the fuel line
- Using the wrong fuel filter
- Using a fuel filter for too long without replacing it

To keep the fuel system clean and the engine running properly:

- Use only clean, low-sulfur diesel fuel.
- Keep fuel storage containers clean and free from water and other contaminants.
- Use only Deutz-brand fuel filters.
- Replace the fuel filter regularly. See *Maintenance schedules* on page 91.

Use the hand pump to vent the fuel system

You may have trouble starting the engine if:

- The fuel level in the engine is very low.
- You recently worked on some part of the fuel system.
- The system has not been used for a long period of time.

If you have trouble starting the engine, use the hand pump to vent (or prime) the fuel system.

If you frequently need to vent the fuel system in order to start the engine, this may indicate an air leak in the fuel line. Have an authorized Hypertherm Freedom 38 PPA repair facility examine the fuel supply lines, or have an authorized Deutz service dealer examine the engine.

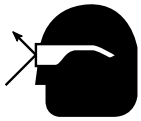
1. Turn OFF the system.
2. Remove the service panel on the generator side of the system.
3. Push in the hand pump several times in quick succession until you feel a strong resistance and until you no longer hear fuel moving through the fuel supply lines.
4. Start the engine, but leave the main circuit breaker and the transformer circuit breaker off. Run the engine without load for 2–3 minutes. This allows air to return to the fuel tank via the return fuel line.
5. Put the service panel back in place.

Hand pump

Jump-start the battery


WARNING!

RISK OF EXPLOSION – WEAR EYE PROTECTION

Always wear eye protection when jump-starting or charging the battery.

When a lead acid battery is charged or discharged, an explosive chemical change occurs. If anything is present that ignites this explosive gas, the explosion can throw sulfuric acid into your eyes, causing blindness.

See *Battery hazards* on page 37 for more information on how to handle batteries safely.


CAUTION!

Follow these precautions when jump-starting or charging the battery.

ALWAYS:

- **Make sure the system and all electrical accessories are OFF before attaching jump-start cables.**
- **Attach the negative (-) ground cable last, and remove it first.**
- **Use ONLY equal voltage for jump-starting. Using higher voltage will damage the electrical system.**

NEVER:

- **Reverse the battery cables. Doing so can damage the alternator.**
- **Remove the vent caps from the battery.**
- **Check the battery by producing sparks between the positive (+) and negative (-) posts.**

This system requires a 12 VDC battery with a capacity of 750 cold cranking amperes (CCA).

If the battery is severely discharged, the alternator may not be able to fully recharge the battery, even after jump-starting. In this case, fully charge the battery to the correct voltage with a battery charger (with the engine turned off), or install a new battery. See *Replace the battery* on page 129.

Always dispose of old batteries in compliance with local and national regulations.

1. Turn OFF the system.
2. Remove the service panel on the plasma side of the system.
3. Connect one positive (+) end of the jump-start cable to the positive (+) cable terminal of the battery in the system. See *Figure 14*. Connect the other positive (+) end of the jump-start cable to the positive (+) cable terminal of the electrical source.

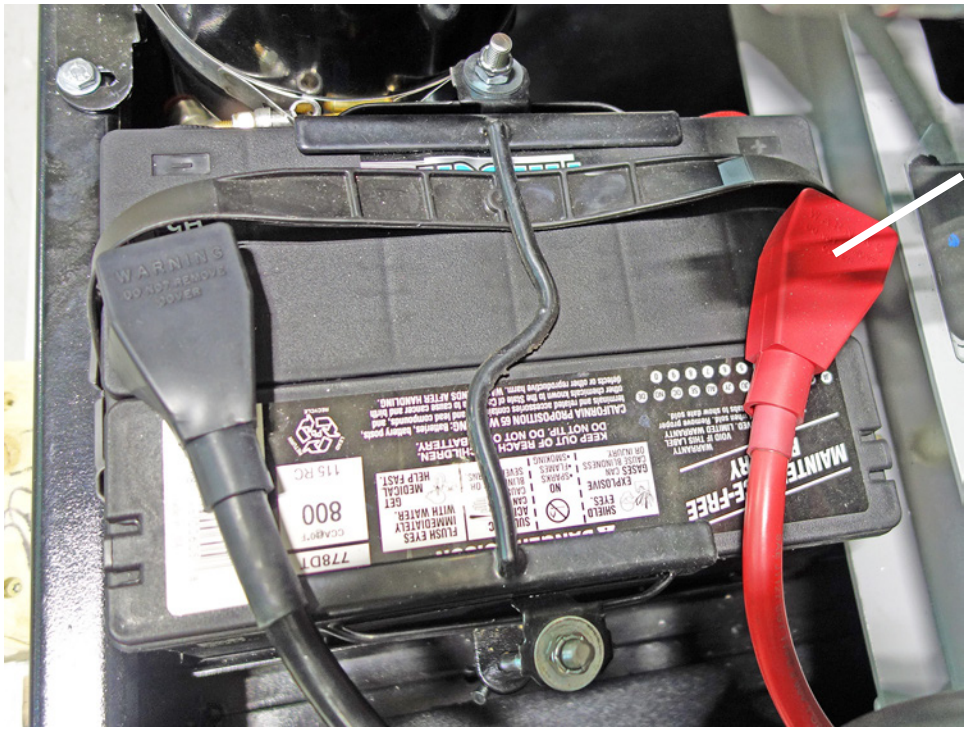
4. Connect one negative (-) end of the jump-start cable to the negative (-) cable terminal of the electrical source. Connect the other negative (-) end of the jump-start cable to the engine block or to the chassis ground.

5. Turn ON the system and start the engine.

6. As soon as the engine starts, disconnect the jump-start cables in the reverse order of that listed in *step 3* and *step 4*. **Make sure the first cable you disconnect is the negative (-) cable connected to the engine block or chassis ground.**

7. Put the service panel back in place.

Figure 14



Common engine and generator issues

Problem	Solutions
The engine emits a lot of black smoke.	▪ Black smoke indicates a fuel-related issue. There is too much fuel in the fuel system or not enough air. ▪ Check the fuel level. Add clean, low-sulfur diesel fuel, if needed. ▪ Use the hand pump to prime the engine. See page 70. ▪ If the problem persists, have an authorized Deutz service dealer examine the engine.
The engine emits blue smoke.	▪ In many cases, blue smoke indicates that the engine is burning oil. This problem can be caused, or made worse, by using the wrong engine oil and oil filter. Change the engine's oil and oil filter. Use only a Deutz-brand filter and Deutz-brand oil or Shell ROTELLA T Triple Protection oil. See page 107. ▪ If the problem persists after changing the oil and filter, have an authorized Deutz service dealer examine the engine.
The fuel filter gets clogged in cold weather.	▪ If the fuel tank contains summer-grade fuel, the cold temperatures can cause some of this fuel to "gel." This thicker fuel can clog the fuel filter. Add winter-grade diesel fuel to the fuel tank, and install a new Deutz-brand fuel filter. See *Change the fuel filter in the engine* on page 110.
When you try to turn on the system, the engine clicks but does not crank. Voltage is present.	▪ Check the connections on the battery. Clean and tighten the connectors as needed. See page 106. ▪ Jump-start or charge the battery. See page 71. ▪ The engine's starter may be faulty. Have an authorized Deutz service dealer examine the starter.
The 120 V auxiliary outlet is not working.	▪ Make sure the transformer circuit breaker on the front panel is turned ON (**I**). See page 51. This switch must be turned on before you can use the 120 V auxiliary outlet. ▪ Test the GFCI protection on the 120 V auxiliary outlet. See page 30. ▪ If the outlet still does not work, it may be faulty. Have an authorized service technician examine the system.
The system controller LCD screen does not display output current (amperage) for the generator.	▪ Make sure the transformer circuit breaker on the front panel is turned ON (**I**). See page 51. This switch must be turned on in order to view the generator's output current on the system controller.

Troubleshoot air flow issues (air compressor)

The air pressure for this system must be between 7 bar – 8 bar (100 psi – 120 psi) to operate the on-board plasma cutting system.

If needed, you can use the plasma cutting system to test whether proper air flow is reaching the torch. See *Run a gas test* on page 84.

If the system's air pressure is too low, if there is no air pressure at all, or if the 0-12 fault code displays on the plasma cutting system's LCD screen, do the following checks in the order listed:

1. Turn off the system. Inspect the consumables in the torch. Are they installed incorrectly?
   - ❑ If yes, remove the consumables, then install them properly. See *Install the consumables in the plasma torch* on page 48.
   - ❑ If no, continue with the next step.
2. Inspect the torch. Are there any signs of damage that might be causing air to leak?
   - ❑ If yes, have an authorized service technician examine the torch and torch lead.
   - ❑ If no, continue with the next step.

     If you have another torch available, you can also connect that to the plasma supply to see if the same problem occurs.
3. Is the valve open that is used to drain condensate from the air tank?
   - ❑ If yes, rotate the lever underneath the front panel to close the valve. See *Drain the condensate from the air tank* on page 99.
   - ❑ If no, continue with the next step.
4. Is the valve open that is used to drain condensate from the air/oil separation tank?
   - ❑ If yes, close the valve underneath the tank. See *Drain the condensate from the air compressor's air/oil separation tank* on page 103.
   - ❑ If no, continue with the next step.
5. Check the oil level in the air compressor. Is the oil level too low?
   - ❑ If yes, add Chicago Pneumatic Rotair Plus synthetic oil to the compressor's air/oil separation tank, as needed. See *Check the oil level in the air compressor* on page 101.
   - ❑ If no, continue with the next step.
6. Check the output from the generator. Plug an external device into the 120 V auxiliary outlet. Make sure the transformer circuit breaker is turned ON (**I**). (See page 51.) Does the device operate properly?
   - ❑ If yes, continue with the next step.
   - ❑ If no, the issue may be power-related. See *Troubleshoot power-related issues (generator/alternator)* on page 76.

7. Is the primary filter in the engine air cleaner clogged or damaged?

- ❑ If the primary filter is clogged or dirty, use moisture-free compressed air to gently clean it. Do not remove the safety filter. See *Service the engine air cleaner* on page 113.

  If the primary filter is damaged, install a new one. If the safety filter is damaged, replace it too; otherwise, do not remove the safety filter. See *Service the engine air cleaner* on page 113.
- ❑ If no, continue with the next step.

In this system, the air compression system is connected to the engine air manifold.

8. Is the air drying filter clogged or damaged?

- ❑ If yes, install a new filter. See *Replace the air drying filter* on page 104.
- ❑ If no, continue with the next step.

9. Is the air compressor's oil separation filter clogged or damaged?

- ❑ If yes, install a new filter. See *Change the oil separation filter in the air compressor* on page 118.
- ❑ If no, continue with the next step.

10. Is the air compressor's oil filter clogged or damaged?

- ❑ If yes, install a new filter. See *Change the oil and oil filter in the air compressor* on page 115.
- ❑ If no, continue with the next step.

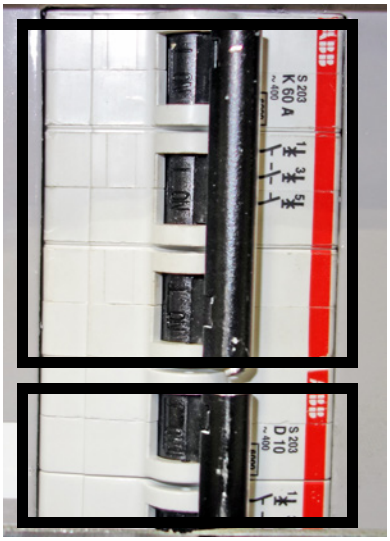
11. Does the 0-12 fault code display on the plasma cutting system's LCD screen?

- ❑ If yes, install a new air filter element in the plasma cutting system. See page 133.
- ❑ If none of these steps resolve the issue, have an authorized service technician examine the air compressor and plasma cutting system.

Troubleshoot power-related issues (generator/alternator)

To troubleshoot possible power-related issues with the generator/alternator, do the following checks in the order listed:

1. Is the engine running, and are the main circuit breaker (top) and the transformer circuit breaker (bottom) turned ON (**I**)?
   - ❑ If yes, continue with the next step.
   - ❑ If no, make sure the main circuit breaker (top) and the transformer circuit breaker (bottom) are turned ON (**I**). If the engine is not running, check the engine to see if it requires maintenance. See *Troubleshoot engine issues* on page 67.
2. Are you using the auxiliary outlets to power external devices?
   - ❑ If yes, disconnect the devices from the auxiliary outlets. You can exceed the generator's output capacity if you power external devices from the auxiliary outlets while running the on-board plasma cutting system at full output.
   - ❑ If no, continue with the next step.



3. Did the main circuit breaker or the transformer circuit breaker trip?
   - ❑ If yes, turn OFF the on-board plasma cutting system by turning OFF (**O**) its power switch. Remove any source of external load from the generator. Reset the main circuit breaker and the transformer circuit breaker. Turn the plasma cutting system back ON (**I**).
   - ❑ If no, continue with the next step.
4. Is the generator providing phase-to-phase voltage of 480 VDC? Use the LCD screen on the system controller to check. See *Check engine and generator status* on page 61.
   - ❑ If yes, continue with the next step.
   - ❑ If no, have an authorized service technician examine the system.
5. Is the generator operating at a speed of 1800 RPM and a frequency of 60 Hz? Use the LCD screen on the system controller to check. See *Check engine and generator status* on page 61.
   - ❑ If yes, continue with the next step.
   - ❑ If no, have an authorized service technician examine the system.

6. Did the circuit breaker for the 120 V auxiliary outlet trip?

- ❑ If yes, reset the circuit breaker by pressing the button above the 120 V outlet.
- ❑ If none of these steps resolves the issue, have an authorized service technician examine the generator/alternator.

The transformer circuit breaker on the front panel must be turned ON (**I**) in order to use the 120 V auxiliary outlet.

Troubleshoot plasma cutting issues

The following table provides an overview of the most common problems that can arise when using the plasma cutting system and explains how to solve them.

Fault icons and corresponding fault codes appear in the LCD screen on the plasma cutting system. See *Plasma cutting system fault codes and solutions* on page 79.

If a fault occurs, turn OFF the system, wait 60 to 70 seconds, and turn ON the system.

If you are unable to fix the problem by following this basic troubleshooting guide, or if you need further assistance:

1. Call your Hypertherm distributor or authorized Hypertherm repair facility.
2. Call the nearest Hypertherm office listed in the front of this manual.

Common cutting issues

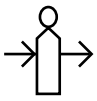
Problem	Solutions
The arc does not transfer to the workpiece.	▪ Clean the area where the ground clamp contacts the workpiece to ensure a good metal-to-metal connection. ▪ Inspect the ground clamp for damage, and repair as necessary. ▪ The pierce-height distance may be too large. Move the torch closer to the workpiece and fire the torch again.
The arc blows out, but re-ignites when the torch trigger is pressed again.	▪ Inspect the consumable parts and replace them if they are worn or damaged. See *Inspect the plasma torch consumables* on page 98. ▪ Replace the air filter element in the back of the plasma supply if it is contaminated. See page 133.
The cut quality is poor.	▪ Make sure the torch is being used correctly. See *Operate the system* on page 47. Refer to the *Hand Cutting* or *Mechanized Cutting* section in the *Powermax125 Operator Manual*. ▪ Inspect the consumables for wear and replace as necessary. See *Inspect the plasma torch consumables* on page 98. ▪ Make sure the cutting mode switch is in the proper position for the cutting operation. ▪ Make sure the correct consumables are installed.

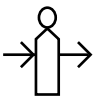
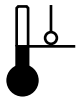
Plasma cutting system fault codes and solutions

The following table provides suggestions for solving several common faults related to plasma power and air flow.

A label with descriptions for these common fault codes can be found inside the front cover of the *Powermax125 Operator Manual*. You can peel off the label and place it on the system's top panel or side panel for reference.

If a fault occurs, turn OFF the system, wait 60 to 70 seconds, and turn ON the system.

Fault code	Description	Power LED	Fault LED	Fault icon	Solutions
0-12	Low input air pressure or unstable air pressure: Warning (the system continues to operate)	On	Off		▪ The air inlet pressure is below the minimum 7 bar (95 psi) required to operate the plasma cutting system. Check the system's air flow components. You may need to install a new air filter element in the plasma cutting system. See *Troubleshoot air flow issues (air compressor)* on page 74.
0-13	AC input unstable: Warning (the system continues to operate)	Blinks (3 Hz)	Off		▪ Check the generator/alternator for possible power-related issues. See *Troubleshoot power-related issues (generator/alternator)* on page 76.
0-19	Power board hardware protection. One or more power board hardware faults (or noise) detected.	On	On		▪ The inverter shuts down and does not fire again for several seconds. If the fault is caused by electrical noise, the fault clears in a few seconds and the machine operates normally. ▪ A true 0-19 fault may display for up to 60 seconds before fault code 0-99 displays on the operator screen. A qualified service technician must service the plasma cutting system. Contact your distributor or authorized repair facility. ▪ 0-19 can indicate a fault that occurs 10 times without removing power. Fault code 0-99 displays. A qualified service technician must service the plasma cutting system. Contact your distributor or authorized repair facility.
0-20	Low air pressure	On	On		▪ Make sure the compressed air hose is connected to the back of the plasma supply. ▪ Adjust the air pressure to the acceptable range using Manual mode. Refer to the *Basic System Operations* section in the *Powermax125 Operator Manual*. Perform a quick restart.

Fault code	Description	Power LED	Fault LED	Fault icon	Solutions
0-21	Excessive arc voltage change: check consumables, air flow	On	On		▪ Restore the air inlet pressure and restart the plasma supply. ▪ Check the torch lead for leaks or kinking. ▪ Change consumables.
0-22	No air input	On	On		▪ Connect the compressed air hose to the back of the plasma supply, then restart the plasma supply.
0-30	Torch consumables stuck This indicates either a “torch stuck open” or a “torch stuck closed” situation.	On	On		▪ If the consumables became loose or were removed while the plasma supply was ON, turn OFF the power, correct the problem and then turn ON the power to clear this fault. ▪ Change consumables. ▪ If the consumables appear to be installed correctly, the torch may be damaged. Contact your Hypertherm distributor or authorized repair facility.
0-32	End of consumable life	On	On		▪ Replace the electrode and nozzle. ▪ Check the remaining consumables for wear and replace as needed.
0-40	Over/under temperature	On	On		▪ Leave the system ON to allow the fan in the plasma supply to cool the plasma supply. ▪ If the internal temperature of the plasma supply approaches -30°C (-22°F), move the system to a warmer location.
0-50	Retaining cap off	On	On		▪ Turn OFF (**O**) the system. Verify that the consumables are installed correctly in the plasma torch. Turn the system back ON (**I**). ▪ If the consumables appear to be installed correctly, the torch may be damaged. Contact your Hypertherm distributor or authorized repair facility.
0-51	Start/trigger signal on at power up This situation indicates that the plasma supply is receiving a start signal. It is sometimes referred to as a “stuck start.”	On	On		▪ If the system is turned on while the torch trigger is pressed, the plasma cutting system is disabled. Release the trigger and recycle the power switch on the back of the plasma supply (or turn the system OFF and then back ON again).

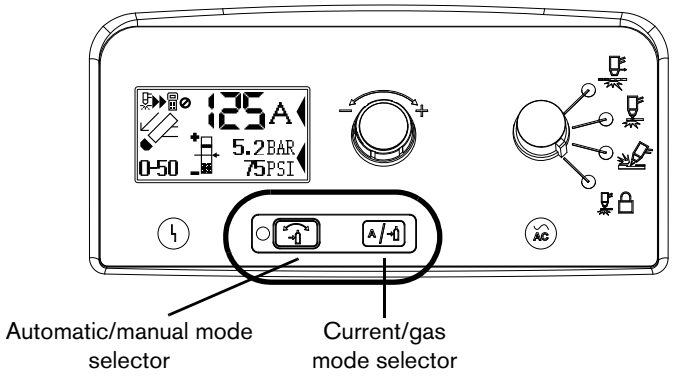
Fault code	Description	Power LED	Fault LED	Fault icon	Solutions
0-52	Torch not connected	On	On		▪ Plug a torch lead into the FastConnect receptacle on the front of the plasma supply and recycle the power switch on the back of the plasma supply.
0-60	AC input voltage error	On	On		▪ This fault code displays when you turn OFF (**O**) the main circuit breaker and the transformer circuit breaker while the engine and generator are running. Wait approximately 1 minute to allow the fault to clear on its own before turning ON (**I**) the main circuit breaker and the transformer circuit breaker and starting to cut again. ▪ If the fault persists, check the generator/alternator for possible power-related issues. See *Troubleshoot power-related issues (generator/alternator)* on page 76.
0-61	AC input unstable: Shutdown	On	On		▪ Check the generator/alternator for possible power-related issues. See *Troubleshoot power-related issues (generator/alternator)* on page 76.
0-99	System hardware fault – service required Indicates a major fault with the system.	On	On		▪ A qualified service technician must service the plasma cutting system. Contact your distributor or authorized repair facility.

Display the service screen on the plasma cutting system

You can view system information that aids troubleshooting by accessing the service screen on the plasma cutting system. This screen displays recent fault codes, arc hours, the software version your system is running, and several additional details. You can also run a gas test from this screen.

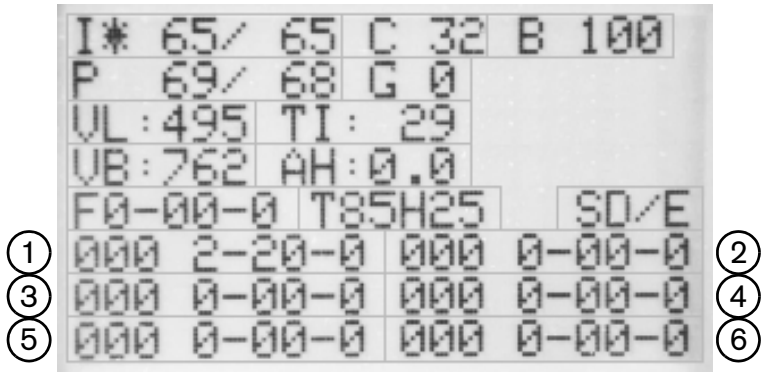
For example, if a fault code displays on the status screen (in the format *N-nn*) while you are operating the system, you can check the service screen for an additional four-digit fault code (in the format *N-nn-n*). If qualified service technicians must service the system, these four-digit fault codes help them diagnose the problem.

To display the service screen, simultaneously press the **automatic/manual** and **current/gas** mode selectors for approximately two seconds.



To navigate the service screen, move the field selector (*) between fields by pressing the **current/gas** mode selector. The asterisk (*) indicates the selected field.

To exit the service screen, simultaneously press the **automatic/manual** and **current/gas** mode selectors. The operator screen displays.



Designator	Description
I	Current set/read
C	LCD contrast
B	LCD brightness (percent)
P	Pressure set/read
G	Gas test enable (1)/disable (0)
VL	Incoming AC line voltage
TI	Inverter module temperature (°C)
VB	DC bus voltage
AH	Arc hours
F	Live four-digit fault code for diagnosing system errors
T	Torch identifier (amperage/hand (H) or machine (M)/lead length in feet)
S	DSP/control board software versions
(callouts 1 – 6)	Fault log of recent fault codes recorded by the system (0-00-0) and the last three digits of the arc hour count when the fault occurred (000).

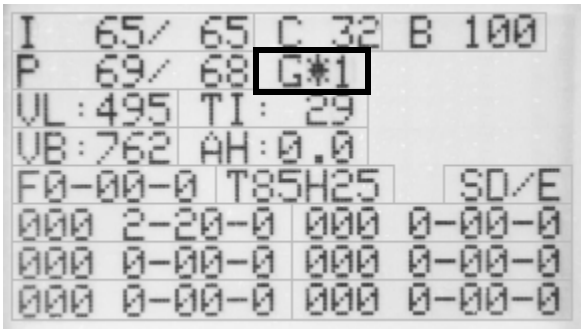
Run a gas test

CAUTION!

Point the torch away from you before performing a gas test. Always keep hands, clothes, and objects clear of the torch tip, and never point the torch toward yourself or others.

1. Display the service screen on the plasma cutting system by simultaneously pressing the **automatic/manual** and **current/gas** mode selectors for approximately two seconds.
2. Select the gas test field by pressing the **current/gas** mode selector until the asterisk (*) is next to the "G."
3. Use the adjustment knob to set the gas test field from 0 to 1.

   If gas does not flow, call your Hypertherm distributor or authorized Hypertherm repair facility, or call the nearest Hypertherm office listed in the front of this manual.



4. Use the adjustment knob to set the gas test field back to 0.
5. Simultaneously press the **automatic/manual** and **current/gas** mode selectors to exit the service screen.

Find serial numbers

The system has its own serial number. Each major component also has its own serial number.

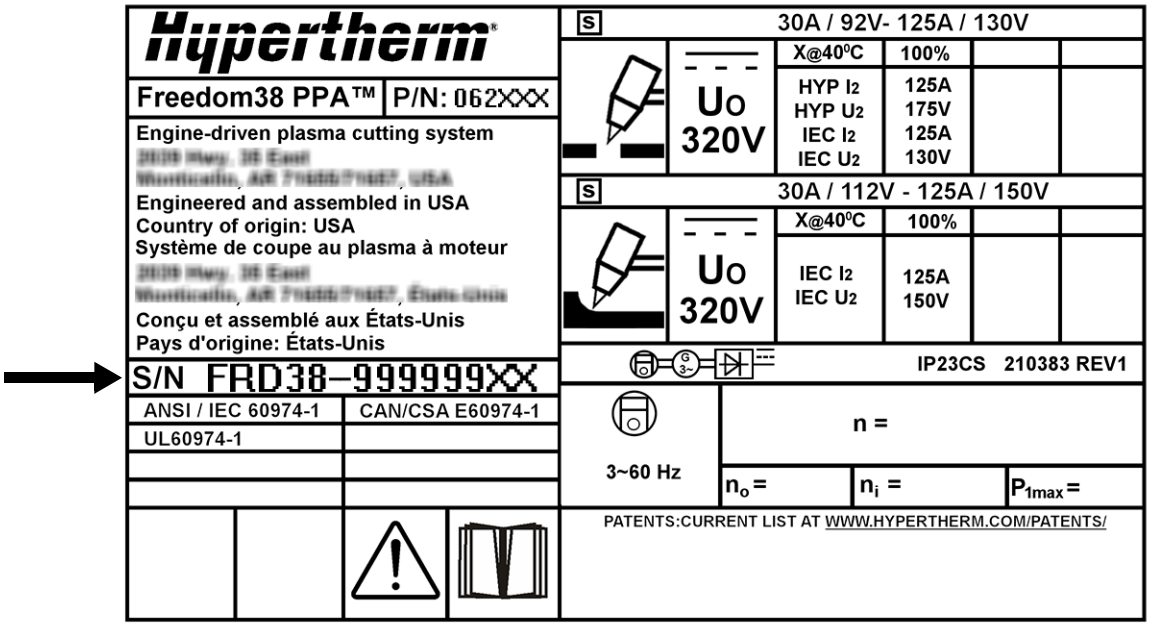
The following topics show where to find each serial number. You may need these numbers if you contact the manufacturers with warranty or support questions.

For instructions on how to remove the cover from the system, see *Remove and install the system's cover* on page 123.

Serial number for the system

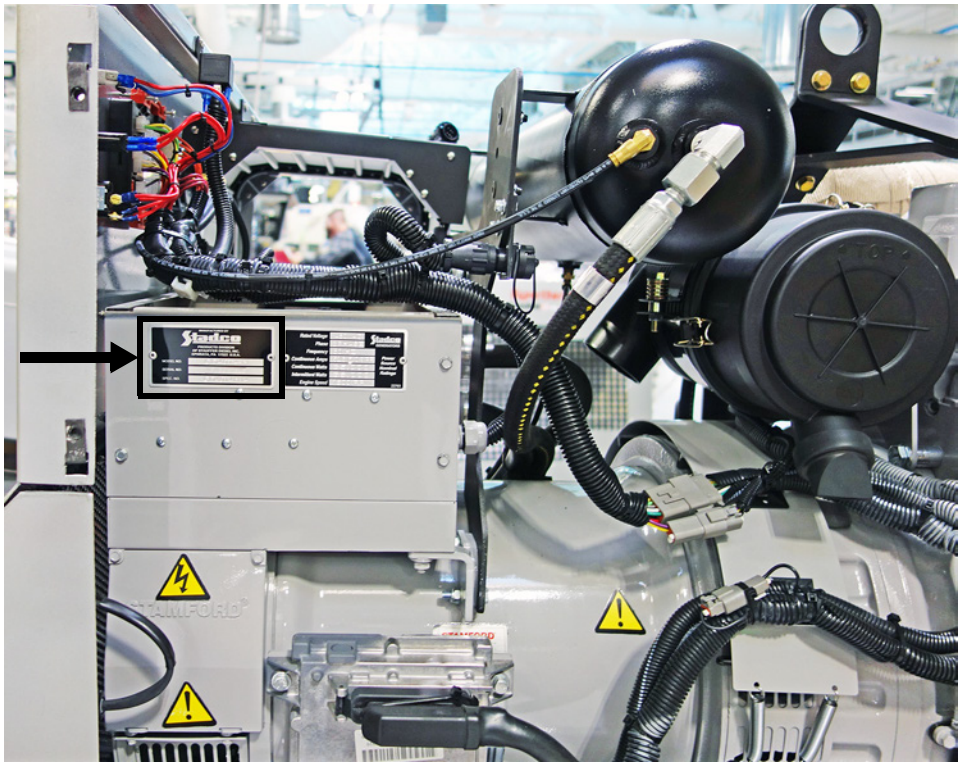
The serial number for the system is located on the system's data plate. The data plate is located in 3 places:

- On the system's front panel
- On the inside of both service panels



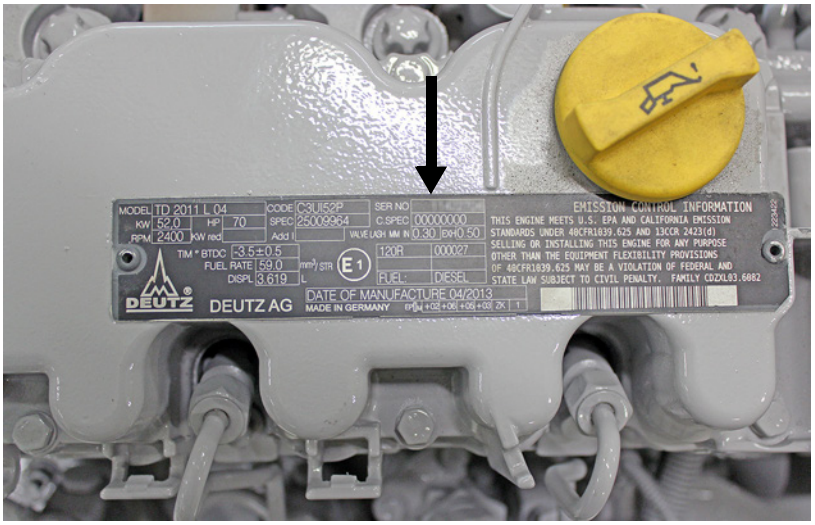
Serial number for the generator

The serial number for the generator is located on the generator near the front panel. You may need to remove the cover on the generator side of the system to see the serial number.



Serial number for the engine

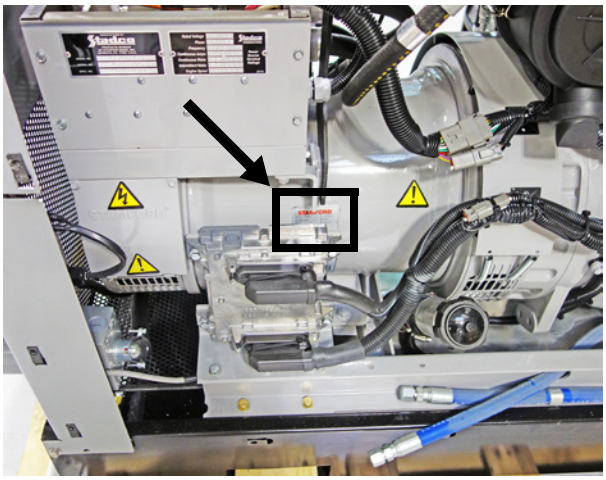
The serial number for the engine is located on top of the engine near the rear panel. Remove the top cover from the system to see the serial number.

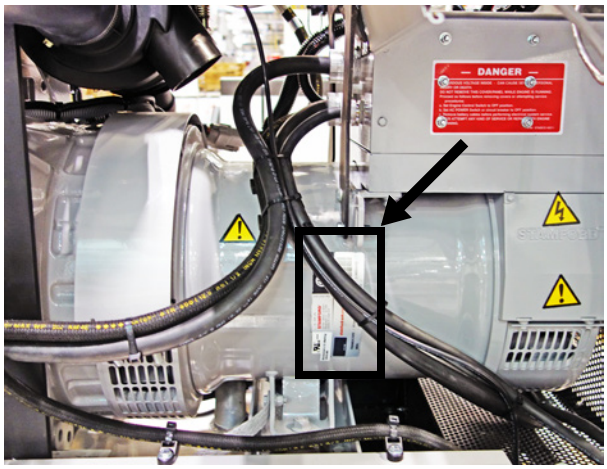


Serial number for the alternator

The serial number for the alternator is located in 2 places:

- On the outer side of the alternator behind the fuel tank fill valve. You may need to remove the cover on the generator side of the system to see this serial number.
- On the inner side of the alternator behind the plasma cutting system. Move the plasma cutting system to see this serial number. You may also need to remove the cover on the plasma side of the system.





Serial number and version numbers for the system controller

When you select the device information command on the system controller's LCD screen, you can see the controller's:

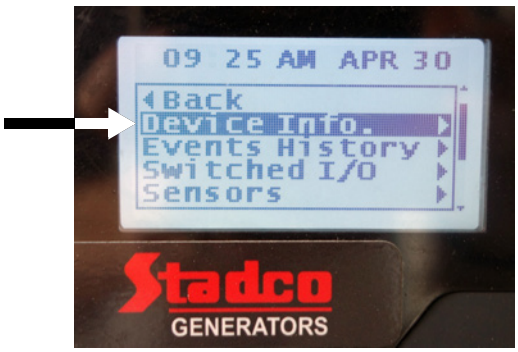
- Serial number
- Hardware version
- Software version

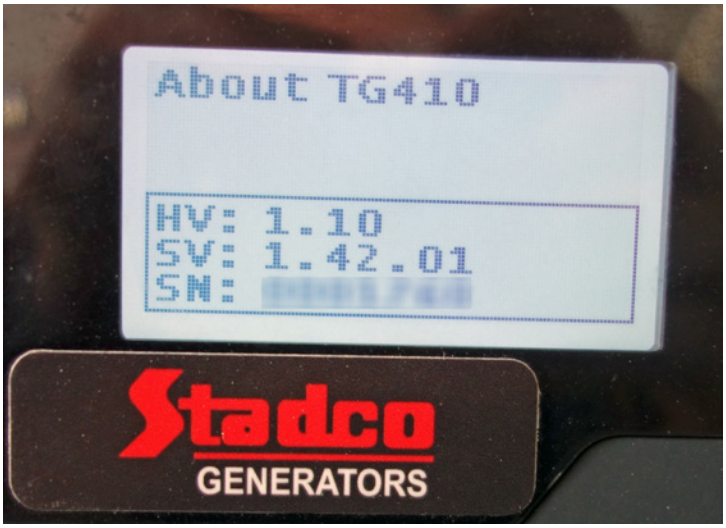
You can also find the serial number on the back of the system controller. Lift up or remove the top panel to see this serial number.

1. Set the power switch to the ON (**I**) position.
2. Press the **ENTER** button to display the menu commands on the LCD screen.

   If AUTO mode is enabled on the system controller, press the **OFF** button. Then press **ENTER** to display the menu commands.

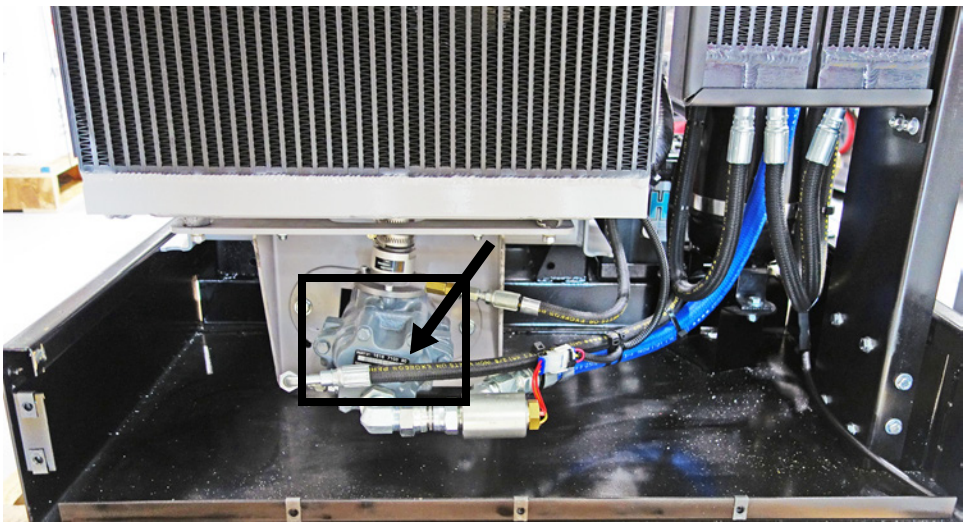
3. Use the arrow buttons to navigate to the **Device Info** command.
4. Press the **ENTER** button to display the system controller's hardware version (HV), software version (SV), and serial number (SN).





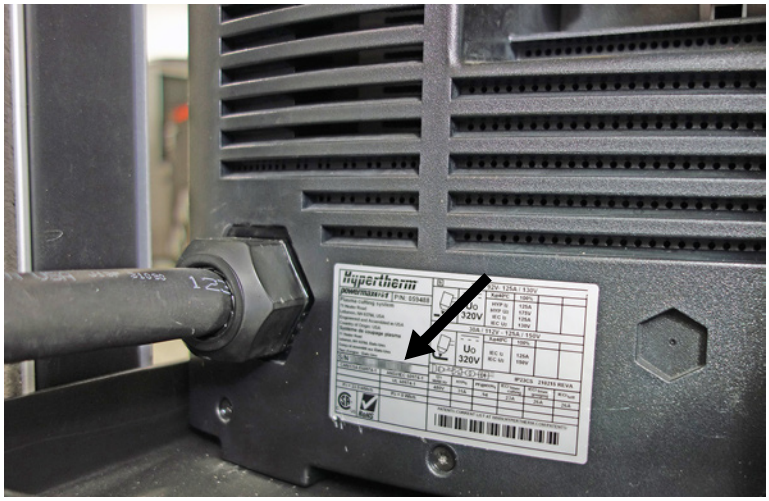
Serial number for the air compressor

The serial number for the air compressor is located on the air compressor at the base of the system behind the rear panel. Remove the rear panel to see the serial number.



Serial number for the plasma cutting system

The serial number for the plasma cutting system is located on the data plate on the system's rear panel, next to its power cord.



Section 5

Routine Maintenance

Maintenance schedules

The maintenance intervals in this section apply for normal system use in normal environmental conditions. Adjust these intervals as needed to match the workload and conditions under which you are operating the system.

For example, clean or replace items more frequently if you operate the system in conditions that are extremely humid, extremely dusty or dirty, or at very high altitudes.

CAUTION!

To ensure safe operation of the system at all times, and to maximize the life of the product, use only replacement parts that are approved by the manufacturers.

CAUTION!

Do not use a pressure washer to clean the outside of the system.

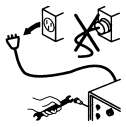
WARNING!

ELECTRIC SHOCK CAN KILL

Turn OFF the power before removing the cover from the system or from the plasma supply. In the U.S., use a "lock-out / tag-out" procedure until the service or maintenance work is complete. In other countries, follow appropriate national or local safety procedures.

Before servicing the engine or generator, turn OFF the system, wait for 30 seconds, then disconnect the battery's negative (-) ground cable.

Do not touch live electrical parts! If power is required for servicing, use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the system that can cause serious injury or death.



Do not attempt to repair printed circuit boards. Do not cut away or remove any protective conformal coating from circuit boards. To do so will risk a short circuit between the AC input circuit and the output circuit and may result in serious injury or death.

HOT PARTS CAN CAUSE SEVERE BURNS

Allow the system's internal components to cool before servicing.

Do not remove the pressure cap from the radiator while the engine is still hot.

MOVING PARTS CAN CAUSE INJURY

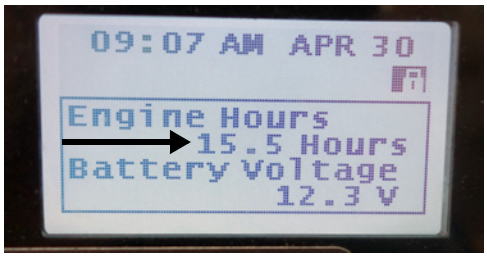
Use extreme caution if you need to work on a running engine.

- **Keep hands, clothing, jewelry, and tools away from moving parts.**
- **Keep your hands away from the engine's fan.**
- **Do not wear loose clothing or jewelry that can catch on moving parts.**
- **Remove safety guards only when necessary. Replace the safety guards as soon as maintenance is complete.**
- **Close the service panels when maintenance is complete. Repair or replace the panels if they are damaged.**

STATIC ELECTRICITY CAN DAMAGE CIRCUIT BOARDS

Put on a grounded wrist strap before handling printed circuit boards.

This system includes a service hour meter. You can view the engine's total operating hours on the system controller's LCD screen. See *Check engine and generator status* on page 61.

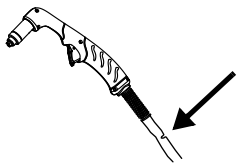
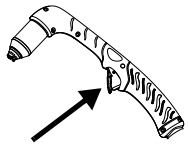
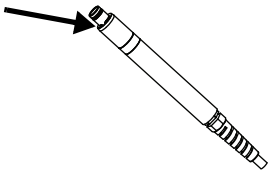


Every use	
System component	**Recommended maintenance**
Engine/generator	❑ Check the system controller for any fault LEDs or notifications. Correct any fault conditions.
Plasma cutting system	❑ Check the plasma supply's front panel for any fault LEDs and its LCD screen for any fault icons. Correct any fault conditions. ❑ Inspect the consumables on the plasma torch for proper installation and wear. See page 98.

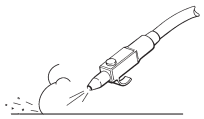
Every day	
System component	**Recommended maintenance**
System	❑ Inspect the system for signs of wear or damage.
Engine/generator	❑ Check the oil level in the engine. See page 100. ❑ Check the fuel level. The percentage of fuel remaining displays on the system controller's LCD screen. See page 61.
Air compressor	❑ Drain condensate from the air tank. See page 99.

Every week	
System component	**Recommended maintenance**
Air compressor	❑ Drain condensate from the air/oil separation tank. See page 103. ❑ Check the oil level in the air compressor. See page 101.

Every month	
System component	**Recommended maintenance**
Engine/generator	❑ Test the GFCI protection on the 120 V auxiliary outlet. See page 30.
Air compressor	❑ Replace the air drying filter. See page 104.

Every 3 months (or 500 operating hours)	
System component	**Recommended maintenance**
Engine/generator	❑ Check the battery and electrical cable connectors. Tighten as needed. Replace any cracked or broken wires. See page 106. ❑ Change the oil and oil filter in the engine. At a minimum, change the oil and filter once per year. See page 107. Use only Deutz-brand engine oil or Shell ROTELLA® T Triple Protection® engine oil. Use only Deutz-brand oil filters.
Air compressor	❑ Adjust the tension of the air compressor belt.*
Plasma cutting system	❑ Inspect the plasma torch lead. Replace if damaged.  ❑ Inspect the plasma torch trigger for damage. Inspect the torch body for cracks and exposed wires. Replace any damaged parts.  ❑ If applicable, inspect the screws on the machine torch that connect the torch body to the mounting sleeve. Tighten the screws, if needed. 

* Hypertherm strongly recommends that only authorized service technicians do this maintenance.

Every 6 months (or 1,000 operating hours)	
System component	**Recommended maintenance**
Engine/generator	❑ Change the fuel filter. See page 110. Use only Deutz-brand fuel filters. ❑ Clean the fuel pump screen. See page 112. ❑ Change the air cleaner filter.* At a minimum, change the primary filter once per year. Change the safety filter once for every 3 primary filter changes. See *Service the engine air cleaner* on page 113. ❑ Adjust the tension of the belt. ❑ Check the air hose clamps and connectors. Tighten as needed. ❑ Check the clearance of the valves. Adjust as needed.† ❑ Check the electrical heater plugs. At a minimum, replace the heater plugs once every 2 years. ❑ Check the mounting hardware and engine mounts. Tighten as needed.
Plasma cutting system	❑ Clean the inside of the plasma supply with moisture-free compressed air or a vacuum. To do this maintenance, remove the plasma supply from the system. See page 125. 

* In very dusty or dirty environments, check the primary filter approximately once every 2 weeks. Use moisture-free compressed air to gently clean the filter, as needed. Do not remove the safety filter unless you are installing a new one.

† Have an authorized Deutz service dealer do this maintenance.

Every year (or 2,000 operating hours)	
System component	**Recommended maintenance**
Engine/generator	❑ Check the fuel tank. ❑ Clean the dust discharge valve. For optimum performance, clean the dust discharge valve any time you service the engine air cleaner. See page 113. ❑ Clean the heat exchanger. ❑ Check the electrical wiring and AC load cables. Tighten as needed. Replace any cracked or broken wires.
Air compressor	❑ Change the oil and the oil filter in the air compressor.* At a minimum, change the oil and filter once per year. Use only Chicago Pneumatic Rotair Plus synthetic oil. See page 115. In very dusty or dirty environments, change the oil more than once per year.

* Hypertherm strongly recommends that only authorized service technicians do this maintenance.

Every 3,000 operating hours	
System component	**Recommended maintenance**
Engine/generator	❑ Change the fuel injector nozzles.* ❑ Make sure the electrical engine protection and monitoring devices are functioning properly.

* Have an authorized Deutz service dealer do this maintenance.

Every 4,000 operating hours	
System component	**Recommended maintenance**
Air compressor	❑ Change the oil separation filter.* See page 118. ❑ Clean the finned surface of the air/oil cooler.*

* Hypertherm strongly recommends that only authorized service technicians do this maintenance.

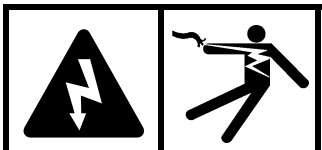
Every 6,000 operating hours	
System component	**Recommended maintenance**
Engine/generator	❑ Change the timing belt.* At a minimum, replace the timing belt once every 5 years.

* Have an authorized Deutz service dealer do this maintenance.

Every 12,000 operating hours	
System component	**Recommended maintenance**
Engine/generator	❑ Overhaul the engine.*

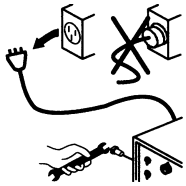
* Have an authorized Deutz service dealer do this maintenance.

Routine maintenance procedures



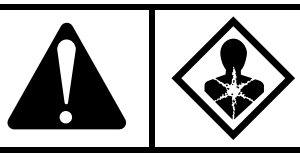
WARNING!

ELECTRIC SHOCK CAN KILL



Disconnect or turn OFF electrical power before doing any maintenance that involves removing the cover from the system or the consumables from the plasma torch.

Read the separate *Safety and Compliance Manual* included with your system for more safety precautions pertaining to plasma cutting.



CAUTION!

FILTERS, FUEL, AND LUBRICATING OILS CAN CAUSE DISCOMFORT

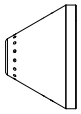
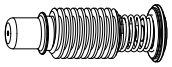
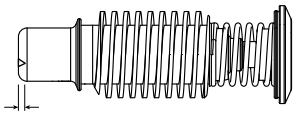
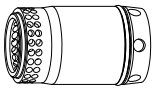
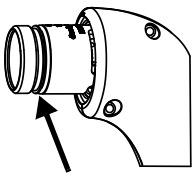
Handle all engine filters, fuel, and lubricating oils with care. Fuel and lubricating oils can irritate skin. Some filters can cause discomfort if they come in contact with the eyes or mouth.

Wash thoroughly if your skin comes in contact with fuel or oil from the engine.

- See *Every use* on page 98.
- See *Every day* on page 99.
- See *Every week* on page 101.
- See *Every month* on page 104.
- See *Every 3 months* on page 106.
- See *Every 6 months* on page 110.
- See *Every year* on page 115.
- See *Every 4,000 operating hours* on page 118.

Every use

Inspect the plasma torch consumables

Part	Inspect	Action
 Shield	The center hole for roundness.	Replace the shield if the hole is no longer round.
	The gap between the shield and the nozzle for accumulated debris.	Remove the shield and clean away any material.
 Nozzle	The center hole for roundness.  Good Worn	Replace nozzle if the center hole is not round.
 Electrode	 Max. 1.6 mm (1/16 inch)	Replace electrode if the surface is worn or the pit depth is greater than 1.6 mm (1/16 inch) deep.
 Swirl ring	The surface inside the swirl ring for damage or wear and the gas holes for blockages.	Replace swirl ring if the surface is damaged or worn or any of the gas holes are blocked.
	The O-ring for damage or wear.	If the O-ring is worn or damaged, replace the swirl ring.
	The length of the swirl ring.	If the length of the swirl ring is less than 32 mm (1.27 inches), replace it.
 Torch O-ring	The surface for damage, wear, or a lack of lubrication.	If the O-ring is dry, lubricate it and the threads with a thin layer of silicone lubricant. If the O-ring is worn or damaged, replace it.

Every day

- *Drain the condensate from the air tank*, below
- *Check the oil level in the engine* on page 100

Drain the condensate from the air tank

CAUTION!

Drain condensate from the compressed air tank to make sure the tank operates safely.

Condensation inside the tank causes corrosion over time and weakens the integrity of the tank walls.

1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. Facing the plasma side of the system, make sure the pressure release opening near the front corner of the base is not obstructed. Air and condensate exit from the air tank through this opening.
3. Facing the front of the system, slowly rotate the lever so that it is facing down. The lever is in the recessed cutout under the generator. See *Figure 15*.
4. When the air draining from the tank is clear, close the valve by rotating the lever towards you until it is parallel with the bottom of the system.

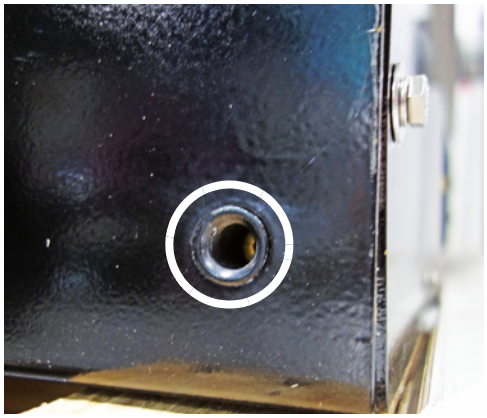
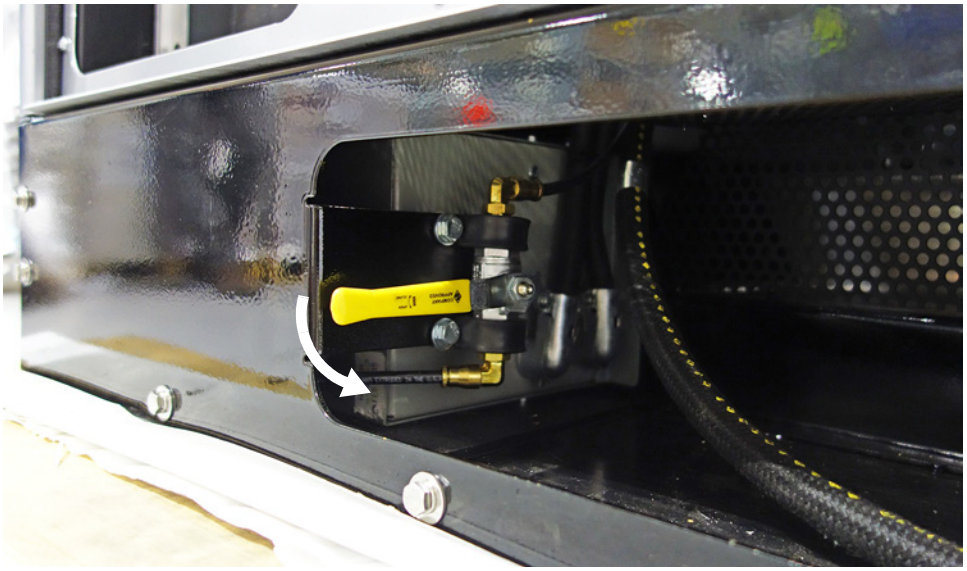


Figure 15



Rotate lever down to drain air tank

Check the oil level in the engine

1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. Wait for 30 seconds, then disconnect the battery's negative (-) ground cable.
3. Leave the system at rest for 2 minutes. This allows the oil to drain back into the oil pan.
4. Remove the service panel on the generator side of the system.
5. Remove the oil dipstick from the engine. See *Figure 16*. Wipe any oil off the dipstick.
6. Fully insert the dipstick back into the engine.
7. Remove the dipstick from the engine. Make sure the oil level is between the low and high marks.
8. Reconnect the negative (-) ground cable to the battery.
9. Put the service panel back in place.

Do not exceed the maximum fill level. For details on how to add oil to the engine, see *Change the oil and oil filter in the engine* on page 107.

Figure 16 – Engine oil dipstick

Every week

- *Check the oil level in the air compressor*, below
- *Drain the condensate from the air compressor's air/oil separation tank* on page 103

Check the oil level in the air compressor

Check the air compressor's oil level only when the system is:

- Turned OFF and any foam in the air/oil separation tank has had time to abate.
- Positioned on level ground, not at an incline.

Figure 17

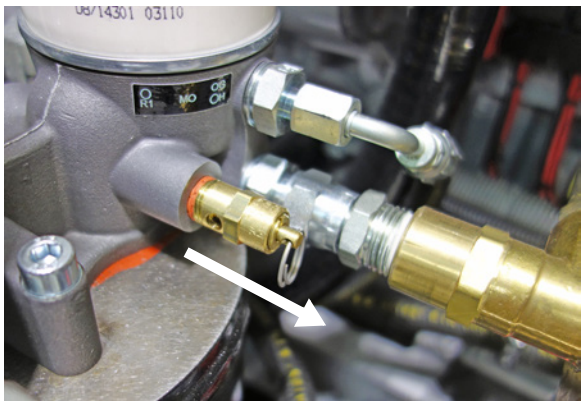
Maximum fill level
(when the system is OFF)

Do not exceed the maximum fill level.

Minimum fill level
(when the system is OFF)

To add oil to the air compressor:

1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. Remove the top panel and the plasma-side panel from the system.
3. Slowly pull the pressure release valve above the air/oil separation tank straight out approximately 5 mm (1/4 inch). Use the ring at the end of the valve. This discharges internal pressure from the air compressor.
4. Drain the air tank to release pressure. See page 99.



5. Unscrew the fill cap from the top of the air/oil separation tank to remove it. See *Figure 18*.

CAUTION!

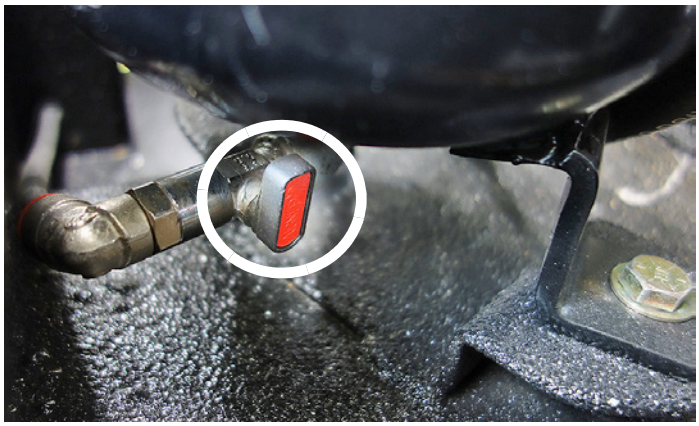
When adding oil to the compressor, always use the same type of oil. Use only synthetic oil. Do not mix different types of oil.

6. Pour new oil into the air/oil separation tank to the recommended fill line:
   - Use only Chicago Pneumatic Rotair Plus synthetic oil.
   - Use a funnel to direct the flow of oil.
   - **Do not exceed the maximum fill level.** See *Figure 17* on page 101.
7. Screw the fill cap back onto the top of the air/oil separation tank.
8. Put the system's panels back in place. See *Install the cover* on page 124.

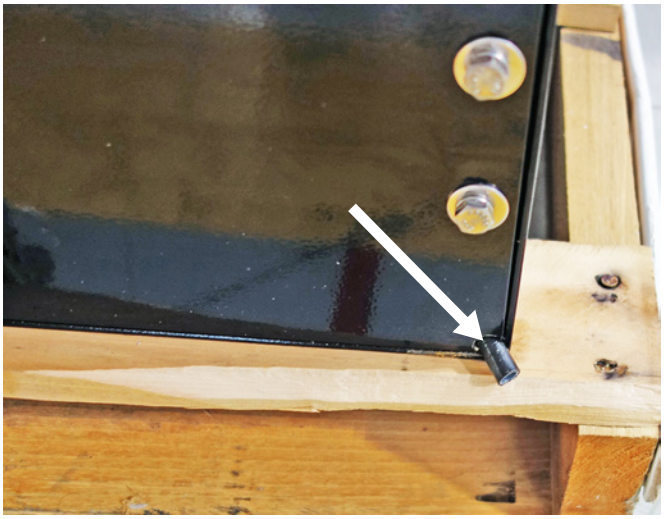
Figure 18

Drain the condensate from the air compressor's air/oil separation tank

1. Make sure the system has been turned OFF for a minimum of 8 consecutive hours.
2. Remove the service panel on the plasma side of the system.
3. Slowly turn the valve on the bottom of the air/oil separation tank to gradually discharge the condensate.



4. When you see the first traces of oil, close the valve. The condensate exits through the small black hose that extrudes from a bottom corner of the rear panel.
5. Dispose of the condensate in compliance with local and national regulations.
6. Put the service panel back in place.



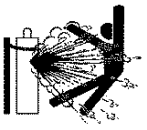
Every month

- *Test the GFCI outlet* on page 30
- *Replace the air drying filter*, below

Replace the air drying filter

WARNING!

RISK OF INJURY – HANDLE COMPRESSED AIR WITH CARE



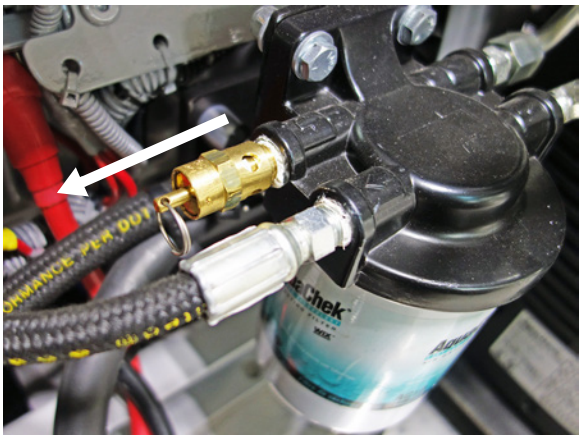
When servicing air compressor components:

- **Discharge internal pressure from the air compressor before performing maintenance on any compressor parts. Trapped air pressure can discharge violently and cause serious injury.**
- **Do not inhale compressed air. Serious injury can result.**
- **If air that was under pressure pierces your skin, seek medical treatment immediately.**
- **Never disable or disconnect any safety mechanisms for the air compressor.**
- **Check all air compressor hoses and connections for leaks and damage before operating the system again.**

CAUTION!

Replace the air drying filter regularly. When the cartridge inside an overused filter begins to deteriorate, small pieces of the cartridge can get into the plasma cutting's system air supply and cause damage to the plasma supply.

1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. Remove the service panel on the plasma side of the system.
3. Slowly pull the pressure release valve above the air drying filter straight out approximately 5 mm (1/4 inch). Use the ring at the end of the valve. This discharges internal pressure from the air compressor.
4. Drain the air tank to release pressure. See page 99.
5. Unscrew the air drying filter to remove it. See *Figure 19*. Dispose of old filters in compliance with local and national regulations.



6. Use a clean, dry cloth to wipe away any dirt or other contaminants from the threads and mounting surface where the new filter will be installed.

7. Lightly apply clean oil to the seal on the new air drying filter.

8. Screw the air drying filter into place. Tighten by hand plus a 3/4 turn.

9. Put the service panel back in place.

Figure 19 – Air drying filter

Every 3 months

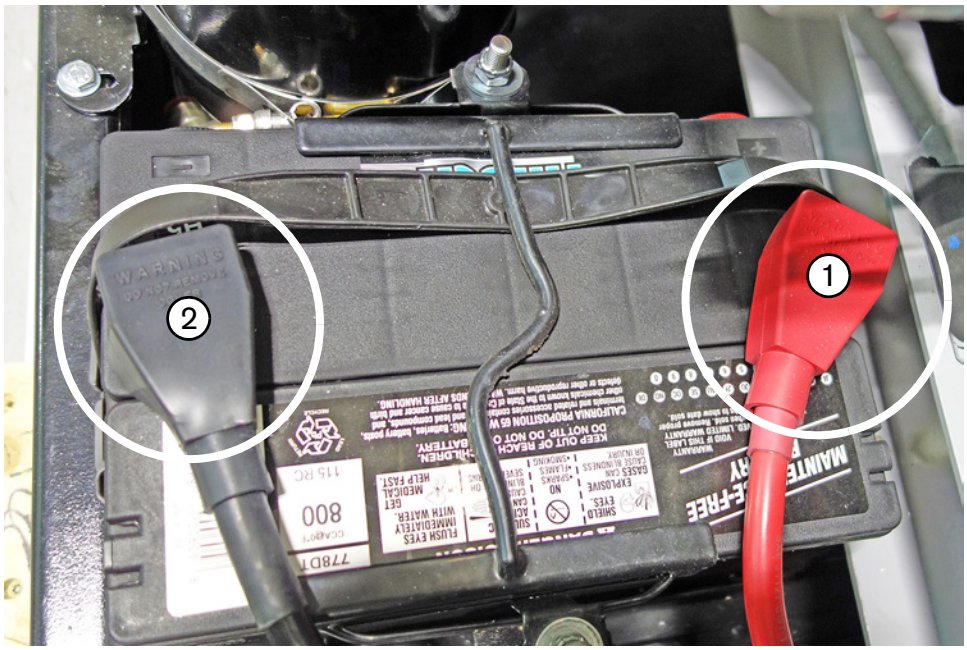
- *Check the battery and cable connectors*, below
- *Change the oil and oil filter in the engine* on page 107

Check the battery and cable connectors

		**WARNING!** **WEAR PROTECTIVE CLOTHING**
		**Turn OFF the engine before performing any battery checks or maintenance.** **Always wear protective glasses and gloves when servicing the battery. Avoid contact with sulfuric acid from the engine's battery. It can cause serious injury if it comes in contact with eyes or skin.** **See *Battery hazards* on page 37 for more information on how to handle batteries safely.**

1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. Remove the service panel on the plasma side of the system.
3. Check the positive (+) ① and negative (-) ② cable connections on the battery. Tighten as needed.
4. Put the service panel back in place.

Figure 20



Change the oil and oil filter in the engine


WARNING!

HOT OIL CAN CAUSE BURNS

Avoid contact with the oil as you drain it from the engine. Engine oil can become very hot and can cause scalding or severe burns if it comes in contact with skin.

CAUTION!

When changing the oil in the engine, always use the same type of oil. Do not mix different types of oil. Use only Deutz-brand oil filters.

This engine is cooled by the lubricating oil, so the oil must be drained from both the oil pan and the heat exchanger.

1. Turn ON the system, and allow it to run for 2–3 minutes to warm the oil in the engine.

   Do not drain the oil when the engine is cold. Waste particles in the oil settle on the bottom of the oil pan when the oil is cold and do not get removed during the oil change.

2. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position. Wait for 30 seconds, then disconnect the battery's negative (-) ground cable.

3. Leave the system at rest for 2 minutes. This allows the oil to drain back into the oil pan.

4. Remove the service panel on the generator side of the system.

5. Place a container underneath the oil filter to catch any oil that spills as you remove the filter. See *Figure 21* on page 109.

   If needed, remove the top panel and the generator-side panel to better access the filter. See *Remove the cover* on page 123.

6. Use a band-type gripping tool to unscrew the oil filter from the engine. Dispose of the old oil and filter in compliance with local and national regulations.

7. Use a clean, dry cloth to wipe away any dirt or other contaminants from the threads and mounting surface where the new filter will be installed.

   Make sure the rubber seal from the old filter did not stick to the mounting surface when you removed the filter.

8. Lightly apply clean oil to the seal on the new oil filter.

9. Screw the new oil filter into place. Tighten to 15–17 N·m (11–12.5 foot·pounds).

10. Remove the oil fill cap. See *Figure 21* on page 109. Clean the cap, and set it aside.

11. Pull one of the drain hoses out from the system, and place a container underneath the end of the hose. See *Figure 21*.

> One hose drains the oil from the oil pan. The other hose drains the oil from the heat exchanger. **The oil pan and heat exchanger must both be drained at every oil change.**

12. Remove the cap from the end of the drain hose to drain the oil into the container.

13. When the oil has drained, put the cap back on the end of the drain hose. Push the hose back inside the system.

14. Pull the other drain hose out from the system, and move the container underneath the end of the hose. Repeat *step 12* and *step 13* to drain the oil from the second hose.

15. Dispose of the old oil in compliance with local and national regulations.

16. Pour new oil into the engine where you removed the oil fill cap in *step 10*. Use only Deutz-brand engine oil or Shell ROTELLA® T Triple Protection® engine oil.

Fill the oil to the “high” mark on the oil dipstick – approximately 14 liters (14.8 quarts). Remove the dipstick as needed to check the oil level. **Do not exceed the maximum fill level.**

17. Put the oil fill cap back in place.

18. Reconnect the negative (-) ground cable to the battery.

19. Turn ON the system. Allow the engine to run for 3–5 minutes to circulate the oil.

20. Turn OFF the system.

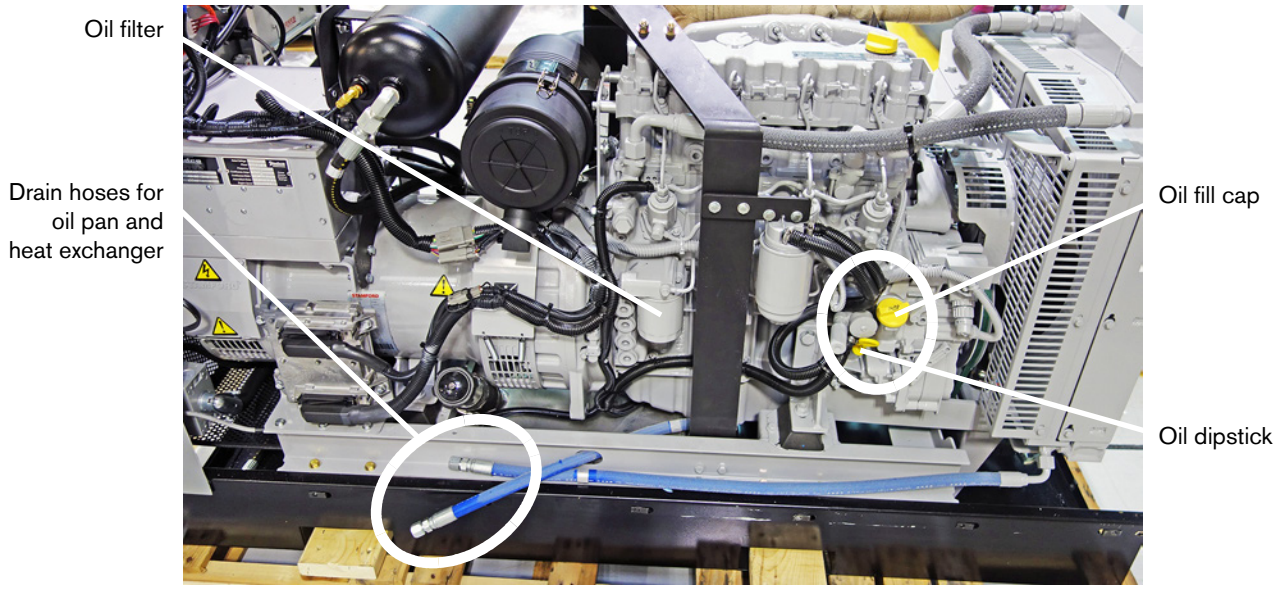
21. Leave the system at rest for 2 minutes to allow the oil to drain back into the oil pan.

22. Remove the dipstick to check the oil level. Add more oil as needed, but do not exceed the maximum fill level.

23. Put the top panel and the generator-side panel back in place, if you removed them. See *Install the cover* on page 124.

24. Put the service panel back in place.

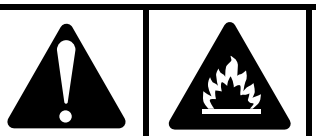
Figure 21


Oil filter
Drain hoses for oil pan and heat exchanger
Oil fill cap
Oil dipstick

Every 6 months

- *Change the fuel filter in the engine*, below
- *Clean the fuel pump screen* on page 112
- *Service the engine air cleaner* on page 113

Change the fuel filter in the engine



WARNING!

RISK OF FIRE OR EXPLOSION

Do not allow any open flames or sparks near the system when working on fuel system components. Do not smoke cigarettes when working on fuel system components. Serious injury can result from fire or explosion.

1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. Wait for 30 seconds, then disconnect the battery's negative (-) ground cable.
3. Remove the service panel on the generator side of the system.
4. Place a container underneath the fuel filter to catch any fuel that spills as you remove the filter. See *Figure 22* on page 111.
5. Use a band-type gripping tool to unscrew the fuel filter from the engine. Dispose of the old fuel and filter in compliance with local and national regulations.
6. Use a clean, dry cloth to wipe away any dirt or other contaminants from the threads and mounting surface where the new filter will be installed.

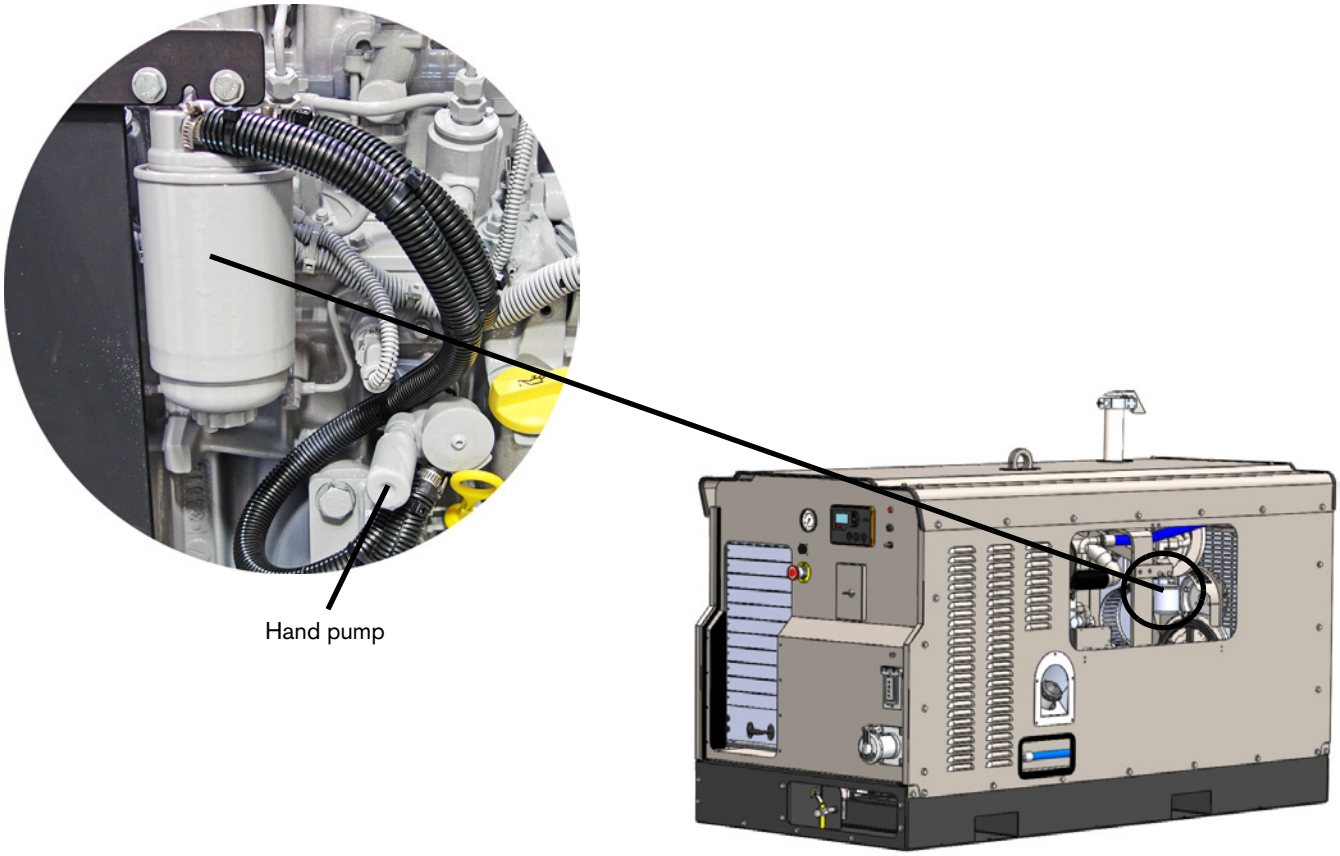
   Make sure the rubber seal from the old filter did not stick to the mounting surface when you removed the filter.

7. Lightly apply clean diesel fuel to the seal on the new fuel filter.
8. Screw the new fuel filter into place on the engine. Tighten to 10–12 N·m (7.4–8.9 foot·pounds).
9. Push in the hand pump several times in quick succession until you feel a strong resistance and until you no longer hear fuel moving through the fuel supply lines. This circulates fuel through the new filter. See *Figure 22*.

   You may need to push in the hand pump as many as 20 times.

10. Reconnect the negative (-) ground cable to the battery.
11. Put the service panel back in place.

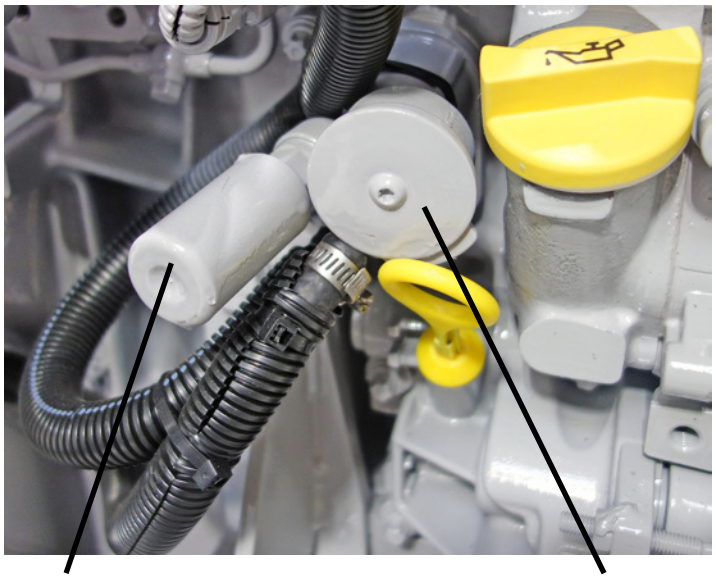
Figure 22 – Engine fuel filter



Clean the fuel pump screen

 	**WARNING!** **RISK OF FIRE OR EXPLOSION**
 	**Do not allow any open flames or sparks near the system when working on fuel system components. Do not smoke cigarettes when working on fuel system components. Serious injury can result from fire or explosion.**

1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. Wait for 30 seconds, then disconnect the battery's negative (-) ground cable.
3. Remove the service panel on the generator side of the system.
4. Place a container underneath the fuel pump screen to catch any fuel that spills as you remove the screen.
5. Remove the cover from the fuel pump screen by removing the screw that holds it in place.
6. Remove the fuel pump screen. Dispose of any spilled fuel in compliance with local and national regulations.
7. Is the fuel pump screen damaged in any way?
   - ❑ If yes, obtain a new fuel pump screen. Continue with the next step.
   - ❑ If no, clean the fuel pump screen and the O-ring with clean diesel fuel. Continue with the next step.
8. Install the fuel pump screen. Make sure the O-ring is positioned correctly.



Hand pump

Cover of fuel pump screen

9. Install the cover to the fuel pump screen. Tighten the screw you removed in *step 5*.
10. Push in the hand pump several times in quick succession until you feel a strong resistance and until you no longer hear fuel moving through the fuel supply lines.
11. Reconnect the negative (-) ground cable to the battery.
12. Put the service panel back in place.
13. Turn ON the system. Make sure there are no fuel leaks.

Service the engine air cleaner

CAUTION!

Replace the air cleaner filters regularly. Never run the engine when the air cleaner filters are missing or damaged. The air cleaner filters prevent airborne debris from entering the air inlet. Dirt or other debris that enters the engine can cause premature wear and damage to engine components that is difficult and expensive to repair.

The engine air cleaner contains 2 filters:

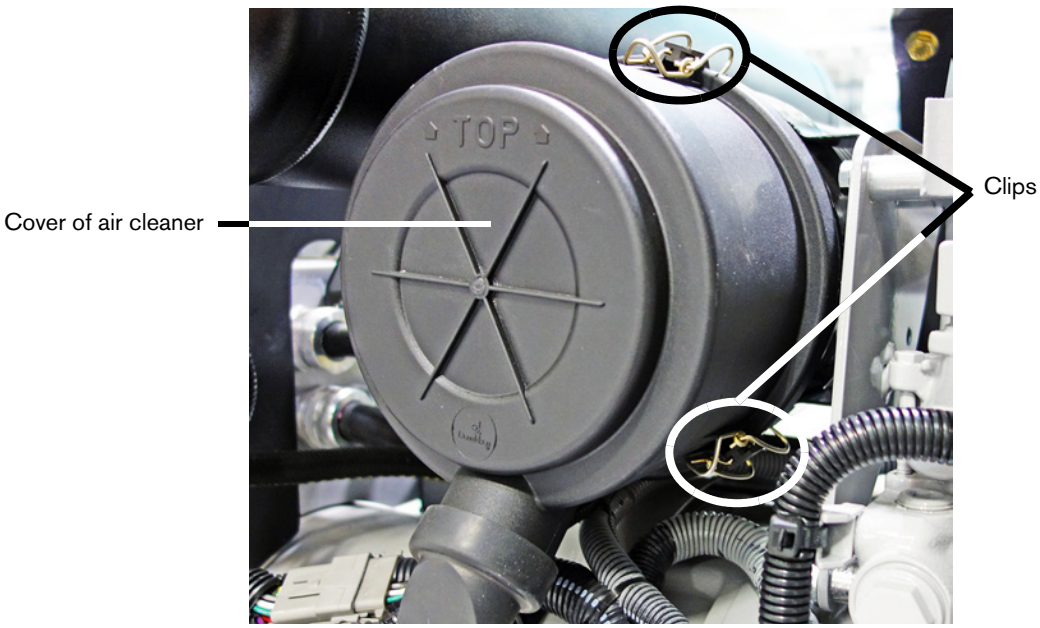
- A **primary filter** that fits over the outlet tube, which creates a critical seal on the inside diameter of the filter endcap
- A **safety filter** that fits inside the outlet tube, which creates a critical seal on the outside diameter of the filter endcap

Replace the safety filter every 3 air cleaner services or every 2 years, whichever interval is less.

In very dusty or dirty environments, check the primary filter approximately once every 2 weeks. Use moisture-free compressed air to gently clean the filter, as needed. Never remove the safety filter except to install a new one.

1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. Wait for 30 seconds, then disconnect the battery's negative (-) ground cable.
3. Remove the service panel on the generator side of the system.
4. Pull back the 3 clips, and remove the cover from the air cleaner. See *Figure 23*.

Figure 23



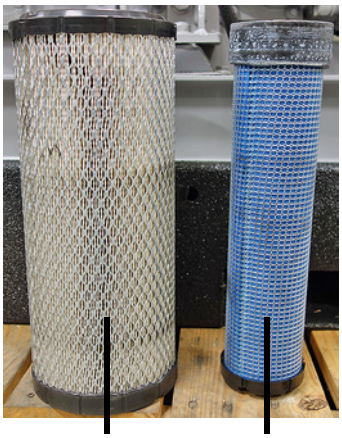
5. Carefully remove the primary filter by gently moving it side-to-side to break the seal.

6. Are you replacing the safety filter?

   - ❑ If yes, carefully remove the safety filter by gently moving it side-to-side to break the seal.
   - ❑ If no, continue with the next step.

7. Use a clean, dry cloth to wipe away any dirt or other contaminants from the sealing surfaces of the outlet tube.

   Do not leave any dirt on the sealing surfaces of the outlet tube because it can prevent a good seal with the new filters or enter the engine.



8. Examine the old filters for signs of damage. For example, a streak of dust on the inside surface of the filter indicates a possible leak. Remove or repair any possible causes of leaks in the air cleaner before installing new filters.

9. Examine the new filters for signs of damage. Do not install damaged filters.

10. Are you installing a new safety filter?

    - ❑ If yes, insert the safety filter into the air cleaner housing. Make sure it sits fully in the housing.
    - ❑ If no, continue with the next step.

11. Insert the new primary filter over the safety filter in the air cleaner housing. Insert the filter by hand, and make sure it sits fully in the housing.

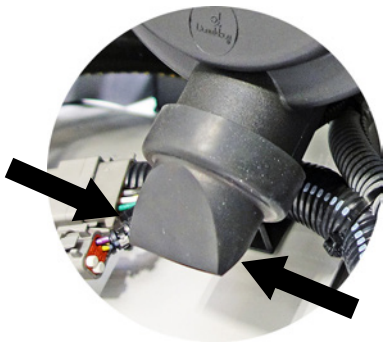
12. Put the cover back on the air cleaner, and hold it in place by folding down the 3 clips.

    The cover should go on easily, with no added force required. If the cover hits the primary filter before it is in place, push the filter further into the housing before putting the cover back on.

13. Empty the air cleaner's dust discharge valve by pinching the discharge slot. After the valve is empty, clean the discharge slot.

14. Reconnect the negative (-) ground cable to the battery.

15. Put the service panel back in place.

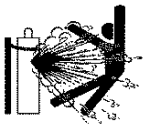


Every year

Change the oil and oil filter in the air compressor

WARNING!

RISK OF INJURY – HANDLE COMPRESSED AIR WITH CARE



THIS PROCEDURE MUST BE PERFORMED ONLY BY EXPERIENCED SERVICE TECHNICIANS.

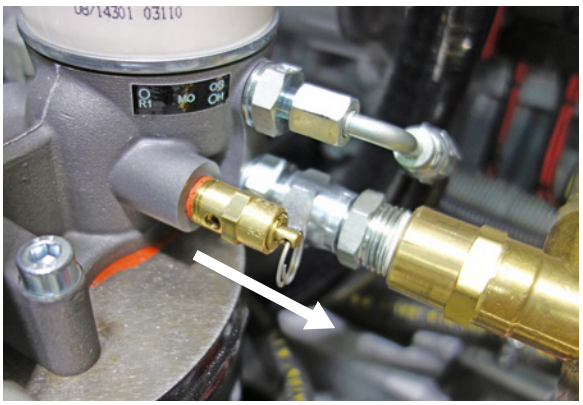
When servicing air compressor components:

- **Discharge internal pressure from the air compressor before performing maintenance on any compressor parts. Trapped air pressure can discharge violently and cause serious injury.**
- **Do not inhale compressed air. Serious injury can result.**
- **If air that was under pressure pierces your skin, seek medical treatment immediately.**
- **Never disable or disconnect any safety mechanisms for the air compressor.**
- **Check all air compressor hoses and connections for leaks and damage before operating the system again.**

CAUTION!

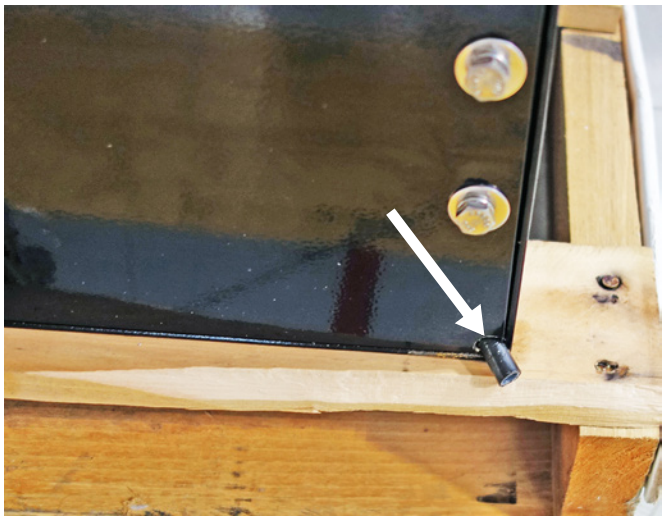
When changing the oil in the compressor, always use the same type of oil. Use only synthetic oil. Do not mix different types of oil.

1. **Discharge internal pressure from the air compressor:**
   - **a.** Turn ON the system, and allow it to run for 2–3 minutes. This warms the oil in the air compressor.
   - **b.** Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
   - **c.** Slowly pull the pressure release valve above the air/oil separation tank straight out approximately 5 mm (1/4 inch). Use the ring at the end of the valve. This discharges internal pressure from the air compressor.
   - **d.** Drain the air tank to release pressure. See page 99.



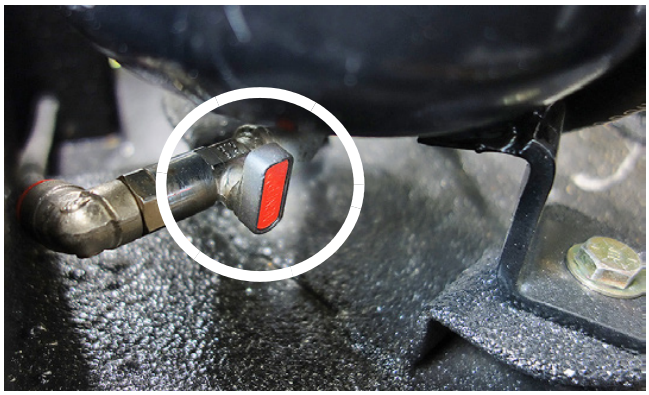
2. **Drain the oil from the air/oil separation tank:**

   a. Place a container under the small black hose that extrudes from a bottom corner of the rear panel. The oil drains through this hose. You may need to reposition the system to catch the oil as it exits the drain hose.



   b. Slowly turn the valve on the bottom of the air/oil separation tank. Condensate may discharge from the tank before the oil starts to drain.

   c. After the oil drains from the tank, close the valve. Dispose of the old oil in compliance with local and national regulations.



3. **Replace the oil filter:**
   - **a.** Unscrew the oil filter ① to remove it. See *Figure 24*. Dispose of the old filter in compliance with local and national regulations.
   - **b.** Lightly apply clean oil to the seal on the new oil filter.
   - **c.** Screw the oil filter into place. Tighten by hand.
4. **Add new synthetic oil to the air/oil separation tank:**
   - **a.** Unscrew the fill cap ② from the top of the air/oil separation tank ③ to remove it. See *Figure 24*. Set the fill cap and its washer aside.

     If needed, remove the top panel and the plasma-side panel to better access the tank. See *Remove the cover* on page 123.

   - **b.** Pour new oil into the air/oil separation tank to the recommended fill line:
     - Use only Chicago Pneumatic Rotair Plus synthetic oil.
     - Use a funnel to direct the flow of oil.
     - **Do not exceed the maximum fill level.** See *Check the oil level in the air compressor* on page 101.
   - **c.** Screw the fill cap and its washer back onto the top of the air/oil separation tank.
   - **d.** Put the top panel and the plasma-side panel back in place, if you removed them. See *Install the cover* on page 124.
   - **e.** Turn ON the system, and allow it to run for 1 minute.

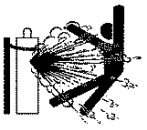
Figure 24 – Air compressor's oil filter and air/oil separation tank

Every 4,000 operating hours

Change the oil separation filter in the air compressor


WARNING!

RISK OF INJURY – HANDLE COMPRESSED AIR WITH CARE



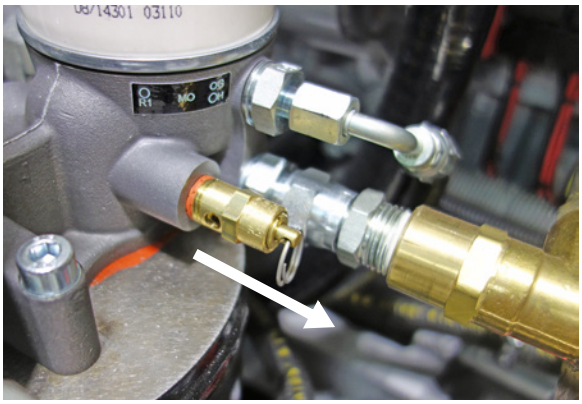
When servicing air compressor components:

- **Discharge internal pressure from the air compressor before performing maintenance on any compressor parts. Trapped air pressure can discharge violently and cause serious injury.**
- **Do not inhale compressed air. Serious injury can result.**
- **If air that was under pressure pierces your skin, seek medical treatment immediately.**
- **Never disable or disconnect any safety mechanisms for the air compressor.**
- **Check all air compressor hoses and connections for leaks and damage before operating the system again.**

CAUTION!

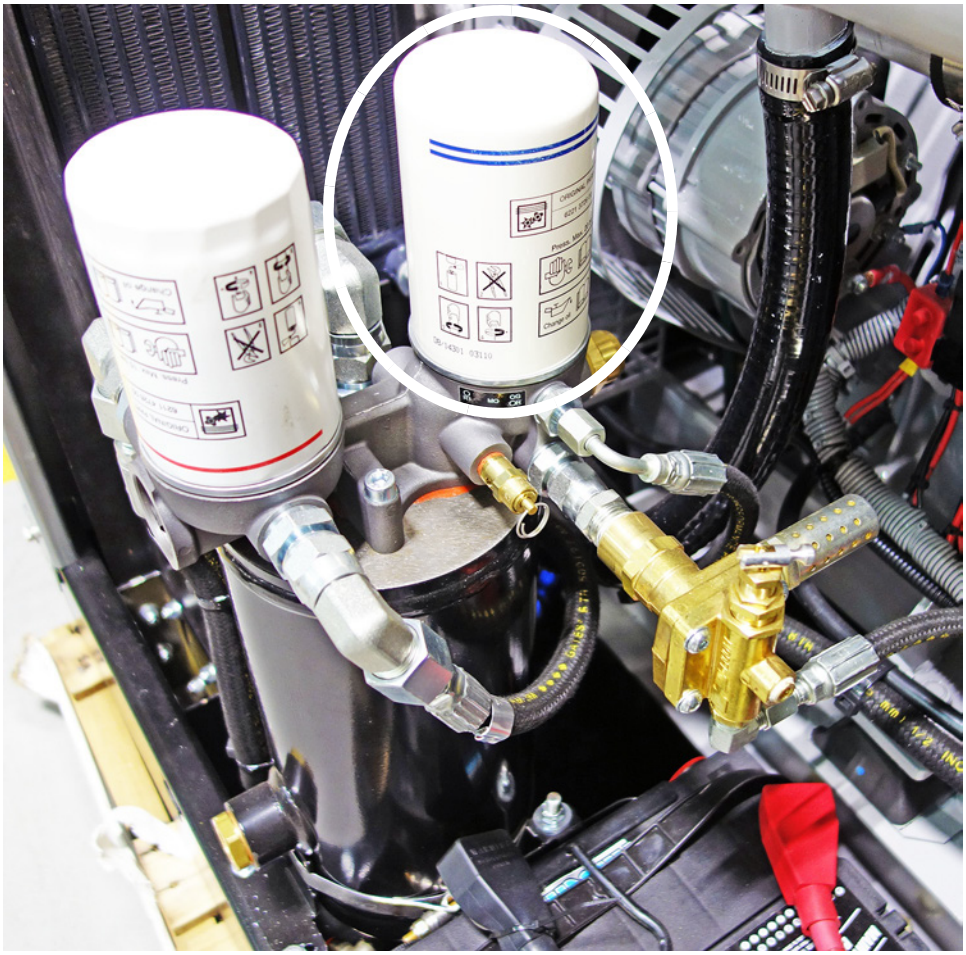
When changing the oil in the compressor, always use the same type of oil. Use only synthetic oil. Do not mix different types of oil.

1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. Remove the service panel on the plasma side of the system.
3. Slowly pull the pressure release valve above the air/oil separation tank straight out approximately 5 mm (1/4 inch). Use the ring at the end of the valve. This discharges internal pressure from the air compressor.
4. Drain the air tank to release pressure. See page 99.
5. Unscrew the oil separation filter to remove it. See *Figure 25*. Dispose of old oil and filters in compliance with local and national regulations.



6. Lightly apply clean oil to the seal on the new oil separation filter.
7. Screw the oil separation filter into place. Tighten by hand.
8. Put the service panel back in place.

Figure 25 – Air compressor's oil separation filter



Section 6

Component Replacement Procedures

The procedures in this section explain how to replace several internal components. The procedures are organized by primary system component:

CAUTION!

To ensure safe operation of the system at all times, and to maximize the life of the product, use only replacement parts that are approved by the manufacturers.

CAUTION!

FILTERS, FUEL, AND LUBRICATING OILS CAN CAUSE DISCOMFORT

Handle all engine filters, fuel, and lubricating oils with care. Fuel and lubricating oils can irritate skin. Some filters can cause discomfort if they come in contact with the eyes or mouth.

Wash thoroughly if your skin comes in contact with fuel or oil from the engine.

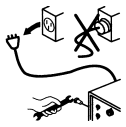
WARNING!

ELECTRIC SHOCK CAN KILL

Turn OFF the power before removing the cover from the system or from the plasma supply. In the U.S., use a "lock-out / tag-out" procedure until the service or maintenance work is complete. In other countries, follow appropriate national or local safety procedures.

Before servicing the engine or generator, turn OFF the system, wait for 30 seconds, then disconnect the battery's negative (-) ground cable.

Do not touch live electrical parts! If power is required for servicing, use extreme caution when working near live electrical circuits. Dangerous voltages exist inside the system that can cause serious injury or death.



Do not attempt to repair printed circuit boards. Do not cut away or remove any protective conformal coating from circuit boards. To do so will risk a short circuit between the AC input circuit and the output circuit and may result in serious injury or death.

HOT PARTS CAN CAUSE SEVERE BURNS

Allow the system's internal components to cool before servicing.

Do not remove the pressure cap from the radiator while the engine is still hot.

MOVING PARTS CAN CAUSE INJURY

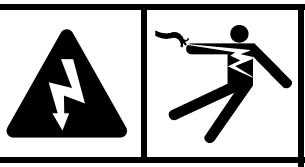
Use extreme caution if you need to work on a running engine.

- **Keep hands, clothing, jewelry, and tools away from moving parts.**
- **Keep your hands away from the engine's fan.**
- **Do not wear loose clothing or jewelry that can catch on moving parts.**
- **Remove safety guards only when necessary. Replace the safety guards as soon as maintenance is complete.**
- **Close the service panels when maintenance is complete. Repair or replace the panels if they are damaged.**

STATIC ELECTRICITY CAN DAMAGE CIRCUIT BOARDS

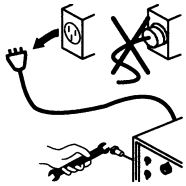
Put on a grounded wrist strap before handling printed circuit boards.

System-level components



WARNING!

ELECTRIC SHOCK CAN KILL



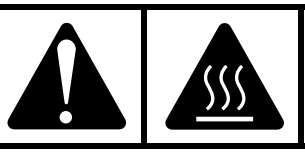
Disconnect or turn OFF electrical power before performing any maintenance that involves removing the cover from the system or the consumables from the plasma torch.

Read the separate *Safety and Compliance Manual* (80669C) included with your system for more safety precautions pertaining to plasma cutting.

- *Remove and install the system's cover*, below
- *Remove and replace the plasma supply* on page 125
- *Replace the battery* on page 129

Remove and install the system's cover

Remove the cover

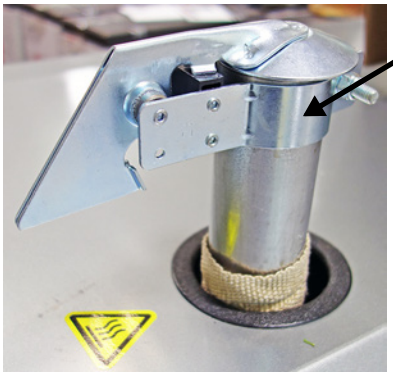


WARNING!

RISK OF SEVERE BURNS

Allow the exhaust pipe and top panel to cool before starting this procedure. This area gets extremely hot when the engine is running.

1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. When the exhaust pipe on the top of the system is cool enough to touch, remove the cap from the exhaust pipe.
3. Remove both service panels.
4. Remove the top panel. Make sure you lift it above the exhaust pipe. Carefully set aside the panel and all of its screws and washers.



5. Remove the screws and washers from any other panels you need to remove.

   You may need to remove the fuel fill cap in order to remove the generator-side panel. If you do, be sure to put the cap back in place as soon as the panel is removed.

   You must remove both side panels before you can remove the rear panel.

CAUTION!

Do not remove the front panel unless absolutely necessary.

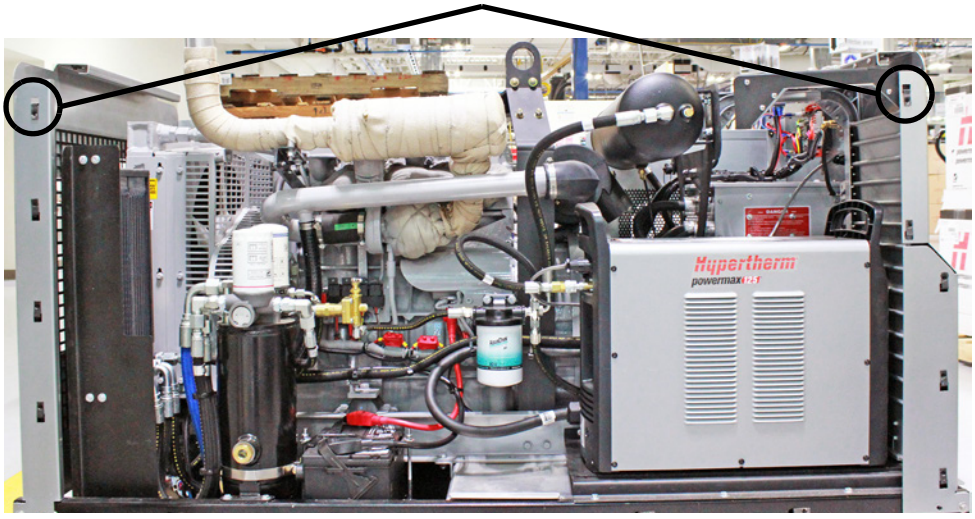
All of the front panel controls must be disconnected before the front panel can be removed.

Install the cover

1. Before you put the panels back in place, clean off any dirt or debris to avoid introducing any contaminants into the engine compartment.
2. If you removed the rear panel, put it back in place first. Install all screws and washers by hand, then tighten.
3. Set the side panel in place. The bottom corners of the panel should sit on the corners of the base boards.
4. Install the screws and washers by hand, then tighten. Do **not** install screws in the top-most slots at each corner – these slots are used to install the top panel. See *Figure 26*.

Figure 26

Do **not** install screws in the top-most slots until you install the top cover.



5. Repeat *step 3* and *step 4* to install the other side panel, if you removed it.
6. Make sure the fuel fill cap is in place, if you removed it earlier.

7. Set the top panel in place. Install the screws and washers by hand, then tighten.
8. Put both service panels back in place.
9. Install the cap on top of the exhaust pipe.

CAUTION!

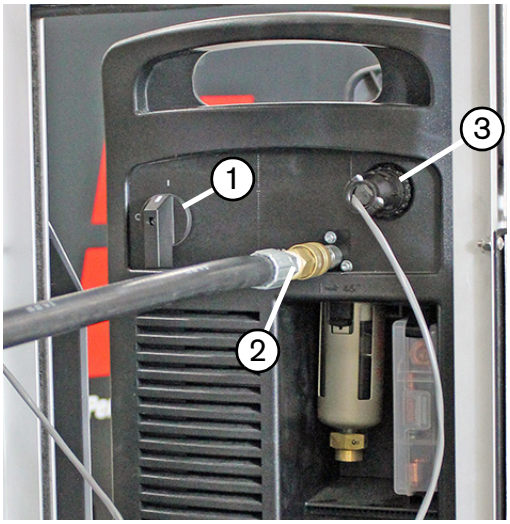
The cap must be put back in place on the exhaust pipe. If it is left off, water, debris, and other contaminants can enter the pipe and cause severe damage to the engine.

Remove and replace the plasma supply

The plasma supply's power cord is wired directly to the system.

Disconnect and remove the plasma supply

1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. Wait for 30 seconds, then disconnect the battery's negative (-) ground cable.
3. Remove the top panel and the plasma-side panel from the system. See *Remove the cover* on page 123.
4. Set the power switch ① on the back of the plasma supply to OFF (**O**).
5. Disconnect the compressed air hose ②.
6. Disconnect the machine interface (CPC) connector ③.



7. Remove the cover from the top of the electrical box that sits on top of the generator/alternator.

8. Disconnect the power cord's green ground wire ④. See *Figure 27*.

9. Disconnect the power cord's black, red, and white wires ⑤.

10. Loosen the top-most strain relief at the back of the electrical box. Slowly pull the power cord's wires through the strain relief.

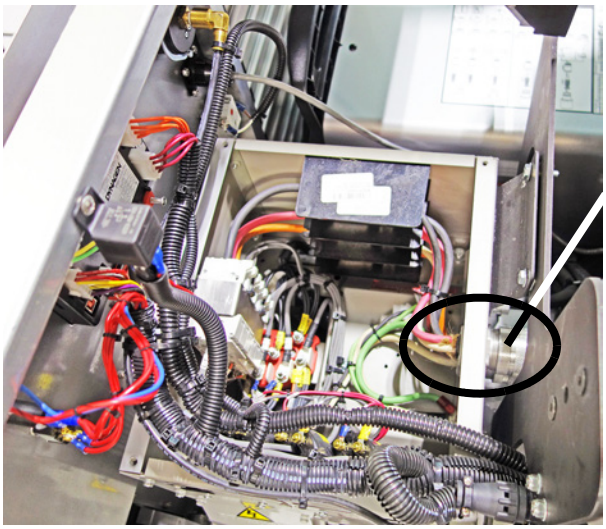
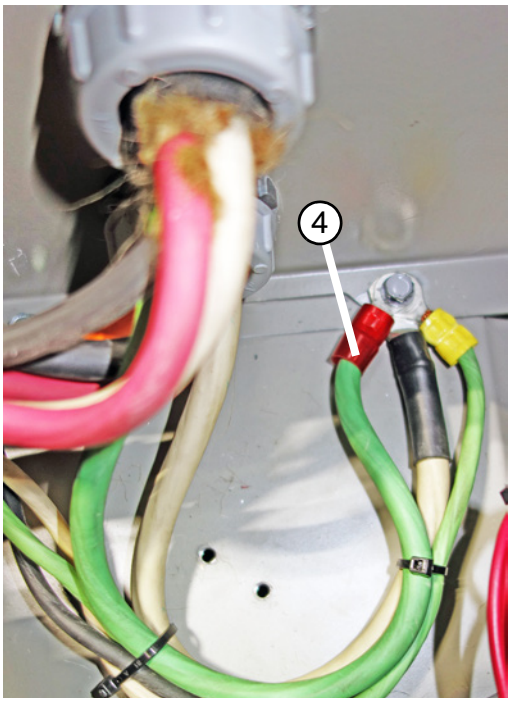
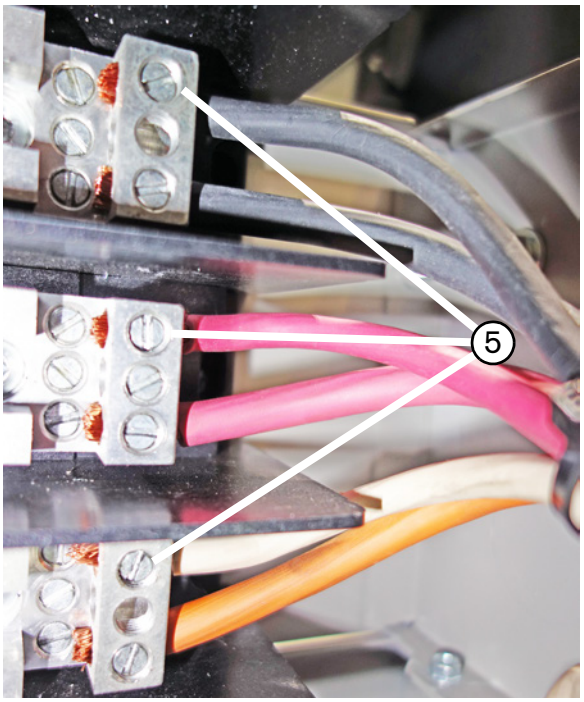


Figure 27





11. Carefully free the plasma supply from the tray it sits on. Grip the handles at the top of the front and rear panels, and lift the plasma supply up and out of the system. Set down the plasma supply on a clean, dry surface.

Place the plasma supply back in the system

1. Make sure the system is OFF.
2. Make sure the power switch on the back of the plasma supply is set to OFF (**O**).
3. Set the plasma supply on the tray inside the system, and carefully secure it to the tray. Make sure the plasma supply cannot be tilted or lifted off the tray.
4. Route the plasma supply's power cord wires through the top-most strain relief in the back of the electrical box ①.
5. Connect the green ground wire to the base of the electrical box ②. Make sure you also reconnect the other 2 wires. See *Figure 28*.
6. Connect the black, red, and white power cord wires as shown in *Figure 28*.
7. Tighten the strain relief.
8. Put the cover back in place on top of the electrical box.

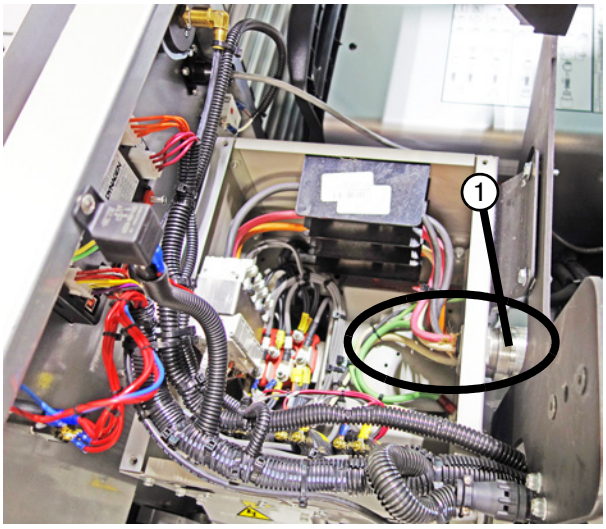
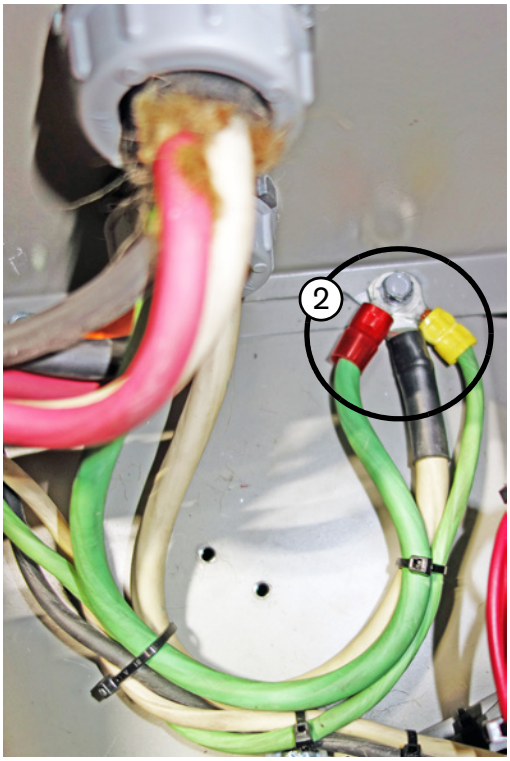
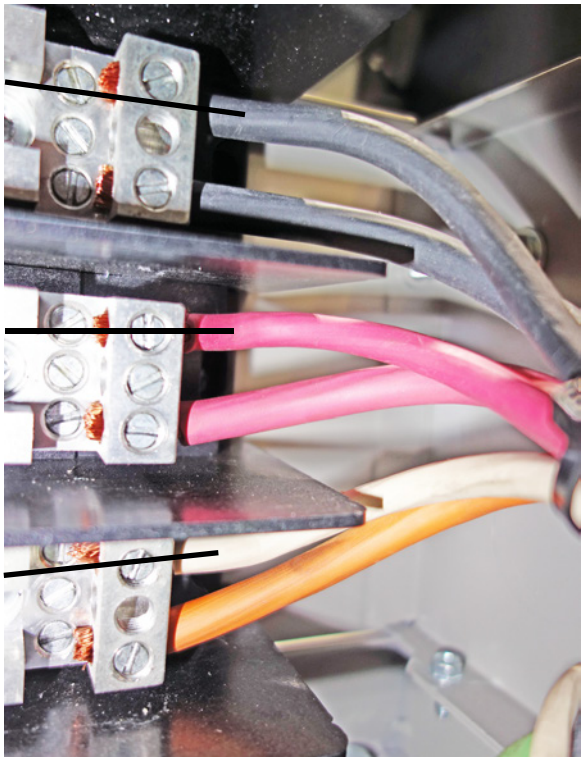


Figure 28



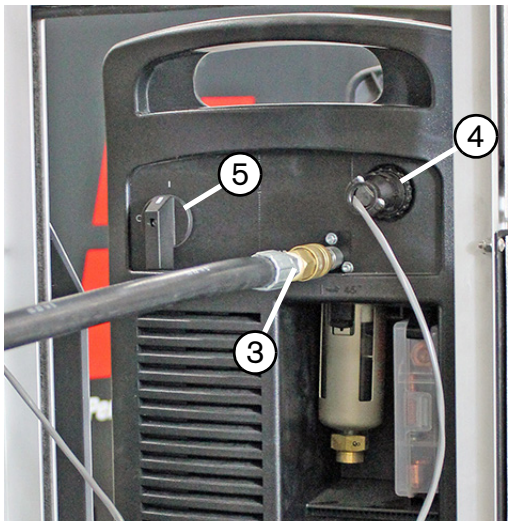


9. Reconnect the compressed air hose ③ and machine interface (CPC) connector ④ to the back of the plasma supply.

10. Set the power switch ⑤ on the back of the plasma supply to ON (**I**).

11. Reconnect the negative (-) ground cable to the battery.

12. Put the system's panels back in place. See *Install the cover* on page 124.



Replace the battery

		**WARNING!** **WEAR PROTECTIVE CLOTHING**
		**Turn OFF the engine before performing any battery checks or maintenance.** **Always wear protective glasses and gloves when servicing the battery. Avoid contact with sulfuric acid from the engine's battery. It can cause serious injury if it comes in contact with eyes or skin.** **See *Battery hazards* on page 37 for more information on how to handle batteries safely.**

This system requires a 12 VDC battery with a capacity of 750 cold cranking amperes (CCA).

The system ships with a Battery Charging Indicator (BCI) group 34/78 12 V battery. Replace it with a battery of comparable specifications and size. Approximate dimensions for replacement batteries:

- Length: 27 cm (10.5 inches)
- Width: 18 cm (7 inches)
- Height: 18 cm (7 inches)

1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. Remove the service panel on the plasma side of the system.
3. **Disconnect the negative (-) cable ① from the battery first to prevent electric shock.** Pull back the black cover to expose the negative (-) terminal. See *Figure 29* on page 130.
4. Disconnect the positive (+) cable from the battery ②. Pull back the red cover to expose the positive (+) terminal.
5. Remove the nuts and washers ③ from the long screws that hold the battery in place. Set the nuts and washers aside.

   The washers in your system may differ slightly from those shown in *Figure 29*.

6. Use the handle on top of the battery to lift the battery straight up. Keep in mind the battery can weigh 30–40 pounds. As you lift the battery straight up, make sure both sides of the support bracket come off the long screws.
7. Set the support bracket aside.
8. Dispose of the old battery in compliance with local and national regulations.
9. Set the new battery in place next to the air compressor's air/oil separation tank. Make sure:
   - ❑ The battery's negative (-) terminal is nearest the outside edge of the system.
   - ❑ The battery sits flat and is not angled up in any direction.
10. Set the support bracket in place over the battery. The bracket should fit over the long screws. See *Figure 29*.

11. Install the washers and nuts ③ over the long screws. Tighten by hand.

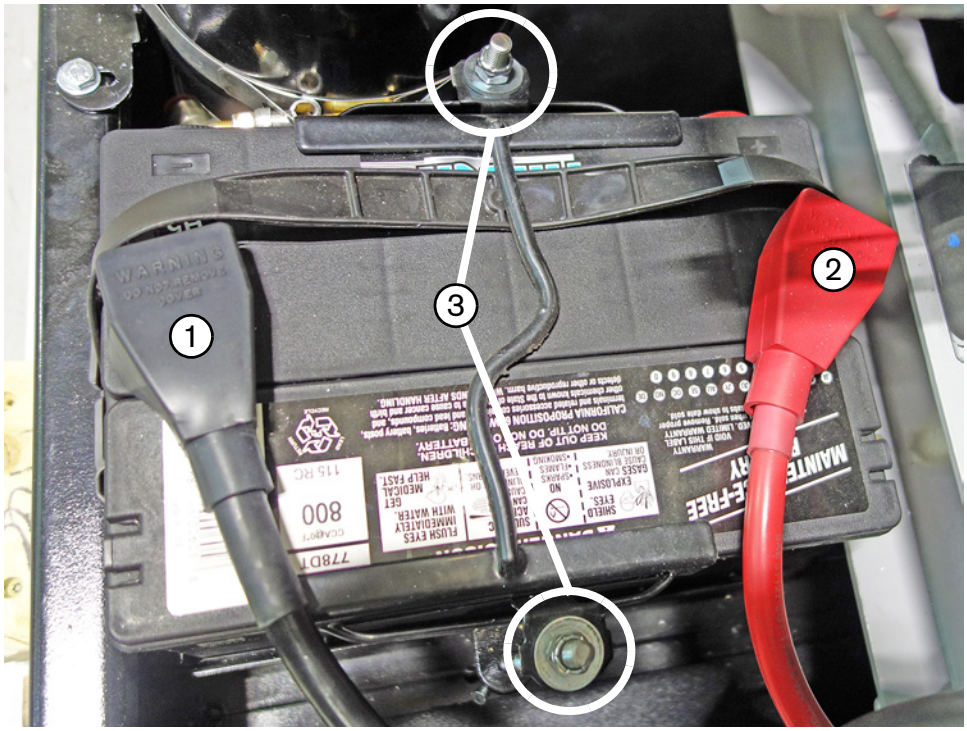
12. Attach the positive (+) cable to the positive (+) terminal on the battery ②. Cover the terminal with the red sleeve from the cable, as shown in *Figure 29*.

13. Attach the negative (-) cable to the negative (-) terminal on the battery ①. **Connect the negative (-) cable last to prevent electric shock.** Cover the terminal with the black sleeve from the cable, as shown in *Figure 29*.

14. Make sure both battery cable connections are tightened securely before starting the system.

15. Put the service panel back in place.

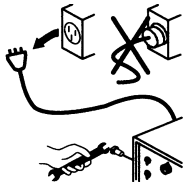
Figure 29



Air compressor components


WARNING!

ELECTRIC SHOCK CAN KILL

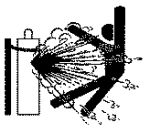


Disconnect or turn OFF electrical power before performing any maintenance that involves removing the cover from the system or the consumables from the plasma torch.

Read the separate *Safety and Compliance Manual* (80669C) included with your system for more safety precautions pertaining to plasma cutting.


WARNING!

RISK OF INJURY – HANDLE COMPRESSED AIR WITH CARE



THESE PROCEDURES MUST BE PERFORMED ONLY BY EXPERIENCED SERVICE TECHNICIANS.

When servicing air compressor components:

- **Discharge internal pressure from the air compressor before performing maintenance on any compressor parts. Trapped air pressure can discharge violently and cause serious injury.**
- **Do not inhale compressed air. Serious injury can result.**
- **If air that was under pressure pierces your skin, seek medical treatment immediately.**
- **Never disable or disconnect any safety mechanisms for the air compressor.**
- **Check all air compressor hoses and connections for leaks and damage before operating the system again.**

Replace the air pressure gauge

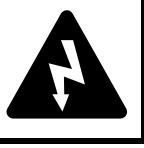
1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. Drain the air tank to release pressure. See page 99.
3. Remove the top panel from the system. See *Remove the cover* on page 123.
4. From behind the front panel, push-to-disconnect the air hose from the 90° fitting at the back of the air pressure gauge.
5. Disconnect the 90° fitting from the back of the air pressure gauge.
6. Remove the 2 screws that secure the air pressure gauge to the front panel.
7. Remove the air pressure gauge from the front panel.
8. Apply a small drop of thread sealant to the middle threads of the fitting at the back of the new air pressure gauge.
9. Set the new air pressure gauge in place in the front panel.
10. From behind the front panel, connect the 90° fitting to the back of the air pressure gauge.

CAUTION!

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

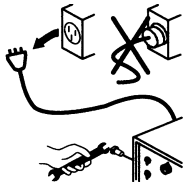
11. Secure the air pressure gauge to the front panel by installing the 2 screws.
12. Check the front of the air pressure gauge to make sure it is oriented correctly.
13. Push-to-connect the air hose to the 90° fitting.
14. Put the system's top panel back in place. See *Install the cover* on page 124.

Plasma cutting system components



WARNING!

ELECTRIC SHOCK CAN KILL



Disconnect or turn OFF electrical power before performing any maintenance that involves removing the cover from the system or the consumables from the plasma torch.

Read the separate *Safety and Compliance Manual* (80669C) included with your system for more safety precautions pertaining to plasma cutting.

Replace the air filter element and air filter bowl in the plasma supply

1. Turn OFF the system. Make sure the power switch on the front panel is in the OFF (**O**) position.
2. Drain the air tank to release pressure. See page 99.
3. Remove the service panel on the plasma side of the system.
4. Disconnect the compressed air hose from the back of the plasma supply.
5. Locate the air filter bowl in the plasma cutting system's rear panel. The air filter element is inside the filter bowl.

   The air filter bowl in your plasma supply may differ slightly from the one shown in this picture.

6. Refer to the *Maintenance and Repair* chapter in the *Powermax125 Operator Manual* to install a new air filter element and air filter bowl.
7. Reconnect the compressed air hose to the back of the plasma supply.
8. Put the service panel back in place.

Section 7
Parts

Use the part and kit numbers in this section to order replacement parts, accessories, plasma torches, and consumables for your system.

Refer to the *Powermax125 Operator Manual* (808080) for a list of additional replacement parts for the Powermax125 plasma supply and Duramax® Hyamp hand torches and machine torches.

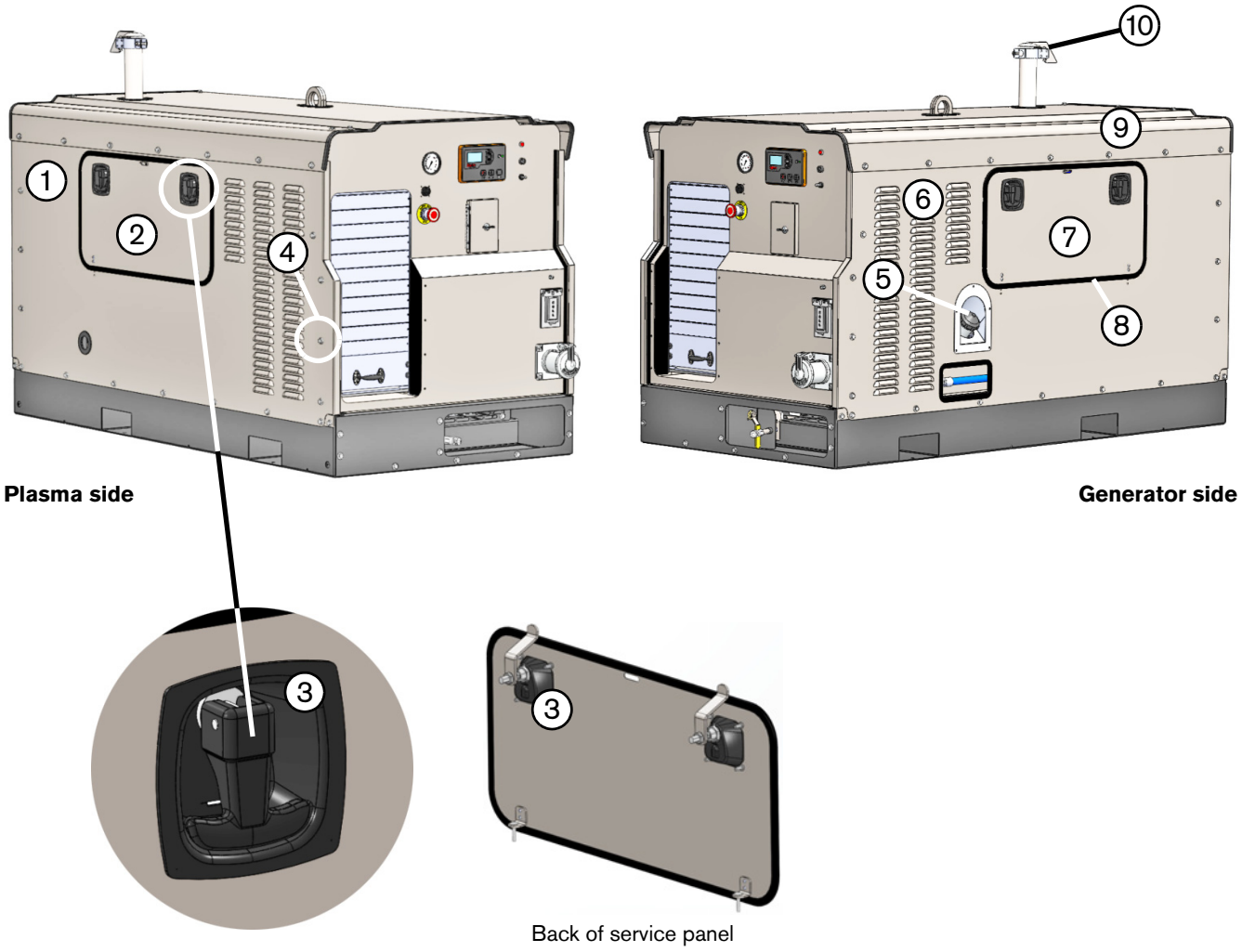
System parts

Exterior, front panel

	Description	Part number
1	Kit: Air pressure gauge	428496
2	Kit: Machine interface cable with CPC receptacle	428557
	Protective cover for machine interface (CPC) receptacle (not shown)	127204
3	Kit: Emergency Stop button	428498
	Kit: Contactor for Emergency Stop button	428497
	Kit: Yellow warning sticker for Emergency Stop button	428508
4	Kit: Protective panel for main circuit breaker and transformer circuit breaker	428523
5	Kit: ON/OFF power switch, 12 V	428510
6	Kit: Front panel (hardware not included)	428518
7	Kit: Replacement screws and washers for cover panels	428587

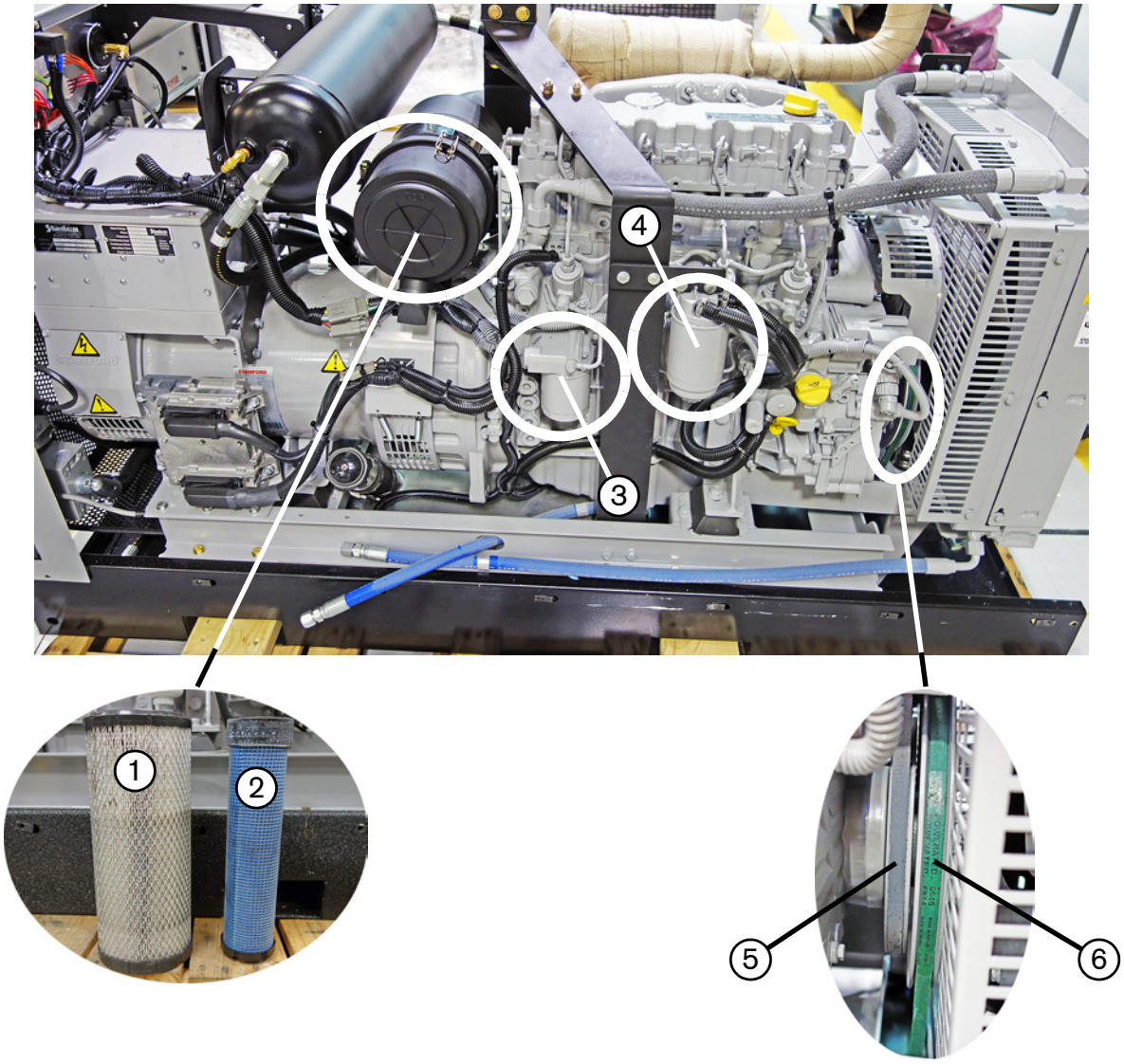
Description	Part number
Kit: Rear panel (hardware not included) (not shown)	428517
Kit: Ventilation screen for rear panel (not shown)	428515
Kit: Freedom 38 PPA decal for front and rear panels	428507
Kit: Labels for front panel controls (not shown)	428506
Freedom 38 PPA safety label (not shown)	210385
“Hot surface” warning label (near exhaust pipe – not shown)	210393

Exterior, sides



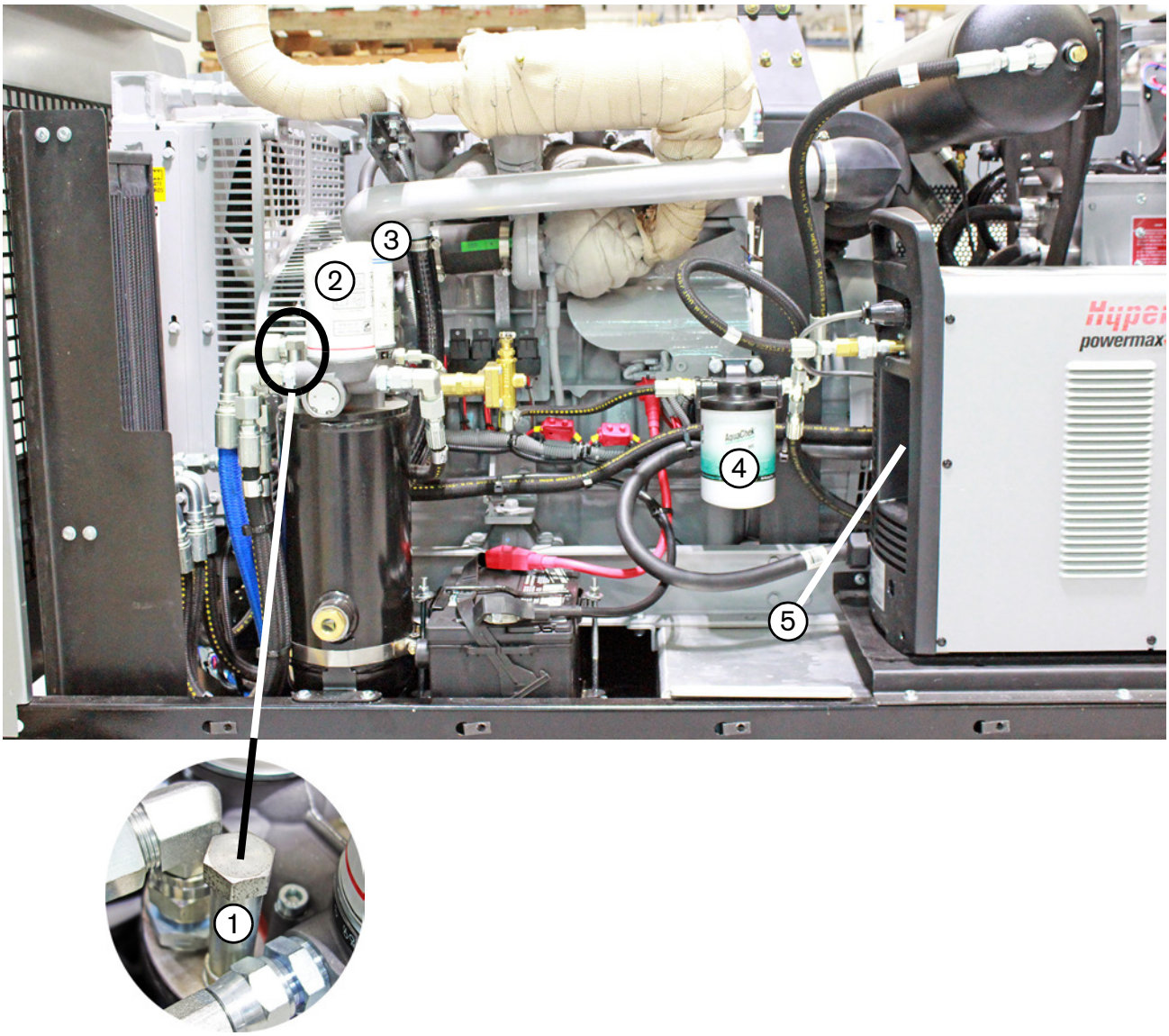
	Description	Part number
1	Kit: Side panel, plasma side (hardware not included)	428520
2	Kit: Service panel, plasma side (twist-lock latches not included)	428552
3	Kit: Replacement twist-lock latch for service panels	428586
4	Kit: Replacement screws and washers for cover panels	428587
5	Kit: Fill cap for fuel tank	428550
6	Kit: Side panel, generator side (hardware not included)	428516
7	Kit: Service panel, generator side (twist-lock latches not included)	428551
8	Kit: Protective edge lining for cover panels and service panels	428558
9	Kit: Top panel (hardware not included)	428519
10	Kit: Cap for engine exhaust pipe	428499
	Kit: Freedom 38 PPA decal for side panels (not shown)	428505

Interior, engine and generator



	Description	Part number
1	Kit: Primary filter for engine air cleaner	428503
2	Kit: Safety filter for engine air cleaner	428504
3	Kit: Deutz-brand oil filter for engine	428613
4	Kit: Deutz-brand fuel filter for engine	428511
5	Kit: Engine belt	428513
6	Kit: Air compressor belt	428500

Interior, air compression system

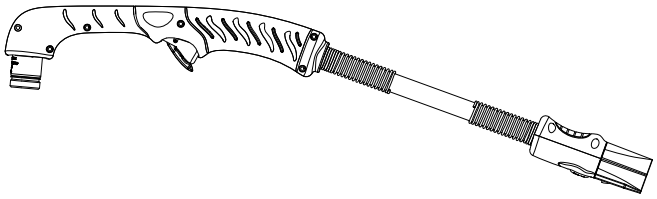


	Description	Part number
1	Kit: Fill cap for air/oil separation tank (includes washer)	428556
2	Kit: Oil filter for air compressor	428501
3	Kit: Oil separation filter for air compressor	428502
4	Kit: Air drying filter for air compressor	428544
5	Kit: Nylon air filter bowl for plasma cutting system (includes O-ring) (in rear panel recess)	428415
	Kit: Air filter element for plasma cutting system (inside filter bowl – includes O-ring for filter bowl)	228695

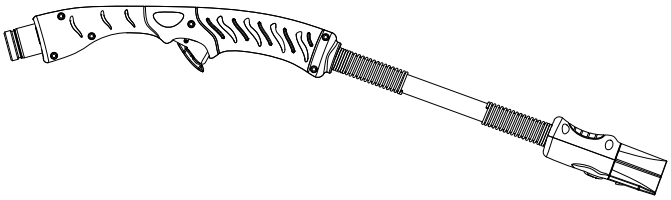
Plasma torches

Hand torches

The following torch assemblies do not include consumables. See page 143 for a list of consumable part numbers.



85° hand torch



15° hand torch

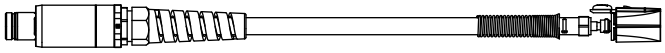
Part Number	Description
059492	Duramax Hyamp 85° hand torch assembly with 7.6 m (25 foot) lead
059493	Duramax Hyamp 85° hand torch assembly with 15 m (50 foot) lead
059494	Duramax Hyamp 85° hand torch assembly with 23 m (75 foot) lead
059495	Duramax Hyamp 15° hand torch assembly with 7.6 m (25 foot) lead
059496	Duramax Hyamp 15° hand torch assembly with 15 m (50 foot) lead
059497	Duramax Hyamp 15° hand torch assembly with 23 m (75 foot) lead

Hypertherm also offers longer torches in 0.6 m (2 foot) and 1.2 m (4 foot) configurations. See the *Duramax Hyamp Long Handheld Torches Service Manual* (808290). Download the manual from the "Downloads library" at www.hypertherm.com.

Machine torches

The following torch assemblies do not include consumables. See page 144 for a list of consumable part numbers.

Full-length machine torch



Mini machine torch

Part Number	Description
059519	Duramax Hyamp 180° full-length machine torch assembly with 4.6 m (15 foot) lead
059520	Duramax Hyamp 180° full-length machine torch assembly with 7.6 m (25 foot) lead
059521	Duramax Hyamp 180° full-length machine torch assembly with 10.7 m (35 foot) lead
059522	Duramax Hyamp 180° full-length machine torch assembly with 15 m (50 foot) lead
059523	Duramax Hyamp 180° full-length machine torch assembly with 23 m (75 foot) lead
059514	Duramax Hyamp 180° mini machine torch assembly with 4.6 m (15 foot) lead
059515	Duramax Hyamp 180° mini machine torch assembly with 7.6 m (25 foot) lead
059516	Duramax Hyamp 180° mini machine torch assembly with 10.7 m (35 foot) lead
059517	Duramax Hyamp 180° mini machine torch assembly with 15 m (50 foot) lead

Hypertherm also offers robotic torches in 45°, 90°, and 180° configurations. See the *Duramax/Duramax Hyamp Robotic Torches Service Manual* (807460). Download the manual from the “Downloads library” at www.hypertherm.com.

Plasma torch consumables

Hand cutting

For illustrations of many of these consumables, see *Choose consumables for the plasma hand torch* on page 57.

Drag cutting

Part Number	Description
420172	Duramax Hyamp shield 45/65 A
420000	Duramax Hyamp shield 105/125 A
220977	Duramax Hyamp retaining cap
420158	Duramax Hyamp nozzle 45 A
420169	Duramax Hyamp nozzle 65 A
220975	Duramax Hyamp nozzle 105/125 A
220971	Duramax Hyamp electrode
220997	Duramax Hyamp swirl ring

Gouging

Part Number	Description
420112	Duramax Hyamp gouging shield for maximum removal (standard)
420509	Duramax Hyamp gouging shield for maximum control (optional)
220977	Duramax Hyamp retaining cap
420001	Duramax Hyamp gouging nozzle
220971	Duramax Hyamp electrode
220997	Duramax Hyamp swirl ring

FineCut

Part Number	Description
420152	Duramax Hyamp FineCut shield
220977	Duramax Hyamp retaining cap
420151	Duramax Hyamp FineCut nozzle
220971	Duramax Hyamp electrode
420159	Duramax Hyamp FineCut swirl ring

Mechanized cutting

For illustrations of many of these consumables, see the *Machine Torch Setup* section in the *Powermax125 Operator Manual*.

Shielded

Part Number	Description
420168	Duramax Hyamp shield 45/65 A
220976	Duramax Hyamp shield 105/125 A
220977	Duramax Hyamp retaining cap
420156	Duramax Hyamp Ohmic retaining cap
420158	Duramax Hyamp nozzle 45 A
420169	Duramax Hyamp nozzle 65 A
220975	Duramax Hyamp nozzle 105/125 A
220971	Duramax Hyamp electrode
220997	Duramax Hyamp swirl ring

Gouging

Part Number	Description
420112	Duramax Hyamp gouging shield
220977	Duramax Hyamp retaining cap
420001	Duramax Hyamp gouging nozzle
220971	Duramax Hyamp electrode
220997	Duramax Hyamp swirl ring

FineCut

Part Number	Description
420152	Duramax Hyamp FineCut shield
220977	Duramax Hyamp retaining cap
420156	Duramax Hyamp Ohmic retaining cap
420151	Duramax Hyamp FineCut nozzle
220971	Duramax Hyamp electrode
220997	Duramax Hyamp swirl ring

Accessory parts for plasma cutting

Part Number	Description
223292	Kit: 125 A work lead with hand clamp, 7.6 m (25 feet)
223293	Kit: 125 A work lead with hand clamp, 15 m (50 feet)
223294	Kit: 125 A work lead with hand clamp, 23 m (75 feet)
223298	Kit: 125 A work lead with C-style clamp, 7.6 m (25 feet)
223299	Kit: 125 A work lead with C-style clamp, 15 m (50 feet)
223300	Kit: 125 A work lead with C-style clamp, 23 m (75 feet)
223295	Kit: 125 A work lead with ring terminal, 7.6 m (25 feet)
223296	Kit: 125 A work lead with ring terminal, 15 m (50 feet)
223297	Kit: 125 A work lead with ring terminal, 23 m (75 feet)
008539	Ground hand clamp: 500 A
024548	Brown leather torch sheathing, 7.6 m (25 foot)
024877	Black leather torch sheathing with Hypertherm logo, 7.6 m (25 foot)
017053	Hyamp deluxe circle cutting guide
428348	Gouging heat shield for Duramax Hyamp torches
017031	Hyamp helmet: face shield with automatic dimming, shades 8–12
017025	Leather cutting gloves – medium (M)
017026	Leather cutting gloves – large (L)
017027	Leather cutting gloves – extra large (XL)
017028	Leather cutting gloves – extra, extra large (XXL)
017032	Fiberglass cutting blanket, 1.5 m X 1.8 m (5 feet X 6 feet), rated for 538°C (1000°F)