



ESAB Cutmaster® 40 PLASMA CUTTING SYSTEM SL60 1Torch™

Operating
Manual



Art # A-12777_AA



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Issue Date: July 31, 2015

Manual No.: 0-5376

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WE APPRECIATE YOUR BUSINESS!

Congratulations on your new ESAB product. We are proud to have you as our customer and will strive to provide you with the best service and reliability in the industry. This product is backed by our extensive warranty and world-wide service network. To locate your nearest distributor or service agency, visit us on the web at www.esab.com.br.

This Operating Manual has been designed to instruct you on the correct use and operation of your ESAB product. Your satisfaction with this product and its safe operation is our ultimate concern. Therefore please take the time to read the entire manual, especially the Safety Precautions. They will help you to avoid potential hazards that may exist when working with this product.

YOU ARE IN GOOD COMPANY!

The Brand of Choice for Contractors and Fabricators Worldwide.

ESAB is a Global Brand of manual and automation Plasma Cutting Products.

We distinguish ourselves from our competition through market-leading, dependable products that have stood the test of time. We pride ourselves on technical innovation, competitive prices, excellent delivery, superior customer service and technical support, together with excellence in sales and marketing expertise.

Above all, we are committed to developing technologically advanced products to achieve a safer working environment within the welding industry.



WARNING

Read and understand this entire Manual and your employer's safety practices before installing, operating, or servicing the equipment.

While the information contained in this Manual represents the Manufacturer's best judgement, the Manufacturer assumes no liability for its use.

Plasma Cutting Power Supply
ESAB Cutmaster 40
SL60 1Torch™
Operating Manual Number 0-5376

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Record the following information for Warranty purposes:

Where Purchased: _____

Purchase Date: _____

Power Supply Serial #: _____

Torch Serial #: _____

**Be sure this information reaches the operator.
You can get extra copies through your supplier.**

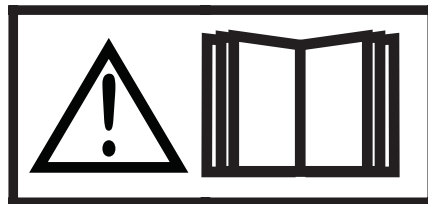
CAUTION

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for arc welding and cutting equipment, we urge you to read our booklet, "Precautions and Safe Practices for Arc Welding, Cutting, and Gouging," Form 52-529. Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information. Be sure to read the Safety Precautions before installing or operating this equipment.

USER RESPONSIBILITY

This equipment will perform in conformity with the description thereof contained in this manual and accompanying labels and/or inserts when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically. Malfunctioning or poorly maintained equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, the manufacturer recommends that a telephone or written request for service advice be made to the Authorized Distributor from whom it was purchased.

This equipment or any of its parts should not be altered without the prior written approval of the manufacturer. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than the manufacturer or a service facility designated by the manufacturer.



**READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR
OPERATING.
PROTECT YOURSELF AND OTHERS!**

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SECTION 1: SAFETY

1.0 Safety Precautions

Users of ESAB welding and plasma cutting equipment have the ultimate responsibility for ensuring that anyone who works on or near the equipment observes all the relevant safety precautions. Safety precautions must meet the requirements that apply to this type of welding or plasma cutting equipment. The following recommendations should be observed in addition to the standard regulations that apply to the workplace.

All work must be carried out by trained personnel well acquainted with the operation of the welding or plasma cutting equipment. Incorrect operation of the equipment may lead to hazardous situations which can result in injury to the operator and damage to the equipment.

1. Anyone who uses welding or plasma cutting equipment must be familiar with:
 - its operation
 - location of emergency stops
 - its function
 - relevant safety precautions
 - welding and / or plasma cutting
2. The operator must ensure that:
 - no unauthorized person stationed within the working area of the equipment when it is started up.
 - no one is unprotected when the arc is struck.
3. The workplace must:
 - be suitable for the purpose
 - be free from drafts
4. Personal safety equipment:
 - Always wear recommended personal safety equipment, such as safety glasses, flame proof clothing, safety gloves.
 - Do not wear loose fitting items, such as scarves, bracelets, rings, etc., which could become trapped or cause burns.
5. General precautions:
 - Make sure the return cable is connected securely.
 - Work on high voltage equipment **may only be carried out by a qualified electrician.**
 - Appropriate fire extinguishing equipment must be clearly marked and close at hand.
 - Lubrication and maintenance **must not** be carried out on the equipment during operation.



Dispose of electronic equipment at the recycling facility!

In observance of European Directive 2002/96/EC on Waste Electrical and Electronic Equipment and its implementation in accordance with national law, electrical and/or electronic equipment that has reached the end of its life must be disposed of at a recycling facility.

As the person responsible for the equipment, it is your responsibility to obtain information on approved collection stations.

For further information contact the nearest ESAB dealer.

ESAB can provide you with all necessary cutting protection and accessories.

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WARNING

Arc welding and cutting can be injurious to yourself and others. Take precautions when welding and cutting. Ask for your employer's safety practices which should be based on manufacturers' hazard data.

ELECTRIC SHOCK - Can kill.

- Install and earth (ground) the welding or plasma cutting unit in accordance with applicable standards.
- Do not touch live electrical parts or electrodes with bare skin, wet gloves or wet clothing.
- Insulate yourself from earth and the workpiece.
- Ensure your working stance is safe.

FUMES AND GASES - Can be dangerous to health.

- Keep your head out of the fumes.
- Use ventilation, extraction at the arc, or both, to take fumes and gases away from your breathing zone and the general area.

ARC RAYS - Can injure eyes and burn skin.

- Protect your eyes and body. Use the correct welding / plasma cutting screen and filter lens and wear protective clothing.
- Protect bystanders with suitable screens or curtains.

FIRE HAZARD

- Sparks (spatter) can cause fire. Make sure therefore that there are no inflammable materials nearby.

NOISE - Excessive noise can damage hearing.

- Protect your ears. Use earmuffs or other hearing protection.
- Warn bystanders of the risk.

MALFUNCTION - Call for expert assistance in the event of malfunction.

READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR OPERATING.

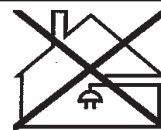
PROTECT YOURSELF AND OTHERS!

WARNING

Do not use the power source for thawing frozen pipes.

CAUTION

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



CAUTION

This product is solely intended for metal removal. Any other use may result in personal injury and / or equipment damage.

CAUTION

Read and understand the instruction manual before installing or operating.



SECTION 2 SYSTEM: INTRODUCTION

2.01 How To Use This Manual

This Owner's Manual applies to just specification or part numbers listed on page i.

To ensure safe operation, read the entire manual, including the chapter on safety instructions and warnings.

Throughout this manual, the words WARNING, CAUTION, DANGER, and NOTE may appear. Pay particular attention to the information provided under these headings. These special annotations are easily recognized as follows:



NOTE!

An operation, procedure, or background information which requires additional emphasis or is helpful in efficient operation of the system.



CAUTION

A procedure which, if not properly followed, may cause damage to the equipment.



WARNING

A procedure which, if not properly followed, may cause injury to the operator or others in the operating area.



WARNING

Gives information regarding possible electrical shock injury. Warnings will be enclosed in a box such as this.



DANGER

Means immediate hazards which, if not avoided, will result in immediate, serious personal injury or loss of life.

Additional copies of this manual may be purchased by contacting ESAB at the address and phone number in your area listed on back cover of this manual. Include the Owner's Manual number and equipment identification numbers.

Electronic copies of this manual can also be downloaded at no charge in Acrobat PDF format by going to the ESAB web site listed below

<http://www.esab.com.br>

2.02 Equipment Identification

The unit's identification number (specification or part number), model, and serial number usually appear on a data tag attached to the rear panel. Equipment which does not have a data tag such as torch and cable assemblies are identified only by the specification or part number printed on loosely attached card or the shipping container. Record these numbers on the bottom of page i for future reference.

2.03 Receipt Of Equipment

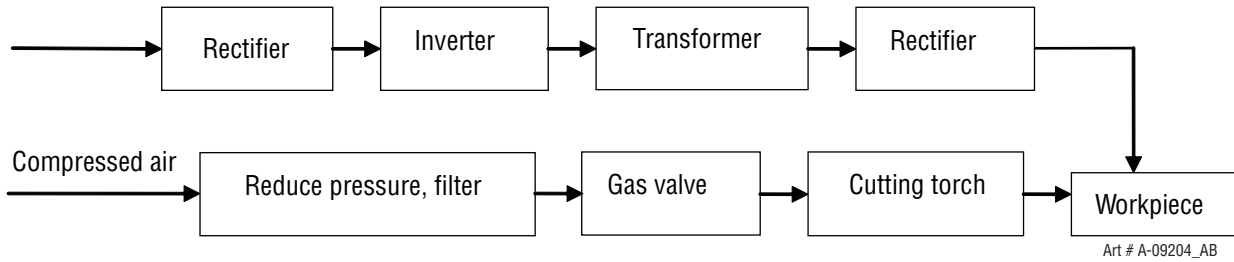
When you receive the equipment, check it against the invoice to make sure it is complete and inspect the equipment for possible damage due to shipping. If there is any damage, notify the carrier immediately to file a claim. Furnish complete information concerning damage claims or shipping errors to the location in your area listed in the inside back cover of this manual.

Include all equipment identification numbers as described above along with a full description of the parts in error.

Move the equipment to the installation site before un-crating the unit. Use care to avoid damaging the equipment when using bars, hammers, etc., to un-crate the unit.

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2.04 Working Principle



2.05 Power Supply Specifications

ESAB Cutmaster 40 Power Supply Specifications	
Input Power	120 VAC (+-10%), 1 Phase, 50/60Hz 230 VAC (+-10%), 1 Phase, 50/60Hz
Output Current	20 Amps @ 120VAC, 15A 20-27 Amps @ 120VAC, 20A 20-40 Amps @ 230VAC, 20A
ESAB Cutmaster 40 Power Supply Duty Cycle (Note 1)	
Ambient Temperature	104° F (40° C)
Duty Cycle	30% @ 120VAC, 40% @ 230VAC
Rated Current	27 Amps @ 120VAC, 40 Amps @ 230V
SL60 1Torch Gas Requirements (see section 2T.03)	
Notes	
1. Duty Cycle is the percentage of time the system can be operated without overheating. Duty cycle is reduced if primary input voltage (AC) is low or the DC voltage is higher than shown in this chart.	
2. Air supply must be free of oil, moisture, and other contaminants. Excessive oil and moisture may cause double-arcing, rapid tip wear, or even complete torch failure. Contaminants may cause poor cutting performance and rapid electrode wear. Optional filters provide increased filtering capabilities.	



NOTE!

IEC Rating is determined as specified by the International Electro-Technical Commission. These specifications include calculating an output voltage based upon power supply rated current. To facilitate comparison between power supplies, all manufacturers use this output voltage to determine duty cycle.

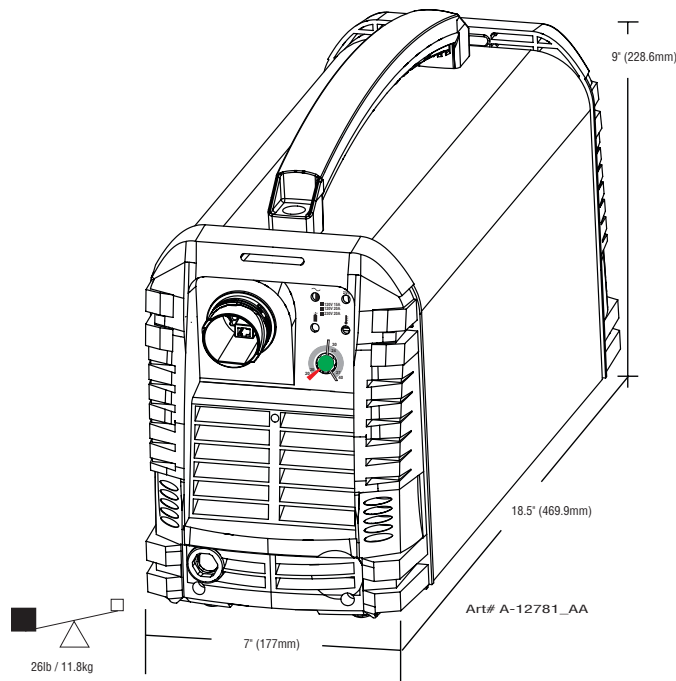


Figure 2-1: Power Supply Dimensions & Weight

i NOTE!
Weight includes torch & leads, input power cord, and work cable with clamp.

! CAUTION
Provide clearance for proper air flow through the power supply. Operation without proper air flow will inhibit proper cooling and reduce duty cycle.

2.06 Input Wiring Specifications

ESAB Cutmaster 40 Input Power Requirements					
Input		Power Input	Current Input	Current Input	Suggested Sizes (See Note)
Voltage	Freq.	(kVA)	Max (Amps)	I _{eff} (Amps)	Fuse (Amps)
(Volts-AC)	(Hz)	1-Ph	1-Ph	1-Ph	1-Ph
120	50/60	3.3	27.5	15	25
230	50/60	5.0	21.4	13.5	20

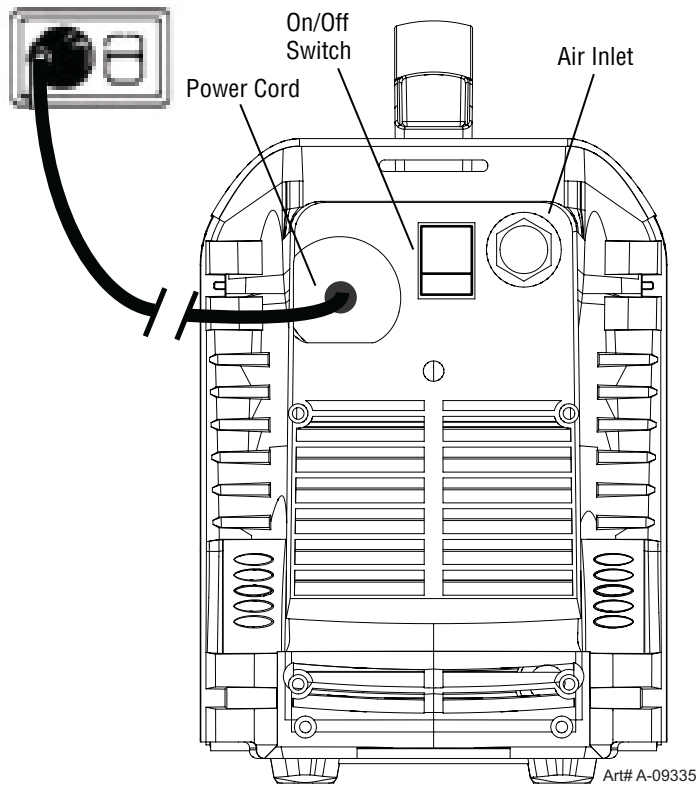
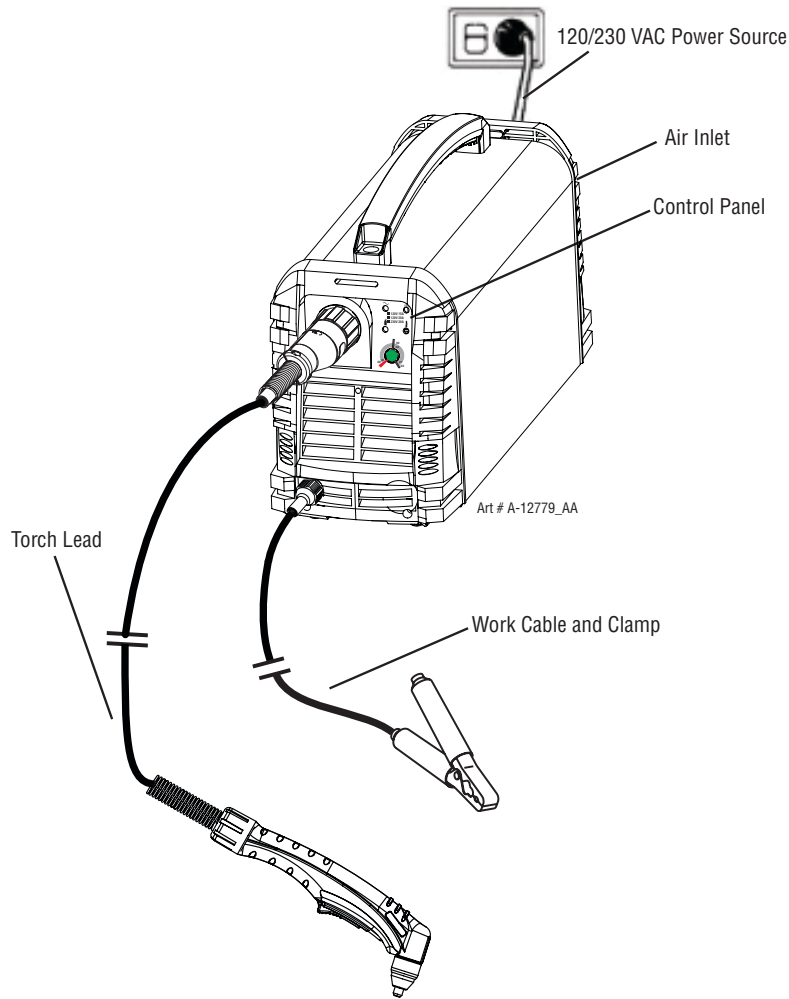
Line Voltages with Suggested Circuit Protection

Motor start fuses or thermal circuit breakers are recommended for this application. Check local requirements for your situation in this regard.

i NOTE!
Refer to Local and National Codes or local authority having jurisdiction for proper wiring requirements. Cable size is de-rated based on the Duty Cycle of the equipment. The suggested sizes are based on flexible power cable with power plug installations. Cable conductor temperature used is 167° F (75° C).

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2.07 Power Supply Features



SECTION 2 TORCH: INTRODUCTION

2T.01 Scope of Manual

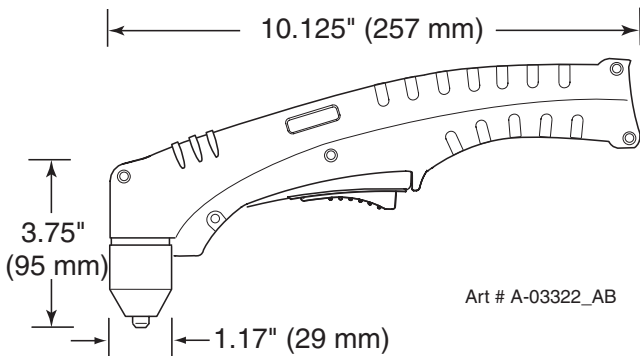
This manual contains descriptions, operating instructions and maintenance procedures for the SL60 Plasma Cutting Torch. Service of this equipment is restricted to properly trained personnel; unqualified personnel are strictly cautioned against attempting repairs or adjustments not covered in this manual, at the risk of voiding the Warranty. Read this manual thoroughly. A complete understanding of the characteristics and capabilities of this equipment will assure the dependable operation for which it was designed.

2T.02 Specifications

A. Torch Configurations

1. Hand Torch, Model SL60

The hand torch head is at 75° to the torch handle. The hand torches include a torch handle and torch trigger assembly.



B. Torch Leads Lengths

Hand Torches are available as follows:

- 20 ft / 6.1 m, with ATC connectors

C. Torch Parts (see Section 6.03)

Starter Cartridge, Electrode, Tip, Shield Cup

D. Parts - In - Place (PIP)

Torch has built-in switch.

12 vdc circuit rating

E. Type Cooling

Combination of ambient air and gas stream through torch.

F. Torch Ratings

SL60 Torch Ratings	
Ambient Temperature	104° F 40° C
Duty Cycle	100% @ 60 Amps @ 400 scfh
Maximum Current	60 Amps
Voltage (V_{peak})	500V
Arc Striking Voltage	7kV
Torch Control Circuit Voltage	24V

G. Current Ratings

SL60 Current Ratings	
SL60 Torch & Leads	Up to 60 Amps, DC, Straight Polarity



NOTE!

Power Supply characteristics will determine material thickness range.

H. Gas Requirements

SL60 Torch Gas Specifications	
Gas (Plasma and Secondary)	Compressed Air
Minimum Input Pressure	60 - 95 psi 4.1 - 6.5 bar
Maximum Input Pressure	125 psi / 8.6 bar
Gas Flow	300 - 500 scfh 142 - 235 lpm



WARNING

This torch is not to be used with oxygen (O_2). This torch is not to be used with high frequency starting systems.

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2T.03 Introduction to Plasma

A. Plasma Gas Flow

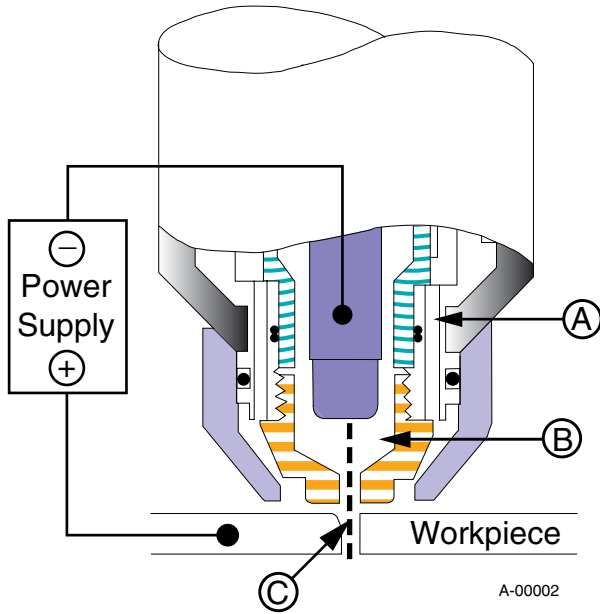
Plasma is a gas which has been heated to an extremely high temperature and ionized so that it becomes electrically conductive. The plasma arc cutting and gouging processes use this plasma to transfer an electrical arc to the workpiece. The metal to be cut or removed is melted by the heat of the arc and then blown away.

While the goal of plasma arc cutting is separation of the material, plasma arc gouging is used to remove metals to a controlled depth and width.

In a Plasma Cutting Torch a cool gas enters Zone B, where an arc between the electrode and the torch tip heats and ionizes the gas. The main cutting arc then transfers to the workpiece through the column of plasma gas in Zone C.

By forcing the plasma gas and electric arc through a small orifice, the torch delivers a high concentration of heat to a small area. The stiff, constricted plasma arc is shown in Zone C. Direct current (DC) straight polarity is used for plasma cutting, as shown in the illustration.

Zone A channels a secondary gas that cools the torch. This gas also assists the high velocity plasma gas in blowing the molten metal out of the cut allowing for a fast, slag-free cut.



Typical Torch Head Detail

B. Gas Distribution

The single gas used is internally split into plasma and secondary gases.

The plasma gas flows into the torch through the negative lead, through the starter cartridge, around the electrode, and out through the tip orifice.

The secondary gas flows down around the outside of the torch starter cartridge, and out between the tip and shield cup around the plasma arc.

C. Pilot Arc

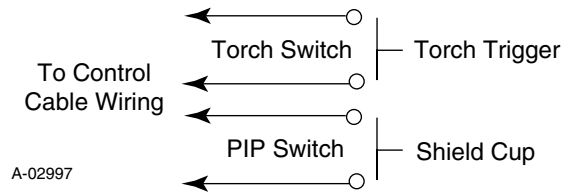
When the torch is started a pilot arc is established between the electrode and cutting tip. This pilot arc creates a path for the main arc to transfer to the work.

D. Main Cutting Arc

DC power is also used for the main cutting arc. The negative output is connected to the torch electrode through the torch lead. The positive output is connected to the workpiece via the work cable and to the torch through a pilot wire.

E. Parts - In - Place (PIP)

The torch includes a 'Parts - In - Place' (PIP) circuit. When the shield cup is properly installed, it closes a switch. The torch will not operate if this switch is open.



Parts - In - Place Circuit Diagram for Hand Torch


SECTION 3: INSTALLATION

3.01 Unpacking


1. Use the packing lists to identify and account for each item.
2. Inspect each item for possible shipping damage. If damage is evident, contact your distributor and / or shipping company before proceeding with the installation.
3. Record Power Supply and Torch model and serial numbers, purchase date and vendor name, in the information block at the front of this manual.

3.02 Lifting Options

The Power Supply includes a handle for **hand lifting only**. Be sure unit is lifted and transported safely and securely.



WARNING
Do not touch live electrical parts. Disconnect input power cord before moving unit.



WARNING
FALLING EQUIPMENT can cause serious personal injury and can damage equipment.
HANDLE is not for mechanical lifting.

- Only persons of adequate physical strength should lift the unit.
- Lift unit by the handle, using two hands. Do not use straps for lifting.
- Use optional cart or similar device of adequate capacity to move unit.
- Place unit on a proper skid and secure in place before transporting with a fork lift or other vehicle.

3.03 Primary Input Power Connections

Power Cords Included With Power Supply

Attached to the power supply is an input power cord with a 230 Volt 50 Amp NEMA 6-50P for plug. Optional adapters allow for connection of the power supply input cable plug when using 120V input power.

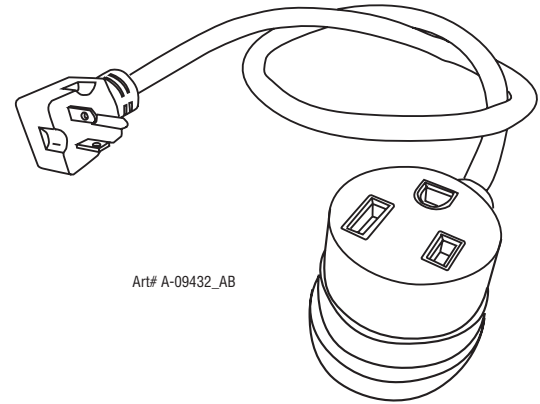



Figure 3-1: 120VAC Adapter Pigtail



CAUTION
Check your power source for correct voltage before plugging in or connecting the unit. The primary power source, fuse, and any extension cords used must conform to local electrical code and the recommended circuit protection and wiring requirements as specified in Section 2.

Input Voltage (VAC)	Rated Output	Amps (RMS) input at rated output, 60 Hz, single-phase	kVA
120V, 15A Circuit	20A, 88V	20.4	2.5
120V, 20A Circuit	27A, 91V	28.5	3.5
120V, 30A Circuit	27A, 91V	28.5	3.5
208-230V, 20A Circuit	40A, 96V	23-21.4	4.8

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3.04 Air Supply Connections

A. Connecting Air Supply to Unit

The connection is the same for compressed air or industrial compressed air in gas cylinders.

1. Connect the gas line to the compressed air inlet port at the appropriate pressure. Air inlet port is an ISO7/1 tapered fitting. A 1/4 NPT adapter is included with the machine.

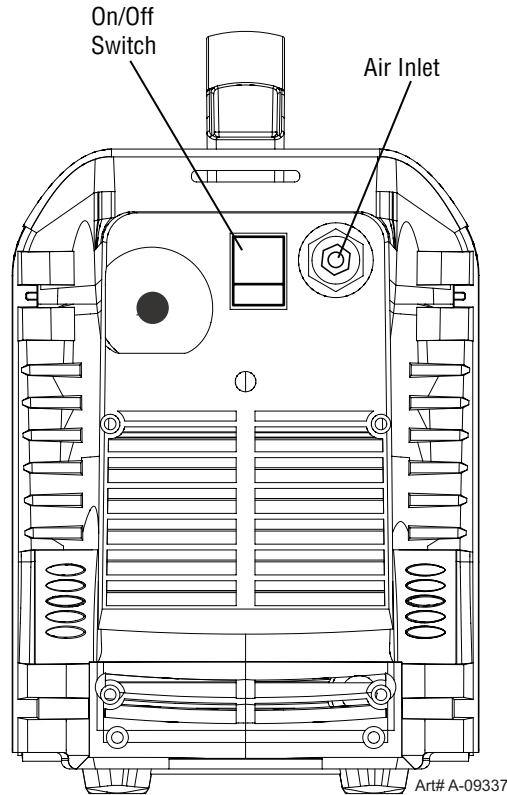


Figure 3-2: Gas Connection to Compressed Air input

B. Using Industrial Compressed Air In Gas Cylinders

When using Industrial compressed air in gas cylinders as the gas supply:

1. Refer to the manufacturer's specifications for installation and maintenance procedures for high pressure gas regulators.
2. Examine the cylinder valves to be sure they are clean and free of oil, grease or any foreign material. Briefly open each cylinder valve to blow out any dust which may be present.
3. The cylinder must be equipped with an adjustable high - pressure regulator capable of outlet pressures up to 100 psi (6.9 bar) maximum and flows of at least 250 scfh (120 lpm).
4. Connect gas supply hose to the cylinder.



NOTE!

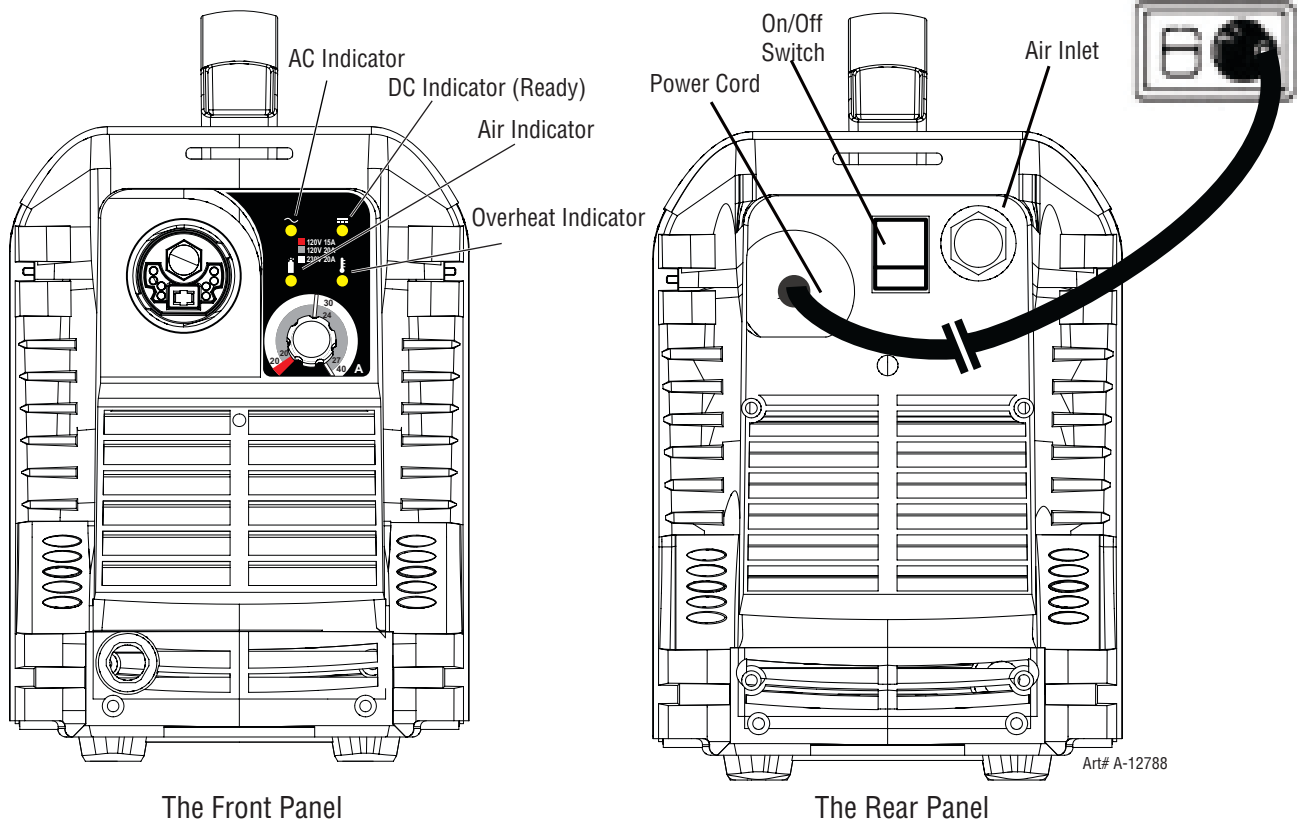
Pressure should be set at 100 psi (6.9 bar) at the high pressure cylinder regulator.

Supply hose must be at least 1/4 inch (6 mm) I.D.

For a secure seal, apply thread sealant to the fitting threads, according to manufacturer's instructions. Do Not use Teflon tape as a thread sealer, as small particles of the tape may break off and block the small air passages in the torch.

SECTION 4 SYSTEM: OPERATION

4.01 Control Panel



The Front Panel


The Rear Panel

1. **ON / OFF Switch (Power Switch/Lamp)**

Controls input power to the power supply. 1 is ON (Red Lamp), 0 is OFF.

2. **(A) Output Current Control**

Sets the desired output current. If the overload protection (fuse or circuit breaker) on the input power circuit opens frequently, either reduce cutting output, reduce the cutting time, or connect the unit to more adequate input power. Note: For 120V input power, the unit will automatically limit the output current to a maximum of 27A. For 230V input power, the maximum output is 40 Amps. Refer to Section 2 for input power requirements.

3.  **AC Indicator**

Steady light indicates power supply is ready for operation.

4.  **OVERHEAT Indicator (TEMP Indicator)**


Indicator is normally OFF. Indicator is ON when internal temperature exceeds normal limits. Allow the unit to run with the fan on until the temp indicator turns OFF.

5.  **AIR Indicator**

AIR light should be ON when there is sufficient gas pressure.

6.  **READY (DC Indicator)**

Indicator is ON when DC output circuit is active.

 **NOTE!**
All consumables must be correctly installed and maintained to ensure correct operation.

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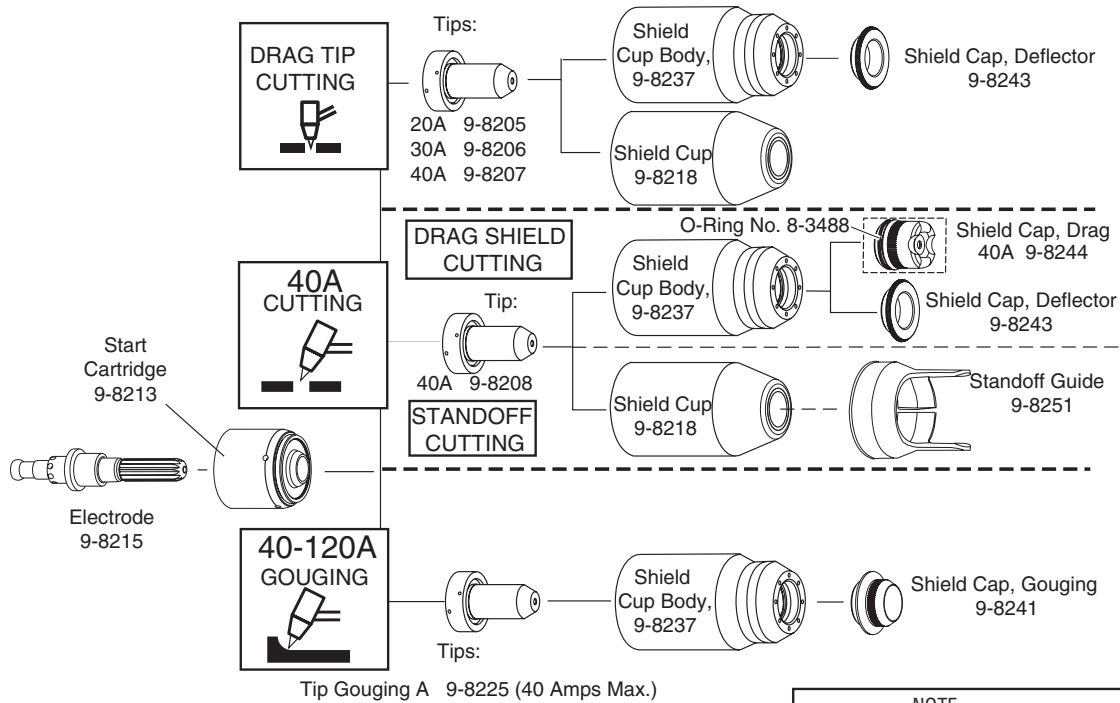
4.02 Preparations For Operating

At the start of each operating session:

WARNING
Disconnect primary power at the source before assembling or disassembling power supply, torch parts, or torch and leads assemblies.

A. Torch Parts Selection

Check the torch for proper assembly and appropriate torch parts. The torch parts must correspond with the type of operation, and with the amperage output of this power supply (60 amps maximum). Use only genuine ESAB parts with this torch.



NOTE
 ESAB CutMaster 60 uses 60A and less
 ESAB CutMaster 80 uses 80A and less
 ESAB CutMaster 100 uses 100A and less
 ESAB CutMaster 120 uses 120A and less

Art # A-12890



NOTE!

When operating the torch in a normal condition, some gas vents through the gap between the shield cup and torch handle. Do not attempt to over tighten the shield cup as irreparable damage to internal components may result.

B. Torch Connection

Check that the torch is properly connected.

C. Check Primary Input Power Source

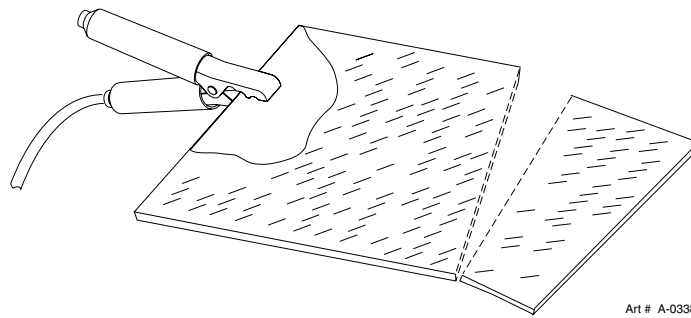
1. Check the power source for proper input voltage. Make sure the input power source meets the power requirements for the unit per Section 2, Specifications.
2. Connect the input power cable (or close the main disconnect switch) to supply power to the system.

D. Gas Selection

Ensure gas source meets requirements listed in section 2T. Check connections and turn gas supply on.

E. Connect Work Cable

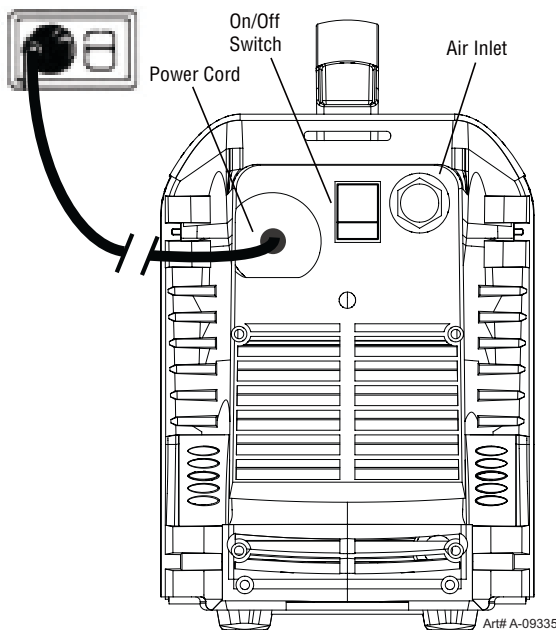
Clamp the work cable to the workpiece or cutting table. The area must be free from oil, paint and rust. Connect only to the main part of the workpiece; do not connect to the part to be cut off.



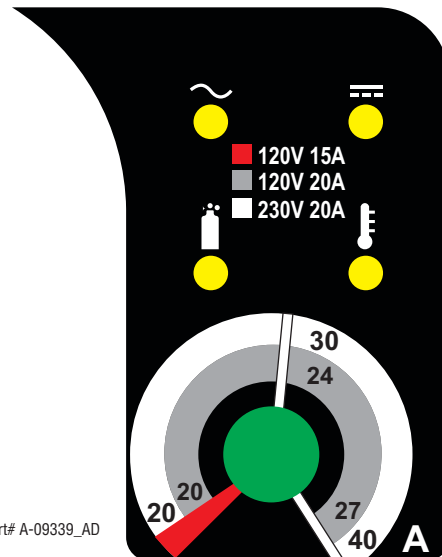
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F. Power On

Place the power supply ON / OFF switch to the ON (I) position. Power indicator turns on.



Rear Panel with ON/OFF Switch



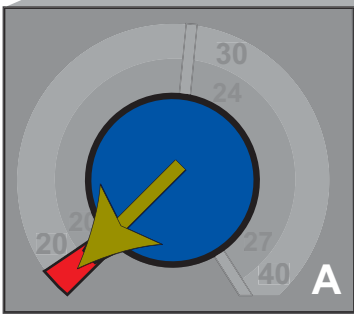
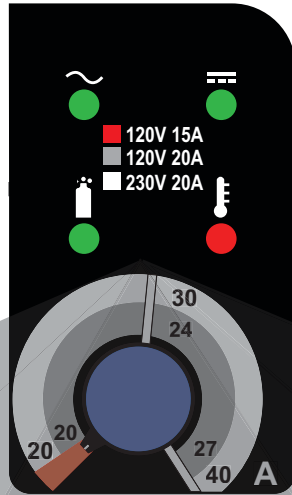
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Front Panel With Power ON/OFF Indicator

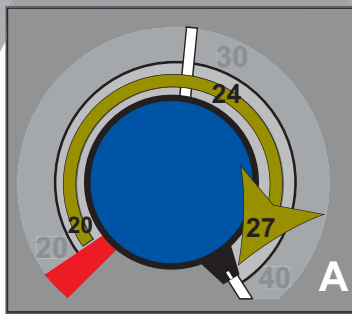
ESAB CUTMASTER 40

G. Select Current Output Level

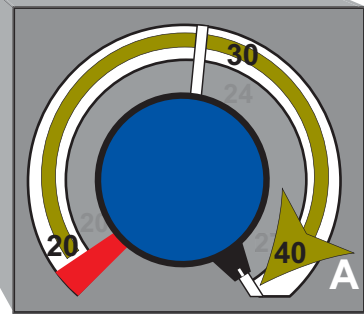
Set the desired current output level.



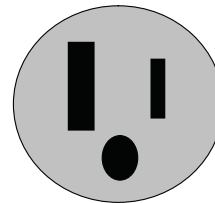
120V, 15A



120V, 20A




230V, 20A



A#09697_AA

4.03 Sequence of Operation

The following is a typical sequence of operation for this power supply.

1. Place the ON / OFF switch on the power supply to ON (up) position (Red indicator lamp is illuminated).
 - a. AC indicator  turns on; fan turns on.



NOTE!

During initial power up, there will be a delay of about 2 seconds before the AC Indicator light will illuminate and the pre-flow gas and fan starts. The gas will automatically flow from torch for approximately 10 seconds (only after the AC Indicator lamp is illuminated) (The AC Indicator lamp and fan turns on approximately 2 seconds after the ON/OFF switch is enabled), this is a process that makes sure all inputs (gas, input power, torch connection, and torch parts) are acknowledged for proper operation.

2. Wear protective clothing, including welding gloves and appropriate eye protection (see table 1-1). Place tip on work piece and pull trigger. Arc will initiate and start cutting material.

Standoff Cutting With Hand Torch



NOTE!

For best performance and parts life, always use the correct parts for the type of operation.

- A. The torch can be comfortably held in one hand or steadied with two hands. Position the hand to press the Trigger on the torch handle. With the hand torch, the hand may be positioned close to the torch head for maximum control or near the back end for maximum heat protection. Choose the holding technique that feels most comfortable and allows good control and movement.

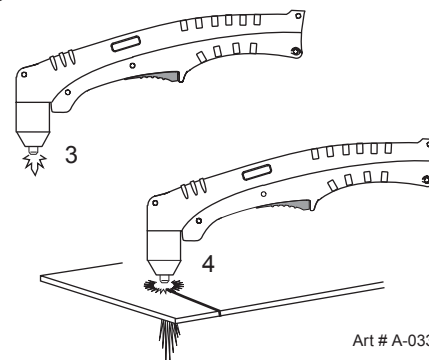
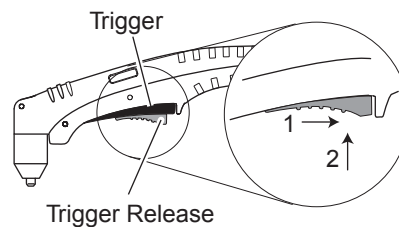
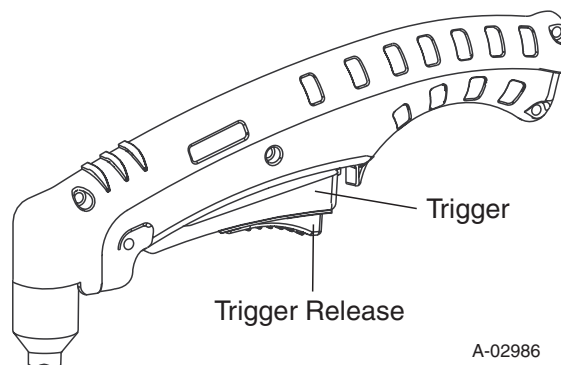
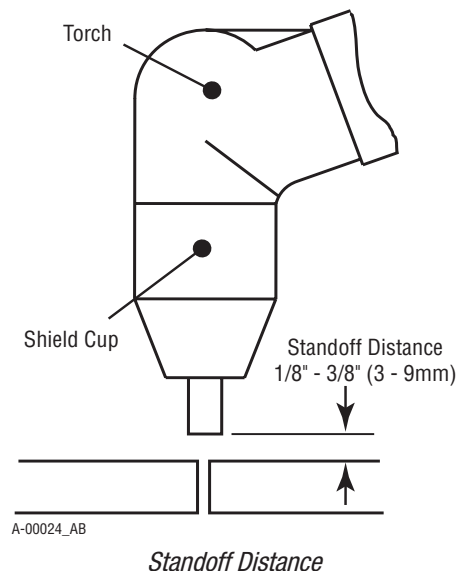


NOTE!

The tip should never come in contact with the workpiece except during drag cutting operations.

- B. Depending on the cutting operation, do one of the following:
 - a) For drag cutting, place the tip on the plate holding the torch at a angle to the plate so that only one edge of the tip is in contact with the plate. This prevents damage to the tip during the piercing process.

- b) For standoff cutting, hold the torch tip on the work piece, pull the trigger. After the arc is initiated lift the tip to 1/8" - 3/8" (3-4mm) off the work.



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NOTE!

When the shield cup is properly installed, there is a slight gap between the shield cup and the torch handle. Gas vents through this gap as part of normal operation. Do not attempt to force the shield cup to close this gap. Forcing the shield cup against the torch head or torch handle can damage components.

Drag Cutting With a Hand Torch

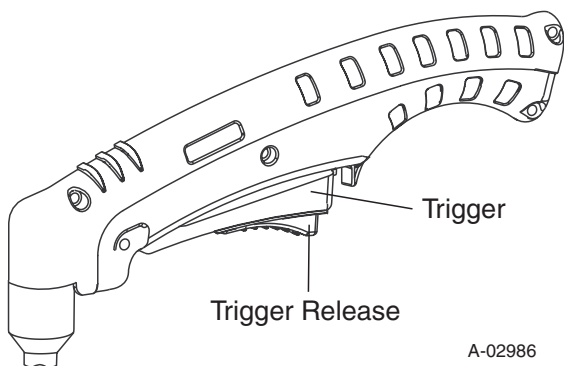
Drag cutting works best on metal 1/4" (6 mm) thick or less.



NOTE!

For best performance and parts life, always use the correct parts for the type of operation.

- A. Install the drag cutting tip and set the output current.
- B. The torch can be comfortably held in one hand or steadied with two hands. Position the hand to press the Trigger on the torch handle. With the hand torch, the hand may be positioned close to the torch head for maximum control or near the back end for maximum heat protection. Choose the holding technique that feels most comfortable and allows good control and movement.
- C. Keep the torch in contact with the workpiece during the cutting cycle.
- D. Hold the torch away from your body.
- E. Slide the trigger release toward the back of the torch handle while simultaneously squeezing the trigger. The arc will start.

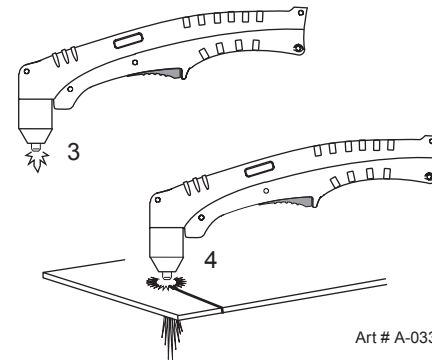
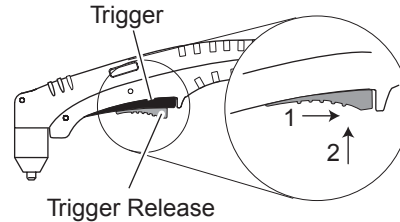


- F. Place the torch tip on the work. The main arc will transfer to the work.



NOTE!

The gas preflow and postflow are a characteristic of the power supply and not a function of the torch.




- G. Cut as usual. Simply release the trigger assembly to stop cutting.
 - H. Follow normal recommended cutting practices as provided herein.
3. Complete cutting operation.



NOTE!

If the torch is lifted too far from the workpiece while cutting, the main arc will stop and the pilot arc will automatically restart.

4. Release the torch trigger.
 - a. Main arc stops.
5. Set the power supply ON / OFF switch to OFF (down position).
 - a. AC indicator  turns OFF.
6. Set the main power disconnect to OFF, or unplug input power cord.
 - a. Input power is removed from the system.

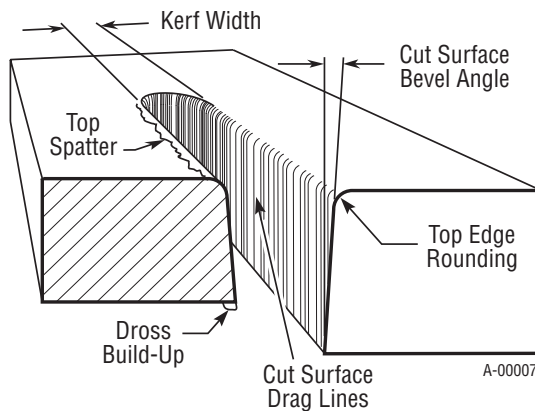
4.04 Cut Quality



NOTE!

Cut quality depends heavily on setup and parameters such as torch standoff, alignment with the workpiece, cutting speed, gas pressures, and operator ability. Refer to appendix pages for additional information as related to the power supply.

Cut quality requirements differ depending on application. For instance, nitride build-up and bevel angle may be major factors when the surface will be welded after cutting. Dross-free cutting is important when finish cut quality is desired to avoid a secondary cleaning operation. The following cut quality characteristics are illustrated in the following figure:



Cut Quality Characteristics

Cut Surface

The desired or specified condition (smooth or rough) of the face of the cut.

Nitride Build - Up

Nitride deposits can be left on the surface of the cut when nitrogen is present in the plasma gas stream. These buildups may create difficulties if the material is to be welded after the cutting process.

Bevel Angle

The angle between the surface of the cut edge and a plane perpendicular to the surface of the plate. A perfectly perpendicular cut would result in a 0° bevel angle.

Top - Edge Rounding

Rounding on the top edge of a cut due to wearing from the initial contact of the plasma arc on the workpiece.

Bottom Dross Buildup

Molten material which is not blown out of the cut area and resolidifies on the plate. Excessive dross may require secondary cleanup operations after cutting.

Kerf Width

The width of the cut (or the width of material removed during the cut).

Top Spatter (Dross)

Top spatter or dross on the top of the cut caused by slow travel speed, excess cutting height, or cutting tip whose orifice has become elongated.

4.05 General Cutting Information



WARNING

Disconnect primary power at the source before disassembling the power supply, torch, or torch leads.

Frequently review the Important Safety Precautions at the front of this manual. Be sure the operator is equipped with proper gloves, clothing, eye and ear protection. Make sure no part of the operator's body comes into contact with the workpiece while the torch is activated.



CAUTION

Sparks from the cutting process can cause damage to coated, painted, and other surfaces such as glass, plastic and metal.



NOTE!

Handle torch leads with care and protect them from damage.

Torch Standoff

Improper standoff (the distance between the torch tip and workpiece) can adversely affect tip life as well as shield cup life. Standoff may also significantly affect the bevel angle. Reducing standoff will generally result in a more square cut.

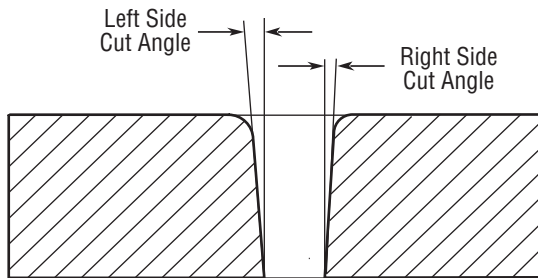
Edge Starting

For edge starts, hold the torch perpendicular to the workpiece with the front of the tip near (not touching) the edge of the workpiece at the point where the cut is to start. When starting at the edge of the plate, do not pause at the edge and force the arc to "reach" for the edge of the metal. Establish the cutting arc as quickly as possible.

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Direction of Cut

In the torches, the plasma gas stream swirls as it leaves the torch to maintain a smooth column of gas. This swirl effect results in one side of a cut being more square than the other. Viewed along the direction of travel, the right side of the cut is more square than the left.



Side Characteristics Of Cut

To make a square - edged cut along an inside diameter of a circle, the torch should move counterclockwise around the circle. To keep the square edge along an outside diameter cut, the torch should travel in a clockwise direction.

Dross

When dross is present on carbon steel, it is commonly referred to as either "high speed, slow speed, or top dross". Dross present on top of the plate is normally caused by too great a torch to plate distance. "Top dross" is normally very easy to remove and can often be wiped off with a welding glove. "Slow speed dross" is normally present on the bottom edge of the plate. It can vary from a light to heavy bead, but does not adhere tightly to the cut edge, and can be easily scraped off. "High speed dross" usually forms a narrow bead along the bottom of the cut edge and is very difficult to remove. When cutting a troublesome steel, it is sometimes useful to reduce the cutting speed to produce "slow speed dross". Any resultant cleanup can be accomplished by scraping, not grinding.

SECTION 5 SYSTEM: SERVICE

5.01 General Maintenance



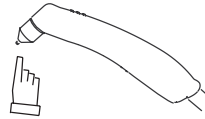
Warning!

There are extremely dangerous voltage and power levels present inside this product. Do not attempt to open or repair unless you are a qualified electrical tradesperson and you have had training in power measurements and troubleshooting techniques. If major complex subassemblies are faulty, then the Cutting Power Source must be returned to an Accredited Service Provider for repair.

Maintain more often if used under severe conditions

Each Use

Visual check of torch tip and electrode

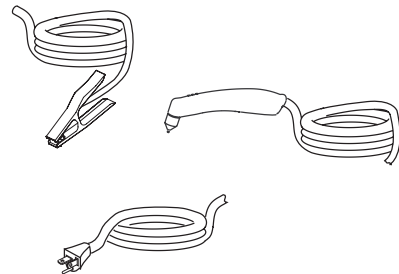


Weekly

Visually inspect the torch body tip, electrode, start cartridge and shield cup

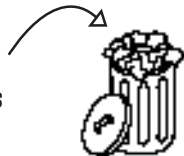


Visually inspect the cables and leads. Replace as needed

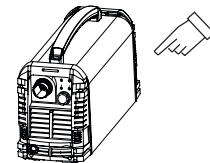


3 Months

Replace all broken parts

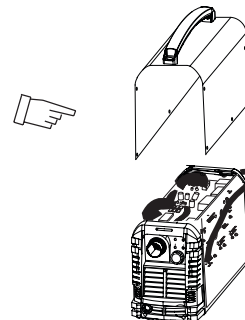


Clean exterior of power supply



6 Months

Visually check and Carefully clean the interior



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A. Every three months

Check external air filter, replace if necessary.

1. Shut off input power; turn off the gas supply. Bleed down the gas supply. Check air filter and replace if necessary.



NOTE!

Leave internal ground wire in place.

B. Every six months

1. Check the in-line air filter(s), clean or replace as required.
2. Check cables and hoses for leaks or cracks, replace if necessary.
3. Check all contactor points for severe arcing or pits, replace if necessary.
4. Vacuum dust and dirt out of the entire machine.

5.02 Basic Troubleshooting Guide



WARNING

There are extremely dangerous voltage and power levels present inside this unit. Do not attempt to diagnose or repair unless you have had training in power electronics measurement and troubleshooting techniques.

Common Faults symptom LED Indicators

A. AC indicator OFF

1. *Main input power cord does not connect to power distribution net.*
 - a. Connect the power cord.
2. *Power ON/OFF switch in OFF (down) position.*
 - a. Turn switch to ON (up) position.
3. *Actual input voltage does not correspond to voltage of unit.*
 - a. Verify that the input line voltage is correct.
4. *Faulty components in unit*
 - a. Return for repair or have qualified technician repair per service manual.

B. AC indicator blinking

1. *Indicator blinking (1 sec ON/1 Sec OFF, Gas may also pulse 3 times).*
 - a. Check for missing torch parts or not properly installed. Turn ON/OFF switch to OFF position and restart the machine by turning the power switch to ON.
2. *Indicator blinking (1 sec ON/3 Sec OFF).*
 - a. Check for worn or sticking torch parts. Replace if necessary.
3. *Indicator blinking (3 sec ON/3 Sec OFF).*
 - a. Torch switch was depressed before machine was completely powered up. Turn ON/OFF switch to OFF position and the restart the machine by turning the power switch to ON.

C. Air indicator OFF

1. *Gas pressure too low. Check supply pressure.*

D. TEMP indicator ON, (AC indicator ON)

1. *Unit air flow obstructed.*
 - a. Check for blocked air flow around the unit and correct condition.
2. *Fan blocked.*
 - a. Check for blocked status and correct condition.
3. *Unit is overheated.*
 - a. Keep the machine plugged in and turned on for five minutes. This will allow the fan to run and cool the machine.
4. *Faulty components in unit*
 - a. Return for repair or have qualified technician repair per service manual.

E. Torch will not pilot, when torch trigger is activated.

1. *Faulty parts in torch*
 - a. Check torch parts per section 4.02 and 6.04; replace as needed.
2. *Gas pressure too low*
 - a. Adjust supply pressure to proper setting value.
3. *Faulty tip in use*
 - a. In 115VAC operation, 40 Amp Tip is used which prevents the unit from piloting;
Replace with 20 Amp Tip.

4. *Faulty components in unit*
 - a. Return for repair or have qualified technician repair per service manual.

F. No cutting output when torch is activated; AC indicator ON, gas flows, fan turns.

1. *Torch is not connected properly to power supply.*
 - a. Check torch connection to power supply.
2. *Working cable not connected to work piece, or connection is poor.*
 - a. Make sure that work cable has a proper connection to a clean, dry area of the work piece.
3. *Faulty components in unit*
 - a. Return for repair or have qualified technician repair per service manual.
4. *Faulty torch*
 - a. Return for repair or have qualified technician repair.

G. Torch cuts but not adequately

1. *Incorrect setting of output current control*
 - a. Check and adjust to proper setting.
2. *Working cable connection to work piece is poor.*
 - a. Make sure that work cable has a proper connection to a clean, dry area of the work piece.
3. *Faulty components in unit*
 - a. Return for repair or have qualified technician repair.

H. Output is restricted, and can not be controlled.

1. *Input or output connection is poor.*
 - a. Check all input and output connection leads.
2. *Working cable connection to work piece is poor.*
 - a. Make sure that work cable has a proper connection to a clean, dry area of the work piece.
3. *Faulty components in unit*
 - a. Return for repair or have qualified technician repair per service manual.

I. Cutting output is unstable or inadequate at 120V operation.




1. *Low or fluctuating input voltage*
 - a. Turn output current to minimum (20 amps) and suggest using 20A Drag tip.
 - b. Connect to a dedicated input line voltage.
 - c. Have electrician check input line voltage under load.
2. *Input or output connection is poor*
 - a. Check all input and output connection leads.
3. *Working cable connection is poor.*
 - a. Make sure that work cable has a proper connection to a clean, dry area of the work piece.

J. Hard to startup

1. *Torch parts worn (consumables)*
 - a. Turn off input power, remove shield cup, tip, start cartridge, and electrode and check them all. If the electrode or cutting tip is worn out, replace them. If the start cartridge does not move freely, replace it. If there is too much spatter on shield cup, replace it.

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K. Arc goes out while operating. Arc can't be restarted when torch trigger is activated.

1. *Power Supply is overheated (TEMP indicator  ON).*
 - a. Let unit cool down for at least 5 minutes. Make sure the unit has not been operated beyond duty cycle limit.
2. *Fan blades blocked (TEMP indicator  ON).*
 - a. Check and clear blades.
3. *Air flow blocked*
 - a. Check for blocked air flow around the unit and correct condition.
4. *Gas pressure is too low. (Air indicator  ON when torch trigger is activated.)*
 - a. Check gas source. Adjust to proper setting value.
5. *Torch parts worn*
 - a. Check torch shield cup, cutting tip, start cartridge and electrode. Replace as needed.
6. *Faulty component in unit*
 - a. Return for repair or have qualified technician repair per service manual.

L. Torch cuts but not well.

1. *Current control is set too low.*
 - a. Increase the current setting.
2. *Torch is being moved too fast across work piece*
 - a. Reduce cutting speed.
3. *Excessive oil or moisture in torch*
 - a. Hold torch 1/8 inch (3 mm) from clean surface while purging and observe oil or moisture buildup (do not activate torch). If there are contaminants in the gas, additional filtering may be needed.
4. *Torch parts worn*
 - a. Check torch shield cup, cutting tip, start cartridge and electrode. Replace as needed.

M. Gas in torch pulsates 3 times and then stops. AC indicator light blinking.

1. *Torch parts not properly installed in torch. There may have been an attempt to remove torch parts without turning off ON/OFF power switch to OFF on unit.*
 - a. Check to make sure torch parts are properly installed.
 - b. Turn ON/OFF switch to OFF and then back to ON.
 - c. Check Start Cartridge to make sure the copper slider (or nozzle) moves in and out freely.

SECTION 5 TORCH: SERVICE

5T.01 General Maintenance



NOTE!

Refer to Previous "Section 5: System" for common and fault indicator descriptions.

Cleaning Torch

Even if precautions are taken to use only clean air with a torch, eventually the inside of the torch becomes coated with residue. This buildup can affect the arc initiation and the overall cut quality of the torch.



WARNING

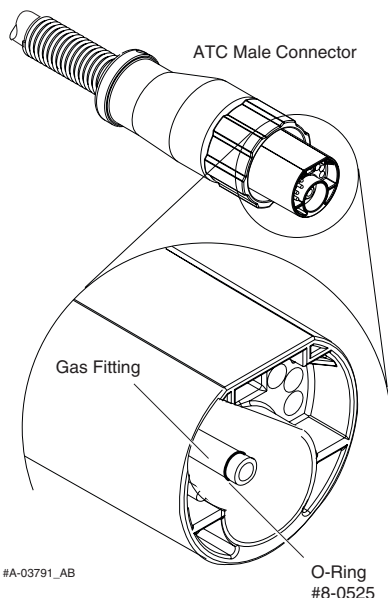
Disconnect primary power to the system before disassembling the torch or torch leads.
DO NOT touch any internal torch parts while the AC indicator light of the Power Supply is ON.

The inside of the torch should be cleaned with electrical contact cleaner using a cotton swab or soft wet rag. In severe cases, the torch can be removed from the leads and cleaned more thoroughly by pouring electrical contact cleaner into the torch and blowing it through with compressed air.



CAUTION

Dry the torch thoroughly before reinstalling.



Art #A-03791_AB

O-Ring #8-0525

5T.02 Inspection and Replacement of Consumable Torch Parts



WARNING

Disconnect primary power to the system before disassembling the torch or torch leads.
DO NOT touch any internal torch parts while the AC indicator light of the Power Supply is ON.

Remove the consumable torch parts as follows:



NOTE!

DO NOT use other lubricants or grease, they may not be designed to operate within high temperatures or may contain "unknown elements" that may react with the atmosphere. This reaction can leave contaminants inside the torch. Either of these conditions can lead to inconsistent performance or poor parts life.

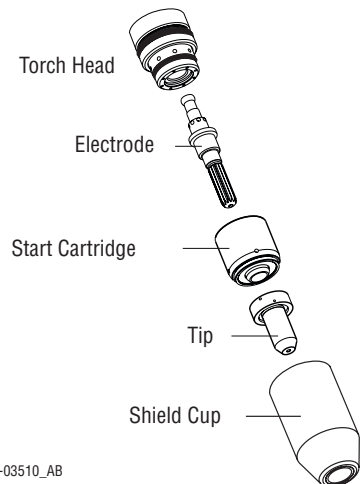
1. Unscrew and remove the shield cup from the torch.



NOTE!

Slag built up on the shield cup that cannot be removed may effect the performance of the system.

2. Inspect the cup for damage. Wipe it clean or replace if damaged.

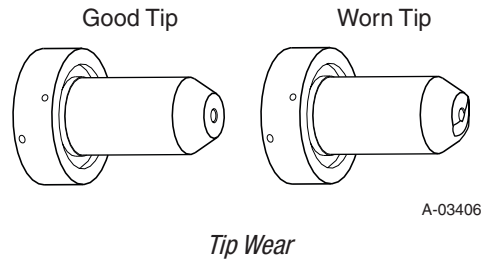


A-03510_AB

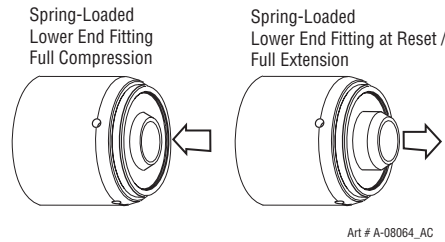
Consumable Parts

ESAB CUTMASTER 40

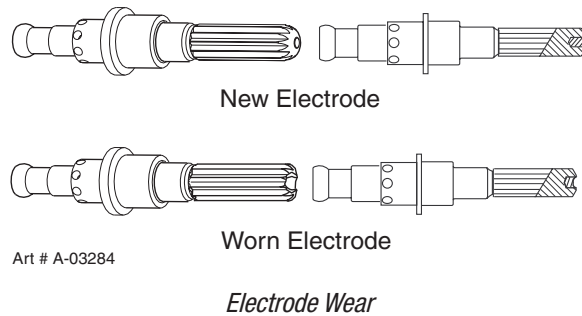
3. Remove the tip. Check for excessive wear (indicated by an elongated or oversized orifice). Clean or replace the tip if necessary.



4. Remove the starter cartridge. Check for excessive wear, plugged gas holes, or discoloration. Check the lower end fitting for free motion. Replace if necessary.



5. Pull the electrode straight out of the torch head. Check the face of the electrode for excessive wear. Refer to the following figure.



6. Reinstall the electrode by pushing it straight into the torch head until it clicks.
7. Reinstall the desired starter cartridge and tip into the torch head.
8. Hand tighten the shield cup until it is seated on the torch head. If resistance is felt when installing the cup, check the threads before proceeding.

SECTION 6: PARTS LISTS

6.01 Introduction

A. Parts List Breakdown

The parts list provides a breakdown of all replaceable components.

B. Returns

If a product must be returned for service, contact your distributor. Materials returned without proper authorization will not be accepted.

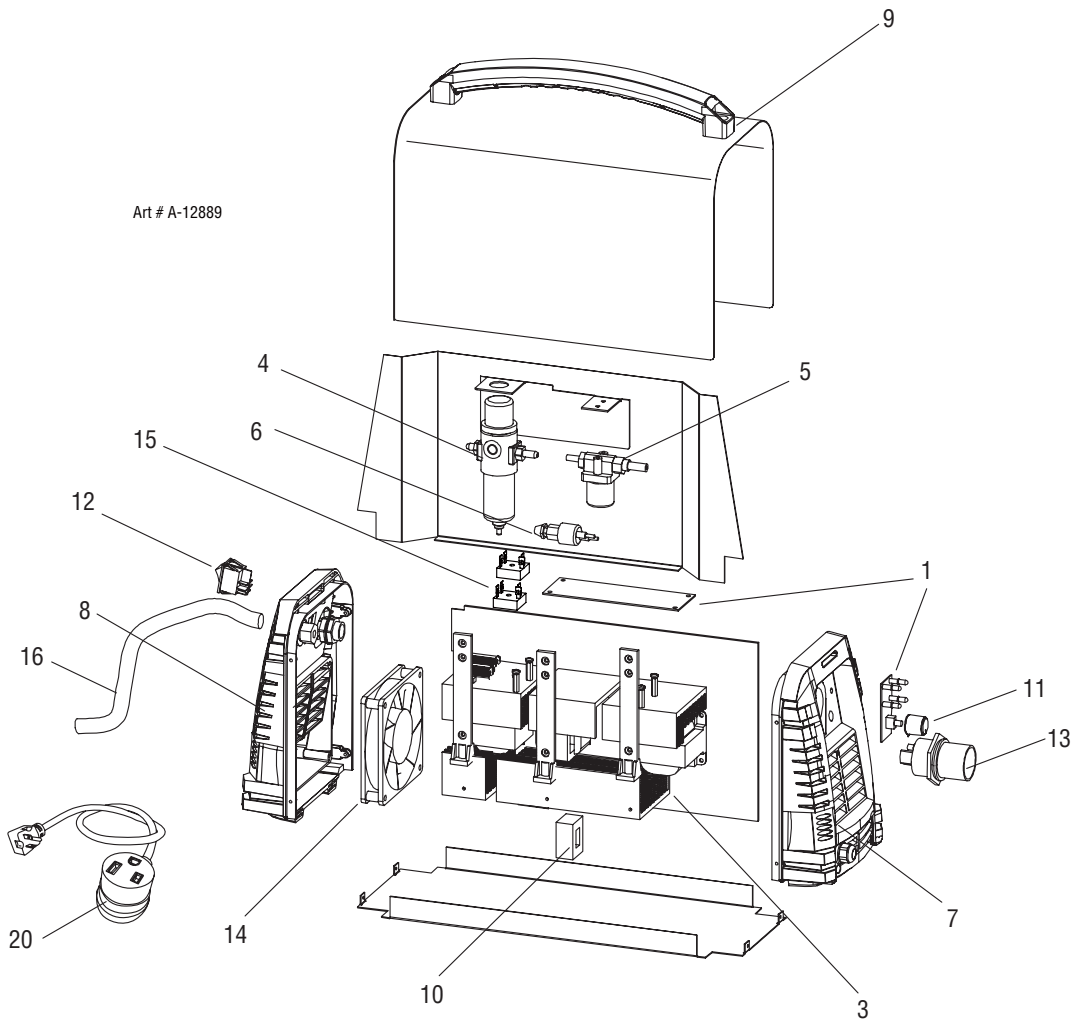
C. Ordering Information

Order replacement parts by catalog number and complete description of the part or assembly, as listed in the parts list for each type item. Also include the model and serial number of the torch. Address all inquiries to your authorized distributor.

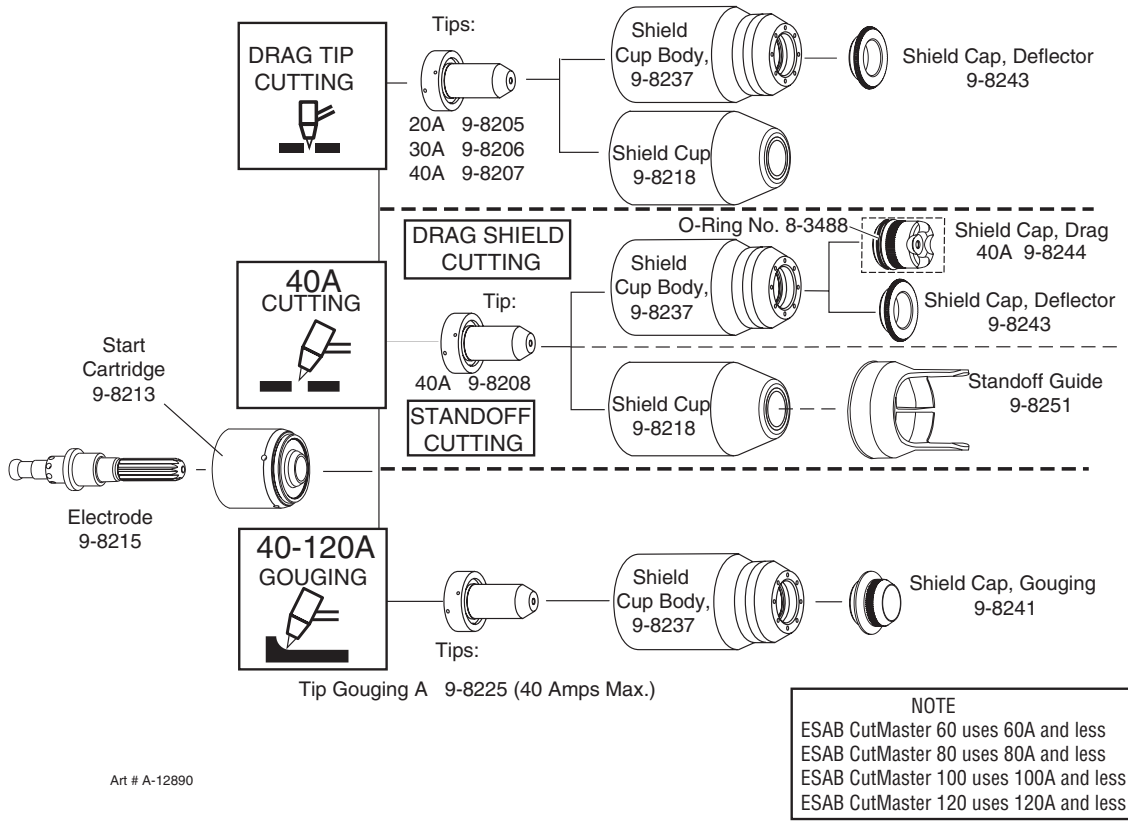
ESAB CUTMASTER 40

6.02 Power Supply Replacement Parts

Item #	Qty.	Description	Catalog #
1	1	Control and Logic PCB assembly	9-0077
3	1	Main PCB assembly	9-0079
4	1	Regulator	9-0081
5	1	Solenoid assembly	9-0082
6	1	Pressure Switch	9-0075
7	1	Front Panel with Label	9-0071E
8	1	Rear Panel with Label	9-0072E
9	1	Cover with Labels	9-0080E
10	1	Hall Current Sensor	9-0088
11	1	Cutting Control Knob	9-0073
12	1	On/Off Switch	9-0074
13	1	ATC Connection	9-0083
14	1	Fan	9-0042
15	1	AC/DC Rectifier	9-0049
16	1	Power Cord	9-0025
17	1	Carry Case (not shown)	9-0084E
18	1	Gloves (not shown)	9-0086
19	1	Glasses (not shown)	9-0087
20	1	120VAC Adapter, 15A	W4014000



6.03 SL60 Torch Consumable Parts



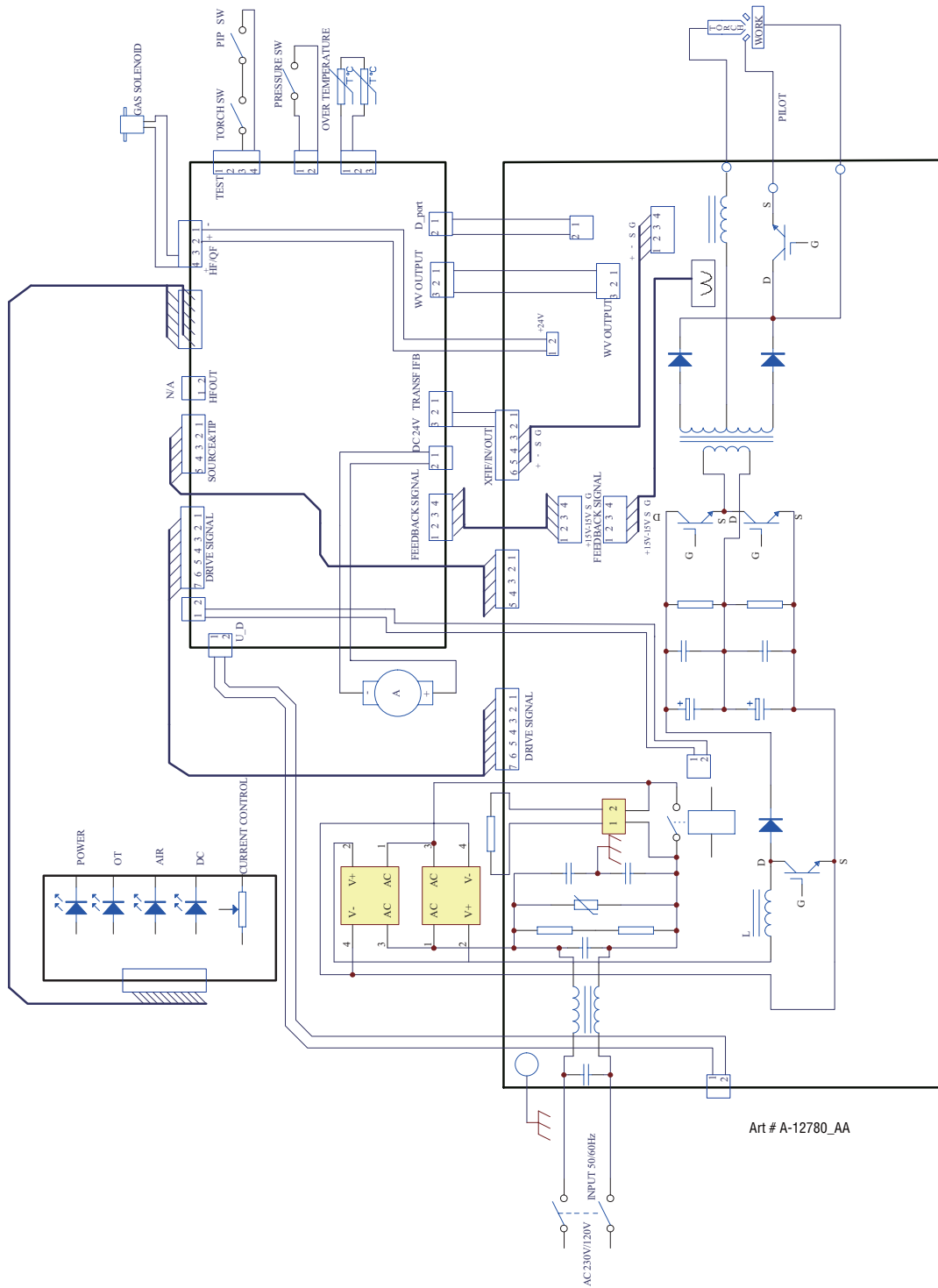
Art # A-12890

ESAB CUTMASTER 40

6.04 Optional Accessories

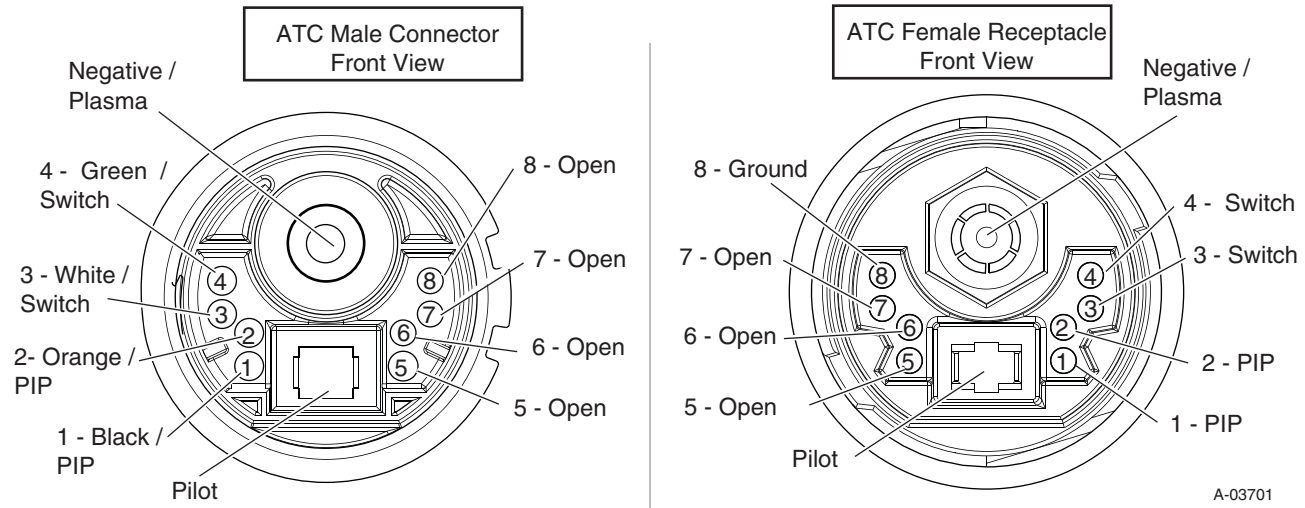
Description	Cat. No.
Circle Cutting Guide Kit,	7-3291
Radius/Roller Cutting Guide Kit	7-7501
Single stage air filter Kit	7-7507
Filter Body	9-7740
Hose, single stage air filter	9-7742
Filter Element, single stage air filter	9-7741
Two Stage Air Filter	9-9387
First Stage Element, two stage filter	9-1021
Second Stage Element, two stage filter	9-1022

APPENDIX 1: ESAB CUTMASTER 40 CIRCUIT DIAGRAM



APPENDIX 2: SL60 TORCH PIN-OUT DIAGRAM

A. Hand Torch Pin-Out Diagram



Revision History

Date	Rev	Description
01/15/2015	AA	Manual release

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