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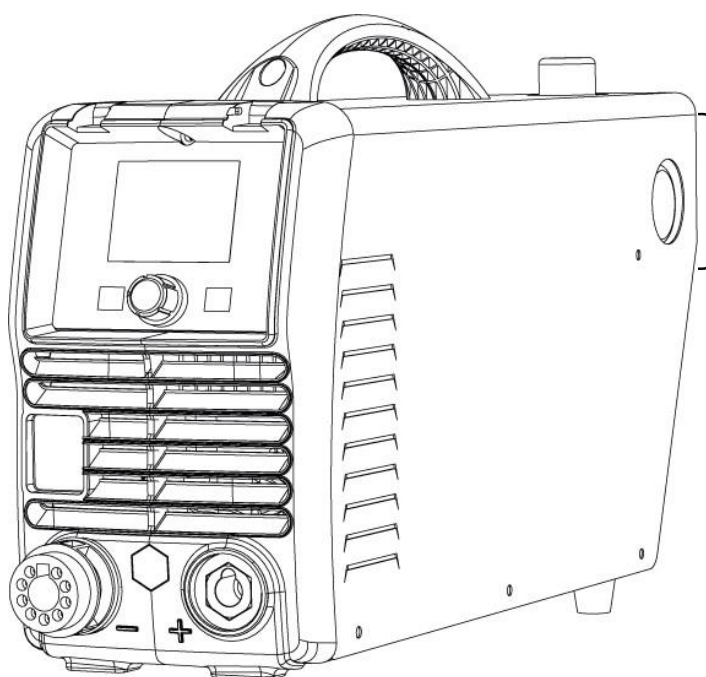


Processes

Plasma

110-240VAC

Plasma 40 LCD Inverter System



Operator Manual

IMPORTANT: Read this Owner's Manual Completely before attempting to use this equipment. Save this manual and keep it handy for quick reference. Pay particular attention to the safety instructions we have provided for your protection. Contact your distributor if you do not fully understand this manual.

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§1 SAFETY

Important Safety Precautions



OPERATION AND MAINTENANCE OF PLASMA ARC EQUIPMENT CAN BE DANGEROUS AND HAZARDOUS TO YOUR HEALTH.

Plasma arc cutting produces intense electric and magnetic emissions that may interfere with the proper function of cardiac pacemakers, hearing aids, or other electronic health equipment. Persons who work near plasma arc cutting applications should consult their medical health professional and the manufacturer of the health equipment to determine whether a hazard exists.

To prevent possible injury, read, understand and follow all warnings, safety precautions and instructions before using the equipment.



GASES AND FUMES

Gases and fumes produced during the plasma cutting process can be dangerous and hazardous to your health.

- Keep all fumes and gases from the breathing area. Keep your head out of the cutting fume plume.
- Use an air-supplied respirator if ventilation is not adequate to remove all fumes and gases.
- The kinds of fumes and gases from the plasma arc depend on the kind of metal being used, coatings on the metal, and the different processes. You must be very careful when cutting or cutting any metals which may contain one or more of the following:

Antimony	Chromium	Mercury	Beryllium
Arsenic	Cobalt	Nickel	Lead
Barium	Copper	Selenium	Silver
Cadmium	Manganese	Vanadium	

Always read the Material Safety Data Sheets (MSDS) that should be supplied with the material you are using. These MSDSs will give you the information regarding the kind and amount of fumes and gases that may be dangerous to your health.

- Use special equipment, such as water or down draft cutting tables, to capture fumes and gases.
- Do not use the plasma torch in proximity to combustible or explosive gases or materials.
- Phosgene, a toxic gas, is generated from the vapors of chlorinated solvents and cleansers. Remove all sources of these vapors.



ELECTRIC SHOCK

Electric Shock can injure or kill. The plasma arc process uses high voltage electrical energy. This electric energy can cause severe or fatal shock to the operator or others in the workplace.

- Never touch any parts that are electrically “live” or “hot.”
- Wear dry gloves and clothing. Insulate yourself from the work piece and live torch parts.
- Repair or replace all worn or damaged parts.
- Extra care must be taken when the workplace is moist or damp.
- Disconnect power source before performing any service or repairs.
- Read and follow all the instructions in the Operating Manual.



FIRE AND EXPLOSION

Fire and explosion can be caused by hot slag, sparks, or the plasma arc.

- Be sure there is no combustible or flammable material in the workplace.

-
- Ventilate all flammable or explosive vapors from the workplace.
 - Do not cut or weld on containers that may have held combustibles.
 - Provide a fire watch when working in an area where fire hazards may exist.
 - Hydrogen gas may be formed and trapped under aluminum work-pieces when they are cut underwater or while using a water table. DO NOT cut aluminum alloys underwater or on a water table unless the hydrogen gas can be eliminated or dissipated. Trapped hydrogen gas that is ignited will cause an explosion.



NOISE

Noise can cause permanent hearing loss. Plasma arc processes can cause noise levels to exceed safe limits. Operator must protect ears to prevent permanent loss of hearing.

- Operator should wear protective ear plugs and/or earmuffs. Protect others in the workplace.
- Noise levels should be measured to be sure the decibels (sound) do not exceed safe levels.



PLASMA ARC RAYS

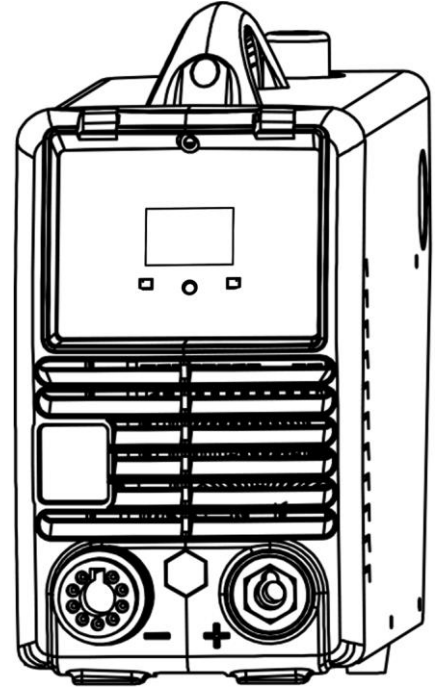
Plasma Arc Rays can injure your eyes and burn your skin. These arc rays will damage your eyes and burn your skin if you are not properly protected.

- Wear safety glasses with specified UV/IR DIN 1.7-6.0 with side shields other protective eye wear.
- Wear cutting gloves and suitable clothing to protect your skin from the arc rays and sparks.
- Keep helmet and safety glasses in good condition. Replace lenses when cracked, chipped or dirty.
- Protect others in the work area from the arc rays. Use protective booths, screens or shields.

§2 Technology Parameters

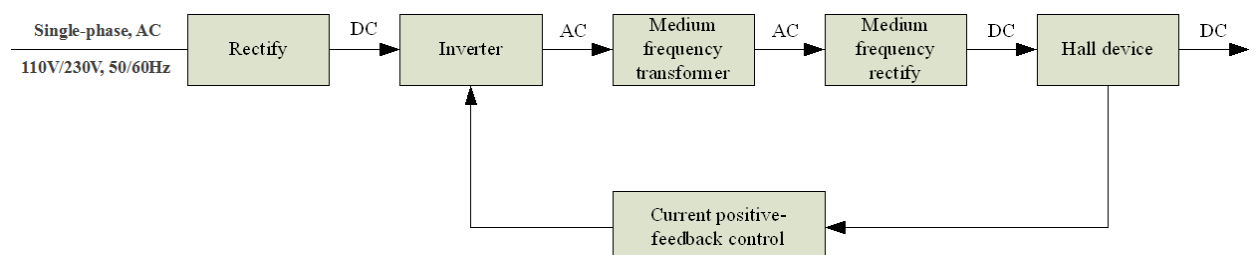
§2.1 Features

1. PFC technology provides dual input voltage allowing operation on 115 & 230 VAC line power outlets.
2. LCD screen for accurate setting & status.
3. Power factor rating > 0.99 provides high electrical efficiency and energy saving.
4. IGBT parallel balanced current technology and digital control technology.
5. EMI filter restrains the EMI transmission to the LINE power and other shop equipment.
6. Pilot-Arc ignition starts without high-frequency, increases cutting speeds and improves tip life. Grid cutting mode for applications without loss of arc.



§2.2 Working Principle

The working principle of Plasma 40 LCD Plasma Cutting Machine is shown as the following figure. Single-phase 110V/240VAC / 50/60Hz is rectified into DC (about 530V), then it is converted to medium frequency AC (about 20 KHz) by inverter device (discrete IGBT), after reducing voltage by medium transformer (the main transformer) and rectified by medium frequency rectifier (fast recovery diode) and is outputted by inductance filtering. The circuit adopts current feedback control technology to insure current output stably.



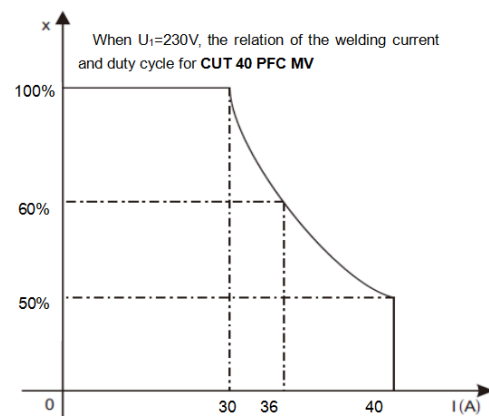
§2.3 Technical Data

Models	PLASMA 40LCD	
Parameters		
Rated input voltage (V)	1-110±10%	1-230±10%
Frequency (HZ)	50/60	
Rated input current (A)	28.7	18
Rated input power (KW)	3.2	4.1
Cutting current (A)	20~30	20~40
No-load voltage (V)	329.1	328.8
Duty cycle (40℃ 10minutes)	100% 30A	50% 40A 60% 36A 100% 30A
Severance Cut for Carbon Steel (mm)	= 18	= 20
Carbon steel	= 14	= 15
Stainless steel	= 14	= 15
Aluminum	= 14	= 20
Cuprum	= 5	= 10
Dimensions (mm)	510*146*278	
Protection class	IP21S	
Circuit breaker	JD03-A1 30A	
Net weight (kg)	7.6	
Cooling method	AF	

Note: The above parameters are subject to change with the improvement of machines.

§2.4 Duty Cycle and Over-heat

The “X” axis represents Duty Cycle, which is defined as the portion of the time a welding machine can weld at maximum rated output current within a 10-minute cycle. Additionally, this operation must be performed at 104° F ambient temperature to pass CSA / UL requirements.



If the plasma machine is operated beyond the rated duty-cycle, the IGBT heat sensor will send a signal to the machine control unit to switch the output cutting current OFF and illuminate the over-heat LED. The machine should not be operated for 10~15 minutes to allow cool down. When operating the machine again, the cutting output current should be reduced to match the duty cycle.

§3 Inspection & Installation

3.1 Unpacking & Inspection

Identify and account for each item per the following list:

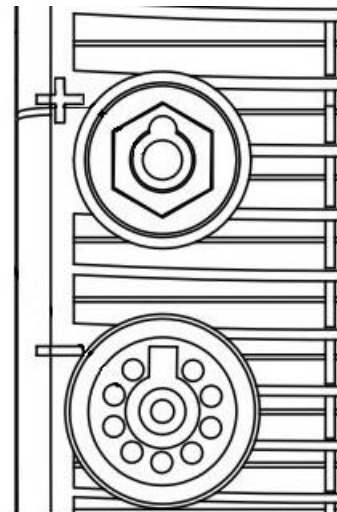
- 1) Plasma 40LCD power source (with NEMA6-50 power cord and compressed air regulator/dryer)
- 2) NPT48 Plasma Torch (with central adaptor cable connector)
- 3) Earth Clamp Cable (with 200-amp clamp and 25-10 cable connector)
- 4) NEMA 5-15P Adaptor cord for 115VAC power
- 5) Spare Consumables (with 3 spare Electrodes and 5 spare Cutting tips)
- 6) Operator Manual

Inspect each item for possible shipping damage. If damage is evident, contact your distributor and / or shipping company before proceeding with the installation.

3.2 Plasma Torch & Earth Clamp Connections

Install the earth clamp cable by inserting the brass plug into the female socket (+) on the front panel being certain to align the tab with the channel and “TWIST-LOCK” into place to secure.

Install the NPT48 plasma torch by first removing the plastic cap on the brass machine plug. Insert the plug into the female socket (-) on the front panel being certain to align the collar with the pin detents. Screw locking collar in place to secure torch.

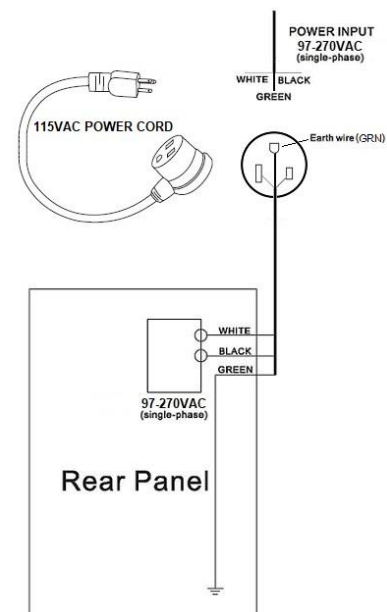


3.3 Input Power Connections

The Plasma 40LCD cutting machine features electronic switching power supply allowing it to be connected to any 110-240VAC, 1-Phase LINE power outlet.

208-240VAC LINE CONNECTION: Machine is provided with NEMA 6-50P LINE Service cord to be plugged into any 6-50R outlet with 208-240VAC, single-phase power and **35+ amp circuit breaker**.

110-120VAC LINE CONNECTION: Machine is provided with NEMA 6-50R to NEMA 5-15P Adaptor cord. This allows the machine to be plugged into 5-15R standard outlet with **20+ amp (Min.) circuit breaker**.



NOTICE: In the event NEMA6-50R or 5-15R outlets, with rated circuit breaker amperage are not available, they should be installed by a licensed electrician in accordance with national & local codes.

In the event LINE power supply is over voltage (>245) or under voltage (<195), protection circuit inside the machine will illuminate alarm light and current will be cut off.

If the power supply voltage continually goes beyond the safe work voltage range, it will shorten the life of the machine. If this occurs, the below measures should be taken:

- Change the LINE power supply. Such as, connect the welder to a dedicated circuit.
- Shut off other machines using LINE power supply at the same time as welding.

WARNING: Any modification or removal of factory installed service power cords will VOID MACHINE WARRANTY!

3.4 Input Gas Connections

The Plasma 40LCD plasma cutter is supplied with a compressed air filter/dryer and adjustable air flow knob. The air hose from the compressor should be connected directly to this air regulator. Connecting additional regulator in-line can reduce air flow to the cutting torch and damage the system.

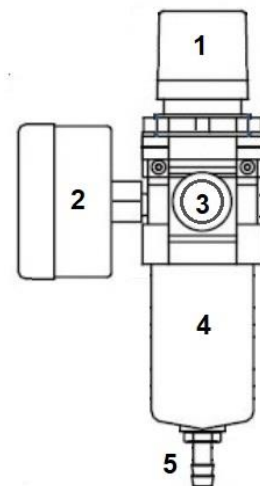
The pressure regulator should be set **~60-75 psi (4.55-5.3 KGf/cm²)** and flow rate should be 210 SCFH (100 lpm) minimum with 1/4" (6mm) minimum hose diameter at 1/4G regulator input.

WARNING: Maximum INPUT Line air pressure not to exceed 125PSI (8.8 KGf/cm²)

Air Regulator / Dryer with Pressure Gauge

The shop airline is to be connected to the air regulator located on the back of the plasma cutter. A customer supplied quick-connect fitting is commonly used.

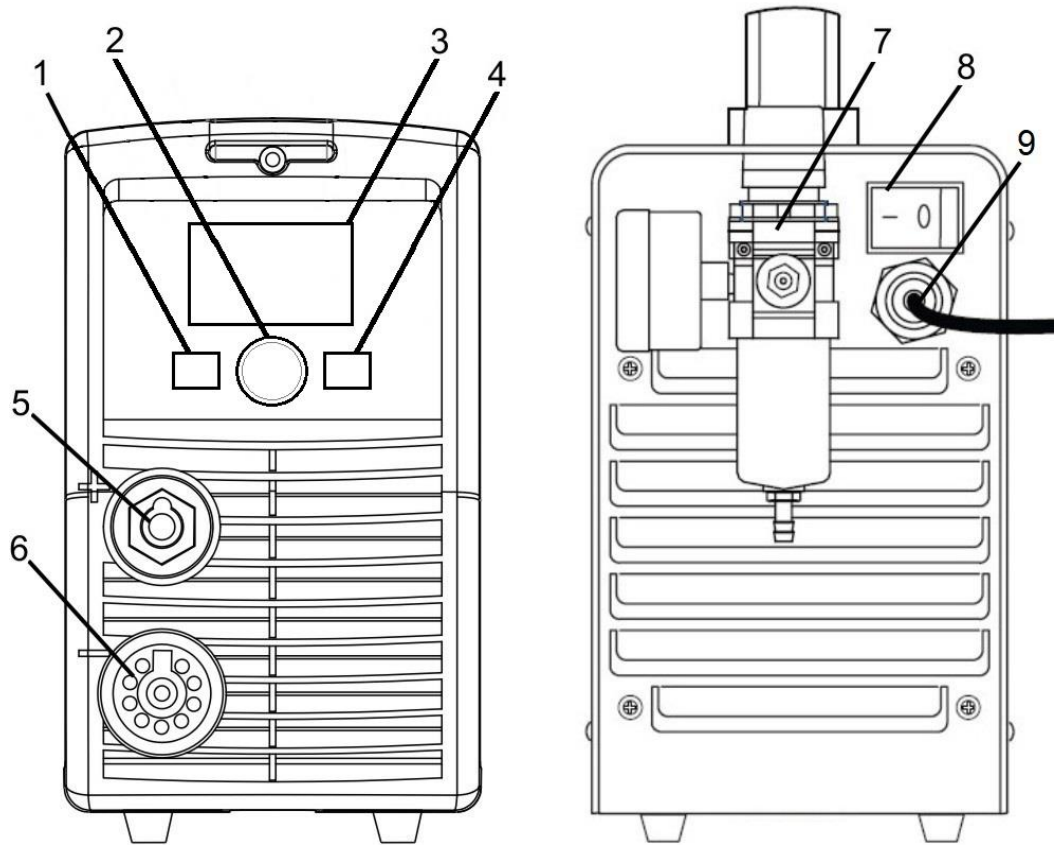
- 1) **Adjustment Knob:** Pull knob "up" to adjust air pressure setting. Once set at desired output, press "down" to lock in set position.
- 2) **Air Pressure Gauge:** Displays the output air pressure setting.
- 3) **Air Line INPUT:** Female fitting for **1/4NPT** threaded hose fitting.
- 4) **Filter Bowl:** Clear display of moisture captured from the air line.
- 5) **Drain Valve:** Push fitting upward to release water & oil from bowl being careful to keep hose in place so contents are not pulled into the plasma cutter by the cooling fan.



WARNING: Power OFF when draining bowl!!!

§4 Set-Up & Operation

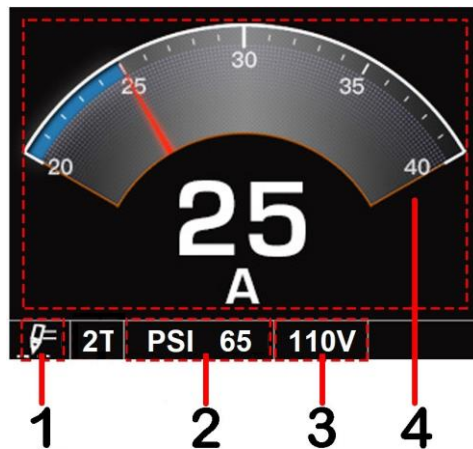
4.1 Layout of Front and Rear Panel



- | | |
|------------------------|---|
| 1. SET Touch Pad | Push to select cutting mode of STANDARD or GRID. |
| 2. Current Regulator | Allows operator adjustment of output cutting current. |
| 3. Display Screen | LCD displays cutting mode, air pressure, input voltage, output amps & alarm |
| 4. AIR Touch Pad | Push to purge compressed air through plasma torch |
| 5. Earth Socket (+) | Connect earth clamp cable from machine to work-piece |
| 6. Torch Socket (-) | Connect plasma cutting torch cable to the power source |
| 7. Air Regulator/Dryer | Connect compressed shop air hose to regulator (3.4) |
| 8. Power switch | Flip toggle to turn line power ON or OFF to machine |
| 9. Power cord | Connected plug end to the appropriate power outlet (3.3) |

4.2 Display Functions

4.2.1 Standard Display



- | | |
|-------------------|---|
| 1. Cutting Mode: | Displays STANDARD or GRID plasma cutting icon. |
| 2. Air Pressure: | Displays regulator adjusted torch air pressure in PSI. |
| 3. Input Voltage: | Displays input voltage from power cord plug to LINE power. |
| 4. Output Amps: | Displays cutting torch output amps as selected by operator. |

4.2.2 Alarm Error Displays

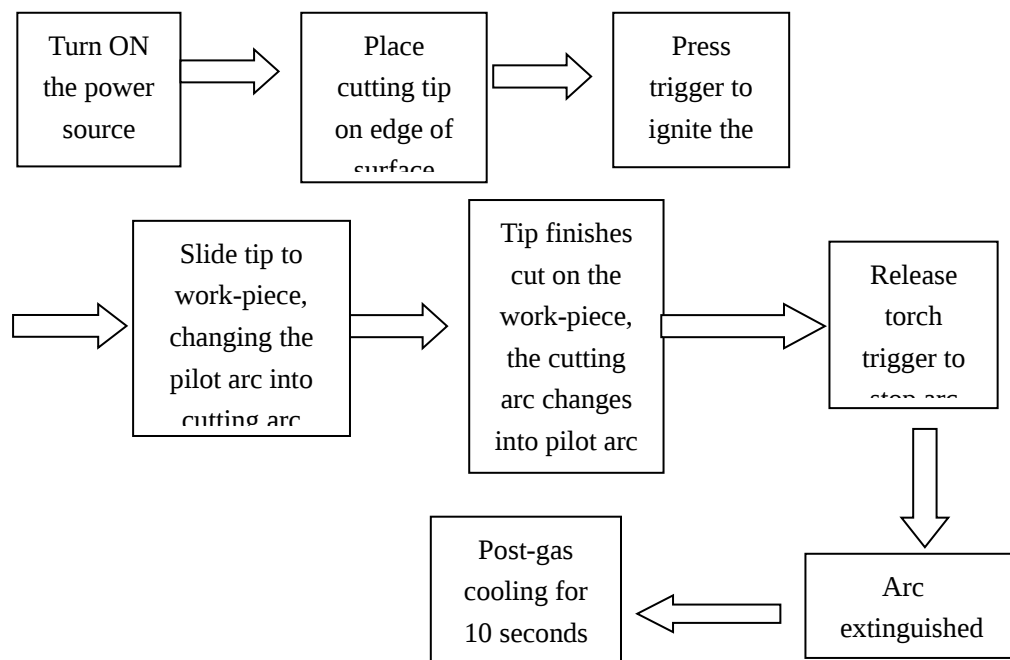


- | | |
|-------------------------------|--|
| 1. Undervoltage: | Correct line power problem (extension cord?) until the alarm display OFF, then press trigger to start cutting again. |
| 2. Overtemp: | Allow unit to cool until the alarm display OFF, then press trigger to start cutting again. |
| 3. Lack of Gas: | Correct air line supply issue (connection?) until the alarm display OFF, then press trigger to start cutting again. |
| 4. Torch Disconnected: | Shield cup is removed from torch head or torch connector is not installed properly. Shield cup and/or torch connector must be re-installed securely in place for alarm display OFF, then press trigger to start cutting again. |

4.3 Machine Set-Up

- 1、 Connect the power cable to electrical outlet (the input voltage, refer to the section 3.3).
- 2、 Connect the air hose to the shop air supply and the input air fitting on the regulator. Be sure all connections are sealed. Set machine air pressure to ~60-70 psi (4.2 bar).
- 3、 Connect the earth cable to the workpiece not being removed with cut.
- 4、 Make certain operator is wearing proper safety glasses (1.7-6.0 DIN) gloves and protective clothing.
- 5、 Make certain work area is clean and free of all hazardous liquids & gases.
- 6、 Turn ON the power switch and check the power pilot lamp is illuminated continuously.
- 7、 **Push AIR button and hold down for 30 seconds** to purge any moisture from the torch and cable.
- 8、 Push SET button to STD or GRID and machine is ready to cut.

4.4 Cutting Operation



§4.5 Operation Environment

- ▲ Height above sea level $\leq 3,200$ Ft. (1000 M). Air density will affect cutting performance.
- ▲ Operation temperature range: 14~104°F (-10 ~ +40°C) with humidity below 90%.
- ▲ Preferable set the machine on a **clean** level surface (+/- 15°) above the floor level to insure cooling fan does not intake (suction) dirt, dust or other particles into the power supply.
- ▲ Protect the machine against high moisture, rain, water and against direct sunshine.
- ▲ Take care that there is sufficient ventilation during cutting. There must be at least 1-1/2" (38cm) free distance between the machine and wall.

§4.6 Operation Notices

- ▲ Read Section §1 carefully before starting to use this equipment.
- ▲ Ensure that the input voltage is 110V-240VAC, single-phase: 50/60Hz.
- ▲ Before operation, clear the working area. Do not watch the arc in unprotected eyes.
- ▲ Ensure good ventilation of the machine to improve duty cycle and life.
- ▲ Turn off power supply when the operation finished for energy consumption efficiency.
- ▲ When power switch shuts off protectively because of failure. Do not restart until problem has been resolved. Otherwise, permanent damage could occur.
- ▲ In case of problems, contact your local dealer.

4.6 Operation Maintenance

- ▲ Read Section §1 carefully before starting to use this equipment.
Ensure that the input voltage is 110V-240VAC, single-phase: 50/60Hz.
- ▲ Before operation, clear the working area. Do not watch the arc without welding DIN rated safety glasses, goggles or helmet.

§5 Trouble Shooting

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 repair techniques.

§5.1 Machine Troubleshooting

A. Machine is ON, the screen is illuminated, but both fan and the air are not functioning.

1. Power line problem: Check input power cords, plug and wall receptacle.
2. Main board failure: Please contact your Dealer or qualified technician.

B. Machine ON, the screen display “Undervoltage”.

Air pressure is too low. Adjust to 70 psi (5.0 bar).

Line voltage is too low. Remove any extension cord. Have electrician confirm LINE voltage.

C. Machine ON, the screen display “Over Heat”.

1. Air flow blocked, check for blocked air flow around the unit and correct condition.
2. Fan blocked, check fan and correct condition.
3. The machine is over-heated, let it cool down for at least 5 minutes. Make sure the machine has not been operated beyond the Duty Cycle (refer to technology parameters in Section 2).
4. Input voltage over or under the required range, choosing the proper voltage (refer to technology parameters in the Section). Remove any extension cord on power supply.
5. Faulty components in the machine. Please contact your Dealer or qualified technician.

§5.2 Torch Troubleshooting

A. Torch failed to ignite the arc when torch is triggered.

1. The system is set in “Air Check” mode. Reset to cut mode.
2. Faulty or worn torch consumables, inspect torch parts and replace if necessary.
3. Air pressure is too high or too low, adjust it to proper state.

B. Difficult starting

1. The swirl ring (gas distributor) is missing inside shield cap. Replace.
2. Worn torch parts (consumables), shut off input power. Remove and inspect torch shield cup, tip, swirl ring and electrode. Replace electrode or tip if worn; replace swirl ring if burnt or air ports blocked; replace shield cup if excessive spatter adheres to it or blocks air ports.
3. Electrode is "sticking": Push electrode down with thumb. It must move freely. Replace.

C. Low output arc

1. Poor connection between torch and power supply: Check the torch leads are properly connect to power supply.
2. Poor connection earth cable to work piece. Make sure that work cable connection to machine is tight and work clamp has a good electrical connection to a clean and dry area of the workpiece.
3. Faulty Torch: Please contact your Dealer or qualified technician.

D. Arc shuts off during operation, and it will not restart.

1. Power Supply is overheated (Alarm on), let unit cool down for at least 5 minutes. Make sure the unit has not been operated beyond Duty Cycle limit. Refer to Section 2 for duty cycle specifications.
2. Air pressure is too low. Check source for at least 65 psi/4.5 bar; adjust as needed.
3. Torch consumables worn, check torch shield cup, tip, swirl ring and electrode; replace as needed.
4. Faulty components in unit: Please contact your Dealer or qualified technician.

§5.3 Cutting Troubleshooting

A. No gas flow; power lamp and fan ON

1. Airline not connected, not turned on at compressor or pressure is too low, check connections. Adjust air pressure to proper setting.
2. Two regulators on airline. Remove wall mounted regulator.
3. Faulty components in the unit: Please contact your Dealer or qualified technician.

B. Low cutting output

1. Incorrect setting of cutting current (A), check and adjust to proper setting.
2. Air pressure too low. Turn pressure higher until torch will not ignite.
3. Swirl ring is missing. Replace missing swirl ring.

4. Input voltage is too low due to extension cord. Remove extension cord.

C. Torch can cut but the cutting quality is poor

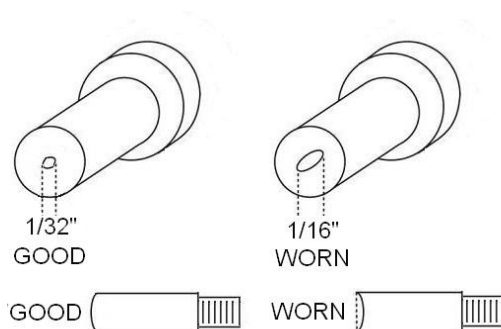
1. Current (A) control set too low, increase current setting.
2. The torch move too fast across the workpiece, reduce cutting speed.
3. Swirl ring is missing. Replace missing swirl ring.
4. Air pressure too low. Check the air pressure (65 psi min.) and air flow. Adjust air pressure to highest possible setting (until blows torch out) and turn back ¼ turn.
5. Excessive oil or moisture in torch, 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.

§6 Maintenance

6.1 Cutting Torch Maintenance

Plasma cutting torches use ionized air (plasma) as the arc that “melts” the metal and is pushed away by the compressed air. This **plasma arc exceeds 50,000°F (28,000°C)** when it is pushed through the .030”-.040” (0.8-1.0mm) hole in the beryllium copper cutting tip. Considering these extreme temperatures, it is easy to understand the **need to replace tips & electrodes, as they become worn**, and to check that all cooling air ports are clear to allow maximum air flow.

Changing Tip & Electrodes: When reduced cutting performance is observed by the operator, worn tips and electrodes must be replaced. A simple visual inspection will determine need for replacement.



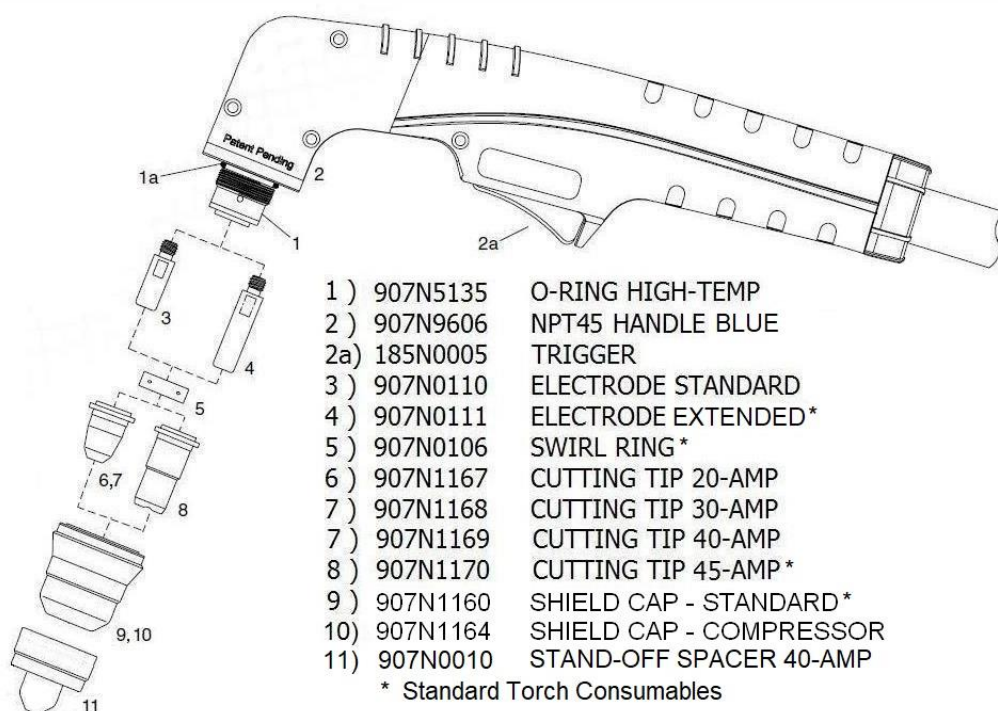
NOTICE: Cutting with worn tip & electrode is similar to drilling a hole with a worn-out drill bit. There is nothing wrong with the “drill” but the worn bit makes drilling the hole difficult. Same applies to plasma, it will cut with worn consumables but not easily and can damage cutting torch if operated for extended periods.

To replace tips & electrode, complete the following steps:

- 1) Turn power switch to OFF position and unplug power source (wait 5 secs.)
- 2) Move to clean work benchtop area and, with tip pointing up, remove shield cap.
- 3) Remove cutting tip and swirl ring by lifting off electrode and place both on bench.
- 4) Locate electrode wrench and remove electrode by turning counter-clockwise.
- 5) Inspect torch head for clogged air ports or damage.
- 6) Replace electrode with new part and **tighten with wrench**. It is important to secure with wrench as electrode transfers very high DC current at very high temperatures. **A loose electrode will damage the torch head.**
- 7) Inspect the swirl ring for any damage and replace if necessary.
- 8) Install the new cutting tip making sure to align with the step in the swirl ring.
- 9) Inspect the shield cap, making certain no melted outer covering is blocking cooling air ports. If shield cap is burned or cover is melted, replace.
- 10) Reinstall shield cap, making certain it is securely turned down to the base making contact with safety pins located in handle at base.

6.2 Cutting Torch Consumables

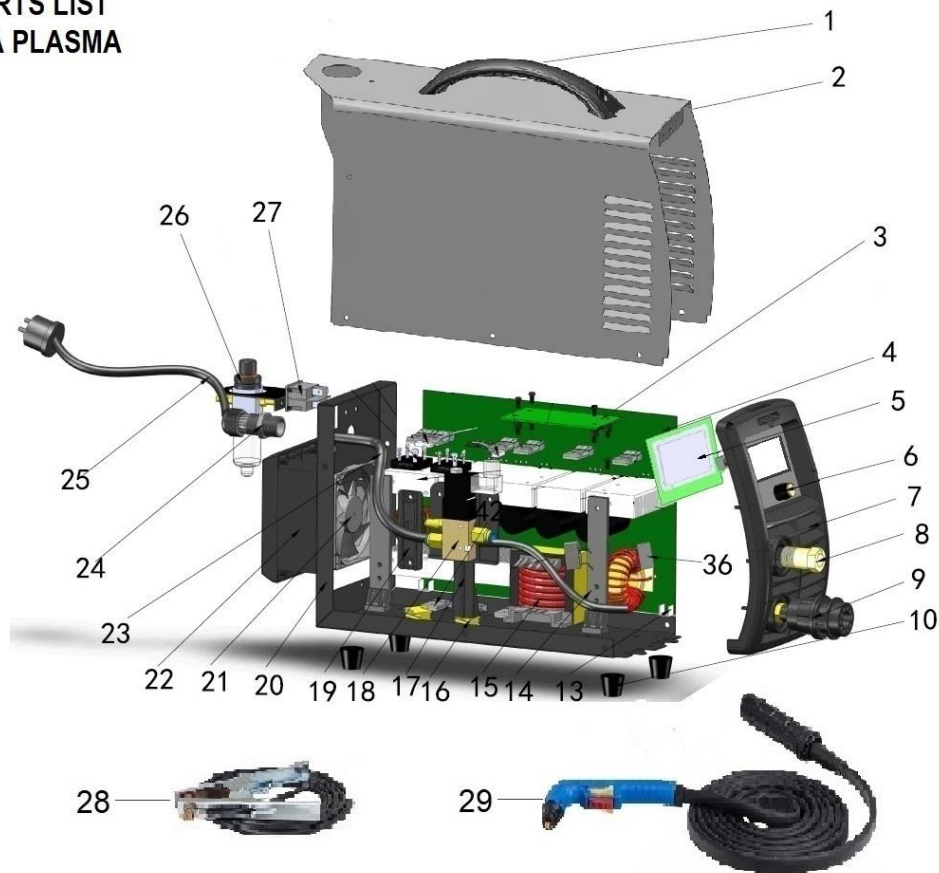
NPT45/48 TORCH CONSUMABLES



NOTE: The 907N1170 cutting tip is designed for DRAG cutting operation and should be placed directly in contact with the cutting surface. No “stand-off” or “spacing” is required. When cutting with 907N1168 (30A) or 907N1167 (20A) tips, below 40A, they may also be directly in contact with the cutting surface.

6.3 Parts Listing

PARTS LIST 40A PLASMA



1	530.0018	HANDLE	16	740.0116	AL HEAT RESISTOR
2	740.1102	CABINET COVER	17	740.0117	VALVE MOUNTING PLATE
3	740.1103	CONTROL BOARD	18	740.0118	AIR SOLENOID VALVE
4	740.1104	INVERTER BLOCK	19	740.0119	PFC INDUCTOR
5	740.1109	FRONT PANEL F-LCD	20	740.0120	CABINET BASE
5a	740.1106	LCD DISPLAY	21	740.0121	COOLING FAN
6	521.0013	CURRENT KNOB	22	740.0122	COOLING FAN COVER
7	740.1107	CABINET FRAME-F	23	740.0123	AIR HOSE
8	740.0012	3550F PANEL CONNECTOR	24	740.0124	STRAIN RELIEF
9	501N4262	CENTRAL ADAPTOR SOCKET	25	740.0011	POWER CORD NEMA6-50
10	530.0025	MACHINE FOOT	26	738.1014	REGULATOR W/ GAUGE
13	740.0113	SUPPORT COLUMN	27	530.0020	SWITCH ROCKER ON/OFF
14	740.0114	SUPPORT PILLAR	28	513N0009	EARTH CLAMP CABLE
15	740.0115	MAIN TRANSFORMER	29	709N9048	NPT48 PLASMA TORCH

TECHNICAL SUPPORT LINE: 704-935-5242

6.4 Electrical Principal Schematic

