



DiamondBack™ Orbital Weldhead Owner's Manual

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Manual:	091-0511
Serial:	02100001
Voltage Rating:	N/A
Revision:	June 2009 Rev C
Model Number:	5006



Table of Contents

Safety Guidelines	i - iii
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Installation Section A

Technical Specifications	1
Electrical	1
Mechanical	1
Weldhead Connections	1
Collet Selection & Adjustment	2
Tungsten Electrode Properties	2
Gas Flow Rates	4

Operations Section B

Weldhead Calibration	5
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Accessories Section C

Benchmount	5
Extension Cable	5
Collets	6

Maintenance Section D

Preventative Maintenance	6
Rotor Accuracy	6
Cable Assembly	6

Troubleshooting Section E

Arc Start Troubleshooting	7
Operational Troubleshooting	7

Appendices Section F

Diagram/Parts List	9
Appendix A: Collets	15
Appendix B: Pre-Ground Tungsten Electrodes	15
Appendix C: Overall Dimensional Drawings	16

Warranty

Declaration of Conformity for European Community (CE) Products

Note  This information is provided for units with CE certification (see rating label on unit).

Manufacturer's Name: **MK Products, Inc.**
16882 Armstrong Ave.
Irvine, CA 92606

Declares that the product: **DiamondBack™**
conforms to the following Directives and Standards:

Directives

Low Voltage Directive: 73/23/EEC

Electromagnetic Compatibility (EMC) Directive: 89/336/EEC

Standards

Arc Welding Equipment Part I: Welding Power Sources: IEC 60974-1
(September 1998 - Second Edition)

Arc Welding Equipment: Wirefeed Systems: IEC 974-5
(September 1997 - Draft Revision)

Degrees of Protection Provided by Enclosures (IP Code): IEC 529:1989
(November 1989 - First Edition)

Insulation Coordination For Equipment With Low-Voltage Systems:
Part I: Principles, Requirements and Tests: IEC 664-1: 1992
(October 1992 - First Edition)

Electromagnetic Compatibility, (EMC): EN 50199
(August 1995)

Torches And Guns For Arc Welding, EN 50078

SAFETY CONSIDERATIONS

ELECTRIC ARC WELDING EQUIPMENT

CAUTION : READ BEFORE ATTEMPTING INSTALLATION, OPERATION OR MAINTENANCE OF THIS EQUIPMENT

1-1 INTRODUCTION

This equipment is intended for ultimate application by commercial/industrial users and for operation by persons trained and experienced in the use and maintenance of welding equipment. Operation should not be undertaken without adequate training in the use of such equipment. Training is available from many public and private schools or similar facilities.

Safe practices in the installation, operation and maintenance of this equipment requires proper training in the art, a careful study of the information provided with the equipment, and the use of common sense. Rules for safe use are generally provided by suppliers of welding power sources, compressed gas suppliers, and electrode suppliers. Careful compliance with these rules will promote safe use of this equipment.

The following Safety Rules cover some of the more generally found situations. READ THEM CAREFULLY. In case of any doubt, obtain qualified help before proceeding.

1-2 GENERAL PRECAUTIONS

A. Burn Prevention

ELECTRIC ARC WELDING PRODUCES HIGH INTENSITY HEAT AND ULTRAVIOLET RADIANT ENERGY WHICH MAY CAUSE SERIOUS AND PERMANENT EYE DAMAGE AND WHICH MAY DAMAGE ANY EXPOSED SKIN AREAS.

Wear helmet with safety goggles or glasses with side shields underneath, appropriate filter lenses or plates (protected by clear cover glass). This is a must for welding or cutting (and chipping) to protect the eyes from radiant energy and flying metal. Replace cover glass when broken, pitted, or spattered.

Medical first aid and eye treatment. First aid facilities and a qualified first aid person should be available for each shift unless medical facilities are close by for immediate treatment of flash burns of the eyes and skin burns.

Wear protective clothing - leather (or asbestos) gauntlet gloves, hat, and high safety-toe shoes. Button shirt collar and pocket flaps, and wear cuffless trousers to avoid entry of sparks and slag.

Avoid oily or greasy clothing. A spark may ignite them.

Flammable hair preparations should not be used by persons intending to weld or cut.

Hot metal such as electrode stubs and work pieces should never be handled without gloves.

Ear plugs should be worn when working on overhead or in a confined space. A hard hat should be worn when others work overhead.

B. Toxic Fume Prevention

WARNING: The use of this product may result in exposure to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Adequate ventilation. Severe discomfort, illness or death can result from fumes, vapors, heat, or oxygen enrichment or depletion that welding (or cutting) may produce. Prevent them with adequate ventilation. NEVER ventilate with oxygen.

Lead-, cadmium-, zinc-, mercury-, beryllium-bearing and similar materials, when welded or cut, may produce harmful concentrations of toxic fumes. Adequate local exhaust ventilation must be used, or each person in the area, as well as the operator, must wear an air-supplied respirator. For beryllium, both must be used.

Metals coated with or containing materials that emit toxic fumes should not be heated unless coating is removed from the work surface, the area is well ventilated, or the operator wears an air-supplied respirator.

Work in a confined space only while it is being ventilated and, if necessary, while wearing an air-supplied respirator.

Gas leaks in a confined space should be avoided. Leaked gas in large quantities can change oxygen concentration dangerously. Do not bring gas cylinders into a confined space.

Leaving confined space, shut OFF gas supply at source to prevent possible accumulation of gases in the space if downstream valves have been accidentally opened or left open. Check to be sure that the space is safe before reentering it.

Vapors from chlorinated solvents can be decomposed by the heat of the arc (or flame) to form PHOSGENE, a highly toxic gas, and other lung and eye irritating products. The ultraviolet (radiant) energy of the arc can also decompose trichloroethylene and perchloroethylene vapors to form phosgene. DO NOT WELD or cut where solvent vapors can be drawn into the welding or cutting atmosphere or where the radiant energy can penetrate to atmospheres containing even minute amounts of trichloroethylene or perchloroethylene.

C. Fire and Explosion Prevention

Causes of fire and explosion are: combustibles reached by the arc, flame, flying sparks, hot slag, or heated material, misuse of compressed gases and cylinders, and short circuits.

BE AWARE THAT flying sparks or falling slag can pass through cracks, along pipes, through windows or doors, and through wall or floor openings, out of sight of the goggled operator. Sparks can fly many feet.

To prevent fires and explosion:

Keep equipment clean and operable, free of oil, grease, and (in electrical parts) of metallic particles that can cause short circuits.

If combustibles are in area, do NOT weld or cut. Move the work if practicable, to an area free of combustibles. Avoid paint spray rooms, dip tanks, storage areas, ventilators. If the work cannot be moved, move combustibles at least 35 feet away, out of reach of sparks and heat; or protect against ignition with suitable and snug-fitting, fire-resistant covers or shields.

Walls touching combustibles on opposite sides should not be welded on (or cut). Walls, ceilings, and floor near work should be protected by heat-resistant covers or shields.

Fire watcher must be standing by with suitable fire extinguishing equipment during and for some time after welding or cutting if:

1. Appreciable combustibles (including building construction) are within 35 feet.
2. Appreciable combustibles are further than 35 feet, but can be ignited by sparks.
3. Openings (concealed or visible) in floors or walls within 35 feet may expose combustibles to sparks.
4. Combustibles adjacent to walls, ceilings, roofs, or metal partitions can be ignited by radiant or conducted heat.

Hot work permit should be obtained before operation to ensure supervisor's approval that adequate precautions have been taken.

After work is done, check that area is free of sparks, glowing embers, and flames.

An empty container that held combustibles, or that can produce flammable or toxic vapors when heated, must never be welded on or cut, unless container has first been cleaned in accordance with industry standards.

This includes: a thorough steam or caustic cleaning (or a solvent of water

washing, depending on the combustible's solubility), followed by purging and inerting with nitrogen or carbon dioxide, and using protective equipment.

Water-filling just below working level may substitute for inerting.

A container with unknown contents should be cleaned (see paragraph above). Do NOT depend on sense of smell or sight to determine if it is safe to weld or cut.

Hollow castings or containers must be vented before welding or cutting. They can explode.

Explosive atmospheres. NEVER weld or cut where the air may contain flammable dust, gas, or liquid vapors (such as gasoline).

D. Compressed Gas Equipment

The safe handling of compressed gas equipment is detailed in numerous industry publications. The following general rules cover many of the most common situations.

1. Pressure Regulators

Regulator relief valve is designed to protect only the regulator from overpressure; it is not intended to protect any downstream equipment. Provide such protection with one or more relief devices.

Never connect a regulator to a cylinder containing gas other than that for which the regulator was designed.

Remove faulty regulator from service immediately for repair (first close cylinder valve). The following symptoms indicate a faulty regulator:

Leaks - if gas leaks externally.

Excessive Creep - if delivery pressure continues to rise with downstream valve closed.

Faulty Gauge - if gauge pointer does not move off stop pin when pressurized, nor returns to stop pin after pressure release.

Repair. Do NOT attempt repair. Send faulty regulators for repair to manufacturer's designated repair center, where special techniques and tools are used by trained personnel.

2. Cylinders

Cylinders must be handled carefully to prevent leaks and damage to their walls, valves, or safety devices:

Avoid electrical circuit contact with cylinders including third rails, electrical wires, or welding circuits. They can produce short circuit arcs that may lead to a serious accident. (See 1-3C)

ICC or DOT marking must be on each cylinder. It is an assurance of safety when the cylinder is properly handled.

Identifying gas content. Use only cylinders with name of gas marked on them; do not rely on color to identify gas content. Notify supplier if unmarked. NEVER DEFACE or alter name, number, or other markings on a cylinder. It is

illegal and hazardous.

Empties: Keep valves closed, replace caps securely; mark MT; keep them separate from FULLS, and return promptly.

Prohibited use. Never use a cylinder or its contents for other than its intended use, NEVER as a support or roller.

Locate or secure cylinders so they cannot be knocked over.

Passageways and work areas. Keep cylinders clear of areas where they may be stuck.

Transporting cylinders. With a crane, use a secure support such as a platform or cradle. Do NOT lift cylinders off the ground by their valves or caps, or by chains, slings, or magnets.

Do NOT expose cylinders to excessive heat, sparks, slag, and flame, etc. that may cause rupture. Do not allow contents to exceed 55° C (130° F.) Cool with water spray where such exposure exists.

Protect cylinders, particularly valves from bumps, falls, falling objects, and weather. Replace caps securely when moving cylinders.

Stuck valve. Do NOT use a hammer or wrench to open a cylinder valve that cannot be opened by hand. Notify your supplier.

Mixing gases. NEVER try to mix any gases in a cylinder.

NEVER refill any cylinder.

Cylinder fittings should never be modified or exchanged.

3. Hose

Prohibited use. Never use hose other than that designed for the specified gas. A general hose identification rule is: red for fuel gas, green for oxygen, and black for inert gases.

Use ferrules or clamps designed for the hose (not ordinary wire or other substitute) as a binding to connect hoses to fittings.

No copper tubing splices. Use only standard brass fittings to splice hose.

Avoid long runs to prevent kinks and abuse. Suspend hose off ground to keep it from being run over, stepped on, or otherwise damaged.

Coil excess hose to prevent kinks and tangles.

Protect hose from damage by sharp edges, and by sparks, slag, and open flame.

Examine hose regularly for leaks, wear, and loose connections. Immerse pressured hose in water; bubbles indicate leaks

Repair leaky or worn hose by cutting area out and splicing. Do NOT use tape.

4. Proper Connections

Clean cylinder valve outlet of impurities that may clog orifices and damage seats before connecting regulator. Except for hydrogen, crack valve momentarily, pointing outlet away from people and

sources of ignition. Wipe with a clean, lintless cloth.

Match regulator to cylinder. Before connecting, check that the regulator label and cylinder marking agree, and that the regulator inlet and cylinder outlet match. NEVER Connect a regulator designed for a particular gas or gases to a cylinder containing any other gas.

Tighten connections. When assembling threaded connections, clean and smooth seats where necessary. Tighten. If connection leaks, disassemble, clean, and retighten, using properly fitting wrench.

Adapters. Use a CGA adapter (available from your supplier) between cylinder and regulator, if one is required. Use two wrenches to tighten adapter marked RIGHT and LEFT HAND threads.

Regulator outlet (or hose) connections may be identified by right hand threads for oxygen and left hand threads (with grooved hex on nut or shank) for fuel gas.

5. Pressurizing Steps:

Drain regulator of residual gas through suitable vent before opening cylinder (or manifold valve) by turning adjusting screw in (clockwise). Draining prevents excessive compression heat at high pressure seat by allowing seat to open on pressurization. Leave adjusting screw engaged slightly on single-stage regulators.

Stand to side of regulator while opening cylinder valve.

Open cylinder valve slowly so that regulator pressure increases slowly. When gauge is pressurized (gauge reaches regulator maximum) leave cylinder valve in following position: for oxygen and inert gases, open fully to seal stem against possible leak; for fuel gas, open to less than one turn to permit quick emergency shut-off.

Use pressure charts (available from your supplier) for safe and efficient recommended pressure settings on regulators.

Check for leaks on first pressurization and regularly thereafter. Brush with soap solution. Bubbles indicate leaks. Clean off soapy water after test; dried soap is combustible.

E. User Responsibilities

Follow all Safety Rules.

Remove leaky or defective equipment from service immediately for repair. Read and follow user manual instructions.

F. Leaving Equipment Unattended

Close gas supply at source and drain gas.

G. Rope Staging-Support

Rope staging-support should not be used for welding or cutting operation; rope may burn.

1-3 ARC WELDING

Comply with precautions in 1-1, 1-2, and this section. Arc Welding, properly done,

is a safe process, but a careless operator invites trouble. The equipment carries high currents at significant voltages. The arc is very bright and hot. Sparks fly, fumes rise, ultraviolet and infrared energy radiates, weldments are hot, and compressed gases may be used. The wise operator avoids unnecessary risks and protects himself and others from accidents.

A. Burn Protection

Comply with precautions in 1-2.

The welding arc is intense and visibly bright. Its radiation can damage eyes, penetrate lightweight clothing, reflect from light-colored surfaces, and burn the skin and eyes. Skin burns resemble acute sunburn; those from gas-shielded arcs are more severe and painful. **DON'T GET BURNED; COMPLY WITH PRECAUTIONS.**

1. Protective Clothing

Wear long-sleeve clothing in addition to gloves, hat, and shoes. As necessary, use additional protective clothing such as leather jacket or sleeves, flameproof apron, and fire-resistant leggings. Avoid outer garments of untreated cotton.

Bare skin protection. Wear dark, substantial clothing. Button collar to protect chest and neck, and button pockets to prevent entry of sparks.

2. Eye and Head Protection

Protect eyes from exposure to arc. Eyes may be damaged by radiant energy when exposed to the electric arc, even when not looking in the direction of the arc. Never look at an electric arc without protection.

Welding helmet or shield containing a filter plate shade no. 12 or denser must be used when welding. Place over face before striking arc.

Protect filter plate with a clear cover plate.

Cracked or broken helmet or shield should NOT be worn; radiation can be passed through to cause burns.

Cracked, broken, or loose filter plates must be replaced IMMEDIATELY. Replace clear cover plate when broken, pitted, or spattered.

Flash goggles with side shields MUST be worn under the helmet to give some protection to the eyes should the helmet not be lowered over the face before an arc is struck. Looking at an arc momentarily with unprotected eyes (particularly a high intensity gas-shielded arc) can cause a retinal burn that may leave a permanent dark area in the field of vision.

3. Protection of Nearby Personnel

Enclose the welding area. For production welding, a separate room or enclosed bay is best. In open areas, surround the operation with low-reflective, noncombustible screens or panels. Allow for free air circulation, particularly at floor level.

Viewing the weld. Provide face shields for all persons who will be looking directly

at the weld.

Others working in area. See that all persons are wearing flash goggles.

Before starting to weld, make sure that screen flaps or bay doors are closed.

B. Toxic Fume Prevention

Comply with precautions in 1-2B.

Generator engine exhaust must be vented to the outside air. Carbon monoxide can kill.

C. Fire and Explosion Prevention

Comply with precautions in 1-2C.

Equipment's rated capacity. Do not overload arc welding equipment. It may overheat cables and cause a fire.

Loose cable connections may overheat or flash and cause a fire.

Never strike an arc on a cylinder or other pressure vessel. It creates a brittle area that can cause a violent rupture or lead to such a rupture later under rough handling.

D. Compressed Gas Equipment

Comply with precautions in 1-2D.

E. Shock Prevention

Exposed electrically hot conductors or other bare metal in the welding circuit, or in ungrounded, electrically-HOT equipment can fatally shock a person whose body becomes a conductor. **DO NOT STAND, SIT, LIE, LEAN ON, OR TOUCH** a wet surface when welding without suitable protection.

To protect against shock:

Keep body and clothing dry. Never work in damp area without adequate insulation against electrical shock. Stay on a dry duckboard, or rubber mat when dampness or sweat cannot be avoided. Sweat, sea water, or moisture between body and an electrically HOT part - or grounded metal - reduces the body surface electrical resistance, enabling dangerous and possibly lethal currents to flow through the body.

1. Grounding the Equipment

When installing, connect the frames of each unit such as welding power source, control, work table, and water circulator to the building ground. Conductors must be adequate to carry ground currents safely. Equipment made electrically HOT by stray currents may shock, possibly fatally. **DO NOT GROUND** to electrical conduit, or to a pipe carrying ANY gas or a flammable liquid such as oil or fuel.

Three-phase connection. Check phase requirement of equipment before installing. If only three-phase power is available, connect single-phase equipment to only two wires of the three-phase line. **DO NOT** connect the equipment ground lead to the third (live) wire, or the equipment will become electrically HOT - a dangerous condition that can shock, possibly fatally.

Before welding, check ground for continuity. Be sure conductors are touching bare metal of equipment frames

at connections.

If a line cord with a ground lead is provided with the equipment for connection to a switch box, connect the ground lead to the grounded switch box. If a three-prong plug is added for connection to a grounded mating receptacle, the ground lead must be connected to the ground prong only. If the line cord comes with a three-prong plug, connect to a grounded mating receptacle. Never remove the ground prong from a plug, or use a plug with a broken ground prong.

2. Connectors

Fully insulated lock-type connectors should be used to join welding cable lengths.

3. Cables

Frequently inspect cables for wear, cracks, and damage. **IMMEDIATELY REPLACE** those with excessively worn or damaged insulation to avoid possibly lethal shock from bared cable. Cables with damaged areas may be taped to give resistance equivalent to original cable.

Keep cable dry, free of oil and grease, and protected from hot metal and sparks.

4. Terminals and Other Exposed Parts

Terminals and other exposed parts of electrical units should have insulating covers secured before operation.

5. Electrode Wire

Electrode wire becomes electrically HOT when the power switch of gas metal-arc welding equipment is ON and welding gun trigger is pressed. Keep hands and body clear of wire

and other HOT parts.

6. Safety Devices

Safety devices such as interlocks and circuit breakers should not be disconnected or shunted out.

Before installation, inspection, or service of equipment, shut OFF all power, and remove line fuses (or lock or red-tag switches) to prevent accidental turning ON of power. Disconnect all cables from welding power source, and pull all 115 volts line-cord plugs.

Do not open power circuit or change polarity while welding. If, in an emergency, it must be disconnected, guard against shock burns or flash from switch arcing.

Leaving equipment unattended. Always shut OFF, and disconnect all power to equipment.

Power disconnect switch must be available near the welding power source.

Thank You

For selecting a quality product. We want you to take pride in operating this product...as much pride as we have in bringing the product to you!

Please Examine Carton and Equipment For Damage Immediately

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

Please record your equipment identification information below for future reference. This information can be found on your machine nameplate.

Model Name & Number _____

Code & Serial Number _____

Date of Purchase _____

Whenever you request replacements parts for, or information on this equipment always supply the information you have recorded above.

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.

Section A

Installation

Technical Specifications

The DiamondBack™ weldhead was designed for process piping and manufacturing work-cell applications. The DiamondBack™ weldhead is capable of welding 2" Tube OD to 6" Nominal Pipe and associated fittings.

Electrical

The DiamondBack™ uses a 24VDC motor with TACH feedback. It is controlled by an orbital power-supply motor-control circuit to turn the rotor at the precise speed to create a near perfect weld.

Mechanical

Power Cable Size: #6, 75A, 600V.
Twist-lock cable-end connectors.

Gas/Water Hose Size: Nylon Tube, ¼" OD x 0.17 ID
Double-end shut-off coupler

Control Cable Specification: ... 20AWG, 12 conductor

Weldhead Connections

The DiamondBack™ comes equipped with an integrated 25 foot cable, which connects to the CobraTig® 150 orbital power-supply. The cable assembly provides a path for weld power, operator control and motor signals and inert gas flow (see Figure 1).



Figure 1

Connecting to the CobraTig® 150

The DiamondBack™ connects directly to the CobraTig® 150 orbital power supply.

Welding Leads

The two welding Power Leads use a twist-lock type of power connector. These are designed to attach directly to the rear panel of the CobraTig® 150.

The male connector connects to the receptacle labeled "ELECTRODE". The female connector connects to the receptacle labeled "GROUND".

Control Cable

The 24 MS-type pin connector attaches to the mating receptacle on the rear panel of the orbital welding power-supply. All of the Control, Feedback and Welding functions of the weldhead transfer through this connector.

The operator controls are on the weldhead handle. They include: JOG, GAS/NEXT LEVEL, FINAL SLOPE and START/STOP (Figure 2).



Figure 2

Gas Hose

The gas connector is a double-end shut-off type valve that prevents flow or leakage out of either the unit or the gas hose if the connection is broken.

The gas hose connector from the weldhead plugs into the "GAS OUT" receptacle.

Collet Selection

The three-piece collet assembly mounts to both the jaws and the bottom face plate of the weldhead and maintains the weld joint alignment of the parts to be welded. The collets are manufactured to correspond with the outside diameter of the material to be welded. Each set of collets has three pieces; two sides and one bottom. Two sets of collets are needed to weld two tubes together. Appendix A lists collet part numbers for tube and pipe.

Collet Adjustment

The parts to be welded are held in place by the Collets. The tolerance of the outside diameter of tubes and pipes vary, so these variations are handled through the use of brass-tipped setscrews, referred to as plungers, in the top Collet halves. These plungers not only make up the diameter difference between the Collet and the part to be welded, but they also act as an aid in the grounding path between the weldhead and the tube or pipe to be welded. The tube or pipe is forced down into the bottom third of the collets, which are screwed to a line-bored concentric face in the weldhead side-plates.

The plungers are adjusted as follows:

1. Back the plungers out until the brass tip is flush or below the surface of the bored Collet surface.
2. Place the parts to be welded into the Collets and clamp down the latches.
Adjust the latching mechanism of the weldhead to ensure a tight, but not overly-tight clamping of the Side Plate Jaws.
3. Alternately adjust the plungers on one side of the weldhead until contact is made, and then add about 1/4 turn more.
4. At this point the tube should be firmly held in place. The tube should not turn if attempting to rotate it by hand.
5. Repeat the process for the opposite side of the weldhead.
6. Once completed, check the alignment of the parts. A misalignment may be corrected by moving the left or right plunger in or out by a fraction of a turn and then repeating the opposite action to the opposing plunger on the same Collet.

Tungsten Electrode Properties

The recommended tungsten type to be used in the DiamondBack™ and the MK Orbital Welding System is 2% Ceriated, 3/32 inch diameter. 1/16 inch diameter tungsten is also available for the DiamondBack™ orbital weldhead.

Appendix B gives the MK part numbers for pre-ground tungsten electrodes and an illustrated formula to determine the length of tungsten electrode required using a given weldhead size with a specified tube or pipe diameter. These lengths of tungsten are long enough to allow the setscrew to securely hold the tungsten while maintaining a relatively close arc gap, and keep the tungsten from sticking out the back of the rotor while using a large arc gap.

Tungsten Geometry

The recommended grind angle and shape for tungsten is 18° included angle and a .015 inch flat (Figure 3). Regardless of the electrode tip geometry selected; it is important that consistent electrode geometry be used once a welding procedure is established.

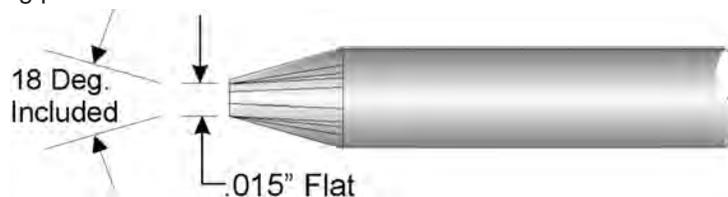


Figure 3

Changes in electrode geometry can significantly influence the weld bead shape and size; therefore, electrode tip configuration is a welding variable that should be defined during procedure development.

Tungsten Preparation

Tungsten electrodes should be properly ground for consistent results. If the electrode is to be hand ground, use a dedicated diamond wheel. The grinding marks should be perpendicular to the tungsten electrode or poor arc starts, arc wander and inclusions may occur (See Figure 4). No other parts should be ground with these wheels, since contamination of the electrode could result and create problems with arc initiation, arc wander during the weld and tungsten inclusions in the weld bead.

All tungsten supplied by MK Products, Inc. is prepared using the latest manufacturing techniques in order to meet the geometry specifications as described above.



Correct - Lengthwise grind marks don't restrict current. Diamond ground mirror finish is best.



Incorrect - Crosswise grind marks restrict welding current, cause arc wander, risk inclusions.

Figure 4

Installing the Tungsten Electrode

The electrode is mounted in the rotor and held in place with a setscrew.

To insert the electrode, jog the rotor around until the setscrew is exposed (approximately at the twelve-o'clock position), and loosen the setscrew. Insert a properly prepared electrode from the top of the rotor and tighten the setscrew. Be sure to set the appropriate arc gap prior to welding.

Setting the Arc Gap

1. Place the part to be welded on the lower Collets with the clamps in the upright open position.
2. Jog the rotor until the tungsten hole in the rotor is sitting directly over the part with access to the tungsten set screw, approximately at twelve-o'clock.
3. Prepare the tungsten electrode with the right length and shape as explained in the Tungsten Geometry and Tungsten Preparation sections.
4. Put the tungsten electrode through the appropriate hole on the top of the rotor.
5. Place the appropriate thickness gauge between the tungsten electrode and the part to be welded so that the tungsten electrode is at the correct gap.

Be certain the thickness gauge is perpendicular to the tungsten electrode.

6. Tighten the setscrew to secure the tungsten electrode in the rotor.

Recommended Arc Gap

The proper arc gap is an important part of the proper use of your orbital welding equipment. Improper arc gap can cause arc strikes to occur to your Collets.

Be sure the arc gap is as short as possible, consistent with the process and weld current level, but not so short as to 'crash' or touch the weld being made.

If no arc gap is known when designing a weld procedure a good rule-of-thumb is as follows:

Work Cell Apps: (Wall Thickness x 0.5) + 0.010".

Field Apps: Match Arc Gap to Wall Thickness, up to max. gap of .070"*

* Some applications may require variance on this dimension depending on pipe concentricity and ovality.

CAUTION

Do not over-tighten the tungsten set screw. Over-tightening the setscrew can crack and splinter the tungsten causing errant starts and arc wander.

Be sure that the tungsten does not extend into the rotor teeth and that both setscrews are flush with the rotors surface.

Any length of tungsten that is protruding out the back of the rotor will jam with the meshing gears inside the weldhead. This will push the tungsten into the weld being made and inevitably cause either an ARC FAULT or MOTOR FAULT, or worse.

If the weldhead becomes jammed, a "Motor Stall" will result. Usually, some foreign matter, or a piece of tungsten electrode has fallen within the gear mechanism of the weldhead, hindering the rotation of the gears.

Clearing a Jammed Weldhead

In order to clear the jam, turn the weldhead upside-down and vigorously shake the weldhead. Another way to attempt removal of the foreign matter is to jog the rotor in the reverse direction.

This is accomplished by depressing the reverse direction button. Locate the red button through the hole in the bottom of the handle. This is a momentary reverse switch, which means the rotor will reverse momentarily when the JOG button is pressed while holding the red button down.

Before turning the weldhead right side up, attempt to locate the foreign object. If the jam cannot be cleared in this manner, the weldhead must be returned to MK for disassembly to have the objects removed.

Gas Flow Rates

Recommended arc gas flow rate is 35 CFH at 50 PSI using the CobraTig® 150. Flow rates higher than 35 CFH can create turbulence within the weldhead chamber and blow the arc about. If more gas coverage is required, increase the pre-purge time on the CobraTig™.

Back-up gas flow rates are typically between 5 and 20 CFH, depending on internal volume and component configuration. Typically, when welding components with relatively large internal volumes, a separate source for backup purge gas is recommended.

NOTE: Disassembly of weldhead will void the warranty.

Section B

Operation

Weldhead Calibration

The software program in the orbital welding power-supply provides for weldhead rotor speed and motor controller calibration. This calibration program consists of driving the rotor at two predetermined speeds: **1.0 and 0.5 RPM**. The start and end of each rotation are detected by the passage of the reed switch or "home" sensor in the weldhead. The rotation is clocked by the computer and, by process of adjusting and recalculating, provides very accurate and consistent speeds.

NOTE: IT IS MANDATORY THAT THE WELDHEAD BE CALIBRATED EACH TIME THE SYSTEM IS TURNED 'ON'. FAILURE TO CALIBRATE THE WELDHEAD MAY RESULT IN THE WELDHEAD OPERATING AT A "ROUGH" ADJUSTMENT THAT MAY NOT PROVIDE CORRECT ROTOR SPEED AGAINST THE CONTROLLERS' DEMAND SPEED.

CobraTig® 150

The report generated by this unit is not as elaborate as the report from the ACL, however; it does show some very important information. It shows both the MOTOR and TACH gain values. The calibration and adjustment is still the same. The Zero Offset for both the MOTOR and TACH is also shown:

MOTOR Calibration report

MOTOR gain: -4.6% Zero offset: 0.30 RPM
TACH gain: 1.9% Zero offset: 0.02 RPM

Should these MOTOR & TACH gain values return with number of 0.00% and 0.00 RPM, the calibration was invalid and should be re-run.

Results containing all zeros are an indication that the weldhead is in need of service:

MOTOR Calibration report

MOTOR gain: 0.0% Zero offset: 0.00 RPM
TACH gain: 0.0% Zero offset: 0.00 RPM

NOTE: If all values for MOTOR or WELDER calibration are zeros, it means that weldhead calibration did not complete successfully and is not valid. A recalibration is highly recommended at this time.

Section C

Accessories

Table Edge Benchmark

The DiamondBack™ weldhead can be used while held in the operator's hand. However, due the weight and size of the weldhead, at times it may be necessary for the operator to use both hands to manipulate parts within the weldhead and which requires the use of a Table Edge Weldhead Benchmark. This Table Edge Benchmark, P/N 005-0680, can be affixed to any table or counter edge and can hold the DiamondBack™ Model 5006 orbital weldhead.

Extension Cable

When longer weldhead cables are needed, a weldhead extension cable is also available in a 25' length. The extension cable (P/N 005-0635) has all the connections needed to connect the DiamondBack™ to the CobraTig 150: welding leads, gas, and control interface.

Section D

Collets

A set of Collets is defined as 3 each 120° segments for each side of the weldhead. Typically, 2 sets are required per each weldhead (See Appendix A for Part Numbers).

Maintenance

Due to the complexity of the DiamondBack™ ; there is no maintenance permitted for the DiamondBack™ with the exception of preventive maintenance, adjustments and replacement of consumables.

NOTE: Disassembly of weldhead will void the warranty.

Preventative Maintenance

Prior to performing any maintenance, the weldhead should be tested to “benchmark” its performance. A normal calibration should be run and the required correction noted. If the weldhead is running slowly or sluggishly, this usually indicates that there is an excessive load on the drive motor, and that maintenance is required.

Rotor Accuracy

Weld uniformity depends on the accuracy of the position of the rotor during welding. Rotor rotation should be circular in motion in a plane at right angles to the tube and concentric with the center of the tube to be welded. Any deviation from the proper tracking or discontinuity in the rotor will appear in the weld.

Problems in the plane of rotation are usually associated with Collets and can be corrected by Collet modification. Discontinuities with rotor motion are more serious and may require replacement of the rotor, the race, or both. Proper replacement requires factory tooling and is not a field repair.

Cable Assembly

An electrical measurement should be made to determine continuity from the positive cable connector to the rotor and from the negative cable connector to the jaws on the weldhead.

Resistance measurements should be less than 0.1 ohms.

A measurement should also be made to verify that no conductivity exists between the positive and negative power cables. Any measurable conductivity through the weldhead will severely reduce arc start reliability.

The resistance measurement must be greater than 20 MΩ when measured between the tungsten and the jaws.

A visual inspection should be made to determine the condition of the weldhead and the cable assembly. If there are damaged or worn items, the weldhead should be returned for factory service.

Section E

Troubleshooting

Arc Start Troubleshooting

If you experience intermittent arc start problems or strikes to the Collet or Side Plate Clamp instead of the part to be welded, check for the following:

1. The proper arc gap is an important part of the proper use of your MK Orbital equipment. Improper arc gap can cause arc strikes to occur to your Side Plate Clamp or Collets.
2. Be sure that the tungsten is ground properly, (18° included angle and a .015" - .017" flat at the end of the tip). Sharpening should be accomplished with the grind marks parallel to the longitudinal axis of the tungsten, not around the tungsten (reference Figure 3).
3. Parts must be clean with no oxidation, oils, solvents or other insulating surface contaminant.
4. If the tungsten is contaminated at any time, it should be replaced. Dirty tungsten can cause poor arc starts and tungsten inclusions.
5. Make sure that the part to be welded is tight in the Collets, or a loose ground will result. If the part to be welded can be turned in a latched Collet, tighten the Collet plungers.
6. Avoid any tooling that might have sharp edges or points or this will cause an arc strike to the Collets or the Side Plate Clamp.
7. To insure reliable arc starting and extended tungsten life, the pre-purge settings should be determined by the size of the tube and weldhead size: the smaller the tube in a given size weldhead; the longer the pre-purge time.
8. If an arc strike occurs to the Collet or Side Plate Clamp, the resulting arc spot may induce future arc strikes. Be sure to smooth out any arc spots with a fine abrasive pad or cover it with appropriate insulating tape.
9. Be sure that there is a tube in the weldhead before trying to make a weld.

Operational Troubleshooting

If the weldhead does not return to the 'Home' position, but continues to rotate when the 'Home' switch is pressed; the Reed Switch is most likely defective.

The DiamondBack™ weldhead must be returned to the factory for any and all repairs.

NOTE: Disassembly of weldhead will void the warranty.

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Section F

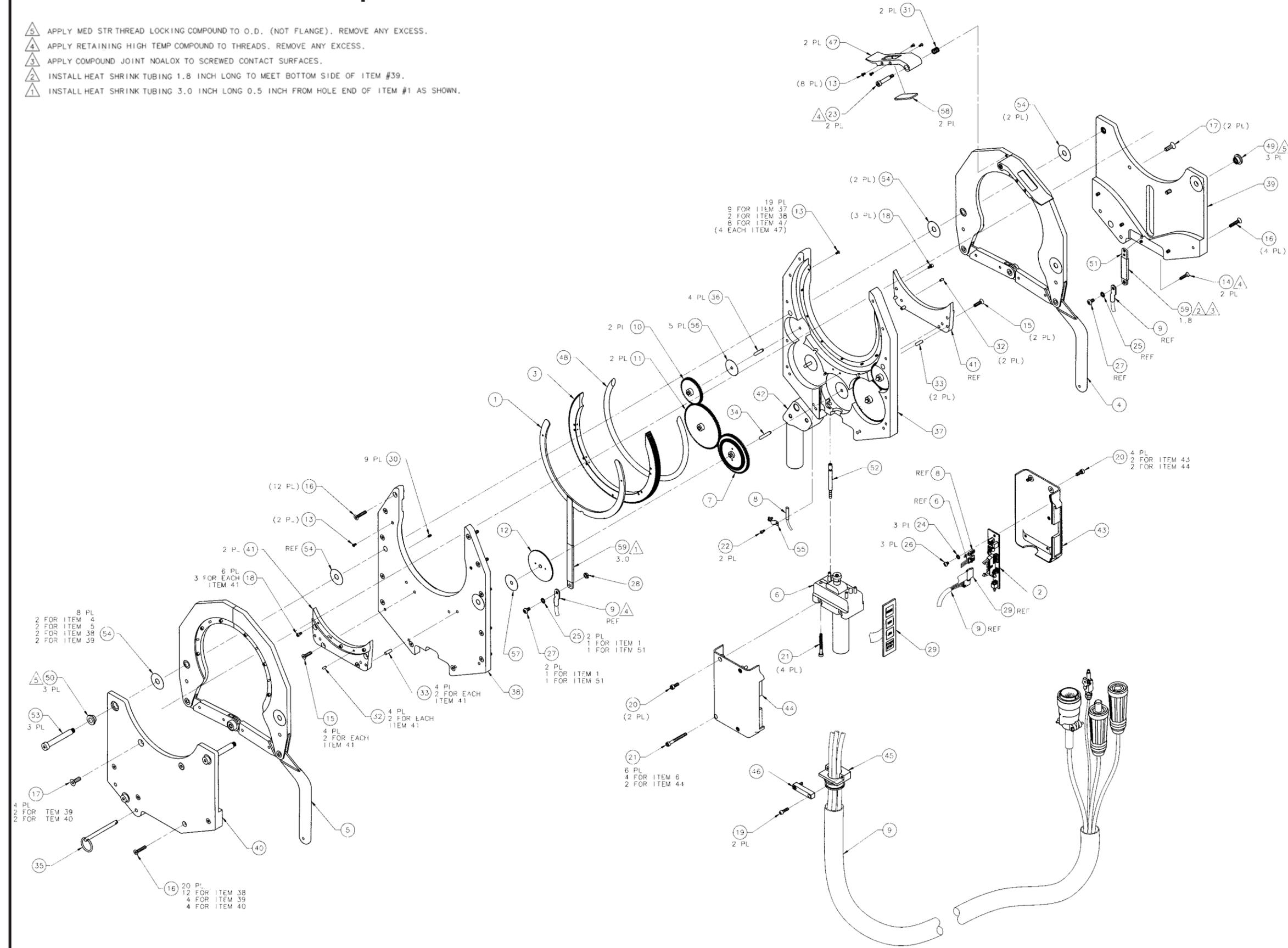
Appendices

Exploded View	11
Bill of Material.....	11
Assembly Motor Mount	13
Assembly Leads.....	14
Appendix A: Collets.....	15
Appendix B: Pre-Ground Tungsten Electrodes	15
Appendix C: Overall Dimensional Drawings	16

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DiamondBack™ Weldhead Exploded View

- 5 APPLY MED STR THREAD LOCKING COMPOUND TO O.D. (NOT FLANGE). REMOVE ANY EXCESS.
- 4 APPLY RETAINING HIGH TEMP COMPOUND TO THREADS. REMOVE ANY EXCESS.
- 3 APPLY COMPOUND JOINT NOALOX TO SCREWED CONTACT SURFACES.
- 2 INSTALL HEAT SHRINK TUBING 1.8 INCH LONG TO MEET BOTTOM SIDE OF ITEM #39.
- 1 INSTALL HEAT SHRINK TUBING 3.0 INCH LONG 0.5 INCH FROM HOLE END OF ITEM #1 AS SHOWN.



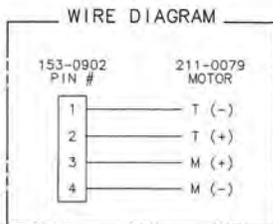
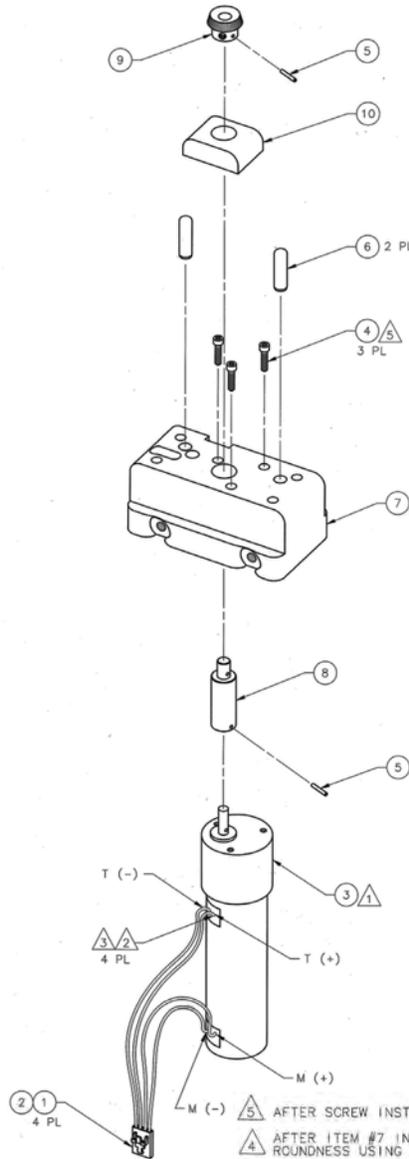
Exploded View

No.	Qty.	Part No.	Description
1	1	002-0650	Assy Brush Plate
2	1	003-2142	Assy PCB DiamondBack
3	1	003-2162	Assy Rotor
4	1	003-2163	Assy Clamp Right
5	1	003-2164	Assy Clamp Left
6	1	003-2165	Assy Motor Mount
7	1	003-2166	Assy Gear Spur Bevel
8	1	003-2167	Assy Reed Swx
9	1	003-2169	Assy Lead DiamondBack
10	2	003-2171	Assy Gear 48T
11	2	003-2172	Assy Gear 84T
12	1	003-2173	Assy Hub Gear Bevel
13	19	318-0004	Scr F Slot 4-40 x 1/4 82° NYL
14	2	319-0019	Scr F SK 82D 8-32 x 3/4
15	4	319-0024	Scr F SK 82D 10-24 x 3/4
16	20	319-0025	Scr F SK 82D 10-24 x 1.0
17	4	319-0038	Scr F SK 82D 1/4-20 x 3/4
18	6	338-0020	Scr SHC 6-32 x 1/4 SST
19	2	328-0026	Scr SHC 8-32 x 5/8
20	4	328-0036	Scr SHC 10-24 x 1/2 ST
21	6	328-0043	Scr SHC 10-24 x 1 3/4
22	2	328-0237	Scr SHC 4-40 x 1/4 SST
23	2	330-0005	Scr SHDR 10-24 x 1/4 x 1
24	3	331-0036	Wshr Flat 0.310 x 0.19 x 0.032
25	2	333-0045	Washer LK Star-IN #10
26	3	336-0027	Scr PN P 8-32 x 1/4 ST
27	2	336-0155	Scr PN P 10-32 x 0.375 SST
28	1	341-0072	Nut Hex 10-32 SST
29	1	405-0958	Switch Membrane Panel Assy
30	9	419-0063	SPG Comp 1/8 OD x 17/64 LG SST
31	2	419-0097	SPG Comp 0.36 OD x 0.29 ID
32	4	421-0714	Pin Dowel 1/8 x 5/16 SST
33	4	421-0730	Pin Dowel 3/16 x 5/8 SST
34	1	421-0733	Pin Dowel 3/16 x 1 1/8 SST
35	1	421-0742	Pin Detent
36	4	421-3111	Pin Dowel 3/16 x 7/8 SST
37	1	431-1670	Base Gear G10 5006
38	1	431-1671	Cover Gear 6 IN
39	1	431-1672	Sideplate Right
40	1	431-1673	Sideplate Left
41	2	431-1676	Clamp Bottom
42	1	431-1681	Pivot Mount
43	1	431-1682	Housing Control Right
44	1	431-1683	Housing Control Left
45	1	431-1684	Strain Relief Clamp Base
46	1	431-1685	Strain Relief Clamp Bar
47	2	431-1693	Bezel Weld Lens
48	1	431-1694	Race Teflon
49	3	431-1698	Bshg FLG 5/16-18 SS DBack
50	3	431-1699	Bshg FLG PVT SS DBack
51	1	431-1701	Strap Ground DiamondBack
52	1	431-1704	Fitting Gas Barbed DBack
53	3	431-1705	Scr Slidr Mod 0.375 x 2.5
54	8	435-1201	Shim 1.25 OD x 0.391 ID x 0.01
55	1	435-1202	Clamp Reed Swx
56	5	435-1203	Shim 1.25 OD x 0.193 ID x 0.01
57	1	435-1204	Shim 1.25 OD x 0.250 ID x 0.01
58	2	435-1205	Window Weld View

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DiamondBack™ Assembly Motor Mount

P/N 003-2165



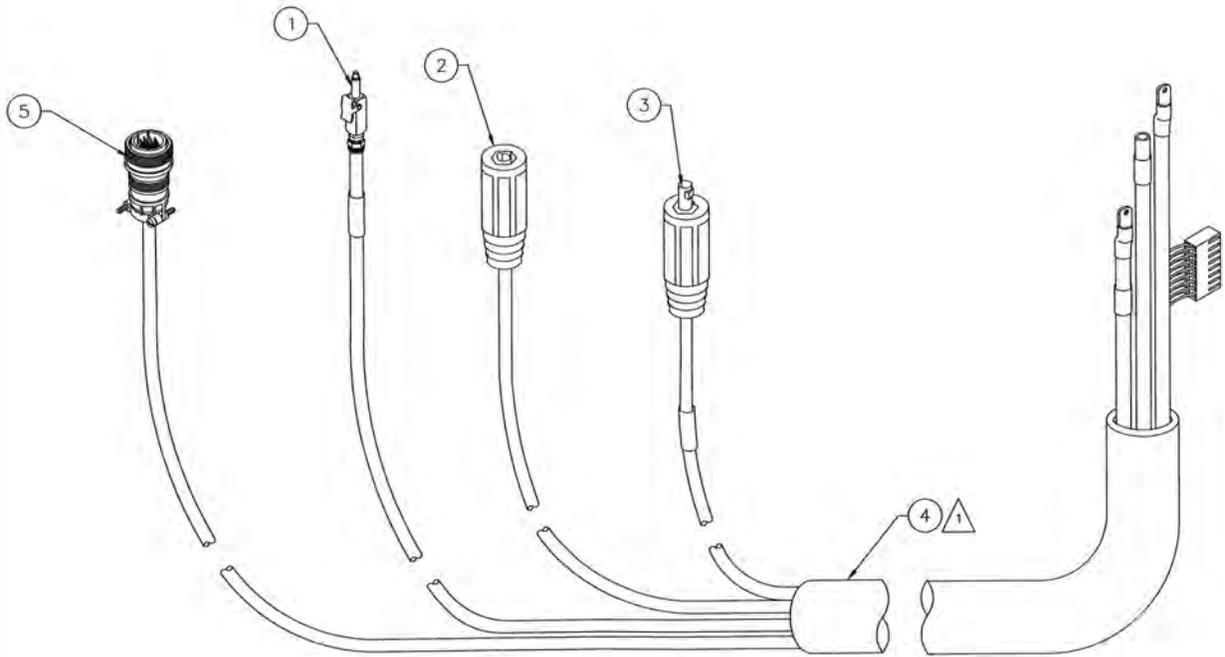
- 5 AFTER SCREW INSTALLATION, BACK-FILL SCREW HOLES WITH ITEM #1.
- ⚠ AFTER ITEM #7 INSTALLATION, TEST INSTALLED ITEM #8 FOR OUT OF ROUNDNESS USING DIAL GAUGE. MUST BE WITHIN 0.005.
- ⚠ COMPLETELY COVER SOLDERED LEAD TERMINALS WITH HOT MELT GLUE AFTER SUCCESSFUL COMPLETION OF INSPECTION.
- 2 CUT MOTOR TERMINAL EXCESS. DO NOT CUT WIRE LEADS.
- ⚠ PRIOR TO ASSEMBLY, TEST MOTOR AT 250 mc 24v FOR SMOOTH OPERATION. UNIT MAY REQUIRE MINOR PERCUSSIVE ADJUSTMENT.

Assembly Motor Mount

No.	Qty.	Part No.	Description
1	4	153-0853	Pin Crimp
2	1	153-0902	Conn Single Row 4P
3	1	211-0078	Motor Pittman Gear 581:1
4	3	328-0003	Scr Shc 4-40 x 1/2
5	2	421-0129	Pin Spring 0.063 x 0.437
6	2	421-0426	Pin Dowel 1/4 x 7/8 SST
7	1	431-1690	Block Motor Mount
8	1	431-1702	Coupler Motor Gear
9	1	431-1708	Mod Gear Pinion 30T
10	1	431-1709	Spacer Motor Mount

DiamondBack™ Assembly Lead

P/N 003-2169



⚠ After installing leads, secure snakeskin cover with tie wraps

Assembly Lead			
No.	Qty.	Part No.	Description
1	1	552-0221	Gas Hose
2	1	843-0692	Cable Ground 25 ft
3	1	843-0691	Cable Electrode 25 ft
4	1	301-0225	Snake Skin Cover
5	1	843-0564	Cable Controller DiamondBack
6	⚠ 2	411-0202	Tie Wrap

Appendix A Collets

Diameter - Tube OD	Description	Part Number
2"	COL 5006 FLS 2 IN OD	623-5006-2.000
2-1/2"	COL 5006 FLS 2-1/2 IN OD	623-5006-2.500
3"	COL 5006 FLS 3 IN OD	623-5006-3.000
3-1/2"	COL 5006 FLS 3-1/2 IN OD	623-5006-3.500
4"	COL 5006 FLS 4 IN OD	623-5006-4.000
4-1/2"	COL 5006 FLS 4-1/2 IN OD	623-5006-4.500
5"	COL 5006 FLS 5 IN OD	623-5006-5.000
5-1/2"	COL 5006 FLS 5-1/2 IN OD	623-5006-5.500
6"	COL 5006 FLS 6 IN OD	623-5006-6.000
Diameter - NPS	Description	Part Number
2"	COL 5006 FLS 2 IN NP	623-5006-2NP
2-1/2"	COL 5006 FLS 2-1/2 IN NP	623-5006-2-1/2NP
3"	COL 5006 FLS 3 IN NP	623-5006-3NP
3-1/2"	COL 5006 FLS 3-1/2 IN NP	623-5006-3-1/2NP
4"	COL 5006 FLS 4 IN NP	623-5006-4NP
5"	COL 5006 FLS 5 IN NP	623-5006-5NP
5-1/2"	COL 5006 FLS 5-1/2 IN NP	623-5006-5-1/2NP
6"	COL 5006 FLS 6 IN NP	623-5006-6NP
Diameter - Metric Tube	Description	Part Number
114.0	COL 5006 FLS 114.0MM OD	623-5006-114.0MM
115.0	COL 5006 FLS 115.0MM OD	623-5006-115.0MM
60.0	COL 5006 FLS 60.0MM OD	623-5006-60.0MM
72.0	COL 5006 FLS 72.0MM OD	623-5006-72.0MM
78.8	COL 5006 FLS 78.8MM OD	623-5006-78.8MM

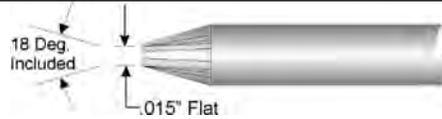
Collets screws (reference #18 in previous drawing) = 338-0020

Collets requiring sizes other than those listed above, are considered 'Custom Collets'.

Please consult factory for part number and pricing of 'Custom Collets'.

Blank collets for the 5006 DiamondBack™ weldhead are not available.

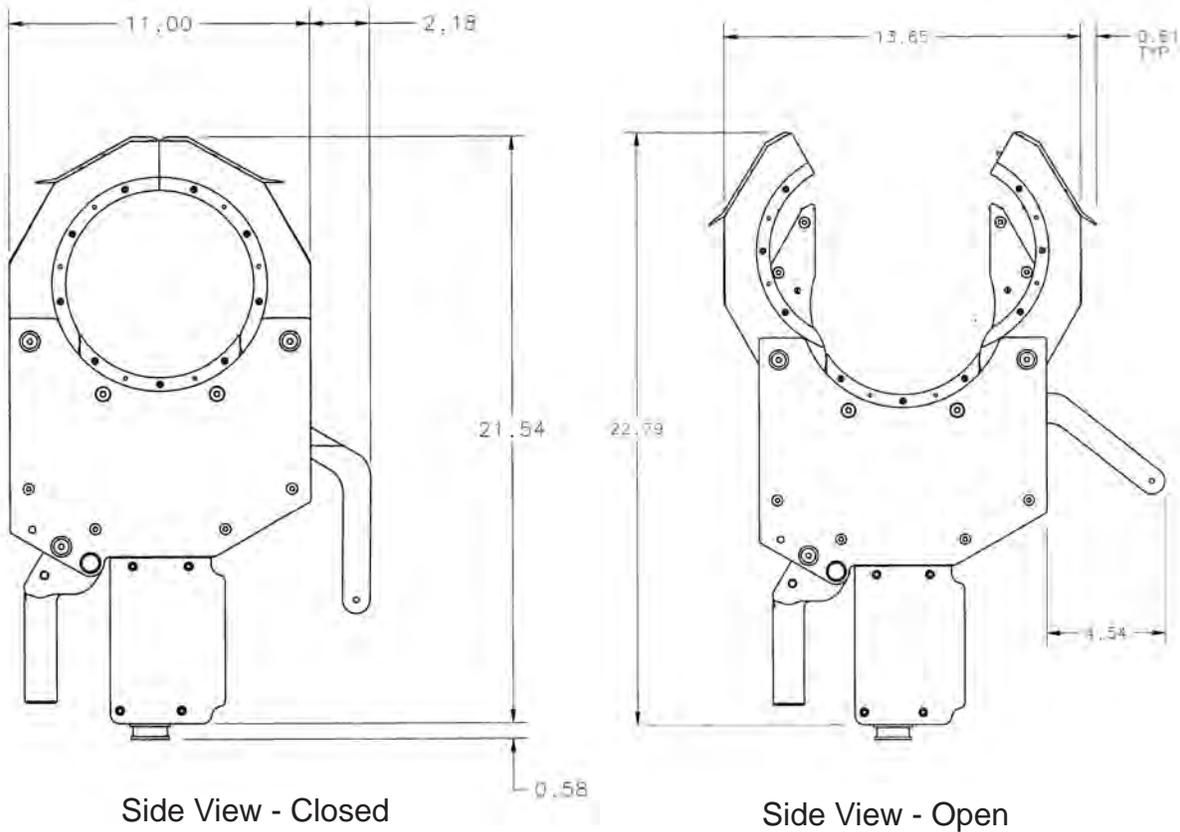
Appendix B Pre-Ground Tungsten Electrodes



Tungsten set screw = 321-1264

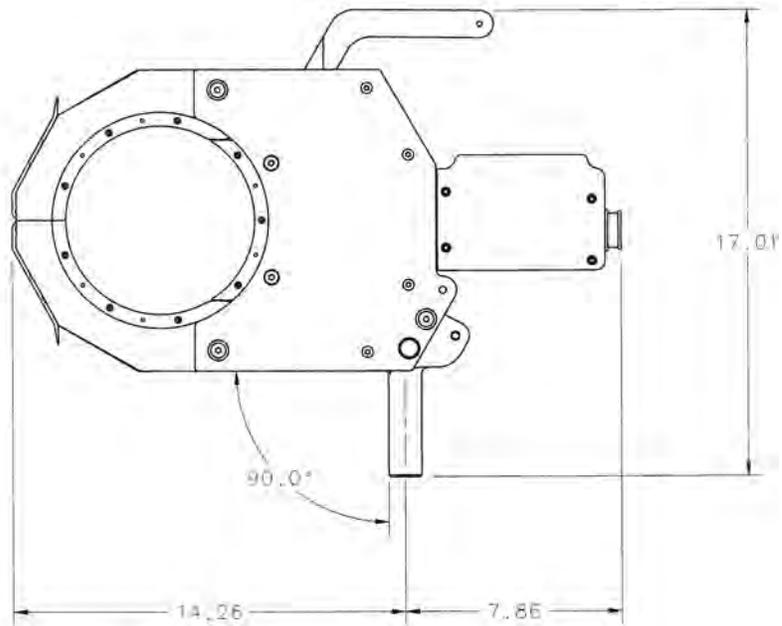
Diameter - Tube OD	Description	Part Number
2"	TUNG 3/32 5006 2 OD	635-093-3.339
2 1/2"	TUNG 3/32 5006 2-1/2 OD	635-093-3.089
3"	TUNG 3/32 5006 3 OD	635-093-2.828
3-1/2"	TUNG 3/32 5006 3-1/2 OD	635-093-2.578
4"	TUNG 3/32 5006 4 OD	635-093-2.328
4-1/2"	TUNG 3/32 5006 4-1/2 OD	635-093-2.086
5"	TUNG 3/32 5006 5 OD	635-093-1.828
5-1/2"	TUNG 3/32 5006 5-1/2 OD	635-093-1.578
6"	TUNG 3/32 5006 6 OD	635-093-1.332
Diameter - NPS	Description	Part Number
2"	TUNG 3/32 5006 2 NP	635-093-3.147
2-1/2"	TUNG 3/32 5006 2-1/2 NP	635-093-2.890
3"	TUNG 3/32 5006 3 NP	635-093-2.578
3-1/2"	TUNG 3/32 5006 3-1/2 NP	635-093-2.328
4"	TUNG 3/32 5006 4 NP	635-093-2.067
5"	TUNG 3/32 5006 5 NP	635-093-1.531
6"	TUNG 3/32 5006 6 NP	635-093-1.000
Diameter - Metric Tube	Description	Part Number
60.0	TUNG 3/32 5006 60.0 MM OD	635-093-3.147
72.0	TUNG 3/32 5006 72.0 MM OD	635-093-2.890
78.8	TUNG 3/32 5006 78.8 MM OD	635-093-2.781
114.0	TUNG 3/32 5006 114.0 MM OD	635-093-2.086
115.0	TUNG 3/32 5006 115.0 MM OD	635-093-2.067

Appendix C Overall Dimensional Drawings



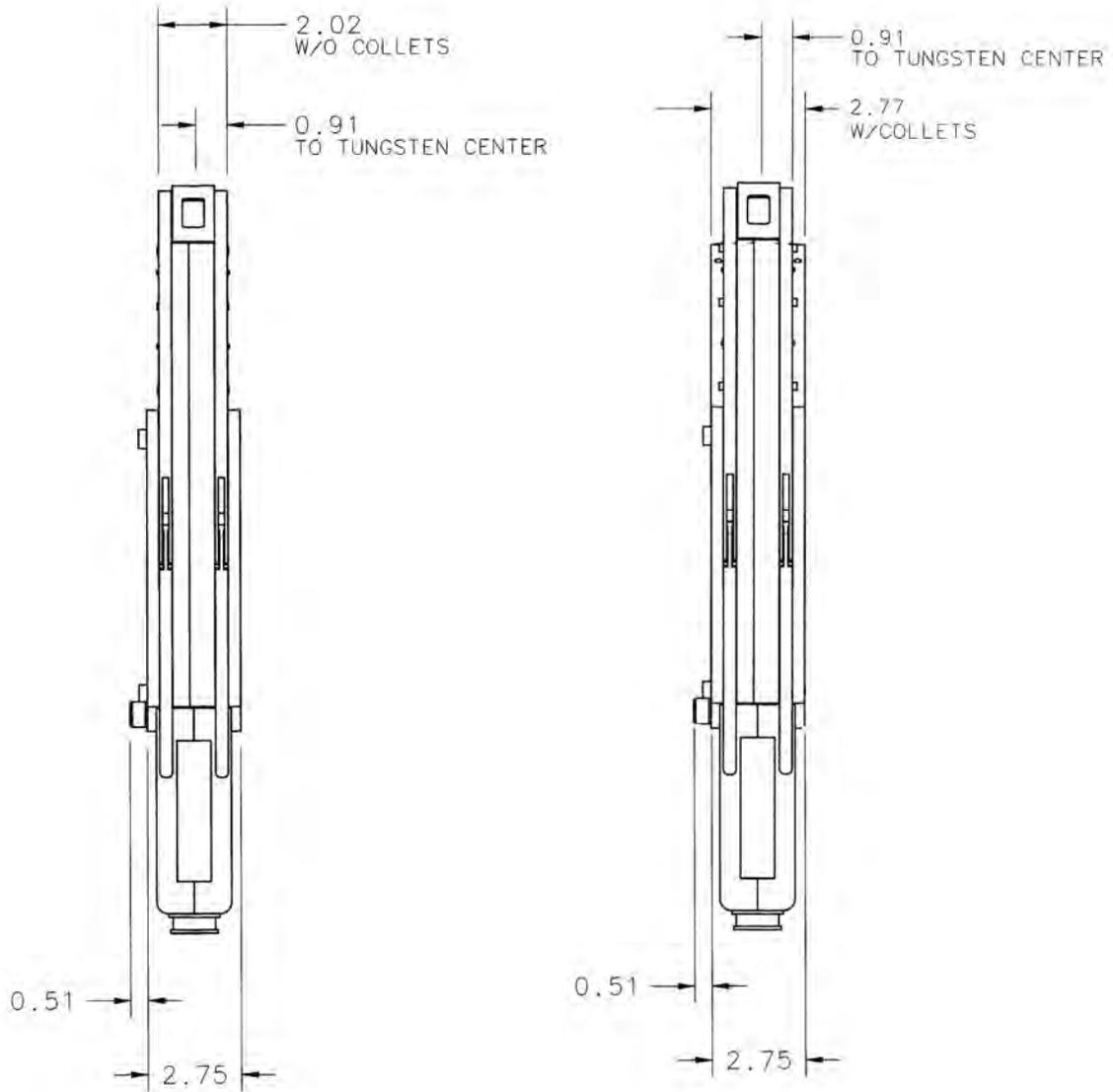
Side View - Closed

Side View - Open



Side View - 90° Tilted

Appendix C Overall Dimensional Drawings



Profile - without Collets

Profile - with Collets

**Specifications subject to change without notice.
Dimensions provided are for reference only.**

			
WARNING	<ul style="list-style-type: none"> Do not touch electrically live parts or electrode with skin or wet clothing. Insulate yourself from work and ground. 	<ul style="list-style-type: none"> Keep flammable materials away. 	<ul style="list-style-type: none"> Wear eye, ear and body protection.
Spanish AVISO DE PRECAUCION	<ul style="list-style-type: none"> No toque las partes o los electrodos bajo carga con la piel o ropa mojada. Aisiese del trabajo y de la tierra. 	<ul style="list-style-type: none"> Mantenga el material combustible fuera del área de trabajo. 	<ul style="list-style-type: none"> Protéjase los ojos, los oídos y el cuerpo.
French ATTENTION	<ul style="list-style-type: none"> Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension. Isolerez-vous du travail et de la terre. 	<ul style="list-style-type: none"> Gardez à l'écart de tout matériel inflammable. 	<ul style="list-style-type: none"> Protégez vos yeux, vos oreilles et votre corps.
German WARNUNG	<ul style="list-style-type: none"> Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! Isolieren Sie sich von den Elektroden und dem Erdboden! 	<ul style="list-style-type: none"> Entfernen Sie brennbares Material! 	<ul style="list-style-type: none"> Tragen Sie Augen-, Ohren- und Körperschutz!
Portuguese ATENÇÃO	<ul style="list-style-type: none"> Não toque partes elétricas e electrodos com a pele ou roupa molhada. Isole-se da peça e terra. 	<ul style="list-style-type: none"> Mantenha inflamáveis bem guardados. 	<ul style="list-style-type: none"> Use proteção para a vista, ouvido e corpo.
Japanese 注意事項	<ul style="list-style-type: none"> 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。 施工物やアースから身体が絶縁されている様にして下さい。 	<ul style="list-style-type: none"> 燃えやすいものの側での溶接作業は絶対にしてはなりません。 	<ul style="list-style-type: none"> 目、耳及び身体に保護具をして下さい。
Chinese 警告	<ul style="list-style-type: none"> 皮肤或湿衣物切勿接触带电部件及焊缝。 使你自已与地面和工件绝缘。 	<ul style="list-style-type: none"> 把一切易燃物品移离工作场所。 	<ul style="list-style-type: none"> 佩戴眼、耳及身体劳动保护用具。
Korean 위험	<ul style="list-style-type: none"> 전도체나 응집봉을 젖은 헝겊 또는 피부로 절대 접촉치 마십시오. 모재와 접지를 접촉치 마십시오. 	<ul style="list-style-type: none"> 인화성 물질을 접근 시키지 마십시오. 	<ul style="list-style-type: none"> 눈, 귀와 몸에 보호장구를 착용하십시오.
Arabic تحذير	<ul style="list-style-type: none"> لا تلمس الأجزاء التي يمر بها التيار الكهربائي أو الأقطاب بجلد الجسم أو بالملائم المبللة بالماء. ضع عازلا على جسمك خلال العمل. 	<ul style="list-style-type: none"> ضع المواد القابلة للاشتعال في مكان بعيد. 	<ul style="list-style-type: none"> ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.

READ AND UNDERSTAND THE MANUFACTURER'S INSTRUCTION FOR THIS EQUIPMENT AND THE CONSUMABLES TO BE USED AND FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES.

SE RECOMIENDA LEER Y ENTENDER LAS INSTRUCCIONES DEL FABRICANTE PARA EL USO DE ESTE EQUIPO Y LOS CONSUMIBLES QUE VA A UTILIZAR, SIGA LAS MEDIDAS DE SEGURIDAD DE SU SUPERVISOR.

LISEZ ET COMPRENEZ LES INSTRUCTIONS DU FABRICANT EN CE QUI REGARDE CET EQUIPMENT ET LES PRODUITS A ETRE EMPLOYES ET SUIVEZ LES PROCEDURES DE SECURITE DE VOTRE EMPLOYEUR.

LESEN SIE UND BEFOLGEN SIE DIE BETRIEBSANLEITUNG DER ANLAGE UND DEN ELEKTRODENEINSATZ DES HERSTELLERS. DIE UNFALLVERHÜTUNGSVORSCHRIFTEN DES ARBEITGEBERS SIND EBENFALLS ZU BEACHTEN.

			
<ul style="list-style-type: none"> ● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone. 	<ul style="list-style-type: none"> ● Turn power off before servicing. 	<ul style="list-style-type: none"> ● Do not operate with panel open or guards off. 	WARNING
<ul style="list-style-type: none"> ● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases. 	<ul style="list-style-type: none"> ● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio. 	<ul style="list-style-type: none"> ● No operar con panel abierto o guardas quitadas. 	Spanish AVISO DE PRECAUCION
<ul style="list-style-type: none"> ● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail. 	<ul style="list-style-type: none"> ● Débranchez le courant avant l'entretien. 	<ul style="list-style-type: none"> ● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés. 	French ATTENTION
<ul style="list-style-type: none"> ● Vermeiden Sie das Einatmen von Schweißrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes! 	<ul style="list-style-type: none"> ● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!) 	<ul style="list-style-type: none"> ● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen! 	German WARNUNG
<ul style="list-style-type: none"> ● Mantenha seu rosto da fumaça. ● Use ventilação e exaustão para remover fumo da zona respiratória. 	<ul style="list-style-type: none"> ● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas. 	<ul style="list-style-type: none"> ● Mantenha-se afastado das partes moventes. ● Não opere com os painéis abertos ou guardas removidas. 	Portuguese ATENÇÃO
<ul style="list-style-type: none"> ● ヒュームから頭を離すようにして下さい。 ● 換気や排煙に十分留意して下さい。 	<ul style="list-style-type: none"> ● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。 	<ul style="list-style-type: none"> ● パネルやカバーを取り外したまま機械操作をしないで下さい。 	Japanese 注意事項
<ul style="list-style-type: none"> ● 頭部遠離煙霧。 ● 在呼吸區使用通風或排風器除煙。 	<ul style="list-style-type: none"> ● 維修前切斷電源。 	<ul style="list-style-type: none"> ● 儀表板打開或沒有安全罩時不準作業。 	Chinese 警告
<ul style="list-style-type: none"> ● 얼굴로부터 용접가스를 멀리하십시오. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시오. 	<ul style="list-style-type: none"> ● 보수전에 전원을 차단하십시오. 	<ul style="list-style-type: none"> ● 관널이 열린 상태로 작동치 마십시오. 	Korean 위험
<ul style="list-style-type: none"> ● ابتعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها. 	<ul style="list-style-type: none"> ● قطع التيار الكهربائي قبل القيام بأية صيانة. 	<ul style="list-style-type: none"> ● لا تشغيل هذا الجهاز اذا كانت الاغطية الحديدية الوالفة لوست عليه. 	Arabic تحذير

LEIA E COMPREENDA AS INSTRUÇÕES DO FABRICANTE PARA ESTE EQUIPAMENTO E AS PARTES DE USO, E SIGA AS PRÁTICAS DE SEGURANÇA DO EMPREGADOR.

使う機械や溶材のメーカーの指示書をよく読み、まず理解して下さい。そして貴社の安全規定に従って下さい。

請詳細閱讀並理解製造廠提供的說明以及應該使用的銀焊材料，並請遵守貴方的有關勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

اقرأ بتمعن وافهم تعليمات المصنع المنتج لهذه المعدات والمواد قبل استعمالها واتبع تعليمات الوقاية لصاحب العمل.

LIMITED WARRANTY

Effective August 1, 2008

This warranty supersedes all previous MK Products warranties and is exclusive, with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY - MK Products Inc., Irvine, California warrants that all new and unused equipment furnished by MK Products is free from defects in workmanship and material as of the time and place of delivery by MK Products. No warranty is made by MK Products with respect to trade accessories or other items manufactured by others. Such trade accessories and other items are sold subject to the warranties of their respective manufacturers, if any.

MK Products' warranty does not apply to components having normal useful life of less than one (1) year, such as relay points, wire conduit, tungsten, and welding gun parts that come in contact with the welding wire, including gas cups, gas cup insulators, and contact tips where failure does not result from defect in workmanship or material.

MK Products shall, exclusively remedy the limited warranty or any duties with respect to the quality of goods, based upon the following options:

- (1) repair
- (2) replacement
- (3) where authorized in writing by MK Products, the reasonable cost of repair or replacement at our Irvine, California plant.

As a matter of general policy only, MK Products may honor an original user's warranty claims on warranted equipment in the event of failure resulting from a defect within the following periods from the date of delivery of equipment to the original user:

- 1. Power Supplies and Wire Feed Cabinets 3 years
- 2. Weldheads, CobraCooler, Positioners, Prince XL and Prince XL Spool Guns, Python, CobraMAX, Cobra SX, Cobra MX 1 year
- 3. Sidewinder Spool Gun, Prince SG Spool Guns, Modules 180 days
- 4. Repairs/Exchanges/Parts/Accessories 90 days

Classification of any item into the foregoing categories shall be at the sole discretion of MK Products. Notification of any failure must be made in writing within 30 days of such failure.

A copy of the invoice showing the date of sale must accompany products returned for warranty repair or replacement.

All equipment returned to MK Products for service must be properly packaged to guard against damage from shipping. MK Products will not be responsible for any damages resulting from shipping.

Normal surface transportation charges (one way) for products returned for warranty repair or replacement will be borne by MK Products, except for products sold to foreign markets.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY, OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE, OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MK PRODUCTS, IS EXCLUDED AND DISCLAIMED BY MK PRODUCTS.

EXCEPT AS EXPRESSLY PROVIDED BY MK PRODUCTS IN WRITING, MK'S PRODUCTS ARE INTENDED FOR ULTIMATE PURCHASE BY COMMERCIAL/INDUSTRIAL USERS AND FOR OPERATION BY PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT AND NOT FOR CONSUMERS OR CONSUMER USE. MK PRODUCTS' WARRANTIES DO NOT EXTEND TO, AND NO RE-SELLER IS AUTHORIZED TO EXTEND MK PRODUCTS' WARRANTIES TO ANY CONSUMER.

USE OF OTHER THAN *GENUINE* MK PRODUCTS' CONSUMABLES, PARTS, AND ACCESSORIES MAY INVALIDATE YOUR PRODUCT WARRANTY.



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