BERNARD™

OM-BTB-1.1 Dec. 2014

Processes

MIG (GMAW) Welding

Description

Semi-Automatic, Air-Cooled, MIG (GMAW) Welding Gun

Best of the Best (BTB) Platform

OWNER'S MANUAL

Bernard
A Division of Miller Electric Mfg. Co.
449 West Corning Road, Box 667
Beecher, Illinois 60401 USA

Phone: 1-855-MIGWELD (644-9353) (US & Canada)
1-519-737-3030 (International)
Fax: 708-946-6726
For more information, visit us at BernardWelds.com

Thank You for Choosing Bernard

Thank you for selecting a Bernard product. The MIG gun you have purchased has been carefully assembled and is ready to weld and factory tested prior to shipment to ensure high performance. Before installing, compare the equipment received against the invoice to verify that the shipment is complete and undamaged. It is the responsibility of the purchaser to file all claims of damage or loss that may have occurred during transit with the carrier.

The owner's manual contains general information, instructions and maintenance to help better maintain your MIG gun. **Please read, understand and follow all safety precautions.**

While every precaution has been taken to assure the accuracy of this owner's manual, Bernard assumes no responsibility for errors or omissions. Bernard assumes no liability for damages resulting from the use of information contained herein. The information presented in this owner's manual is accurate to the best of our knowledge at the time of printing. Please reference Bernardwelds.com for updated material.

For customer support and special applications, please call the Bernard Customer Service Department at 1-855-MIGWELD (644-9353) (Canada & US) or 1-519-737-3030 (International) or fax 1-708-946-6726. Our trained Customer Service Team is available between 8:00 a.m. and 4:30 p.m. CST, and will answer your product application or repair questions.

Bernard manufactures premium semi-automatic GMAW (MIG) and FCAW (flux-cored) welding guns, consumables, accessories and manual arc products. For more information on other premium Bernard products, contact your local Bernard distributor or visit us on the web at BernardWelds.com

For additional support materials such as spec sheets, troubleshooting information, how-to guides and videos, animations, online configurators and much more please visit BernardWelds.com
Scan this QR Code with your smart phone for immediate access to BernardWelds.com/TechnicalSupport

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Subject to Change – The information presented in this owner's manual is accurate to the best of our knowledge at the time of printing. Please visit BernardWelds.com for the most up-to-date information.

DECLARATION OF CONFORMITY

for European Community (CE marked) products.

Bernard Welding, 449 West Corning Rd., Beecher, IL 60401 U.S.A. declares that the product(s) identified in this declaration conform to the essential requirements and provisions of the stated Council Directive(s) and Standard(s).

Product/Apparatus Identification:

Product	Stock Number
Bernard Q20 Series – 200A	Q20XXXXXXX (Configurable #)
Bernard Q30 Series – 300A	Q30XXXXXXX (Configurable #)
Bernard Q40 Series – 400A	Q40XXXXXXX (Configurable #)
Bernard Q50 Series – 500A	Q50XXXXXXX (Configurable #)
Bernard Q60 Series – 600A	Q60XXXXXXX (Configurable #)
Bernard S30 Series – 300A	S30XXXXXXX (Configurable #)
Bernard S40 Series – 400A	S40XXXXXXX (Configurable #)
Bernard S50 Series – 500A	S50XXXXXXX (Configurable #)
Bernard S60 Series – 600A	S60XXXXXXX (Configurable #)

Council Directives:

- 2006/95/EC Low Voltage
- 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment

Standards:

- IEC 60974-7:2013 Arc welding equipment – Part 7: Torches

Signatory:

David A. Werba
MANAGER, PRODUCT DESIGN COMPLIANCE

May 16, 2014
Date of Declaration

SECTION 1 - SAFETY PRECAUTIONS - READ BEFORE USING

1-1 Fume and Gas Hazards

FUMES AND GASES can be hazardous

Welding and cutting produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove welding and cutting fumes and gases. The recommended way to determine adequate ventilation is to sample for the composition and quantity of fumes and gases to which personnel are exposed.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes and metals.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding and cutting fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld or cut in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld or cut on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

1-2 Arc Rays and Welding Hazards

ARC RAYS can burn eyes and skin.

Arc rays from welding and cutting processes produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

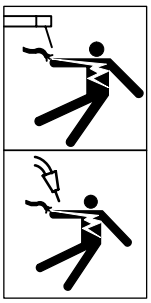
- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes from arc rays and sparks when welding, cutting, or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear body protection made from durable, flame resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap.

WELDING AND CUTTING can cause fire or explosion

Welding or cutting on closed containers, such as tanks, drums or pipes, can cause them to blow up. Sparks can fly off from the welding or cutting arc. The flying sparks, hot work piece and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating or fire. Check and be sure the area is safe before doing any welding or cutting.

- Remove all flammables within 35 ft (10.7 m) of the welding or cutting arc. If this is not possible, tightly cover them with approved covers.
- Do not weld or cut where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding and cutting can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding or cutting on a ceiling, floor, bulkhead or partition can cause fire on the hidden side.
- Do not weld or cut on containers that have held combustibles, or on closed containers such as tanks, drums, or pipes unless they are properly prepared according to AWS F4.1 and AWS A6.0 (see Safety Standards).
- Do not weld or cut where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- Connect work cable to the work as close to the welding or cutting area as practical to prevent welding or cutting current from traveling long, possibly unknown paths and causing electric shock, sparks and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear body protection made from durable, flame resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding or cutting.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or by-pass them.

- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes and metals.



ELECTRIC SHOCK can kill

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic wire welding, the wire, wire reel, drive roll housing and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding or cutting process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a semi-automatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install, ground, and operate this equipment according to its Owner's Manual and national, state/provincial and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first and double-check connections
- Keep cords dry, free of oil and grease and protected from hot metal and sparks.
- Frequently inspect input power cord for damage or bare wiring. Replace cord immediately if damaged. Bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground or another electrode from a different machine.
- Do not touch electrode holders connected to two welding machines at the same time since double open circuit voltage will be present.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal. Disconnect cable for process when not in use.

CYLINDERS CAN EXPLODE if damaged.

Compressed gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

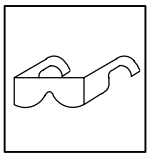
- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding, cutting or other electrical circuits.
- Never drape a welding electrode or cutting torch over a gas cylinder.
- Never allow a welding electrode or cutting torch to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct compressed gas cylinders, regulators, hoses and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve. Do not stand in front of or behind the regulator when opening the valve.

- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

1-3 Additional Safety Warnings for Installation, Operation and Maintenance

HOT PARTS can burn.

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.

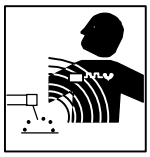


FLYING METAL or DIRT can injure or kill.

- Welding, cutting, chipping, wire brushing and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.

BUILDUP OF GAS can injure or kill.

- Shut off compressed gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



ELECTRIC AND MAGNETIC FIELDS (EMF) can affect implanted Medical Devices

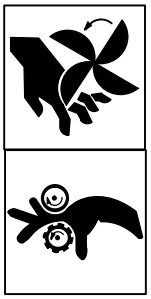
- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting or induction.

NOISE can damage hearing

- Noise from some processes or equipment can damage hearing.
- Wear approved ear protection if noise level is high.

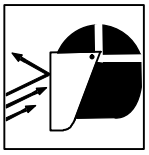
FIRE OR EXPLOSION hazard

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammbles.
- Do not overload building wiring – be sure power supply system is properly sized, rated and protected to handle this unit.



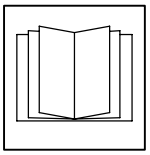
MOVING PARTS can injure.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers or guards for maintenance and troubleshooting as necessary.
- Reinstall doors, panels, covers or guards when maintenance is finished and before reconnecting input power.
- Keep away from pinch points such as drive rolls.



FLYING SPARKS can INJURE.

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand and body protection.
- Sparks can cause fires - keep flammables away.

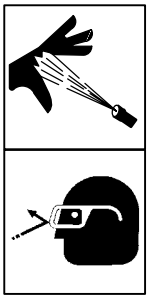


READ INSTRUCTIONS.

- Read and follow all labels and the Owner's Manual carefully before installing, operating, or servicing unit. Read the safety information at the beginning of the manual and in each section.
- Use only genuine replacement parts from the manufacturer.
- Perform maintenance and service according to the Owner's Manual, industry standards and national, state/provincial and local codes.

WELDING WIRE can injure

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people or any metal when threading welding wire.



COMPRESSED AIR can injure or kill

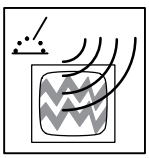
- Before working on compressed air system, turn off and lockout/tagout unit, release pressure and be sure air pressure cannot be accidentally applied.
- Relieve pressure before disconnecting or connecting air lines.
- Check compressed air system components and all connections and hoses for damage, leaks and wear before operating unit.
- Do not direct air stream toward self or others.
- Wear protective equipment such as safety glasses, hearing protection, leather gloves, heavy shirt and trousers, high shoes, and a cap when working on compressed air system.
- Use soapy water or an ultrasonic detector to search for leaks––never use bare hands. Do not use equipment if leaks are found.

TRAPPED AIR PRESSURE AND WHIPPING HOSES can injure

- Release air pressure from tools and system before servicing, adding or changing attachments or opening compressor oil drain or oil fill cap.

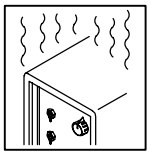
H.F. RADIATION can cause interference

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- Have the installation regularly checked and maintained.
- If notified by the FCC about interference, stop using the equipment at once.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



ARC WELDING AND PLASMA CUTTING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep cables as short as possible, close together, and down low, such as on the floor.
- Locate welding or cutting operation 100 meters from any sensitive electronic equipment.
- Be sure welding machine or plasma cutter is installed and grounded according to its Owner's Manual.
- If interference still occurs, the user must take extra measures such as moving the welding or cutting machine using shielded cables, using line filters or shielding the work area.



OVERUSE CAN CAUSE OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.

1-4 California Proposition 65 Warnings

Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

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

1-5 EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). The current from arc welding (and allied processes including spot welding, gouging, plasma arc cutting, and induction heating operations) creates an EMF field around the welding circuit. EMF fields may interfere with some medical implants, e.g. pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, restrict access for passersby or conduct individual risk assessment for welders. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep head and trunk as far away from the equipment in the welding circuit as possible.
5. Connect work clamp to workpiece as close to the weld as possible.
6. Do not work next to, sit or lean on the welding power source.
7. Do not weld while carrying the welding power source or wire feeder.

About Implanted Medical Devices:
Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

1-6 Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, is available as a free download from the American Welding Society at http://www.aws.org or purchased from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Safe Practices for the Preparation of Containers and Piping for Welding and Cutting, American Welding Society Standard AWS F4.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org and www. sparky.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 14501 George Carter Way, Suite103, Chantilly, VA 20151 (phone: 703-788-2700, website:www.cganet.com).

Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Ontario, Canada L4W 5NS (phone: 800-463-6727, website: www.csa-international.org).

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (phone: 212-642-4900, website: www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (phone: 1-866-512-1800) (there are 10 OSHA Regional Offices— phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

Applications Manual for the Revised NIOSH Lifting Equation, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30333 (phone: 1-800-232-4636, website: www.cdc.gov/NIOSH).

1-7 Commercial Warranty

Product is warranted to be free from defects in material and workmanship for 1 Year after the sale by an authorized Buyer. Straight handles, straight handle switches and rear strain relief are covered by a lifetime warranty.

Bernard reserves the right to repair, replace or refund the purchase price of non-conforming product. Product found not defective will be returned to the Buyer after notification by Customer Service.

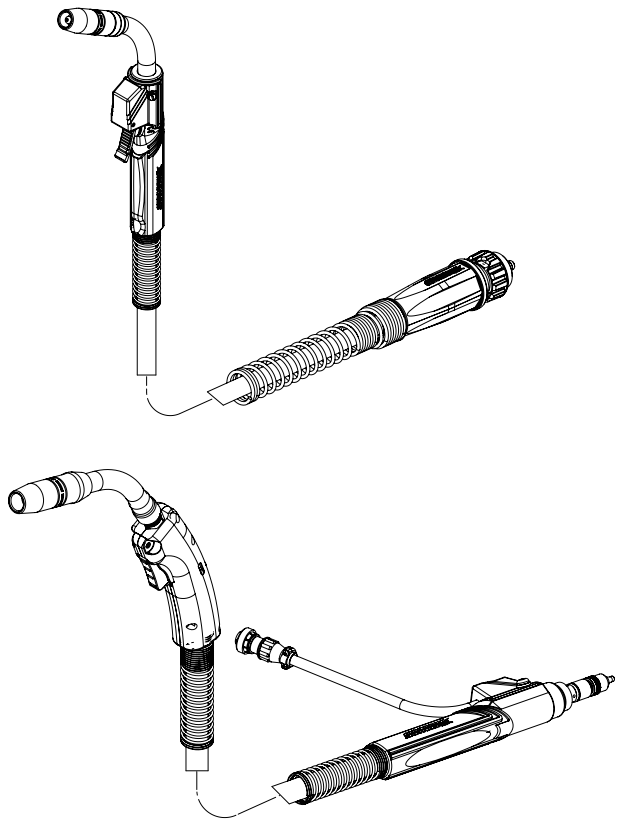
Bernard makes no other warranty of any kind, expressed or implied, including, but not limited to the warranties of merchantability or fitness for any purpose.

Bernard shall not be liable under any circumstances to Buyer, or to any person who shall purchase from Buyer, for damages of any kind. Including, but not limited to any, direct, indirect incidental or consequential damages or loss of production or loss of profits resulting from any cause whatsoever, including, but not limited to, any delay, act, error or omission of Bernard.

Genuine Bernard parts must be used for safety and performance reasons or the warranty becomes invalid. Warranty shall not apply if accident, abuse, or misuse damages a product, or if a product is modified in any way except by authorized Bernard personnel.

SECTION 2 - SPECIFICATIONS

2-1 Specifications



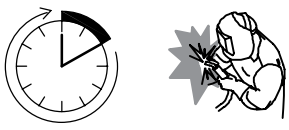
Air-Cooled MIG Guns for GMAW Welding
200 amp gun feeds maximum wire size of 1/16” (1.6 mm) **Duty Cycle Rating:** 100%: 200 Amp with CO_2 Shielding gas 60%: 200 Amp with Mixed Gases
300 amp gun feeds maximum wire size of 5/64” (2.0 mm) **Duty Cycle Rating:** 100%: 300 Amp with CO_2 Shielding Gas 60%: 300 Amp with Mixed Gases
400 amp gun feeds maximum wire size of 5/64” (2.0 mm) **Duty Cycle Rating:** 100%: 400 Amp with CO_2Shielding Gas 60%: 400 Amp with Mixed Gases
500 amp gun feeds maximum wire size of 3/32” (2.4 mm) **Duty Cycle Rating:** 100%: 500 Amp with CO_2Shielding Gas 60%: 500 Amp with Mixed Gases
600 amp gun feeds maximum wire size of 1/8” (3.2 mm) **Duty Cycle Rating:** 100%: 600 Amp with CO_2Shielding Gas 60%: 600 Amp with Mixed Gases

2-2 Duty Cycle and Overheating

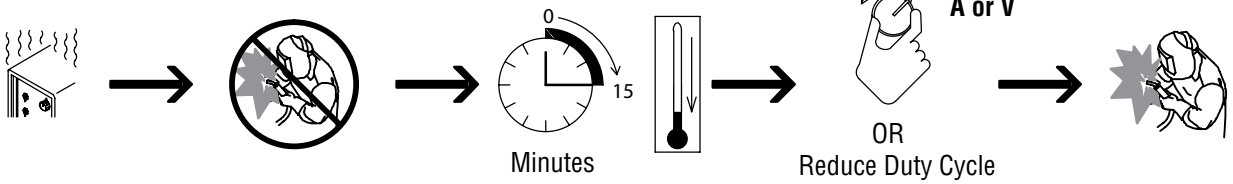
Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

Using mixed gases other than CO_2 reduces duty cycle ratings 10-50% depending on gas mixture and welding parameters.

Please reference chart above for duty cycle ratings by amperage



Continuous Welding

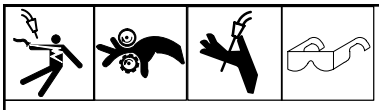


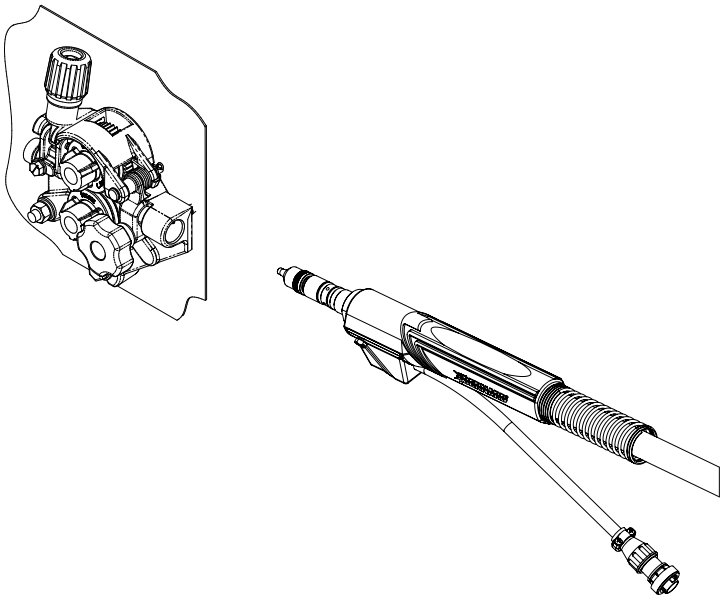
Minutes

OR
Reduce Duty Cycle

SECTION 3 - INSTALLATION

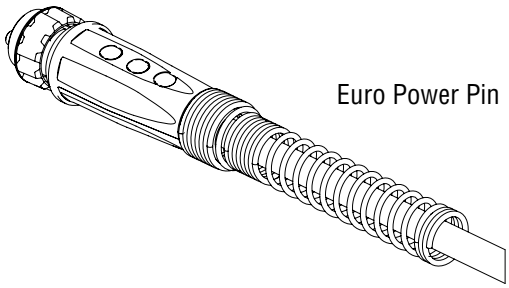
3-1 Installing to a Feeder with a Power Pin





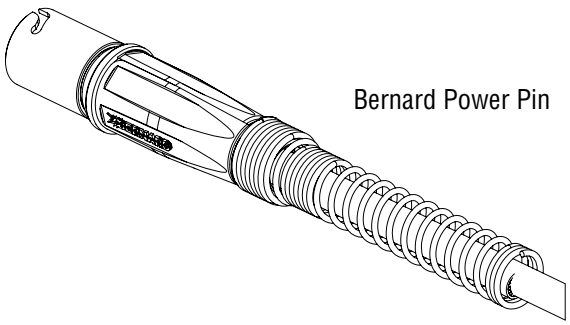
1. Insert power pin to shoulder and secure tightly.
2. Insert control plug into feeder.
3. Feed welding wire into power pin by hand and tighten drive rolls.

3-2 Installing to a Feeder with a Euro or Bernard Power Pin



Euro Power Pin

1. Insert the Euro power pin to face of receptacle. Thread Euro hand nut clockwise to tighten.

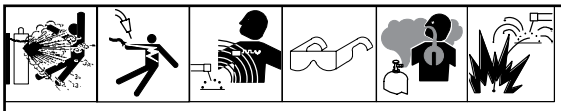


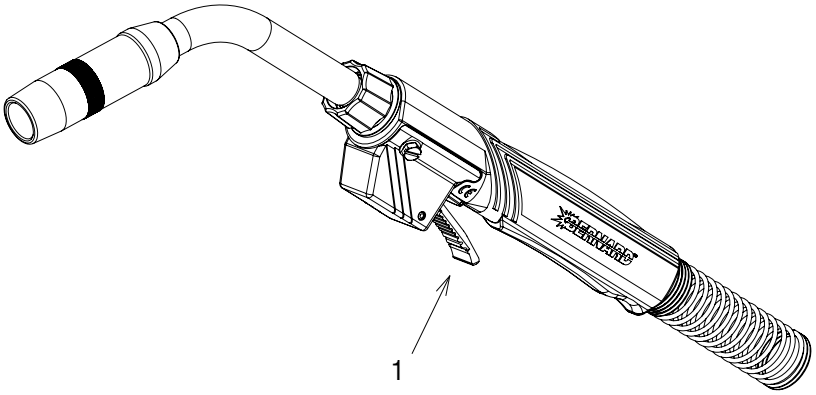
Bernard Power Pin

1. Insert the Bernard power pin to face of receptacle. Engage and rotate locking sleeve to tighten

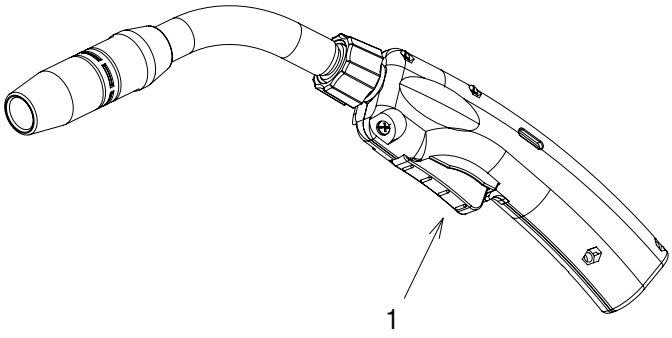
SECTION 4 - OPERATION

4-1 Pulling the Trigger



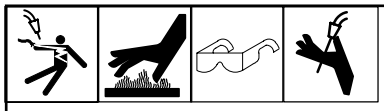


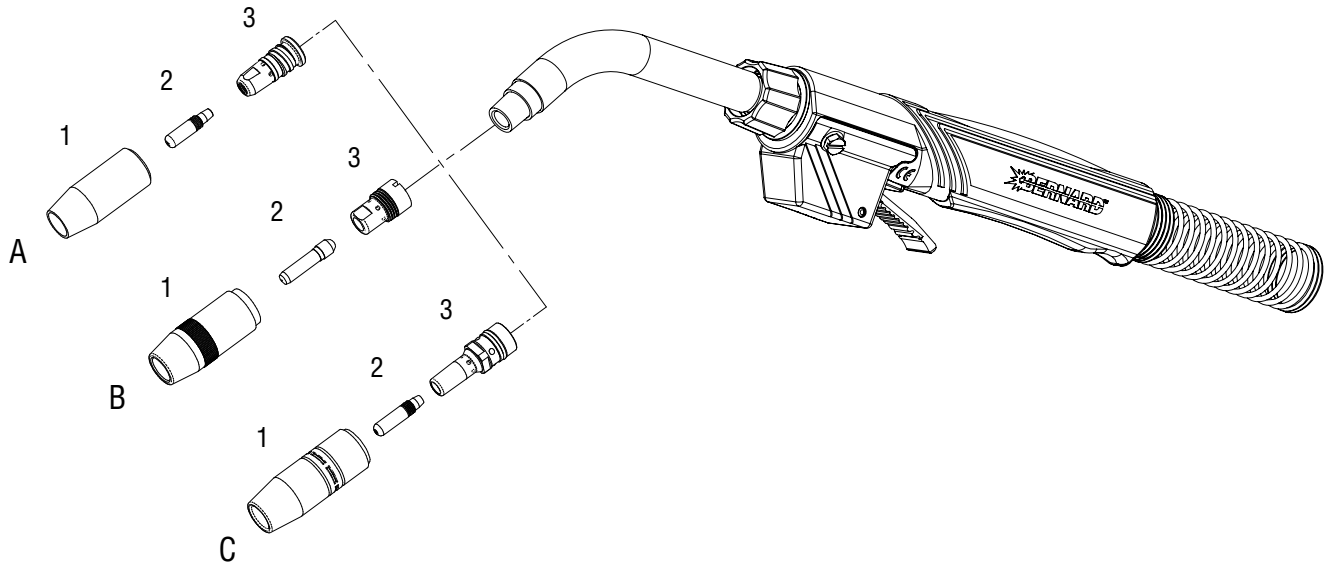
1. Trigger - When pressed, energized wire feeds and shielding gas flows.



SECTION 5 - REPLACEMENT

5-1 Changing Consumables





A. Changing Quik Tip™ Consumables

1. Remove threaded nozzle by turning in a counterclockwise direction. Slip-on nozzle can be removed with a slipping and pulling motion
2. Cut electrode and remove all burrs before removing contact tip. Remove the Quik Tip contact tip from the gas diffuser with a 1/4 turn counterclockwise. To replace slide the contact tip over electrode into gas diffuser and lock with a 1/4 turn clockwise rotation.
3. Gas diffuser may be removed with an appropriate wrench in a counterclockwise rotation. To install firmly secure gas diffuser with an appropriate wrench in a clockwise rotation, torque to 144 in-lbs.

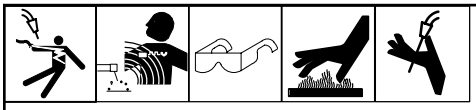
B. Changing Centerfire™ Consumables

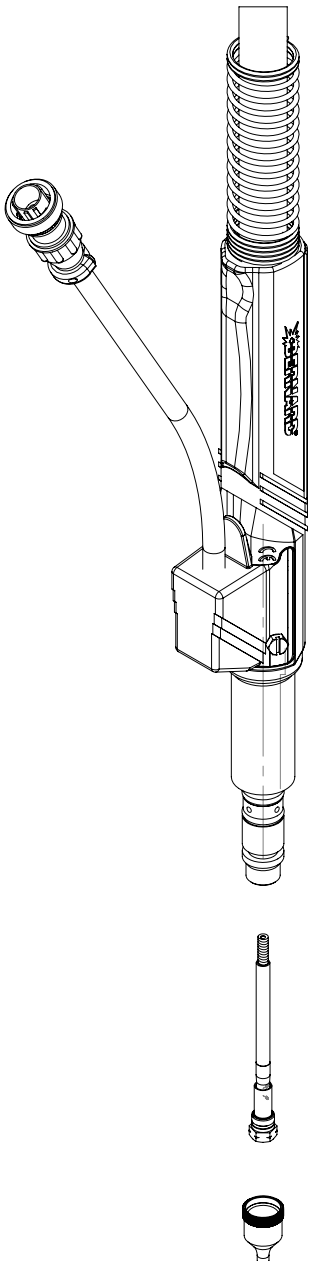
1. Cut electrode and remove all burrs before removing contact tip. Remove threaded nozzle by turning in a counterclockwise direction.
2. Pull the Centerfire contact tip from the gas diffuser. To replace slide the contact tip over electrode into gas diffuser and lock by installing nozzle onto gas diffuser. Nozzle is used to secure contact tip.
3. Gas diffuser may be removed with an appropriate wrench in a counterclockwise rotation. To install firmly secure gas diffuser with an appropriate wrench in a counter clockwise rotation, torque to 144 in-lbs.

C. Changing TOUGH LOCK™ Consumables

1. Remove the slip-on nozzle with a twisting and pulling motion.
2. Cut electrode and remove all burrs before removing contact tip. Remove the TOUGH LOCK contact tip from the retaining head with a counterclockwise turn.
   To replace slide the contact tip over electrode into gas diffuser and lock with a clockwise rotation.
3. Retaining head may be removed with an appropriate wrench in a counterclockwise rotation. To install firmly secure gas diffuser with an appropriate wrench in a clockwise rotation, torque to 144 in-lbs.

5-2 Changing the Liner

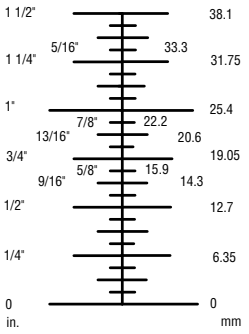


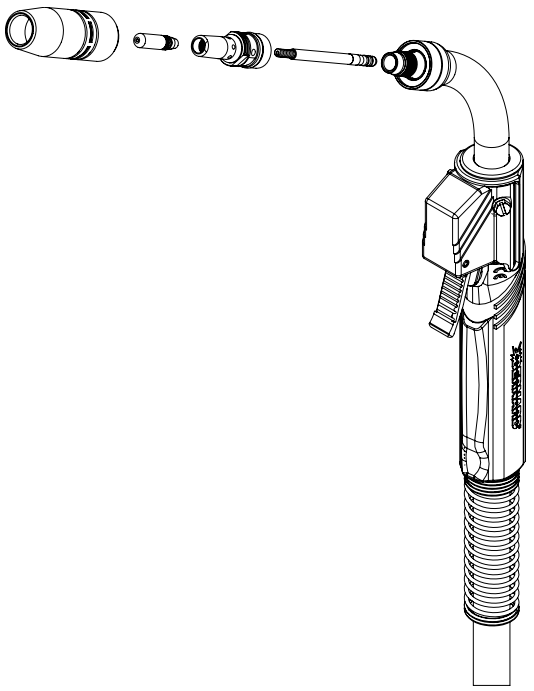


A. Changing Universal Conventional Liner

1. Remove nozzle, contact tip, and gas diffuser/ retaining head and lay cable straight. Using a 10 mm wrench, turn liner lock counterclockwise until it is free from the power pin. Remove liner from gun assembly.
2. With cable laying straight, insert new liner into power pin and feed through gun using short strokes to prevent kinking. Twist liner clockwise if necessary. Use a 10 mm wrench to turn liner lock clockwise to tighten into power pin.
3. Trim to dimensions shown in the liner chart below. Remove all burrs from end of liner and replace gas diffuser/retaining head, contact tip and nozzle.

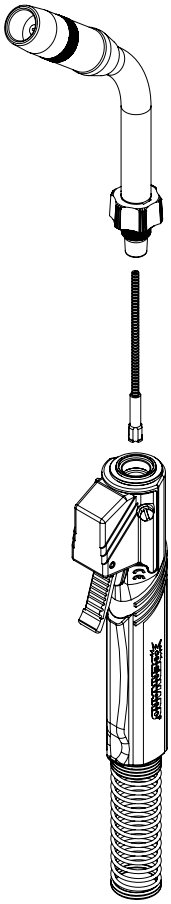
New Liner Trim Lengths		
Centerfire™ Diffuser Part Number	**Liner Trim Length**	
D-1	9/16"	14.3 mm
D-1T	13/16"	20.6 mm
D-1T-5	13/16"	20.6 mm
DS-1	9/16"	14.3 mm
DS-1T	5/8"	15.9 mm
DW-1	1/4"	6.4 mm
Quik Tip™ Diffuser Part Number	**Liner Trim Length**	
D114	5/8"	15.9 mm
D114Q	9/16"	14.3 mm
D118	3/4"	19.1 mm
D118Q	3/4"	19.1 mm
D118QLL	1-5/16"	33.3 mm
D1FQ	7/8"	22.2 mm
D218	7/8"	22.2 mm
TOUGH LOCK™ Retaining Head Part Number	**Liner Trim Length**	
ALL	3/4"	19.1 mm





B. Changing QUICK LOAD™ Liner

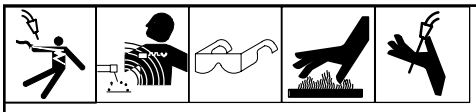
1. Remove the nozzle, contact tip and gas diffuser and lay cable straight. Pull the QUICK LOAD liner from the end of the neck using pliers.
2. Remove the protective cap from the new QUICK LOAD liner and insert it through the neck using the wire as a guide. Feed the liner through the gun using short strokes to prevent kinking.
3. Once the liner stops feeding, give it an extra push to ensure it is seated correctly. Push liner into gun and trim to dimensions shown on 'New Liner Trim Lengths' chart on p. 11. Remove all burrs from end of liner and replace gas diffuser, contact tip and nozzle.

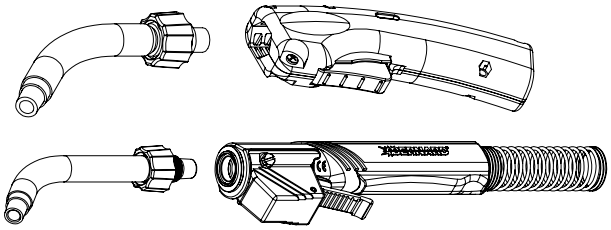


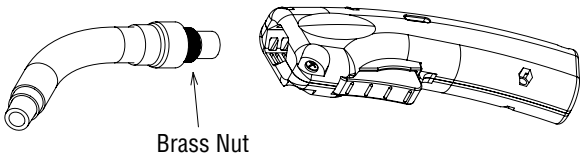
C. Changing a Jump Liner

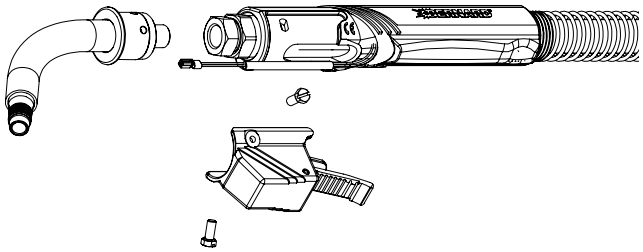
1. Remove the nozzle, contact tip, gas diffuser and neck. Remove used jump liner from the back end of neck.
2. Insert new jump liner making sure the liner stop is fully seated at the back of the neck.
3. Take the tapered end of the neck and insert into end fitting of the gun handle. Install the neck.
4. Trim jump liner to dimensions shown on 'New Liner Trim Lengths' chart on p. 11. Deburr the jump liner past the nozzle end of the neck.
5. Install gas diffuser, contact tip and nozzle.

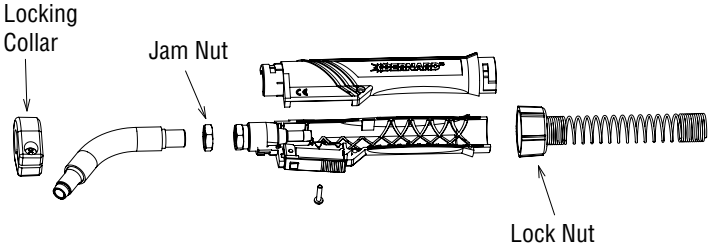
5-3 Changing the Neck











A. Changing the Neck - Rotatable

1. To remove neck, grasp lock nut and rotate counterclockwise. Rotation will free neck from end fitting. To install the neck, perform the above instructions in reverse order and torque to 38 in-lbs.
2. Liner may need to be changed if switching to a neck of a different bend angle or length.

B. Changing the Neck - Fixed with Curved Handle

1. To remove neck, remove the nut insulator.
2. Using a wrench, rotate brass nut counterclockwise, rotation will free neck from end fitting.
3. To install the neck, perform the above instructions in reverse order and tighten lock nut to 16 ft-lbs (21.7 Nm). Be sure nut insulator is in place.
4. Liner may need to be changed if switching to a neck of a different bend angle or length.

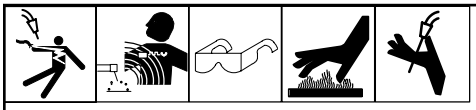
C. Changing the Neck - Fixed with T Series Large Straight Handle

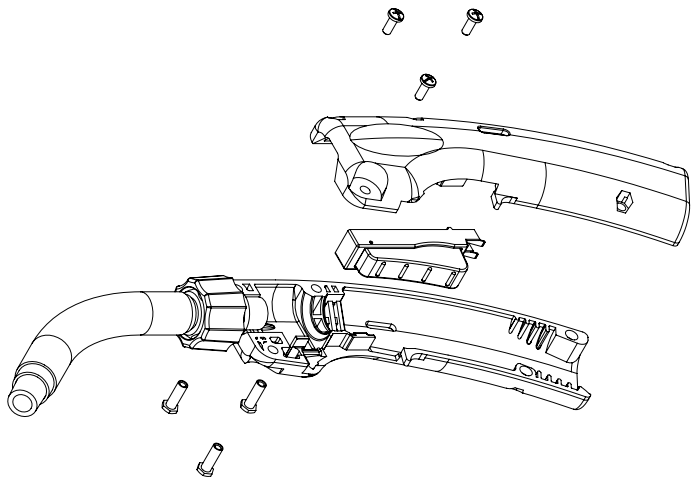
1. Place neck in vise. Remove both switch mounting housing screws with an 8 mm nut driver.
2. Slide handle back exposing the cable connection. Loosen the cable/neck connection using a 7/8" wrench.
3. Remove from vise and unthread neck by hand.
4. Thread the neck into the cable connection (hand tighten). Place neck in vise and tighten with a wrench to within 1/8" (3.2 mm) spacing between the cable connection and neck.
5. Install the switch and reposition handle and switch housing.
6. Reinstall switch housing mounting screws.
7. Liner may need to be changed if switching to a neck of a different bend angle or length.

D. Changing the Neck - Fixed with T Series Small Straight Handle

1. Loosen and remove locking collar.
2. Place neck in vise, twist handle lock nut counterclockwise and pull away from handle.
3. Remove screw from handle. Separate handle halves exposing jam nut and front of unicable.
4. Loosen jam nut using two 19 mm wrenches and unthread neck. Remove from vise and unthread neck by hand.
5. Thread jam nut onto new neck. Thread neck into unicable to desired orientation. Place neck in vise, tighten unicable and jam nut.
6. Reposition switch and handle. Reinstall handle lock nut, locking collar and screw.
7. Liner may need to be changed if switching to a neck of a different bend angle or length.

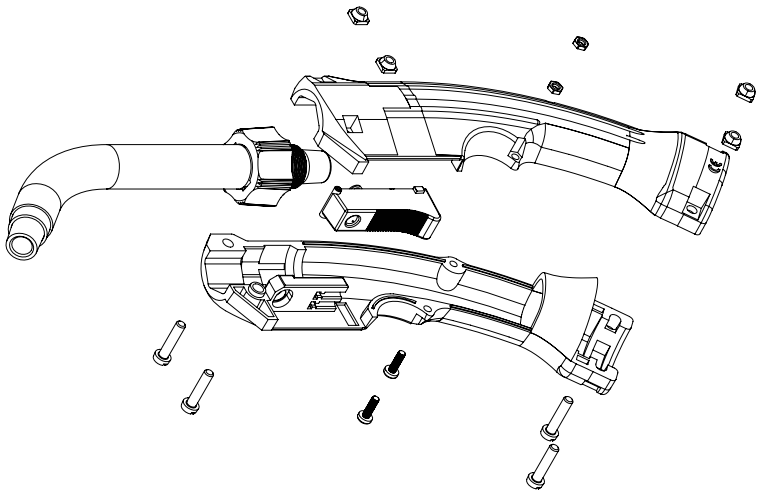
5-4 Changing the Handle and Switch





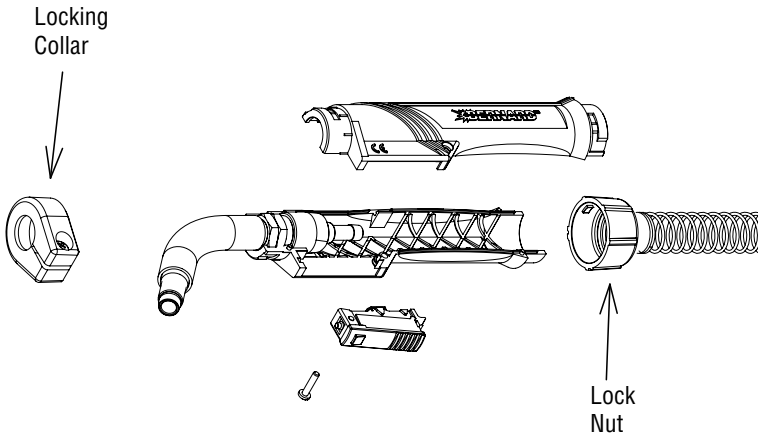
A. B Series Small and Large Curved Handle

1. Remove screws and post fasteners from handles.
2. Separate handle halves and remove trigger. Remove switch lead connectors with needle nose pliers.
3. To replace trigger, connect switch lead connectors onto terminals. Position handle half and trigger on cable so trigger leads are not pinched and movement of the trigger is not impaired.
4. Position the remaining handle half in place. Reinstall post fasteners and screws; torque to 10 in-lbs (1.1 Nm).



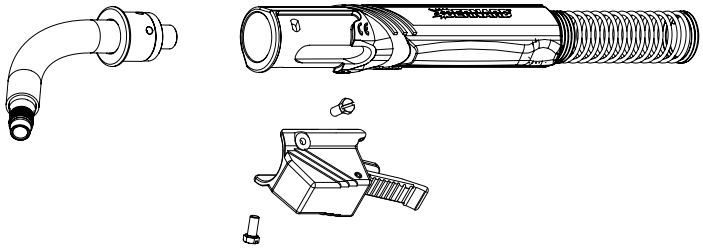
B. O Series Small and Large Curved Handle

1. Loosen screws, but do not fully remove.
2. Pry open bottom side of handle halves with a flat blade screw driver. Trigger should be able to be removed.
3. To replace trigger, install into handle halves with pivot posts inserted into handle cavities so movement is not impaired. Tighten screws; torque to 10 in-lbs (1.1 Nm).



C. T Series Small Straight Handle

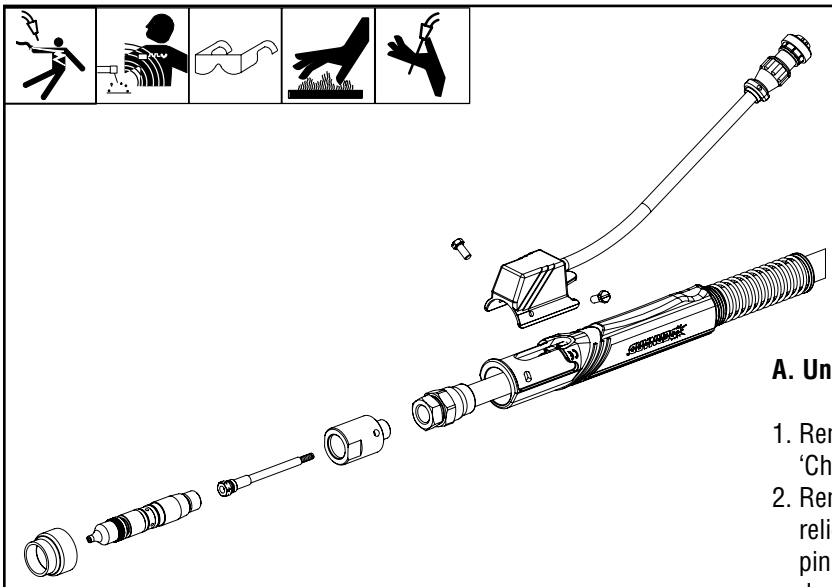
1. Loosen and remove locking collar.
2. Twist handle lock nut counterclockwise. Slide handle lock nut away from handle.
3. Remove screw from handle and separate handles halves.
4. Remove switch from switch lead connectors with needle nose pliers.
5. Connect switch lead connectors firmly onto switch terminals with needle nose pliers.
6. Place gun assembly into handle half positioning neck in desired position. Fit switch into switch nest on handle (switch lead must lie parallel). Reinstall second handle half.
7. Reinstall handle lock nut and locking collar on handle.
8. Insert screw and tighten.



D. T Series Large Straight Handle (Switch Only)

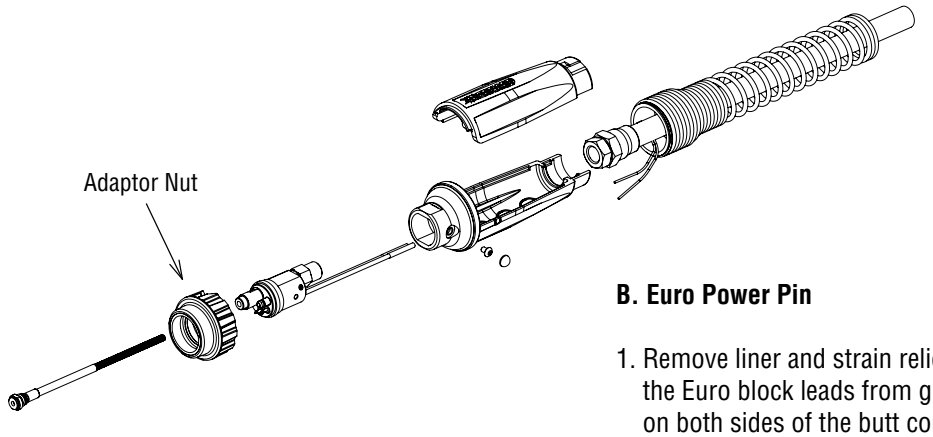
1. Remove both housing screws with an 8mm nut driver.
2. Ease switch out of switch housing with needle nose pliers to grip switch. Remove switch from switch lead connectors with needle nose pliers.
3. Push switch lead connectors firmly onto switch terminals with needle nose pliers.
4. Depress switch housing into nest on handle (switch leads must lie parallel). Align housing holes with threaded holes in body and insert mounting screws. Start both screws first before tightening with 8 mm nut driver to even alignment.

5-5 Changing the Power Pin



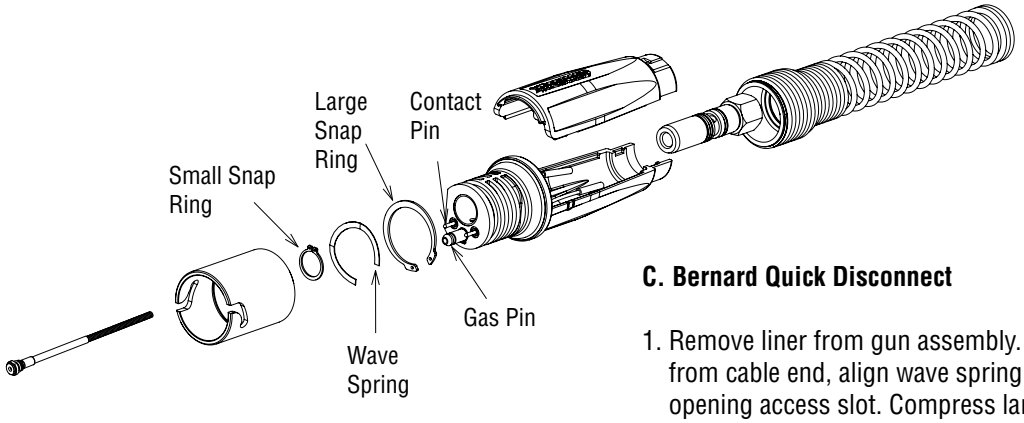
A. Universal Power Pin

1. Remove the liner by following the steps listed in the 'Changing the Liner' section.
2. Remove the screw and assembly from rear strain relief and slide rear strain relief back over power pin. Position control lead wires as necessary to avoid damaging them.
3. Use wrenches and rotate power pin in a counterclockwise direction to remove it from the adapter block.
4. Thread new power pin into adapter block and use wrenches in a clockwise direction to thread power pin into adapter block. Torque to 13 ft-lbs (17.6 Nm).
5. Slide rear strain relief over power pin and locate onto adapter block, aligning flats and screw hole. Secure with screw, position control lead wires in cutout on side of strain relief, close strain relief top and secure assembly by rotating clockwise 1/4 turn.
6. Reinstall liner by following the steps listed in the 'Changing the Liner' section.



B. Euro Power Pin

1. Remove liner and strain relief from gun assembly. Disconnect the Euro block leads from gun by cutting as close as possible on both sides of the butt connectors in order to preserve wire for later retermination.
2. Slide adaptor nut toward cable, thus exposing the Euro block. Remove Euro block from end fitting using appropriate wrenches in a counterclockwise rotation.
3. Test lead wires for continuity when trigger is engaged.
4. Slide adaptor nut over cable with internal threads facing toward rear of the gun.
5. Assemble Euro block onto end fitting in a clockwise rotation using appropriate wrenches. Torque to 17 ft-lbs (23 Nm). Seat adaptor nut on Euro block. Adaptor nut should rotate freely.
6. Strip the control leads ¼" (6.5 mm) and reterminate with appropriate butt connectors.
7. Install strain relief and liner.

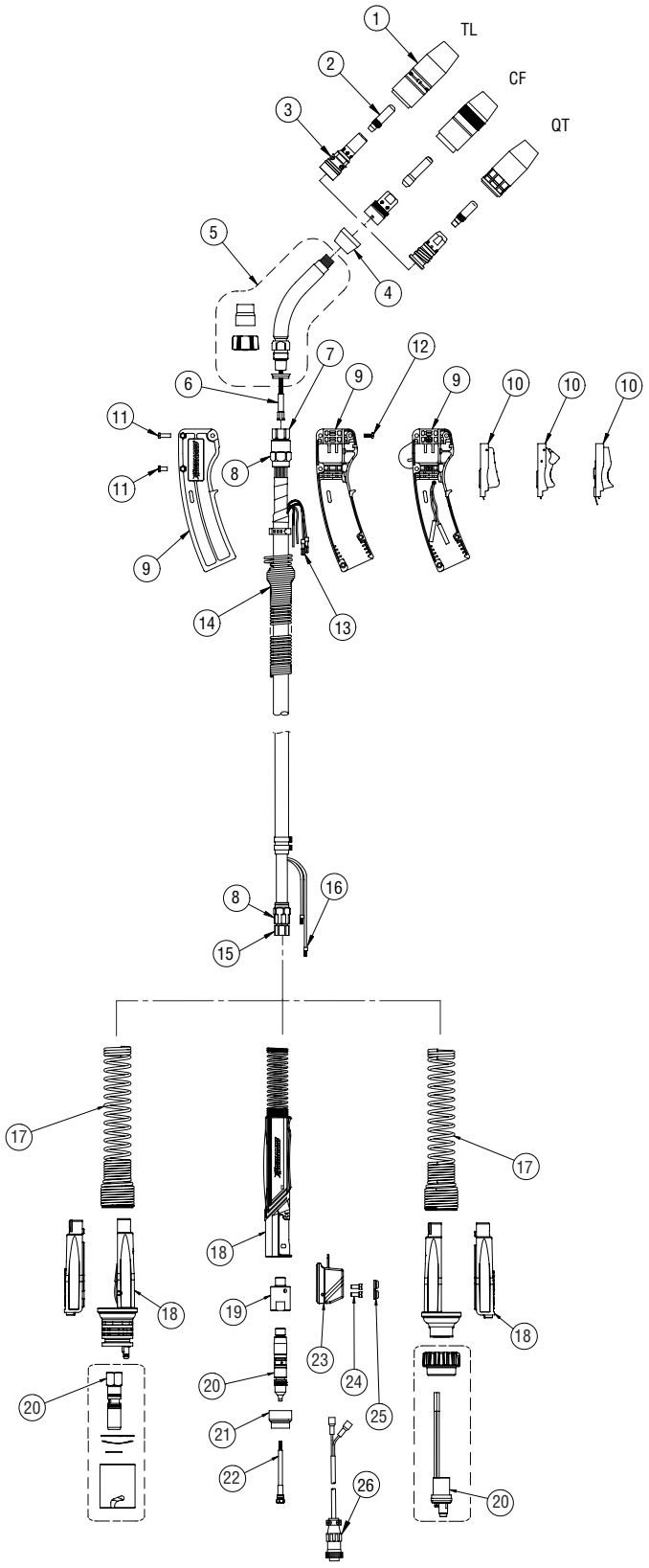


C. Bernard Quick Disconnect

1. Remove liner from gun assembly. Viewing quick disconnect from cable end, align wave spring and large snap ring with opening access slot. Compress large snap ring with internal snap ring pliers and remove locking sleeve. Remove small external snap ring with external snap ring pliers from power pin.
2. Remove the control leads from the rigid strain relief by compressing the locking tabs on the contact pins with needle nose pliers and pulling the lead wire to unseat cap and sleeve assembly.
3. Unthread power pin from end fitting with appropriate wrenches in a counterclockwise rotation. The gas pin may be disassembled by removing the small retaining ring and pulling the pin from the rigid strain relief.
4. Test contact pins for continuity when trigger is engaged.
5. Inspect all components for cracks, debris, excessive wear and breakage. Replace with new components if safety or performance of product is compromised.
6. Thread power pin onto cable end fitting and torque to 17 ft-lbs (23 Nm) minimum.

SECTION 6 - PARTS LIST

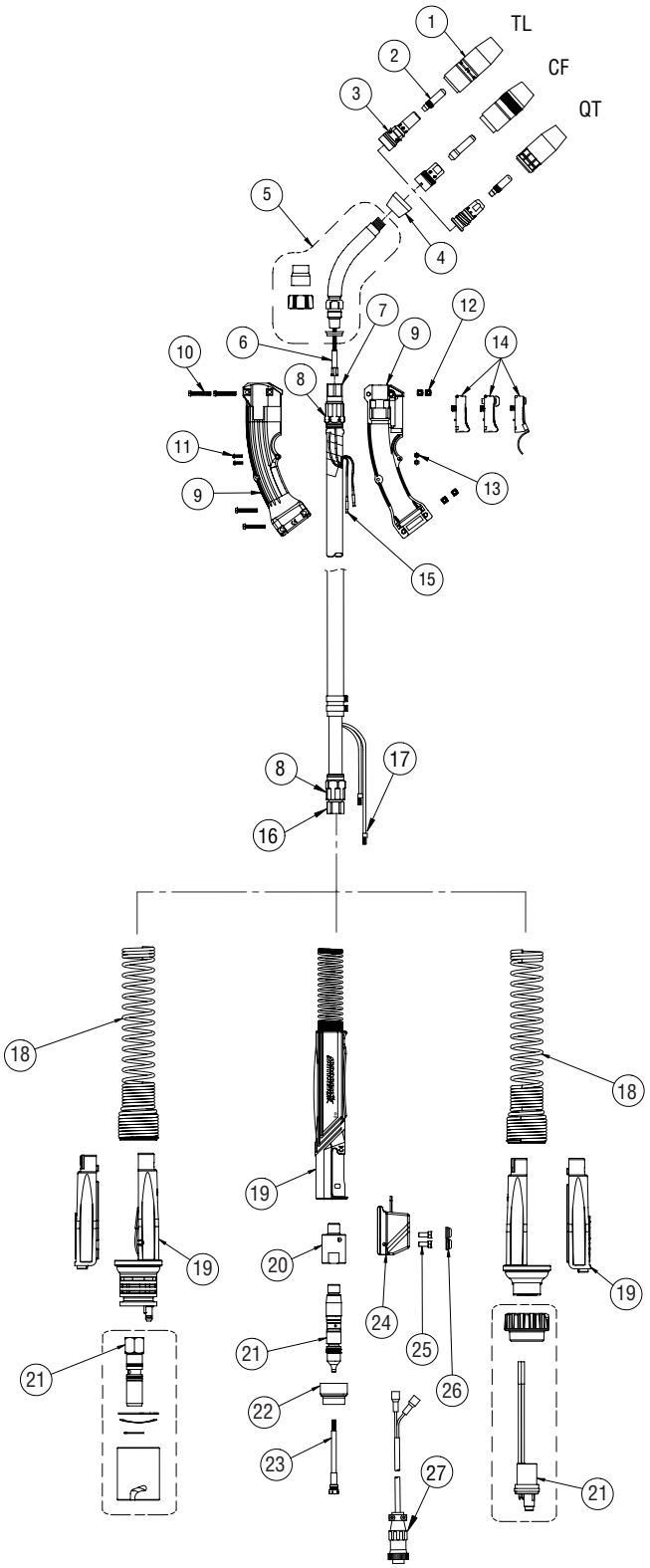
6-1 Replacement Parts 200, 300, 400 amp with B Series Small and Large Curved Handles



ITEM #	PART #			DESCRIPTION
	Q20	Q30	Q40	
1	401-6-62			Nozzle, TOUGH LOCK™ Series, Standard
	N/A	401-6-62	401-6-62	Nozzle, TOUGH LOCK™ Series, Heavy Duty
	NS-1218B	NS-5818C		Nozzle, Centerfire™ "N" Series
	N1C58Q			Nozzle, Quik Tip™ Series
2	*See TOUGH LOCK™ Consumable Spec Sheet**			Contact Tip, TOUGH LOCK, Standard
	*See TOUGH LOCK Consumable Spec Sheet**			Contact Tip, TOUGH LOCK, Heavy Duty
	*See Centerfire™ Consumable Spec Sheet**			Contact Tip, Centerfire
	*See Quik Tip™ Consumable Spec Sheet**			Contact Tip, Quik Tip
3	404-18			Retaining Head, TOUGH LOCK, Standard
	404-26			Retaining Head, TOUGH LOCK, Heavy Duty
	DS-1		D-1	Gas Diffuser, Centerfire
	D118Q			Gas Diffuser, Quik Tip
4	*See Consumable Spec Sheet**			Neck Insulator
5	*See Neck Spec Sheet**			Neck
6	*See Jump Liner Spec Sheet**			Jump Liner
7	4213B		4313B	End Fitting, Front
8	4305	1540003		Cone Nut
NS	4939			Jacket Clamp
NS	4992			Conduit Clamp
9	1880155		1880198	Handle Kit, Standard Locking*
				Handle Kit, Locking Trigger*
				Handle Kit, Dual Pull Trigger*
	N/A		DSA-1	Handle Kit, D/S, Std. Trigger*
				Handle Kit, D/S, Locking Trigger*
10	5662			Trigger, Standard
	5662L			Trigger, Locking
	2690001			Trigger, Dual Pull, 3 Wire *(With Insulated Terminals)*
11	4207			Post Fastener *(1 Req'd - Q20, Q30) (5 Req'd - Q40)*
	2030004		N/A	Post Fastener, Short *(4 Req'd)*
12	4209			Handle Screw *(5 Req'd)*
13	2660001			Terminal, Quick Disconnect *(2 Req'd)*
14	N/A		2520042	Handle Spring
15	1680087	1680088		End Fitting, Rear
16	412-1			Switch Connector *(2 Req'd)*
17	2520033		2520041	Spring, Strain Relief
18	410			Straight Rear Strain Relief
	2520069			Clamshell Rear Strain Relief *(Euro Power Pin)*
	2520073			Clamshell Rear Strain Relief with Installed Gas Pin *(Bernard Power Pin)*
19	414-400			Adapter Block
20	*See Power Pin Spec Sheet**			Power Pin
21	*See Power Pin Spec Sheet**			Power Pin Insulator
22	*See QUICK LOAD™ or Conventional Liner Spec Sheet**			Liner
23	416-5			Terminal Housing
	416-13			Terminal Housing, Dual Schedule
24	411-3M			Screw, Trigger Housing *(2 Req'd)*
25	1620004			Screw, Cover Rear Housing
26	*See Control Plug Spec Sheet**			Trigger Control Plug Assembly

**Please use the QR Codes on the back for immediate access to Spec Sheets*

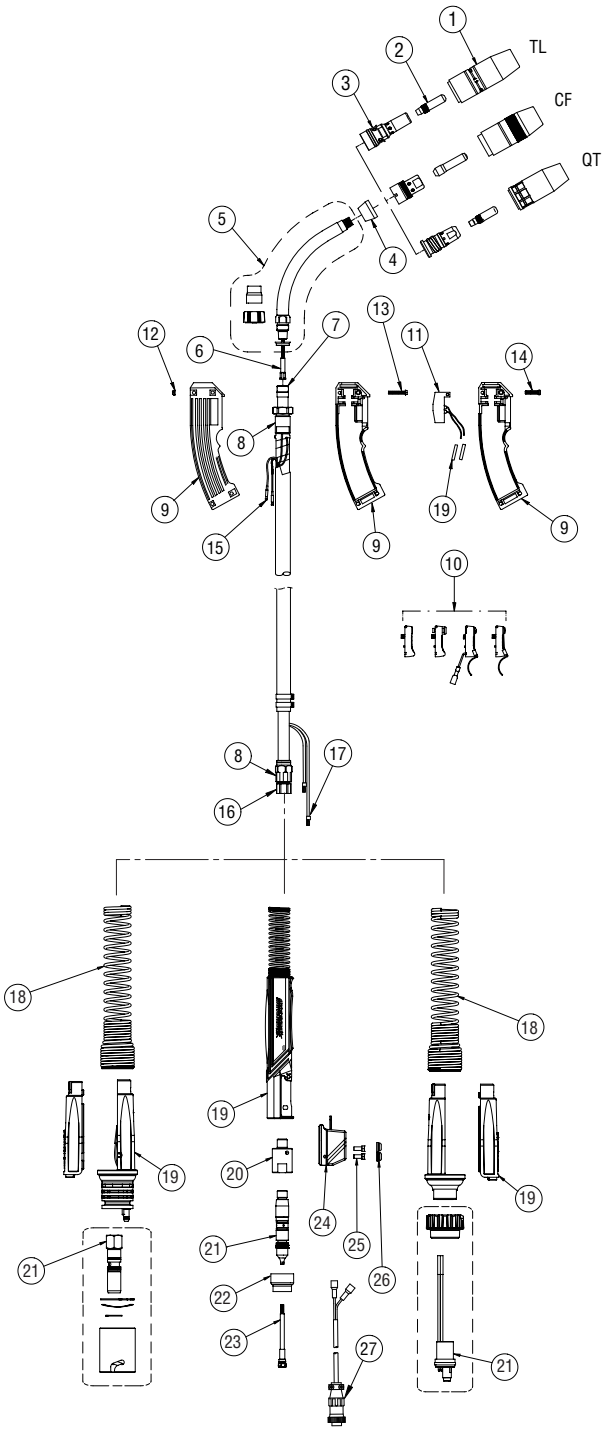
6-2 Replacement Parts 200, 300, 400 amp with O Series Small Curved Handle



ITEM #	PART #			DESCRIPTION
	Q20	**Q30/S30**	**Q40/S40**	
1	401-6-62			Nozzle, TOUGH LOCK™ Series, Standard
	N/A	401-6-62	401-6-62	Nozzle, TOUGH LOCK™ Series, Heavy Duty
	NS-1218B	NS-5818C		Nozzle, Centerfire™ "N" Series
	N1C58Q			Nozzle, Quik Tip™ Series
2	*See TOUGH LOCK Consumable Spec Sheet**			Contact Tip, TOUGH LOCK, Standard
	*See TOUGH LOCK Consumable Spec Sheet**			Contact Tip, TOUGH LOCK, Heavy Duty
	*See Centerfire Consumable Spec Sheet**			Contact Tip, Centerfire
	*See Quik Tip Consumable Spec Sheet**			Contact Tip, Quik Tip
3	404-18			Retaining Head, TOUGH LOCK, Standard
	404-26			Retaining Head, TOUGH LOCK, Heavy Duty
	DS-1		D-1	Gas Diffuser, Centerfire
	D118Q			Gas Diffuser, Quik Tip
4	*See Consumable Spec Sheet**			Neck Insulator
5	*See Neck Spec Sheet**			Neck
6	*See Jump Liner Spec Sheet**			Jump Liner
7	**Q20** 4213B	**Q30** 4213B	**Q40** 4313B	End Fitting
		S30 1680064	**S40** 1680064	
8	**Q20** 4305	**Q30** 1540003	**Q40** 1540003	Cone Nut
		S30 1540007	**S40** 1540008	
NS	**Q20** 4992	**Q30** 4992	**Q40** 4992	Conduit Clamp *(2 Req'd)*
		S30 Not Needed	**S40** Not Needed	
NS	4939			Jacket Clamp
9	1880219			Handle Kit, Standard and Locking Trigger
	177370			Handle Kit, Standard Trigger with Extension
10	203296-005			Handle Screw, Large *(4 Req'd)*
11	2280044			Handle Screw, Small *(2 Req'd)*
12	177272			Handle Nut *(4 Req'd)*
13	2030029			Handle Nut, Small *(2 Req'd)*
14	177488			Trigger, Standard
	MS2110			Trigger, Locking
15	177271			Trigger Pin *(2 Req'd)*
16	**Q20** 1680087	**Q30** 1680088	**Q40** 1680088	End Fitting, Rear
	S20 N/A	**S30** 1680090	**S40** 1680090	
17	412-1			Switch Connector *(2 Req'd)*
18	**Q20** 2520023	**Q30** 2520023	**Q40** 2520041	Spring, Strain Relief
	S20 N/A	**Q30** 2520056	**Q40** 2520056	
19	410			Straight Rear Strain Relief
	2520073			Clamshell Rear Strain Relief with Installed Gas Pin *(Bernard Power Pin)*
	2520069			Clamshell Rear Strain Relief *(Euro Power Pin)*
20	414-400			Adapter Block
21	*See Power Pin Spec Sheet**			Power Pin
22	*See Power Pin Spec Sheet**			Power Pin Insulator
23	*See QUICK LOAD™ or Conventional Liner Spec Sheet**			Liner
24	416-5			Housing Terminal
25	411-3M			Screw, Trigger Housing *(2 Req'd)*
26	1620004			Screw Cover, Rear Housing
27	*See Control Plug Spec Sheet**			Trigger Control Plug Assembly

**Please use the QR Codes on the back for immediate access to Spec Sheets*

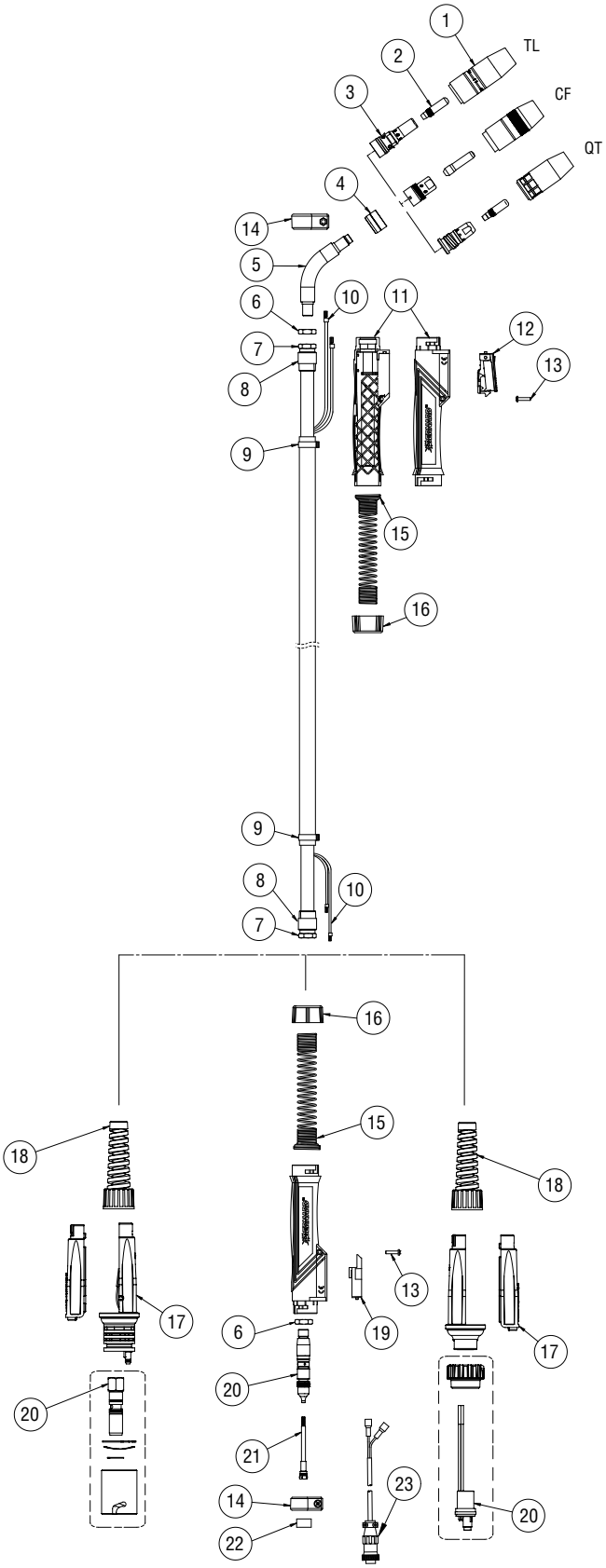
6-3 Replacement Parts 400, 500, 600 amp with O Series Large Curved Handles



ITEM #	PART #			DESCRIPTION
	Q40/S40	**Q50/S50**	**Q60/S60**	
1	401-6-62	N/A	N/A	Nozzle, TOUGH LOCK™ Series, Standard
	401-6-62		401-6-75	Nozzle, TOUGH LOCK Series, Heavy Duty
	N-5818C	N-5814C	N-3414C	Nozzle, Centerfire™ "N" Series
	N1C58Q	N1C34HQ	N1C34HQ	Nozzle, Quik Tip™ Series
2	*See TOUGH LOCK Consumable Spec Sheet**			Contact Tip, TOUGH LOCK, Standard
	*See TOUGH LOCK Consumable Spec Sheet**			Contact Tip, TOUGH LOCK, Heavy Duty
	*See Centerfire Consumable Spec Sheet**			Contact Tip, Centerfire
	*See Quik Tip Consumable Spec Sheet**			Contact Tip, Quik Tip
3	404-18	N/A	N/A	Retaining Head, TOUGH LOCK, Standard
	404-26			Retaining Head, TOUGH LOCK, Heavy Duty
	D-1			Gas Diffuser, Centerfire
	D118Q	D114Q		Gas Diffuser, Quik Tip
4	*See Consumable Spec Sheet**			Neck Insulator
5	*See Neck Spec Sheet**			Neck
6	*See Jump Liner Spec Sheet**			Jump Liner
7	**Q40** 1680049	**Q50** 1680050	**Q60** 1680050	End Fitting
	S40 1680065	**S50** 1680066	**S60** 1680066	
8	**Q40** 1540003	**Q50** 1540004	**Q60** 1540004	Cone Nut
	S40 CB9201	**S50** 20038	**S60** CB9206	
NS	**Q40** 4992	**Q50** 4993	**Q60** 4992	Conduit Clamp *(2 Req'd)*
	S40 Not Needed	**S50** Not Needed	**S60** Not Needed	
NS	**Q40** 4939	**Q50** 4944	**Q60** 4944	Jacket Clamp
	S40 407709-013	**S50** 407709-013	**S60** 407709-013	
9	1880220			Handle Kit, Standard, Locking and Dual Pull Trigger
	1880221			Handle Kit, D/S Std. and D/S Locking Trigger
10	177488			Trigger, Standard
	MS2110			Trigger, Locking
	2620062			Trigger, Dual Pull w/ Extension
	177379			Trigger, Standard w/ Extension
11	PDS			Switch Assembly, Dual Schedule *(Includes Switch, Housing, & Screws)*
12	177272			Handle Nut *(4 Req'd Non-D/S, 3 Req'd D/S)*
13	203296-005			Screw *(4 Req'd Non-D/S, 3 Req'd D/S)*
14	20005			Screw Modified *(1 Req'd D/S)*
15	177271			Trigger Pin *(2 Req'd)*
16	**Q40** 1680088	**Q50** 1680089	**Q60** 1680089	End Fitting, Rear
	S40 1680090	**S50** 1680091	**S60** 1680091	
17	412-1			Switch Connector *(2 Req'd)*
18	**Q60** 2520041			Spring, Strain Relief
	S60 2520056			
19	410			Straight Rear Strain Relief
	2520073			Clamshell Rear Strain Relief with Installed Gas Pin *(Bernard Power Pin)*
	2520069			Clamshell Rear Strain Relief *(Euro Power Pin)*
20	414-400			Adapter Block
21	*See Power Pin Spec Sheet**			Power Pin
22	*See Power Pin Spec Sheet**			Power Pin Insulator
23	*See QUICK LOAD™ or Conventional Liner Spec Sheet**			Liner
24	416-5			Terminal Housing
	416-13			Terminal Housing, Dual Schedule
25	411-3M			Screw, Trigger Housing *(2 Req'd)*
26	1620004			Screw Cover, Rear Pod
27	*See Control Plug Spec Sheet**			Trigger Control Plug Assembly

**Please use the QR Codes on the back for immediate access to Spec Sheets*

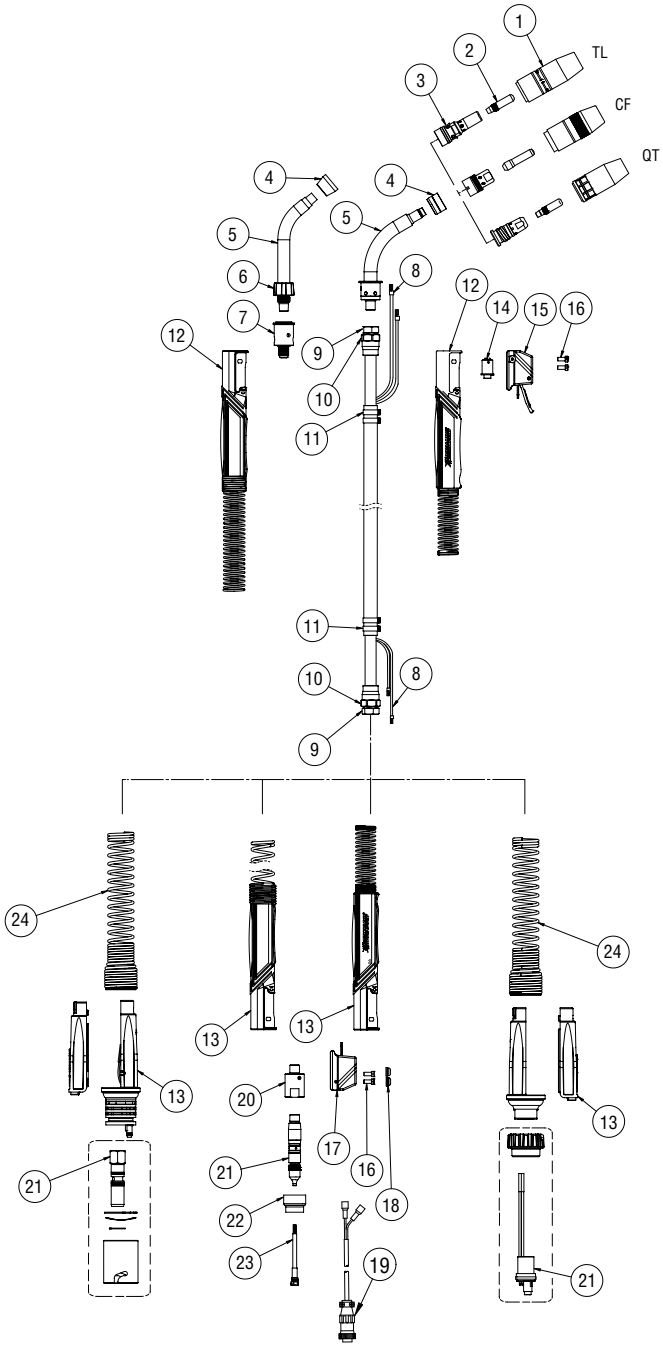
6-4 Replacement Parts 300 amp with T Series Small Straight Handle



ITEM #	PART #	DESCRIPTION
	Q30	
1	401-6-62	Nozzle, TOUGH LOCK™ Series, Standard
	401-6-62	Nozzle, TOUGH LOCK™ Series, Heavy Duty
	NS-5818C	Nozzle, Centerfire™ "N" Series
	N1C58Q	Nozzle, Quik Tip™ Series
2	*See TOUGH LOCK Consumable Spec Sheet**	Contact Tip, TOUGH LOCK, Standard
	*See TOUGH LOCK Consumable Spec Sheet**	Contact Tip, TOUGH LOCK, Heavy Duty
	*See Centerfire Consumable Spec Sheet**	Contact Tip, Centerfire
	*See Quik Tip Consumable Spec Sheet**	Contact Tip, Quik Tip
3	404-18	Retaining Head, TOUGH LOCK, Standard
	404-26	Retaining Head, TOUGH LOCK, Heavy Duty
	DS-1	Gas Diffuser, Centerfire
	D118Q	Gas Diffuser, Quik Tip
4	*See Consumable Spec Sheet**	Neck Insulator
5	*See Neck Spec Sheet**	Neck
6	208-2	Jam Nut
7	318	End Fitting
8	319	Cone Nut
9	4939	Jacket Clamp
NS	4992	Conduit Clamp
10	412-1	Switch Connector *(2 Req'd)*
11	320	Handle Kit *(Includes (1) #13 and (1) #14)*
12	211-5	Trigger Assembly
13	320-1-6	Screw, Handle
14	320-6	Handle Collar
15	M169700-12	Spring, Handle
16	320-3	Handle Cap, Locking, Rear
17	2520073	Clamshell Rear Strain Relief with Installed Gas Pin *(Bernard Power Pin)*
	2520069	Clamshell Rear Strain Relief *(Euro Power Pin)*
18	2520033	Spring Strain Relief
19	216-1	Control Plug Block
20	*See Power Pin Spec Sheet**	Power Pin
21	*See QUICK LOAD or Conventional Liner Spec Sheet**	Liner
22	*See Power Pin Spec Sheet**	Power Pin Insulator
23	*See Control Plug Spec Sheet**	Trigger Control Plug Assembly

**Please use the QR Codes on the back for immediate access to Spec Sheets*

6-5 Replacement Parts 300, 400, 500, 600 amp with T Series Large Straight Handles



ITEM #	PART #				DESCRIPTION
	Q30	Q40	Q50	Q60	
1	401-6-62		N/A		Nozzle, TOUGH LOCK™ Series, Standard
	401-6-62			401-6-75	Nozzle, TOUGH LOCK™ Series, Heavy Duty
	NS-5818C	N-5818C	N-5814C	N-3414C	Nozzle, Centerfire™ "N" Series
	N1C58Q		N1C34HQ	N1C34HQ	Nozzle, Quik Tip™ Series
2	*See TOUGH LOCK™ Consumable Spec Sheet**				Contact Tip, TOUGH LOCK, Standard Duty
	*See TOUGH LOCK™ Consumable Spec Sheet**				Contact Tip, TOUGH LOCK, Heavy Duty
	*See Centerfire Consumable Spec Sheet**				Contact Tip, Centerfire
	*See Quik Tip Consumable Spec Sheet**				Contact Tip, Quik Tip
3	404-18		N/A		Retaining Head, TOUGH LOCK, Standard
	404-26				Retaining Head, TOUGH LOCK, Heavy Duty
	DS-1	D-1			Gas Diffuser, Centerfire
	D118Q		D114Q		Gas Diffuser, Quik Tip
4	*See Consumable Spec Sheet**				Neck Insulator, TOUGH LOCK
	*See Consumable Spec Sheet**				Neck Insulator, Centerfire
	*See Consumable Spec Sheet**				Neck Insulator, Quik Tip
5	*See Neck Spec Sheet**				Neck
6	1840057				Rotatable Nut Cover
7	1680085				Rotatable Neck Adapter
8	412-1				Switch Connector *(2 Req'd)*
9	308	408T	608-1		End Fitting
10	509	409	609		Cone Nut
11	4939		4993		Jacket Clamp
NS	4992		4993		Conduit Clamp
12	410			610	Handle
13	410			616	Straight Rear Strain Relief
	2520073				Clamshell Rear Strain Relief with Installed Gas Pin *(Bernard Power Pin)*
	2520069				Clamshell Rear Strain Relief *(Euro Power Pin)*
14	411-1				Switch
15	411-2				Trigger Housing, Standard
	411-4				Trigger Housing, Locking
	411-11				Trigger Housing, Dual Pull
	411-12				Trigger Housing, Dual Schedule
	411-13				Trigger Housing, Dual Schedule w/ Locking
16	411-3M				Screw, Trigger Housing *(2 Req'd)*
17	416-5				Trigger Control Plug Terminal
	416-13				Trigger Control Plug Terminal, Dual Schedule
18	1620004				Screw Cover, Rear Housing
19	*See Control Plug Spec Sheet*				Trigger Control Plug Assembly
20	414-400				Adapter Block
21	*See Power Pin Spec Sheet**				Power Pin
22	*See Power Pin Spec Sheet**				Power Pin Insulator
23	*See QUICK LOAD™ or Conventional Liner Spec Sheet**				Liner
24	2520033	2520041			Spring, Strain Relief

**Please use the QR Codes on the back for immediate access to Spec Sheets*

SECTION 7 - TROUBLESHOOTING

7-1 Troubleshooting Table

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
1. Electrode does not feed	1. Feeder relay.	1. Consult feeder manufacturer.
	2. Broken control lead.	2 a. Test & connect spare control lead. b. Install new cable.
	3. Poor adaptor connection.	3. Test & replace leads and/or contact pins.
	4. Worn or broken switch.	4. Replace.
	5. Improper drive roll size.	5. Replace with proper size.
	6. Drive roll tension misadjusted.	6. Adjust tension at feeder.
	7. Burn back to contact tip.	7. See 'Contact Tip Burn Back'.
	8. Wrong size liner.	8. Replace with correct size.
	9. Buildup inside of liner.	9. Replace liner, check condition of electrode.
2. Contact tip burn back	1. Improper voltage and/or wire feed speed.	1. Set parameters.
	2. Erratic wire feeding.	2. See 'Erratic Wire Feeding'.
	3. Improper tip stickout.	3. Adjust nozzle/tip relationship.
	4. Improper electrode stickout.	4. Adjust gun to base metal relationship.
	5. Faulty ground.	5. Replace cables and/or connections.
3. Tip disengages from gas diffuser	1. Worn gas diffuser/retaining head.	1. Replace tip and/or gas diffuser/retaining head.
	2. Improper tip installation.	2. Install as per 'Changing Consumables' (Section 5 pg. 10).
	3. Extreme heat or duty cycle.	3. Replace with heavy duty consumables. See appropriate spec sheet for details.
4. Short contact tip life	1. Contact tip size.	1. Replace with proper size.
	2. Electrode eroding contact tip.	2. Inspect and/or change drive rolls.
	3. Exceeding duty cycle.	3. Replace with properly rated Bernard MIG Gun.
5. Erratic arc	1. Worn contact tip.	1. Replace.
	2. Buildup inside of liner.	2. Replace liner, check condition of electrode.
	3. Wrong tip size.	3. Replace with correct size tip.
	4. Not enough bend in neck.	4. Replace with 45º or 60º neck.
6. Erratic wire feeding	1. Buildup inside of liner.	1. Replace liner, check condition of electrode.
	2. Wrong size liner.	2. Replace with new liner of proper size.
	3. Improper drive roll size.	3. Replace with proper size drive roll.
	4. Worn drive roll.	4. a. Replace with new drive roll. b. Stone edge of groove on drive roll.
	5. Improper guide tube relationship.	5 a. Adjust/replace guide as close to drive rolls as possible. b. Eliminate all gaps in electrode path.
	6. Improper wire guide diameter.	6. Replace with proper guide diameter.
	7. Gaps at liner junctions.	7. a. Replace with new liner trimming as per 'Changing the Liner' (Section 5, pg. 11). b. Replace guide tube/liner, trim as close to mating component as possible.
	8. Feeder malfunction.	8. Consult feeder manufacturer.
	9. Contact tip.	9. Inspect and replace.*

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
7. Extreme spatter	1. Improper machine parameters.	1. Adjust parameters.
	2. Improper tip installation.	2. Adjust nozzle/tip relationship.
	3. Improper shielding.	3. a. Verify shielding gas coverage. b. Verify gas mixture.
	4. Contaminated wire or work piece.	4. Clean wire and work piece.
8. Porosity in weld	1. Insulator worn.	1. Replace nozzle/insulator.
	2. Gas diffuser damaged.	2. Replace gas diffuser.
	3. Extreme heat or duty cycle.	3. Replace with heavy duty consumables.
	4. Solenoid faulty.	4. Replace solenoid.
	5. No gas.	5 a. Install full tanks. b. Check supply. c. Hose leaks.
	6. Flow improperly set.	6. Adjust.
	7. Gas ports plugged.	7. a. Clean or replace gas diffuser. b. Clean nozzle.
	8. Ruptured gas hose.	8. Repair or replace cable or line.
	9. Control circuit loss.	9. See 'Electrode Does Not Feed'.
	10. Worn, cut or missing O-rings.	10. Replace O-rings
	11. Loose fittings.	11. Tighten gun & cable connections to specified torque. See 'Replacement' (Section 5).
9. Gun running hot	1. Exceeding duty cycle.	1. a. Replace with properly rated Bernard MIG Gun. b. Decrease parameters to within gun rating.
	2. Loose or poor power connection.	2. a. Clean, tighten or replace cable grounding connection. b. Tighten gun & cable connections to specified torque. See 'Replacement' (Section 5).
10. Liner is discolored full length	1. Short circuit to electrode.	1. Isolate electrode reel from feeder and drive block. Consult feeder manufacturers manual.
	2. Broken copper stranding in power cable.	2. Replace MIG Gun.
11. Sporadic feeding of aluminum electrode	1. Tip galling.	1. *Inspect & replace.
	2. Synthetic liner melting.	2. a. Replace liner. b. Replace with composite liner. c. Replace the neck and jump liner.
	3. Wire deformed by feed rolls.	3. Adjust drive rolls as per feeder manufacturer's manual.

*In some cases with aluminum and mild steels, it may be necessary to use a contact tip with either a larger or smaller bore size.

NOTES

For additional support materials such as spec sheets, troubleshooting information, how-to guides and videos, animations, online configurators and much more please visit BernardWelds.com. Scan this QR Code with your smart phone for immediate access to BernardWelds.com/TechnicalSupport

Scan to view Power Pin Options.....

Scan to view TOUGH LOCK™ Consumables.....

Scan to view Centerfire™ Consumables.....

Scan to view Quik Tip™ Consumables.....

Scan to view New Universal Conventional Liners.....

Scan to view QUICK LOAD™ Liners.....

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