Bernard® BTB Semi-Automatic Air-Cooled MIG Gun

OWNER'S MANUAL

August 2020 **OM-BTB-2.2**

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

BERNARD®

BernardWelds.com/TechnicalSupport
1-855-MIGWELD (644-9353) (US & Canada)
+1-519-737-3000 (International)

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) (US & Canada) or +1-519-737-3000 (International) or fax 1-708-946-6726. Our trained Customer Service Team is available between 8:00 a.m. and 5:30 p.m. EST, and will answer your product application or repair questions.

Bernard manufactures premium semi-automatic (GMAW) 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.

Subject to Change – The information presented in this 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.

Additional Material – 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

TABLE OF CONTENTS

DECLARATION OF CONFORMITY

for European Community (CE marked) products

Bernard, 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	Q20XXXXXXXX (Configurable #)
Bernard Q30 Series – 300A	Q30XXXXXXXX (Configurable #)
Bernard Q40 Series – 400A	Q40XXXXXXXX (Configurable #)
Bernard Q50 Series – 500A	Q50XXXXXXXX (Configurable #)
Bernard Q60 Series – 600A	Q60XXXXXXXX (Configurable #)
Bernard S30 Series – 300A	S30XXXXXXXX (Configurable #)
Bernard S40 Series – 400A	S40XXXXXXXX (Configurable #)
Bernard S50 Series – 500A	S50XXXXXXXX (Configurable #)
Bernard S60 Series – 600A	S60XXXXXXXX (Configurable #)

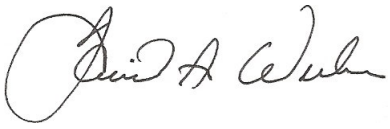
Council Directives:

- 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:



March 16, 2014

Date of Declaration

David A. Werba
MANAGER, PRODUCT DESIGN COMPLIANCE

SECTION 1 — SAFETY PRECAUTIONS — READ BEFORE USING

Protect yourself and others from injury – read, follow, and save these important safety precautions and operating instructions.

1-1 Symbol Usage

DANGER! – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

NOTICE – Indicates statements not related to personal injury.

☞ – Indicates special instructions.

This group of symbols means Warning! Watch Out! ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2 Arc Welding Hazards

The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Principal Safety Standards section. Read and follow all Safety Standards.

Only qualified persons should install, operate, maintain, and repair this equipment. A qualified person is defined as one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated ability to solve or resolve problems relating to the subject matter, the work, or the project and has received safety training to recognize and avoid the hazards involved.

During operation, keep everybody, especially children, away.

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 semi-automatic or automatic 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 weld output in damp, wet, or confined spaces, or if there is a danger of falling.
- Use AC output ONLY if required for the welding 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 Principal Safety Standards).
- Properly install, ground, and operate this equipments according to its Owner's Manual and national, state, 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 – double-check connections.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- Frequently inspect input power cord and ground conductor for damage or bare wiring – replace immediately if damaged – bare wiring can kill.

- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or repaired 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 not in use.
- Use GFCI protection when operating auxiliary equipment in damp or wet locations.

SIGNIFICANT DC VOLTAGE exists in inverter welding power sources AFTER removal of input power.

- Turn off unit, disconnect input power, and discharge input capacitors according to instructions in Manual before touching any parts.

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.

FUMES AND GASES can be hazardous.

Welding 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.
- Ventilate the work area and/or use local forced ventilation at the arc to remove welding 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 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 in locations near degreasing, cleaning, or spraying operations. The heat and the rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld 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.

ARC RAYS can burn eyes and skin.

Arc rays from the welding process 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 or watching (see ANSI Z49.1 and Z87.1 listed in Principal 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.

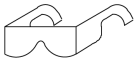
WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, 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.

- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Do not weld 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 can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not cut or weld on tire rims or wheels. Tires can explode if heated. Repaired rims and wheels can fail. See OSHA 29 CFR 1910.177 listed in Principal Safety Standards.
- Do not weld 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 Principal Safety Standards).
- Do not weld where the atmosphere can contain flammable dust, has, or liquid vapors (such as gasoline).
- Connect work cable to the work as close to the welding area as practical to prevent welding 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.
- 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 bypass 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.

FLYING METAL or DIRT can injure eyes.



- Welding, 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.

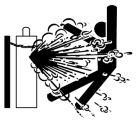
- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.

NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.

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 or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode 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 proper equipment, correct procedures, and sufficient number of persons to lift, move, and transport cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Principal Safety Standards.

1-3 Additional Symbols For Installation, Operation, And Maintenance

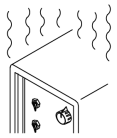
FIRE OR EXPLOSION hazard.

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

FALLING EQUIPMENT can injure.

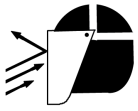
- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use correct procedures and equipment of adequate capacity to lift and support unit.
- If using fork lifts to move unit, be sure forks are long enough to extend beyond the opposite side of unit.
- Keep equipment (cables and cords) away from moving vehicles when working from an aerial location.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94-110) when manually lifting heavy parts or equipment.

OVERUSE can cause OVERHEATING.



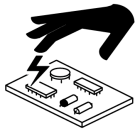
- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.

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.

STATIC (ESD) can damage PC boards.



- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.

MOVING PARTS can injure.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

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.

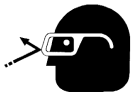
BATTERY EXPLOSION can injure.

- Do not use welder to charge batteries or jump start vehicles unless it has a battery charging feature designed for this purpose.

MOVING PARTS can injure.

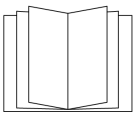
- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance and troubleshooting as necessary.
- Reinstall doors, panels, covers, or guards when maintenance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

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.
- Reinstall doors, panels, covers, or guards when servicing is finished and before starting unit.
- If ANY air is injected into the skin or body, seek medical help immediately.

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 installation, maintenance, and service according to the Owner's Manuals, industry standards, and national, state, and local codes.

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.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- 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 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 weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure the welding machine is installed and grounded according to the Manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

1-4 California Proposition 65 Warnings

WARNING: This product can expose you to chemicals including lead, which are known to the state of California to cause cancer and birth defects or other reproductive harm.

For more information, go to **www.P65Warnings.ca.gov**.

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 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).

Safe Practices for Welding and Cutting Containers That Have Held Combustibles, American Welding Society Standard A6.0, 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, Suite 103, 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: 1-800-463-6727, 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, Pittsburg, 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 30329-4027 (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.

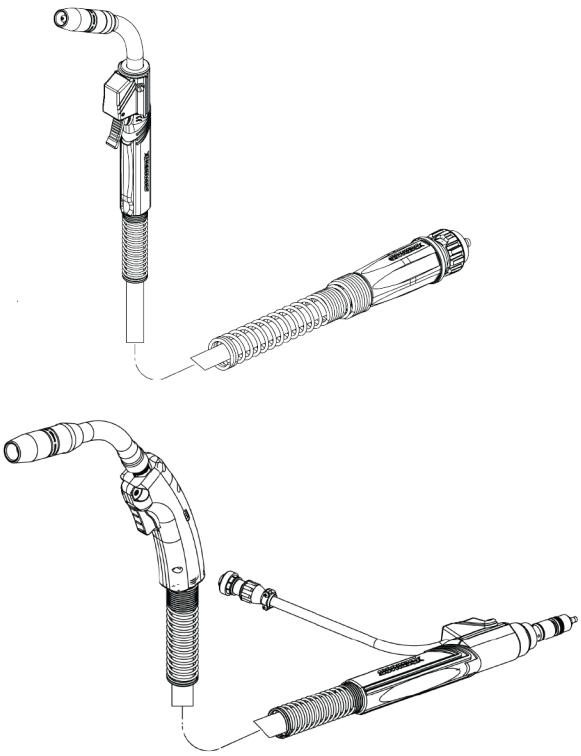
Bernard shall not be liable under any circumstances to Buyer, or to any person who shall purchase from Buyer, for damages of any kind, including, but not limited to any direct, indirect incidental or consequential damages or loss of production or loss of profits resulting from any cause whatsoever, including, 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 of 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_2 Shielding 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_2 Shielding Gas
60%: 500 amp with Mixed Gases

600 amp gun feeds maximum wire size of 1/8" (3.2 mm)

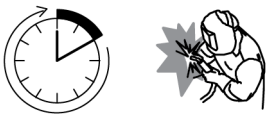
Duty Cycle Rating:
100%: 600 amp with CO_2 Shielding Gas
60%: 600 amp with Mixed Gases

2-2 Duty Cycle and Overheating

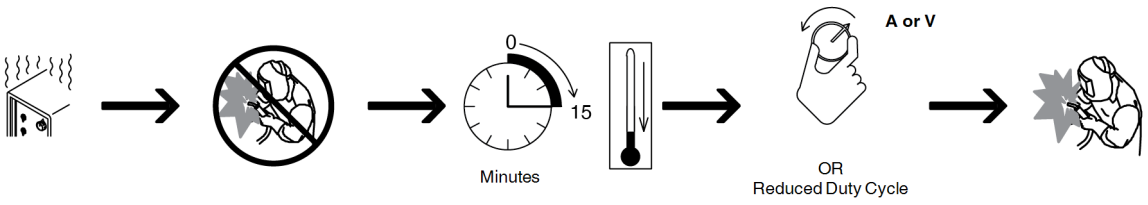
Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

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

Please reference Section 2 — Specifications on page 8 for duty cycle ratings by amperage.



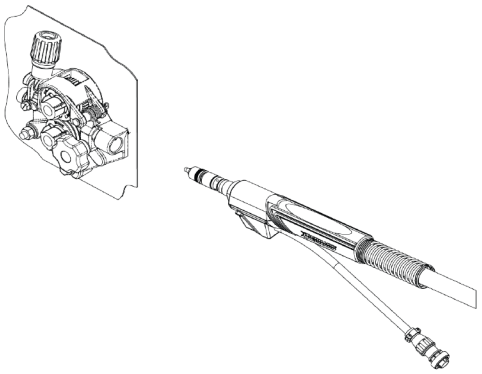
Continuous Welding



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.

Figure 3-A

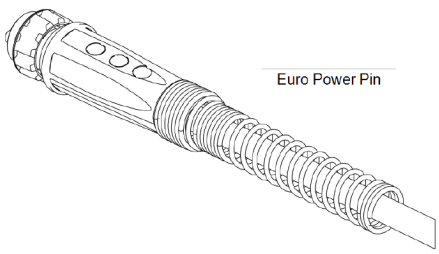


3-2 Installing to a Feeder with a Euro or a Bernard® Power Pin

A. Euro Power Pin

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

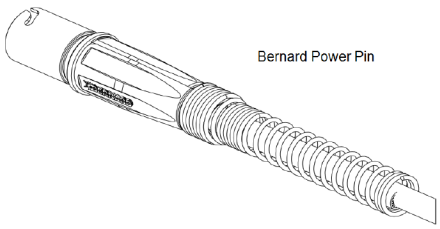
Figure 3-B



B. Bernard Power Pin

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

Figure 3-C



4-1 Pulling the Trigger

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

Figure 4-A

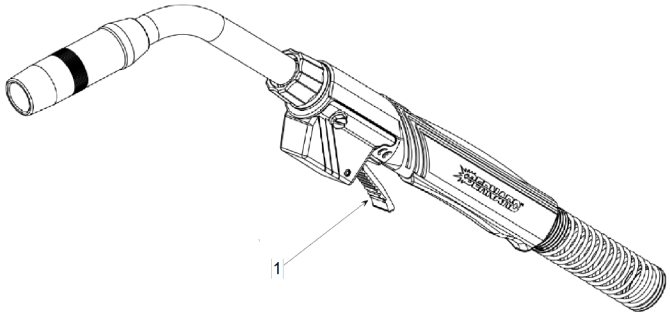
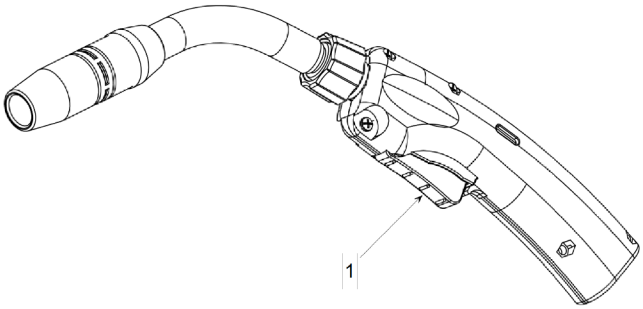
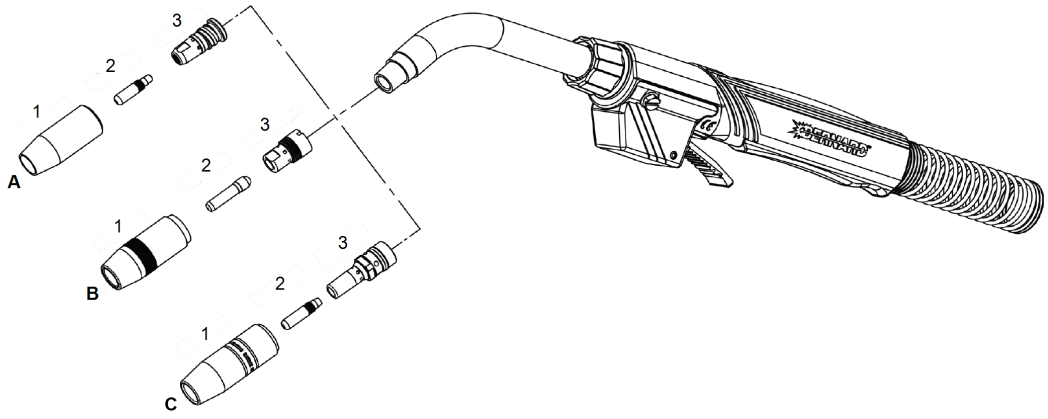


Figure 4-B



5-1 Changing Consumables

Figure 5-A



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 counterclockwise turn. To replace, slide the contact tip over the electrode into the gas diffuser and lock with a 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 counterclockwise 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 the 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 retaining head and lock with a clockwise rotation.
3. Retaining head may be removed with an appropriate wrench in a counterclockwise rotation. To install, firmly secure retaining head 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 front-end consumables and lay cable straight.
2. Using a 10 mm wrench, turn liner counterclockwise until it is free from the power pin. Remove liner from gun assembly.
3. 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.
4. Use a 10 mm wrench to turn liner lock clockwise to tighten into power pin.
5. Trim to dimensions shown in the **New Liner Trim Lengths** chart shown below.
6. 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

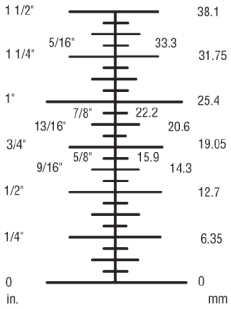
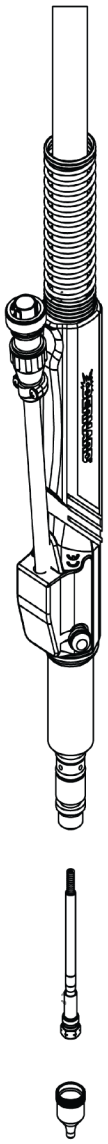
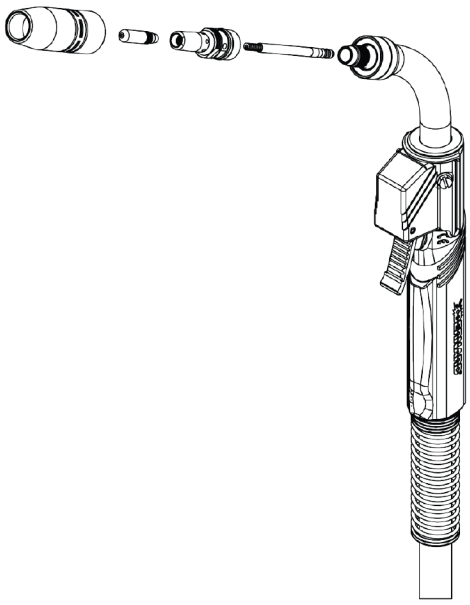


Figure 5-B



B. Changing QUICK LOAD™ Liner

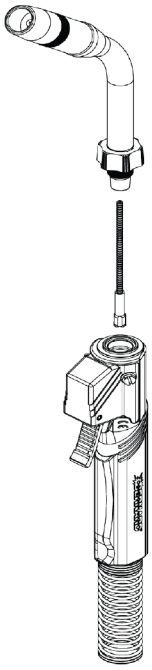
Figure 5-C



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

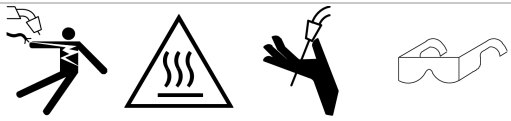
C. Changing a Jump Liner

Figure 5-D



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

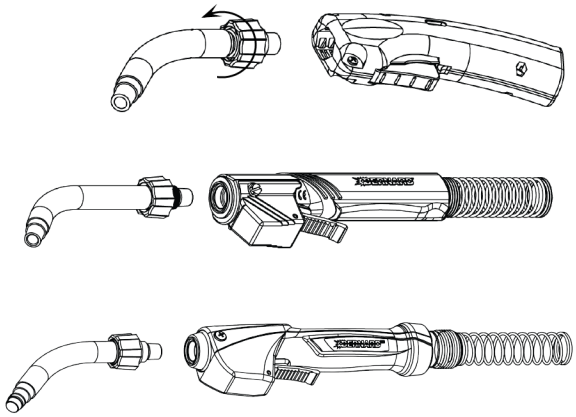
5-3 Changing the Neck



A. Changing the Neck - Rotatable

Figure 5-E

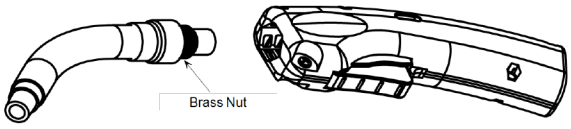
1. To remove neck, grasp lock nut and rotate counterclockwise. Rotation will free neck from end fitting.
2. To install neck, perform the above step in reverse order and torque to 38 in-lbs.
3. Liner may need to be changed if switching to a neck of different bend angle or length.



B. Changing the Neck - Fixed with Curved Handle

Figure 5-F

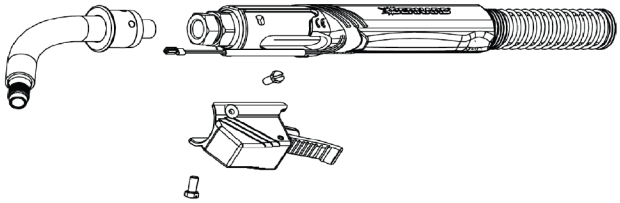
1. To remove neck, remove the nut insulator.
2. Using a wrench, rotate brass nut counterclockwise. Rotation will free neck from end fitting.
3. To install the neck, perform the above instructions in reverse order and tighten lock nut to 16 ft-lbs (21.7 Nm). Be sure nut insulator is in place.
4. Liner 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 Straight Handle

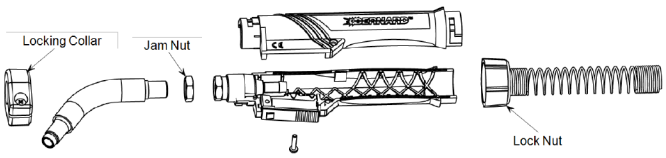
Figure 5-G

1. Place neck in vise. Remove both switch housing mounting 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 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

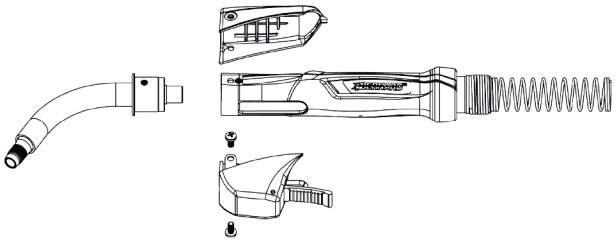
Figure 5-H



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

E. Changing the Neck - Fixed with C Series Straight Handle

Figure 5-I



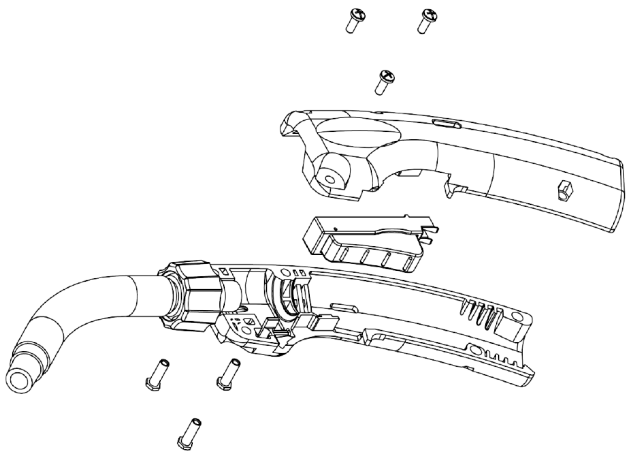
1. Place neck in vise. Remove both switch housing mounting screws with a Phillips screwdriver.
2. Remove both the top and bottom pods from handle.
3. Slide handle back, exposing the cable connection. Loosen the cable/neck connection using a 7/8" wrench.
4. Remove from vise and unthread neck by hand.
5. Thread the new neck into the cable connection (hand tighten).
6. Place neck in vise and tighten with a wrench to within 1/8" (3.2 mm) spacing between the cable connection and neck.
7. Install the switch and reposition handle and switch housing.
8. Reinstall switch housing mounting screws.
9. 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 Regular and Small Curved Handle

Figure 5-J

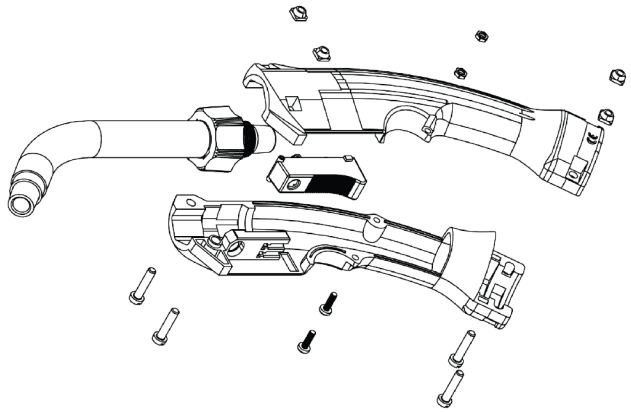
1. Remove screws and post fasteners from handles.
2. Separate handle halves and remove trigger.
3. Remove switch lead connectors with needle nose pliers.
4. To replace trigger, connect switch lead connectors onto terminals of new switch. Position handle half and trigger on cable so trigger leads are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



B. O Series Regular and Small Curved Handle

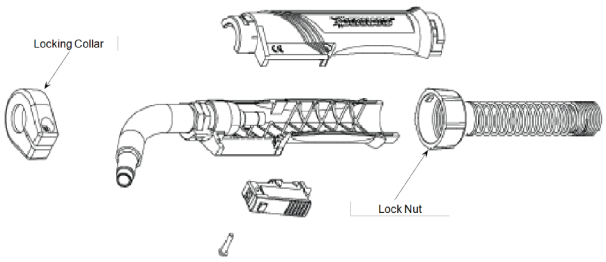
Figure 5-K

1. Loosen screws, but do not fully remove.
2. Pry open bottom side of handle halves with a flat blade screwdriver. 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.
4. Tighten screws. Torque to 10 in-lbs (1.1 Nm).



C. T Series Small Straight Handle

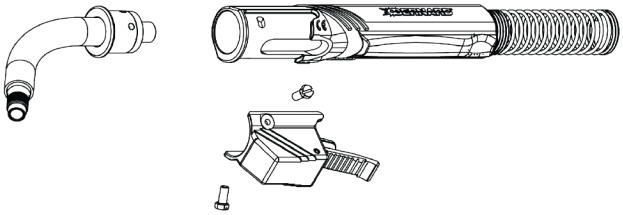
Figure 5-L



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 handle halves.
4. Remove switch from switch lead connectors with needle nose pliers.
5. Connect switch lead connectors firmly onto new switch terminals with needle nose pliers.
6. Place gun assembly into handle half, positioning neck in desired position.
7. Fit switch into switch nest on handle (switch lead must lay parallel).
8. Reinstall second handle half.
9. Reinstall handle lock nut and locking collar on handle.
10. Insert screw and tighten.

D. T Series Straight Handle (Switch Only)

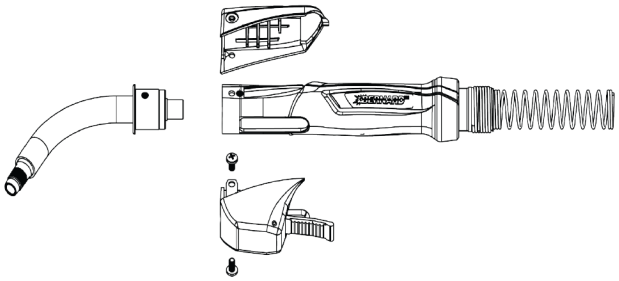
Figure 5-M



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

E. C Series Straight Handle (Switch Only)

Figure 5-N

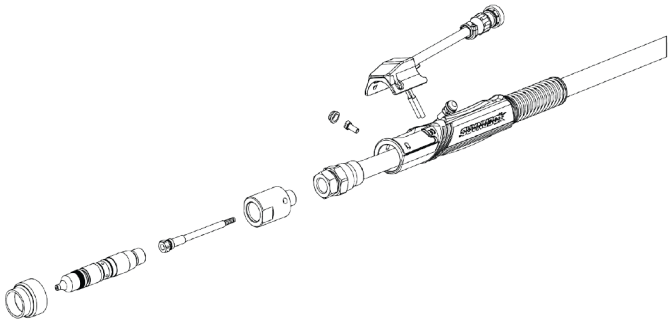


1. Remove both switch mounting screws with a Phillips screwdriver.
2. Remove both the top and bottom pods from the handle.
3. Ease switch out of switch housing with needle nose pliers.
4. Remove switch from switch lead connectors with needle nose pliers.
5. Push lead connectors onto new switch using needle nose pliers.
6. Depress switch housing into nest on handle (switch leads must lay parallel).
7. Align the holes of body housing with the holes in the handle to start screws by hand. Finish tightening with a Phillips screwdriver.

5-5 Changing the Power Pin

A. Universal Power Pin

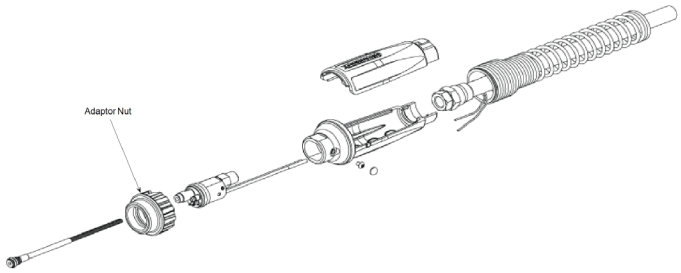
Figure 5-O



1. Remove the liner by following steps listed in section 5-2 Changing the Liner on page 12.
2. Use wrenches and rotate power pin in a counterclockwise direction to remove it from the adaptor block.
3. Thread new power pin into adaptor block and use wrenches in a clockwise direction to thread power pin into adaptor block. Torque to 18 ft-lbs (24 Nm).
4. Reinstall liner by following the steps listed in section 5-2 Changing the Liner on page 12.

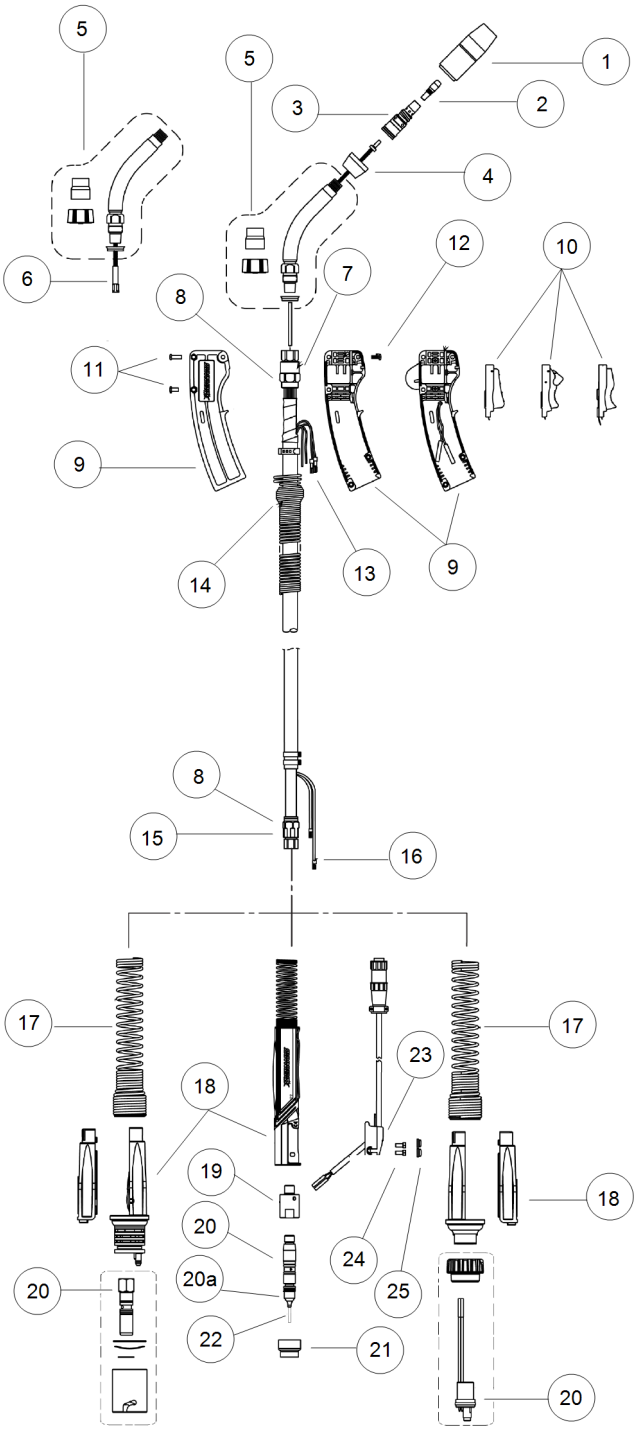
B. Euro Power Pin

Figure 5-P



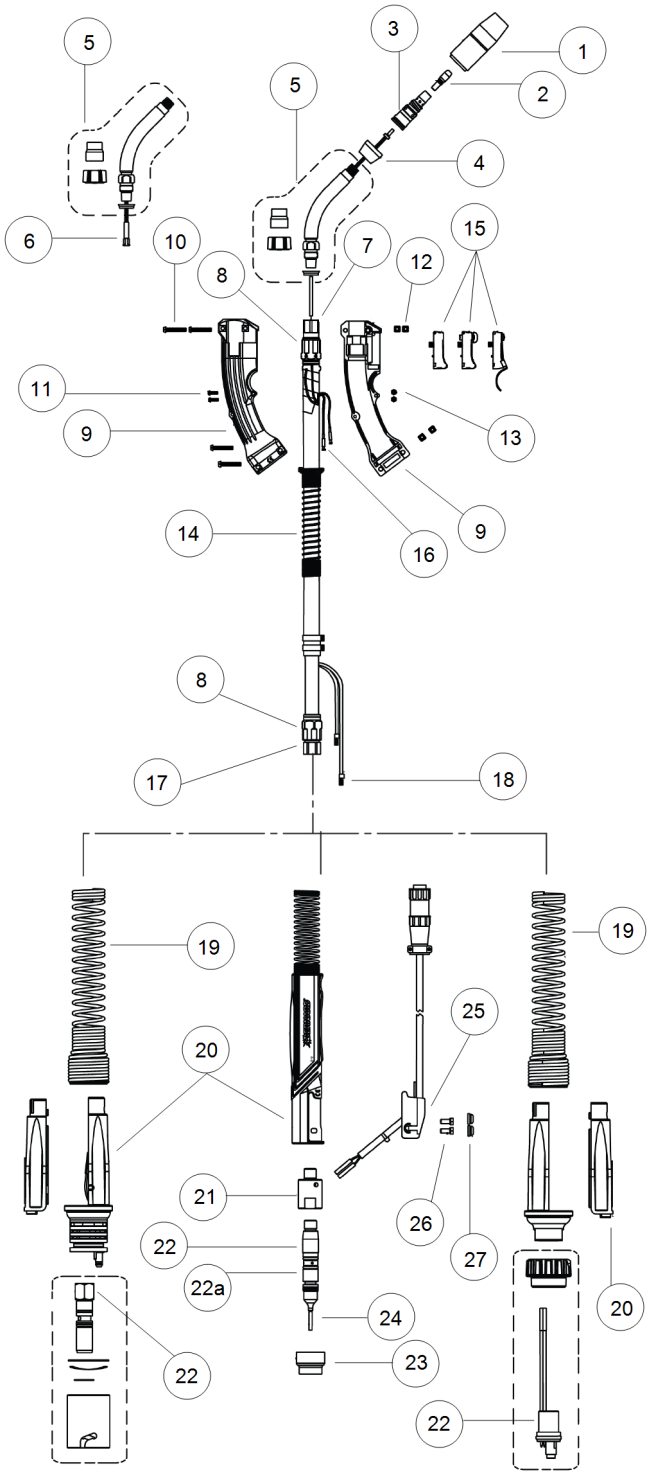
1. Remove liner, strain relief cap/spring, strain relief top half, screw cover and the screw that attaches the strain relief to the Euro block.
2. Slide strain relief bottom toward cable, exposing Euro block.
3. Remove Euro block from end fitting using appropriate wrenches in a counterclockwise rotation.
4. Disconnect the Euro block control leads from the gun by cutting as close as possible on both sides of the butt connectors to preserve wire length for later re-termination.
5. Remove adaptor nut and install onto new Euro block.
6. Assemble Euro block onto end fitting in a clockwise rotation using appropriate wrenches. Torque to 18 ft-lbs (24 Nm). Adaptor nut should rotate freely.
7. Strip the cable control leads 1/4" (6.5 mm) and re-terminate with appropriate butt connectors.
8. Align strain relief bottom with threaded hole in Euro block and install screw, assemble strain relief and liner.

6-1 B Series Regular and Small Curved Handles with Yellow Trigger



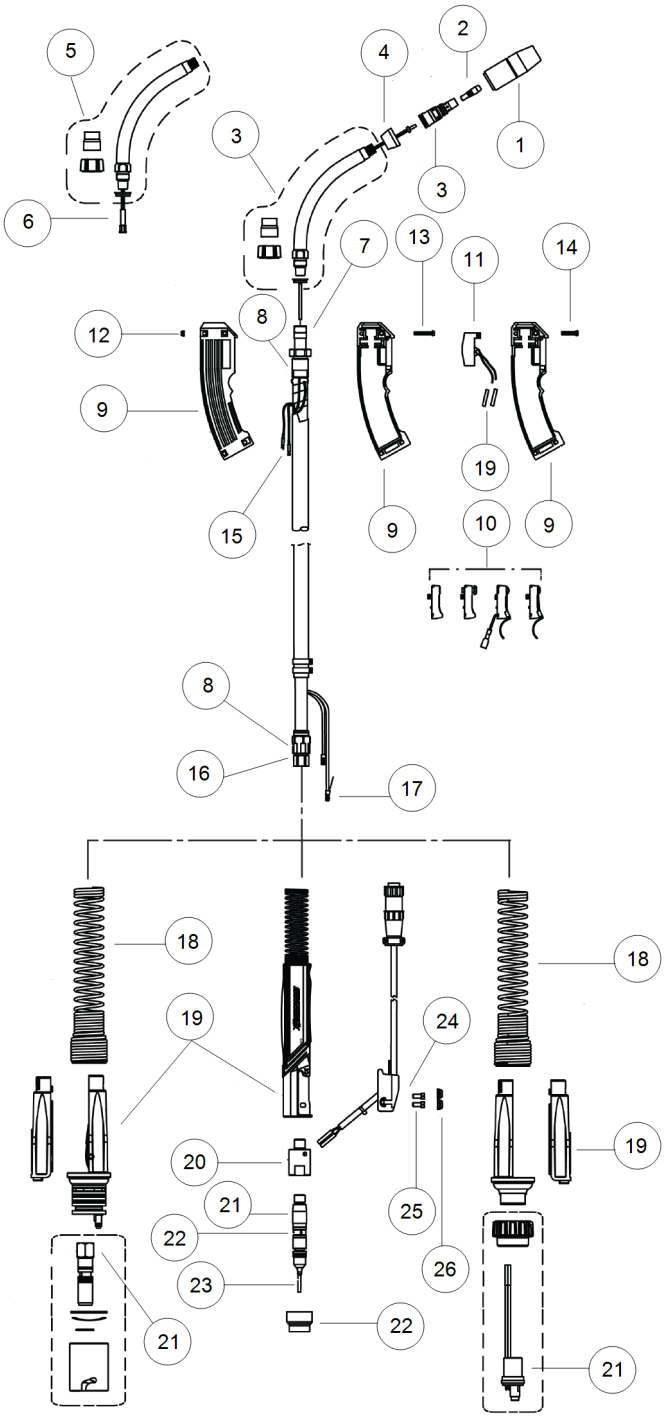
ITEM	PART #			DESCRIPTION
	Q20	Q30	Q40	
1	401-5-62	401-6-62		Nozzle, TOUGH LOCK Heavy Duty
	NS-1218B	N-5818C		Nozzle, Centerfire™
	N1C58Q			Nozzle, Quik Tip™
2	*See SP-BTB*			Contact Tip
3	404-26			Retaining Head, TOUGH LOCK Heavy Duty
	DS-1		D-1	Gas Diffuser, Centerfire
	D118Q			Gas Diffuser, Quik Tip
4	*See SP-BTB*			Neck Insulator
5	*See SP-BTB*			Neck
6	*See SP-BTB*			Jump Liner
7	4213B	4313B	1680086	End Fitting, Front
8	4305	1540003		Cone Nut
NS	4939			Jacket Clamp
NS	4992			Conduit Clamp
9	1880155		1880198	Handle Kit, Standard, Locking & Dual Pull Trigger
	N/A		DSA-1	Handle Kit, Dual Schedule (D/S) Std and 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	2520074		2520042	Handle Spring
15	1680087		1680088	End Fitting, Rear
16	412-1			Switch Connector *(4 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			Adaptor Block
20	*See SP-BTB*			Power Pin
20a	*See SP-BTB*			Power Pin Cap
21	*See SP-BTB*			Power Pin Insulator
22	*See SP-BTB*			Liner
23	1810053			Terminal Housing
	1810054			Terminal Housing, Dual Schedule
24	411-3M			Screw, Trigger Housing *(2 req'd)*
25	1620004			Screw Cover, Rear Pod

6-2 O Series Small Curved Handle with Blue Trigger



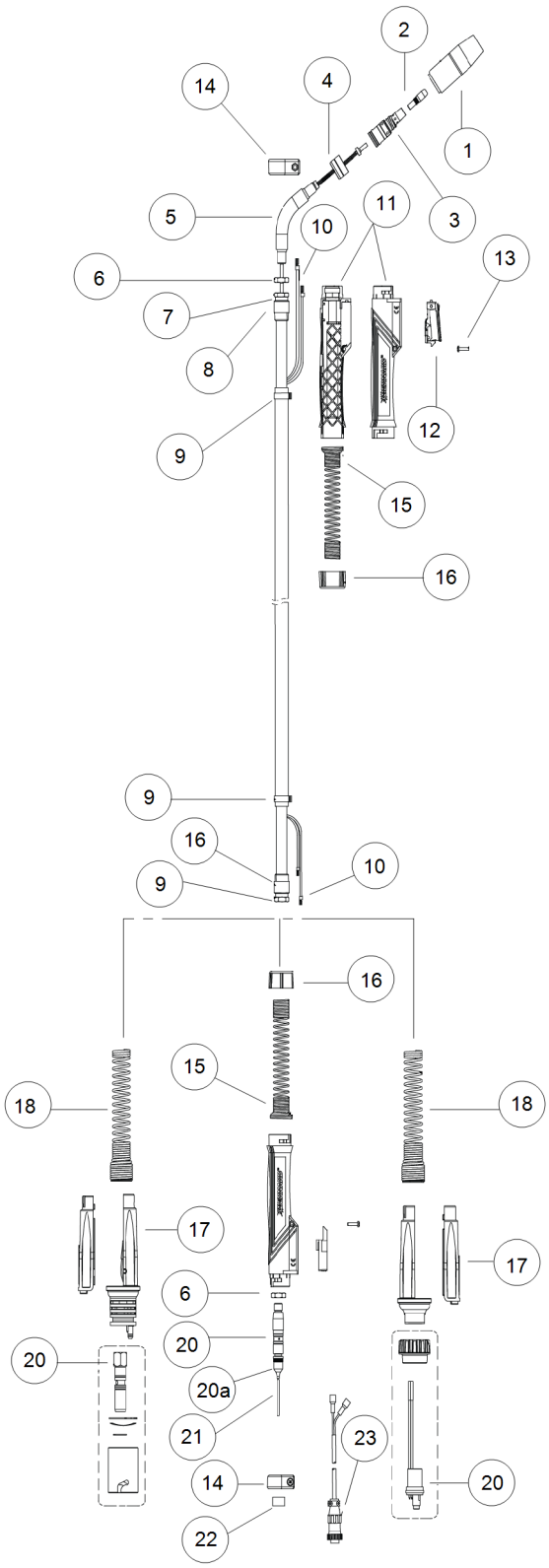
ITEM	PART #			DESCRIPTION
	Q20	Q30*/S30^	Q40*/S40^	
1	401-5-62	401-6-62		Nozzle, TOUGH LOCK HD
	NS-1218B	N-5818C		Nozzle, Centerfire™
	N1C58Q			Nozzle, Quik Tip™
2	*See SP-BTB*			Contact Tip
3	404-26			Retaining Head, TL HD
	DS-1		D-1	Gas Diffuser, Centerfire
	D118Q			Gas Diffuser, Quik Tip
4	*See SP-BTB*			Neck Insulator
5	*See SP-BTB*			Neck
6	*See SP-BTB*			Jump Liner
7	4213B	4313B*	1680086*	End Fitting, Front
		1680064^	1680064^	
8	4305	1540003*	1540003*	Cone Nut
		1540007^	1540008^	
NS	4992	4992*	4992*	Conduit Clamp *(2 req'd)*
		N/A^	N/A^	
NS	4939			Jacket Clamp
9	1880219			Handle Kit, Standard and Locking
10	203296-005			Handle Screw, Large *(4 req'd)*
11	2280044			Handle Screw, Small *(2 req'd)*
12	177272H			Handle Nut *(4 req'd)*
13	2030029			Handle Nut, Small *(2 req'd)*
14	M169700-12	M169700-12*	M169700-12*	Handle Spring
		N/A^	N/A^	
15	177488H			Trigger, Standard
	177379			Trigger, Standard with Extension
	MS2110			Trigger, Locking
16	177271H			Trigger Pin *(2 req'd)*
17	1680087	1680087*	1680088*	End Fitting, Rear
		1680090^	1680090^	
18	412-1			Switch Connector
19	2520023	2520023*	2520041*	Spring, Strain Relief
		2520056^	2520056^	
20	410			Straight Rear Strain Relief
	2520069			Clamshell Rear Strain Relief *(Euro Power Pin)*
	2520073			Clamshell Rear Strain Relief *(Bernard Power Pin)*
21	414-400			Adaptor Block
22	*See SP-BTB*			Power Pin
23	*See SP-BTB*			Power Pin Insulator
24	*See SP-BTB*			Liner
23	1810053			Terminal Housing
	1810054			Terminal Housing, Dual Schedule
24	411-3M			Screw, Trigger Housing *(2 req'd)*
25	1620004			Screw Cover, Rear Pod

6-3 O Series Curved Handle with Blue Trigger



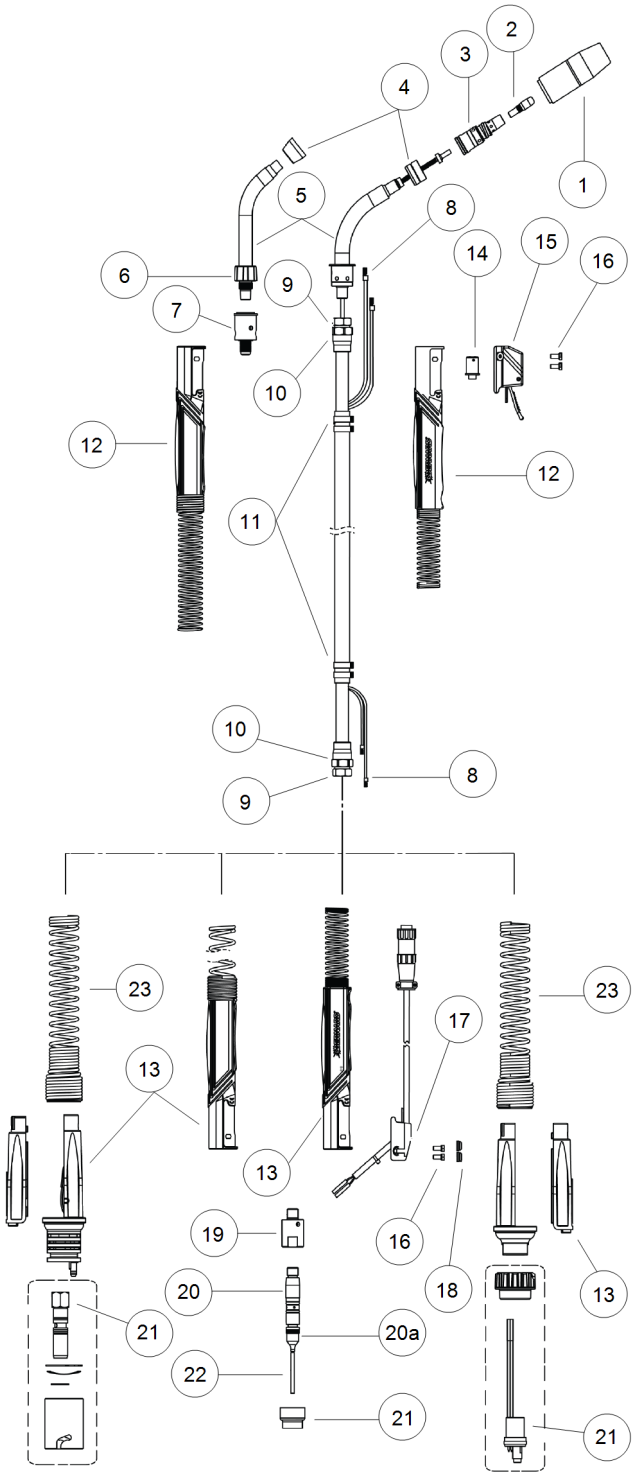
ITEM	PART #			DESCRIPTION
	Q40*/S40^	Q50*/S50^	Q60*/S60^	
1	401-6-62	401-5-62	401-5-75	Nozzle, TOUGH LOCK HD
	N-5818C	N-5814C	N-3414C	Nozzle, Centerfire
	N1C58Q	N1C34HQ	N1C34HQ	Nozzle, Quik Tip
2	*See SP-BTB*			Contact Tip
3	404-26			Retaining Head, TL HD
	D-1			Gas Diffuser, Centerfire
	D118Q	D114Q		Gas Diffuser, Quik Tip
4	*See SP-BTB*			Neck Insulator
5	*See SP-BTB*			Neck
6	*See SP-BTB*			Jump Liner
7	1680049*	1680050*	1680050*	End Fitting
	1680065^	1680066^	1680066^	
8	1540003*	1540004*	1540004*	Cone Nut
	CB9201^	20038^	CB9206^	
NS	4992*	4993*	4993*	Conduit Clamp (2 req'd)
	N/A^	N/A^	N/A^	
NS	4939*	4944*	4944*	Jacket Clamp
	407709-013^	407709-013^	407709-013^	
9	1880220			Handle Kit, Standard, Locking and Dual Pull Trigger
	1880221			Handle Kit, Dual Schedule (D/S) Std and D/S Locking Trigger
10	177488H			Trigger, Standard
	MS2110			Trigger, Locking
	2620062			Trigger, Dual Pull w/ Extension
	177379			Trigger, Standard w/ Extension
11	PDS			Switch, D/S
12	177272H			Handle Nut *(4 req'd non-D/S; 3 req'd D/S)*
13	203296-005			Screw
14	20005			Screw, Modified *(1 req'd D/S)*
15	177271H			Trigger Pin *(2 req'd)*
16	1680088*	1680089*	1680089*	End Fitting, Rear
	1680090^	1680091^	1680091^	
17	412-1			Switch Connector *(4 req'd)*
18	N/A*	N/A*	2520041*	Spring, Strain Relief
	N/A^	N/A^	2520056^	
19	410			Straight Rear Strain Relief
	2520073			Clamshell Rear Strain Relief *(Bernard Power Pin)*
	2520069			Clamshell Rear Strain Relief *(Euro Power Pin)*
20	414-400			Adaptor Block
21	*See SP-BTB*			Power Pin
22	*See SP-BTB*			Power Pin Insulator
23	*See SP-BTB*			Liner
24	1810053			Terminal Housing
	1810054			Terminal Housing, Dual Schedule
25	411-3M			Screw, Trigger Housing *(2 req'd)*
26	1620004			Screw Cover, Rear Pod

6-4 T Series Small Straight Handle with Black Trigger



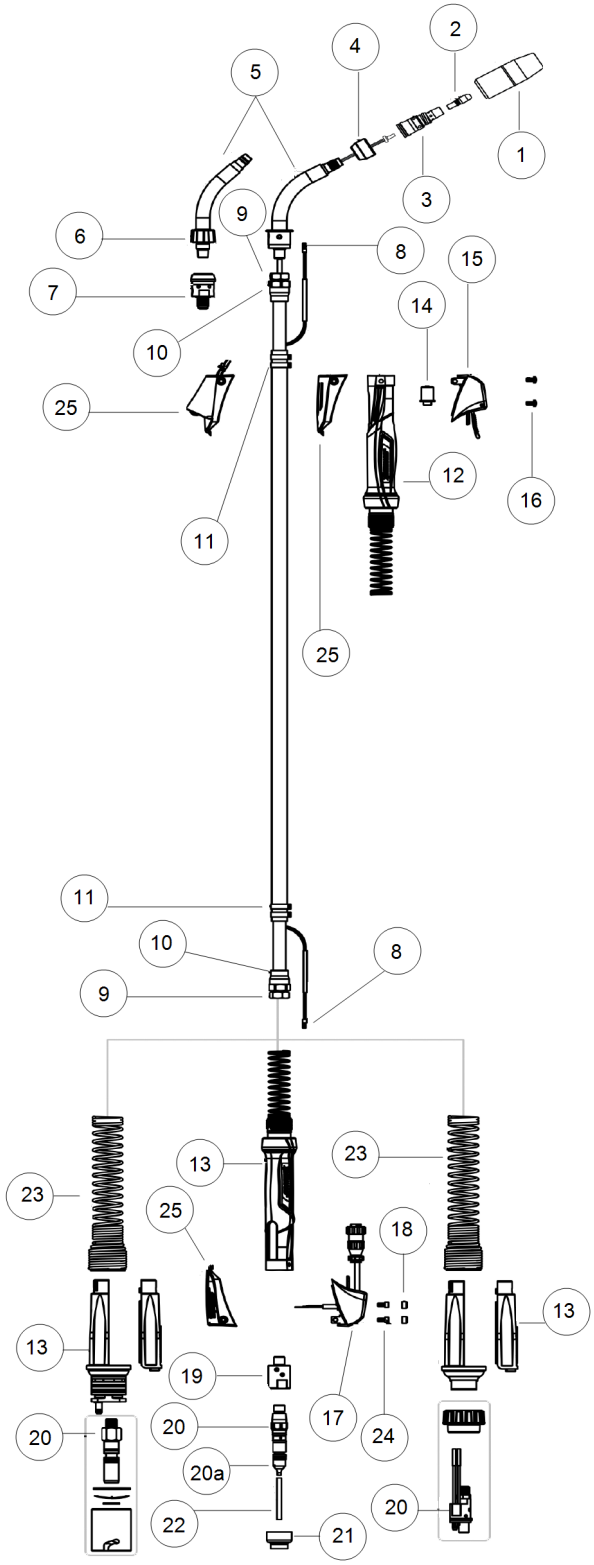
ITEM	PART #	DESCRIPTION
	Q20 / Q30	
1	401-6-62	Nozzle, TOUGH LOCK Heavy Duty
	NS-5818C	Nozzle, Centerfire
	N1C58Q	Nozzle, Quik Tip
2	*See SP-BTB*	Contact Tip
3	404-26	Retaining Head, TOUGH LOCK HD
	DS-1	Gas Diffuser, Centerfire
	D118Q	Gas Diffuser, Quik Tip
4	*See SP-BTB*	Neck Insulator
5	*See SP-BTB*	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 *(4 req'd)*
NS	1880262	Cable Repair Kit *(includes (1) #7, (1) #8, (1) #9, (1) Conduit Clamp, (2) #10)*
11	320	Handle Kit *(includes (1) #13, (1) #14)*
12	211-5	Trigger Assembly
13	310-1-6	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 SP-BTB*	Power Pin
21	*See SP-BTB*	Liner
22	*See SP-BTB*	Power Pin Insulator
23	*See SP-BTB*	Trigger Control Plug Assembly

6-5 T Series Straight Handle with Silver Trigger



ITEM	PART #				DESCRIPTION
	Q30*/S30^	Q40*/S40^	Q50*/S50^	Q60*/S60^	
1	401-6-62		401-5-62	401-5-75	Nozzle, TL HD
	NS-5818C	N-5818C	N-5814C	N-3414C	Nozzle, Centerfire
	N1C58Q		N1C34HQ		Nozzle, Quik Tip
2	*See SP-BTB*				Contact Tip
3	404-26				Retaining Head, TL HD
	DS-1	D-1			Diffuser, Centerfire
	D118Q		D114Q		Diffuser, Quik Tip
4	*See SP-BTB*				Neck Insulator
5	*See SP-BTB*				Neck
6	1840057				Rotatable Nut Cover
7	1680085				Rotatable Neck Adaptor
8	412-1				Switch Connector
9	308*	408T*	608-1*	608-1*	End Fitting
	1680090^	1680090^	608-1^	608-1^	
10	509*	409*	509*	609*	Cone Nut
	CB9200^	CB9201^	509^	609^	
11	4939*	4939*	4944*	4944*	Jacket Clamp
	407709-013^	407709-013^	4944^	4944^	
NS	4992*	4992*	4993*	4993*	Conduit Clamp
	N/A^	N/A^	4993^	4993^	
NS	1880261*	1880263*	513-8*	513-8*	Cable Repair Kit
	N/A^	N/A^	513-8^	513-8^	
12	410			610	Handle
13	410			616	Rear Strain Relief
	2520073				Clamshell Rear Strain Relief *(Bernard Pin)*
	2520069				Clamshell Rear Strain Relief *(Euro Pin)*
14	411-1				Switch
15	411-2				Trigger, Standard
	411-4				Trigger, Locking
	411-11				Trigger, Dual Pull
	411-12				Trigger, D/S
	411-13				Trigger, D/S Locking
16	411-3M				Screw, Trigger
17	1810052				Trigger Control Plug Terminal
	1810054				Trigger Control Plug Terminal, D/S
18	1620004				Screw Cover, Rear Housing
19	414-400				Adaptor Block
20	*See SP-BTB*				Power Pin
21	*See SP-BTB*				Power Pin Insulator
22	*See SP-BTB*				Liner
23	2520041*	2520041*	2520041*	2520041*	Spring, Strain Relief
	2520056^	2520056^	2520041^	2520041^	

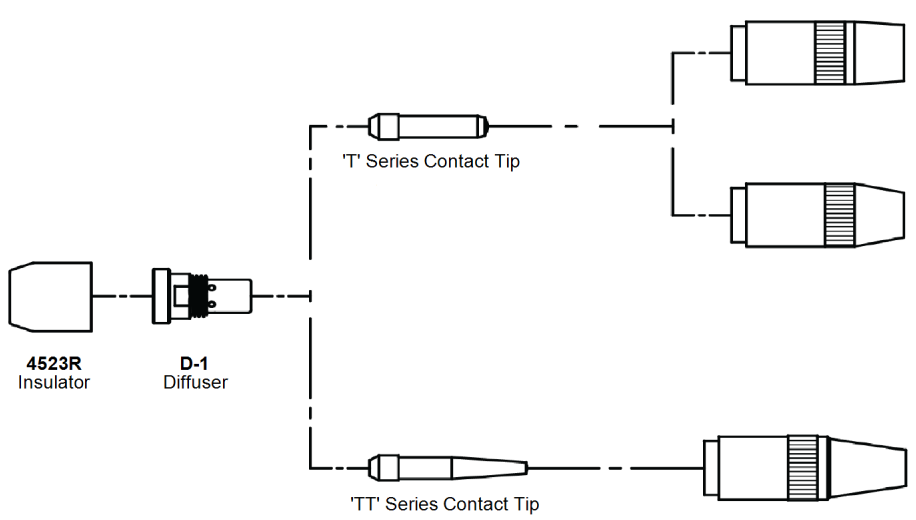
6-6 C Series Straight Handle with Black Trigger



ITEM	PART #				DESCRIPTION
	Q20	Q30*/S30^	Q40*/S40^	Q50	
1	401-5-62	401-6-62		401-5-62	Nozzle, TL HD
	NS-5818C		N-5818C	N-5814C	Nozzle, Centerfire
	N1C58Q			N1C34HQ	Nozzle, Quik Tip
2	*See SP-BTB*				Contact Tip
3	404-26				Retaining Head, TL HD
	DS-1		D-1		Diffuser, Centerfire
	D118Q		D114Q		Diffuser, Quik Tip
4	*See SP-BTB*				Neck Insulator
5	*See SP-BTB*				Neck
6	1840057				Rotatable Nut Cover
7	1680085C				Rotatable Neck Adaptor
8	412-1				Switch Connector
9	308*	308*	408T*	608-1*	End Fitting
	308^	1680090^	1680090^	608-1^	
10	509*	509*	409*	509*	Cone Nut
	509^	CB9200^	CB9201^	509^	
11	4939*	4939*	4939*	4944*	Jacket Clamp
	4939^	407709-013^	407709-013^	4944^	
NS	4992*	4992*	4992*	4993*	Conduit Clamp
	4992^	N/A^	N/A^	4993^	
NS	1880261*	1880261*	1880263*	513-8*	Cable Repair Kit
	1880261^	N/A^	N/A^	513-8^	
12	1780086				Front Handle
13	1780086				Rear Strain Relief
	2520073				Clamshell Rear Strain Relief *(Bernard Pin)*
	2520069				Clamshell Rear Strain Relief *(Euro Pin)*
14	411-1				Switch
15	2690077				Trigger, Standard
	1690088				Trigger, Dual Pull
16	2280064				Screw, Trigger Housing
17	1810055				Trigger Control Plug
	1810058				Trigger Control Plug, D/S
18	1620006				Screw Cover, Rear Housing
19	414-400C				Adaptor Block
20	*See SP-BTB*				Power Pin
21	*See SP-BTB*				Power Pin Insulator
22	*See SP-BTB*				Liner
23	2520041*	2520041*	2520041*	2520041*	Spring, Strain Relief
	2520041^	2520056^	2520056^	2520041^	
24	2280071				Screw, Rear Housing
25	1810046				Top Housing, Standard
	2690082				Top Housing, Insight Ltd
	2690083				Top Housing, D/S

7-1 Centerfire™ Consumable Series

A. Small Centerfire Gas Diffusers and Nozzles

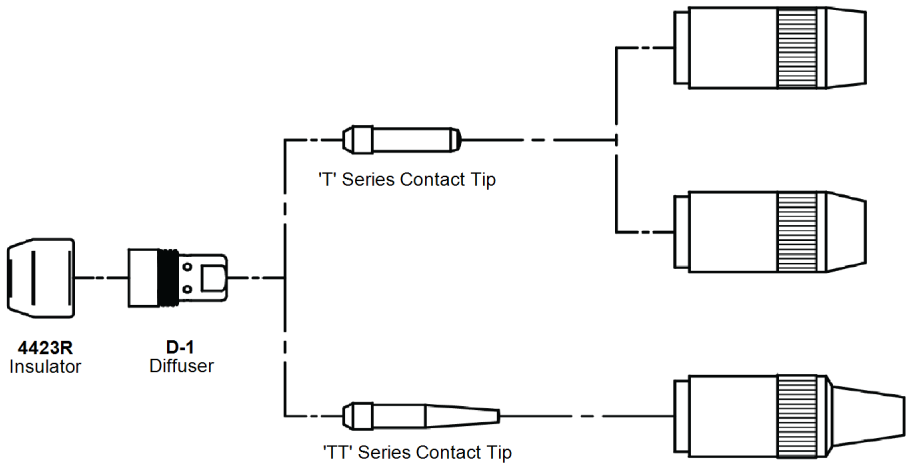


NS-5800C (5/8" I.D., Flush, Copper)
NS-5818C (5/8" I.D., 1/8" Recess, Copper)
NS-5800B (5/8" I.D., Flush, Brass)
NS-5818C (5/8" I.D., 1/8" Recess, Brass)

NS-1218C (1/2" I.D., 1/8" Recess, Copper)
NS-1200B (1/2" I.D., Flush, Brass)
NS-1218B (1/2" I.D., 1/8" Recess, Brass)

NST-3800B (3/8" I.D., Flush, Brass)
NST-3818B (3/8" I.D., 1/8" Recess, Brass)
NST-38XTB (3/8" I.D., 1/8" Extension, Brass)

B. Large Centerfire Gas Diffusers and Nozzles



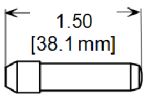
N-3400C (3/4" I.D., Flush, Copper)
N-3418C (3/4" I.D., 1/8" Recess, Copper)
N-3414C (3/4" I.D., 1/4", Brass)
N-3418B (3/4" I.D., 1/8" Recess, Brass)
N-3414B (3/4" I.D., 1/4" Recess, Brass)

N-5800C (5/8" I.D., Flush, Copper)
N-5818C (5/8" I.D., 1/8" Recess, Copper)
N-5814C (5/8" I.D., 1/4" Recess, Copper)
N-5818B (5/8" I.D., 1/8" Recess, Brass)
N-5814B (5/8" I.D., 1/4" Recess, Brass)

NT-3800C (3/8" I.D., Flush, Copper)

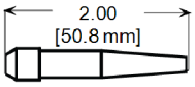
C. Centerfire Contact Tips

'T' Series Contact Tips



T-023	0.023" (0.6 mm)	**T-045**	0.045" (1.2 mm)	**T-078**	5/64" (2.0 mm)
T-030	0.030" (0.8 mm)	**T-052**	0.052" (1.4 mm)	**T-094**	3/32" (2.4 mm)
T-035	0.035" (0.9 mm)	**T-062**	1/16" (1.6 mm)	**T-109**	7/64" (2.8 mm)
T-039	0.039" (1.0 mm)	**T-072**	0.072" (1.8 mm)	**T-125**	1/8" (3.2 mm)

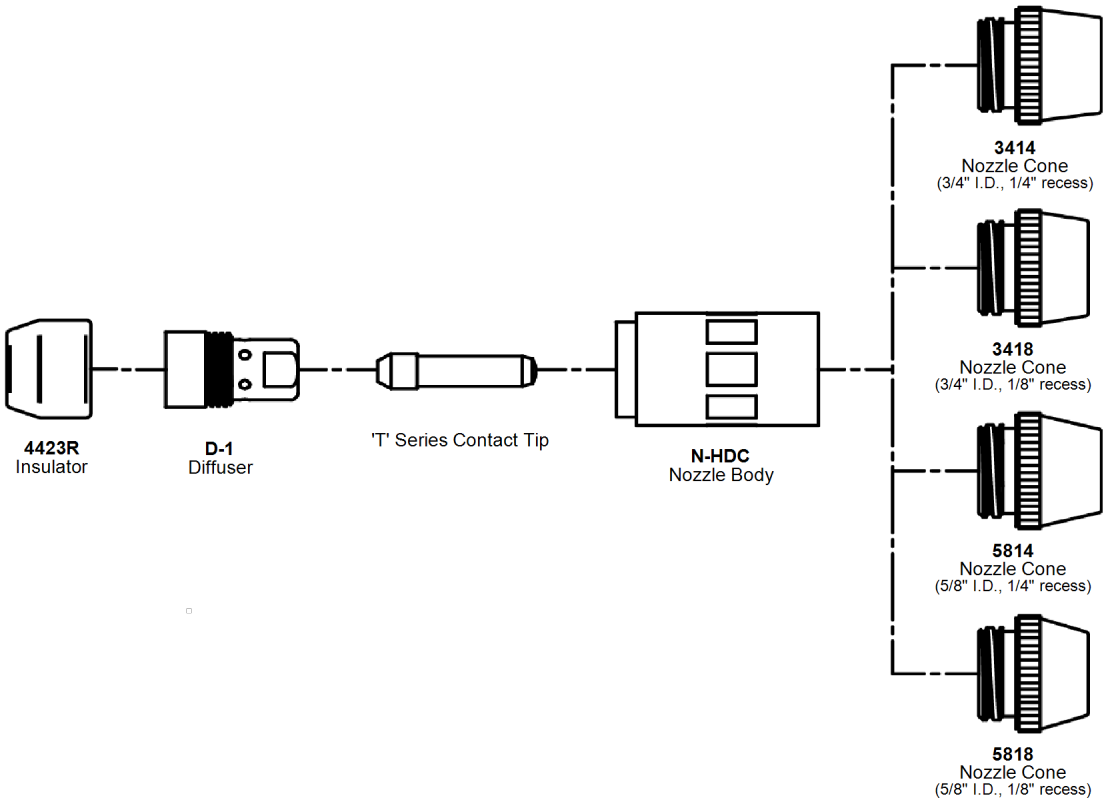
'TT' Series Contact Tip



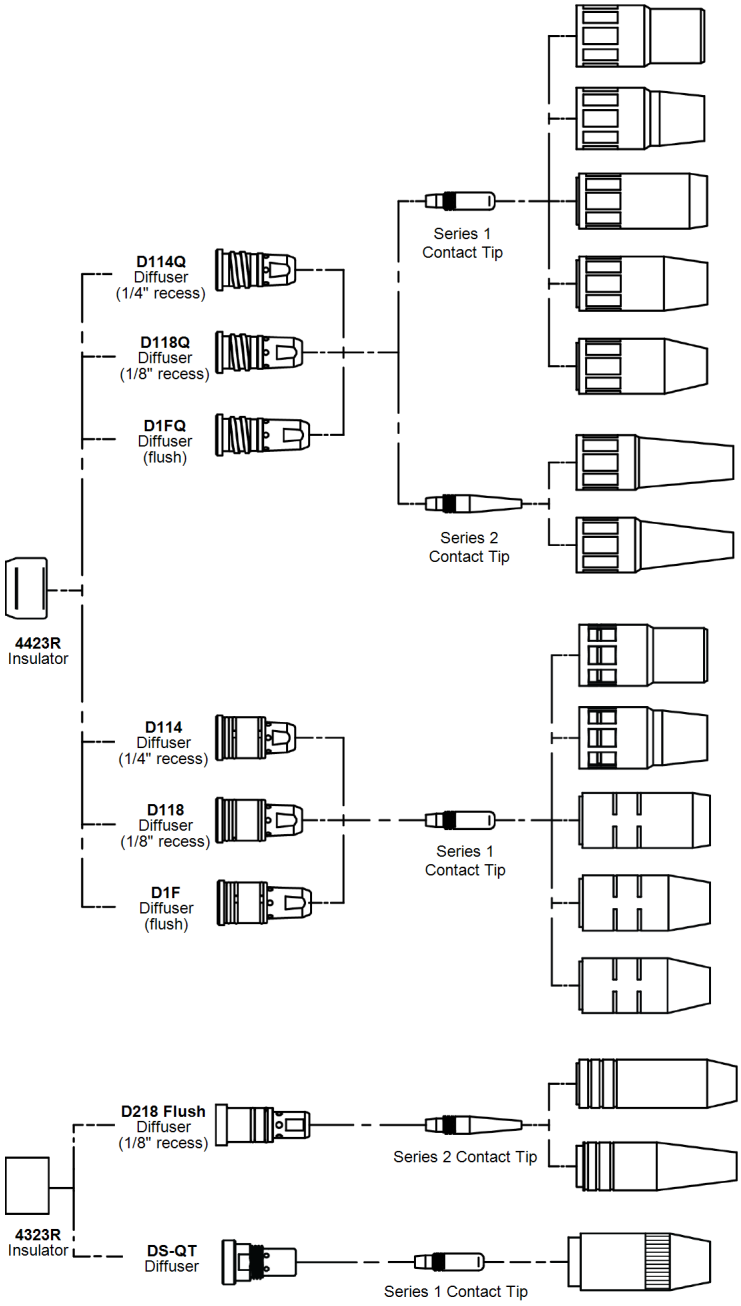
TT-023	0.023" (0.6 mm)	**TT-039**	0.039" (1.0 mm)	**TT-052**	0.052" (1.4 mm)
TT-030	0.030" (0.8 mm)	**TT-045**	0.045" (1.2 mm)	**TT-062**	1/16" (1.6 mm)
TT-035	0.035" (0.9 mm)				

7-2 Centerfire HD Consumable Series

Centerfire HD Consumable Series is not configurable and will need to be ordered separately. Couple the Centerfire HD nozzle body with a Centerfire HD nozzle cone to form a complete Centerfire HD nozzle.



A. Quik Tip Gas Diffusers and Nozzles



N1C34HQ (Plated Copper, 3/4" Heavy Duty)

N1C58HQ (Plated Copper, 5/8" Heavy Duty)

N1C34Q (Plated Copper, 3/4" Heavy Duty)
N1B34Q (Brass, 3/4")

N1C58Q (Plated Copper, 5/8")
N1B58Q (Brass, 5/8")

N1C12Q (Plated Copper, 1/2")

N2C12HQ (Plated Copper, 1/2")

N2C38HQ (Plated Copper, 3/8")

N1C34HD (Plated Copper, 3/4" Heavy Duty)

N1C58HD (Plated Copper, 5/8" Heavy Duty)

N1C34 (Copper, 3/4")

N1C58 (Copper, 5/8")

N1C12 (Copper, 1/2")

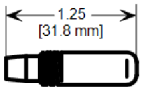
N2C12 (Copper, 1/2")

N2C38 (Copper, 3/8")

NSQT-1200 (Copper, 1/2" I.D., Flush)
NSQT-1218 (Copper, 1/2" I.D., 1/8" Recess)

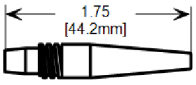
B. Quik Tip Contact Tips

Series 1 Contact Tips



T1023	0.023" (0.6 mm)	**T1052**	0.052" (1.4 mm)	**T1332**	3/32" (2.4 mm)
T1030	0.030" (0.8 mm)	**T1116**	1/16" (1.6 mm)	**T1764**	7/64" (2.8 mm)
T1035	0.035" (0.9 mm)	**T1068**	0.068" (1.7 mm)	**T1118**	1/8" (3.2 mm)
T1039	0.039" (1.0 mm)	**T1072**	0.072" (1.8 mm)	**T1364**	3/64" (1.2 mm)
T1045	0.045" (1.2 mm)	**T1564**	5/64" (2.0 mm)		

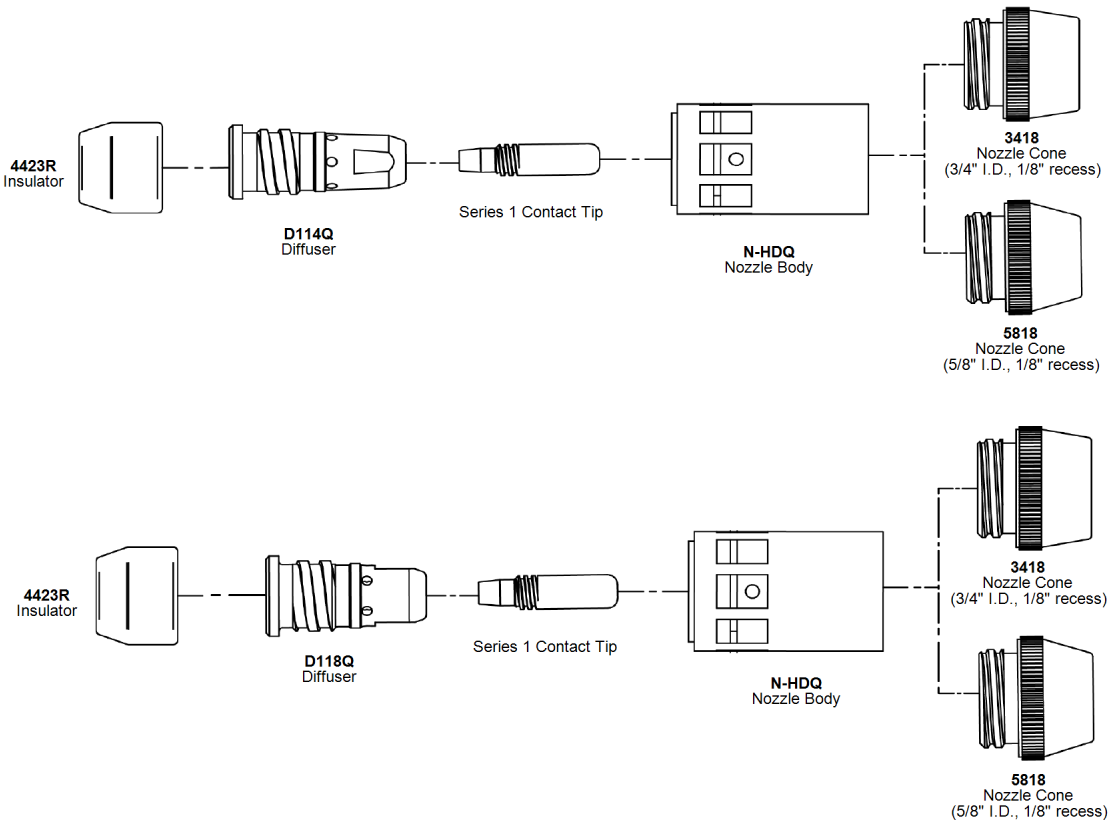
Series 2 Contact Tip



T2023	0.023" (0.6 mm)	**T2045**	0.045" (1.2 mm)	**T2052**	0.052" (1.4 mm)
T2030	0.030" (0.8 mm)	**T2364**	3/64" (1.2 mm)	**T2116**	1/16" (1.6 mm)
T2035	0.035" (0.9 mm)				

7-4 Quik Tip HD Consumable Series

Quik Tip HD Consumable Series is not configurable and will need to be ordered separately. Couple the Quik Tip HD nozzle body with the Quik Tip HD nozzle cone to form a complete Quik Tip HD nozzle.



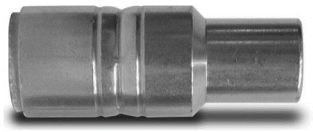
A. TOUGH LOCK Contact Tip Part Numbers

WIRE SIZE	STANDARD DUTY	HEAVY DUTY	HEAVY DUTY TAPERED	EXTENDED LIFE HEAVY DUTY	EXTRA HEAVY DUTY	QTY
0.023" (0.6 mm)	403-14-23	N/A	N/A	N/A	N/A	100
0.030" (0.8 mm)	403-14-30	403-20-30	403-21-30	403-27-30	N/A	100
0.035" (0.9 mm)	403-14-35	403-20-35	403-21-35	403-27-35	N/A	100
0.039" (1.0 mm)	403-14-1.0	403-20-1.0	403-21-1.0	403-27-1.0	603-20-1.0	100
0.045" (1.2 mm)	403-14-45	403-20-45	403-21-45	403-27-45	603-20-45	100
3/64" (1.2 mm)	N/A	403-20-364	N/A	403-27-364	603-20-364	100
0.052" (1.3 mm)	N/A	403-20-52	N/A	403-27-52	603-20-52	100
0.055" (1.4 mm)	N/A	403-20-1.4	N/A	N/A	603-20-1.4	100
1/16" (1.6 mm)	N/A	403-20-116	N/A	403-27-116	603-20-116	100
0.070" (1.8 mm)	N/A	403-20-1.8	N/A	N/A	N/A	100
0.078" (2.0 mm)	N/A	403-20-78	N/A	N/A	N/A	100
5/64" (2.0 mm)	N/A	403-20-564	N/A	N/A	603-20-564	100
3/32" (2.4 mm)	N/A	403-20-332	N/A	N/A	603-20-332	100
7/64" (2.8 mm)	N/A	N/A	N/A	N/A	603-20-764	100
1/8" (3.2 mm)	N/A	N/A	N/A	N/A	603-20-18	100

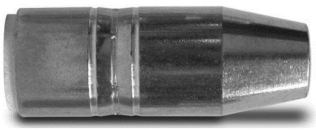
B. TOUGH LOCK Retaining Head Part Numbers

DESCRIPTION	SINGLE TAPER PART NUMBER	DUAL TAPER PART NUMBER	QTY
Heavy Duty	404-20-25	404-26-25	25
Heavy Duty	404-20	404-26	100
Heavy Duty	404-20-250	404-26-250	250
Standard Duty	404-14-25	404-18-25	25
Standard Duty	404-14	404-18	100
THREAD-ON RETAINING HEADS FOR NEW STYLE THREAD-ON NOZZLES			
Heavy Duty	N/A	404-53-25	25

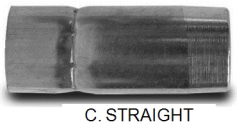
C. TOUGH LOCK Nozzle Part Numbers



A. BOTTLENECK



B. TAPER



C. STRAIGHT

PART NUMBER	NOZZLE TYPE	BORE	TYPE	MATERIAL	O.D.	LENGTH	TIP POSITION	QTY
401-6-50	Heavy Duty	1/2"	B	Copper	1.062"	2.88"	1/8" Recess	10
401-48-62	Heavy Duty	5/8"	A	Copper	1.062"	2.76"	Flush	10
401-5-62	Heavy Duty	5/8"	B	Copper	1.062"	3.00"	1/4" Recess	10
401-6-62	Heavy Duty	5/8"	B	Copper	1.062"	2.88"	1/8" Recess	10
401-71-62	Heavy Duty	5/8"	B	Brass	1.106"	2.88"	1/8" Recess	10
401-7-62	Heavy Duty	5/8"	B	Brass	1.106"	3.00"	1/4" Recess	10
401-81-62	Heavy Duty	5/8"	B	Copper	1.062"	2.63"	1/8" Stick-Out	10
401-87-62	Heavy Duty	5/8"	B	Brass	1.062"	2.63"	1/8" Stick-Out	10
401-5-75	Heavy Duty	3/4"	B	Copper	1.062"	3.00"	1/4" Recess	10
401-6-75	Heavy Duty	3/4"	B	Copper	1.062"	2.88"	1/8" Recess	10
401-7-75	Heavy Duty	3/4"	B	Brass	1.106"	2.88"	1/8" Recess	10
401-42-50	Standard Duty	1/2"	A	Brass	0.938"	2.88"	1/8" Recess	10
401-4-50	Standard Duty	1/2"	B	Copper	0.938"	2.88"	1/8" Recess	10
401-44-50	Standard Duty	1/2"	A	Brass	0.938"	2.50"	1/4" Stick-Out	10
401-48-50	Standard Duty	1/2"	A	Brass	0.938"	2.63"	1/8" Recess	10
401-4-38	Standard Duty	3/8"	B	Copper	0.938"	2.74"	Flush	10
401-40-38	Standard Duty	3/8"	B	Brass	0.938"	2.81"	1/16" Recess	10
401-4-62	Standard Duty	5/8"	B	Copper	0.938"	2.88"	1/8" Recess	10
401-8-62	Standard Duty	5/8"	B	Copper	0.938"	2.63"	1/8" Stick-Out	10
401-9-62	Standard Duty	5/8"	B	Copper	0.938"	2.51"	1/4" Stick-Out	10
401-4-75	Standard Duty	3/4"	C	Copper	0.938"	2.88"	1/8" Recess	10

8-1 Troubleshooting Table

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
1. Electrode does not feed.	1. Feeder relay. 2. Broken control lead. 3. Poor adaptor connection. 4. Improper / worn drive roll. 5. Drive roll tension misadjusted. 6. Burn back to contact tip. 7. Wrong size liner. 8. Buildup inside of liner.	1. Consult feeder manufacturer. 2. **a.** Test and connect spare control lead. **b.** Install new cable. 3. Test and replace leads and/or contact pins. 4. Replace drive roll. 5. Adjust tension at feeder. 6. See '**Contact tip burn back**'. 7. Replace with correct size. 8. Replace liner or clean out with compressed air, check condition of electrode.
2. Contact tip burn back.	1. Improper voltage and/or wire feed speed. 2. Erratic wire feeding. 3. Improper tip stickout. 4. Improper electrode stickout. 5. Faulty ground.	1. Adjust parameters. 2. See '**Erratic wire feeding**'. 3. Adjust nozzle / tip relationship. 4. Adjust wire stickout. 5. Replace cables and/or connections.
3. Tip disengages from the gas diffuser.	1. Worn gas diffuser/retaining head. 2. Improper tip installation. 3. Extreme heat or duty cycle.	1. Replace tip and/or gas diffuser / retaining head. 2. Install as per section 5-1 Changing Consumables on page 11. 3. Replace with heavy duty consumables. See appropriate Spec Sheet for details.
4. Short contact tip life.	1. Contact tip size 2. Electrode eroding contact tip. 3. Exceeding duty cycle.	1. Replace with proper size. 2. Inspect and/or change drive rolls. 3. Replace with properly rated Bernard MIG Gun.
5. Erratic arc.	1. Worn contact tip. 2. Buildup inside of liner. 3. Wrong tip size. 4. Not enough bend in neck.	1. Replace contact tip. 2. Replace liner, check condition of electrode. 3. Replace with correct tip size. 4. Replace with 45° or 60° neck.
6. Erratic wire feeding.	1. Buildup inside of liner. 2. Wrong size liner. 3. Improper drive roll size. 4. Worn drive roll. 5. Improper guide tube relationship. 6. Improper wire guide diameter. 7. Gaps at liner junctions. 8. Feeder malfunction. 9. Worn contact tip.	1. Replace liner, check condition of electrode. 2. Replace with new liner of proper size. 3. Replace with proper size drive roll. 4. **a.** Replace with new drive roll. **b.** Repair worn drive roll. 5. a. Adjust / replace guide as close to drive rolls as possible. b. Eliminate all gaps in electrode path. 6. Replace with proper guide diameter. 7. **a.** Replace with new liner trimmed as per section 5-1 Changing Consumables on page 11. **b.** Replace guide tube / liner trimming as close to mating component as possible. 8. Consult feeder manufacturer. 9. Inspect and replace.*
7. Extreme spatter.	1. Improper machine parameters. 2. Improper tip installation. 3. Improper shielding gas coverage. 4. Contaminated wire or workpiece.	1. Adjust parameters. 2. Adjust nozzle / tip relationship. 3. **a.** Verify shielding gas coverage. **b.** Verify gas mixture. 4. Clean wire and workpiece.

8. Porosity in weld.	1. Insulator worn. 2. Gas diffuser damaged 3. Extreme heat or duty cycle. 4. Solenoid faulty. 5. No gas. 6. Flow improperly set. 7. Gas ports plugged. 8. Ruptured gas hose. 9. Control circuit loss. 10. Worn, cut or missing o-rings. 11. Loose fittings.	1. Replace nozzle / insulator. 2. Replace gas diffuser or o-rings. 3. Replace with heavy duty consumables. 4. Replace solenoid. 5. **a.** Install full tanks. **b.** Check supply. **c.** Check for hose leaks. 6. Adjust flow. 7. **a.** Clean or replace gas diffuser. **b.** Clean nozzle. 8. Repair or replace cable or line. 9. See '**Electrode does not feed**'. 10. Replace o-rings. 11. Tighten gun and cable connections to specified torque. See Section 5 — Replacement on page 11.
9. Gun running hot.	1. Exceeding duty cycle. 2. Loose or poor power connection.	1. **a.** Replace with properly rated Bernard MIG Gun. **b.** Decrease parameters to within gun rating. 2. **a.** Clean, tighten or replace cable grounding connection. **b.** Tighten gun and cable connections to specified torque. See Section 5 — Replacement on page 11.
10. Liner is discolored full length.	1. Short circuit to electrode. 2. Broken copper stranding in power cable.	1. Isolate electrode reel from feeder and drive block. Consult feeder manufacturer's manual. 2. Replace MIG gun.
11. Sporadic feeding of aluminum electrode.	1. Tip galling. 2. Synthetic liner melting. 3. Wire deformed by feeder rolls.	1. Inspect and replace the contact tip.* 2. **a.** Replace liner. **b.** Replace with composite liner. **c.** Replace the neck and jump liner. 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.*

ADDITIONAL SUPPORT MATERIALS

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

Scan to view the BTB MIG Gun Owner's Manual

Scan to view the BTB MIG Gun Spec Sheet

Scan to view the AccuLock™ S (Semi-Auto) Consumables Spec Sheet

Scan to view the Centerfire® Consumables Spec Sheet

Scan to view the Quik Tip™ Consumables Spec Sheet

Scan to view the TOUGH LOCK® Consumables Spec Sheet

Scan to view the QUICK LOAD® Liner and AutoLength™ Pins Spec Sheet

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