

Processes

MIG (GMAW) Welding

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

Bernard BTB MIG Guns



OWNER'S MANUAL

BernardA Division of Miller Electric Mfg. LLC
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Beecher, Illinois 60401 USAPhone: 1-855-MIGWELD (644-9353) (US & Canada)
1-519-737-3000 (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 1-519-737-3000 (International) or fax 1-708-946-6726. Our trained Customer Service Team is available Monday to Friday 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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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	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:

David A. Werba
MANAGER, PRODUCT DESIGN COMPLIANCE


May 16, 2014


Date of Declaration

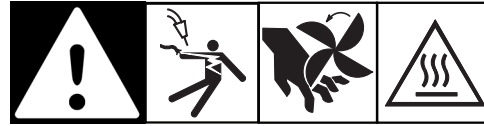
SECTION 1 - SAFETY PRECAUTIONS FOR GMAW WELDING GUNS - READ BEFORE USING

-  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.



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 welding power source Owner's Manual. Read and follow all Safety Standards.

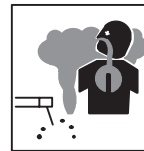
-  Only qualified persons should install, operate, maintain, and repair this equipment. A qualified person is defined as one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated ability 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.

- Always wear dry insulating gloves.
- Insulate yourself from work and ground.
- Do not touch live electrode or electrical parts.
- Replace worn, damaged, or cracked guns or cables.
- Turn off welding power source before changing contact tip or gun parts.
- Keep all covers and handle securely in place.



FUMES AND GASES can be hazardous.

- Keep your head out of the fumes.
- Ventilate area, or use breathing device. The recommended way to determine adequate ventilation is to sample for the composition and quantity of fumes and gases to which personnel are exposed.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals.



MOVING PARTS can injure.

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



WELDING can cause fire or explosion.

- Do not weld near flammable material.
- 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 Safety Standards).
- Watch for fire; keep 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.



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.



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 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.



HOT PARTS can burn.

- Allow gun to cool before touching.
- Do not touch hot metal.
- Protect hot metal from contact by others.



NOISE can damage hearing.

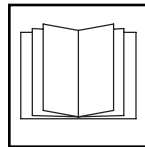
Noise from some processes or equipment can damage hearing.

- Check for noise level limits exceeding those specified by OSHA.
- Use approved ear plugs or ear muffs if noise level is high.
- Warn others nearby about noise hazard.



WELDING WIRE can injure.

- Keep hands and body away from gun tip when trigger is pressed.



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.

1-3 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.

1-4 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 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).

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 AWS 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 02169 (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, Mississauga, Ontario, Canada L4W 5N5 (phone: 800-463-6727, website: www.csagroup.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 02169 (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 1910.177 Subpart N, 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).

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 passers-by 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 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 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 CO₂ 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

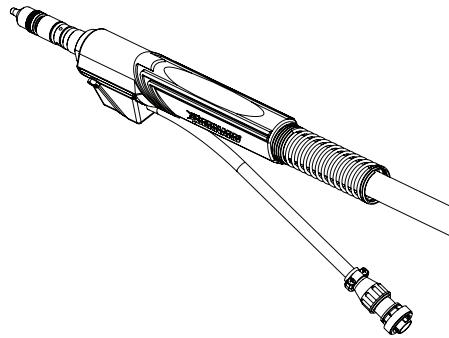
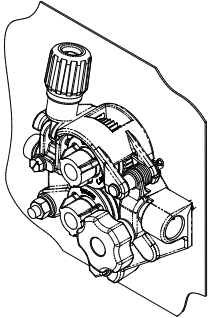
A or V

OR

Reduce Duty Cycle

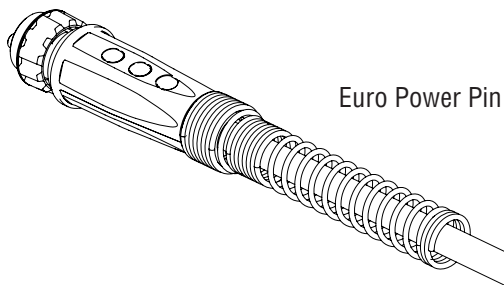
SECTION 3 - INSTALLATION

3-1 Installing to a Feeder with a Power Pin



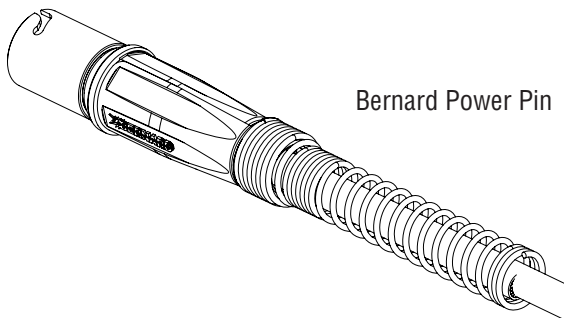
1. Insert power pin to shoulder and secure tightly.
2. Insert control plug into feeder.
3. Feed welding wire into power pin by hand and tighten drive rolls.

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.

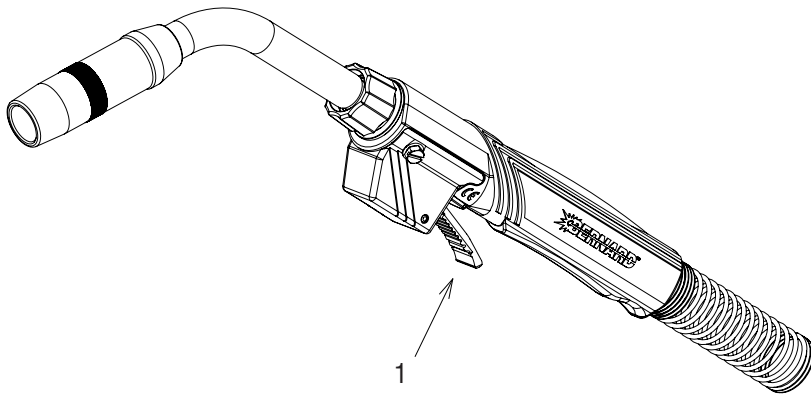


Bernard Power Pin

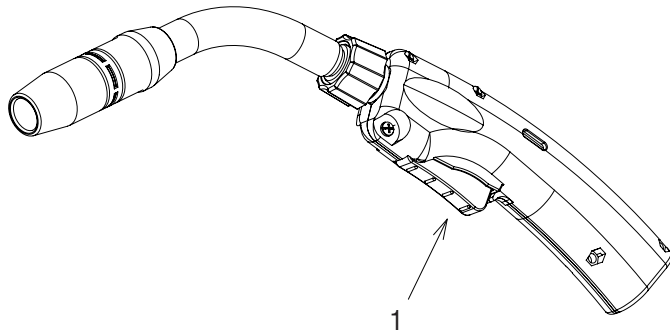
1. Insert the Bernard power pin to face of receptacle. Engage and rotate locking sleeve to tighten

SECTION 4 - OPERATION

4-1 Pulling the Trigger

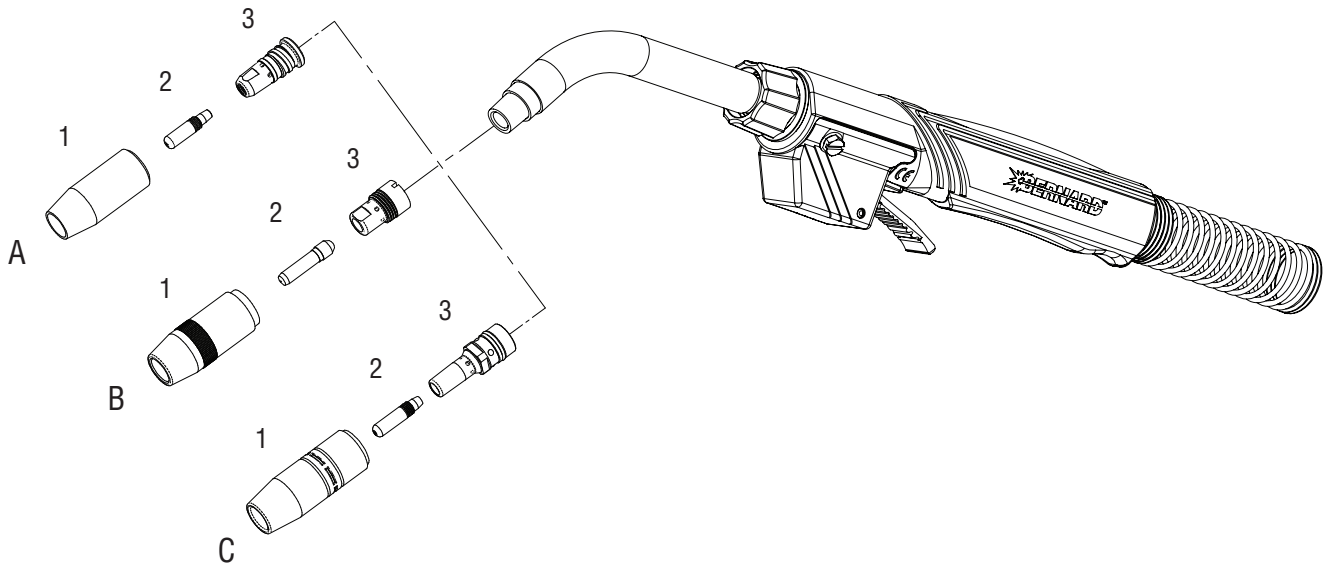


1. Trigger - When pressed, energized wire feeds and shielding gas flows.



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

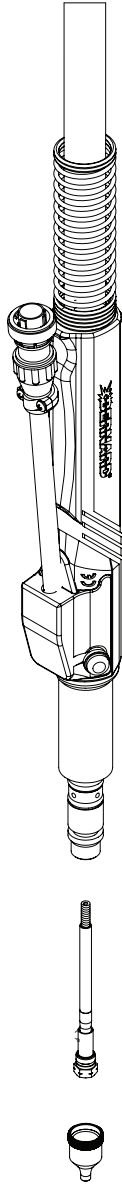
1. Cut electrode and remove all burrs before removing contact tip. Remove threaded nozzle by turning in a counterclockwise direction.
2. Pull the Centerfire contact tip from the gas diffuser. To replace slide the contact tip over electrode into gas diffuser and lock by installing nozzle onto gas diffuser. 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.

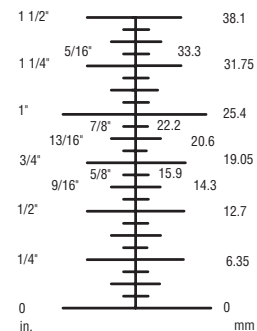
5-2 Changing the Liner

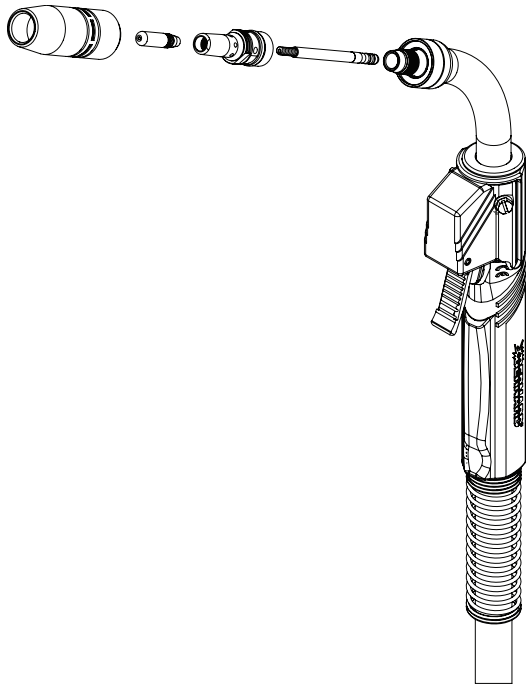


A. Changing Universal Conventional Liner

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.

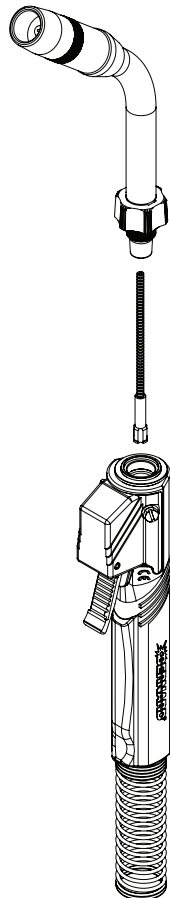
New Liner Trim Lengths		
Centerfire™ Diffuser Part Number	Liner Trim Length	
D-1	9/16"	14.3 mm
D-1T	13/16"	20.6 mm
D-1T-5	13/16"	20.6 mm
DS-1	9/16"	14.3 mm
DS-1T	5/8"	15.9 mm
DW-1	1/4"	6.4 mm
Quik Tip™ Diffuser Part Number	Liner Trim Length	
D114	5/8"	15.9 mm
D114Q	9/16"	14.3 mm
D118	3/4"	19.1 mm
D118Q	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 **pg. 12**. Remove all burrs from end of liner and replace gas diffuser, contact tip and nozzle.



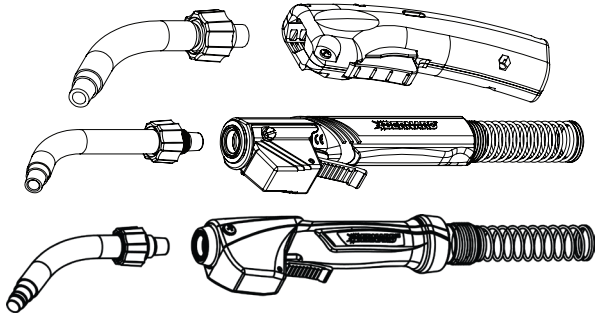
C. Changing a Jump Liner

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 **pg. 9**. Deburr the jump liner past the nozzle end of the neck.
5. Install gas diffuser, contact tip and nozzle.

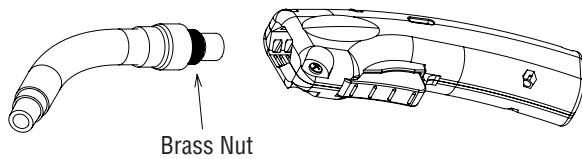
5-3 Changing the Neck



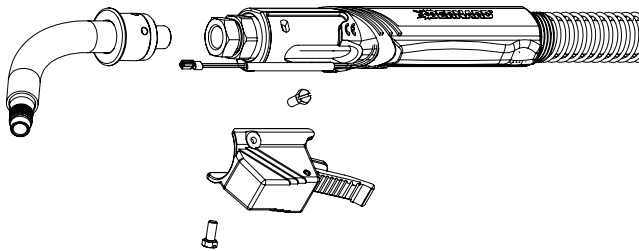
A.



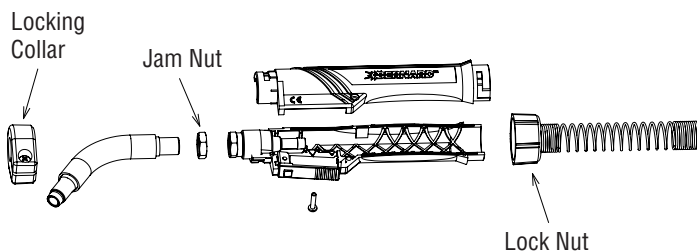
B.



C.



D.



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.

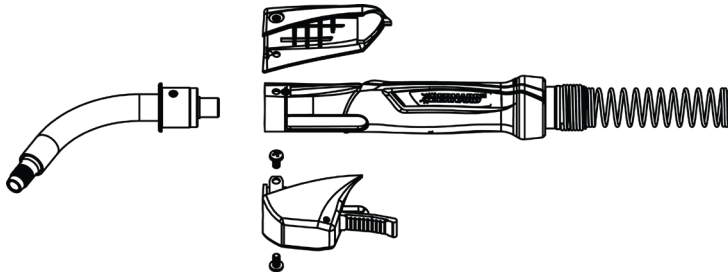
C. Changing the Neck - Fixed with T Series Large Straight Handle

1. Place neck in vise. Remove both switch 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 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.

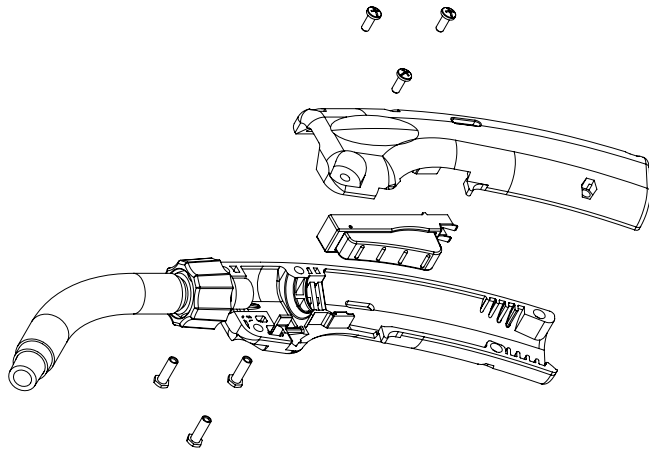
E.



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

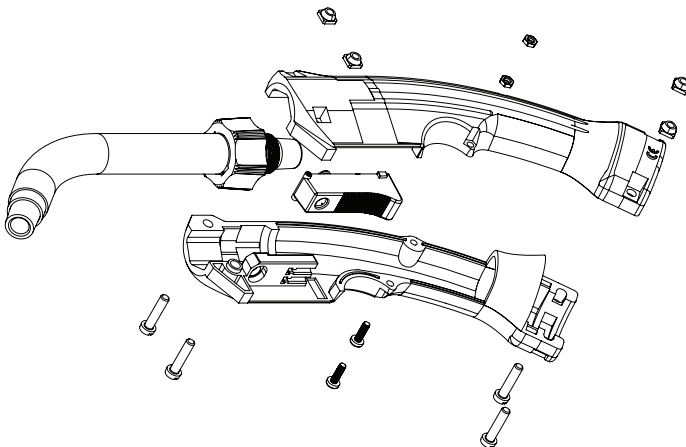
1. Place neck in vise. Remove both switch housing mounting screws with a Phillips screwdriver.
2. Remove both the top and bottom pods from handle.
3. Slide handle back, exposing the cable connection. Loosen the cable/neck connection using a 7/8" wrench.
4. Remove from vise and unthread neck by hand.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



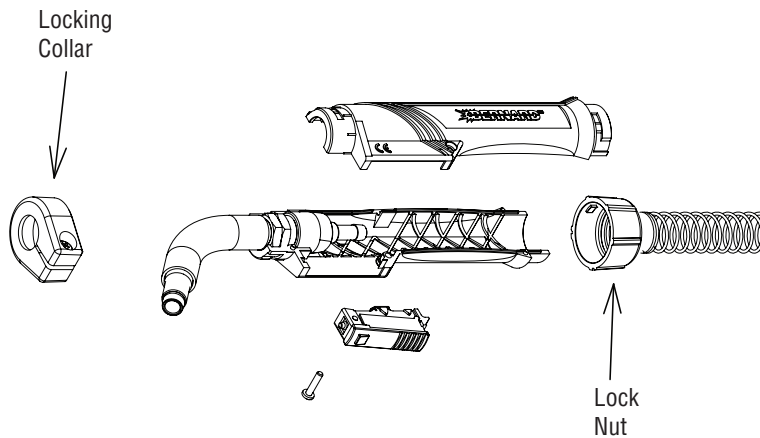
A. B Series Small and Large Curved Handle

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 of new switch. 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).



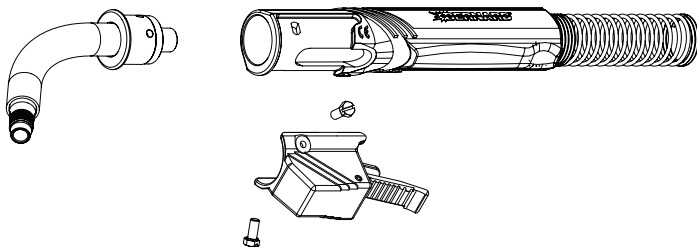
B. O Series Small and Large Curved Handle

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).



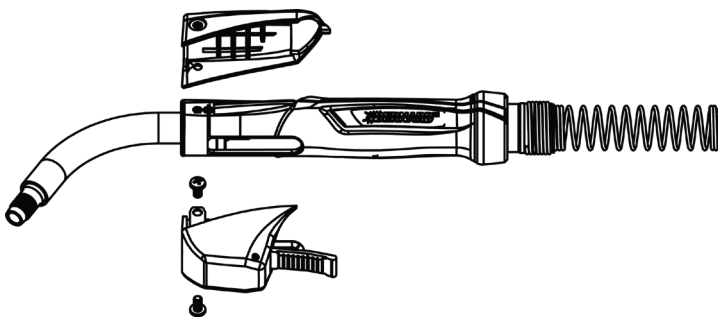
C. T Series Small Straight Handle

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 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. 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)

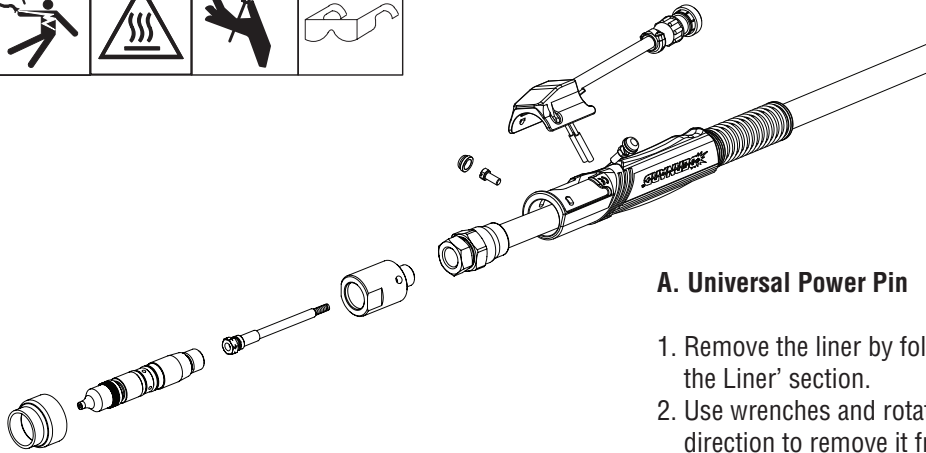
1. Remove both housing screws with an 8 mm nut driver.
2. Ease switch out of switch housing with needle nose pliers to grip switch. Remove switch from switch lead connectors with needle nose pliers.
3. Push switch lead connectors firmly onto new switch terminals with needle nose pliers.
4. Depress switch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



E. C Series Large Straight Handle (Switch Only)

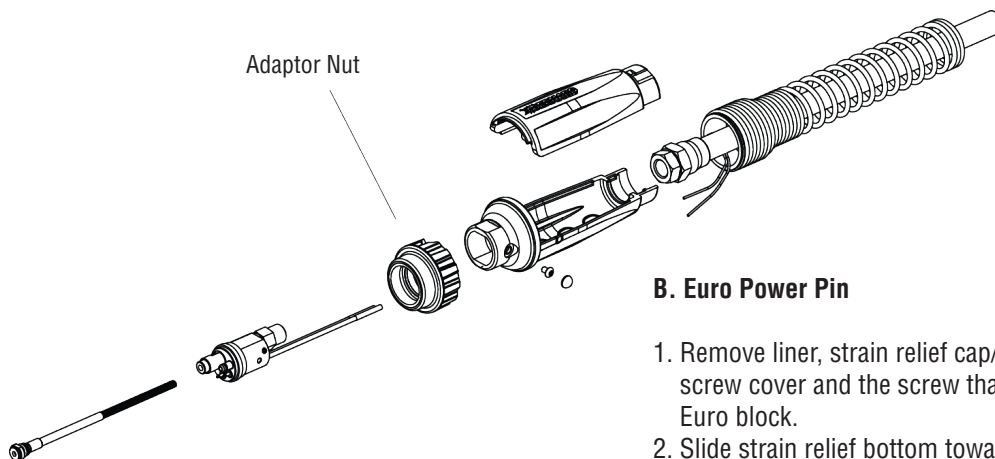
1. Remove both switch mounting housing screws with a Phillips screwdriver.
2. Remove both the top and bottom pods from handle.
3. Ease switch out of switch housing with needle nose pliers. Remove switch from switch lead connectors with needle nose pliers.
4. Push lead connectors onto new switch using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

5-5 Changing the Power Pin



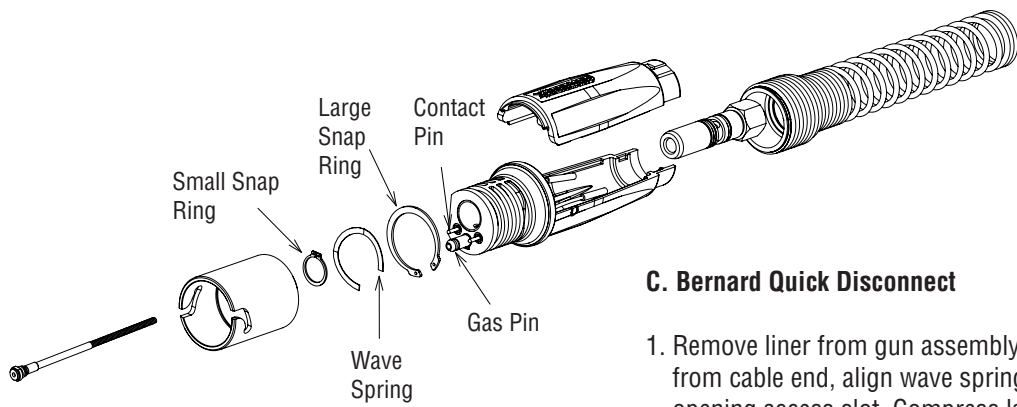
A. Universal Power Pin

1. Remove the liner by following the steps listed in the 'Changing the Liner' section.
2. 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 the 'Changing the Liner' section.



B. Euro Power Pin

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.

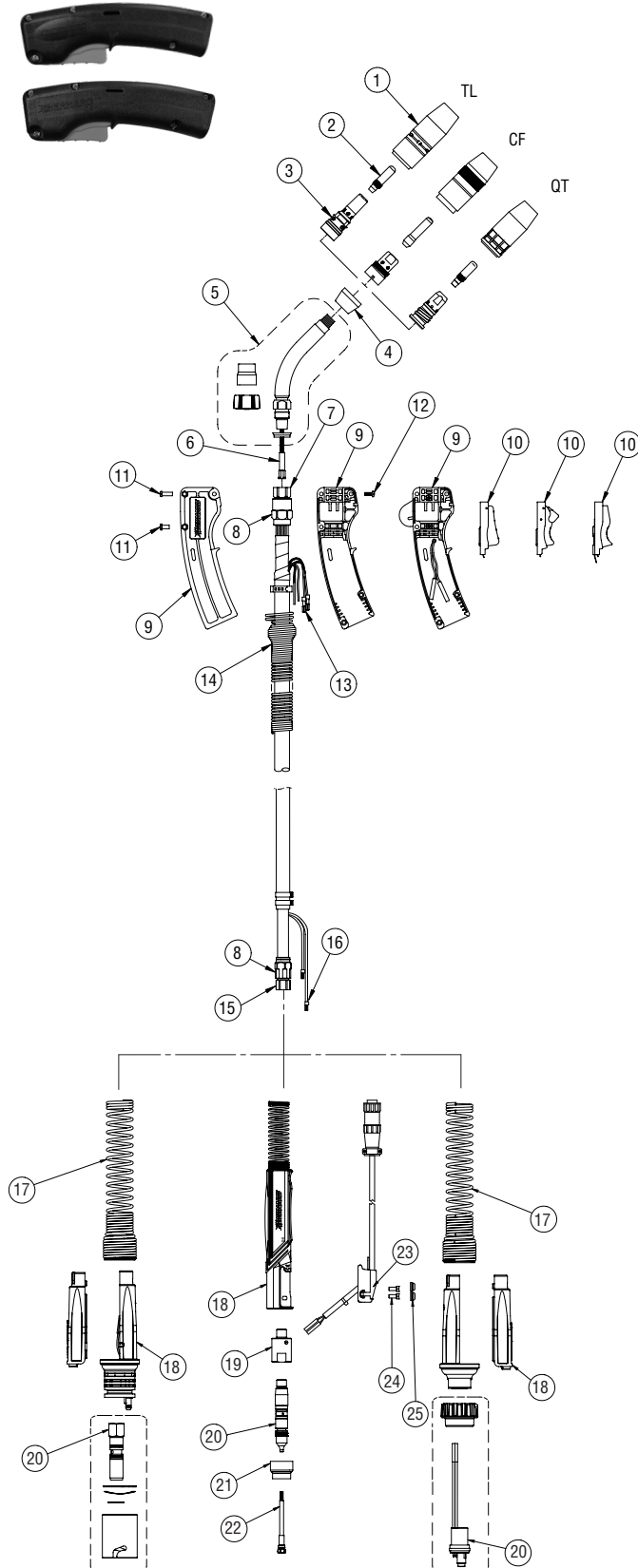


C. Bernard Quick Disconnect

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. Reinstall contact pins and gas pin if necessary.
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 18 ft.-lbs. (24 Nm) minimum.

SECTION 6 - PARTS LIST

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

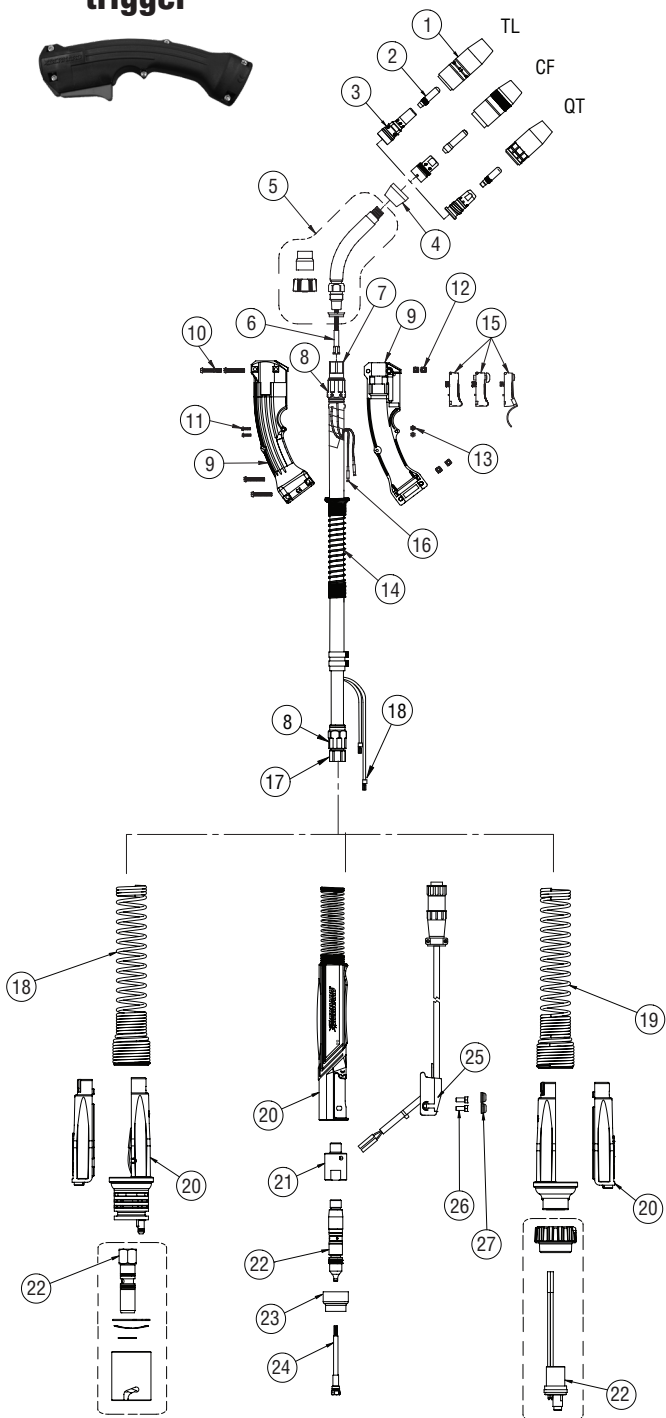


ITEM #	PART #			DESCRIPTION
	Q20	Q30	Q40	
1		401-6-62		Nozzle, TOUGH LOCK™ Standard Duty
	401-5-62	401-6-62		Nozzle, TOUGH LOCK Heavy Duty
	NS-1218B	NS-5818C		Nozzle, Centerfire™ "N" Series
2		N1C58Q		Nozzle, Quik Tip™ Series
		See Section 7		Contact Tip, TOUGH LOCK Standard Duty
		See Section 7		Contact Tip, TOUGH LOCK Heavy Duty
		See Section 7		Contact Tip, Centerfire
3		See Section 7		Contact Tip, Quik Tip
		404-18		Retaining Head, TOUGH LOCK Standard Duty
		404-26		Retaining Head, TOUGH LOCK Heavy Duty
		DS-1	D-1	Gas Diffuser, Centerfire
		D118Q	Gas Diffuser, Quik Tip	
4		See SP-BTB Spec Sheet*		Neck Insulator
5		See SP-BTB Spec Sheet*		Neck
6		See SP-BTB Spec Sheet*		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		Adapter Block
20		See SP-BTB Spec Sheet*		Power Pin
21		See SP-BTB Spec Sheet*		Power Pin Insulator
22		See SP-BTB Spec Sheet*		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



*Scan this code for immediate access to the SP-BTB Spec Sheet

6-2 Replacement Parts 200, 300, 400 amp with 0 Series Small Curved Handle with blue trigger

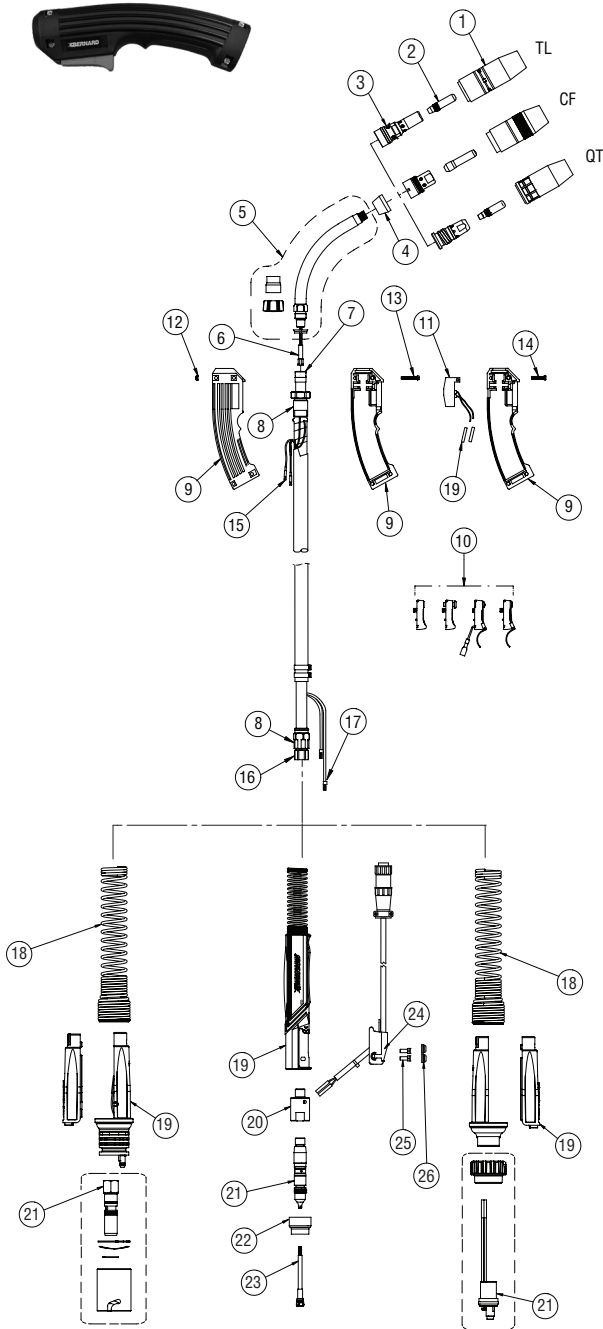


ITEM #	PART #			DESCRIPTION
	Q20	Q30/S30	Q40/S40	
1		401-6-62		Nozzle, TOUGH LOCK™ Standard Duty
	401-5-62	401-6-62		Nozzle, TOUGH LOCK Heavy Duty
	NS-1218B	NS-5818C		Nozzle, Centerfire™ "N" Series
		N1C58Q		Nozzle, Quik Tip™ Series
2		See Section 7		Contact Tip, TOUGH LOCK Standard Duty
		See Section 7		Contact Tip, TOUGH LOCK Heavy Duty
		See Section 7		Contact Tip, Centerfire
		See Section 7		Contact Tip, Quik Tip
3		404-18		Retaining Head, TOUGH LOCK Standard Duty
		404-26		Retaining Head, TOUGH LOCK Heavy Duty
		DS-1	D-1	Gas Diffuser, Centerfire
		D118Q		Gas Diffuser, Quik Tip
4	See SP-BTB Spec Sheet*			Neck Insulator
5	See SP-BTB Spec Sheet*			Neck
6	See SP-BTB Spec Sheet*			Jump Liner
7	Q20 4213B	Q30 4213B	Q40 1680086	End Fitting, Front
		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	
		Jacket Clamp		
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	Q20 M169700-12	Q30 M169700-12	Q40 M169700-12	Handle Spring
		S30 Not Needed	S40 Not Needed	
		177488H		
15	177379			Trigger, Standard
	177379			Trigger, Standard with Extension
	MS2110			Trigger, Locking
16	177271H			Trigger Pin (2 Req'd)
17	Q20 1680087	Q30 1680087	Q40 1680088	End Fitting, Rear
		S30 1680090	S40 1680090	
18	412-1			Switch Connector (4 Req'd)
19	Q20 2520023	Q30 2520023	Q40 2520041	Spring, Strain Relief
		S30 2520056	S40 2520056	
		410		
20	2520073			Clamshell Rear Strain Relief with Installed Gas Pin (Bernard Power Pin)
	2520069			Clamshell Rear Strain Relief (Euro Power Pin)
	414-400			Adapter Block
21	414-400			Adapter Block
22	See SP-BTB Spec Sheet*			Power Pin
23	See SP-BTB Spec Sheet*			Power Pin Insulator
24	See SP-BTB Spec Sheet*			Liner
25	1810053			Terminal Housing
	1810054			Terminal Housing, Dual Schedule
26	411-3M			Screw, Trigger Housing (2 Req'd)
27	1620004			Screw Cover, Rear Pod



*Scan this code for immediate access to the SP-BTB Spec Sheet

6-3 Replacement Parts 400, 500, 600 amp with 0 Series Large Curved Handles with blue trigger

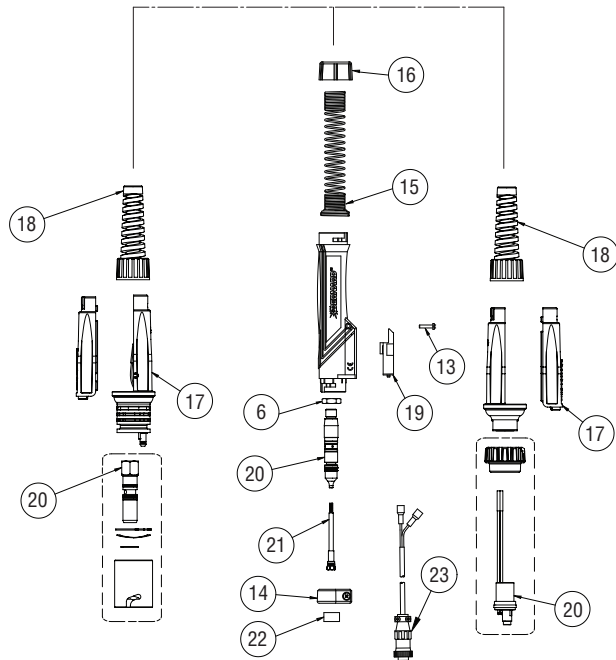
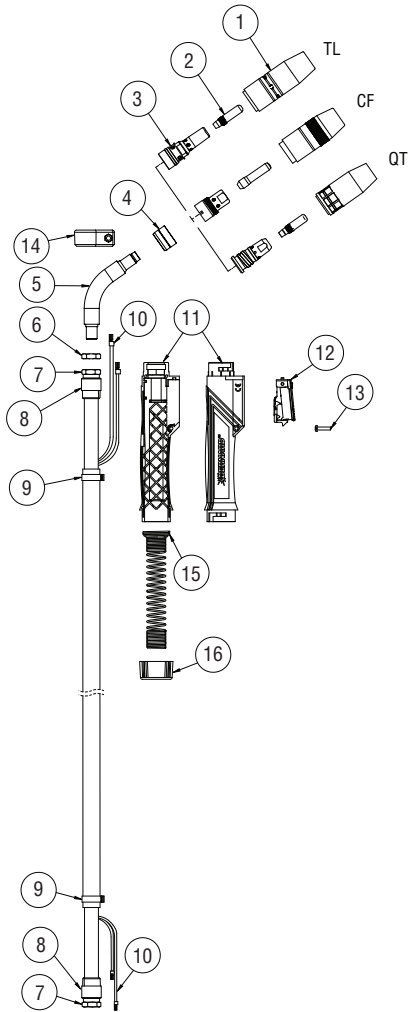


ITEM #	PART #			DESCRIPTION
	Q40/S40	Q50/S50	Q60/S60	
1	401-6-62	N/A	N/A	Nozzle, TOUGH LOCK™ Standard Duty
	401-6-62	401-5-62	401-5-75	Nozzle, TOUGH LOCK Heavy Duty
	N-5818C	N-5814C	N-3414C	Nozzle, Centerfire™ "N" Series
	N1C58Q	N1C34HQ	N1C34HQ	Nozzle, Quik Tip™ Series
2	See Section 7			Contact Tip, TOUGH LOCK Standard Duty
	See Section 7			Contact Tip, TOUGH LOCK Heavy Duty
	See Section 7			Contact Tip, Centerfire
	See Section 7			Contact Tip, Quik Tip
3	404-18	N/A	N/A	Retaining Head, TOUGH LOCK Standard Duty
	404-26			Retaining Head, TOUGH LOCK Heavy Duty
	D-1			Gas Diffuser, Centerfire
	D118Q	D114Q		Gas Diffuser, Quik Tip
4	See SP-BTB Spec Sheet*			Neck Insulator
5	See SP-BTB Spec Sheet*			Neck
6	See SP-BTB 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 4993	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, 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 Assembly, Dual Schedule (Includes: Switch, Housing, & Screws)
12	177272H			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	177271H			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 (4 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 SP-BTB Spec Sheet*			Power Pin
22	See SP-BTB Spec Sheet*			Power Pin Insulator
23	See SP-BTB Spec Sheet*			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



*Scan this code for immediate access to the SP-BTB Spec Sheet

6-4 Replacement Parts 200, 300 amp with T Series Small Straight Handle with black trigger

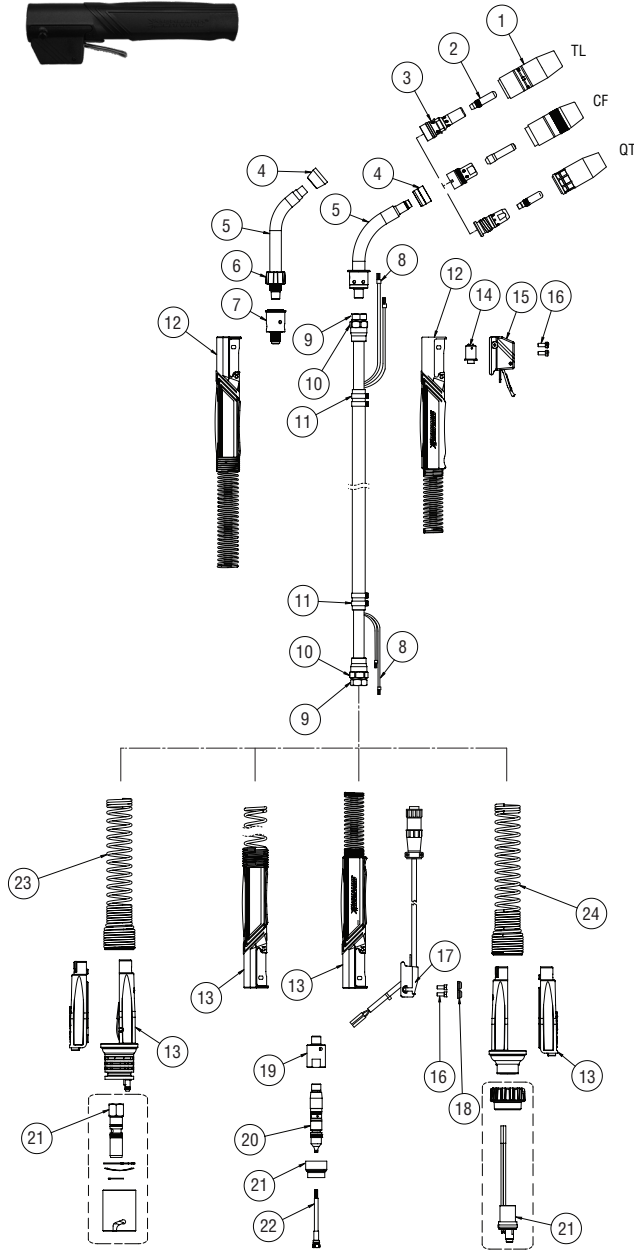


ITEM #	PART #	DESCRIPTION
	Q20/Q30	
1	401-4-62	Nozzle, TOUGH LOCK™ Standard Duty
	401-6-62	Nozzle, TOUGH LOCK™ Heavy Duty
	NS-5818C	Nozzle, Centerfire™ "N" Series
	N1C58Q	Nozzle, Quik Tip™ Series
2	See Section 7	Contact Tip, TOUGH LOCK Standard Duty
	See Section 7	Contact Tip, TOUGH LOCK Heavy Duty
	See Section 7	Contact Tip, Centerfire
	See Section 7	Contact Tip, Quik Tip
3	404-18	Retaining Head, TOUGH LOCK Standard Duty
	404-26	Retaining Head, TOUGH LOCK Heavy Duty
	DS-1	Gas Diffuser, Centerfire
	D118Q	Gas Diffuser, Quik Tip
4	See SP-BTB Spec Sheet*	Neck Insulator
5	See SP-BTB 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 (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 and (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 Spec Sheet*	Power Pin
21	See SP-BTB Spec Sheet*	Liner
22	See SP-BTB Spec Sheet*	Power Pin Insulator
23	See SP-BTB Spec Sheet*	Trigger Control Plug Assembly



*Scan this code for immediate access to the SP-BTB Spec Sheet

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

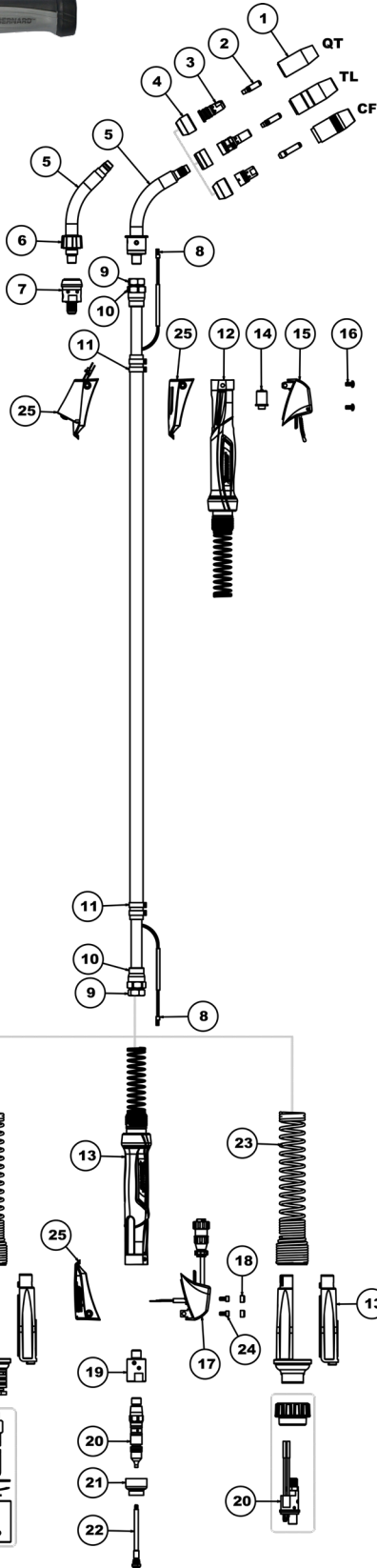


ITEM #	PART #				DESCRIPTION
	Q30/S30	Q40/S40	Q50	Q60	
1	401-4-62	401-6-62	N/A		Nozzle, TOUGH LOCK™ Standard Duty
	401-6-62		401-5-62	401-5-75	Nozzle, TOUGH LOCK™ Heavy Duty
	NS-5818C	N-5818C	N-5814C	N-3414C	Nozzle, Centerfire™ "N" Series
	N1C58Q		N1C34HQ	N1C34HQ	Nozzle, Quik Tip™ Series
2	<i>See Section 7</i>				Contact Tip, TOUGH LOCK Standard Duty
	<i>See Section 7</i>				Contact Tip, TOUGH LOCK Heavy Duty
	<i>See Section 7</i>				Contact Tip, Centerfire
	<i>See Section 7</i>				Contact Tip, Quik Tip
3	404-18		N/A		Retaining Head, TOUGH LOCK Standard Duty
	404-26				Retaining Head, TOUGH LOCK Heavy Duty
	DS-1	D-1			Gas Diffuser, Centerfire
	D118Q		D114Q		Gas Diffuser, Quik Tip
4	<i>See SP-BTB Spec Sheet*</i>				Neck Insulator, TOUGH LOCK
	<i>See SP-BTB Spec Sheet*</i>				Neck Insulator, Centerfire
	<i>See SP-BTB Spec Sheet*</i>				Neck Insulator, Quik Tip
5	<i>See SP-BTB Spec Sheet*</i>				Neck
6	1840057				Rotatable Nut Cover
7	1680085				Rotatable Neck Adapter
8	412-1				Switch Connector (4 Req'd)
9	Q30 308	Q40 408T	608-1		End Fitting
	S30 1680090	S40 1680090			
10	Q30 509	Q40 409	509	609	Cone Nut
	S30 CB9200	S40 CB9201			
11	Q30 4939	Q40 4939	4944		Jacket Clamp
	S30 407709-013	S40 407709-013			
NS	Q30 4992	Q40 4992	4993		Conduit Clamp
	S30 N/A	S40 N/A			
NS	Q30 1880261	Q40 1880263	513-8		Cable Repair Kit (Includes: (2) #8, (1) #9, (1) #10, (1) #11, (1) Conduit Clamp)
	S30 N/A	S40 N/A			
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 (D/S)
	411-13				Trigger Housing, Dual Schedule w/ Locking
16	411-3M				Screw, Trigger Housing (2 Req'd)
17	1810052				Trigger Control Plug Terminal
	1810054				Trigger Control Plug Terminal, Dual Schedule
18	1620004				Screw Cover, Rear Housing
19	414-400				Adapter Block
20	<i>See SP-BTB Spec Sheet*</i>				Power Pin
21	<i>See SP-BTB Spec Sheet*</i>				Power Pin Insulator
22	<i>See SP-BTB Spec Sheet*</i>				Liner
23	Q30 2520041	Q40 2520041	2520041		Spring, Strain Relief
	S30 2520056	S40 2520056			



*Scan this code for immediate access to the SP-BTB Spec Sheet

6-6 Replacement Parts 300, 400, 500 amp with C Series Large Straight Handles with black trigger



ITEM #	PART #			DESCRIPTION	
	Q20	Q30/S30	Q40/S40		Q50
1		401-6-62		N/A	Nozzle, TOUGH LOCK™ Standard Duty
		401-5-62	401-6-62	401-5-62	Nozzle, TOUGH LOCK™ Heavy Duty
		NS-5818C	N-5818C	N-5814C	Nozzle, Centerfire™ "N" Series
		N1C58Q		N1C34HQ	Nozzle, Quik Tip™ Series
2	See Section 7				Contact Tip, TOUGH LOCK Standard Duty
	See Section 7				Contact Tip, TOUGH LOCK Heavy Duty
	See Section 7				Contact Tip, Centerfire
	See Section 7				Contact Tip, Quik Tip
3	404-18			N/A	Retaining Head, TOUGH LOCK Standard Duty
	404-26				Retaining Head, TOUGH LOCK Heavy Duty
	DS-1		D-1		Gas Diffuser, Centerfire
	D118Q		D114Q		Gas Diffuser, Quik Tip
4	See SP-BTB Spec Sheet*				Neck Insulator
5	See SP-BTB Spec Sheet*				Neck
6	1840057				Rotatable Nut Cover
7	1680085C				Rotatable Neck Adaptor, Continuum
8	412-1				Switch Connector (4 Req'd)
9	308	Q30 308	Q40 408T	608-1	End Fitting
		S30 1680090	S40 1680090		
10	509	Q30 509	Q40 409	509	Cone Nut
		S30 CB9200	S40 CB9201		
11	4939	Q30 4939	Q40 4939	4944	Jacket Clamp
		S30 407709-013	S40 407709-013		
NS	4992	Q30 4992	Q40 4992	4993	Conduit Clamp
		S30 N/A	S40 N/A		
NS	1880261	Q30 1880261	Q40 1880263	513-8	Cable Repair Kit (Includes: (2) #8, (1) #9, (1) #10, (1) #11, (1) Conduit Clamp)
		S30 N/A	S40 N/A		
12	1780086				Front Handle
13	1780086				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	2690077				Trigger Housing, Standard
	2690088				Trigger Housing, Dual Pull
16	2280064				Screw, Trigger Housing
17	1810055				Trigger Control Plug
	1810058				Trigger Control Plug, Dual Schedule
18	1620006				Screw Cover, Rear Housing
19	414-400C				Adaptor Block
20	See SP-BTB Spec Sheet*				Power Pin
21	See SP-BTB Spec Sheet*				Power Pin Insulator
22	See SP-BTB Spec Sheet*				Liner
23	2520041	Q30 2520041	Q40 2520041	2520041	Spring, Strain Relief
		S30 2520056	S40 2520056		
24	2280071				Screw, Rear Housing
25	1810046				Top Housing, Standard
	2690082				Top Housing, Insight™ Limited
	2690083				Top Housing, Dual Schedule

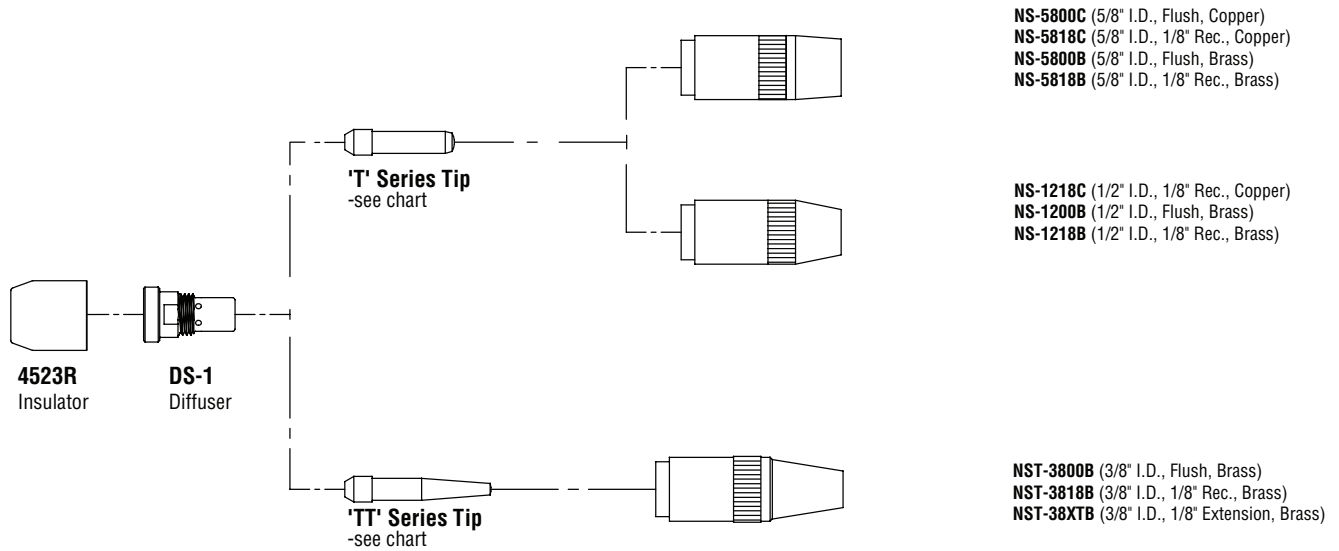


*Scan this code for immediate access to the SP-BTB Spec Sheet

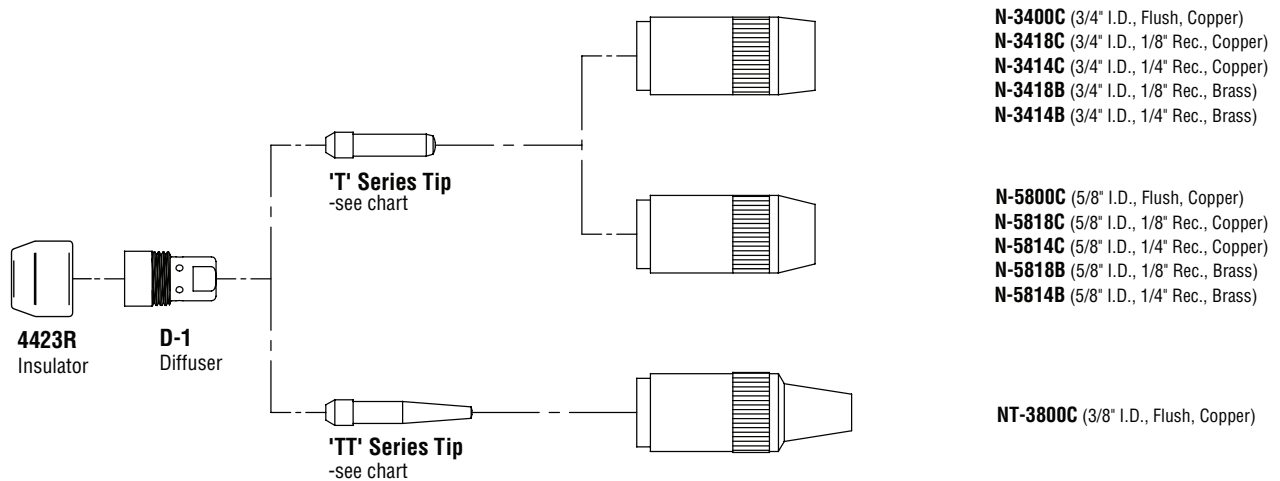
SECTION 7 - CONSUMABLE PARTS

7-1 Centerfire™ Consumable Series

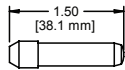
Small Centerfire Gas Diffusers and Nozzles

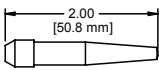


Large Centerfire Gas Diffusers and Nozzles



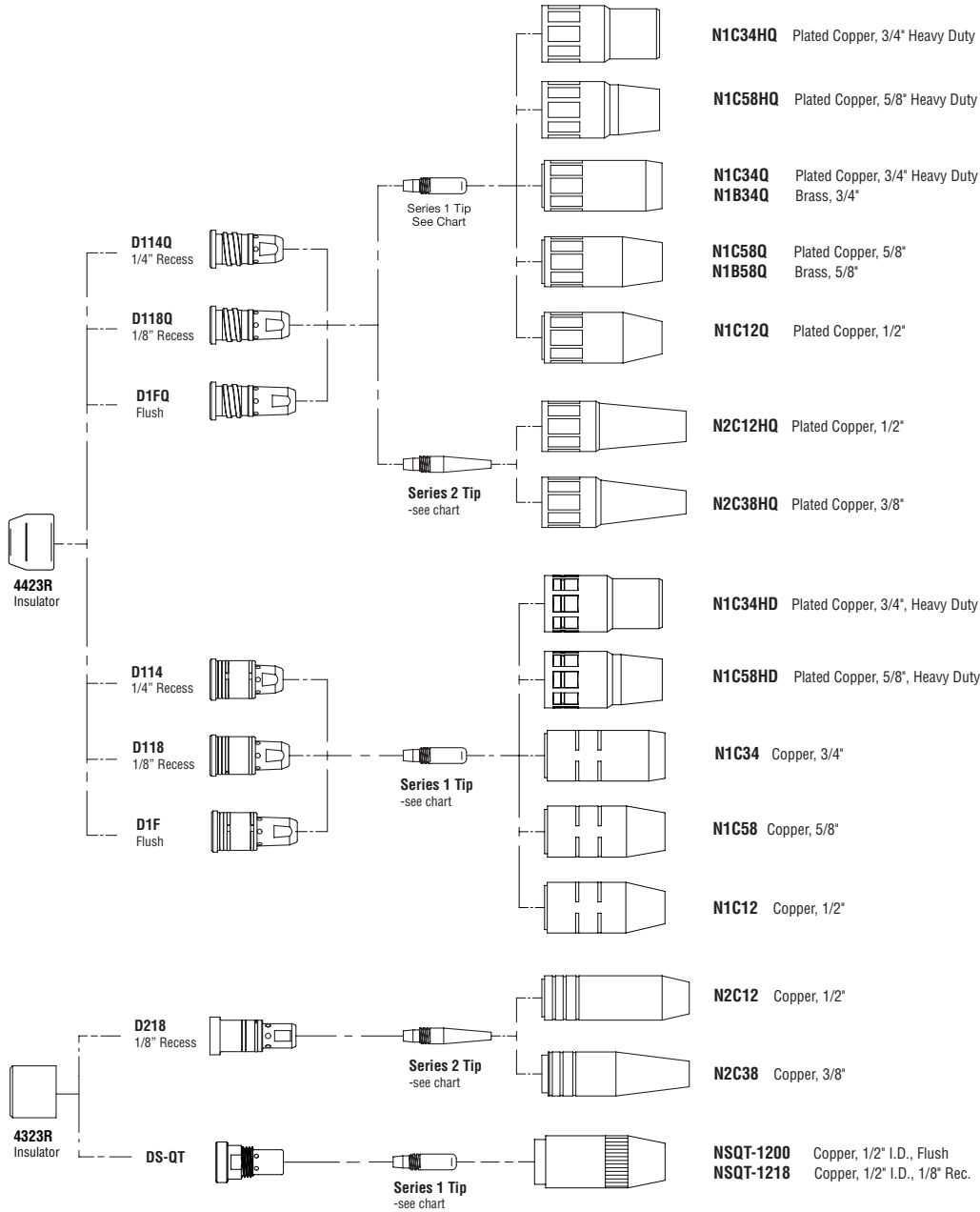
Centerfire Contact Tips

 'T' Series Tip	
T-023	.023" (.6 mm)
T-030	.030" (.8 mm)
T-035	.035" (.9 mm)
T-039	.039" (1.0 mm)
T-045	.045" (1.2 mm)
T-052	.052" (1.4 mm)
T-062	1/16" (1.6 mm)
T-072	.072" (1.8 mm)
T-078	5/64" (2.0 mm)
T-094	3/32" (2.4 mm)
T-109	7/64" (2.8 mm)
T-125	1/8" (3.2 mm)

 'TT' Series Tip	
TT-023	.023" (.6 mm)
TT-030	.030" (.8 mm)
TT-035	.035" (.9 mm)
TT-039	.039" (1.0 mm)
TT-045	.045" (1.2 mm)
TT-052	.052" (1.4 mm)
TT-062	1/16" (1.6 mm)

7-2 Quik Tip™ Consumable Series

Quik Tip Gas Diffusers and Nozzles



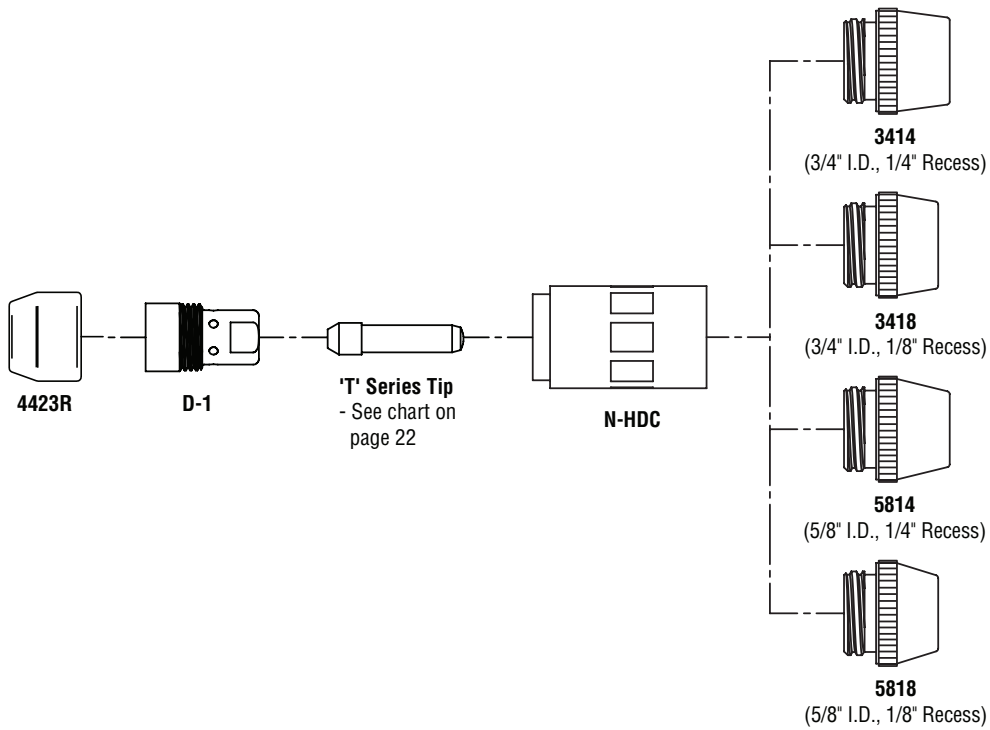
Quik Tip Contact Tips

Series 1 Tip	
T1023	.023" (.6 mm)
T1030	.030" (.8 mm)
T1035	.035" (.9 mm)
T1039	.039" (1.0 mm)
T1045	.045" (1.2 mm)
T1052	.052" (1.4 mm)
T1116	1/16" (1.6 mm)
T1068	.068" (1.7 mm)
T1072	.072" (1.9 mm)
T1564	5/64" (2.0 mm)
T1332	3/32" (2.4 mm)
T1764	7/64" (2.8 mm)
T1118	1/8" (3.2 mm)
T1364	3/64" (1.2 mm)

Series 2 Tip	
T2023	.023" (.6 mm)
T2030	.030" (.8 mm)
T2035	.035" (.9 mm)
T2045	.045" (1.2 mm)
T2364	3/64" (1.2 mm)
T2052	.052" (1.4 mm)
T2116	1/16" (1.6 mm)

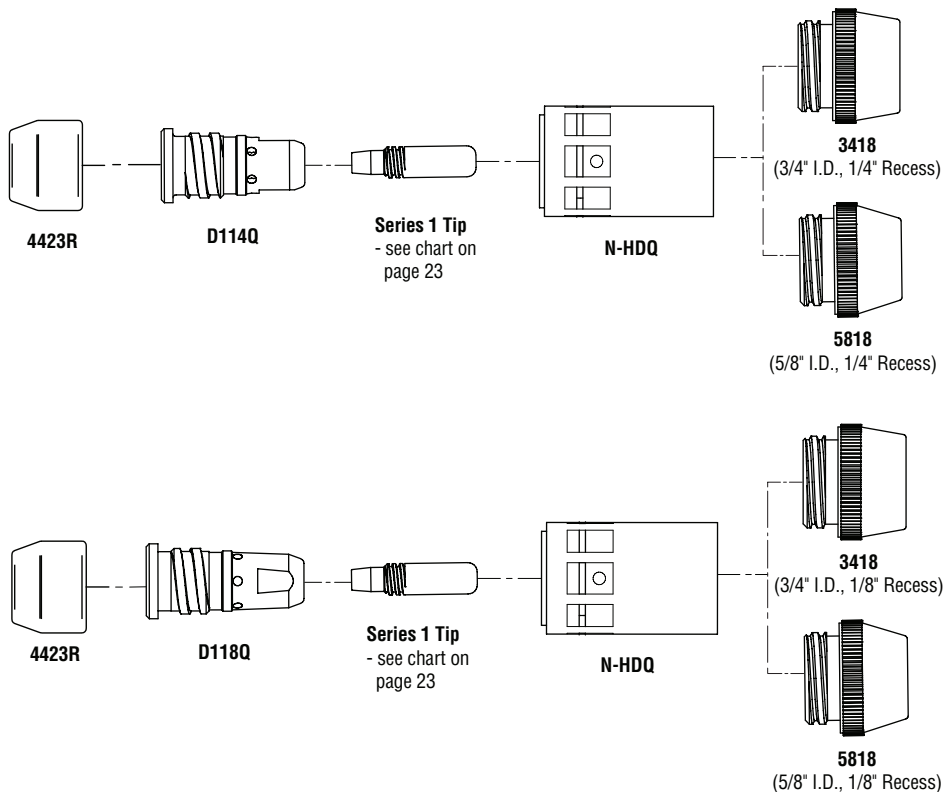
7-3 Centerfire™ HD Consumable Series

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.



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 a Quik Tip HD nozzle cone to form a complete Quik Tip HD nozzle.



7-5 TOUGH LOCK™ Consumable Series

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
0.040" (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

TOUGH LOCK RETAINING HEAD PART NUMBERS

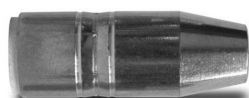
DESCRIPTION	SINGLE TAPER PART NUMBER	DUAL TAPER PART NUMBER	QTY
Heavy Duty	404-20-25	404-26-25	25
Heavy Duty	404-20	404-26	100
Heavy Duty	404-20-250	404-26-250	250
Standard Duty	404-14-25	404-18-25	25
Standard Duty	404-14	404-18	100
THREAD-ON RETAINING HEADS FOR NEW STYLE THREAD-ON NOZZLES			
Heavy Duty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

TOUGH LOCK NOZZLE PART NUMBERS

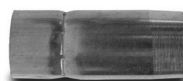
PART NUMBER	NOZZLE TYPE	BORE	TYPE	MATERIAL	O.D.	LENGTH	RECESS	QTY
401-6-50	Heavy Duty	1/2"	B	Copper	1.062"	2.88"	1/8" Recess	10
401-48-62	Heavy Duty	5/8"	A	Copper	1.062"	2.76"	Flush	10
401-5-62	Heavy Duty	5/8"	B	Copper	1.062"	3.00"	1/4" Recess	10
401-6-62	Heavy Duty	5/8"	B	Copper	1.062"	2.88"	1/8" Recess	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	1.162"	2.63"	1/8" Stick-Out	10
401-87-62	Heavy Duty	5/8"	B	Brass	1.162"	2.63"	1/8" Stick-Out	10
401-5-75	Heavy Duty	3/4"	B	Copper	1.162"	3.00"	1/4" Recess	10
401-6-75	Heavy Duty	3/4"	B	Copper	1.162"	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



A. BOTTLENECK



B. TAPER



C. STRAIGHT

SECTION 8 - TROUBLESHOOTING

8-1 Troubleshooting Table

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
1. Electrode does not feed	<ol style="list-style-type: none"> 1. Feeder relay. 2. Broken control lead. 3. Poor adaptor connection. 4. Worn or broken switch. 5. Improper drive roll size. 6. Drive roll tension misadjusted. 7. Burn back to contact tip. 8. Wrong size liner. 9. Buildup inside of liner. 	<ol style="list-style-type: none"> 1. Consult feeder manufacturer. 2. a. Test & connect spare control lead. b. Install new cable. 3. Test & replace leads and/or contact pins. 4. Replace. 5. Replace with proper size. 6. Adjust tension at feeder. 7. See 'Contact Tip Burn Back'. 8. Replace with correct size. 9. Replace liner, check condition of electrode.
2. Contact tip burn back	<ol style="list-style-type: none"> 1. Improper voltage and/or wire feed speed. 2. Erratic wire feeding. 3. Improper tip stickout. 4. Improper electrode stickout. 5. Faulty ground. 	<ol style="list-style-type: none"> 1. Set parameters. 2. See 'Erratic Wire Feeding'. 3. Adjust nozzle/tip relationship. 4. Adjust gun to base metal relationship. 5. Replace cables and/or connections.
3. Tip disengages from gas diffuser	<ol style="list-style-type: none"> 1. Worn gas diffuser/retaining head. 2. Improper tip installation. 3. Extreme heat or duty cycle. 	<ol style="list-style-type: none"> 1. Replace tip and/or gas diffuser/retaining head. 2. Install as per 'Changing Consumables' (Section 5 pg. 11). 3. Replace with heavy duty consumables. See appropriate spec sheet for details.
4. Short contact tip life	<ol style="list-style-type: none"> 1. Contact tip size. 2. Electrode eroding contact tip. 3. Exceeding duty cycle. 	<ol style="list-style-type: none"> 1. Replace with proper size. 2. Inspect and/or change drive rolls. 3. Replace with properly rated Bernard MIG Gun.
5. Erratic arc	<ol style="list-style-type: none"> 1. Worn contact tip. 2. Buildup inside of liner. 3. Wrong tip size. 4. Not enough bend in neck. 	<ol style="list-style-type: none"> 1. Replace. 2. Replace liner, check condition of electrode. 3. Replace with correct size tip. 4. Replace with 45° or 60° neck.
6. Erratic wire feeding	<ol style="list-style-type: none"> 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. Contact tip. 	<ol style="list-style-type: none"> 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. Stone edge of groove on 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 trimming as per 'Changing the Liner' (Section 5, pg. 11). b. Replace guide tube/liner, trim as close to mating component as possible. 8. Consult feeder manufacturer. 9. Inspect and replace.*

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
7. Extreme spatter	1. Improper machine parameters. 2. Improper tip installation. 3. Improper shielding. 4. Contaminated wire or work piece.	1. Adjust parameters. 2. Adjust nozzle/tip relationship. 3. a. Verify shielding gas coverage. b. Verify gas mixture. 4. Clean wire and work piece.
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. 3. Replace with heavy duty consumables. 4. Replace solenoid. 5. a. Install full tanks. b. Check supply. c. Hose leaks. 6. Adjust. 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 & cable connections to specified torque. See 'Replacement' (Section 5).
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 & cable connections to specified torque. See 'Replacement' (Section 5).
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 feed rolls.	1. *Inspect & replace. 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.

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 BTB MIG Gun Spec Sheet



Scan to view Centerfire™ Consumables Spec Sheet



Scan to view TOUGH LOCK™ Consumables Spec Sheet



Scan to view Quik Tip™ Consumables Spec Sheet



Scan to view QUICK LOAD™ Liners & AutoLength™ Pins Spec Sheet



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