

TECHNICAL GUIDE

For TOUGH GUN™ Robotic Water-Cooled Quick-Change MIG Guns 450 amp | 650 amp

- SAFETY & WARRANTY INFORMATION
- INSTALLATION
- MAINTENANCE GUIDE
- TECHNICAL DATA
- OPTIONS
- EXPLODED VIEW & PARTS LIST
- TROUBLESHOOTING
- ORDERING INFORMATION

Effective July 2011 –
**QUICK LOAD™ Liners Standard
on all TOUGH GUN™ Robotic MIG Guns**

Certified ISO 9001:2008
Please read instructions prior to use.
Save this manual for future reference.

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THANK YOU...

...for selecting a Tregaskiss TOUGH GUN™ Robotic Water-Cooled MIG Gun. Manufacturing operations demand extremely dependable robotic equipment. With this in mind, the TOUGH GUN MIG Gun was designed and engineered to be a reliable tool to support high production within a robotic cell. As the name implies, the TOUGH GUN MIG Gun is made from durable materials and components engineered to perform in a rugged, welding environment.

The instructions and illustrations in this technical guide make it easy for you to maintain your TOUGH GUN MIG Gun. **Please read, understand, and follow all safety procedures.** Keep this Technical Guide booklet as a handy reference when ordering complete guns, parts and special options. **For technical support and special applications, please call the Tregaskiss Technical Service Department at 1-855-MIGWELD (644-9353) or fax 1-877-737-2111.** Our trained technicians are available between 8:00 a.m. and 5:00 p.m. EST, and will answer your application or repair questions.

Tregaskiss employees build TOUGH GUN MIG Guns for the world’s welding professionals. We are always striving to improve our products and services, and would appreciate receiving your suggestions or comments. Please contact us immediately if you experience any safety or operating problems.

WARRANTY

Product is warranted to be free from defects in material and workmanship for the period specified below after the sale by an authorized Buyer. Should there be a defect please refer to our Return Merchandise Policy.

PRODUCT	WARRANTY PERIOD
TOUGH GUN™ Robotic MIG Guns	180 days
TOUGH GUN Reamer	1 year
TOUGH GARD™ Spatter Cleaner	1 year
TOUGH GUN Robotic Peripherals (Clutch, Sprayer, Wire Cutter, Mounting Arms)	1 year
Low-Stress Robotic Unicables (LSR Unicables)	2 years

Tregaskiss 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.

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

Genuine Tregaskiss 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 Tregaskiss personnel.

GENERAL SAFETY

Before installation or operation of TOUGH GUN ROBOTIC MIG GUNS, please read the safety precautions listed below.

Before installation or operation of TOUGH GUN MIG Guns, please read the safety precautions listed below.

1. Always wear a properly fitted welding helmet with the proper grade of filter plate and suitable welding gloves. All exposed skin should be covered with flame resistant, protective clothing. **DO NOT WEAR CLOTHING MADE FROM FLAMMABLE SYNTHETIC FIBERS.**
2. Protective screens or barriers should be used to protect others from spatter, flash and glare while welding.
3. Prevent fires by ensuring that hot slag or sparks do not contact combustible solids, liquids or gases.
4. Ensure that operator's head is not too close to the arc and that adequate ventilation is available.
5. Constant repetitive motion may lead to cumulative trauma disorders.
6. Do not touch live electrical parts. The following should be checked to prevent electrical shock.
 - a. Equipment is adequate for the job, properly grounded and installed according to code.
 - b. Faulty or damaged equipment is repaired or replaced.
 - c. Proper operator maintenance is performed to prevent excess spatter accumulation in the nozzle, or the contact tip or other areas of the gun.
 - d. Electrical insulating components are in place and not damaged. Repair or replace if necessary.
 - e. Operator and his surroundings are not wet.
 - f. Cables are not wrapped around operator's body.
 - g. Equipment is off when not in use.
7. CSA Standard W117.2 CODE FOR SAFETY IN WELDING AND CUTTING obtainable from the Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.
8. ANSI Standard Z49.1 CODE FOR SAFETY IN WELDING AND CUTTING obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

CALIFORNIA PROPOSITION 65 WARNING

This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer.

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

(California Health & Safety Code Section 25249.5 at seq.)

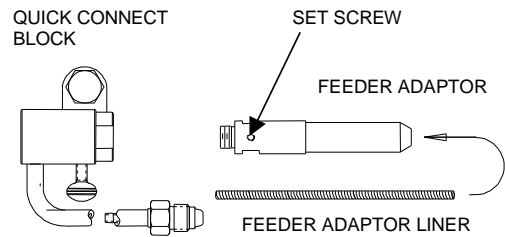


1.0 – INSTALLATION

1.1 INSTALLING QUICK CONNECT BLOCK TO FEEDER

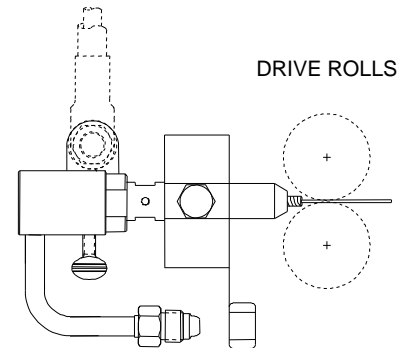
STEP #1

- Insert the correct feeder adaptor liner for desired wire diameter (2 provided) flush with the threaded end of the feeder adaptor.
- Tighten set screw.
- Thread feeder adaptor into Quick Connect block and tighten.



STEP #2

- Position assembly into feeder adaptor and trim liner within 1/16" (1.6 mm) of the drive rolls and remove burrs if necessary.
- Secure assembly into feeder.
- Thread gas hose nipple into feeder gas fitting.
- Connect power cable to 1/2" (13 mm) power bolt with appropriate lug.
- **Tighten all connections.**
- Feed welding wire through assembly by hand and tighten drive rolls.

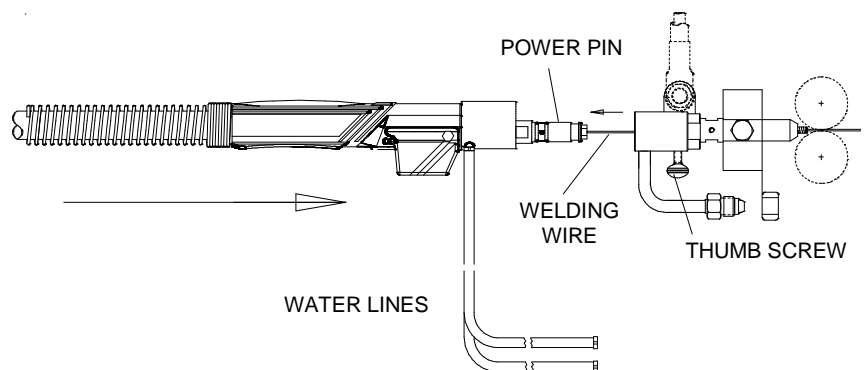


1.2 INSTALLING GUN TO QUICK CONNECT BLOCK

Ensure correct liner and contact tip are utilized. Examine and replace power pin o-rings if necessary.

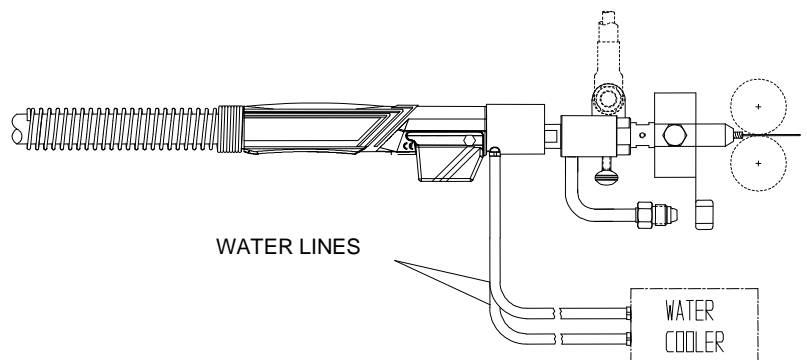
STEP #1

- Guide welding wire into power pin.
- Insert power pin to shoulder.
- Tighten thumb screw securely.



STEP #2

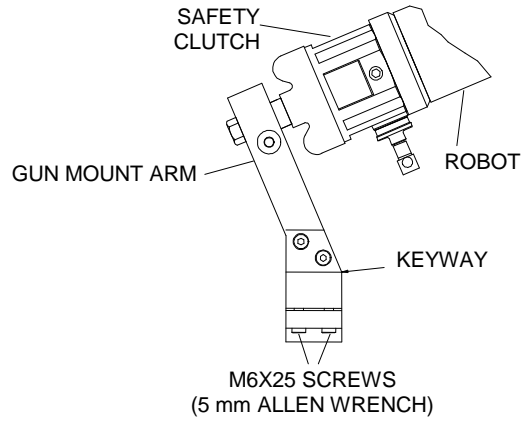
- Securely clamp blue hose on rear housing to "Water Out" on water cooler and red hose on rear housing to "Water In" on water cooler.
- **WARNING:** Ensure water supply is on before operation.
- Water flow sensor should be used to ensure water is on.
- Recheck the following: proper gas flow, drive roll pressure, and voltage and wire feed speed.



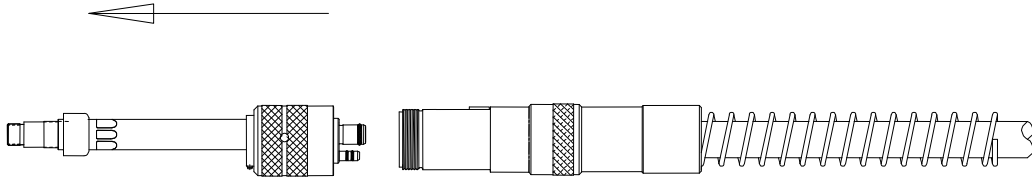
1.3 INSTALLING GUN TO GUN MOUNT ARM

STEP #1

- With arm mounted to robot, loosen the two screws on gun mount arm with a 5 mm Allen wrench.



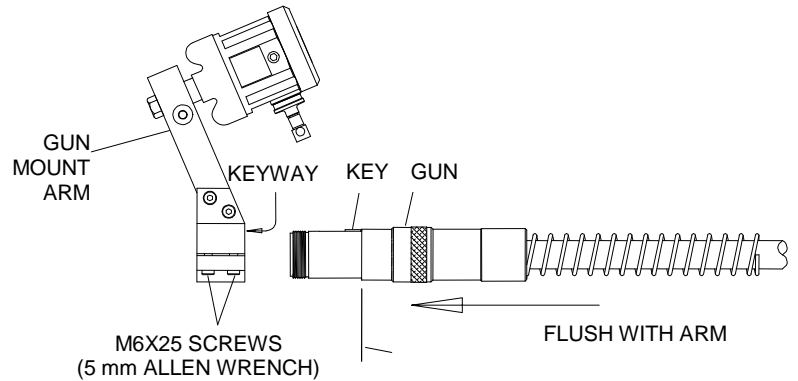
STEP #2



- Remove neck from gun (See **Section 2.2 NECK REPLACEMENT**).

STEP #3

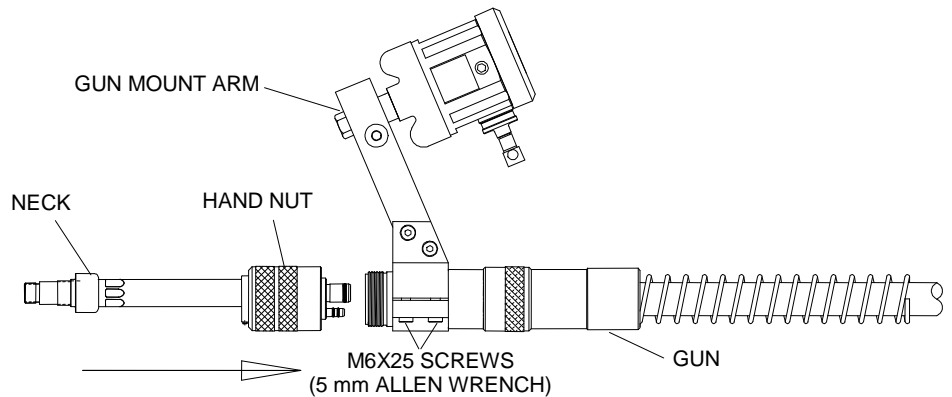
- Insert gun into opening of gun mount arm. Ensure that key on gun housing is lined up with and fully inserted into keyway in gun mount arm.



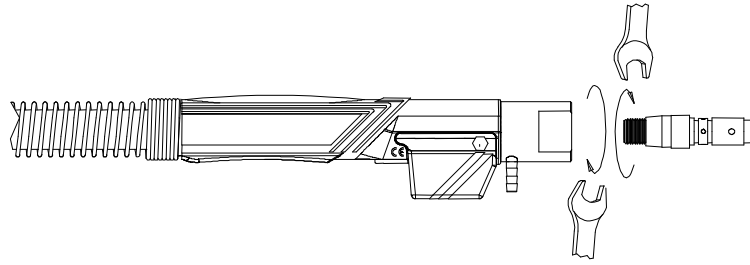
STEP #4

- Tighten two screws on gun mount arm with 5 mm Allen wrench.
- Insert neck back into gun and tighten hand nut with spanner wrench, by turning clockwise until neck is secure in assembly.

SPANNER WRENCH



1.4 INSTALLING TOUGH GUN™ MIG GUNS EQUIPPED WITH “DIRECT PLUG-INS”



IMPORTANT: The thread-in two-piece power pin incorporates a taper to seat and lock in the power pin to the rear handle block. Make sure power pin is tightened in the block with a wrench to insure pin is secure and will not come loose.

NOTE: The rear handle and screws do not have to be removed when installing the two-piece power pins.

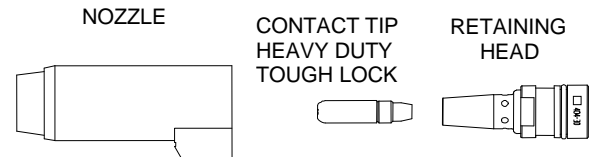
- Thread power pin into the rear handle block.
- Tighten the power pin into the rear block using a 1 1/4" wrench on the rear block and a 5/8" or 3/4" wrench on the power pin.
- Install liner (See **Section 2.3 / 2.4 LINER REPLACEMENT**).
- Install gun to feeder (See Below).
- **Miller® Power Pin and Lincoln® Power Pin**
 - Insert power pin to shoulder and secure.
 - Insert control plug to control housing of gun.
 - Insert control plug into feeder.
 - Feed welding wire into power pin by hand and tighten drive rolls.
 - On Lincoln® it is necessary to connect gas hose to barbed fitting on power pin.
- **Esab® Power Pin (Non Euro Style)**
 - Insert power pin to shoulder and secure.
 - Feed welding wire into power pin by hand and tighten.

2.0 – MAINTENANCE

2.1 NOZZLE AND CONTACT TIP SYSTEMS

Removal - 650 AMP

- Before removal of nozzle, ensure water supply is turned off. Water can be turned off by removing the neck.
- Flip nozzle clasp from neck and pull nozzle straight off.
- Remove contact tip using pliers.
- Remove retaining head using 1/2" (13 mm) wrench.



Removal - 450 AMP

- Pull slip on nozzles off with a clockwise twisting motion.
- Remove contact tip using pliers.
- Remove retaining head using 1/2" (13 mm) wrench.

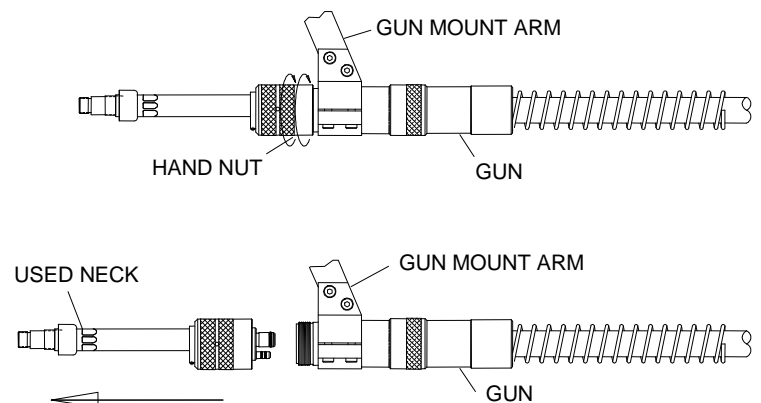
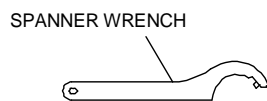


NOTE: Ensure that all parts are tightened before welding and water supply is turned on.

2.2 NECK REPLACEMENT

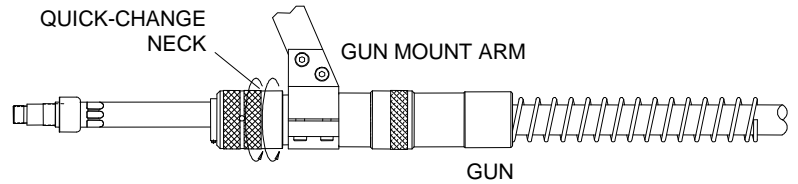
STEP #1

- **NOTE:** Gun does not need to be removed from gun mount arm in order to remove quick-change neck. Water does not need to be turned off for this procedure as internal manifolds will terminate it.
- Turn hand nut on neck approximately 5 turns counterclockwise (until free floating). Use spanner wrench if necessary.
- Pull neck straight out of housing.

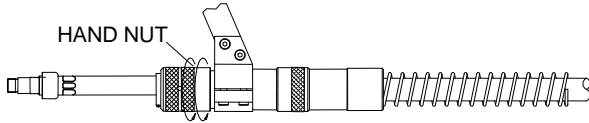


STEP #2

- **NOTE:** To extend life of o-rings, keep sufficiently lubricated.
- Insert neck into connector housing with gas diffuser removed.

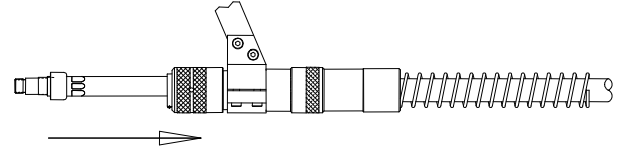


STEP #3



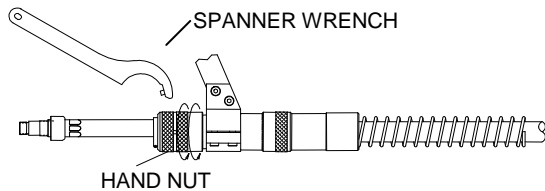
- Thread hand nut 2 to 3 turns.

STEP #4



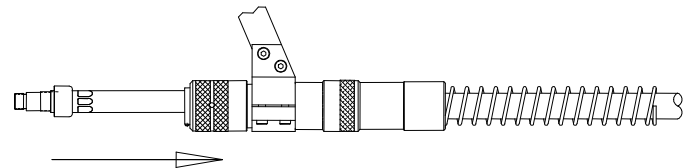
- Push neck to ensure proper seating.

STEP #5



- Push on neck and continue to thread on hand nut until tight, using the supplied spanner wrench.

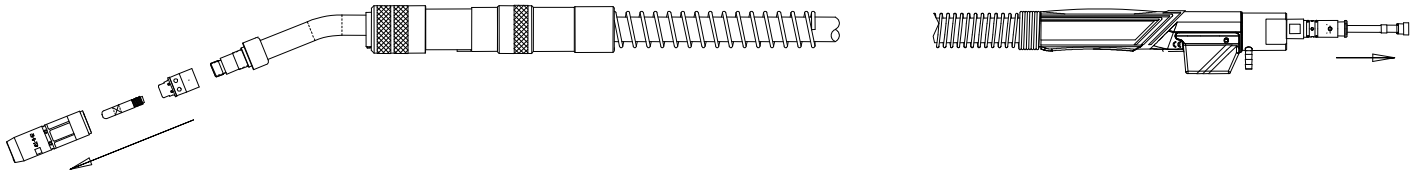
STEP #6



- Push on neck to verify that there is no movement.

2.3 CONVENTIONAL LINER REPLACEMENT

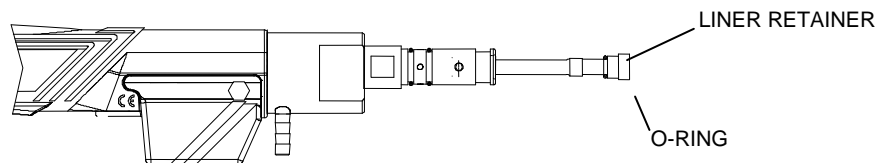
STEP#1



- **NOTE:** Ensure power supply is off and gun is removed from feeder before proceeding.
- Remove nozzle, tip and gas diffuser.
- Using a 10 mm wrench, turn thread-in liner retainer counter-clockwise until liner is free from power pin.
- With gun straightened, grip conduit liner with pliers and remove.

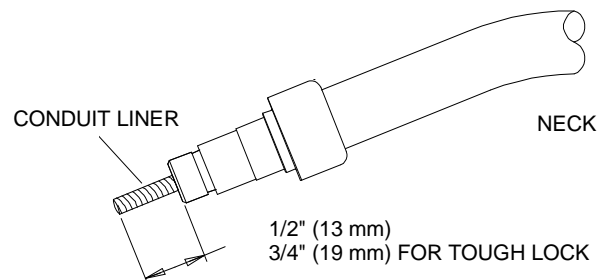
STEP #2

- Feed replacement liner through gun using short strokes to avoid kinking. Twist liner clockwise if necessary.
- Using a 10 mm wrench, turn thread-in liner retainer in a clockwise direction and tighten in power pin.



STEP #3

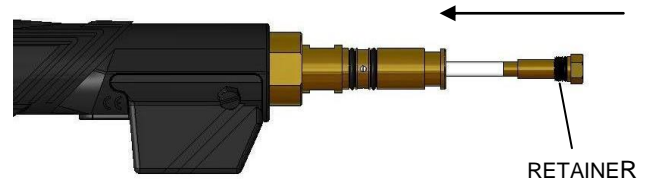
- Trim conduit liner with 1/2" (13 mm) stickout for Conventional retaining heads (3/4" (19 mm) for TOUGH LOCK™ retaining heads).
- Remove any burr that may obstruct wire feed, especially on flat wire type conduit liner.



2.4 QUICK LOAD™ LINER REPLACEMENT

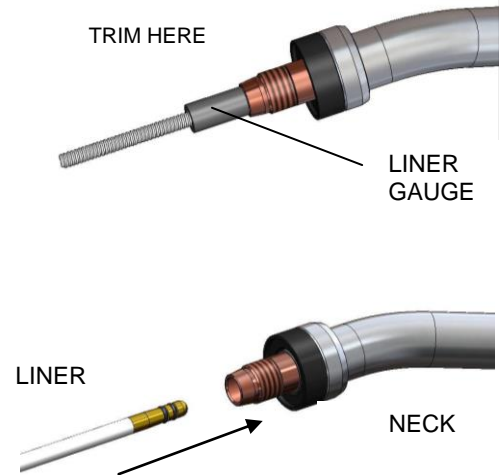
Initial installation – When replacing conventional liner with QUICK LOAD™ Liner:

1. Install the initial QUICK LOAD Liner from the back of the gun with retainer attached (using the same procedure as installing a conventional liner). Future replacements will be done from the front.
2. Push liner back into gun and hold in place. Using liner gauge, trim conduit liner with 3/4" (20 mm) stick out.
3. Feed wire through liner.
4. Reinstall consumables.



Replacement of QUICK LOAD Liner

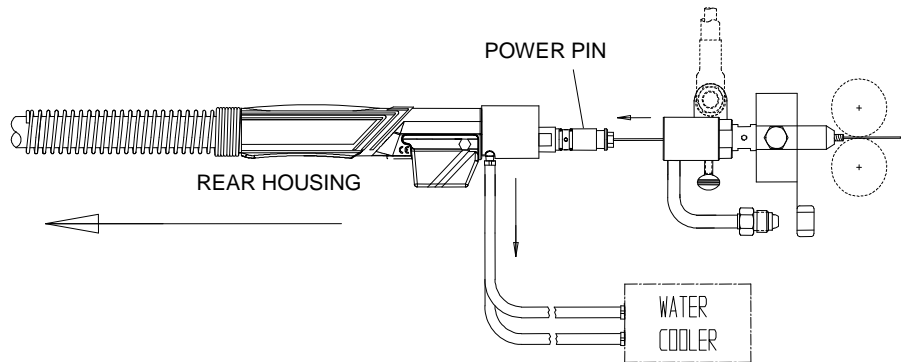
1. Remove consumables (nozzle, contact tip and retaining head).
2. Remove existing QUICK LOAD Liner.
3. Insert the liner through the neck using the wire as a guide. Short strokes will prevent the wire from kinking.
4. Once the liner stops feeding, give it an extra push to ensure it is inserted completely.
5. Using liner gauge, trim conduit liner with 3/4" (20 mm) stick out.
6. Feed wire through liner.
7. Reinstall consumables.



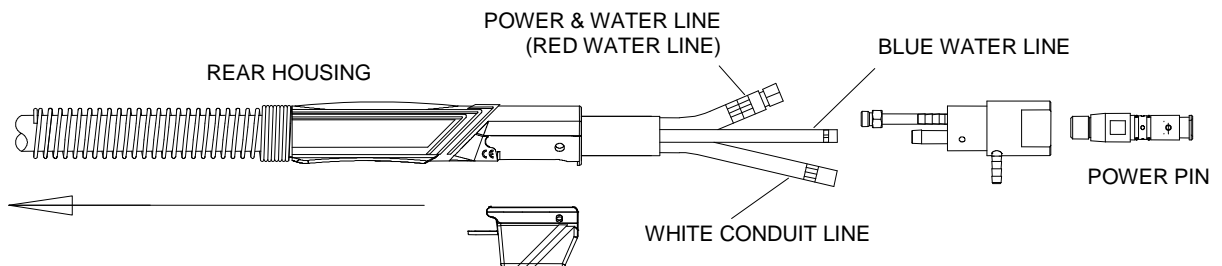
2.5 POWER PIN BLOCK REPLACEMENT

STEP #1

- Remove gun from feeder.
- Remove liner (See **Section 2.3 / 2.4 LINER REPLACEMENT**).



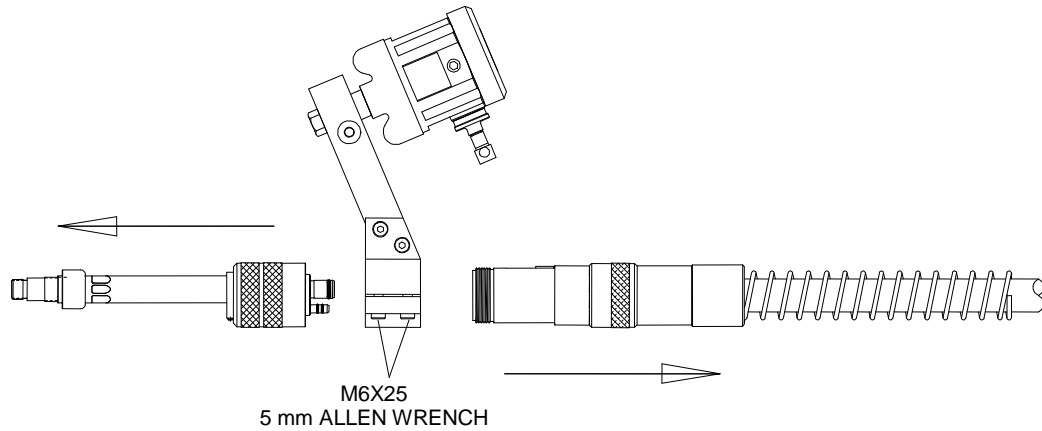
STEP #2



- Slide rear housing back to expose hose connections
- Cut clamps on blue water line and white conduit line at uncable connection and remove lines.
- Unthread red water line connection and remove line.
- Replace used power pin block with new one and repeat steps in reverse order to assemble.

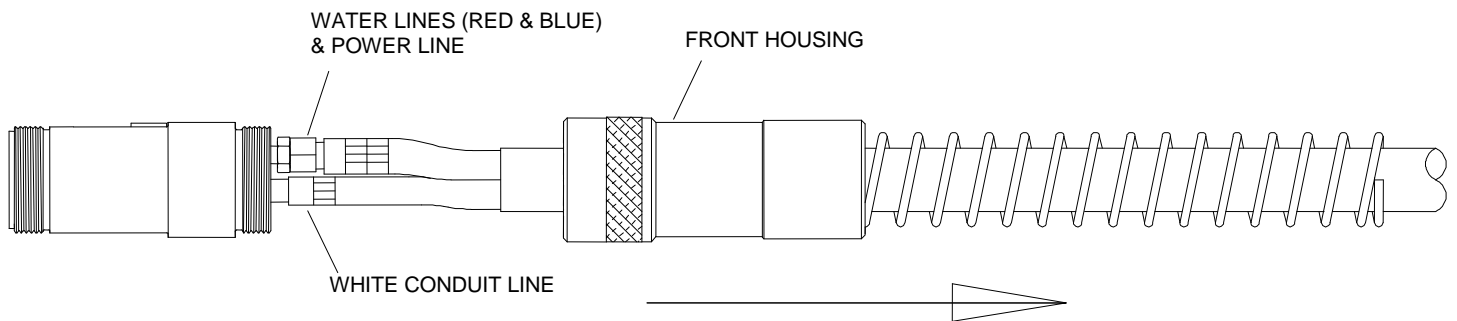
2.6 CABLE BUNDLE REPLACEMENT

STEP #1



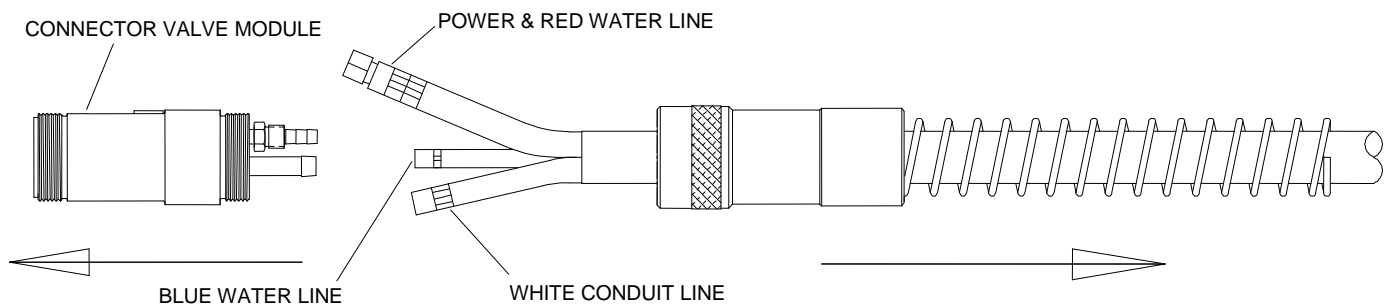
- Remove neck from gun (See **Section 2.2 NECK REPLACEMENT**)
- Loosen two screws on gun mount arm by using a 3/16" Allen wrench and remove gun.
- Remove liner from gun (See **Section 2.3 / 2.4 LINER REPLACEMENT**).

STEP #2



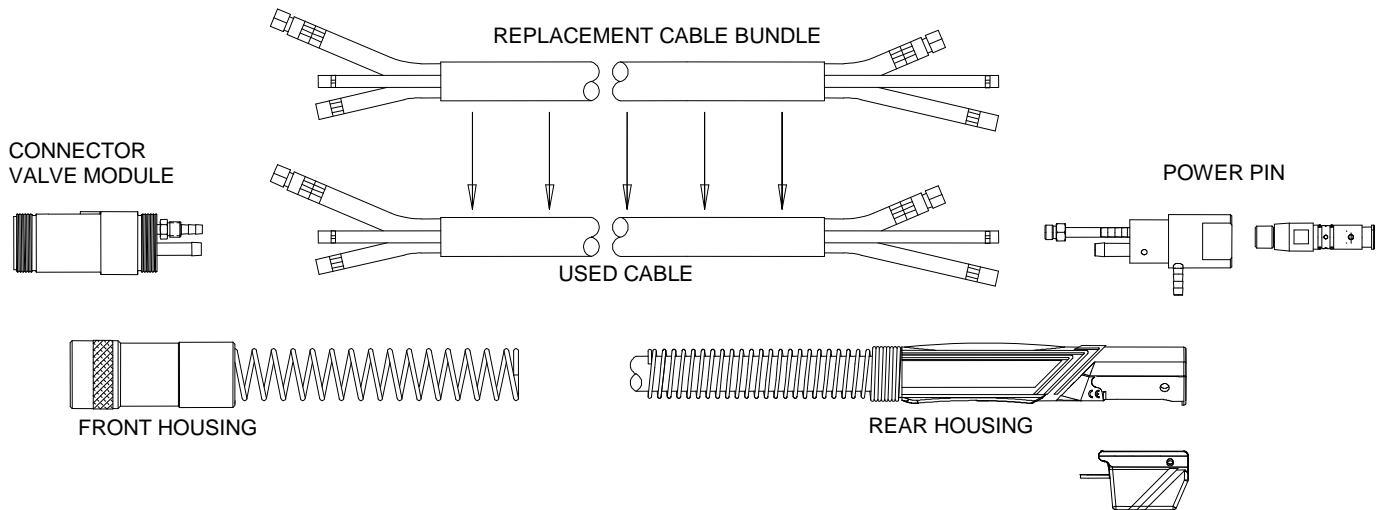
- Remove power pin from uncable (See **Section 2.5 POWER PIN BLOCK REPLACEMENT**).
- Slide front housing back onto uncable to expose water and power line connections.

STEP #3



- Cut blue water line and white conduit line clamps and remove each line from connector valve module.
- Unthread red water line connection and remove line.

STEP #4



- Pull both front housing and rear housing off of cable and replace on new cable.
- Repeat procedure in reverse to assemble gun with new cable.

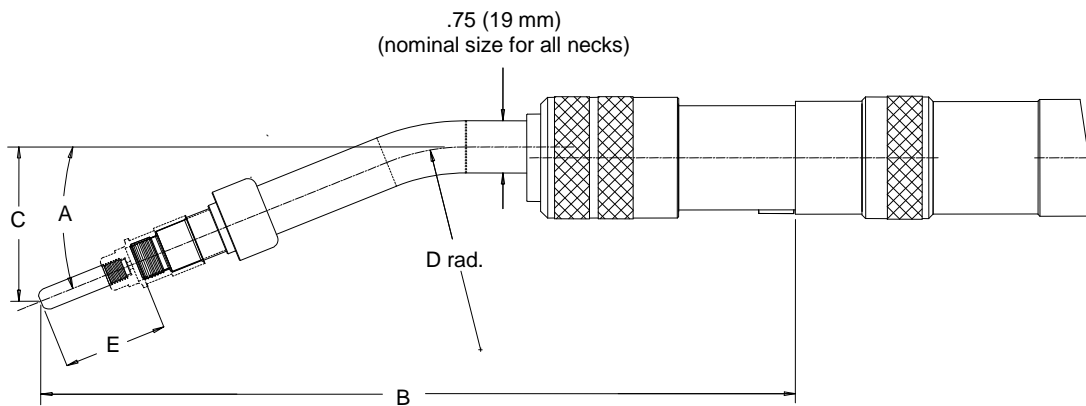
3.0 – TECHNICAL DATA

3.1 GUN AMPERAGE RATINGS

GUN MODEL	60% DUTY CYCLE - MIXED GASES OR 100% DUTY CYCLE - CO ₂
QUICK CHANGE 450	475 amp
QUICK CHANGE 650	650 amp

NOTE: Ratings are based on tests that comply with IEC 60974-7 standards.

3.1 NECK DIMENSIONS

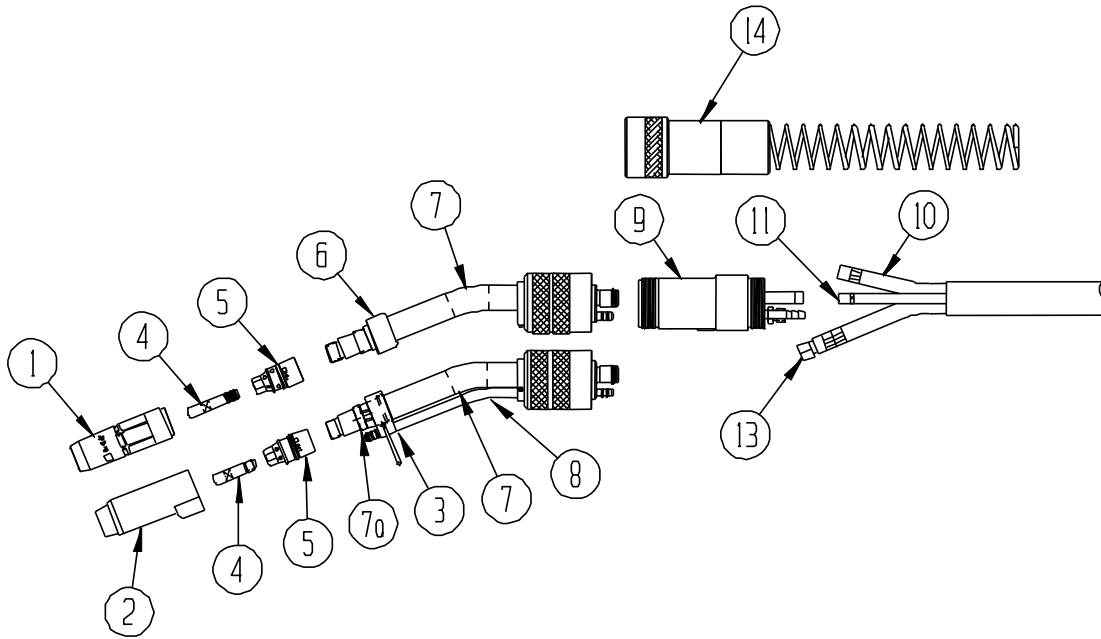


NECK	ANGLE	B		C		D		E	
		INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm
495-180	180°	11.21	284.7	---	---	---	---	1.50	38.1
495-22	22°	10.79	274.1	2.23	56.5	3.00	76.2	1.50	38.1
495-45	45°	9.76	247.9	3.82	97.0	3.00	76.2	1.50	38.1
695-180	180°	11.21	284.7	---	---	---	---	1.50	38.1
695-22	22°	10.79	274.1	2.23	56.5	3.00	76.2	1.50	38.1
695-45	45°	9.76	247.9	3.82	97.0	3.00	76.2	1.50	38.1

4.0 – TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE
POOR WIRE FEED	<ul style="list-style-type: none"> • CONDUIT LINER CLOGGED OR KINKED • INCORRECT LINER SIZE OR CONTACT TIP • LINER CUT TOO SHORT AND NOT SEATING PROPERLY IN GAS DIFFUSER • DRIVE ROLLS TOO TIGHT, RESULTING IN SCORING OF WELDING WIRE • WELDING WIRE DIRTY, RUSTY, OR TOO MUCH CAST
SHORT TIP LIFE	<ul style="list-style-type: none"> • DRIVE ROLLS TOO TIGHT, RESULTING IN SCORING OF WELDING WIRE • WELDING WIRE DIRTY, RUSTY, OR TOO MUCH CAST • UNCOATED WIRE BEING USED, INCREASING USAGE • WRONG TIP SIZE • GUN BEING RUN BEYOND ITS AMPERAGE RANGE
GUN OVERHEATING	<ul style="list-style-type: none"> • LOOSE RETAINING SCREW ON QUICK CONNECT BLOCK • INSUFFICIENT GAUGE POWER CABLE AND/OR GROUND CABLE • GUN IS BEING RUN BEYOND ITS AMPERAGE RANGE • ELECTRICAL MALFUNCTION IN POWER SOURCE
WELD POROSITY	<ul style="list-style-type: none"> • SPATTER BUILT UP IN NOZZLE, BLOCKING GAS • LEAKS IN GAS HOSE OR IMPROPER CONNECTION • O-RINGS ON POWER PIN ARE CUT OR DAMAGED • INNER TUBE LOOSE FROM CONNECTOR CONE • POOR WIRE FEED (SEE ABOVE) • IMPROPER SHIELDING GAS OR WELDING WIRE • RUSTY OR POOR QUALITY WELDING WIRE • PARENT METAL RUSTY OR CONTAMINATED OR HIGH IN SULPHUR CONTENT • GAS FLOW IMPROPERLY SET

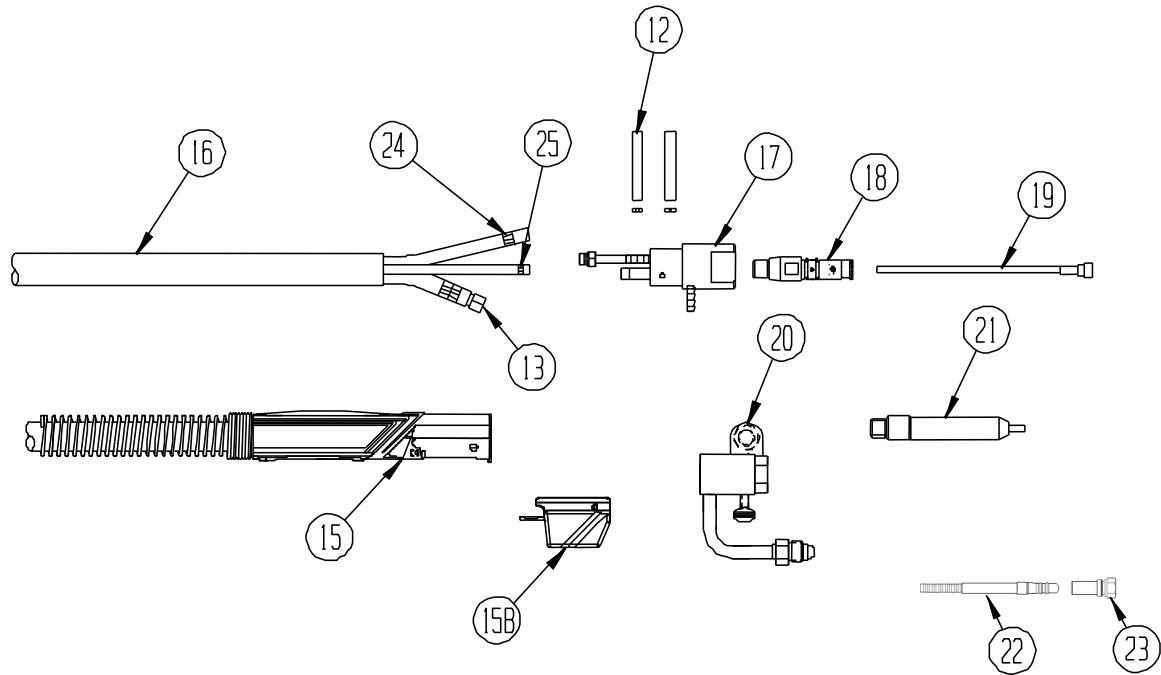
5.0 – EXPLODED VIEW AND PARTS LIST



Numbers in this column correspond to the exploded view images above.

PART #		DESCRIPTION
450 WC	650 WC	
1		STANDARD NOZZLES (SELF - INSULATED) - FOR USE WITH 404-30 RETAINING HEAD ONLY
401-4-38		3/8" (9.5 mm) BORE - FLUSH TIP
401-4-50		1/2" (12.5 mm) BORE - 1/8" (3 mm) TIP RECESS
401-4-62		5/8" (16 mm) BORE - 1/8" (3 mm) TIP RECESS
401-42-50		1/2" (12.5 mm) BORE - 1/8" (3 mm) TIP RECESS
401-48-50		1/2" (12.5 mm) BORE - 1/8" (3 mm) TIP STICKOUT
451-4-38		3/8" (9.5 mm) BORE - 3/16" (5 mm) TIP RECESS
451-5-62		5/8" (16 mm) BORE - 1/4" (6 mm) TIP RECESS
451-5-75		3/4" (19 mm) BORE - 1/4" (6 mm) TIP RECESS
451-6-50		1/2" (12.5 mm) BORE - 1/8" (3 mm) TIP RECESS
451-6-62		5/8" (16 mm) BORE - 1/8" (3 mm) TIP RECESS
451-6-75		3/4" (19 mm) BORE - 1/8" (3 mm) TIP RECESS
451-8-62		5/8" (16 mm) BORE - 1/8" (3 mm) TIP STICKOUT
		HEAVY DUTY NOZZLES - FOR USE WITH 404-30 TOUGH LOCK™ RETAINING HEAD ONLY
401-5-62		5/8" (16 mm) BORE - 1/4" TIP RECESS
401-6-50		1/2" (12.5 mm) BORE - 1/8" (3 mm) TIP RECESS
401-6-62		5/8" (16 mm) BORE - 1/8" (3 mm) IP RECESS
401-71-62		5/8" (16 mm) BORE - 1/8" (3 mm) TIP RECESS
401-87-62		5/8" (16 mm) BORE - 1/8" (3 mm) TIP STICKOUT
		HEAVY DUTY NOZZLES - FOR USE WITH 454-1 RETAINING HEAD ONLY
451-1-62		5/8" (16 mm) BORE - 1/4" (6 mm) TIP RECESS
451-1-75		3/4" (19 mm) BORE - 1/4" (6 mm) TIP RECESS
451-61-62		5/8" (16 mm) BORE - FLUSH TIP
451-81-62		5/8" (16 mm) BORE - 1/8" STICK OUT
2		651 SERIES WATER COOLED NOZZLES FOR USE W/ 454-1 RETAINING HEAD
	651-5-62	5/8" (16 mm) BORE - 1/4" (6 mm) TIP RECESS
	651-5-75	3/4" (19 mm) BORE - 1/4" (6 mm) TIP RECESS
	651-6-62	5/8" (16 mm) BORE - 1/8" (3 mm) TIP RECESS
	651-6-75	3/4" (19 mm) BORE - 1/8" (3 mm) TIP RECESS
		650 SERIES WATER-COOLED NOZZLES FOR USE W/ 404-30 TOUGH LOCK RETAINING HEAD
	650-5-62	5/8" (16 mm) BORE - 1/4" (6 mm) TIP RECESS
	650-5-75	3/4" (19 mm) BORE - 1/4" (6 mm) TIP RECESS
	650-6-62	5/8" (18 mm) BORE - 1/8" (3 mm) TIP RECESS
	650-6-75	3/4" (19 mm) BORE - 1/8" (3 mm) TIP RECESS
3	652	WATER MANIFOLD ASSEMBLY (C/W 652-1, 652-2, 430-2 & 652-4)
	652-1	WATER MANIFOLD
	430-2	NOZZLE CLASP
	652-4	QUICK CONNECT WATER FITTING
	652-5	HEAT RESISTANT O-RING
4		HEAVY DUTY CONTACT TIPS - 5/16" O.D.
403-1-30	403-1-30	FOR .030" (0.6 mm) WIRE
403-1-30-25	403-1-30-25	FOR .030" (0.6 mm) WIRE
403-1-35	403-1-35	FOR .035" (0.9 mm) WIRE
403-1-35-25	403-1-35-25	FOR .035" (0.9 mm) WIRE
403-1-1.0	403-1-1.0	FOR 1 mm WIRE
403-1-1.0-25	403-1-1.0-25	FOR 1 mm WIRE
403-1-45	403-1-45	FOR .045" (1.2 mm) WIRE
403-1-45-25	403-1-45-25	FOR .045" (1.2 mm) WIRE
403-1-52	403-1-52	FOR .052" (1.3 mm) WIRE

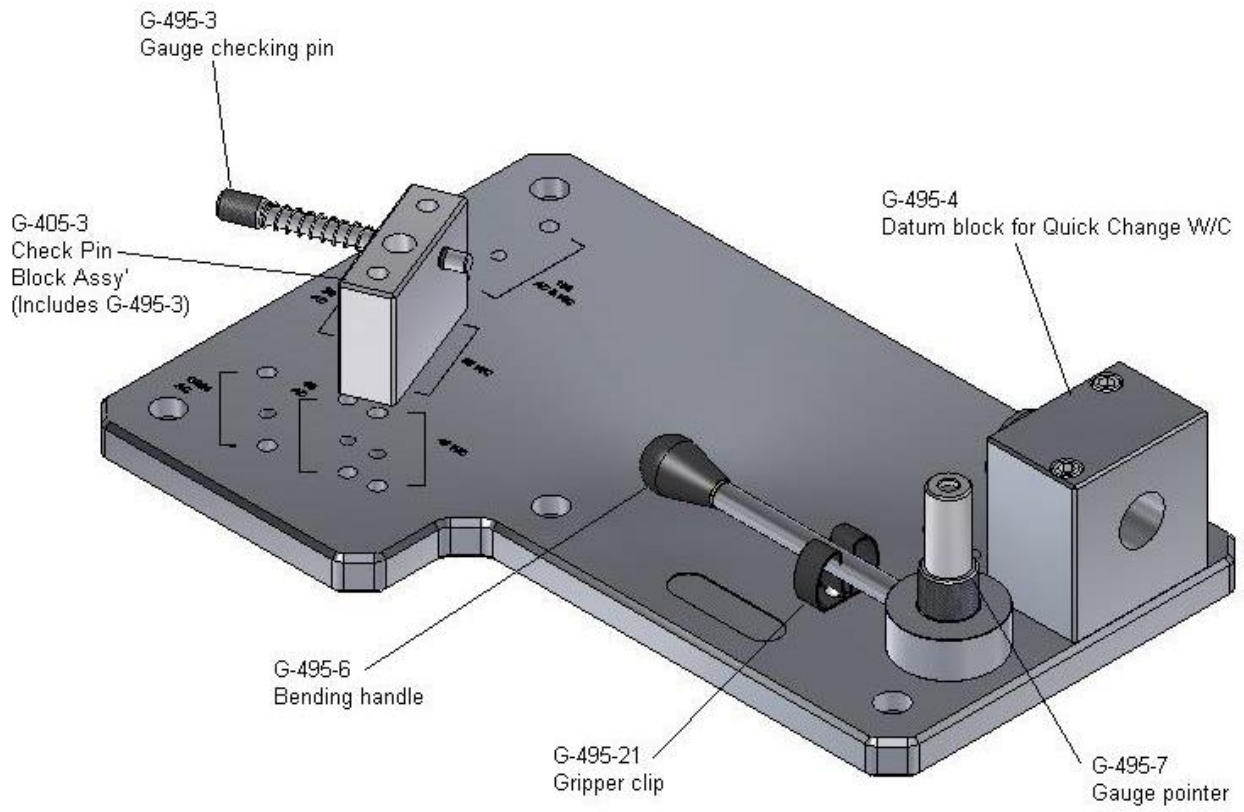
PART #		DESCRIPTION
450 WC	650 WC	
403-1-116	403-1-116	FOR 1/16" (16 mm) WIRE
403-1-52-25	403-1-52-25	FOR .052" (1.3 mm) WIRE
403-1-116	403-1-116	FOR 1/16" (16 mm) WIRE
403-1-116-25	403-1-116-25	FOR 1/16" (16 mm) WIRE
403-1-564	403-1-564	FOR 5/64" (2.0 mm) WIRE
403-1-564-25	403-1-564-25	FOR 5/64" (2.0 mm) WIRE
403-1-332	403-1-332	FOR 3/32" (2.4 mm) WIRE
403-1-332-25	403-1-332-25	FOR 3/32" (2.4 mm) WIRE
403-1-364	403-1-364	FOR 3/64" ALUMINUM (1.2 mm) WIRE
403-1-364-25	403-1-364-25	FOR 3/64" ALUMINUM (1.2 mm) WIRE
403-1-1.8	403-1-1.8	FOR 1/16" ALUMINUM (1.8 mm) WIRE
403-1-1.8-25	403-1-1.8-25	FOR 1/16" ALUMINUM (1.8 mm) WIRE
		HEAVY DUTY TAPERED CONTACT TIPS
403-3-35	403-3-35	FOR .035" (0.9 mm) WIRE
403-3-35-25	403-3-35-25	FOR .035" (0.9 mm) WIRE
403-3-1.0	403-3-1.0	FOR 1 mm WIRE
403-3-1.0-25	403-3-1.0-25	FOR 1 mm WIRE
403-3-45	403-3-45	FOR .045" (1.2 mm) WIRE
403-3-45-25	403-3-45-25	FOR .045" (1.2 mm) WIRE
403-3-52	403-3-52	FOR .052" (1.3 mm) WIRE
403-3-52-25	403-3-52-25	FOR .052" (1.3 mm) WIRE
403-3-116	403-3-116	FOR 1/16" (16 mm) WIRE
403-3-116-25	403-3-116-25	FOR 1/16" (16 mm) WIRE
		HEAVY DUTY TOUGH LOCK CONTACT TIPS
403-20-30	403-20-30	FOR .030" (0.6 mm) WIRE
403-20-30-25	403-20-30-25	FOR .030" (0.6 mm) WIRE
403-20-35	403-20-35	FOR .035" (0.9 mm) WIRE
403-20-35-25	403-20-35-25	FOR .035" (0.9 mm) WIRE
403-20-1.0	403-20-1.0	FOR 1 mm WIRE
403-20-1.0-25	403-20-1.0-25	FOR 1 mm WIRE
403-20-45	403-20-45	FOR .045" (1.2 mm) WIRE
403-20-45-25	403-20-45-25	FOR .045" (1.2 mm) WIRE
403-20-364	403-20-364	FOR .052" (1.3 mm) WIRE
403-20-364-25	403-20-364-25	FOR .052" (1.3 mm) WIRE
403-20-52	403-20-52	FOR 1/16" (16 mm) WIRE
403-20-52-25	403-20-52-25	FOR 1/16" (16 mm) WIRE
403-20-1.4	403-20-1.4	FOR 1.4" (1.4 mm) WIRE
403-20-1.4-25	403-20-1.4-25	FOR 1.4" (1.4 mm) WIRE
403-20-116	403-20-116	FOR 1/16" (16 mm) WIRE
403-20-116-25	403-20-116-25	FOR 1/16" (16 mm) WIRE
403-20-78	403-20-78	FOR .078" (1.8 mm) WIRE
403-20-564	403-20-564	FOR 5/64" (2.0 mm) WIRE
403-20-564-25	403-20-564-25	FOR 5/64" (2.0 mm) WIRE
403-20-332	403-20-332	FOR 3/32" (2.4 mm) WIRE
403-20-332-25	403-20-332-25	FOR 3/32" (2.4 mm) WIRE
		TOUGH LOCK TAPERED CONTACT TIPS
403-21-30	403-21-30	FOR .030" (0.6 mm) WIRE
403-21-30-35	403-21-30-35	FOR .030" (0.6 mm) WIRE
403-21-35	403-21-35	FOR .035" (0.9 mm) WIRE
403-21-35-25	403-21-35-25	FOR .035" (0.9 mm) WIRE
403-21-1.0	403-21-1.0	FOR 1 mm WIRE
403-21-1.0-25	403-21-1.0-25	FOR 1 mm WIRE
403-21-45	403-21-45	FOR .045" (1.2 mm) WIRE



ITEM	PART #		DESCRIPTION
5	450 WC	650 WC	
	402-6	402-6	O-RING FOR 454-1/654-1
	402-10		O-RING FOR 454-30
	404-30	404-30WC	TOUGH LOCK RETAINING HEAD - 100 PKG.
	404-30-25	404-30WC-25	TOUGH LOCK RETAINING HEAD - 25 PKG.
	454-1	654-1	RETAINING HEAD (CONVENTIONAL)
	454-1-2	RETAINING RING ONLY (CONVENTIONAL)	
6	402-7		NECK INSULATOR - TOUGH LOCK™ NECKS
	452-1		NECK INSULATOR - CONVENTIONAL NECK
7	494-22	694-22	NECK - 22 DEGREE - TOUGH LOCK
	494-45	694-45	NECK - 45 DEGREE - TOUGH LOCK
	494-180	694-180	NECK - STRAIGHT - TOUGH LOCK
	495-22	695-22	NECK - 22 DEGREE
	495-45	695-45	NECK - 45 DEGREE
	495-180	695-180	NECK - STRAIGHT
	652-8	652-8	O-RING (SMALL, RED 4 mm, FOR I/O WATER FITTINGS)
	495-7	495-7	O-RING (LARGE, BLACK 12 mm, FOR GAS TUBE)
	652-5	O-RING (SMALL, GREEN 4 mm, FOR NOZZLE FITTING)	
8		655-1-60	ARMORED WATER JUMPERS - FOR ALL NECKS
9	496	496	CONNECTOR VALVE MODULE
	496Y	496Y	CONNECTOR VALVE MODULE - WIRE BRAKE
	496S	496S	CONNECTOR VALVE MODULE - VOLTAGE SENSING
10	657-15	657-15	CONDUIT TUBE (15' = LENGTH)
11	656-15	656-15	BLUE WATER LINE - INTERNAL (15' = LENGTH)
	657-2	657-2	AIR BLAST FITTING (NOT SHOWN)
12	658	658	RED WATER LINE - OUT (C/W (1) 656-1 CLAMP)
	658-1	658-1	BLUE WATER LINE - IN (C/W (1) 656-1 CLAMP)
13			POWER CABLE ASSEMBLY
	659-4	659-4	4' (1.22 m) SERVICE - ACTUAL LENGTH - 3.5' (1.07 m)
	659-6	659-6	6' (1.83 m) SERVICE - ACTUAL LENGTH - 5.5' (1.67 m)
	659-8	659-8	8' (2.44 m) SERVICE - ACTUAL LENGTH - 7.5' (2.29 m)
	659-10	659-10	10' (3.05 m) SERVICE - ACTUAL LENGTH - 9.5' (2.90 m)
14	497	497	FRONT HOUSING ASSEMBLY
15	666-10	666-10	REAR HOUSING (C/W STRAIN RELIEF)
15B	416-15	416-15	CONTROL HOUSING
	416-11	416-11	CONTROL HOUSING - VOLTAGE SENSE
16	663-1-15	663-1-15	OUTER JACKET - 15' SERVICE
16A	661-4	661-4	CABLE BUNDLE - 4' - ACTUAL LENGTH - 3.5'
	661-4.5	661-4.5	CABLE BUNDLE - 4.5' - ACTUAL LENGTH - 4'
	661-5	661-5	CABLE BUNDLE - 5' - ACTUAL LENGTH - 4.5'
	661-6	661-6	CABLE BUNDLE - 6' - ACTUAL LENGTH - 5.5'
	661-8	661-8	CABLE BUNDLE - 8' - ACTUAL LENGTH - 7.5'
	661-10	661-10	CABLE BUNDLE - 10' - ACTUAL LENGTH - 9.5'
17	664-400		POWER PIN BLOCK
18	214	214	TWECO® STYLE POWER PIN (#4 STYLE)
	214-2	214-2	LINCOLN® STYLE POWER PIN
	214-4	214-4	L-TEC MT SERIES®
	214-6-116	214-6-116	MILLER® STYLE POWER PIN
	214-7	214-7	LINCOLN® STYLE POWER PIN (SHORT)
	214-12	214-12	TWECO® STYLE POWER PIN (#5 STYLE)
	214-13	214-13	PANASONIC® STYLE POWER PIN
	414-1	414-1	O-RING TWECO #4, L-TEC
	414-11-2	414-11-2	O-RING FOR MILLER POWER PIN

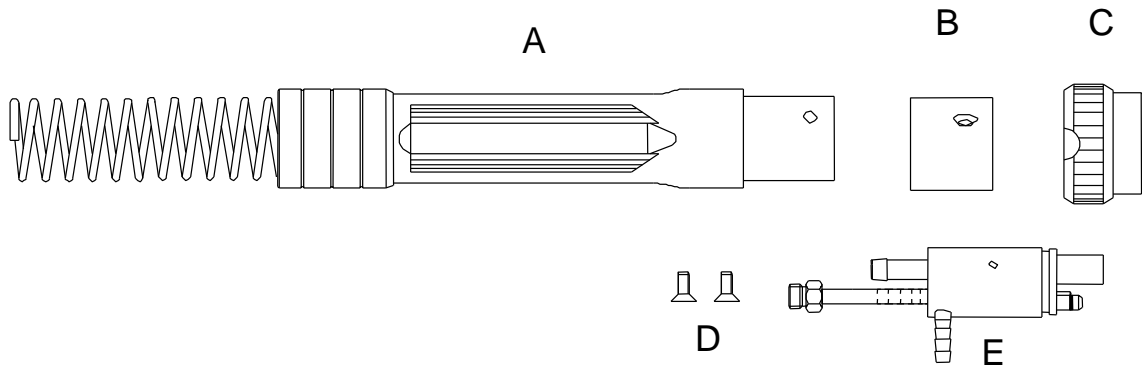
ITEM	PART #		DESCRIPTION
19	450 WC	650 WC	
	415-35-2	415-35-2	LINER - .035" STEEL WRAPPED NYLON
	415-35-05	415-35-05	LINER - 6' .035" ROUND WOUND - ALUMINUM
	415-35-6	415-35-6	LINER - 6' .035" ROUND WOUND - STEEL
	415-35-15	415-35-15	LINER - 15' .035" ROUND WOUND
	415-45-01	415-45-01	LINER - 6' .045" ALUMINUM
	415-45-02	415-45-02	LINER - 10' .045" ALUMINUM
	415-45-03	415-45-03	LINER - 15' .045" ALUMINUM
	415-116-2	415-116-2	LINER - 1/16" STEEL WRAPPED NYLON
	416-116-6	416-116-6	LINER - 6' 1/16" ROUND WOUND
	416-116-10	416-116-10	LINER - 10' 1/16" ROUND WOUND
	415-116-05	415-116-05	LINER - 1/16" STEEL WRAPPED NYLON
	415-116-15	415-116-15	LINER - 15' 1/16" ROUND WOUND
	415-116-21	415-116-21	LINER - 6' 1/16" ALUMINUM
	415-116-22	415-116-22	LINER - 10' 1/16" ALUMINUM
415-116-23	415-116-23	LINER - 15' 1/16" ALUMINUM	
415-332-6	415-332-6	LINER - 6' 3/32" FLAT WOUND	
415-332-15	415-332-15	LINER - 15' 3/32" FLAT WOUND	
415-564-6	415-564-6	LINER - 6' 5/64" ROUND WOUND	
415-564-15	415-564-15	LINER - 15' 5/64" ROUND WOUND	
20			FEEDER ADAPTOR REQUIREMENTS (SOLD SEPARATELY)
	417	417	QUICK CONNECT BLOCK ASSEMBLY
21			FEEDER ADAPTORS (TO BE USED WITH 417 QUICK CONNECT BLOCK)
	418-1	418-1	AIRCO: AHF-E1, AHF-G, AHF-L1, AHF-N, AHF-R, AHF-SAHF-T, AHF-U, AHF-V, MOBILMATIC, LITTLE DIPPER, DIPSTICK-160, DIP-PAC-200, DIP-COR-300
	418-3	418-3	ESAB (NON EURO STYLE), A10, SMASH WELD-180, MEC 30/44, MIGGY 125, OPTIMATIC 30/44
	418-4	418-4	HOBART: 27, 27A, DUALMATIC 27/70, H3S, H4S, H6S, 44, 70, 70S, SP100.
	418-5	418-5	LINDE / L-TEC: EH-8, MIG-32, 160, V160, 3IN1, L-TEC 225, SWM-20, SWM-22, SWM-31, SWM-32, SWM-34, SWM-37.
	418-6	418-6	LINCOLN: LN7, LN8, LN9, LN22, LN25
	418-7	418-7	LINDE / L-TEC: MM253, SWM14
	418-8	418-8	LINDE/L-TEC: DIGIMIG & DIGIMIG DUAL, EH1, EH5, EH10, EH11, SHE-4, SHE-5, SWM11, SWM11B, SWM12, SWM13, SWM23, SWM24, SWM25, SWM26, SWM35, VAM2, L-TEC 35, MIG35, DIGIPULSE, SEH45.
	418-9	418-9	MILLER: 10A, 10E, 30A, 30B, 30E, 70A, 80A, SPOOLMATIC 150, MILLERMATIC 35 (OLD STYLE)
	418-10	418-10	MILLER: INTELLIMATIC, SIDEKICK, D-51A, MILLERMATIC 90, 120, 130, 150, 200, 250, MM-35 (NEW), NEW AUTOMATIC 1, PORTOMIG, S-42GL, S-52A, S-54A, SWING ARC-DUAL, SWING ARC-SINGLE, S-32S, 52D, 54D, 52E, ALL 22 AND 60 SERIES FEEDERS
	418-14	418-14	OTC: CM231
	418-21	418-21	GILLIAND, SAND DIEGO
	418-27	418-27	PANASONIC
	663-15	663-15	OPTIONAL OUTER JACKET WITH VELCRO (NOT SHOWN)
22	415-35-6Q	415-35-6Q	QUICKLOAD LINER FOR .035-.045 WIRE 6FT - USED ONLY WITH TOUGH LOCK™
	415-116-6Q	415-116-6Q	QUICK LOAD LINER FOR .045-116 WIRE 6FT - USED ONLY WITH TOUGH LOCK
23	415-26	415-26	QUICK LOAD LINER RETAINER - USED ONLY WITH TOUGH LOCK
24	657-1	657-1	OETICKER CLAMP - 11.3 mm (CONDUIT)
25	656-1	656-1	OETIKER CLAMP - 9.5 mm (WATER LINE)

6.0 – NECK ALIGNMENT GAUGE



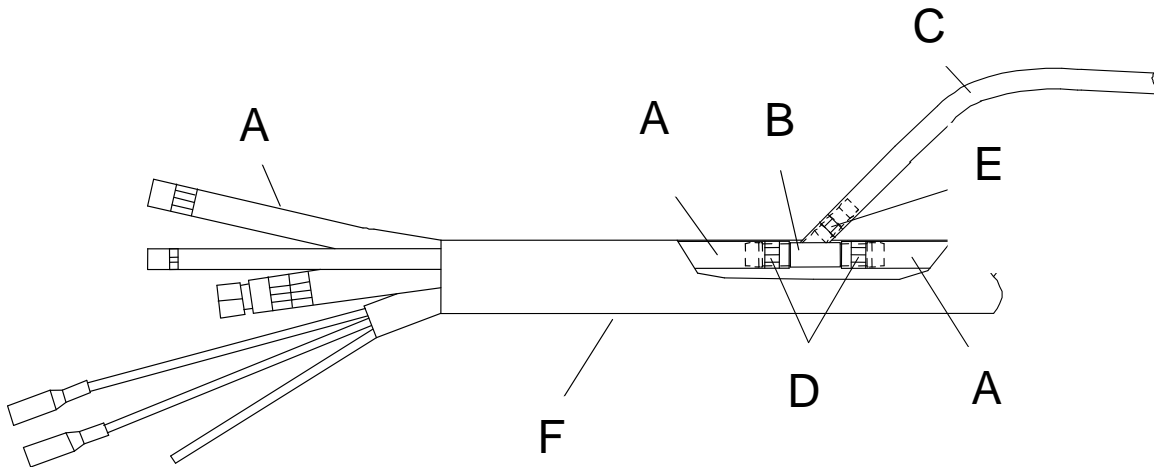
7.0 – OPTIONS

7.1 EURO-CONNECTOR OPTION



ITEM	PART #	DESCRIPTION
A	675-2	EURO CONNECTOR HOUSING
B	675-4	HOUSING BAND
C	425-2	HAND NUT
D	425-5M	MOUNTING SCREWS
E	675-10	EURO CONNECTOR BODY

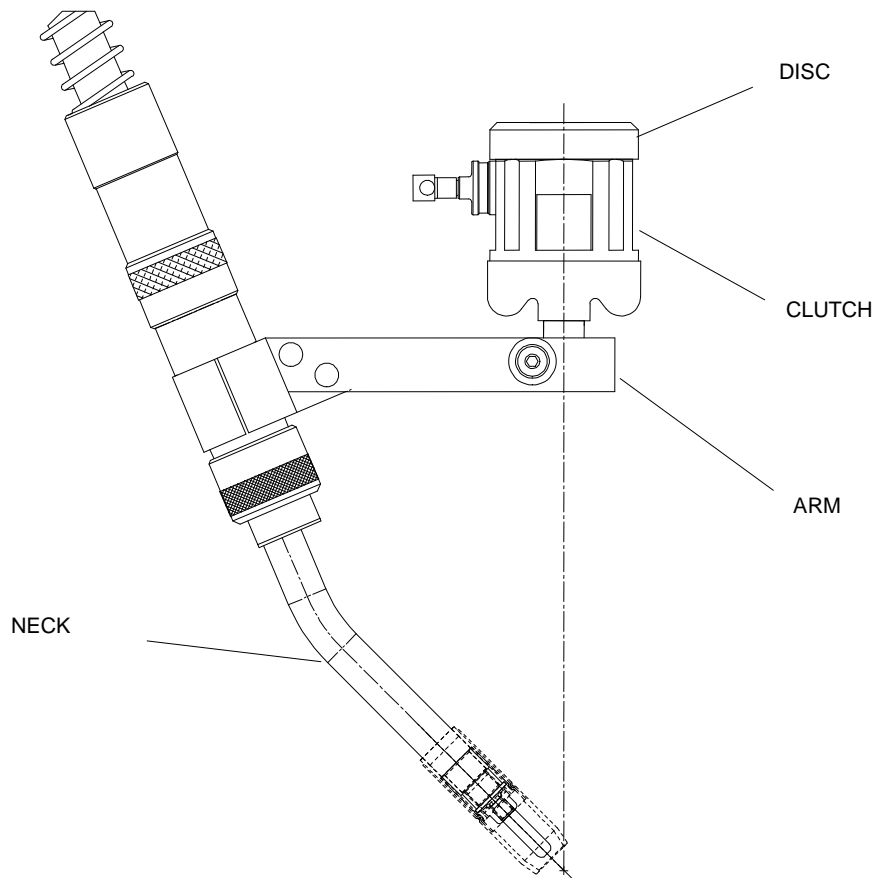
7.2 AIR BLAST OPTION



ITEM	PART #	DESCRIPTION
A	657-15	4' CONDUIT (15' ONLY)
	657-15	6' CONDUIT (15' ONLY)
	657-15	8' CONDUIT (15' ONLY)
	657-15	10' CONDUIT (15' ONLY)
B	657-2	AIR BLAST FITTING
C	656-15	AIR LINE/WATER LINE

ITEM	PART #	DESCRIPTION
D	413-5	CLAMPS
E	656-1	CLAMPS
F	663-1-15	4' OUTER JACKET (15')
	663-1-15	6' OUTER JACKET (15')
	663-1-15	8' OUTER JACKET (15')
	663-1-15	10' OUTER JACKET (15')

7.3 COMPLETE ASSEMBLY OPTIONS



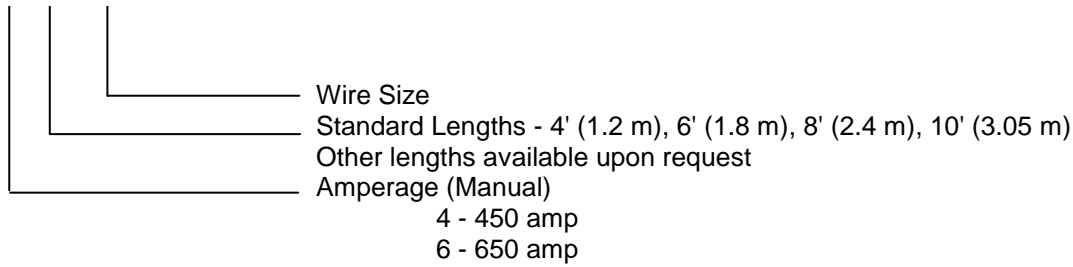
ITEM	PART #	DESCRIPTION
CLUTCH	AS-708	SAFETY CLUTCH
ARMS	AS-49-00-1	FOR 180° NECK
	AS-49-00-2	FOR 22° NECK
	AS-49-00-3	FOR 45° NECK
NECKS	495-22	22° NECK
	495-45	45° NECK
	495-180	180° NECK
	494-22	22° NECK (TOUGH LOCK)
	494-45	45° NECK (TOUGH LOCK)
	494-180	180° NECK (TOUGH LOCK)
INSULATING DISCS	AS-101-01	BLANK
	AS-101-2	ABB® IRB-1400, IRB-1500, IRB-2000, IRB6, MILLER® MRV-2, MRV-10, FANUC®, ARCMATE 100, 120, 100i, 120i, MOTOMAN® SK6, OTC MRV-6, DR-4400
	AS-101-4	ABB® IRB-2400
	AS-101-5	OTC DR200
	AS-101-12	PANASONIC® W0500, ABB MAC500
	AS-102-5	KUKA®
	AS-102-6	HITACHI® PW-10

ITEM	PART #	DESCRIPTION
INSULATING DISCS cont'd	AS-102-7	MILACRON® T3-776
	AS-102-8	COMAU® SMART-3S
	AS-102-10	MOTOMAN® K6, K10 HITACHI® M6060
	AS-102-11	HITACHI® M5030, M6030
	AS-102-12	PANASONIC® AW - 500
	AS-103-3	FANUC ARCMATE® JR, SR
	AS-103-4	KUKA®
	AS-104-3	MILACRON®
	AS-105-1	MILLER® MRK-5
	AS-105-2	MILLER® MRH-2, MR-1000
	AS-106-1	MOTOMAN® L10W, L106 PANASONIC® AW7000
	AS-106-3	MITSUBISHI® MZ10
	AS-106-5	SAMSUNG® FARA AM1
	AS-106-6	PANASONIC® AW-005A, AW-010A NACHI® 7603
	AS-107-1	NACHI® VORG-35
	AS-107-2	NACHI® SC15
	AS-107-3	NACHI® SC 35-01
	AS-107-4	NACHI® 8633
	AS-107-9	PUMA® ALL
	AS-110-1	KAWASAKI® ALL

9.0 – ORDERING INFORMATION

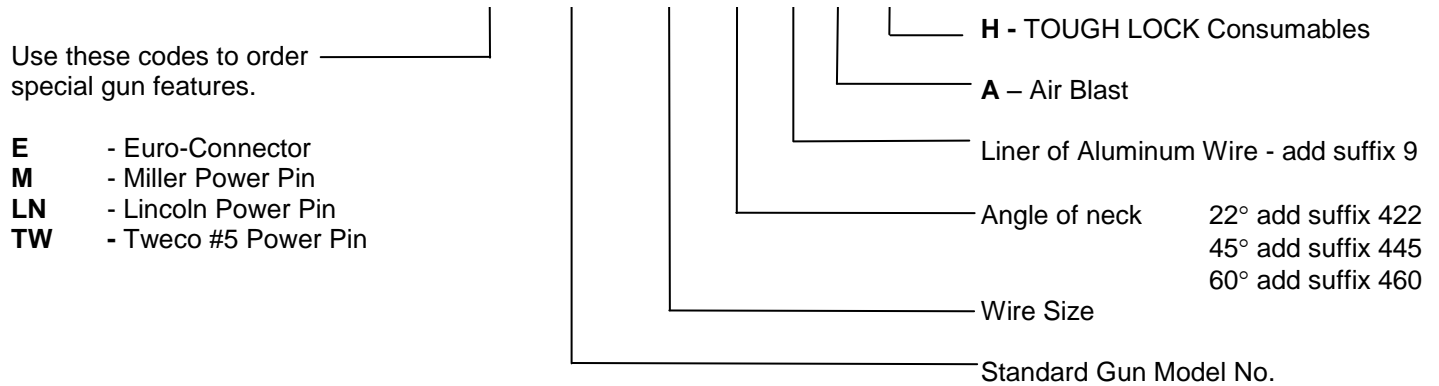
9.1 EXAMPLES OF STANDARD MODEL NO.

4906-45



9.2 EXAMPLE OF CUSTOM BUILT GUN

E 4906-45-22-9-A-H-Q - Q - QUICK LOAD Liner



NOTE: Option numbers should be added only if desired option is not included on standard gun model.

9.3 GUN STANDARDS CHART

Standard models are shipped with the following components.

GUN MODEL	NECK	NECK INSULATOR	NOZZLE	H.D. HEAD	CONTACT TIPS
450 AMP	495-180	452-1	451-6-62	454-1	403-1
650 AMP	695-180	N/A	651-6-62	654-1	403-1



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