



Instruction Manual NCC-P38
W/C Curved Gun
Revised 04/2020

D/F MACHINE SPECIALTIES, INC.

MIG & TIG Welding Products, Consumables & Accessories

1750 Howard Drive, North Mankato, MN 56003

Phone: (507) 625-6200 Fax: (507) 625-6203

Email: sales@dfmachinespecialties.com

www.dfmachinespecialties.com

WATER-COOLED NCC-P38 CURVED GUN



INSTRUCTION, PARTS & SPECIFICATIONS MANUAL

D/F MACHINE SPECIALTIES is a world leader in the design, development, and manufacture of “MIG” (GMAW) & “TIG” (GTAW) welding products, consumables and accessories. D/F offers several types of manual Air or Water-Cooled “MIG” welding tools, and with the increased use of automated and robotic welding systems, a demand has been created for welding tools of the highest quality, durability and interchangeability. For over forty years, D/F welding products have been used extensively on “MIG” and “TIG” welding applications. This experience, coupled with patented design features, unavailable on any other competitive equipment, has made D/F welding tools the most advanced “MIG” and “TIG” welding guns and barrels for semi-automatic, automatic or robotic welding applications.

This Catalog is a guide to helping you select the proper tool for a given semi-automatic, automatic or robotic welding application. The following is only a partial listing of available semi-automatic, automatic and robotic guns. For further information on special “MIG” and “TIG” requirements, please consult the factory.

Customer satisfaction and customer benefits are the center points of all strategic contents

The spirit of the D/F Machine Specialties personnel is to listen to and to integrate the customer throughout the process, to develop and design marketable products, to present prototypes, to carry out pilot tests and to prepare for and be open to new technology and tasks. We attract and carefully select talented individuals who share our values. Together we will nurture and sustain a work environment with two-way communication, training, mentoring, and rewarding career opportunities.

Innovation and quality

Innovation and quality come from being receptive and willing to learn from others. We encourage our people to be creative and take risks in the pursuit of excellence. Innovative practices are deeply rooted in every one of our employees, a philosophy that leads to continuous product development and industry firsts.

Progress

By remaining confident, focused, and persistent in challenging times, we will discover opportunity. Commitment to quality and the pursuit on innovation ensure that D/F Machine Specialties will remain an industry leader for years to come.

Commitment to excellence

At D/F Machine Specialties we commit to design, build and deliver premium products and superior customer support to quality driven welding professionals. Customers still to this day choose D/F over competitors because of our responsiveness and flexibility. Customers will continue to choose D/F tomorrow for our superior hand-made products and service. To ensure this, we need creative and competent personnel in all business divisions, an intensive exchange of thoughts and ideas with all users, participation in working and study groups within the field of welding technology and intensive cooperation with institutes and universities.

Teamwork

Striving for excellence is a commitment that is an integral component of the D/F Culture. Our team of skilled and dedicated employees takes pride in the excellence products they produce. Each of us willingly accepts personal responsibility for meeting our commitments and we hold each other to a high standard of accountability.

Responsibility

We will continually strive to be environmentally responsible and to support the health and safety of our employees, customers, and neighbors. We continue to support the communities in which we operate and the industries in which we participate.

Thank You for Choosing D/F Machine Specialties



TABLE OF CONTENTS

Safety	4-6
Introduction & Installation	7
Adjustment and Operation, Maintenance & Disassembly	8
Assembly	9
Assembly continued	10
Required Tools List for Disassembly & Assembly.....	11-12
(Table 1) Ordering Information, (Table 2) Spare Parts, (Table 3) Current Tips, (Table 4) Gas Nozzles	13
Water Cooled Curved Gun Parts List	14
(Table 5) Liners, (Table 6) Casings, (Table 7) Switch & Cable Assemblies	15
Utility Station.....	16
Wire Feeder Adapters.....	17
What is the Proper Use of the Nozzle Thread Chaser Tap?.....	18
How Do I Cut, Fit, and Install a New Liner?.....	19
Troubleshooting	20-23

BE SURE THIS SAFETY GUIDE REACHES THE OPERATOR

SAFETY MEASURES - **PLEASE READ!**

Welding is not particularly hazardous when certain safety practices are followed. Anyone using this equipment should be thoroughly trained in safe welding practices. Failure to observe safe practices may cause serious injury. Handling welding torches presents no danger if the appropriate safety regulations are strictly adhered to.



WARNING

Protect yourself and others from injury. Serious injury or death may result if welding equipment is not properly installed. Read, follow, understand and save this entire manual and follow your employer's safety practices before installing, operating, or servicing the equipment. Only qualified individuals should install, operate, maintain and repair the equipment.



Please examine carton and equipment for damage immediately upon receipt. Check the equipment against the invoice to make sure it is complete and inspect for damage due to shipping. If there is any damage, please contact the carrier immediately to file a claim. Contact D/F with the information regarding damage claim made to the carrier or shipping errors. Please include a full description of the damage or parts in error.

Electric shock can cause injury or death.



- Wear dry, hole-free insulated gloves and body protection that is in good condition.
- Do not touch electrode with bare hands.
- Do not touch live electric parts.
- Always insulate yourself from the work and ground using insulating mats large enough to cover your full work area.
- Use AC output ONLY if it is required for the welding process.
- Disconnect power before working on the machine.
- Frequently check power cord and ground connector for any damage.
- Replace immediately if any damage is present.
- Properly install and operate all equipment according to the Instruction Manual and all national, state, and local codes.
- Turn off all equipment when not in use.

Smoke, Fumes and Gases can be hazardous to your health.



- Keep your head out of the fumes. Do not breathe the fumes.
- Ventilation must be adequate to remove smoke, fumes and gases during operation.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Safety Data Sheets (SDS) and the manufacturers instructions for adhesives, cleaners, coatings, coolants, consumables, degreasers, fluxes and metals.
- Be sure breathing air is safe.
- Remove all degreasing, cleaning, spraying materials from the area.

Arc rays and sparks can burn eyes and skin.



- Always wear an approved welding helmet fitted with the proper shade of filter lenses. A number 12 to 14 shade will provide the best protection.
- Wear safety glasses with side shields under your welding helmet.
- Wear protective clothing made from flame resistant material to protect yourself from the arc rays and sparks.
- Protect other individuals with screens or barriers. Warn others not to watch arc without protective shade.



Welding and Cutting sparks can cause fire or explosion.

- Remove all flammable materials within 35 ft (11m) of the welding or cutting arc. If this is not possible, cover them tightly with approved covers.
 - Always have a fire extinguisher and a trained fire watcher nearby.
 - Do not weld or cut containers that have once held combustibles.
 - Never use oxygen in a welding torch. Only use inert gases or inert gas mixes that are required for the process.
 - Do not weld or cut where the atmosphere may contain flammable dust, gas or liquid vapors.
 - After work is completed inspect the area for sparks, glowing embers and flames.
 - Protect yourself and others from flying sparks and hot metal.
 - Sparks and spatter are thrown from the arc. Always have protective, oil free, flame resistant clothing.
-



Cylinders can explode if damaged.

- Compressed gas cylinders contain gas under high pressure. If the cylinder is damaged it can explode.
 - Use only the correct shielding gas for the process used. Use the right equipment, correct procedures
 - Keep cylinders away from arc welding, cutting or electrical circuits.
 - Never drape a welding or cutting gun over gas cylinder.
 - Install cylinders in an upright position by securing them to a stationary support or cylinder rack.
 - Protect cylinders from excessive heat, arc welding or cutting, electrical circuits, sources of heat, sparks, or flame, and areas where they may be damaged.
 - Keep protective valve caps in place and hand tight when not in use. Always store empty cylinders with valve caps in place
 - Never face valve outlet when opening cylinder valve. Do not stand in front of or behind the regulator when opening the valve.
 - Store compressed gas and oxygen cylinders in separate locations.
-

Noise can damage hearing



- Noise from the welding process can damage hearing
 - Wear approved hearing devices to ensure protection. Hearing protection must be worn by operators and surrounding personnel.
-



Hot parts can burn

- Do not touch hot welded or cut parts bare handed.
 - If handling is needed, use proper tools and personal protection.
 - Allow cooling period before working on or handling parts.
-

Electric and Magnetic fields (EMF) can affect implanted medical devices.



- Persons with implanted medical devices should consult their physician and the device manufacturer prior to going near welding, cutting or induction heating operations.
- EMF fields may interfere with some pacemakers.



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.

(California Health and Safety Code Section 25249.5 et seq.)

This product contains or produces a chemical known to the State of California to cause cancer and birth defects (or other reproductive harm).

(California Health and Safety Code Section 25249.5 et seq.).

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

Safety and Operating References

Refer to the following standards in their latest revisions and comply as applicable.

- ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING obtainable from the American Welding Society, 2501 N.W. 7th St., Miami, FL 33125.
- ANSI Standard Z41.1, STANDARD FOR MEN'S SAFETY - TOE FOOTWEAR obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
- ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
- ANSI Standard Z88.2, "Practice for Respiratory Protection" obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
- ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION obtainable from the American National Standards Institute, 1430 Broadway, New York, NY, 10018.
- American Welding Society Standard AWSF4.1 "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", obtainable from the American Welding Society, 2501 N.W. 7th St., Miami, FL 33125.
- AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES obtainable from the American Welding Society, 2501 N.W. 7th St., Miami, FL 33125.
- NFPA Standard 70-1978, NATIONAL ELECTRICAL CODE obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
- NFPA Standard 51B "Fire Prevention in Cutting and Welding Processes" obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
- NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING obtainable from the Superintendent of Documents, U.S. Printing Office, Washington, D.C. 20402.
- CSA W117.2 "Safety in Welding, CUTting and Allied Processes." Canadian Standards Association, 178 Rexdale Blvd, Rexdale, ON, Canada M9W 1R3.
- OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the U.S. Government Printing Office, Washington, D.C. 20402.

IMPORTANT

The D/F torch is famous for the fact, that if it is chilled properly, the welder can grab the chrome front water-cooled barrel (not the copper gas nozzle/cup) of the torch with their bare hand and it will be cold to the touch seconds after welding. With the proper chiller, this can be done even after a 4 hour arc time.

Make certain the cooling water supply is at least the minimum flow rate of 1 gallon per minute (for each inner body), at 40 psi (80 psi maximum) with a 6 gallon reservoir and a recommended 30,000 BTU/hr cooling capacity. Gun ratings are affected by shielding gas used, arc time, cooling time and inlet water temperature. Water outlet temperature should not exceed 27°C (80°F). The torch's water out & power cable is not cooled until the coolant has gone through the torch and out the water out & power cable. If water is not flowing through the D/F torch for at least 1 minute prior to striking an arc, when you apply the power and water hits the "hot" water/out & power cable, you will generate steam. Steam can damage the torches internals in seconds causing a leak. It can also blow out the torches water/out & power cable. A flow switch can be installed after the return line ensuring that coolant is present at the return line prior to striking an arc.

**When High-Deposition GMAW, high current density, high amperages, preheat, or extended periods of arc time are used, a refrigerated liquid chiller with a larger reservoir is required. Precise temperature control maintains the cooling at a constant 13°C (55°F) temperature, thus prolonging the life of the welding equipment and more specifically extending the service life of the gas nozzle and current tip.

A water chiller or refrigerated liquid chiller for GMAW may be obtained from:

For normal duty cycle single torch chillers: Dynaflux - 800-334-4420 - www.dynaflux.com

**For extreme duty cycles or multiple torch cooling systems: MTA - 716-693-8651 - <https://www.mta-it.com>

INTRODUCTION

The NCC-P38 50 degree water cooled gun, part #36800, is a rugged all purpose, water cooled, manual MIG welding torch designed to operate at welding currents up to 600 amps in CO2 and 500 amperes continuous duty using argon as the shielding gas. The NCC-P38 is intended for use with all manufacturers wire feeders which have provision for water cooling and will handle all types of welding wires in sizes from .035"-1/16" Steel, and 3/64" – 3/32" Aluminum. It accommodates a slip-in tip fastened by a collet action nut. A unique feature of this Water-Cooled Curved Gun is that the nozzle assembly water chamber and inner body water chamber are serially connected to each other with sliding removable connectors making it a relatively simple matter to detach the nozzle assembly, thus completely eliminating the need for gaskets in the water passage system.

The 50-degree, curved metallic water-cooled front body allows for operation in tight, hard-to-reach areas. The torch has a copper gas nozzle, which threads into the copper front end of the torch for better heat dissipation. The slip-in contact tip is threadless and is retained by a collet action nut for easy removal and insertion of a new tip. All utilities are connected internally to the torch body and exit from the rear of the torch body housing. We also offer an optional cable/hose sheath for better cable management. The torch is provided with a button switch which can be positioned at any point on the torch handle. For feeding all wires, a replaceable liner conduit system is available for feeding 0.35, .045, .047, .052, and 1/16-in. hard/cored wires through a continuous metal liner run to the tip in the gun with no gaps. For aluminum welding of 3/64, 1/16 and 3/32-in. wires run through a continuous Nylatron liner run to the tip in the gun with no gaps.

Page 12 illustrates the complete equipment assemblies.

For further information or help with D/F Machine Specialties products, please visit our web site at www.dfmachinespecialties.com, or consult the factory at 1-507-625-6200.

INSTALLATION

Typical modern-day torch setups (D/F's competitors) utilize a unitized cable assembly with the gas, water, power and conduit combined into a single unit. When one cable goes bad the whole unit is replaced. This can be expensive, difficult to work on, and labor intensive. Also, this approach does not allow for a large enough inner power cable needed for necessary high amperages, and it is restricted in size by small passages for water, gas and wire. Water-cooling and gas coverage are both limited by the size restrictions. When there is a problem with modern day unitized welding guns the entire cable assemble must be replaced or the complete welding gun. Hence the term "Throw Away Guns"

D/F torches take an alternative approach to the setup. The D/F torches use a separate gas hose, water-in hose, Water Out & Power Cable, and casing/conduit and liner. When one cable goes bad it is simply replaced instead of attaching an entire new unitized cable assembly; a huge cost saver, time saver and much easier to do! This is also where the D/F Utility Station comes into play. The gas hose, water-in hose, and Water Out & Power Cable are interfaced with the customer's existing lines via the Utility Station (See pg. 15). The D/F torch leads plug into the front of the Utility Station. Into the back of the Utility Station go the customer's utilities. The back includes industry standard 3/8" shanks to allow the customer to connect the water in and water out lines, and a 3/16" shank to connect the gas line. Along with these hoses, **the customer must plug the 4/0 power cable directly from the power source to the back of the Utility Station. This is how the D/F torches are powered, NOT with a power cable to the wire feeder; there can be no jumper cable from the drive roll to the Utility Station. The power must travel through the Utility Station and down to the torch via the Water Out & Power Cable, hence the name.** It is most important to remove the 4/0 power cable from the lug of the wire feeder drive roll stand, strip the cable back roughly 2", and insert the 4/0 power cable into the back of the D/F Utility Station. Finally, a short gas hose jumper is needed for control of the gas. Remove the small black 3/16" hose that connects from the solenoid to the feeder input inside the wire feeder. The jumper can be attached by removing the 3/16" hose from the solenoid and attaching the 3/16" gas jumper hose to the solenoid inside the barb on the wire feeder and to the back of the D/F Utility Station's 3/16" shank. D/F refers to power pins as feeder adapters, for on D/F welding guns there is no power going to the wire feeder. The different feeder adapters can hook up to any of the different Miller, Lincoln, Esab, Fronius, Tweco, etc. wire feeders. In turn the D/F casing/conduit is not powered. Its only purpose is to support the liner, which protects the casing and supports the wire. Since every welding application is different because of size restrictions, access restrictions, positioning restrictions, etc., with the use of the D/F Utility Station you can have a unique and clean installation.

Always check for proper flow of at least ½ GPM and any leaks before striking an arc.

ADJUSTMENT AND OPERATION

Before any adjustments are made, disengage the wire feeder drive roll pressure to prevent wire from feeding and arcing to an accidental ground. To set the shielding gas flow rate, press the torch button switch to open the gas solenoid valve and adjust the flowmeter to the desired flow rate with at least a 3 second pre and post purge for aluminum welding. For proper operation a minimum flow of ½ gallon per minute (gpm) of cooling water at 60-degrees Fahrenheit or less, must be maintained if the torch is to perform at rated capacity. A torch inlet water pressure of 50 psi minimum will provide adequate flow. Check these water flow requirements before welding. The water should be flowing for at least 2 minutes prior to striking an arc and air bubbles should be removed from the system. The wire feed conduit should be kept as straight as possible and without sharp bends to assure smoother wire feed.

MAINTENANCE

If this equipment does not operate properly, stop work immediately and investigate the cause of the malfunction. Maintenance work must be performed by an experienced person, and electrical work by a trained electrician. Do not permit untrained persons to inspect, clean, or repair this equipment. Use only recommended replacements. If the water-cooled power cable assembly becomes damaged, it is recommended that immediately a new one be purchased and the damaged cable is replaced, or the damaged unit should be turned over to an authorized D/F Machine Specialties repair station for repair. D/F has a repair program for its torches; we can usually repair D/F torches for less than 1/3 of the cost of 1 new torch. We would recommend that all torches are sent in every 1-2 years to be factory refurbished for safety. That way you can rest assured that they are working properly and are safe. Just send the torches in question in for a repair/evaluation and we will provide a repair estimate to you. We only charge \$60.00 per torch, plus the parts needed for the repair. We take the torches apart completely; assess the damage, pressure test them, provide the repair estimate to you, reassemble the torches with the needed new parts to factory specs, and re-pressure test to make sure they do not leak and have been repaired.

If the gooseneck nozzle insulation tube is damaged or cracked it should be replaced. The Spatter Disc/Gas Diffuser must always be clean and free of any damage. The internal O-Rings on the Transfer fittings must be lubricated with a silicon lubricant (Sil-Glyde #765-1351) and free of any damage. Any water leakage into the gas stream area, however slight, will disturb gas coverage and weld quality. The gun should be blown out at least once a day or per shift change and should be cleaned and inspected daily. The threads on the copper gas cups or gas nozzles should be cleaned with a wire wheel brush in a lathe or a hand drill. Always blow out the gun before putting parts back together or in the gun. Never use any damage or dirty parts. Always purge the gun with gas after cleaning and blowing out the gun to ensure there is no moisture or particles present.

To remove the gooseneck or front water-cooled barrel for replacement or inspection purposes, proceed as follows: With power source turned off and water turned off, remove gas cup or gas nozzle, contact tip and collet nut, Spatter Disc and Insulation Tube. Loosen the black retaining Nut and gently pull back torches gooseneck from handle body.

DISASSEMBLY

1. All repairs and adjustments to gun assemblies are made with the power source, water, and feeder turned off.
2. Remove the forward gas nozzle or gas cup, current tip, collet nut, Insulation tube and spatter disc/gas diffuser.
3. Counterclockwise unscrew the retaining nut which permits the water-cooled nozzle assembly (Gooseneck) to be pulled forward gently off the torch body. This will expose the water connection Transfer Fittings. With your hand you can remove the Transfer Fittings from the water-cooled nozzle (Gooseneck) assembly or remove the Transfer Fittings from the gun body, they may still be in the white collar. Always Check the O-Rings on Transfer Fittings for cracks and deformed sealing surfaces. When replacing the old or installing a new O-Rings apply a thin film of silicone grease (Sil-Glyde #765-1351) to the O.D of the O-Ring.
4. The white collar/insulator can now be removed by sliding it forward off the copper electrode. The white collar will have an O-Ring on it facing the front of the gun or the tip and gas cup. Always inspect the O-ring, this O-ring does not require lubrication.
5. Now you will see the O-ring on the front of the inner body. Inspect O-ring for any signs of damage. This O-ring does not require lubrication.
6. Inspect the heat shrink on guns copper electrode. There should be no signs of damage to the black heat shrink or it must be replaced. There should be 5/16" of copper electrode showing towards the front of the gun and .281" of copper electrode showing toward the gun body.
7. Remove the flat head inner body holding screw (32610), with the curved copper electrode in your left hand you can remove the body housing by pulling the body housing backwards away from the gooseneck towards the utilities with a slight twisting motion.
8. Now you can see the set screw that secures the casing into the inner body. Also, you will now see the fittings on the inner body where the utilities or service hoses are connected. If needed they can be removed and replaced.
9. Always remove the casing first by loosening the set screw. You do not have to take the set screw completely out of the inner body, just loosen it 5 - ½" turns with a 10/24" Allen wrench. Next remove the small red gas line and small blue water line first. You must use 2 wrenches 1 supporting the inner body and 1 loosening the fittings. To remove the water/out & power cable you must put a crescent wrench on the rear brass boss of the inner body.
10. To remove the Body Liner or Jump Liner if being used; slide body tube backwards toward the utilities, revealing the set screw in the inner body. Back off 10/24 set screw with allen wrench allowing the casing and liner to be removed from inner body. You can now with a piece of scrap liner push up in the front of the gun and push the body liner out the back of the inner body. If not using the body liner you will not have to remove the body to change a liner. Simply just push a piece of scrap liner material up in the front of the gun pushing the liner out the back. With the use of feeder adapters that require an Inlet Guide; you must remove the Inlet Guide first from the feeder adapter to push the liner out the back of the casing
11. If the copper adapter is worn or damaged from cross threading or spatter you can re-tap with a 7/16" tapered tap. If threads are damaged beyond repair the inner body must be replaced.

ASSEMBLY

1. To assemble the water-cooled curved gun, It is easier to get the black body tube over the hoses if you slide it over the gun end of the hose fittings first as they are smaller than the back fittings that go into the Utility Station. You must have the hoses in the correct orientation as they would go on the inner body. See # 2b for installing body housing after hoses are connected to inner body.
- 2a. Make sure to have the black body housing slid over the hoses (minus the casing) in the correct orientation. Connect all service lines to the inner body using 4 wrenches: Install all cables on inner body **do not install the casing at this time**. The power cable must be installed first using a crescent wrench on the large flats on the inner body and a 9/16" wrench on the power cable fitting. Make sure all fitting flats are lined up, then install the smaller red and blue gas and water in hoses using one wrench (3/8") on the inner body fittings and one 7/16" wrench on the the gas and water in hose fittings. Care must be exercised when reassembling the hoses to the fittings on the inner body. Make sure that they are secured tight with no leaks but do not over tighten them. **You must position the flats on the power cable fitting so that they line up with the flats on the inner body fitting, do the same for the water in and gas lines.** You cannot have the points of the fitting facing outwards, there is not enough room to assemble this way.
- 2b. To install the body housing after the hoses are connected to the inner body (do not install the casing at this time); first install the big blue water out and power cable on the inner body using a crescent wrench on the large flats on the inner body and a 9/16" wrench on the power cable fitting. Make sure all fitting flats are lined up, then install the smaller red and blue gas and water in hoses using one wrench (3/8") on the inner body fittings and one 7/16" wrench on the the gas and water in hose fittings. Care must be exercised when reassembling the hoses to the fittings on the inner body. Make sure that they are secured tight with no leaks but do not over tighten them. **You must position the flats on the power cable fitting so that they line up with the flats on the inner body fitting, do the same for the water in and gas lines.** You cannot have the points of the fitting facing outwards, there is not enough room to assemble this way. Take the body housing and insert hose each one at a time, the larger big blue hose, must be passed through the body housing last. You stagger the hoses and slide the body housing up over each one, one at a time. The gun should be secured to the table so it does not fall off and get damaged, or two people should be doing this step, one holding the welding gun and the other with the body housing at the back end of the cables. Start with the 2 smaller red and blue hoses first, stagger the hoses when inserting them through the body housing, the three end fittings will not go through the body at the same time. Slide up the body housing over the small red hose, stagger the hoses, now slide through the small blue hose, stagger the hoses, lastly, slide the large blue hose through the body housing and pull the hoses straight. You will feel resistance sliding up the big blue hose. You cannot have the cables out of position or twisted, they must be in the correct orientation that they connect to the inner body. Now slide the body housing up within 6-12 inches of the inner body.
3. Now insert the casing in the correct orientation from the back of the body housing, between the small red and blue hose, with gun end first, insert through body housing and secure with 10-24 set screw and allen wrench. You can make the casing snug tight so that it doesn't rotate in the inner body or you can back the set screw off just an 1/8" of as turn so that the casing can rotate in the inner body.
4. If all previous steps were followed correctly, all hose fitting flats were lined up, cables are not twisted, the body housing will go on over the hoses and fittings with little resistance. If anything has been bent, damaged, or is out of position, it will not go together. Never force anything.
5. The body tube can be slid or twisted up into position lining up the hole in the inner body with the body tube hole, secure with a flat head screwdriver on the body screw.
6. The O-ring (#33912 smaller o-ring) must be put in place on the inner body. There are 2 different O-Rings that look very similar, but are different sizes and cannot be mixed up. There can be no damage to the O-Rings.
7. Next you will insert the 2 Transfer Fittings into the Inner body. **They must be inserted into the inner body of the gun first; they cannot be put into the gooseneck first.** If the Transfer Fittings are put in the gooseneck first, you could damage the Transfer Fittings or the gun as it will not go together with the Transfer Fittings in the gooseneck. Again, the Transfer Fittings O-rings (#36807) must be lubricated with the silicon grease (we recommend Sil-Glyde #765-1351) and there can be no damage to the transfer fittings or O-Rings.
8. This is the last chance to inspect the heat shrink on the copper electrode. You can never install the gooseneck onto the torch body unless the heat shrink is present and has no signs of damage. There should be 5/16" of copper electrode showing towards the front of the gun body and .281" of copper electrode showing between the heat shrink and the gun body (under the white nylon collar).
9. Slide the white Nylon Collar up on the curved copper electrode. It will go all the way up and keep the O-ring (#33912) in place on the inner body. The other side of the white collar will also have an O-ring (#36805 larger o-ring). The O-Ring on the collar must fit in the groove of the collar and face away from the O-Ring on the inner body. All O-rings must be present and have no signs of damage.
10. You may now slide up carefully the water-cooled nozzle assembly (Gooseneck). With a little pressure it should snap or pop onto the transfer fittings and everything should be seated in place. Make sure neither of the collar O-rings have moved out of place. The must be seated in their grooves.
11. Take the retaining nut and slide the retaining nut up on to the gooseneck and up to the black body housing. The retaining nut will slide over easily if you apply a little pressure to it changing its shape from round to a very slight oval. Be careful not to cross thread the retaining nut when starting it on the body. The body screw must be secured snug tight before securing the retaining nut completely.

ASSEMBLY continued

12. Look down in the front of the gun and see that the copper electrode is centered. If it is not centered, you need to center it before you put the insulation tube and spatter disc in the gun. To center the electrode, loosen the retaining nut a half to a full turn. This will allow you to look down in the front of the gun and position or rotate the water cooled nozzle so that the copper electrode is centered up inside the nozzle. To further center the tip position; you can put the tip and collet in the gun and secure them, put the gas cup on the gun and inspect for centering. If not in center, you can take a flat head screwdriver and push or bend the tip into the correct position. This cannot be done with the spatter disc in the gun, you must remove the spatter disc before centering the tip. Make sure black body retaining nut is snug tight and secured before apply pressure to the tip and electrode for centering.

13. Before you put the consumables into the front of the gun; this is your chance to confirm that the liner was cut to the correct length. You should be able to see the liner sticking up either flush or .030" above the bottom of the counter bore in the copper electrode. If you look at your tip you will see the 60-degree counter bore in the back of the tip. You must cut the liner so that it is not forced into the counter bore but you want it to be flush or just slight into the counter bore. Now that the electrode is centered you an insert the insulation tube into the gooseneck. See page 19 for instructions to cut a new liner.

14. Now that the electrode is centered, insert the insulation tube into the front of the gooseneck. You can then put the spatter disc (gas diffuser) with the counter-bore facing the inner body. If you look closely at the spatter disc you will notice that one side of it has a counter-bore. The counter-end goes into the gun first. Never force the spatter disc into the gun with anything sharp. With the electrode centered, the spatter disc should go into the gun with ease. Then put the contact tip into the collet nut. With the tip sticking out of the collet nut you can insert the tip and collet nut into the spatter disc. Gently insert the collet nut into the copper electrode and make sure to start the threads correctly, you can push the tip all the way into the bore of the copper electrode before securing the tip. Never force any parts if they do not feel right. Always inspect clean, blow out and make sure all items are in their correct orientation and in good working condition.

***The tip should be recessed in the gas cup with a 1/8" set back. If needed the tip could be run in the flush position or as a stickout however, you must cut a new liner to the correct length if you have tip in any other position that the factory 1/8" recessed position. You want no gaps between the tip and liner for smooth feeding.

15. Install the Gas Cup/Gas Nozzle on the front of the gooseneck. You never want to use a gas cup with damaged or dirty threads. You must clean the gas cup threads with a wire wheel brush in a lathe or a hand drill. Always blow out a torch with every consumable change.

If any part does not go together easily or feel to be correct never force anything but take it out or apart immediately and inspect for damage or any part being put in the wrong orientation.

REQUIRED TOOLS LIST FOR DISASSEMBLY & ASSEMBLY

1. **D/F 12111 Collet/Tip Wrench** - This is the only tool that should ever be used to tighten the collet nut or the tip. Pressure should be 30 lbs., or as snug as hand tightened. Never use another wrench to apply more torque to this wrench.
2. **D/F Nozzle Thread Chaser Tap** - This is used to re-tap damaged threads that have been improperly cleaned or cross threaded. Always blow out the nozzle and gas nozzle after changing gas cup or re-tapping. For more information on how to use the nozzle thread chaser tap, use the following link: www.dfmachine.com/taps
3. ***NOT USED* Socket Wrench & 3/8" Long Socket** - This is used to tighten the transfer fittings onto the water-cooled nozzle. The transfer fittings have to be set at a specific height of 1.400" (accepted range is 1.395" – 1.410"), otherwise the water supply in the torch could be cut off, or the torch could leak. If the transfer fittings are tightened past 1.400" they can break. (see p. 21)
4. **3/8" Open Ended Wrench** - This is used on the inner body's water in hose fitting to secure the water in hose to the torch's inner body. A crescent wrench could be used instead, but due to the large size of crescent wrenches, we prefer the smaller size of the open ended wrenches. You never want to use excessive force by using too large of a wrench. You will use the Long 7/16" Open Ended Wrench for the fitting on the water in hose itself while using the 3/8" wrench to steady the inner body at the fitting. (see #5)
5. **Long 7/16" Open Ended Wrench** - This is used to secure the water in hose to the torch's inner body. (see #4)
6. **9/16" & 1/2" Open Ended Wrench**
 - A. This is used on the inner body's water out & power cable fitting to secure the water out and power cable to the torch's inner body. A crescent wrench could be used instead, but due to the large size of crescent wrenches, we prefer the smaller size of the open ended wrenches. We prefer the use of the larger wrenches on the power cable fitting to ensure that there are no water leaks, and that it has been seated correctly. You will use the #7 (Long 9/16" Open Ended Wrench) for the fitting on the water out & power cable hose. (see #7 A)
 - B. ***NOT USED***This wrench is also used to secure the adapter and jam nut that hold the current tip to the inner body. In your left hand hold the inner body, and with your right hand thread up the adapter using the 1/2" Open Ended Wrench until it is tight. Now place the same wrench on the jam nut and snug it up against the inner body. Keeping that wrench on the jam nut and placing it on the table for force, take #7 (Long 1/2" Open Ended Wrench), place it on the adapter and push it down (counter-clockwise) securing the adapter to the inner body. (see #7 B)
 - C. ***NOT USED***This is used on the inner body's gas fitting to secure the gas hose to the torch's inner body. A crescent wrench could be used instead, but due to the large size of crescent wrenches, we prefer the smaller size of the open ended wrenches.
7. **Long 1/2" & 9/16" Open Ended Wrench**
 - A. This is used to secure the water out & power cable to the torch's inner body. A medium size adjustable crescent wrench could be used as well. We prefer the use of the larger wrenches on the power cable fitting to ensure that there are no water leaks, and that it has been seated correctly. (see #6 A)
 - B. ***NOT USED*** This wrench is also used to secure the adapter and jam nut to the inner body. (see #6 B)
 - C. ***NOT USED***This is used to secure the gas hose to the torch's inner body. A crescent wrench could be used instead, but due to the large size of crescent wrenches, we prefer the smaller size of the open ended wrenches.
8. **Adjustable Crescent Wrench** - A medium size adjustable crescent wrench is used to remove the water/out & power cable. You must put a crescent wrench on the rear brass boss of the inner body and use the 9/16" open ended wrench on the power cable hose fitting. We prefer the use of the larger wrenches on the power cable fitting to ensure that there are no water leaks, and that it has been seated correctly. **CAUTION:** Never use excessive force with large wrenches, for you could twist or break parts.
9. **Standard Flat Head Screwdriver** - This is used to tighten or secure the torch's body screw. Also, the screwdriver can be used to straighten the contact tip if it is not aligned in the center of the gas cup or water-cooled nozzle **CAUTION:** This cannot be done unless the spatter disc has been removed from the torch.
10. **Long Nose Pliers** - Used to pull the tip out of the collet/gun.
11. **3/32" Allen Wrench** - This is used to secure the socket cap screw that holds the casing in the inner body.

REQUIRED TOOLS LIST FOR DISASSEMBLY & ASSEMBLY

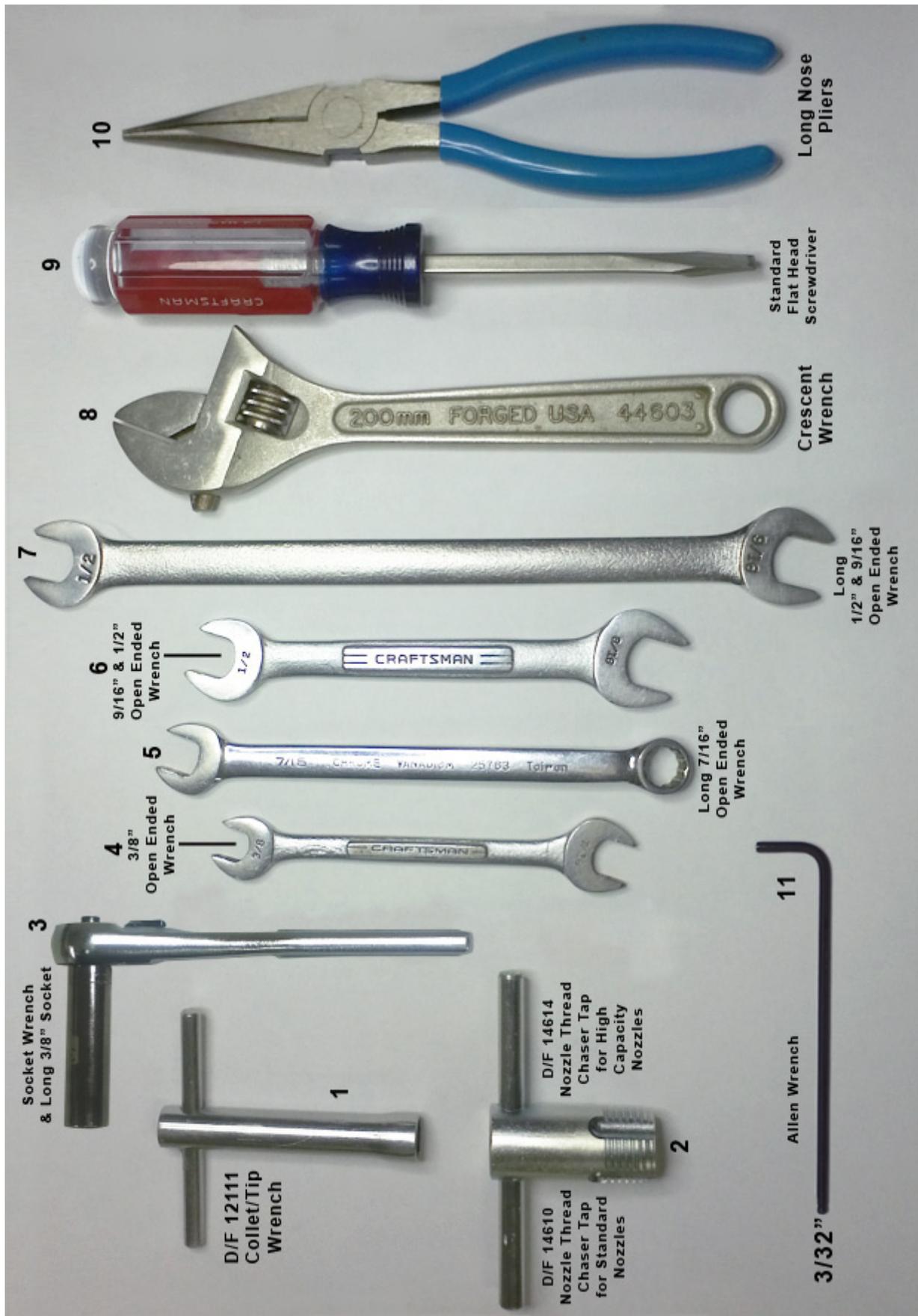


TABLE 1 - ORDERING INFORMATION

CODE NO.	DESCRIPTION	CURRENT TIP		RECOMMENDED WIRE DIAMETER RANGE	ARGON (AMPS)	CO ₂ (AMPS)	MODEL NO.
		TIP LENGTH	FASTENING METHOD				
36800	10 Ft. Assembly	2.625"	Collet Nut	.030"-1/16" Hard/Cored .035"-3/32" AL	500	600	NCC-P38-10

TABLE 2- SPARE PARTS

ITEM	CODE NO.	MIN QTY.
Gas Nozzle	To Be Selected	1
Current Tip	To Be Selected	25
Collet Nut	18262	1
Spatter Disc	42276	1
Insulation Tube	42275	1
Transfer Fitting	36806	2

TABLE 3 - CURRENT TIPS

CURRENT TIPS - 5/16" DIAMETER SLIP-IN

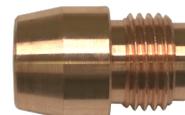
Gun/Barrel Model	Wire Size	Wire Type	Code No.
All NC, NCC, NCM (Tip provides 1/8" set back)	.030" (0.8mm)	Hard/Cored	19390
	.035" (0.9mm)	Hard/Cored	19391
	.045" (1.1mm)	Hard/Cored	19392
	.047" (1.2mm)	Hard/Cored	19494
	.052" (1.4mm)	Hard/Cored	19393
	1/16" (1.6mm)	Hard/Cored	19394
All NC, NCC, NCM (Tip provides 1/8" set back)	3/64" (1.2mm)	Aluminum (Short Welds)	19494
	3/64" (1.2mm)	Aluminum (Long Welds)	19407
	1/16" (1.6mm)	Aluminum (Short Welds)	19394
	1/16" (1.6mm)	Aluminum (Long Welds)	19408
	5/64" (2.0mm)	Aluminum	19728
	3/32" (2.4mm)	Aluminum	19409



TABLE 4 - GAS NOZZLES

STANDARD

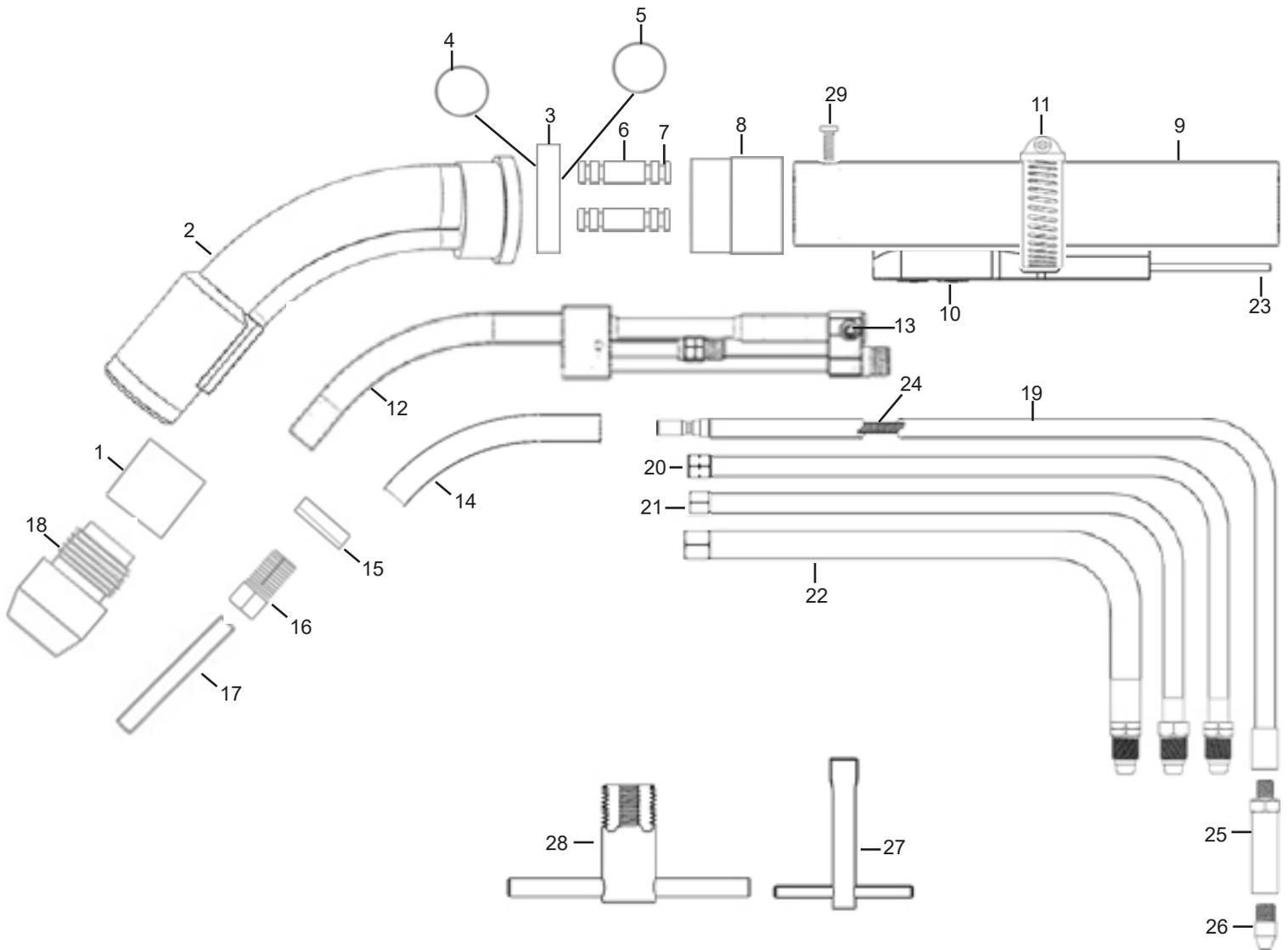
REF	CODE NO.	TYPE	O.D.	I.D.
1	10362	Copper Tapered	15/16"	5/8"



1

WATER-COOLED CURVED GUN - PARTS

MODEL NCC-P38 (Slip-In Tip)



REF.	CODE NO.	Description	REF.	CODE NO.	Description
1	42275	Insulation Tube	15	42276	Spatter Disc/Gas Diffuser
2	36803	W/C Nozzle (Gooseneck)	16	18262	Collet Nut
3	36804	Insulating Collar w/ O-rings	17		Current Tip (see pg. 10, table 3)
4	36805	O-Ring for Collar-W/C Nozzle Side-Large	18		Gas Nozzle (see pg. 10, table 4)
5	33912	O-Ring for Collar-Inner Body Side-Small	19		Casing/Conduit (see pg. 12, table 7)
6	36806	Transfer Fitting (2 req'd)	20	36300-10	Water In Hose 10ft (cut 11ft)
7	36807	O-Ring for Transfer Fitting (4 req'd each fitting)	21	36200-10	Gas Hose 10ft (cut 11 ft)
8	36809	Retaining Nut	22	36100-10	Water Out & Power Cable 10ft (cut 11 ft)
9	36808	Body Housing	23		Switch & Cable Assembly (see pg. 14 table 8)
10	32152	Switch Button & Housing	24		Liner (see pg. 12, table 6)
	36812	Switch ONLY	25		Wire Feeder Adapter (see pg. 14)
11	14803	Clamp	26		Inlet Guide (see pg. 14)
12	36801	Inner Body	27	12111	Collet/Tip Wrench
13	14712	Socket Set Screw (Secures Casing)	28	14610	Nozzle Thread Chaser Tap
14	36802	Heat Shrink for Inner Body	29	32610	Flat Head Screw - SS

TABLE 6 - LINERS

Description	Wire Size	10 Ft.
Hard/Cored	.035"-0.045"	16407
Hard/Cored	.045"-1/16"	16119
Stainless	.035"-0.045"	12336
Stainless	.045"-1/16"	16508
Aluminum	3/64"	12411
Aluminum	1/16"	12402
Aluminum	3/32"	16602

TABLE 7 - CASINGS

Description	Wire Size	10 Ft.
Casing Assembly (Flexible) Select Liner (Table 6)	.035"-1/16" Hard/Cored 3/64"-3/32 Aluminum	13751
Casing Assembly (Reinforced) Select Liner (Table 6)	.035"-1/16" Hard/Cored 3/64"-3/32 Aluminum	12445

TABLE 8 - SWITCH & CABLE ASSEMBLIES

Code No.	Feeder Manufacturer - Model No.	Type Of Connector	Length
32166	Miller "50" Series	AMP	10 Ft.
36111	OTC CMRE-741 & 742	Amphenol - 2 Pin	-
36140	Lincoln LN-7, LN-8, LN-9, Power Feed 10, LF-72, LF-74, PF-84	Amphenol - 5 Pin	-
31170	Miller "30" Series-Linde/ESAB31/35	Hubbell - 2 Blade	-
Code No.	DESCRIPTION (PLUG ONLY)	Type Of Connector	
12162	Miller "50" Series	AMP	
13850	OTC CMRE-741 & 742	Amphenol - 2 Pin	
12160	Hobart-Airco-Westinghouse	Amphenol - 3 Pin	
14731	Oxo All-Auto Arc	Amphenol - 4 Pin	
14734	Lincoln LN-7, LN-8, LN-9, Power Feed 10, LF-72, LF-74, PF-84	Amphenol - 5 Pin	
13317	Miller "30" Series-Linde/ESAB31/35	Hubbell - 2 Blade	
13431	Hobart 27	Phone Jack	

UTILITY STATION - STANDARD

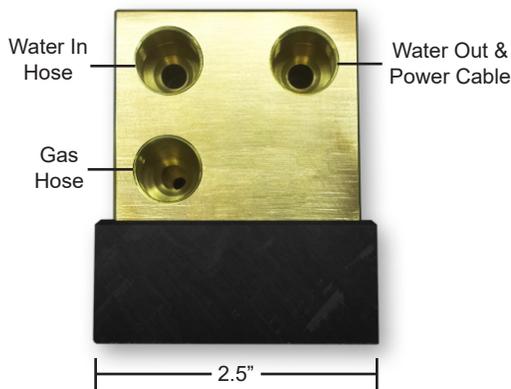
ORDERING INFORMATION

Description	Code No.
Utility Station	45196
Utility Station - Dual Power Cable	45188

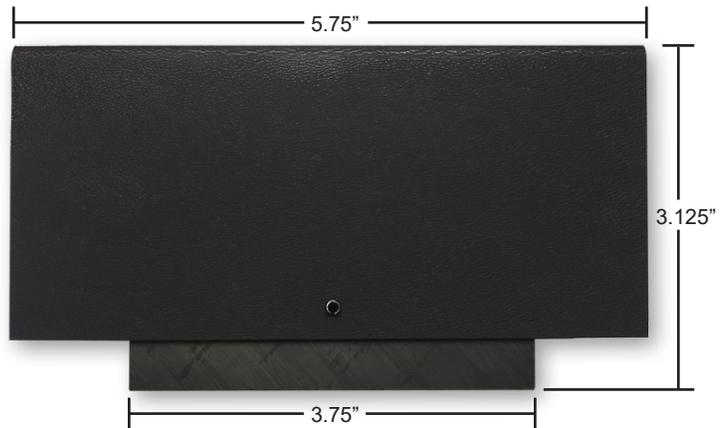
DIMENSION SPECIFICATIONS

Base Length	3.75"
Overall Length	5.75"
Base Width	2.25"
Overall Width	2.5"
Overall Height	3.125"
Mounting Hole Center Distance	2.75"
Overall Weight	3.5 lbs.

D/F TORCH CONNECTION



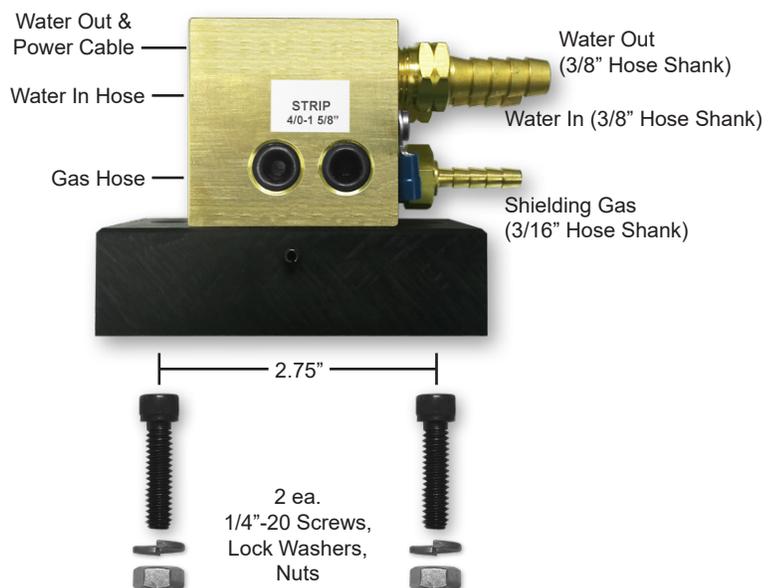
UTILITY STATION SIDE VIEW WITH COVER



CUSTOMER UTILITIES CONNECTION



FROM LEFT: D/F TORCH CONNECTION FROM RIGHT: CUSTOMER UTILITIES CONNECTION



WIRE FEEDER ADAPTERS & INLETS

Manufacturer	Models	Wire Diameter	Remote Mount Adapter			Direct Mount Adapter	
			Hard or AL	Cored	Stub* Liner	Hard or AL	Cored
ESAB®	D20 (20mm)	.030"-3/32" H/C/AL 5/64"-1/8" H/C	13098	13099	*	13096	13097
ESAB®			18246	18247		18248	18249
EURO			18493	18493		18540	18540
Hobart®	All Models	.030"-3/32" H/C/AL 5/64"-1/8" H/C	13067	16087	*	13068	16225
Lincoln®	LN-7, LN-8, NA5-R	.030"-3/32" H/C/AL 5/64"-1/8" H/C	13110	13112	*	13113	13116
	LN-9	.030"-3/32" H/C/AL 5/64"-1/8" H/C	16581	16582	*	16528	16529
	4R220	.030"-3/32" H/C/AL 5/64"-1/8" H/C	13462	13463		13464	13465
	NA3, NA5 MAXSA	.030"-3/32" H/C/AL 5/64"-1/8" H/C	16879	16878	*	16880	16881
Lincoln® "BIG MIG"	NA3, NA5 MAXSA	.030"-3/32" H/C/AL 5/64"-1/8" H/C	16879	16878	*	16888	16888
Lincoln®	Power-Feed 10, LF-72, LF-74, 84	.030"-3/32" H/C/AL 5/64"-1/8" H/C	13479	13469	*	13480	13468
Linde®	SWM31 SWM34 SWM37 SWM38 EH8	Casing to Feeder (Accepts Linde® Outlet Guide)	13046			13046	
		D/F Insert .035"-0.045" Hard .045"-1/16" Hard 5/64"-3/32" Cored 3/64"-1/16" AL	13047 13048 13050	13049		13047 13048 13050	13049
	EH10	.030"-3/32" H/C/AL 5/64"-1/8" H/C	13043	13052	*	13080	13079
Mavrix®	PA-10	.030"-3/32" H/C/AL 5/64"-1/8" H/C	16556	16568	Requires Inlet		
Miller® (50 Series)		.030"-3/32" H/C/AL 5/64"-1/8" H/C	16557	16559	*	16558	16560
Miller® "BIG MIG"		.030"-1/8"	16557	16559		13139	13139
OTC®	Requires Inlet	.030"-1/8" .030"-1/8"	18268		*	18275	
	CMRE-741		18282			18282	
Panasonic®	PME-12X YW50AKW1	.030"-1/16" .030"-1/16"	13090 13466	Requires Inlet			
TWECO®	#4	.030"-3/32" H/C/AL 5/64"-1/8" H/C	13479	13469	*	13480	13468
Welding Alloys®		.030"-3/32" H/C/AL 5/64"-1/8" H/C		Requires Liner Requires Inlet		13486	13486

*Stub liners only required in feeder adapter when single-piece casing is used.



ORDERING INFORMATION

Each D/F gun is fully assembled and ready to install. In order to make the installation complete, the code number, wire size & type, make/model of wire feeder, and inlet as needed must be specified when ordering. If special welding tools or accessories other than those listed previously are required, please consult with the factory.

FEEDER ADAPTER INLETS

Wire Size	Steel Code No.	Brass Code No.	Nylon Code No.
.030"	13801	16417	
.035"	13803	16418	
.045"	13806	16419	
.052"	13844	16420	
1/16"	13809	16421	
5/64"	13812	16422	
3/32"	13814	16422	
7/64"	13816		
1/8"	13842		
3/64" AL			13807
1/16" AL			13810
3/32" AL			13815

Esab®, Hobart®, Lincoln®, Linde®, Miller®, OTC®, Panasonic®, ABB®, Fanuc®, Kuka®, Mavrix®, Motoman®, Thermal Arc®, TWECO®, & Welding Alloys® are registered trademarks of their respective companies. Names are mentioned for reference only. D/F Machine Specialties is in no way affiliated with these companies.



WHAT IS THE PROPER USE OF THE NOZZLE THREAD CHASER TAP?

All D/F Nozzles are hand checked for fit before and after plating, and checked again before shipping. If a nozzle has been installed on a new complete torch, they have also been hand checked while being assembled.

The only reason to ever take a gas cup out a nozzle is to clean it. The nozzle and the gas cup must be blown out, and all of the threads have to be wire brushed and blown out again before hand-tightening the gas cup back into the nozzle. If you can't thread it in by hand then something is wrong. Never force a gas cup into a nozzle.

When using the D/F Machine Specialties nozzle thread chaser taps, be sure to always follow the steps below:

1. Make sure that the nozzle is properly supported when tapping so it does not twist in the front of the torch body and cause damage.
 - Improper support can cause the spigots to twist off the top of the rear nozzle collar, or damage the torch internal body parts.
 - Note where the water ports go down the sides of the water-cooled nozzle (following down in line with the spigots). Too much direct pressure on these water ports could cause them to cave in and block of the flow of water.
 - Best practice is to hold the water-cooled nozzle in a vice with soft jaws, perpendicular to the spigots.
 - Over-tightening of the vice can cause damage in general.
2. Remove the tip from the front of the torch before tapping.
3. Lightly lubricate the nozzle and nozzle thread chaser tap before tapping.
4. Be sure to start the tap very carefully. Do not cross thread the nozzle.
5. Be very careful to start threads correctly. Only tap 1/2 turn at a time, always backing up and removing chips 1/2 cycle at a time before moving forward. Do not try to tap further into the water-cooled nozzle than needed or past the factory thread depth.
6. Blow out the nozzle after tapping. Wire brush and blow off the gas cup before threading it back into the nozzle.
7. If nozzle is badly deformed or damaged please return to the factory for a repair estimate before disposing of product (damaged parts can often be repaired).

ORDERING INFORMATION - NOZZLE THREAD CHASER TAPS

CODE NO.	DESCRIPTION	USED WITH NOZZLE ASSEMBLY	USED FOR GAS NOZZLE
14610	Nozzle Thread Chaser Tap for Standard A/C & W/C Nozzle Assembly Front	13197 16184 11117, 45101 11118, 45102 11119, 45103 45114 45107 NCC-N/HTC-N NCC-LRN, HTC-LRN	10340 10359 10362 10374
14611	Nozzle Thread Chaser Tap for BIG MIG & BIG TIG Nozzle Assembly Front	11123	10382 10387 10389 10390 10392
14612	Nozzle Thread Chaser Tap for Nozzle Body Assembly Rear	13196 13197 13198 16184	
14614	Nozzle Thread Chaser Tap for Series A High-Capacity Nozzle Assembly Front	11142, 45120 11138, 45121 45127 11132, 45129 45125	16748 16749 16750 16751 18030 18031 18032
14615	Nozzle Thread Chaser Tap for Nozzle Body Assembly Front	13198	10379
14617	Nozzle Thread Chaser Tap for Tandem Nozzle Assembly Front	41641	41667 41668



HOW DO I CUT, FIT, AND INSTALL A NEW LINER?

1. Be sure the MIG Gun cable is arranged in a straight line, free from twists, when installing or removing a wire liner.
2. Remove the old liner by first removing the MIG gun's contact tip.
3. Pull the old wire liner out of the conduit/casing assembly from the feeder connector or feeder adapter plug end. If you are using a feeder adapter that has an inlet, the inlet must be removed first. If you have any problems removing the liner you may un-thread the feeder adapter first this will also back the liner out of the conduit/casing. You can also take a piece of liner and go to the front of the gun and with the tip out of the gun you can push the old liner with a piece of liner material from the front out the back an inch or two.
4. If you know that the old liner is the correct length or is still the original liner that was cut at the factory you may hold the new liner up against the old liner and cut off the new liner to the same size as the old liner. This method is not recommended as it is still very hard to get the liner cut to the exact length.
5. Make sure you have a good sharp cut off blade in your utility knife to cut a nylon liner, never use a side cutter or a dull blade to cut a nylon liner. For cutting a steel liner make sure you have a new sharp wire cutters or side cutters.
6. To get the correct length of the new liner, insert the liner into the feeder adapter and feed it through the conduit/casing.
7. Once again be sure the MIG Gun cable is arranged in a straight line, free from twists, when installing a new wire liner.
8. Sometimes on longer conduits/casings and liners it may take 2 people; one on each end to rotate and twist the conduit/casing to get the liner through the torch. We recommend a 60-degree chamfer tool on the end of the Nylon liner to allow it to feed through the casing smoothly.
9. If you have any troubles getting a liner through a torch make sure you have a good sharp cut off, and if you have to you can gently sand the end of the liner on a belt sander. You can remove the cast in the aluminum liner by pre-bending and straightening the liner before loading.
10. After the new liner comes out the end of the torch, insert the inlet guide into the feeder adapter, now you can put a little back pressure on the liner ensuring that it is all the way back against the inlet guide. You will want to cut the new liner off flush with the end of the copper gas nozzle/cup.
11. Now you have the overall length of the liner, you still have to take out the length of the contact tip.
12. Carefully remove the liner one more time.
13. After removing the liner hold the gun end of the liner up against the tip.
14. Cut off the length off the tip plus the set back of the tip (1/8" or 3/8" tip setbacks)
15. Now that you have cut off the length of the tip plus the setback you may install the new liner and it will back up into the back of the tips 60-degree chamfer.
16. We always recommend checking the condition of the insulation tube and spatter disc/gas diffuser in the front of the torch and collet nut that holds the slip-in tip.
17. We always recommend replacing the contact tip, and nozzle, after installing a new liner.

TROUBLESHOOTING: GENERAL GUIDE

Problems/Causes

Possible Solutions

ERRATIC WIRE FEED

Slipping feed rolls

Check that the feed roll size is correct for the wire size being used. Increase the drive roll pressure until the wire feed is even. Do not apply excessive pressure as this can damage the wire surface, causing copper coating to loosen from steel wires or metal shavings to be formed from soft wires like aluminum. These metal fragments or shavings can be drawn into the wire feed conduit and will rapidly clog the liner. When welding with flux-cored wires, excessive drive roll pressure may open the wire seam and allow flux or metal powders to escape.

Clogged or worn gun liner

a. Dust, particles of copper, drawing lubricants, metal or flux and other forms of contamination can all clog the liner so that the wire feed is slowed or impeded. A liner that has been in use for an extended period of time becomes worn and filled with dirt and must be replaced.

b. When changing the welding wire, remove the tip from the front end of the gun and blow out the body liner with clean, dry compressed air from the back of the gun. Repeat with the casing and liner assembly. Note: Wear safety goggles when using compressed air to clean the liners. Make sure proper safety procedures are followed in order to avoid possible serious eye injury.

Liners too long or too short

Check the lengths of the liners and trim or replace if too long or too short. The efficient feeding of the welding wire is dependent on the liners fitting correctly.

Spatter on the wire

An unprotected coil of wire quickly collects dust and other airborne contamination. If grinding is being performed in the vicinity, particles can become attached to the wire, severely interfering with the wire feed. Replace with clean wire and keep it protected with a cover. Make sure spare wire rolls are stored in a clean, dry place.

Coil brake incorrectly adjusted

Set the brake so that the coil immediately stops rotating as soon as welding is interrupted. If the brake is applied too hard it will cause the feed rolls to slip, resulting in uneven wire feed. If it is too loose, overrun of the wire will occur, causing wire tangles, inconsistent tension on the feed mechanism and irregular arc characteristics.

UNSTABLE ARC

Incorrect setting of voltage and/or current

Set the wire feed in relation to the arc voltage in such a way that the arc is stable and burns evenly. In spray arc welding, set the wire feed so that there are no short circuits and the filler metal is transferred in a spray across the arc. Find the cause of the interference and correct it. (See ERRATIC WIRE FEED above)

Problems in wire feeding: worn current tip

When the internal diameter of the current tip becomes worn from the passage of wire through it, the wire may no longer stay in continuous electrical contact with the tip. This results in an unstable arc and an increase in spatter. Paint, mill scale, silicon scale, rust or flux deposits from previous weld runs may form an insulating layer causing an unstable arc. Clean the surfaces to be welded.

Impurities on the base metal

Securely attach the ground cable as close to the point of welding as possible on the workpiece. Clean the surfaces thoroughly to ensure good contact.

Poor contact between ground cable and workpiece or loose power connection

Check to insure the welding power connection on the power source is tight, the and workpiece. Connection on the wire feeder is tight, the connection to the adaptor block is tight, Loose power connection and the connection of the gun to the adaptor block is tight.

Stick-out too long

Adjust the current tip to work distance to a minimum of 3/8" for short arc welding. A more precise distance is 15 times the wire diameter.

TROUBLESHOOTING: GENERAL GUIDE

Problems/Causes

Possible Solutions

AIR-COOLED GUN RUNNING TOO HOT

Poor ground

Inspect ground cable for loose connections, fraying and cuts. Correct any problem areas found. Clean clamping area to insure good contact. Securely attach the ground cable to the workpiece, as close as possible to the point of welding. Make sure there is a good connection to the welding power source.

Loose power connection

Check to make sure the power connection on the power source is tight, the connection on the wire feeder is tight, the connection to the adaptor block is tight, and the connection of the gun to the adaptor block is tight.

Consumable items loose or worn

Remove nozzle from gun and inspect current tip, collet nut (tip holder) and spatter disc (gas diffuser) for wear and tightness; replace or tighten as necessary.

Capacity of gun being exceeded

Note complete weld parameters, including welding current (Amps), welding voltage, wire feed speed, type and size of wire, type of gas and flow rate of gas and consult your local Authorized D/F Machine Specialties Distributor or contact the factory.

Dirty connection

Remove torch and inspect parts for dirt build-up. Periodic cleaning is necessary.

TROUBLESHOOTING: POROSITY (SUMMARY)

NOTE: Most POROSITY is caused by gas problems, followed by base metal contamination.

Causes of Porosity

BASE METAL CONTAMINATION

Impurities on base metal

FILLER METAL CONTAMINATION

Impurities on filler metal (wire)

ATMOSPHERIC CONTAMINATION

Drafts, wind, fans, etc.

GAS MIXING APPARATUS

1. Too high a gas flow, causing turbulence, and/or sucking air at hose connections; creating the venturi effect at end of gas nozzle
2. Too low a gas flow, causing insufficient gas coverage
3. Damaged or kinked gas lines
4. Too high an oxygen content
5. Leaks in gas distribution system
6. Other impurities in gas - moisture, etc.
7. Inconsistent gas flow (cfh) at the torch connection

GAS TURBULENCE

1. Excessive spatter build-up in gas nozzle and on current tip
2. Nozzle damage, causing uneven gas coverage
3. Torch gas ports clogged or deformed
4. Super-heated nozzle, causing shielding gas to expand rapidly and create return effect at end of nozzle
5. Gas diffuser/nozzle insulator missing
6. Too high a gas flow causing the venturi effect

WELDING PARAMETERS, ETC.

1. Too long a wire stick-out; gas nozzle too far from weld puddle
2. Bad torch position - too sharp a torch incline causing the venturi effect at the end of the nozzle leading to atmospheric contamination
3. Excessively wide weld pool for nozzle I.D.
4. Arc voltage too high
5. Too high a travel speed

Possible Solutions

- a. Remove contamination; clean surfaces
 - b. Use of specific wire/gas mix for specific types of impurities
-
- a. Replace wire
 - b. Install wire-cleaning system
 - c. Prevent industrial dust/dirt/grit from contaminating wire during storage or use
 - d. Prevent build-up of aluminum oxide on exposed aluminum wire surface by using up quickly
 - e. Remove wire from wire drive unit and store in a sealed plastic bag when not in use for long periods
-
- a. Protect weld from drafts (curtains/screens)
 - b. Use tapered or bottleneck gas nozzles when drafts cannot be avoided
-
- 1a. Reduce gas flow
 - 1b. Tighten all hose connection points
 2. Increase gas flow
 3. Repair or replace
 4. Adjust mixer
 5. Repair leaks
 6. Overhaul system; fit filters and/or dryers
 7. Regulate pressure into flow meter for consistent cfh delivery of gas
-
1. Clean nozzle and tip regularly; spray with anti-spatter fluid
 2. Replace nozzle
 3. Clean or replace
 4. Check duty cycle rating of torch
 5. Replace
 6. Reduce gas flow
-
1. Use longer nozzle or adjust stick-out (3/8" minimum or 15 times wire diameter)
 2. Correct torch angle
 3. Width of the weld pool should be 1.3 times the nozzle I.D.; use suitable wider gas nozzle
 4. Reduce voltage
 5. Reduce speed

TROUBLESHOOTING: SPATTER

Problems/Causes

SPATTER

Too fast or too slow wire feed for the arc voltage

Too long an arc

Damaged current tip

Inclination of welding gun too great

Faulty power source

Incorrect start

Incorrect pulse parameters

Uneven wire feed

Impurities on the base metal

Poor ground contact

Too long stick-out (short-arc welding)

Incorrect polarity

Possible Solutions

Set the wire feed rate and voltage in accordance with good welding practices as recommended by a qualified welding engineer.

Adjust the wire feed and voltage so that the arc is in accordance with good welding practice for the joint to be welded. The distance from the current tip to the workpiece should be 15 times the welding wire diameter. If the arc is too long there will be spatter, usually in the direction of the weld.

If the current tip becomes worn the welding wire will not be in constant contact with the tip and the arc will become unstable. A current tip contaminated with spatter will cause uneven wire feed resulting in further spatter.

The angle of the gas nozzle relative to the workpiece should be between 45 and 90 degrees. If the angle is too small, the wire runs parallel to the weld pool, resulting in spatter in the direction of the welding.

Have the power source checked for faulty conditions such as broken wires and faulty contacts.

A great deal of spatter occurs if the stick-out is too great and if the welding gun is held too far from the workpiece when striking the arc. Try to start with as short a stick-out as possible and with the welding gun as close to the starting point as possible. If a large ball end is formed on the end of the welding wire, remove it by cutting the wire with sharp wire cutters. It is helpful if the wire is cut to a point. Always remove the ball end before striking an aluminum arc. Check the welding ground connection.

Check the user manual for your power supply or consult a qualified welding engineer.

Uneven wire feed gives rise to heavy spatter. Find the cause of the disturbance and correct the condition before proceeding.

Paint, mill scale, rust and other contamination on the base metal form an insulating layer causing an unstable arc that results in heavy spatter. Clean the surfaces to be welded.

Inspect ground cable for loose connections, fraying and cuts. Correct any problem areas found and attach the ground cable directly to the workpiece after having cleaned the contact surface first. **POOR GROUND CONTACT IS THE MOST COMMON CAUSE OF UNSTABLE MIG WELDING CONDITIONS.**

The stick-out should be 15 times the diameter of the wire electrode being used. With increasing stick-out, the current is reduced and the arc voltage rises, giving a longer unstable arc and increased spatter.

Check for correct polarity. Follow the electrode manufacturer's recommendations.

D/F MACHINE SPECIALTIES, INC.

MIG & TIG Welding Products, Consumables & Accessories

WARRANTY

This Equipment is sold by D/F MACHINE SPECIALTIES, Incorporated, under the warranty set forth in the following paragraph. Such warranty is extended only to the buyer who purchases the equipment directly from D/F or its authorized distributor as new merchandise.

The barrel and cable assemblies are warranted by D/F to be free from manufacturing defects for 90 days after delivery by D/F, provided that the equipment is properly operated under conditions of normal use and that regular periodic maintenance and service is performed. Expendable parts are not warranted for any specific time. Expendable parts referred to herein would be the nozzles, current tips, spatter discs, insulators, casing liners, and wire inlets. D/F's sole obligation under this warranty is limited to making replacement at its manufacturing facility for barrel assemblies which are returned to it with transportation charges prepaid, and upon D/F's examination have been found to be so defective.

Genuine D/F MACHINE SPECIALTIES, Inc. Parts, Accessories, and Consumables must be used for safety and performance reasons. The use of anything other than genuine D/F MACHINE SPECIALTIES, Inc. Parts, Accessories, or Consumables will void this Warranty. All units returned for warranty repair are subject to Warranty Inspection. Warranty and repair work shall not apply to goods that have been altered or repaired, have been subject to misuse or used while any parts are loose, broken, or damaged, or used with other than original D/F® parts, consumables, or accessories which may affect performance and safety.



Rev. 150603-3

D/F MACHINE SPECIALTIES, INC.

1750 Howard Drive

North Mankato, MN 56003

Phone: (507) 625-6200

Fax: (507) 625-6203

www.dfmachinespecialties.com