Instruction Manual 546-35 Long
NCM/HTM X-LRN
35 Degree Robotic Torches
Revised 07/2020

D/F MACHINE SPECIALTIES, INC.

MIG & TIG Welding Products, Consumables & Accessories

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WATER-COOLED MACHINE BARRELS

Remote Mount Docking Spool/Weld Body Combination

Extra Long Reach 35 Degree W/C Nozzle
Docking Spool Machine Barrel

INSTRUCTIONS, 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.

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.

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.

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.

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.

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

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BE SURE THIS SAFETY GUIDE REACHES THE OPERATOR

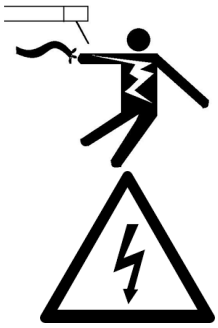
SAFETY MEASURES - **PLEASE READ!**

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 flammagle 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, electical 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 belind 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 implated medical devices.

- Persons with iimplanted 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 productes a chemical known to the State of California to cause cancer and birth defects (or other reprodcutive 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 COMBUSTABLES 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 Standarts Association, 178 Rexdale Blvd, Rexdale, ON, Canada M9W 1R3.
- OSHA, SAFETY AND HEALTH STANDARDS, 29CRF 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 cycle or multiple torch cooling systems: MTA - 716-693-8651 - www.mta-usa.com

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INTRODUCTION

This manual covers the Remote Mount Docking Spool®/Weld Body Combination which accommodates a Composite Type Water-Cooled Machine Barrel. This arrangement is readily adaptable to Dedicated or Robotic Welding applications.
The equipment consists of four (4) basic components: a Utility Station, an intermediate Utilities Combination Assembly, a Docking Spool®/Weld Body Combination and a Water-Cooled Machine Barrel.
The Docking Spool®/Weld Body Combination is the principal component in this welding equipment arrangement. It accepts the utilities at the top end of the Spool and provides a means of accepting the Water-Cooled Machine Barrel at the lower end. Several features important to a welding system are provided. Incorporated within the water channels of the Docking Spool® are check valves which provide a means of retaining residual water in the check lines when the nozzle assembly is removed from the Docking Spool®/Weld Body Combination. In addition, a Posit® Ring is provided at the upper end of the Spool which allows positive location in a Mounting Bracket to maintain dimensional stability.
These Model NCM-X-LRN have a current capacity of 500/600 amperes in argon shielding. They accommodate slip-in current tips fastened by a collet action nut. The wire diameter with hard wire is .030”-1/8,” and with aluminum is 3/64”-3/32”.
The Model HTM-X-LRN have a current capacity range of 500/600 amperes. They employ threaded current tips. The wire diameter with hard wire is .030”-1/8,” and with aluminum is 3/64”-3/32”.
Reference page 11 for the parts breakdown covering the X-Long Reach Water-Cooled Machine Barrel.
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.

DISASSEMBLY

To remove the Water-Cooled Nozzle from the Docking Spool®, proceed as follows.
1) Remove the forward gas nozzle.
2) Next with the wrench remove the collet nut and current tip. This will allow the insulation tube, spatter disc, and support tube to be removed.
3) Unscrew the cone nut which fastens the Water-Cooled Nozzle assembly to the Docking Spool® body of the torch. The Water-Cooled Nozzle may now be pulled from the Docking Spool®.
4) If damaged the water transfer fittings may be removed from the Water-Cooled Nozzle with a 7/16” open end wrench. Transfer fittings are not designed to be reused. If you do not have any spares and are forced to reuse a transfer fitting, you must use Loc-Tite to reseal the threads. Examine the O-rings on the water transfer fittings. Make replacement if necessary. Lubricate the O-rings with silicone lubricant. See page 19 for directions on achieving correct transfer fitting height (1.410”).

ASSEMBLY

1) The nylon collar should be placed over the fittings on the rear of the Water-Cooled Nozzle assembly. It is important that the collar alignment and indication hole (viewed from the rear of the nozzle) align with the small concave mark provided on the collar of the Water-Cooled Nozzle. Apply the water transfer fittings to the fittings provided on the Water-Cooled Nozzle See page 21 for directions on achieving correct transfer fitting height (1.410”). The transfer fittings will break if they are tightened too far, and they will leak if they are not tight enough. Also, transfer fittings are not designed to be reused. If you do not have any spare transfer fittings and are forced to reuse one, you must use Loc-Tite to reseal the threads. Examine the O-rings on the water transfer fittings. Make replacement if necessary, and lubricate the O-rings with silicone lubricant.
2) The nozzle assembly may now be applied to the Docking Spool®. For proper orientation of the water fittings to the channels provided in the Docking Spool®, it is extremely important that the indicator hole in the collar align with the small concave mark provided on the face of the Docking Spool. This alignment will allow the Water-Cooled Nozzle to be pushed up into the Docking Spool®, after which the cone nut may be applied. Make sure that the nozzle is all the way up and that the cone nut is very tight.
3) The insulation tube should now be placed in the Water-Cooled Nozzle. With the high capacity water cooled nozzle assemblies, the insulation tube has a shoulder on one end with a smaller ID that must be inserted up into the torch and recess inside the counter-bored collar of the water-cooled nozzle assembly. Next, insert the spatter disc into the Water-Cooled Nozzle, followed by pushing the support tube (for high capacity nozzles) up into the Water-Cooled Nozzle onto the front of the Docking Spool. The collet nut will hold the support tube, spatter disc, and insulation tube in the torch. The collet does not have to be removed but only loosened 1/2 turn to 1 full turn to change a slip-in tip. When using a threaded tip, the tip itself holds the support tube and inner parts in place. Please remember that you do not have to remove a gas nozzle to change a tip. For nozzle cleaning with the nozzle thread chaser tap, see p. 18. Always clean and blow out a torch before applying the current tip and gas nozzle.

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. Hand tighten. 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. **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. 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. 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. This wrench is also used to secure the adapter and jam nut to the inner body. (see #6 B)
   C. 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 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. **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**

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

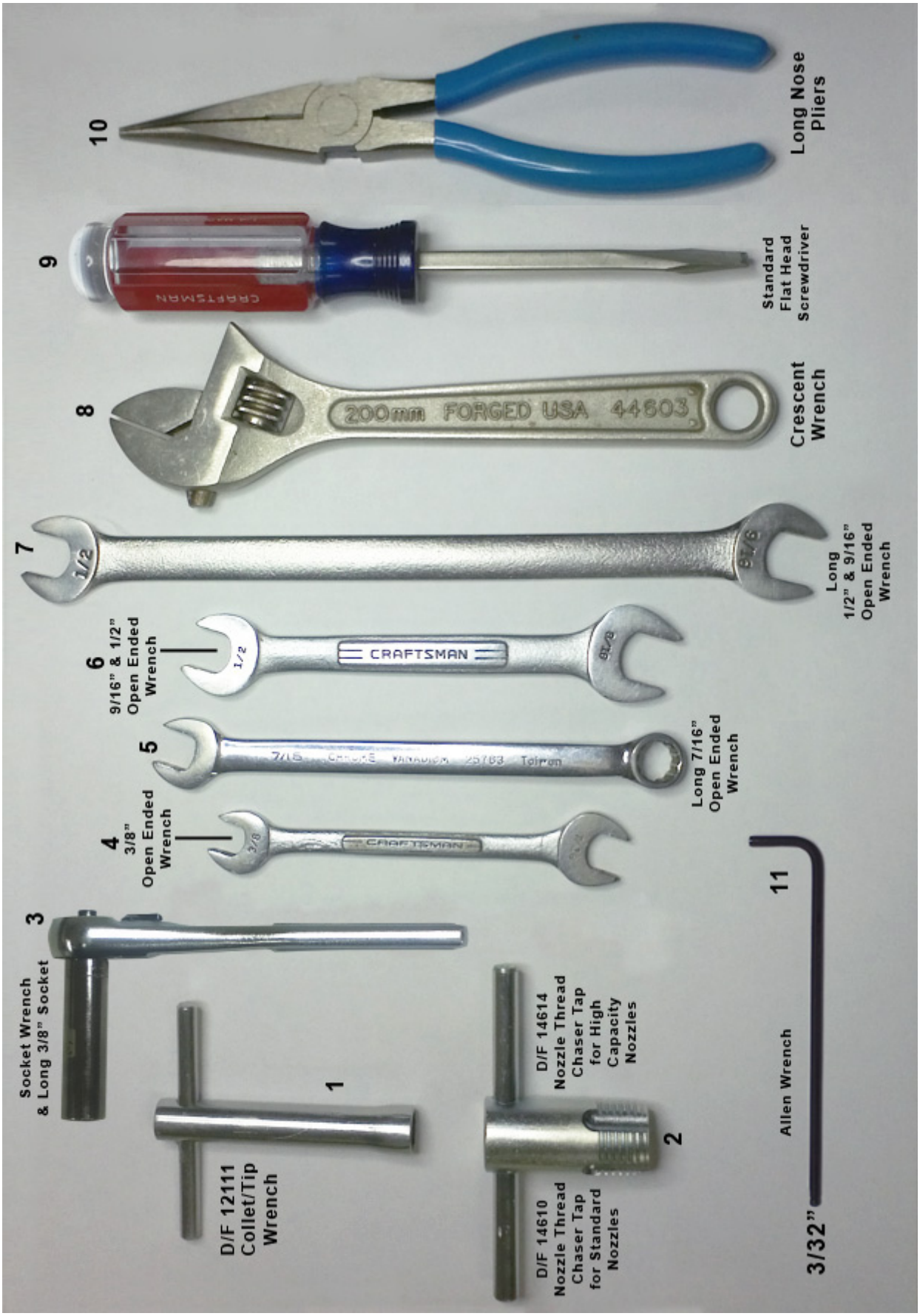


TABLE 1 - GAS NOZZLES

REF	CODE NO.	TYPE	O.D.	I.D.
1	10362	Copper Tapered	15/16”	5/8”
2	10340	Copper Straight	1”	3/4”
3	10374	Copper Straight	5/8”	7/16”
4	10359	Copper Tapered	15/16”	5/8”

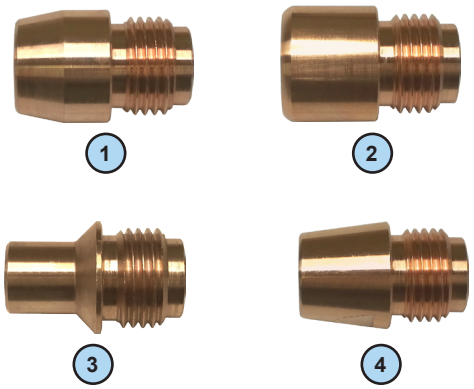
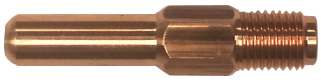


TABLE 2 - CURRENT TIPS

CURRENT TIPS - 7/16” DIAMETER THREADED

Gun/Barrel Model	Wire Size	Wire Type	Code No.
All HT, HTC, HTM, CTW, CW-T, MTW (Tip provides 1/8” set back)	.035”	Hard	15116
	.045”	Hard	15117
	.052”	Hard	15121
	1/16”	Hard	15118
	5/64”	Hard	15119
	3/32”	Hard	15120
	7/64”	Hard	15122
	1/8”	Hard	15105
All HT, HTC, HTM, CTW, CW-T, MTW (Tip provides 3/8” set back)	.045”	Cored	15106
	.052”	Cored	15112
	1/16”	Cored	15107
	5/64”	Cored	15108
	3/32”	Cored	15109
	7/64”	Cored	15110
	1/8”	Cored	15111
All HT, HTC, HTM, CTW, CW-T, MTW (Tip provides 1/8” set back)	3/64”	Aluminum	15126
	1/16”	Aluminum	15125
	5/64”	Aluminum	15087
	3/32”	Aluminum	15148
	1/8”	Aluminum	15123



CURRENT TIPS - 2-1/2” SLIP-IN - 5/16” DIAMETER

Gun/Barrel Model	Wire Size	Wire Type	Code No.
All NC, NCC, NCM (Tip provides 1/8” set back)	.030”	Hard	19390
	.035”	Hard	19391
	.045”	Hard	19392
	.052”	Hard	19393
	1/16”	Hard	19394
	5/64”	Hard	19711
	3/32”	Hard	19726
	7/64”	Hard	19396
	1/8”	Hard	19727
All NC, NCC, NCM (Tip provides 3/8” set back)	.035”	Cored	19400
	.045”	Cored	19401
	.052”	Cored	19402
	1/16”	Cored	19403
	5/64”	Cored	19404
	3/32”	Cored	19405
	7/64”	Cored	19406
	1/8”	Cored	19720
All NC, NCC, NCM (Tip provides 1/8” set back)	3/64”	Aluminum	19407
	1/16”	Aluminum	19408
	5/64”	Aluminum	19728
	3/32”	Aluminum	19409

TABLE 3 - SPARE PARTS

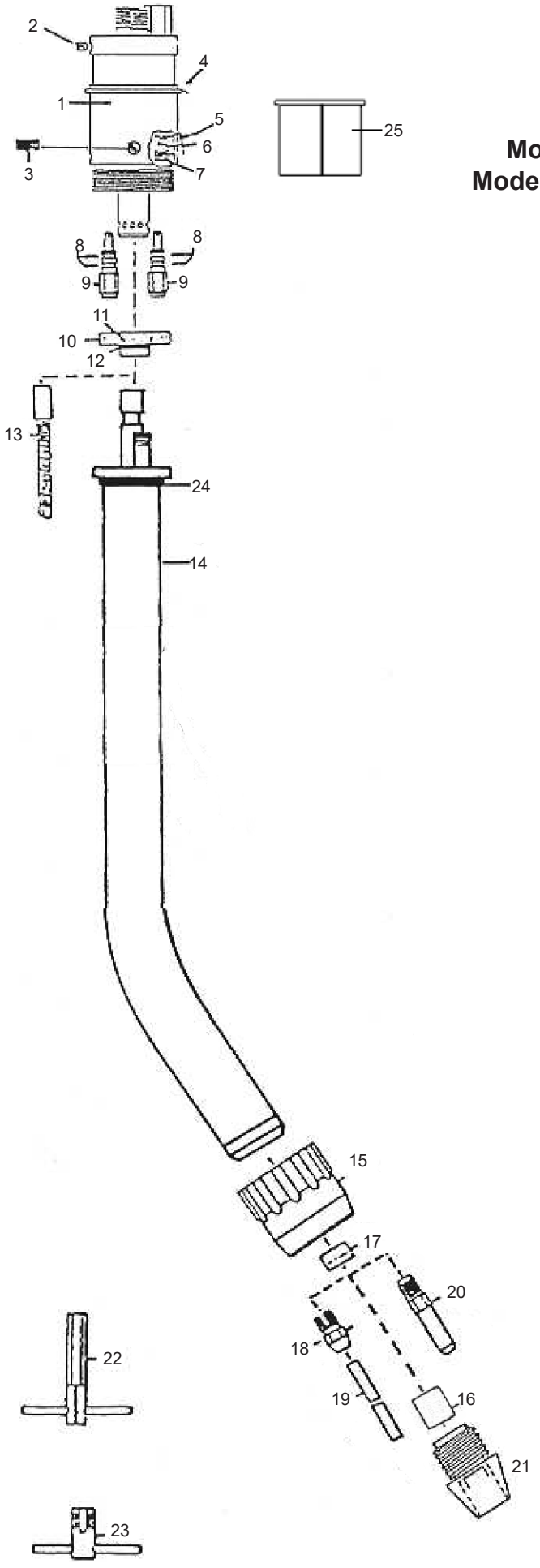
ITEM	CODE NO.	MIN QTY.
Gas Nozzle	To Be Selected	2
Current Tip	To Be Selected	25
Collet Nut	To Be Selected	1
Spatter Disc	To Be Selected	2
Body Liner	To Be Selected	2
Insulation Tube	To Be Selected	1
Transfer Fitting	To Be Selected	2

TABLE 4 - BODY LINERS

Body Liner	For Slip-In Tips	For 7/16” Threaded Tips
.030”-.035” H/C	45515-L	45515-L
.035”-.045” H/C	45516-L	45516-L
.045”-1/16” H/C	45517-L	45521-L
5/64”-7/64” C	45514-L	45523-L
3/64” AL	45518-L	45518-L
1/16” AL	45519-L	45524-L
3/32” AL	45520-L	45525-L

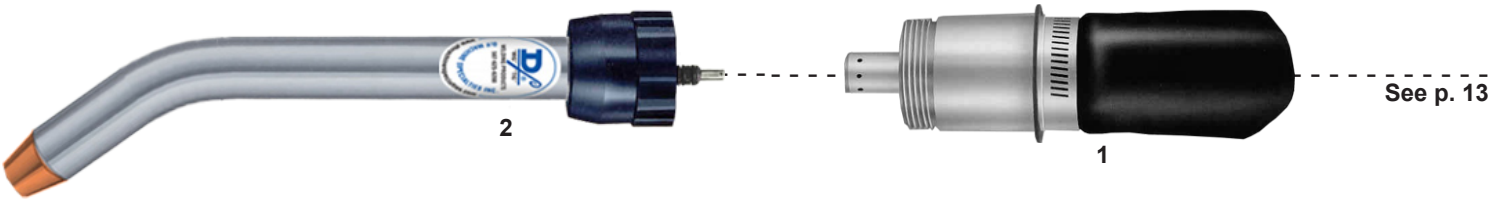
REMOTE MOUNT
DOCKING SPOOL®/WELD BODY COMBINATION
Composite Type
Water-Cooled Machine Barrel

Model NCM-LRN (Slip-In Tip) X-Long Reach 35 Degree
Model HTM-LRN (Threaded Tip) X-Long Reach 35 Degree



REF.	CODE NO.	DESCRIPTION
1	45152	Docking Spool®/Weld Body Combination
2	14715	Socket Set Screw
3	40078	Set Screw (w/ O-ring)
4	40026	Posit Ring®
5	40022	Spring
6	40023	Ball
7	40024	Seat
8	13921	O-rings (4 req'd)
9	40025	Transfer Fitting
10	13912	Internal O-ring
11	40010	Insulating Collar
12	12516	External O-ring
13		Body Liners (see p. 10, Table 4)
14	48245NB-35	Complete W/C Machine Barrel Assembly X-Long Reach 35 Degree Consists of Items 8 - 21 Specify - Current Tip and Body Liner
	48144NB-35	W/C Nozzle Only X-Long Reach 35 Degree
15	42274	Nut
16	42275	Insulation Tube
17	42276	Spatter Disc
18	18262	Collet Nut (5/16" Slip-In Tip)
19		Current Tip 5/16" Slip-In (see p. 10, Table 2)
20		Current Tip 7/16" Threaded(see p. 10, Table 2)
21		Gas Nozzle (see p. 10, Table 1)
22	12111	Wrench
23	14610	Nozzle Thread Chaser Tap
24	13914	O-Ring
25	40539	Bushing - Gun/Barrel Bracket

STANDARD ASSEMBLY
REMOTE MOUNT DOCKING SPOOL®/WELD BODY COMBINATION
accommodates
Composite Type Water-Cooled Machine Barrels



See p. 13

ORDERING INFORMATION

Ref.	Code No.	Description
1	45152	Docking Spool®/Weld Body Combination
2		W/C Machine Barrel X-LRN 35 Degree (page 11, ref. 14)

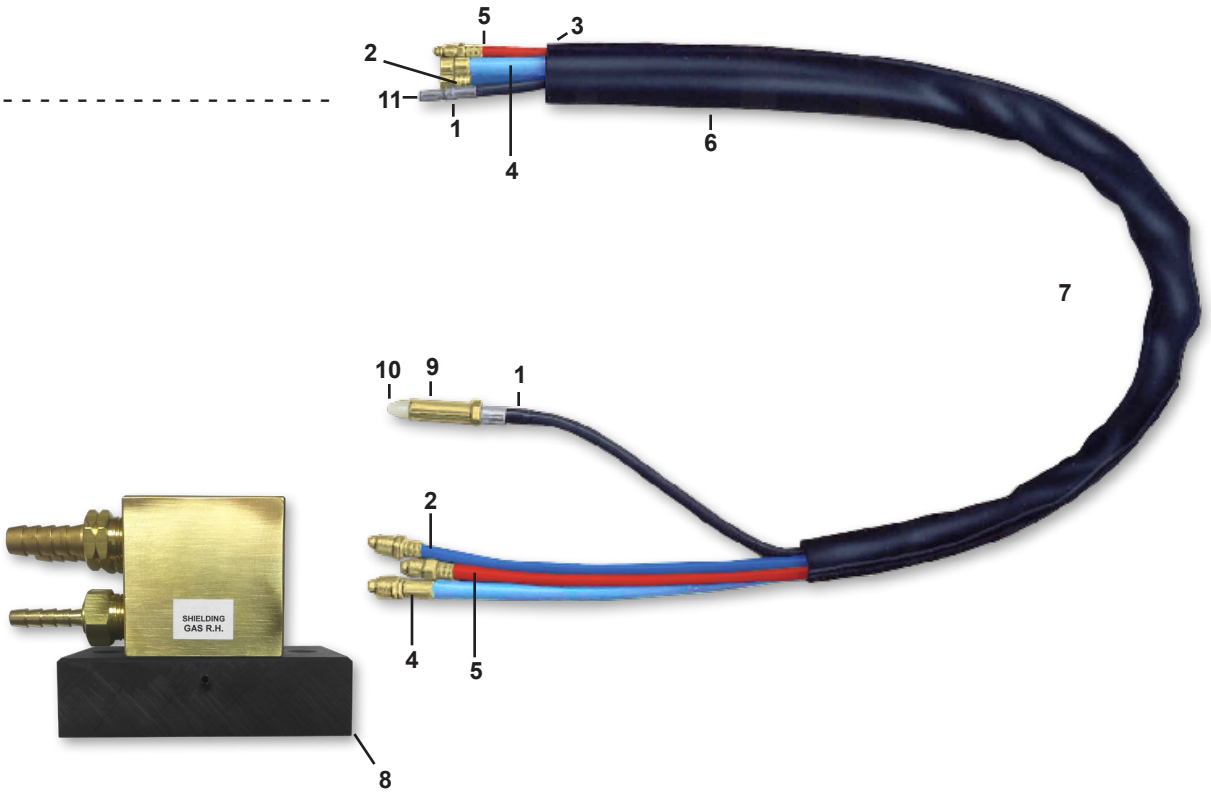
Ordering Information: Complete Standard Assemblies
Note: Specify Slip-In or Threaded Tip
Advise wire diameter and kind/type and wire feeder manufacturer

W/C Machine Barrel Model NCM-X-LRN / Model HTM-X-LRN Slip-In Tips / Threaded Tips
Code No. 48244NB-35-4
Code No. 48244NB-35-5
Code No. 48244NB-35-6
Code No. 48244NB-35-7
Code No. 48244NB-35-8
Code No. 48244NB-35-10
Code No. 48244NB-35-12
Code No. 48244NB-35-15

Note: Add footage to code number for length desired.
Example: Require Standard Model NCM-X-LRN with 5 ft. Utilities - Code No. **48244**-5.

STANDARD ASSEMBLY UTILITIES

From p. 12



Ref.	Code No.	Description
1	46350	Casing .030”-.035” (Requires Liner)
	46370	Casing .035”-1/16” (Requires Liner)
	46420	Casing .035”-.045” (Single Piece)
	46440	Casing .045”-1/16” (Single Piece)
	46460	Casing 5/64”-3/32” (Single Piece)
	46480	Casing 7/64”-1/8” (Single Piece)
	46500	Casing 1/8”(AL., Single Piece)
2	46300	Water In Hose Assembly
3	14803	Clamp
4	46320	Water Out Hose & Power Cable Assembly
5	46260	Gas Hose Assembly - Standard
6	46630	Cable/Hose Sheath
7		Utility Combination - Consists of: Items 1, 2, 3, 4, 5, 6 & 11
	46620	.030”-.035”
	46621	.035”-1/16”
	46622	.035”-.045”
	46623	.045”-1/16”

Ref.	Code No.	Description
7	46624	5/64”-3/32”
	46625	7/64”-1/8”
8	45196	Utility Station (see p. 16)
9		Feeder Adapter (see p. 19)
10		Inlet (see p. 19)
11	47020	Liner .030”-.035” Hard/Cored
	47021	Liner .035”-.045” Hard/Cored
	47022	Liner .045”-1/16” Hard/Cored
	47023	Liner 3/64” Soft
	47024	Liner 1/16” Soft
	47025	Liner 3/32” Soft

NOTE (for Casings, Water In, Water Out & Power Cable, Gas Hose, Sheath, Utility Combination, and Liner only):
Add footage to code number for length desired.
Example: Require 6 Ft. Water In Hose Assembly - Code No. 46300-6.

UTILITY STATION - STANDARD

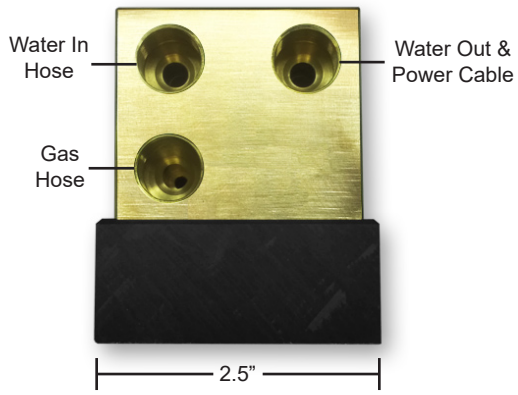
ORDERING INFORMATION

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

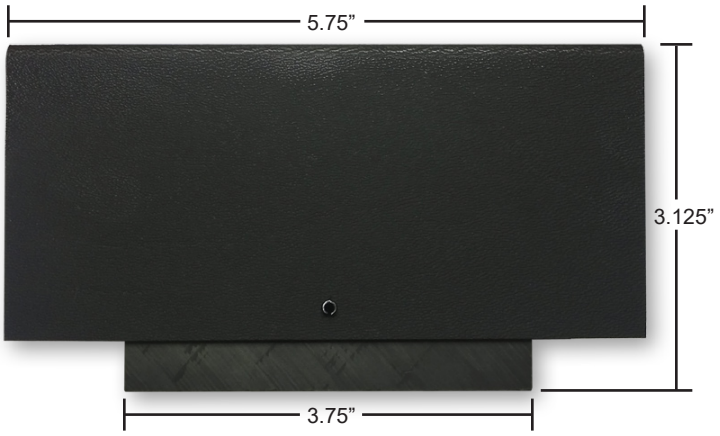
DIMENSION SPECIFICATIONS

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.

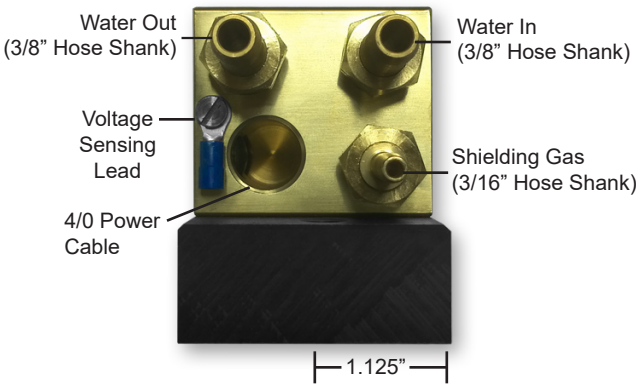
D/F TORCH CONNECTION



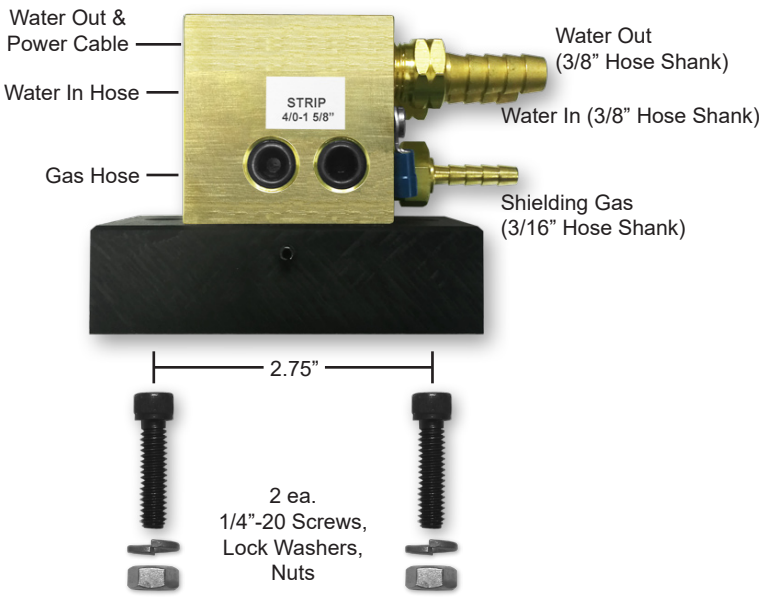
UTILITY STATION SIDE VIEW WITH COVER



CUSTOMER UTILITIES CONNECTION



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



TORCH CONNECTION OPTIONS

BARREL MOUNTING OPTIONS

Typical modern torch setups utilize a unitized cable assembly with the gas, water, power, and conduit combined into a single, replaceable unit. When one cable goes bad the whole unit is replaced. This can be expensive. 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.

D/F torches take an alternative approach to the setup. The torches use a separate gas hose, water-in hose, Water Out & Power Cable, and casing/conduit. When one cable goes bad it is simply replaced instead of attaching an entire new unitized cable assembly; a huge cost saver! 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. The D/F torch leads plug into the front of the Utility Station, and into the back 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 a 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 gas control. 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, and to the D/F Utility Station's 3/16" shank.

Due to the fact that every welding application is different because of size restrictions, access restrictions, positioning restrictions, etc., D/F manufactures barrels in two variations, remote mount and direct mount.

FIGURE 1 - REMOTE MOUNT/ROBOTIC BARRELS

The D/F wire casing/conduit follows a different route than the water and gas lines. On remotely mounted guns and barrels (Fig. 2), the casing/conduit comes straight out the top of the barrel as the other hoses do (180 degrees), but attaches straight to the wire feeder with a feeder adapter. D/F refers to power pins as feeder adapters, for on D/F barrel setups there is no power going to the wire feeder. The feeder adapters can hook up to any of the different Miller, Lincoln, Esab, Welding Alloys, 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.

FIGURE 2 - DIRECT MOUNT/AUTOMATIC BARRELS

A directly mounted barrel plugs directly into the wire feeder. In a direct mount barrel the Water Out & Power Cable, water-in hose, gas hose come out of the barrel at a 90 degree angle and go to the Utility Station, and there is no casing/conduit. The feeder adapter comes out the top of the barrel and connects directly to the wire feeder.

FIGURE 3 - DIRECT MOUNT BARREL - REMOTELY MOUNTED

A third optional mounting method exists that combines features of direct and remote mounting. A direct mount barrel can be remotely mounted with a mounting arm or bracket, and a casing can be attached to the top of the barrel to run to the wire feeder as a remotely mounted barrel would. This unique solution might work for jobs with very limited space.

These alternative setups utilizing the D/F Utility Station enable the D/F barrels to run cooler, work above 1000 degree pre-heat, increase the weld quality (X-ray quality welds), have increased durability, and run the full range of wire through 1/8". It also allows for many different model options, saves on consumable costs, reduces down-time, and allows for a clean installation and ease in maintenance or replacement. The Utility Station is universal throughout the D/F product line. Every D/F barrel will hook up to the same Utility Station.

Figure 1

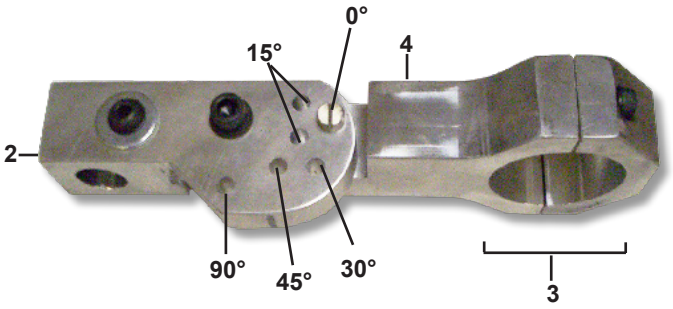
Figure 2

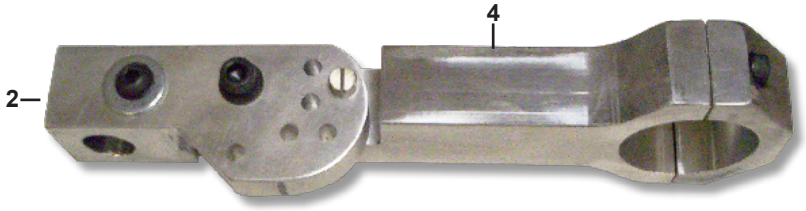
Figure 3

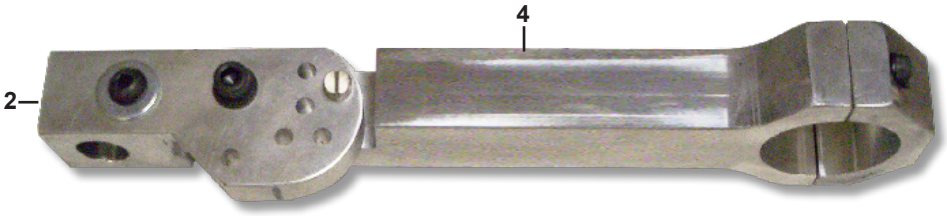
MOUNTING ARMS & BRACKETS

Ref.	Code No.	Description
	40869	Arm Assembly - Complete 6”
	40870	Arm Assembly - Complete 8”
	40871	Arm Assembly - Complete 10”
2	40865	Rear Shaft Bracket Only
3	40539	Bushing
4	40565	Arm - Only 6”
	40566	Arm - Only 8”
	40567	Arm - Only 10”

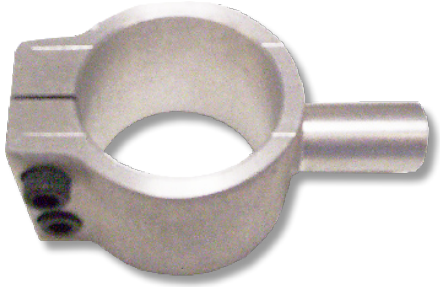
Universal Mounting Arms



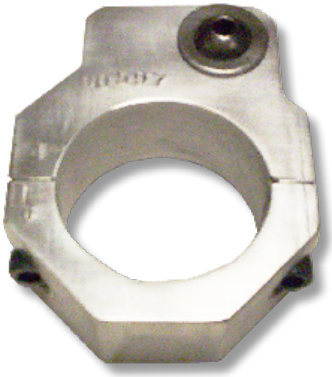




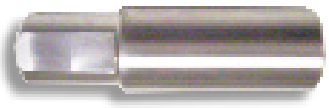
Straight Mounting Arms
Available in various lengths
up to 10” overall
Consult factory for details



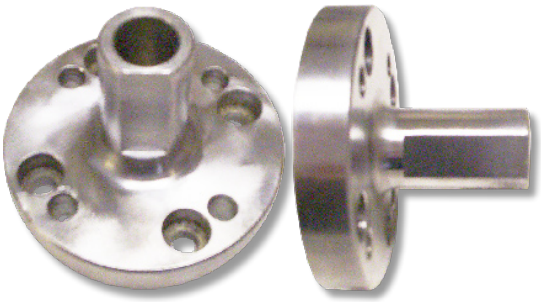
Mounting Bracket
Code No. 14085



Mounting Bracket
Code No. 40597



Torch Bracket Mouning Shaft
Code No. 40598



Flanged Post Mount
Code No. 40589

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
	NA3, NA5	.030”-3/32” H/C/AL 5/64”-1/8” H/C	16879	 16878	* *	16880	 16881
“BIG MIG”	NA3, NA5	.030”-3/32” H/C/AL 5/64”-1/8” H/C	16879	 16878	* *	16888	 16888
Lincoln®	Power-Feed 10, LF-72, LF-74	.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”-.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
OTC®	Requires Insert	.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

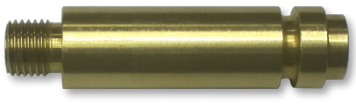
*Stub liners only required in feeder adapter when single-piece casing is used.

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



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.

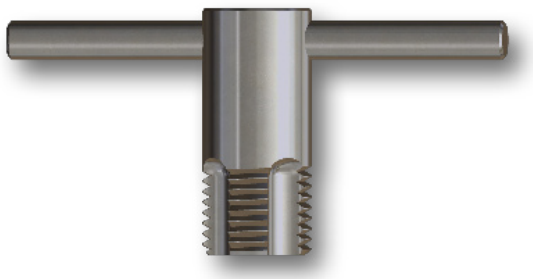
5. Be very careful to start threads correctly. Only tap 1/2 turn at a time, always backing up and removing chips 1/2 cycle at a time before moving forward. Do not try to tap further into the water-cooled nozzle than needed or past the factory thread depth.

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).

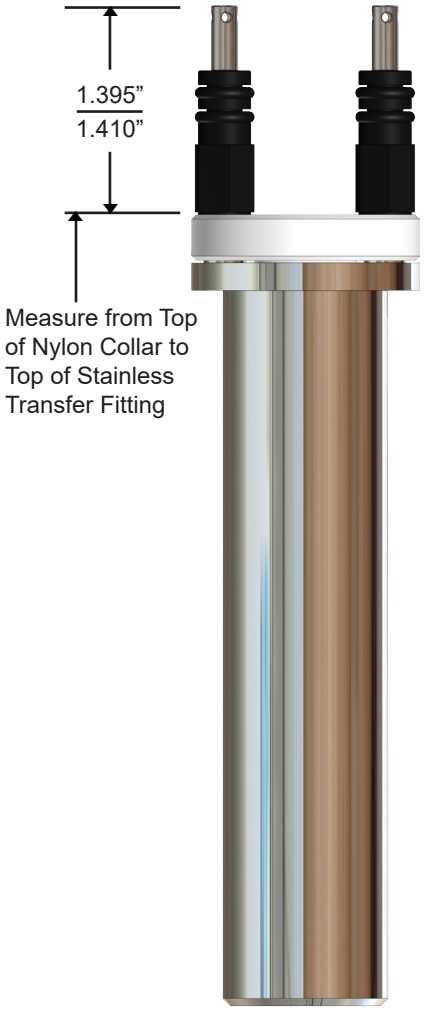
ORDERING INFORMATION - NOZZLE THREAD CHASER TAPS

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



TRANSFER FITTING (D/F #40025) INSTALLATION

Each D/F torch requires 2 of the D/F Transfer Fitting part #40025. When a torch bumps into something or crashes, this is the part that is designed to break to hopefully protect the rest of the torch from being destroyed. We recommend having at least 2 of them in stock for every torch for extra security. This is also the part of the torch that transfers the water from the docking spool body to the water-cooled nozzle. The transfer fittings have to be set at a specific height (1.395” – 1.410”, see right), 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.



ALWAYS use a LONG 3/8” socket when applying transfer fittings for support. At the factory, transfer fittings are set with a height of 1.400”. To check the height on a transfer fitting, hold the water-cooled nozzle in your left hand and place your pointer finger and middle finger over the white collar (like you are throwing a fork ball). You want to hold the collar down tight. When you know the collar is down tight, measure with a micrometer from the top of the white collar to the top of the stainless tip of the transfer fitting. The distance has to be in the 1.395” – 1.410” range (preferably around 1.400”). If a transfer fitting shows signs of wear, or is cracked or broken, it must be replaced. Always make sure there is a proper amount of lubricant/grease on the O-rings of the transfer fittings.

When you put the water-cooled nozzle back on the docking spool body of the torch you must make sure the water-cooled nozzle is pushed up correctly, and tighten the cone nut thoroughly so that everything is in the correct place and there are no leaks. There should be no reason to take apart the torches and wear out the O-rings on the transfer fitting unless there has been a crash. They will not last as long if they are taken apart and put back together over and over.

To properly change a contact tip you do not have to take off the gas cup! Simply loosen the collet one-half to one-full turn and pull out the tip. If you take the collet out all the way make sure to wire brush and blow out the threads in the docking spool body and on the collet. The same goes for the gas cup or nozzle. If you do happen to remove the gas cup for cleaning, make sure to blow out water-cooled nozzle, and wire brush and blow out the threads of the gas cup.

Any preemptive maintenance will considerably extend the life of the torches and their consumables.

Points to Remember:

1. Always make sure transfer fitting height is 1.395” to 1.410” (from the white collar to the stainless spigot)
2. Always use a Long 3/8” socket for support when applying transfer fittings.
3. Do not take off the gas cup to change a tip. Only take off the gas cup when cleaning is needed.
4. Wire brush the threads on gas cups and collets for better heat transfer.
5. Loosen collet ½ a turn to remove tip. Only take out collet when cleaning is needed.
6. Always make sure there is a proper amount of lubricant/grease on the O-rings of the transfer fittings.

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.

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.

5. Make sure you have a good sharp cut off with no material sticking out!

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 together; one on each end to rotate and twist the conduit/casing to get the liner trough the torch.

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 you want to cut the new liner off flush with the end of the copper gas nozzle or Cu gas 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 tip chamfer.

16. We always recommend checking the condition of the insulation tube in the front of the torch and collet nut that holds the slip-in tip.

17. We always recommend replacing the spatter disc/gas diffuser, contact tip, and nozzle, after installing a new liner.

18. Tighten the flat head set screw in the inner body, or the Allen set screw in the docking spool onto the conduit/casing to prevent backward movement or an unwanted pumping action.

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	Possible Solutions
BASE METAL CONTAMINATION	
Impurities on base metal	a. Remove contamination; clean surfaces b. Use of specific wire/gas mix for specific types of impurities
FILLER METAL CONTAMINATION	
Impurities on filler metal (wire)	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
ATMOSPHERIC CONTAMINATION	
Drafts, wind, fans, etc.	a. Protect weld from drafts (curtains/screens) b. Use tapered or bottleneck gas nozzles when drafts cannot be avoided
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	1a. Reduce gas flow 1b. Tighten all hose connection points
2. Too low a gas flow, causing insufficient gas coverage	2. Increase gas flow
3. Damaged or kinked gas lines	3. Repair or replace
4. Too high an oxygen content	4. Adjust mixer
5. Leaks in gas distribution system	5. Repair leaks
6. Other impurities in gas - moisture, etc.	6. Overhaul system; fit filters and/or dryers
7. Inconsistent gas flow (cfh) at the torch connection	7. Regulate pressure into flow meter for consistent cfh delivery of gas
GAS TURBULENCE	
1. Excessive spatter build-up in gas nozzle and on current tip	1. Clean nozzle and tip regularly; spray with anti-spatter fluid
2. Nozzle damage, causing uneven gas coverage	2. Replace nozzle
3. Torch gas ports clogged or deformed	3. Clean or replace
4. Super-heated nozzle, causing shielding gas to expand rapidly and create return effect at end of nozzle	4. Check duty cycle rating of torch
5.Gas diffuser/nozzle insulator missing	5. Replace
6. Too high a gas flow causing the venturi effect	6. Reduce gas flow
WELDING PARAMETERS, ETC.	
1. Too long a wire stick-out; gas nozzle too far from weld puddle	1. Use longer nozzle or adjust stick-out (3/8” minimum or 15 times wire diameter)
2. Bad torch position - too sharp a torch incline causing the venturi effect at the end of the nozzle leading to atmospheric contamination	2. Correct torch angle
3. Excessively wide weld pool for nozzle I.D.	3. Width of the weld pool should be 1.3 times the nozzle I.D.; use suitable wider gas nozzle
4. Arc voltage too high	4. Reduce voltage
5. Too high a travel speed	5. Reduce speed

TROUBLESHOOTING: SPATTER

Problems/Causes	Possible Solutions
SPATTER Too fast or too slow wire feed for the arc voltage	Set the wire feed rate and voltage in accordance with good welding practices as recommended by a qualified welding engineer.
Too long an arc	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.
Damaged current tip	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.
Inclination of welding gun too great	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.
Faulty power source	Have the power source checked for faulty conditions such as broken wires and faulty contacts.
Incorrect start	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.
Incorrect pulse parameters	Check the user manual for your power supply or consult a qualified welding engineer.
Uneven wire feed	Uneven wire feed gives rise to heavy spatter. Find the cause of the disturbance and correct the condition before proceeding.
Impurities on the base metal	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.
Poor ground contact	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.
Too long stick-out (short-arc welding)	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.
Incorrect polarity	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.

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Rev. 150603-3