



# D/F MACHINE SPECIALTIES, INC.

*MIG & TIG Welding Products, Consumables & Accessories*

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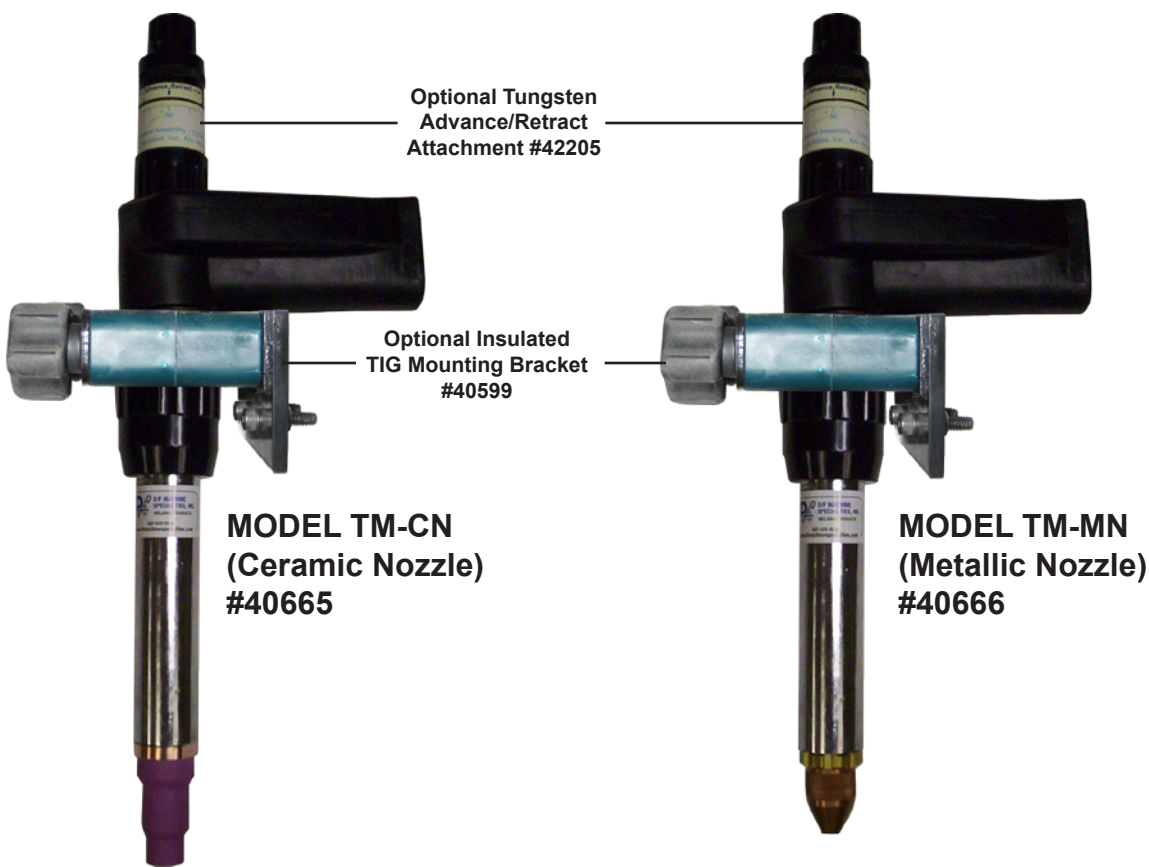
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## WATER-COOLED TIG BARREL

Remote Mount Docking Spool®/Weld Body Combination



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*



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## 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. For example:

- Starting-up procedures must be reserved for those fully conversant with processes relating to arc welding equipment.
- Arc welding can prove damaging to eyes, skin, and hearing! It is therefore imperative that the Accident Prevention Regulations UVV 26.0 and VGB 15 are fully observed and that all protective clothing, eye and ear protectors specified are worn.
- The load data given are maximum limit figures. Overloading will inevitably damage the torch!
- Before changing wear parts, disconnect for the power supply.
- The operating instructions for the individual welding components - e.g. power source, wire feed and cooling unit must be followed.
- Never pull the cable assembly across sharp edges or set down close to weld spatter or on a hot workpiece.
- Those not involved in the welding process should be protected by curtains or partitions from radiation and the danger of being dazzled.
- When handling gas cylinders, consult the instructions issued by the manufacturers and the suppliers of the pressurized gas.
- Workpieces which have been degreased using chlorinated solvents must be sprayed down with clean water before welding starts to avoid the risk of phosgene forming. For the same reason, no degreasing baths containing chlorine must be placed close to the welding point.
- All vapors given off by metals can cause harm and a special warning is attached to lead, cadmium, copper, zinc, and beryllium. If necessary, take appropriate precautions (by providing adequate ventilation or an extraction system) to ensure that the legal maximum levels of toxic concentrations are not exceeded.

**For more information**, 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.
- OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the U.S. Government Printing Office, Washington, D.C. 20402.
- 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.
- 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.
- 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.
- 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.

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### IMPORTANT

The D/F torch is famous for the fact that if it is chilled properly, the welder can grab the front 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 3 quarts per minute (for each inner body), at 40 psi (80 psi maximum) with a 5 gallon reservoir and 15,000 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 or extended periods of arc time are used, it is recommended that a liquid chiller be considered with a larger reservoir and a minimum of 30,000 BTU/hr cooling capacity. 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 refrigerated liquid chiller for GMAW may be obtained from:

For single torch chillers: Dynaflux - 800-334-4420 - [www.dynaflux.com](http://www.dynaflux.com)

For multiple torch cooling systems: Koolant Koolers - 800-968-5665 - [www.koolantkoolers.com](http://www.koolantkoolers.com)

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# INTRODUCTION

This manual covers Remote Mounted Water Cooled TIG Machine Barrels which offer a concept with interchangeability of Models for Mechanized or Robotic welding. The barrels accommodate a tungsten range of .040" thru 5/32".

The equipment consists of four (4) basic components: a utility station, a utilities combination assembly, a Docking Spool®/Weld Body Combination and a Water Cooled Nozzle. The Docking Spool® body is the principal component in the welding equipment arrangement. It accepts the utilities at the top of the body and provides a means of accepting the Water Cooled Nozzle assembly at the lower end. In addition, several other features important to a welding system are provided. Incorporated within the water chamber of the Docking Spool® body are check valves which provide a means of retaining the residual water in the lines when the Water Cooled Nozzle is removed from the Docking Spool® body. Also a Posit ring is provided to allow positive location at the mounting bracket to achieve dimensional stability.

The assemblies are designated by two (2) Models which are illustrated in the parts breakdown list. The Model TM-CN (Ceramic Nozzle) Water Cooled TIG Barrel has a current capability of 600 amperes. Tungsten diameters of .040" thru 5/32" are fastened by a collet action nut. The Barrel will accommodate 12" tungsten.

Model TM-MN (Metallic Nozzle) is also rated at 600 amperes. It also has the same tungsten range and lengths as the Model TM-CN.

Model Conversion can simply be made by applying the proper items required as illustrated in the parts breakdown.

An optional Tungsten Advance/Retract Attachment is available as outlined and described on page 12.

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

## ORDERING INFORMATION - MODEL TM-MN

Description	Length	Code No.
Model TM-MN66-3	3 Ft.	40666-3
Model TM-MN66-4	4 Ft.	40666-4
Model TM-MN66-5	5 Ft.	40666-5
Model TM-MN66-6	6 Ft.	40666-6
Model TM-MN66-8	8 Ft.	40666-8

## ORDERING INFORMATION - MODEL TM-CN

Description	Length	Code No.
Model TM-CN65-3	3 Ft.	40665-3
Model TM-CN65-4	4 Ft.	40665-4
Model TM-CN65-5	5 Ft.	40665-5
Model TM-CN65-6	6 Ft.	40665-6
Model TM-CN65-8	8 Ft.	40665-8



## DISASSEMBLY

To remove the Water-Cooled Nozzle from the Docking Spool®/Weld Body Combination, proceed as follows.

- 1) Remove the forward nozzle or gas nozzle adapter.
- 2) Unscrew the fastening nut (21) which applies the Water-Cooled Nozzle assembly to the Docking Spool®/Weld Body Combination. The Water-Cooled Nozzle may now be pulled from the Docking Spool®/Weld Body Combination. Note that if the Water-Cooled Nozzle has been in service for an extended period of time, it may be necessary to wedge a screwdriver in between the Insulating Collar and Docking Spool® to assist the release of the O-rings which have a tendency to freeze in position making removal of the Water-Cooled Nozzle difficult.
- 3) The water transfer fittings should be removed from the Water-Cooled Nozzle with an adjustable wrench. Following this the insulating collar may be removed.
- 4) The lower insulation tube may be pulled from the Water-Cooled Nozzle. The upper insulation tube may be pushed down from the back of the Water-Cooled Nozzle after the insulating collar has been removed. This will also push out ahead of it the alignment/diffuser disc.

## ASSEMBLY

- 1) Begin by placing the nylon collar over the fittings on the rear of the water cooled nozzle. It is important that the collar alignment 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 with the adjustable wrench. Make certain to apply a lubricant to the O-rings.
- 2) Push the upper insulation tube into the water cooled nozzle. Now apply the alignment/diffuser disc to the nozzle followed by inserting the lower insulation tube into the water cooled nozzle.
- 3) The nozzle assembly may now be applied to the Docking Spool®/Weld Body Combination. For proper orientation of the water fittings to the channels provided in the Docking Spool®/Weld Body Combination 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

SPARE PARTS - MODEL TM-MN

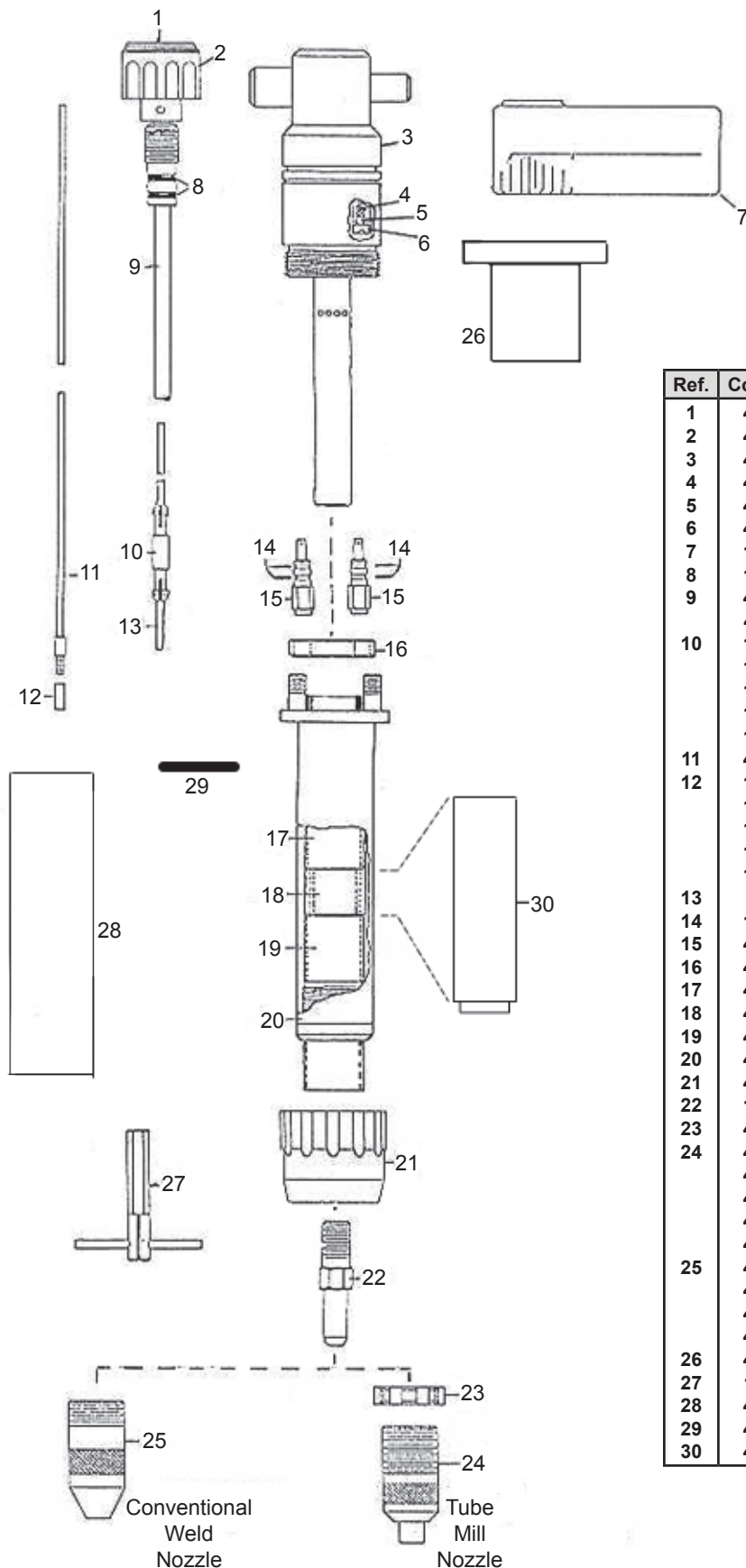
ITEM	CODE NO.	MIN QTY.
Collet Adapter	15881	1
Gas Nozzle	To Be Selected	5
Alignment/Diffuser Disc	42217	1
Transfer Fitting	40025	2
Lower Insulation Tube	42226	1
Collar	40008	1
Collets	To Be Selected	5
O-rings	13921	8
Tungsten Extension Rod	42213	5
Tungsten Sleeve	To Be Selected	5

SPARE PARTS - MODEL TM-CN

ITEM	CODE NO.	MIN QTY.
Collet Adapter	15881	1
Gas Nozzle	To Be Selected	5
Alignment/Diffuser Disc	42217	1
Transfer Fitting	40025	2
Lower Insulation Tube	42226	1
Collar	40008	1
Collets	To Be Selected	5
O-rings	13921	8
Tungsten Extension Rod	42213	5
Tungsten Sleeve	To Be Selected	5
Insulation Tube	16475	5

# REMOTE MOUNT DOCKING SPOOL® TIG WELD BODY COMBINATION

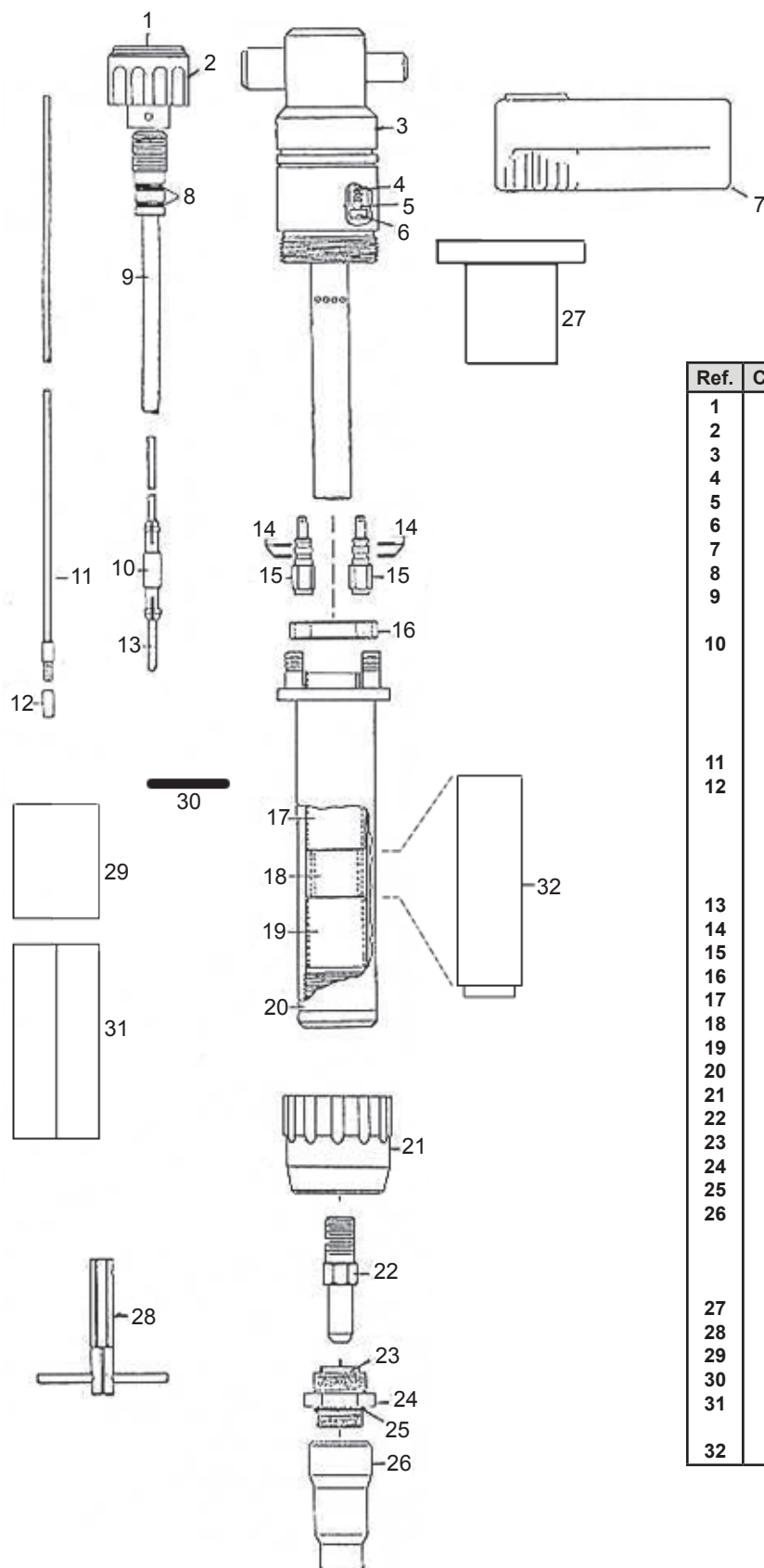
## Model TM-MN (Metallic Nozzle)



Ref.	Code No.	Description
1	42210	Cap - Knob
2	42203	Knob
3	45168	Docking Spool®/Weld Body Combination
4	40022	Spring
5	40023	Ball
6	40024	Seat
7	14050	Boot
8	13917	O-rings (2 req'd)
9	42212	Shaft Assembly (with Knob)
	42211	Shaft Assembly (less Knob)
10	15871	Collet .040" Diameter Tungsten
	15872	Collet 1/16" Diameter Tungsten
	15873	Collet 3/32" Diameter Tungsten
	15874	Collet 1/8" Diameter Tungsten
	15875	Collet 5/32" Diameter Tungsten
11	42213	Extension Rod
12	15865	Tungsten Sleeve .040"
	15866	Tungsten Sleeve 1/16"
	15867	Tungsten Sleeve 3/32"
	15868	Tungsten Sleeve 1/8"
	15869	Tungsten Sleeve 5/32"
13		Select Required Tungsten Size
14	13921	O-Ring (2 req'd)
15	40025	Transfer Fitting
16	40008	Insulating Collar
17	42215	Upper Insulation Tube
18	42217	Alignment/Diffuser Disc
19	42226	Lower Insulation Tube
20	45109	Water-Cooled Nozzle
21	40005	Nut
22	15881	Collet Adapter
23	42224	Jam Nut - Tube Mill Nozzle
24	42228	Gas Nozzle - Metallic - Tube Mill - 1/4" I.D.
	42229	Gas Nozzle - Metallic - Tube Mill - 5/16" I.D.
	42230	Gas Nozzle - Metallic - Tube Mill - 3/8" I.D.
	42231	Gas Nozzle - Metallic - Tube Mill - 1/2" I.D.
	42232	Gas Nozzle - Metallic - Tube Mill - 5/8" I.D.
25	42233	Gas Nozzle - Metallic - Conventional Mill - 1/4" I.D.
	42234	Gas Nozzle - Metallic - Conventional Mill - 3/8" I.D.
	42235	Gas Nozzle - Metallic - Conventional Mill - 1/2" I.D.
	42236	Gas Nozzle - Metallic - Conventional Mill - 5/8" I.D.
26	40540	Body Sleeve - Used w/ Mounting Bracket 40599
27	12117	Wrench
28	40541	Insulating Sleeve
29	40542	O-ring - Insulating Sleeve
30	42241	Center Spacer Insulation Tube

# REMOTE MOUNT DOCKING SPOOL® TIG WELD BODY COMBINATION

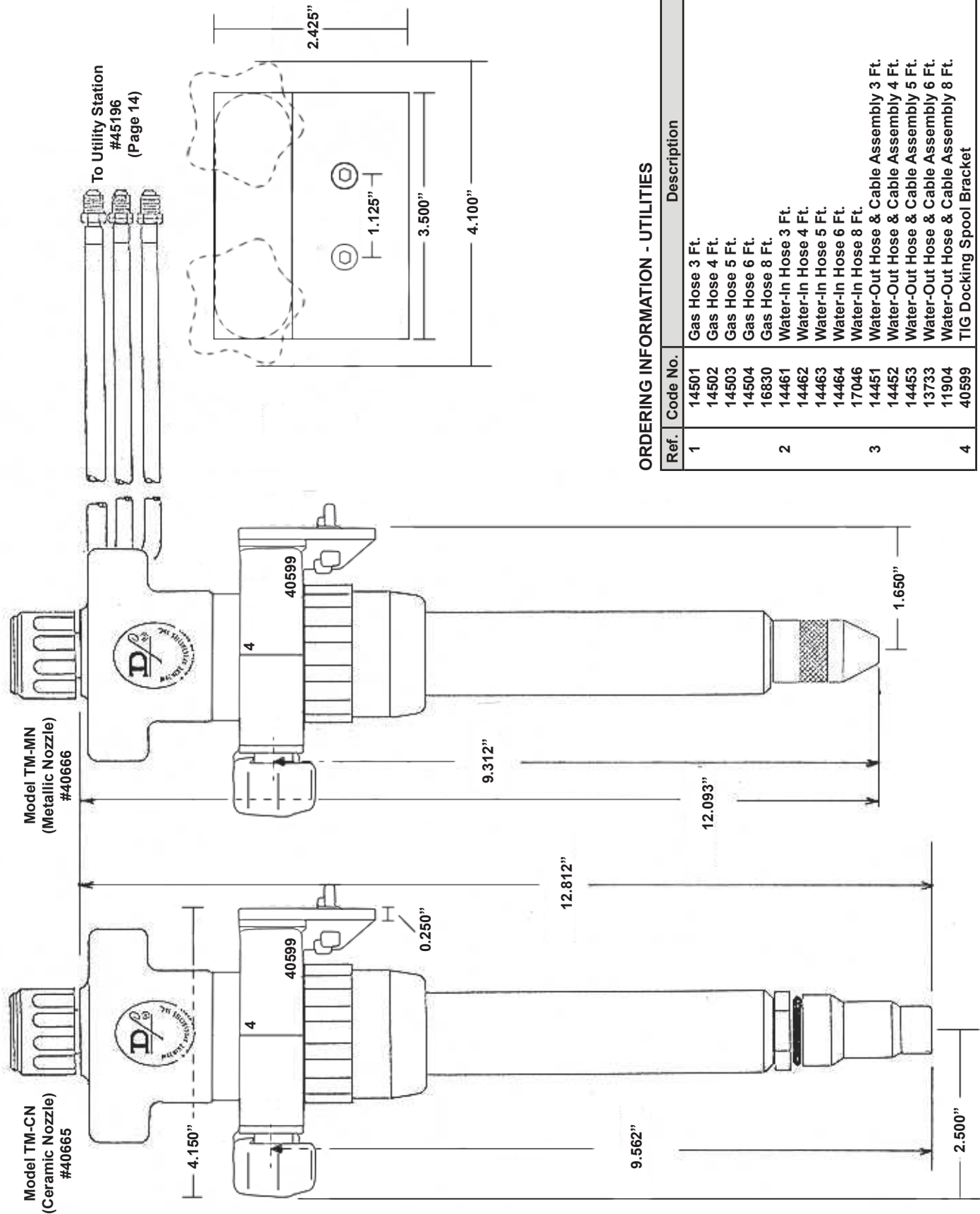
## Model TM-CN (Ceramic Nozzle)



Ref.	Code No.	Description
1	42210	Cap - Knob
2	42203	Knob
3	45168	Docking Spool®/Weld Body Combination
4	40022	Spring
5	40023	Ball
6	40024	Seat
7	14050	Boot
8	13917	O-rings (2 req'd)
9	42212	Shaft Assembly (with Knob)
	42211	Shaft Assembly (less Knob)
10	15871	Collet .040" Diameter Tungsten
	15872	Collet 1/16" Diameter Tungsten
	15873	Collet 3/32" Diameter Tungsten
	15874	Collet 1/8" Diameter Tungsten
	15875	Collet 5/32" Diameter Tungsten
11	42213	Extension Rod
12	15865	Tungsten Sleeve .040"
	15866	Tungsten Sleeve 1/16"
	15867	Tungsten Sleeve 3/32"
	15868	Tungsten Sleeve 1/8"
	15869	Tungsten Sleeve 5/32"
13		Select Required Tungsten Size
14	13921	O-Ring (2 req'd)
15	40025	Transfer Fitting
16	40008	Insulating Collar
17	42215	Upper Insulation Tube
18	42217	Alignment/Diffuser Disc
19	42216	Lower Insulation Tube
20	45109	Water-Cooled Nozzle
21	40005	Nut
22	15881	Collet Adapter
23	16475	Insulation Tube - Used w/ Adapter 16474
24	16474	Adapter - Nozzle
25	16476	O-ring
26	15895	Gas Nozzle - Ceramic - Conventional Mill - 1/4" I.D.
	15896	Gas Nozzle - Ceramic - Conventional Mill - 3/8" I.D.
	15897	Gas Nozzle - Ceramic - Conventional Mill - 1/2" I.D.
	15898	Gas Nozzle - Ceramic - Conventional Mill - 5/8" I.D.
27	40540	Body Sleeve - Used w/ Mounting Bracket 40599
28	12117	Wrench
29	40543	Insulating Sleeve
30	40542	O-ring - Insulating Sleeve
31	15919	TIG Mounting Split Sleeve - Cyclomatic MP4
	15920	TIG Mounting Split Sleeve - Cyclomatic 4608C
32	42241	Center Spacer Insulation Tube



MOUNTING SPECIFICATIONS & PARTS



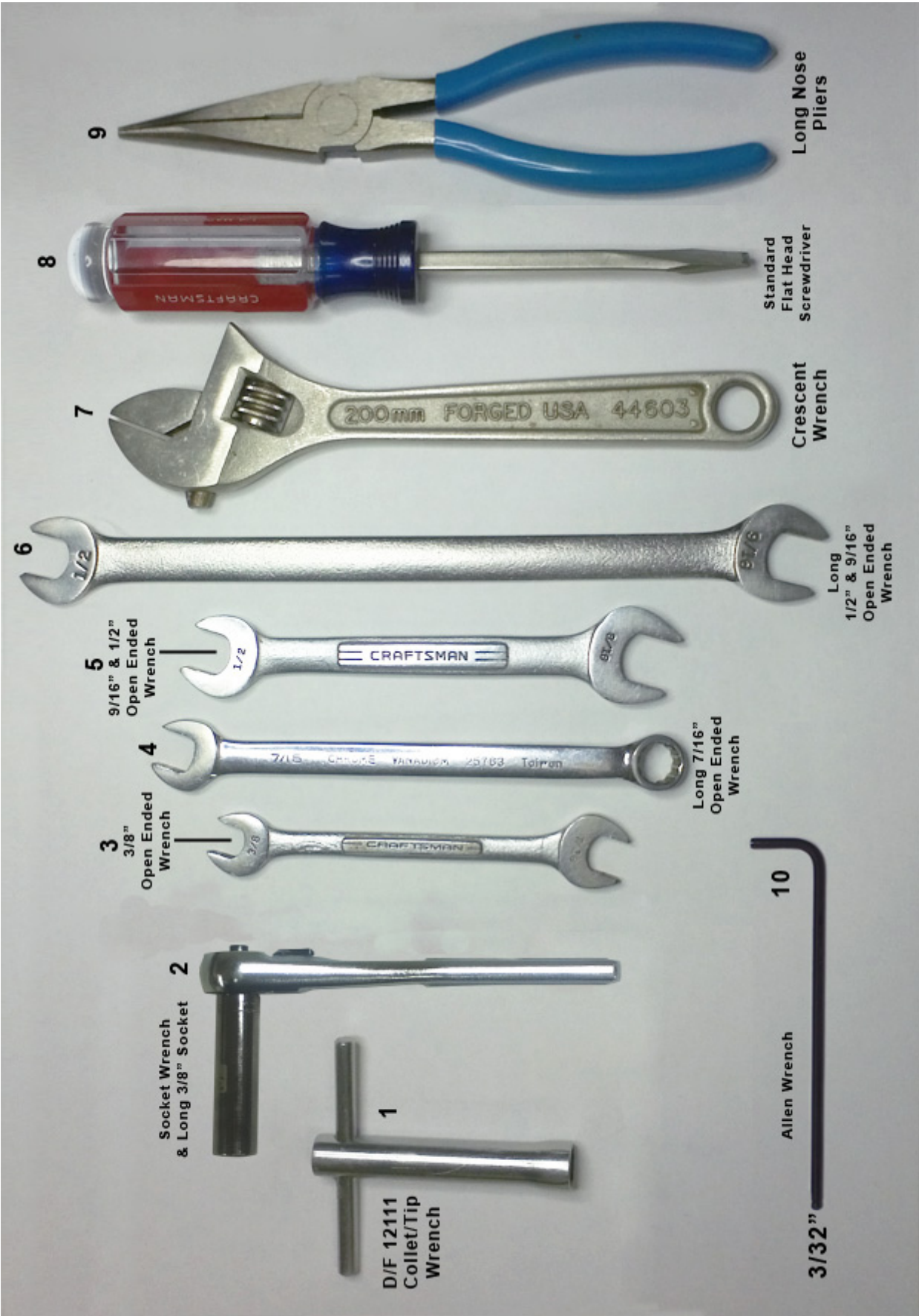
ORDERING INFORMATION - UTILITIES

Ref.	Code No.	Description
1	14501	Gas Hose 3 Ft.
	14502	Gas Hose 4 Ft.
	14503	Gas Hose 5 Ft.
	14504	Gas Hose 6 Ft.
	16830	Gas Hose 8 Ft.
2	14461	Water-In Hose 3 Ft.
	14462	Water-In Hose 4 Ft.
	14463	Water-In Hose 5 Ft.
	14464	Water-In Hose 6 Ft.
	17046	Water-In Hose 8 Ft.
3	14451	Water-Out Hose & Cable Assembly 3 Ft.
	14452	Water-Out Hose & Cable Assembly 4 Ft.
	14453	Water-Out Hose & Cable Assembly 5 Ft.
	13733	Water-Out Hose & Cable Assembly 6 Ft.
	11904	Water-Out Hose & Cable Assembly 8 Ft.
4	40599	TIG Docking Spool Bracket

## 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 adapter. Pressure should be 30 lbs., or as snug as hand tightened. Never use another wrench to apply more torque to this wrench.
2. **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. 15)
3. **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 #4)
4. **Long 7/16" Open Ended Wrench** - This is used to secure the water in hose to the torch's inner body. (see #3)
5. **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 #6)
  - B. 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.
6. **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 #5)
  - B. 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.
7. **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.
8. **Standard Flat Head Screwdriver** - This is used to tighten or secure the torch's body screw. Also, the screwdriver can be used to straighten a 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.
9. **Long Nose Pliers**
10. **3/32" Allen Wrench** - This is used to secure the socket cap screw that holds the casing in the inner body, as well as the socket screw that holds the knob on the tungsten extension shaft.

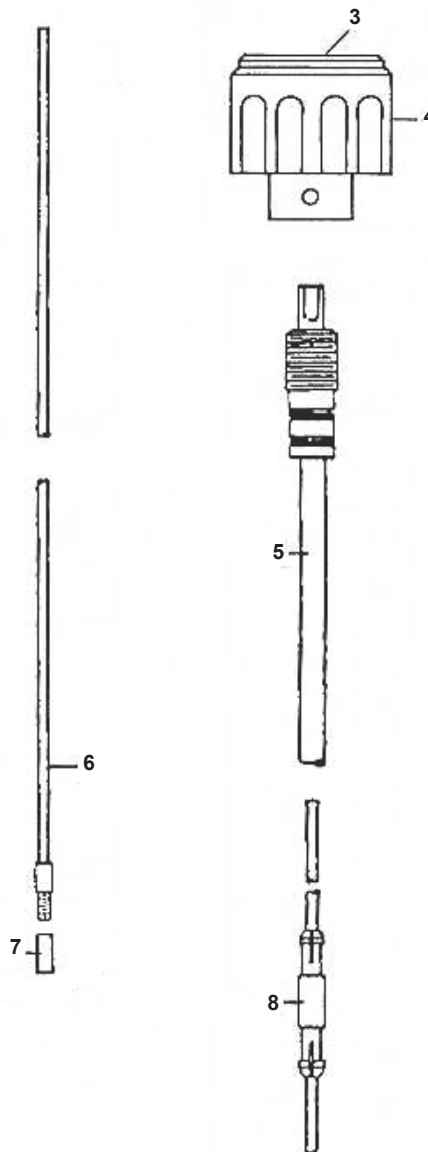
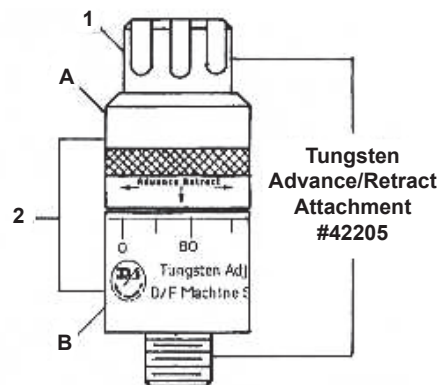
REQUIRED TOOLS LIST FOR DISASSEMBLY & ASSEMBLY



## OPTIONAL TUNGSTEN ADVANCE/RETRACT ATTACHMENT

The Tungsten Advance/Retract Attachment is applicable to the Models TM-500 (conventional TIG barrel) and the Docking Spool Models TM-MN (metallic nozzle) and TM-CN (ceramic nozzle). The attachment offers the manual adjustment of arc length or compensation for tungsten erosion during welding. It allows top loading of electrodes of .040" through 5/32" diameters. The Models TM-500 accommodate 10" tungsten and the Docking Spool Models TM-MN & TM-CN accommodate 12" length tungsten.

Ref.	Code No.	Description
1	42200	Knob - Ext. Rod Collet
2	42201	Upper & Lower Assembly
3	42210	Cap
4	42203	Collet Fastening Knob
5	42211	Top Load Shaft - Less Knob
6	42212	Top Load Shaft - With Knob
7	15865	Sleeve .040" Tungsten
	15866	Sleeve 1/16" Tungsten
	15867	Sleeve 3/32" Tungsten
	15868	Sleeve 1/8" Tungsten
	15869	Sleeve 5/32" Tungsten
8	15871	Collet .040"
	15872	Collet 1/16"
	15873	Collet 3/32"
	15874	Collet 1/8"
	15875	Collet 5/32"



# ASSEMBLY OF THE TUNGSTEN ADVANCE/RETRACT ATTACHMENT

1. Remove the Top Load Shaft (with knob) from the TIG Machine Barrel.
2. Loosen the knob set screw and remove top load shaft. Apply the Top Load Shaft to the Collet Fastening Knob #4.
3. When the Tungsten Advance/Retract attachment is being applied to the TIG barrel that was previously in use without the attachment it will be necessary to push out the top cap #3 in the Collet Fastening Knob #4. After it bottoms out, back it off one (1) full turn. This provides the relief required by the Collet Fastening Knob #4 to move freely for releasing and fastening the tungsten Collet #8.
4. Unscrew the Tungsten Sleeve #7 from the phenolic Tungsten Extension Rod #6 and braze a length of tungsten into the sleeve #7. The tungsten with sleeve may now be applied to the Tungsten Extension Rod #6.
5. Apply the Collet #8 to the tungsten. The Tungsten Extension Rod may now be pushed up through the Collet Fastening Shaft #5 until the extension rod extends beyond the top of the attachment.
6. Apply the Tungsten Advance/Retract Assembly with extension rod, tungsten and collet to the "TIG" Machine Barrel by rotating the Collet Fastening Knob #4.

## OPERATING PROCEDURES

Manual adjustment is permitted by the Tungsten Advance/Retract Attachment over a 1/2" range of Advance/Retract movement by a threaded rod within the attachment assembly.

To Adjust Arc Length and Voltage:

1. Loosen Knob Extension Rod Collet #1
2. Align the Advance/Retract arrow to the zero on graduated label (center spool #3).
3. With your hand, grip the center spool B and release the Knob-Extension Rod Collet #1 and push the Extension Rod #6 down until the tungsten touches the work.
4. Tighten Knob-Extension Rod Collet #1.
5. Gripping the center spool B turn the knurled upper spool A counterclockwise to required arc length.
6. While still gripping the center spool B, turn the Collet Fastening Knob #4 which fastens the collet.

Since the tungsten erodes, the attachment allows adjustment during the weld cycle. To adjust arc voltage, grip the Center Spool B and release the Collet Fastening Knob #4 a half turn, and while retaining your grip on Center Spool B, turn the Knurled Upper Spool A clockwise to decrease arc voltage and counterclockwise to increase.

When the full length of 1/2" travel has been consumed the attachment may be reset without shutting down the weld cycle by:

1. Loosen the Knob (Ext. Rod Collet) #1.
2. Turn the Knurled Upper Spool A counterclockwise until the RED label band on the bottom of the Extension Rod Collet Knob #1 appears. Stop rotation.

Note: Exceeding 10 revolutions will disengage the internal mechanism of the attachment which will make it inoperative.

3. Tighten the Knob (Ext. Rod Collet) #1.



# UTILITY STATION - STANDARD

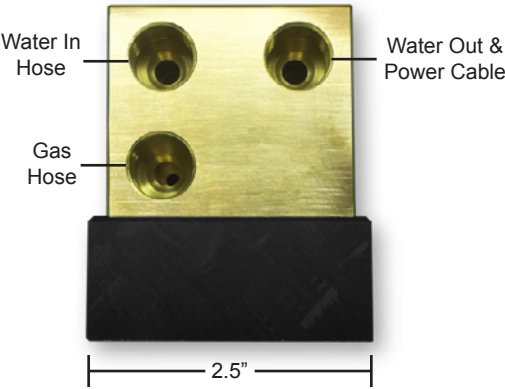
## ORDERING INFORMATION

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

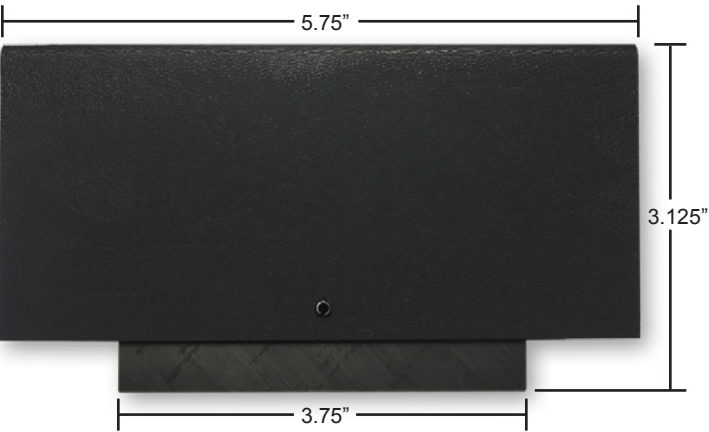
## DIMENSION SPECIFICATIONS

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.

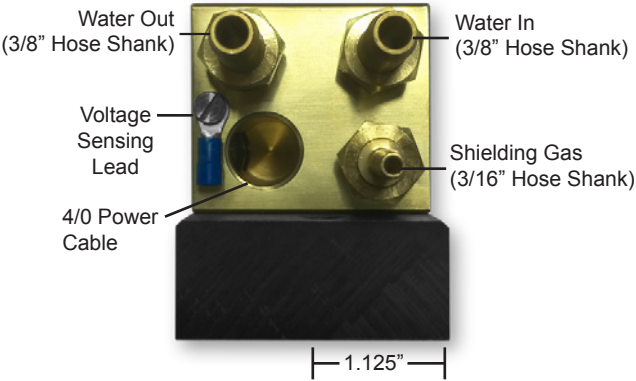
### D/F TORCH CONNECTION



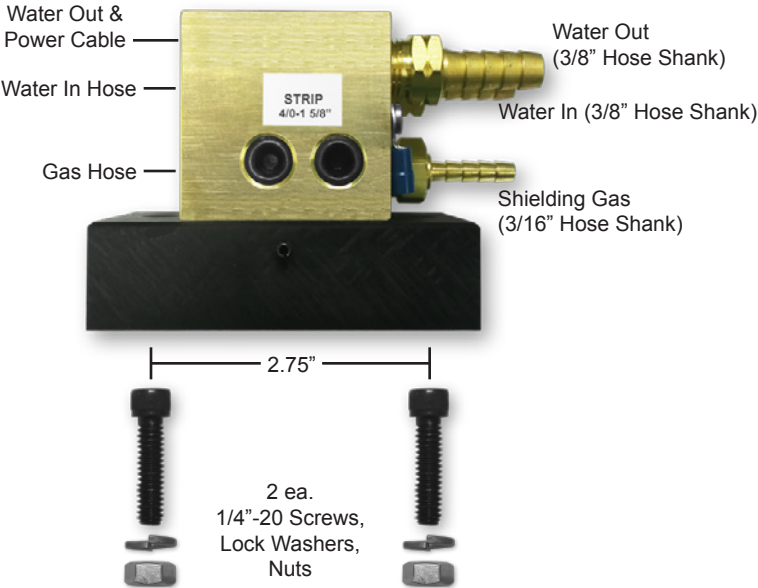
### UTILITY STATION SIDE VIEW WITH COVER



### CUSTOMER UTILITIES CONNECTION



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



## 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.

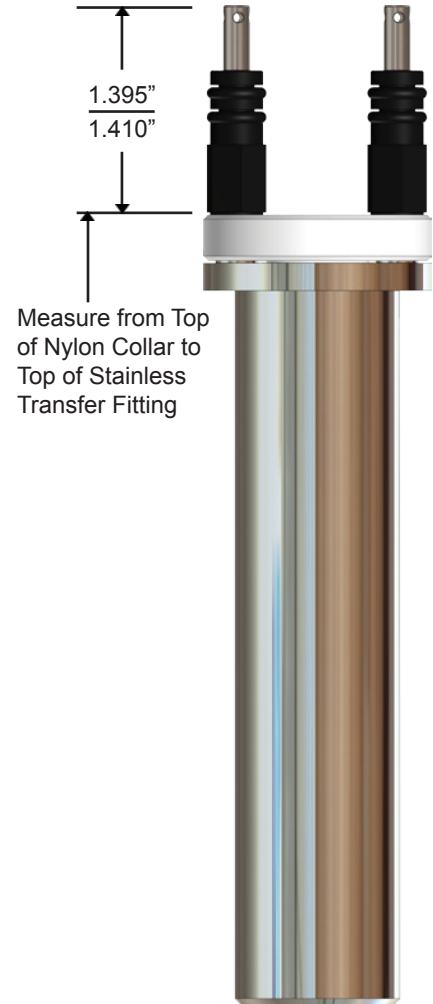
When you put the water-cooled nozzle back on the docking spool body of the torch you must make sure the water-cooled nozzle is pushed up correctly, and tighten the cone nut thoroughly so that everything is in the correct place and there are no leaks. There should be no reason to take apart the torches 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.



# 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.

# 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 work-piece 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.

# D/F MACHINE SPECIALTIES, INC.

*MIG & TIG Welding Products, Consumables & Accessories*

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## 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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