INSTRUCTIONS for

HW-9
TIG WELDING TORCH

60/120 degree head with 12-1/2-ft. cable ........... Part No. 16X28
60/120 degree head with 25-ft. cable .............. Part No. 16X44

RATING: With standard or gas lens collet bodies: 110 amps. (ACHF or DCSP) continuous duty; 120 amps. at 50% duty cycle. (Using standard collet bodies.)

COOLING: Air-cooled design.

ELECTRODES: Uses .020, .040, and 1/16-in. diameter electrodes, 3-in. or 7-in. long. Both the short torch cap (designed for 3-in. electrodes) and the long cap are supplied with the torch. See Table I for electrode diameter vs. current recommendations.

COLLETS: Available for each electrode size. See Table II. One collet body (supplied with torch) is used with each collet.

CUPS: For use with standard collet bodies: Standard ceramic in sizes 4 through 8. High-impact and long high-impact in ceramic sizes 4, 5, and 6. See Table III.

For use with gas lens collet bodies: High-impact ceramic in sizes 4, 5, 6, and 7. See Table III.

TORCH DIMENSIONS:
Length, approx. ......................... 8-3/4-in.
Handle diameter ......................... 3/4-in.
Height of torch head (short cap) ...... 3-1/8-in.
(long cap) .............................. 7-1/8-in.
Diameter of Head ....................... 19/32-in.
Head Angle: Collet and cap are interchangeable to provide either 60-deg. or 120-deg. angle.
Weight (less cable) .................... 3-oz.

REQUIRED ACCESSORIES OR SERVICES:
- Collet, collet body, electrode, cup.
- Shielding gas regulator-flowmeter (if cylinder gas is used) OR flowmeter (if gas is piped).
- Gas Hose, 12-1/2-ft. long (40V77) or 25-ft long (34V38) connects between regulator-flowmeter and torch cable and hose assembly.
- Welding power and shielding gas supplies.

OPTIONAL ACCESSORIES:
- Gas Lens Collet Bodies (see Table II) for extending the shielding gas stream so that an electrode can be extended

These instructions are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for electric welding equipment, we urge you to read Linde's free booklet 'Precautions and Safe Practices for Electric Welding and Cutting', Form 52-529.

Be sure this information reaches the operator. You can get extra copies through your supplier.
3/4-in. beyond the cup. Improves performance in drafty locations and enables operator to weld inside corners and other hard to reach places. To use the gas lens, a collet body insulator (53N85), adaptor (45V52) and special gas cups (see Table III) are also required.

-Wrench (59K07) for use with the above gas lens collet bodies.

-Flow Control Adaptor (21X62): installs inside the torch handle to supply 5 to 15 cfh argon when used with a standard inert gas regulator. Installation and operating instructions are supplied with the adaptor.

-Asbestos Sheath, 9-1/2-ft. (53N56) and 22-ft. (53N57) for protecting service lines.

-Transparent Torch Cap, long (56Y83) to aid in determining when new electrode is needed.

SET-UP AND INSTALLATION

1. Connect the regulator/flowmeter to a gas cylinder. Refer to the instructions supplied with the regulator/flowmeter for details on attaching and adjusting the regulator.

2. Connect one end of the gas hose (40V77 or 34V38) to the regulator outlet; and the other end to the torch cable adaptor (53N43).

3. Connect the power cable adaptor to the welding power source, either directly or through a suitable length of welding cable fitted with lugs.

4. If using the standard torch accessories, refer to Fig. 1 and install collet, electrode, and cup as follows:
   a. Remove the insulator sleeve and collet body from the torch.
   b. Place the correct size electrode and collet into the top end of the collet body, making sure the bottom end of the collet mates with the tapered seat in the collet body.
   c. Screw the collet body into the front end of the torch body.
   d. Install the insulator sleeve so that it fits between the groove on the collet body and the flange on the torch body. A clockwise rotation of the sleeve will then tighten the collet on the electrode.
   e. Screw the proper size ceramic cup onto the collet body.
   f. Adjust the electrode so that it extends 1/8-in to 3/16-in. beyond the end of the cup. This is done by turning the collet insulator sleeve about one-quarter turn to the left, adjusting the electrode, and tightening the collet insulator sleeve again with the fingers.

5. If using the optional gas lens accessories, install the parts as follows:
   a. Remove the sleeve and the standard collet body from the torch (the standard collet body is not required for this installation).
   b. Refering to the inset of Fig. 1, install the sleeve onto the adaptor (45V52); place the insulator (53N85) over the small diameter end of the gas lens collet body and then screw the collet body into the adaptor. Tighten with a wrench (special collet body wrench (59K07) is available).
   c. Insert the selected electrode and collet (tapered end first) into the adaptor end.
   d. Screw the entire assembly (adaptor end first) into the front end of the torch. Rotating the sleeve clockwise will tighten the collet on the electrode.
   e. Install the selected gas lens cup onto the collet body.
   f. Electrode may be adjusted to extend from 1/8-in. to 3/4-in. beyond the cup depending on the nature of the work. Turn the sleeve about 1/4 turn or less to loosen the electrode.

PRECAUTIONS

A. Use a standard welder’s helmet with the proper shade of glass for the welding current to be used.

B. Wear suitable clothing to protect exposed skin from arc burns.

C. Be sure to shut off power before adjusting or replacing electrodes.

D. When welding copper indoors, provide good ventilation or use a respirator.

E. If you use chlorinated solvents for degreasing or cleaning the workpiece, do not weld near degreasing tanks.

F. Shield your welding station to protect neighboring workers from ultra-violet radiation.
OPERATING INSTRUCTIONS

1. Make sure that all gas connections in the system have been securely tightened, and that the torch cap has been well-tightened.
2. With the regulator flow-adjusting valve closed, open the gas cylinder or station valve.
3. Set the power supply for the desired welding current.
4. Open all shielding gas valves downstream from the flow-meter or flowmeter/regulator (e.g., lever-operated shutoff valve, or solenoid-operated valve in power supply).
5. Set shielding gas flow to the desired level, as registered on flowmeter tube or gauge.
6. Close control switch at work station or power supply.
7. Draw a test arc on a heavy piece of scrap steel or copper. (Do NOT use a carbon block, which will tend to contaminate the electrode.)
8. If the test arc is satisfactory, commence welding.

OPERATION AND MAINTENANCE HINTS

1. A poor shielding gas connection, or a leaky hose, will not only waste gas but permit the entry of minute amounts of air, sufficient to contaminate both the electrode and the weld. Trouble signs: a bluish cast on the electrode after it has cooled; in welding aluminum, a dark gray deposit on or beside the weld bead.
2. Keep the torch hose away from hot metal. The plastic hose begins to lose strength at 125 deg. F.
3. Don’t try to repair a damaged power cable. Replace it. Then send the damaged assembly, if it appears worth salvaging, to a Linde repair station, which has special tools for making up tight connections.
4. If an electrode becomes contaminated, shut off power, then remove electrode from torch. Break off the contaminated end (nicking with a grinding wheel first will help) and replace electrode.
5. Keep an eye on the sealing ‘O’ ring on the torch cap. If it shows sign of wear or distortion, cut it off. Then install a new ring (85W49). Apply a little silicone grease to the new ring before attempting to slide it over the cap threads.

<table>
<thead>
<tr>
<th>Electrode Size (in.)</th>
<th>ACHF *</th>
<th>DCSP •†</th>
<th>DCRP †</th>
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<tbody>
<tr>
<td>0.020</td>
<td>5 - 15</td>
<td>5 - 20</td>
<td>5 - 20</td>
</tr>
<tr>
<td>0.040</td>
<td>10 - 60</td>
<td>15 - 80</td>
<td>15 - 80</td>
</tr>
<tr>
<td>1/16</td>
<td>50 - 100</td>
<td>70 - 110</td>
<td>70 - 110</td>
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* In general, for DCSP, the lower end of the specified current range applies to the pure tungsten electrodes and the upper end to the thoriated tungsten electrodes.

† Thoriated tungsten electrodes are recommended when gas lens and high frequency starting are used.

<table>
<thead>
<tr>
<th>TABLE II — COLLETS AND COLLET BODIES</th>
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<tbody>
<tr>
<td>Size, in.</td>
</tr>
<tr>
<td>Collet</td>
</tr>
<tr>
<td>Gas Lens Collet Body *</td>
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* An adaptor (45V52) and insulator (53N85) are also required when using a gas lens.

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<tr>
<th>TABLE III — CUPS</th>
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<tr>
<td>Cup No.</td>
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<tr>
<td>Ceramic Cup</td>
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<tr>
<td>High-Impact Cup</td>
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<tr>
<td>Long High-Impact Cup</td>
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<tr>
<td>Gas Lens High-Impact Cup</td>
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* An adaptor (322117) is required when using these cups.
Fig. 2 - LINDE HW-9 (Series 3) Torch

Part No. 16X28 (12-1/2-ft. cable)
Part No. 16X44 (25-ft. cable)

*Series 1 and 2 torches differ from the series 3 in that they do not have inert gas fittings (i.e., the power cable adaptor on the Series 3 accepts hose having a male fitting, whereas the series 1 and 2 models accept an argon hose having a female fitting).*