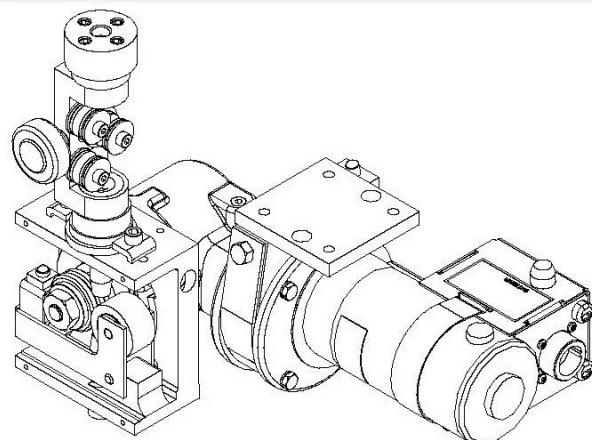


IM2070
04/2017
REV01

MAXsa™ 29 WIRE DRIVE

OPERATOR'S MANUAL



ENGLISH



THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Ave., Cleveland Ohio 44117-1199 USA
www.lincolnelectric.eu

THE LINCOLN ELECTRIC COMPANY
EC DECLARATION OF CONFORMITY



Manufacturer and technical documentation holder: The Lincoln Electric Company

Address: 22801 St. Clair Ave.
Cleveland Ohio 44117-1199 USA

EC Company: Lincoln Electric Europe S.L.

Address: c/o Balmes, 89 - 8⁰ 2^a
08008 Barcelona
SPAIN

Hereby declare that equipment:
K2803, Power Wave AC/DC 1000 SD
K2444, CE Filter
K2814, MAXsa 10 Controller
K2626, MAXsa 19 Controller
K2370, MAXsa 22 Feed Head
K2312, MAXsa 29 Feed Head
(Sales codes may contain suffixes and prefixes.)

Is in conformity with Council Directives and amendments:
Electromagnetic Compatibility (EMC) Directive 2014/30/EU
Low Voltage Directive (LVD) 2014/35/EU

Standards:
EN 60974-1: 2012, Arc Welding Equipment – Part 1: Welding Power Sources;
EN 60974-5: 2013, Arc Welding Equipment-Part 5: Wire Feeders;
EN 60974-10: 2014, Arc Welding Equipment-Part 10: Electromagnetic compatibility (EMC) requirements;

CE marking affixed in 09

A handwritten signature in black ink, appearing to read "Samir Farah".

Samir Farah, Manufacturer
Compliance Engineering Manager
19 January 2017

A handwritten signature in black ink, appearing to read "Dario Gatti".

Dario Gatti, European Community Representative
European Engineering Manager
20 January 2017

MCD240F



12/05

THANKS! For having chosen the QUALITY of the Lincoln Electric products.

- Please Examine Package and Equipment for Damage. Claims for material damaged in shipment must be notified immediately to the dealer.
- For future reference record in the table below your equipment identification information. Model Name, Code & Serial Number can be found on the machine rating plate.

Model Name:

Code & Serial number:

Date & Where Purchased:

ENGLISH INDEX

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Technical Specifications

MAXsa™ 29 WIRE DRIVE

MODEL	TYPE	142:1 SPEED RATIO			95:1 SPEED RATIO			57:1 SPEED RATIO								
		WIRE SIZE			WIRE SIZE			WIRE SIZE								
		SPEED	SOLID	CORED	SPEED	SOLID	CORED	SPEED	SOLID	CORED						
K2312-3	MAXsa™ 29	10-200	7/32	5/32	10-300	1/8	5/32	40-500	1/16	3/32						
WIRE FEEDERS - INPUT VOLTAGE AND CURRENT																
VOLTAGE				INPUT AMPS												
32VDC (.40V Pulse Width Modulated)				6.7 (max.)												
PHYSICAL DIMENSIONS																
HEIGHT (mm)	WIDTH (mm)	DEPTH (mm)			WEIGHT (kg)											
305 203	355	254			15.9											
TEMPERATURE RANGES																
OPERATING TEMPERATURE RANGE (°C)				STORAGE TEMPERATURE RANGE (°C)												
-20 to +40				-40 to +85												
WELDING PROCESSES																
PROCESS	ELECTRODE DIAMETER RANGE	OUTPUT RANGE (A)			WIRE FEED SPEED RANGE											
SAW	1.2-5.6 mm	200-2000+ (with paralleled machines)			.25-11.43 m/minute											

Electromagnetic Compatibility (EMC)

01/11

This machine has been designed in accordance with all relevant directives and standards. However, it may still generate electromagnetic disturbances that can affect other systems like telecommunications (telephone, radio, and television) or other safety systems. These disturbances can cause safety problems in the affected systems. Read and understand this section to eliminate or reduce the amount of electromagnetic disturbance generated by this machine.



This machine has been designed to operate in an industrial area. To operate in a domestic area it is necessary to observe particular precautions to eliminate possible electromagnetic disturbances. The operator must install and operate this equipment as described in this manual. If any electromagnetic disturbances are detected the operator must put in place corrective actions to eliminate these disturbances with, if necessary, assistance from Lincoln Electric.

Before installing the machine, the operator must check the work area for any devices that may malfunction because of electromagnetic disturbances. Consider the following.

- Input and output cables, control cables, and telephone cables that are in or adjacent to the work area and the machine.
- Radio and/or television transmitters and receivers. Computers or computer controlled equipment.
- Safety and control equipment for industrial processes. Equipment for calibration and measurement.
- Personal medical devices like pacemakers and hearing aids.
- Check the electromagnetic immunity for equipment operating in or near the work area. The operator must be sure that all equipment in the area is compatible. This may require additional protection measures.
- The dimensions of the work area to consider will depend on the construction of the area and other activities that are taking place.

Consider the following guidelines to reduce electromagnetic emissions from the machine.

- Connect the machine to the input supply according to this manual. If disturbances occur if may be necessary to take additional precautions such as filtering the input supply.
- The output cables should be kept as short as possible and should be positioned together. If possible connect the work piece to ground in order to reduce the electromagnetic emissions. The operator must check that connecting the work piece to ground does not cause problems or unsafe operating conditions for personnel and equipment.
- Shielding of cables in the work area can reduce electromagnetic emissions. This may be necessary for special applications.

WARNING

EMC classification of this product is class A in accordance with electromagnetic compatibility standard EN 60974-10 and therefore the product is designed to be used in an industrial environment only.

WARNING

The Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There can be potential difficulties in ensuring electromagnetic compatibility in those locations, due to conducted as well as radio-frequency disturbances.



Safety

11/04



WARNING

This equipment must be used by qualified personnel. Be sure that all installation, operation, maintenance and repair procedures are performed only by qualified person. Read and understand this manual before operating this equipment. Failure to follow the instructions in this manual could cause serious personal injury, loss of life, or damage to this equipment. Read and understand the following explanations of the warning symbols. Lincoln Electric is not responsible for damages caused by improper installation, improper care or abnormal operation.

	WARNING: This symbol indicates that instructions must be followed to avoid serious personal injury, loss of life, or damage to this equipment. Protect yourself and others from possible serious injury or death.
	READ AND UNDERSTAND INSTRUCTIONS: Read and understand this manual before operating this equipment. Arc welding can be hazardous. Failure to follow the instructions in this manual could cause serious personal injury, loss of life, or damage to this equipment.
	ELECTRIC SHOCK CAN KILL: Welding equipment generates high voltages. Do not touch the electrode, work clamp, or connected work pieces when this equipment is on. Insulate yourself from the electrode, work clamp, and connected work pieces.
	ELECTRICALLY POWERED EQUIPMENT: Turn off input power using the disconnect switch at the fuse box before working on this equipment. Ground this equipment in accordance with local electrical regulations.
	ELECTRICALLY POWERED EQUIPMENT: Regularly inspect the input, electrode, and work clamp cables. If any insulation damage exists replace the cable immediately. Do not place the electrode holder directly on the welding table or any other surface in contact with the work clamp to avoid the risk of accidental arc ignition.
	ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS: Electric current flowing through any conductor creates electric and magnetic fields (EMF). EMF fields may interfere with some pacemakers, and welders having a pacemaker shall consult their physician before operating this equipment.
	CE COMPLIANCE: This equipment complies with the European Community Directives.
	FUMES AND GASES CAN BE DANGEROUS: Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. To avoid these dangers the operator must use enough ventilation or exhaust to keep fumes and gases away from the breathing zone.
	ARC RAYS CAN BURN: Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing. Use suitable clothing made from durable flame-resistant material to protect you skin and that of your helpers. Protect other nearby personnel with suitable, non-flammable screening and warn them not to watch the arc nor expose themselves to the arc.
	WELDING SPARKS CAN CAUSE FIRE OR EXPLOSION: Remove fire hazards from the welding area and have a fire extinguisher readily available. Welding sparks and hot materials from the welding process can easily go through small cracks and openings to adjacent areas. Do not weld on any tanks, drums, containers, or material until the proper steps have been taken to insure that no flammable or toxic vapors will be present. Never operate this equipment when flammable gases, vapors or liquid combustibles are present.
	WELDED MATERIALS CAN BURN: Welding generates a large amount of heat. Hot surfaces and materials in work area can cause serious burns. Use gloves and pliers when touching or moving materials in the work area.
	SAFETY MARK: This equipment is suitable for supplying power for welding operations carried out in an environment with increased hazard of electric shock.

	CYLINDER MAY EXPLODE IF DAMAGED: Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. Always keep cylinders in an upright position securely chained to a fixed support. Do not move or transport gas cylinders with the protection cap removed. Do not allow the electrode, electrode holder, work clamp or any other electrically live part to touch a gas cylinder. Gas cylinders must be located away from areas where they may be subjected to physical damage or the welding process including sparks and heat sources.
	MOVING PARTS ARE DANGEROUS: There are moving mechanical parts in this machine, which can cause serious injury. Keep your hands, body and clothing away from those parts during machine starting, operating and servicing.

Installation and Operator Instructions

Read this entire section before installation or operation of the machine.

General Description

The MAXsa™ series of Automatic Wire Drives are designed for hard automation, submerged arc welding. The heavy-duty gearbox and feed plate have many years of proven reliability while a new permanent magnet motor has been added.

The MAXsa™ 29 WIRE DRIVE consists of a high torque motor and gearbox assembly with a heavy-duty feed plate housing knurled drive rolls for positive, accurate wire feeding of heavy welding wire. Depending on which options are used, the MAXsa™ has many axes of rotation for ease of fixturing and locating.

Recommended Processes

The MAXsa™ series of wire drive packages are best suited for submerged arc welding.

PROCESS LIMITATIONS

- MIG welding
- Robotic applications

EQUIPMENT LIMITATIONS

The MAXsa™ series of wire drives cannot be used with the NA3, NA-4, or NA-5 series of Lincoln Automatics.

COMMON EQUIPMENT PACKAGES

Basic Package

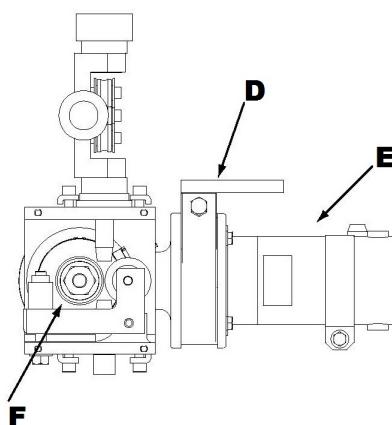
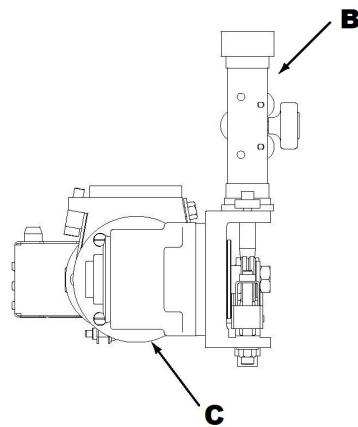
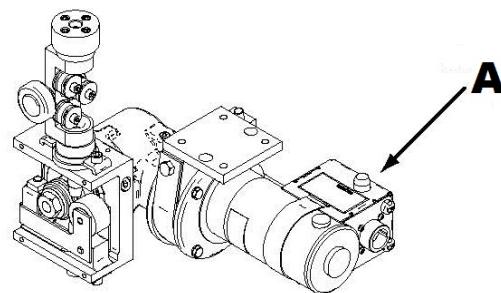
- K2803-x Power Wave® AC/DC 1000 SD
- K2814-x MAXsa™ 10 Controller/Feed Head
- K2370-x MAXsa™ 22 Wire Drive

Basic Package with optional kits:

- K2803-x Power Wave® AC/DC 1000 SD
- K2311-x MAXsa™ Motor Retrofit Kit
- K2312-x MAXsa™ 29 Wire Drive
- K2626-x Wire Drive Controller (for fixture builders that do not require the MAXsa™ 10 Controller).

Design Features - MAXsa™ 29

- Closed-loop speed control.
- Knurled drive rolls.
- Heavy cast aluminum gearbox housing and feed plate assembly.
- Wire straightener.
- 32Vdc permanent magnet, high torque motor.
- Gears included to change speed range.

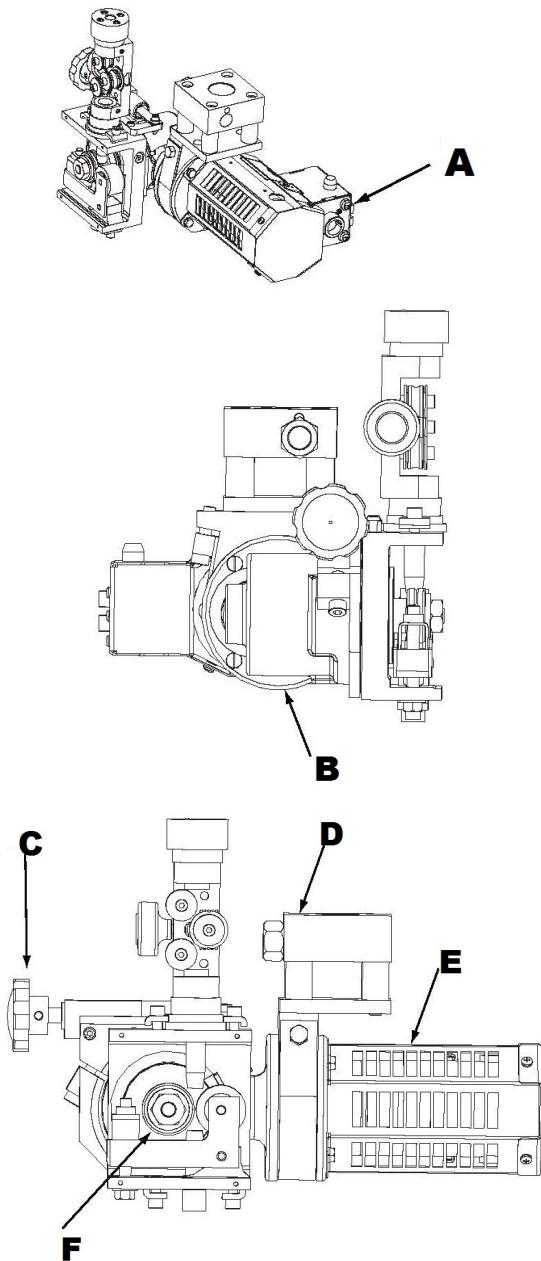


- A. Connection box
- B. Wire straightener
- C. Gear box
- D. Mounting
- E. Drive motor
- F. Drive rolls

Figure 1 – Location of MAXsa™ Components Code
11616

Design Features - MAXsa™ 29

- Closed-loop speed control.
- Knurled drive rolls.
- Heavy cast aluminum gearbox housing and feed plate assembly.
- Wire straightener.
- Cross seam Adjuster.
- Flux hooper (not shown)
- Mounting hardware for accessories.
- 32Vdc permanent magnet, high torque motor.
- Gears included to change speed range.

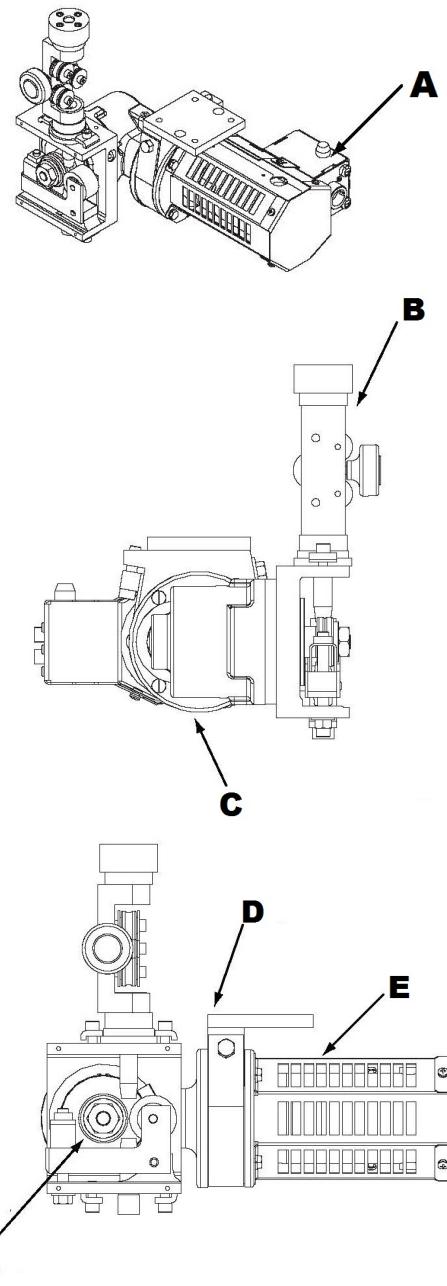


- A. Connection box
B. Gear box
C. Cross seam adjuster
D. Mounting hardware
E. Drive rolls
F. Drive rolls

Figure 1a – Location of MAXsa™ 29 Components

Design Features - MAXsa™ 29

- Closed-loop speed control.
- Knurled drive rolls.
- Heavy cast aluminum gearbox housing and feed plate assembly.
- Wire straightener.
- 32Vdc permanent magnet, high torque motor.
- Gears included to change speed range.



- A. Connection box
B. Wire straighterner
C. Gear box
D. Mounting
E. Drive motor
F. Drive rolls

Figure 1b – Location of MAXsa™ 29 Components Code

WARNING

The MAXsa™ series of wire drives may be at welding voltage potential when the output of the power source is active.

Input and Ground Connections

Only a qualified electrician should connect the MAXsa™ 29 Wire Drive. Wire drive installation should be made in accordance with appropriate National Electrical Code, all local codes and the information in this manual.

Location and Mounting

The MAXsa™ Wire Drive will operate in harsh indoor environments. It has an IP2X rating.

This equipment is for industrial use only and it is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There can be potential difficulties in residential locations due to conducted as well as radiated radio-frequency disturbances. The EMC or RF classification of this equipment is Class A

High Frequency Protection

Locate the MAXsa™ Wire Driveaway from radio controlled machinery.

Power Wave® AC/DC 1000 SD Subarc System Connections

Diagram shown is for a single arc system. Refer to the power source manual for additional connection options (Multi-arc and/or parallel machines). (See Figure 3).

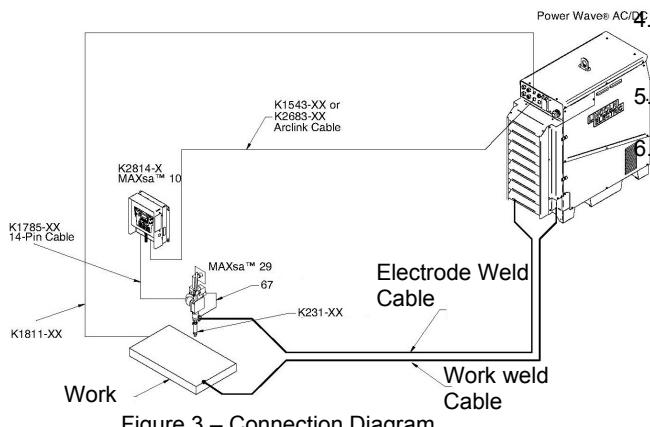


Figure 3 – Connection Diagram

Mounting Dimensions

The MAXsa™ Wire Drive can be mounted by using the four 3/8-16 tapped holes or the two 0.562 through holes. See mounting hole locations (See Figure 4).

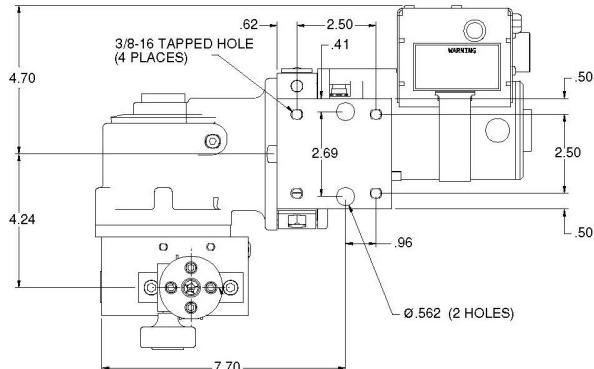


Figure 4 – Mounting Dimensions

Changing the Wire Drive Configuration

The MAXsa™ 29 WIRE DRIVE can be reconfigured to fit in any hard automation application.

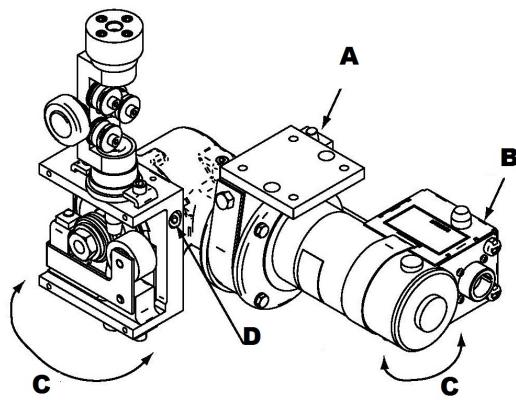
As shipped, the MAXsa™ 29 WIRE DRIVE Drive Rolls rotate clockwise to feed the wire down. Reconfiguring the Wire Drive per Figure 5 may require reversing the direction of the motor. This is accomplished by reversing the motor polarity so that the wire will feed correctly. Follow these instructions to reverse the motor polarity. See the *Electrical Schematic*.

1. Remove all power from the MAXsa™ Wire Drives.
2. Disconnect the Control Cable from the MAXsa™ Wire Drive Connection Box.
3. Loosen the fastener from the Band Strap to the Connection Box, which secures the assembly to the Motor housing, and expose the leads inside of the Connection Box.

4. Locate the Motor leads that go from the Motor to the Control Cable connector on the inside of the Connection Box.

5. Carefully disconnect the Motor leads from the harness by pulling the quick-connect terminals apart. Reverse the motor leads and reconnect the quick-connect terminals (see the *Electrical Schematic*).

7. Carefully replace the wire harness back into the Connection Box and place back onto the Motor housing locating over the Motor lead grommet. Ensure that the tachometer leads are completely covered by the Channel that snaps into the Connection Box. The Connection Box assembly should be pushed all the way up to the Motor-to-Gearbox Adapter Plate.
8. Before securing the Connection Box to the Motor housing with the Band Strap, ensure that none of the harness leads are being pinched underneath the edges of the Connection Box and Channel.
9. Place the Band Strap into the "T" slot on the side of the Connection Box and wrap it around the Motor housing.
10. Replace the fastener between the Band Strap and the Connection Box. Tighten so that the Connection Box cannot move on the Motor housing



- A. Loosen socket Head screw to rotate motor/gearbox assembly
 - B. Remove connection box to change motor polarity
 - C. Rotate
 - D. Loosen socket Head screw to rotate Feedplate
- Figure 5

Wire Feed Mechanism

All MAXsa™ Wire Drive units are shipped with 142:1 ratio gears. Gears are included to change to either 95:1 or 57:1 ratio depending on wire size to be used.

As shipped, the drive mechanism parts are designed to feed 2.4mm - 6.0mm wire. Other wire sizes will require different drive rolls and guide tubes. See table 1.

The Idle Roll pressure will need to be adjusted for the wire being used. The indicator shows two settings -

- 0.9 - 2.4mm
- 3.0 - 6.0mm

The tension adjustment is to be made after loading the wire into the drive rolls.

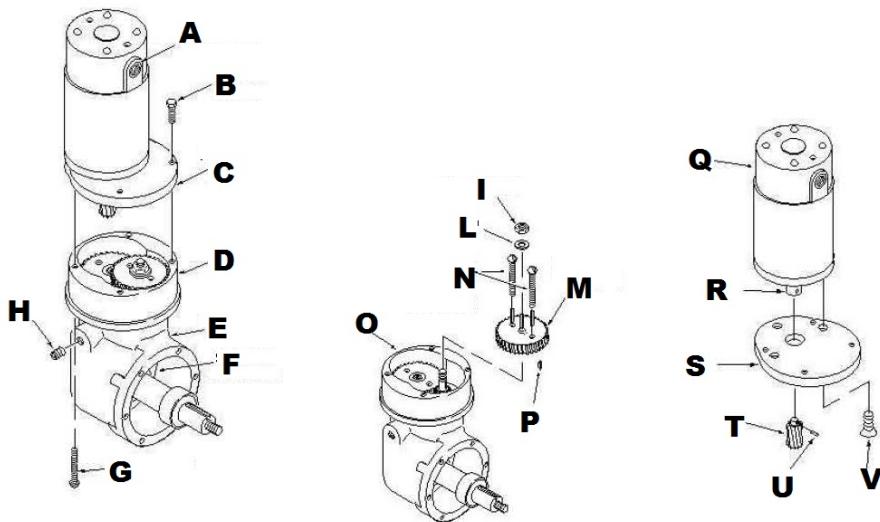
NOTE: Lower tension may need to be needed to prevent crushing of some cored wires or softer alloy solid wires.

Gear Ratio Conversion

(See Figure 6)

1. Remove the 2 hex head screws and the 2 slot head screws holding the Motor to the Wire Drive Gearbox assembly.
2. Remove existing Adapter Plate and Motor Assembly.
3. Take the two long screws removed in step 1 and screw one into each of the tapped holes located on the face of fiber input helical gear. Insert the screws through the full thickness of the gear, and using a screwdriver wedged between the screws to prevent rotation, remove the hex nut that holds the gear to the shaft. Remove plain washer.
4. Pull the gear from the shaft using the screws as a pulling device.
5. Be certain woodruff key is properly located on the shaft. Screw the adapter plate and motor assembly mounting screws into the new fiber input helical gear from the stenciled side and place the gear on the shaft. Replace plain washer, tighten the hex nut, and remove the adapter plate and motor assembly mounting screws from the gear.
6. Support the pinion properly and, with the proper size punch, drive the roll pin that holds the pinion out of the shaft. Pull the pinion off. Remove the Ring Magnet from the pinion gear and snap it onto the new pinion gear. Before installing the new pin-ion gear with the Ring Magnet onto the motor shaft, ensure that the flat washer is located at the bottom of the shaft. Install the new pinion and replace the roll pin.
7. Cover the teeth of the motor pinion and the input gear with a non-fluid molydisulfide type grease such as Non-Fluid Oil Corporation's A-29 Special/MS Lubricant. This grease can be scooped from the cavity of the gear case.
8. Reassemble the motor to the gearbox. Make sure the gears mesh properly and the adapter plate locating bead is in its cavity. Replace and tighten the four screws removed in step 1.

Important: See the MAXsa™ 10, or power source manual for instructions on configuring the system for the new gear ratio.



- A. Drive motor brush
- B. Hex head screw
- C. Adapter plate and motor assembly
- D. First chamber
- E. Wire drive gearbox
- F. Second chamber
- G. Slot head screw
- H. Pipe plug
- I. Hex nut
- L. Plain washer
- M. Input helical gear (12)
- N. Slot head screws (mounting screws)
- O. Wire feed gearbox
- P. Woodruff key (8)
- Q. Wire drive motor
- R. Shaft
- S. Adaptor plate
- T. Pinion
- U. Roll pin
- V. Mounting screw

Figure 6

Table 1 – Drive Roll Kit

KP1899 DRIVE ROLL KIT			INCLUDED WITH KIT			
Drive Roll			Drive Roll		Incoming	Outgoing
Kit Number	Wire sizes	Types	Part Number	No. Required	Guide	Guide
KP1899-1	3/32-7/32"	Wires	KP1885-1	2	KP2116-2	KP1963-1
KP1899-2	1/16-3/32"	Wires	KP1886-1	2	KP2116-1	KP2097-2
KP1899-3	.035-.052"	Solid Wire	KP1887-1	1	KP1967-1	KP2097-1
KP1899-4	.045-.052"	Cored Wire	KP1892-1	2	KP1967-1	KP2097-1

NOTE: Twinarc drive rolls are included with the Twinarc kits.

Electrode Connections

Because the Power Wave® AC/DC 1000 SD can produce either a DC positive, DC negative or AC output the electrode and work connections do not need to be reversed for the different polarities. Additionally no DIP switch changes are required to switch between the different polarities. All of this is controlled internally by the Power Wave® AC/DC. The following directions apply to all polarities:

Connect the electrode cable(s) to the "ELECTRODE" stud(s) on the power source . Connect the other to the contact assembly at the Wire Drive. Be sure the connection makes tight metal-to-metal electrical contact.

The electrode cable should be sized according to the specifications given in Table 2.

NOTE: On the Power Wave® 1000 SD, the Electrode studs are on the lower left rear corner of the machine. On older units they are on the lower left front corner. On those machines, the cables can be routed through the oval hole in the cable tray before being connected to the output terminals.

Table 2 – Output Cable Guidelines

Total Cable Length m	Duty Cycle	Number of Parallel Cables	Cable Size Copper mm ²
0 to 76.2	80%	2	120
0 to 76.2	100%	3	95

When using inverter type power sources like the Power Wave®, use the largest welding (electrode and work) cables that are practical. When using AC applications the current can reach very high levels. Voltage drops due to cable resistance can become excessive, leading to poor welding characteristics if undersized welding cables are used.

Remote Sense Lead Specifications

The MAXsa™ 29 Wire Drive has an Electrode sense lead extending from the connection box that is mounted to the motor. This sense lead is critical to the accuracy of the Power Wave® welding process. A ring terminal is provided at the end of the lead. This lead must be extended and connected to the electrode connection at the nozzle. This connection should be made as close to the welding arc as possible. Use at least a 12 AWG wire with a proper sized ring terminal. Use a screw with a lock washer and nut to make the connection, then insulate the connection with electri-cal tape. Proper care should be taken to protect the sense lead from becoming disconnected or damaged. The loss of a sense lead connection can adversely affect welding performance. The system may have multiple sense lead configurations available. Consult the power source manual on how to configure the power source for the sense leads.

NOTE: The WORK sense lead (21) for the MAXsa™ 29 WIRE DRIVE system is typically connected at the back of the Power Wave® AC/DC 1000 SD. If the MAXsa™ wire drive is to be used in an older system, (PF10A and/or K2344-X) the WORK sense lead must be brought out of the motor connection box and connected to the workpiece

K325 - TC-3 Travel Carriage

The TC-3 travel carriage is available in two models. Both are "High Capacity" and suitable for multiple arc welding.

K325- HC-S (Standard - 952:1 ratio)

127mm to 1.88M/min.

K325-HC-F (High Speed - 254:1 ratio)

381mm to 6.86M/min.

NOTE: Although the carriages can be set for speeds down to zero, speed variations increase dramatically with uneven loading when operated below the recommended minimum speeds.

The maximum amount of equipment that a K325 carriage can safely carry is shown in Table 3.

It is important when mounting wire reels, and other equipment to the TC-3 Travel Carriage that there is a minimum of overhung weight. The Wire Drive mountings are to be such that the heads are within 483mm from the front of the carriage as shown in Figure 7.

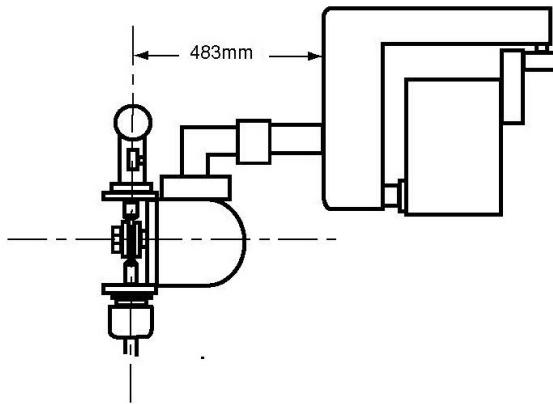


Figure 7

Table 3 – Maximum Equipment Load for TC-3

MULTIPLE ARC OPERATION		TANDEM TWINARC®
Two MAXsa™ Wire Drives and Controls	Three MAXsa™ Wire Drives and Controls	Two MAXsa™ Wire Drives and Controls
Two Wire Reels (60 # Coils)	Three Wire Reels (60# Coils)	Four Wire Reels(60# Coils) Centrally Located
Two K29 Vertical Adjusters	Three K29 Vertical Adjusters	Two K29 Vertical Adjusters
Two K96 Horizontal Adjusters	Three K96 Horizontal Adjusters	Two K96 Horizontal Adjusters
Flux Hopper	Flux Hopper	Flux Hopper
150# of Auxiliary Equipment Centrally Located over TC-3	No Auxiliary Equipment	No Auxiliary Equipment

Installation

The TC-3 comes factory assembled to fit an 203mm beam. See print G1458 for instructions to use it on 254mm or 305mm beams.

The Carriage Release Handle, the Wire Reel Support Bracket and the Wire Drive Support Bracket are not factory mounted. They should be mounted to the carriage before it is placed on the beam per the following instructions:

1. Insert the clutch handle into the hole on the right side of the carriage so that the end of the handle is goes into the lift yoke.
2. Line up the hole in the handle and the hole in the lift yoke and insert the roll pin that came taped to the handle. Drive in the roll pin until it is flush with the yoke.
3. There are 2 possibilities:
 - a) If the MAXsa™ 10 Control Box is not going to be mounted on the carriage, mount the Wire Reel Support Bracket to the left front corner of the carriage using the hardware provided.

- b) Do not mount the Wire Reel Support if the K2462-1 Control Box Mounting Bracket for the MAXsa™ 10 is to be mounted on the carriage. Another means of mounting the wire must be used such as a K390 or a user supplied support for a K299 or K162-1 Spindle Kit (ordered separately).

NOTE: Do not mount the K2462-1 Bracket for the MAXsa™ 10 Control Box until after the carriage is placed on the beam.

4. Install the Wire Drive Mounting Bracket that is supplied with the MAXsa™, using the hardware and insulators provided. See Figure 8.

NOTE: To install a MAXsa™ 29 Wire Drive order a Mounting Bracket (M6769) and the appropriate Head Support (K29 or M8232).

5. Use an ohmmeter to be sure that the Wire Reel shaft and the Wire Drive Mounting Bracket are electrically isolated from the TC-3 frame.

With the release handle all the way down, set the carriage on the beam. It should run freely along the beam. With the release handle in the up position the drive gear should engage the track and hold the carriage securely in position.

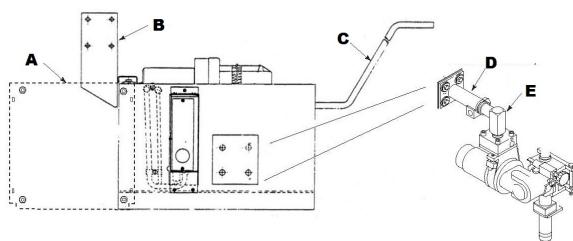
If the MAXsa™ 10 Control Box is to be mounted to the TC-3:

1. Attach the K2462-1 bracket to the left side of the carriage per the instructions included with the bracket.

NOTE: Make certain that there is enough clearance to the left of the beam to accommodate the K2462-1 bracket

2. Mount the MAXsa™ 10 Control Box to the bracket and connect the 4 pin connector from the Travel Control to the mating receptacle on the bottom of the MAXsa™ 10 Control Box.

Keep the load on the TC-3 as uniform as practical. Install cables so that they move smoothly with the carriage. Clamp the weld cables to the carriage using the cable clamp on the left rear corner. After all of the equipment has been mounted to the carriage, the tracking of the drive gear and the bearings should be checked.



- A. MaxSa™ 10 Mounting Bracket (K2462-1)
- B. Wire reel mounting bracket
- C. Clutch handle
- D. Wire drive mounting bracket (M6769)
- E. Head support (M8232)

Figure 8 – Wire Drive Mounting

INCLINED OPERATION OF TC-3

1. The beam should have a Knurled Drive Flange and the TC-3 should have the straight toothed Drive Gear (T13586 - ordered separately).

WARNING

When the carriage is used in an inclined application the unit is free to move whenever the Carriage Release Handle is pulled down. This may happen even if a counter balance weight is used. With a proper counterbalance and if the flux hopper and wire reel(s) are mounted off of the carriage, this "free-wheeling" is less likely to occur since the changing weight will not affect the counterbalance.

2. With a tilt of 5° or less, a counterbalance is typically not required (see Warning)
3. A tilt in excess of 5° will require a counter weight as shown in Figure 9. The amount of counter-weight will depend on the tilt angle and the amount of load on the carriage. Beam angles should be limited to 10° or less.

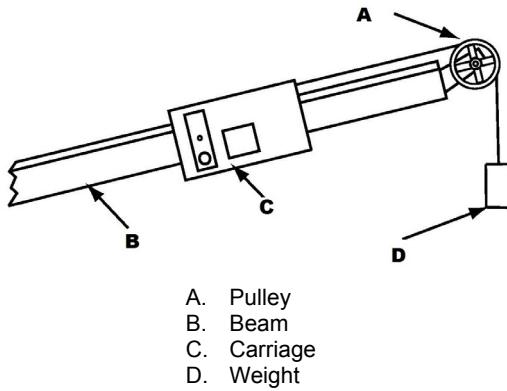
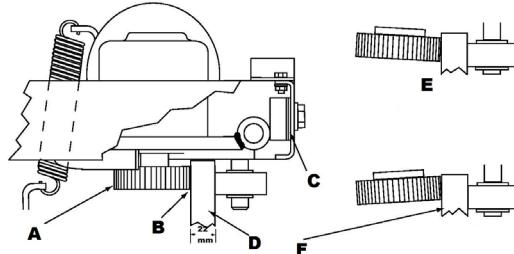


Figure 9 – Inclined Operation

DRIVE GEAR TRACKING

The TC-3 is shimmed at the factory so that the drive gear sits flat against a .88" (22mm) flange when the release handle is in the up position. If the flange dimension is other than .88" (22mm) the shims under the TC-3 gear box mounting will have to be changed accordingly. See Figure 10.

NOTE: TC-3 units are shipped with a helical tooth drive wheel that is suitable for use on a smooth drive rail. A straight tooth gear (T13586) is available for use on a drive rail with a straight cut knurl.

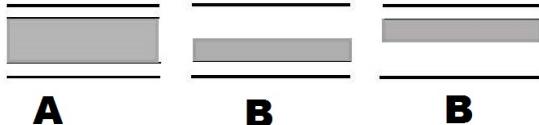


- A. Drive gear
- B. Full face contact
- C. Shims
- D. Beam drive rail
- E. Incorrect ADD shims
- F. Incorrect REMOVE shims

Figure 10 – Drive Gear Tracking

CARRIAGE BEARING TRACKING

Bearing tracking can be checked by placing a strip of white paper over the area where the bearings ride. With the drive gear disengaged (handle down), move the carriage over the strips. If the tracking is correct the bearings will leave a uniform trace on the paper. See Figure 11. If traces are not correct add shims as necessary. See Figure 12.



- A. CORRECT PATTERN: full face bearing contact
- B. INCORRECT PATTERNS: bearing is not flat against drive rail

Figure 11 – Bearing Tracking

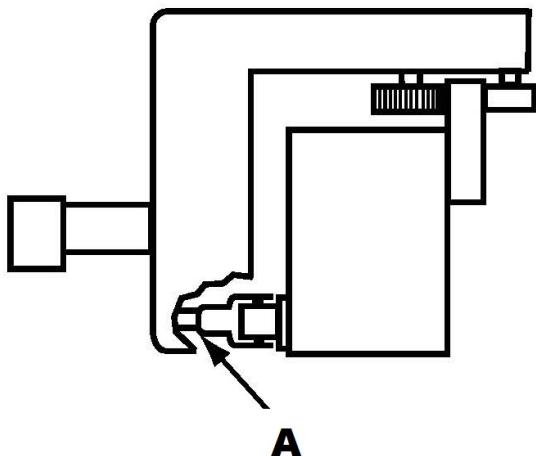


Figure 12 – Bearing Shims

Routine Operation

Once the procedures and parameters are properly set at the controller the operator should be able to make production welds without changing those settings. A typical weld sequence is as follows:

1. Before starting, make sure that:
 - a) There is enough wire on the reel(s) to finish the weld.
 - b) The flux hopper is filled with new or properly screened flux.
2. Energize the power source and wait for it to stabilize (all Status LED's Green).
3. Position the Wire Feed Head at the start of the weld. Be sure the TC-3 Carriage or travel mechanism is set to move in the proper direction
4. Set the travel switch for "Automatic Travel" if the "Hand Travel" position was used to position the feed head in Step 3.

STARTING TECHNIQUES

1. **Hot Starting** - refers to starting the weld with the Wire Drive head stationary and the wire not touching the workpiece.
 - a) Always cut the end of the wire to a sharp point.
 - b) Press Feed Forward until the wire touches the work piece and the flux hopper activates to put

flux around the starting point.

- c) Press Feed Reverse to retract the wire 3.2 to 6.4mm.
 - d) Use the Set-Up menu of the MAXsa™ 10 or remote controller to determine whether the travel will begin with Start Button pressed or with weld current (preferred).
 - e) Press the START button to initiate the weld.
 - f) Press the STOP button to begin the stop-ping sequence.
 - g) If necessary, press the Feed Reverse to move the electrode out of the way.
2. **On-the-fly Starting** - refers to starting the weld after the travel begins to get a "scratch" start. Normally this type of starting requires the use of a 'run-on' tab to insure proper weld deposition at the beginning of the weld.
 - a) Use the Set-Up Menu of the MAXsa™ 10 to set the travel to start with the START button.
 - b) Follow the Hot Starting procedure.
3. **Cold Starting** - refers to starting the weld with the Wire Drive Head stationary and the electrode touching the workpiece.
 - a) This procedure is not recommended for the Power Wave® AC/DC 1000 / MAXsa™ 29 WIRE DRIVE combinations but may work OK with smaller diameter wires and proper setting of the Start parameters.
 - b) Follow Hot Starting procedure but omit "step c".

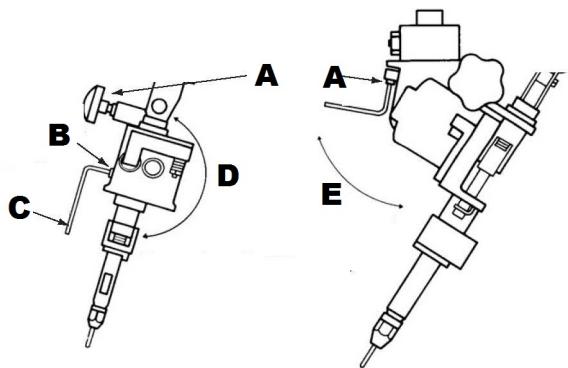
HEAD POSITION ADJUSTMENTS

The MAXsa™ 29 WIRE DRIVE can be easily adjusted to any weld position. The most often used adjustments are available on the MAXsa 29 Wire drive. See Figure 13.

Turn the Cross Seam Adjuster (MAXsa™ 29) to keep the arc in the joint as necessary. With a MAXsa™, a K96 or some other means of horizontal adjustment is recommended. See Figure 14

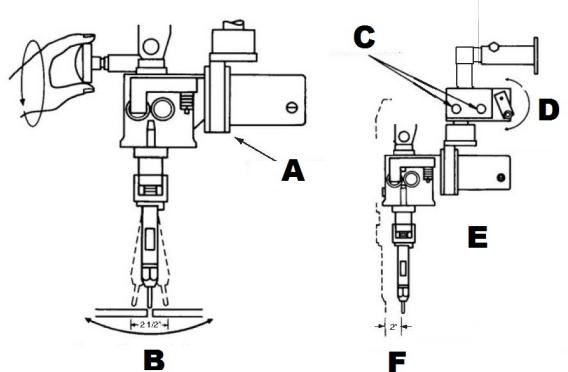
The entire Wire Drive can be moved into or out of the Mounting Bracket (M6789). If using a K29 Vertical Lift Adjuster it can be locked in either the horizontal or vertical position once the vertical position is set. See Figure 15.

If the Wire Drive is rotated to a position where the faceplate is upside down, the contact nozzle and the wire straighter and guide tubes will need to be reversed. The polarity of the motor will also need to be changed so the wire feeds in the proper direction. See the Installation Section, **Changing the Wire Drive Configuration** for instructions on changing the motor polarity.



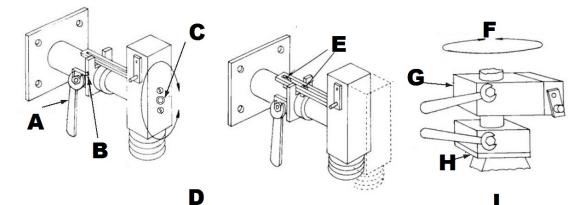
- A. The cross sea adjuster can be mounted to the top or bottom of the gearbox.
- B. Loosen this socket head screw to adjust faceplate angle
- C. 5/16" allen wrench
- D. Face-plate rotates 360° around the drive roll shaft
- E. Feed head rotates 360° around the motor axis.

Figure 13 – Feed Head Adjustment



- A. MaxSA29
- B. Cross seam adjuster
- C. This adjustment can be locked by tightening two socket head screws
- D. Turn handle to adjust
- E. Rotating the K96 allows for 2" movement in any direction in the horizontal plane
- F. K96 horizontal adjuster

Figure 14 – Horizontal Adjustment



- A. Loosen to rotate entire head around mounting axis
- B. With K29 loosen screw
- C. Use this screw to lock vertical position
- D. With standard mounting (M6767) or K29 vertical adjuster
- E. K29 clamps can be set to restrict in and out motion to distances up to 3 3/4"
- F. Head may be rotated around the vertical axis
- G. K96
- H. Head mounting
- I. With standard mounting (M6767) or K96 horizontal adjuster.

Figure 15 – Vertical Adjustment

Maintenance

WARNING

For any maintenance or repair operations it is recommended to contact the nearest technical service center or Lincoln Electric. Maintenance or repairs performed by unauthorized service centers or personnel will null and void the manufacturers warranty.

WARNING

Do not open this machine and do not introduce anything into its openings. Power supply must be disconnected from the machine before each maintenance and service. After each repair, perform proper tests to ensure safety.

Routine Maintenance

- Check weld cables, control cables and gas hoses for cuts
- Clean and tighten all weld terminals.
- Inspect and clean drive rolls and inner wire guide and replace if worn.

Periodic Maintenance

- Every six months check the motor brushes. Replace them if they are less than 1/4" long.
- Every year inspect the gearbox and coat the gear teeth with a moly-disulfide filled grease. DO NOT use graphite grease.

Calibration Specification

All calibration is factory set on the MAXsa™ Wire Drive.

To verify the wire feed speed:

- Adjust the wire feed speed to 2.54m/min and provide a COLD FEED Signal.
- Measure the actual wire feed speed with a calibrated wire feed speed tachometer K283).
- The measured wire feed speed should be within ±2% of the set value.

NOTE: If a K283 is not available, feed wire for 15 seconds and measure the wire. Repeat several times to get an average measurement. It should be 635mm +/-2%.

Sense Lead Fuse

There should never be any current flowing through the sense leads! The sensing lead circuit is current protected in the Power Wave® AC/DC 1000 SD.

If the MAXsa™ 29 WIRE DRIVE are used in an older system, a fuse in series with the #21 sense lead in the wire drive Connection Box protects the sense lead circuit from weld current due to incorrect configuration. If this fuse ever opens, check the sense lead configuration to ensure proper connections. The fuse must be replaced with a comparable fuse with a rating of less than 1 amp before welding. The fuse being open or missing would have the same effect on the welding as having a disconnected sense lead.

Customer Assistance Policy

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers

based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables

beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.

WEEE

07/06

English



Do not dispose of electrical equipment together with normal waste!

In observance of European Directive 2012/19/EC on Waste Electrical and Electronic Equipment (WEEE) and its implementation in accordance with national law, electrical equipment that has reached the end of its life must be collected separately and returned to an environmentally compatible recycling facility. As the owner of the equipment, you should get information on approved collection systems from our local representative.

By applying this European Directive you will protect the environment and human health!

Spare Parts

12/05

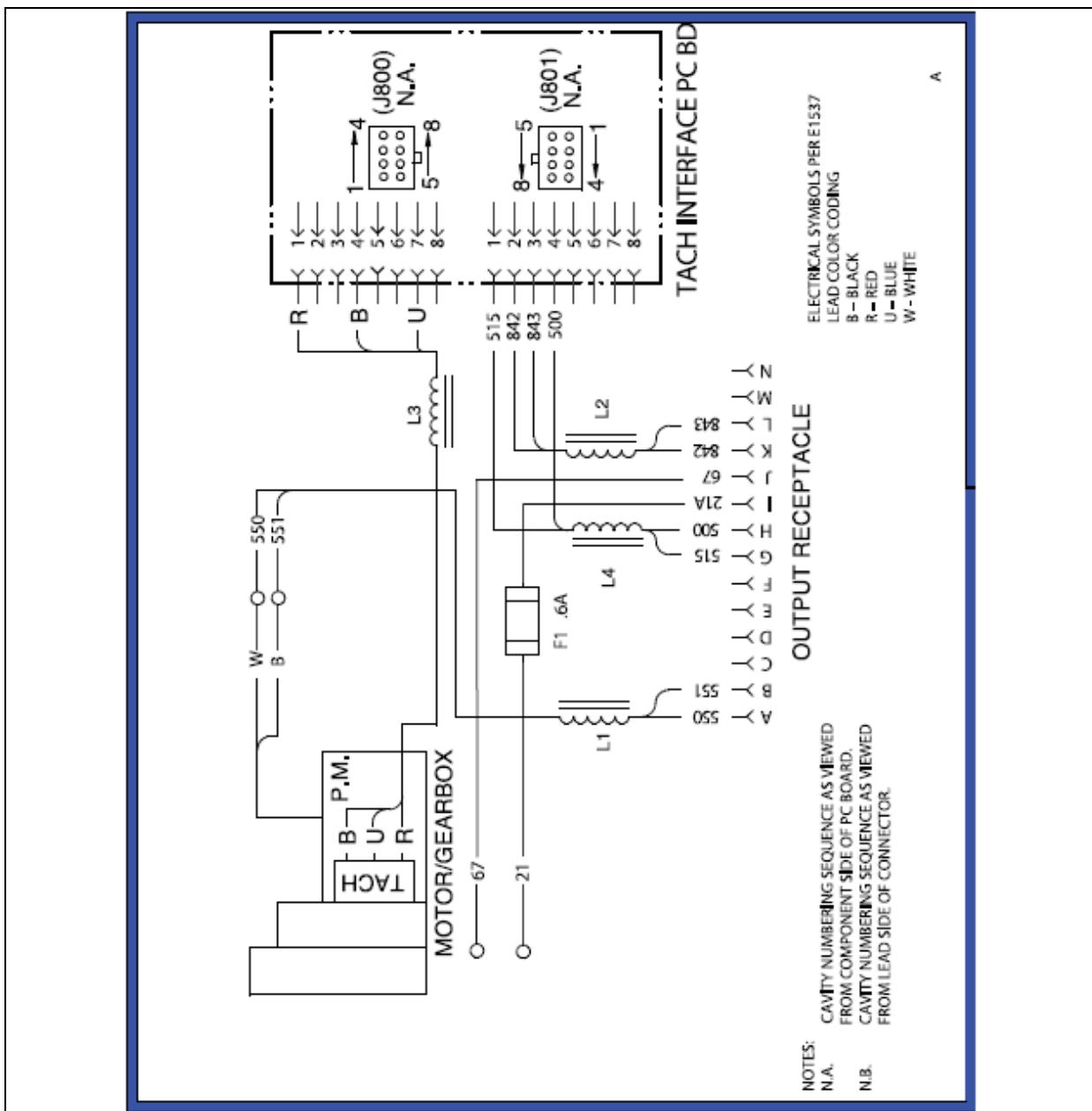
For Spare Parts references visit the Web page : <https://www.lincolnelectric.com/LEEtranet/EPC/>

Authorized Service Shops Location

09/16

- The purchaser must contact a Lincoln Authorized Service Facility (LASF) about any defect claimed under Lincoln's warranty period.
- Contact your local Lincoln Sales Representative for assistance in locating a LASF or go to www.lincolnelectric.com/en-gb/Support/Locator.

Electrical Schematic



Suggested Accessories

BASIC PACKAGE	
Item number	Description
K2803-x	Power Wave® AC/DC 1000 SD CE
K2370-x	MAXsa™ 22 Wire Drive
K2814-x	MAXsa™ 10 Controller/Feed Head
BASIC PACKAGE with OPTIONAL KITS	
K2803-x	Power Wave® AC/DC 1000 SD
K2311-x	MAXsa™ Motor Retrofit Kit
K2312-x	MAXsa™ 29 Wire Drive
K2626-x	Wire Drive Controller (for fixture builders that do not require the MAXsa™ 10 Controller)

Options and Accessories are available at
www.lincolnelectric.com

Follow these steps:

1. Go to www.lincolnelectric.com
2. In the Search field type E9.181 and click on the Search icon (or hit "Enter" on the keyboard)
3. On the results page, scroll down to the Equipment list and click on E9.181.

All of the information for the PowerWave System accessories can be found in this document.

K2311-1 Motor Conversion Kit (for 142:1 NA Style Wire Drives)--This conversion kit converts old NA style wire drives to MAXsa™ 29 WIRE DRIVE.

1. Remove the 2 hex head screws and the 2 slot head screws holding the Motor to the Wire Drive Gearbox assembly.
2. Remove existing Adapter Plate and Motor Assembly.
3. The Conversion Kit Motor is shipped configured for a 142:1 gear ratio. The existing gearbox must be configured for a 142:1 gear ratio for the Conversion Kit to assemble correctly. If both assemblies are not configured for the same gear ratio, this must be done before continuing. (See Gear Ratio Conversion Kit instructions).
4. Cover the teeth of the new Motor pinion gear with a non-fluid molydisulfide type grease such as Non-Fluid Oil Corporation's A-29 Special/MS Lubricant. This grease can be scooped from the cavity of the gear case First Chamber.
5. Reassemble the new Adapter Plate and Motor Assembly on the Wire Drive Gearbox; making sure the gears mesh properly and the Adapter Plate locating bead is in its cavity. Replace and tighten the 4 screws removed in step 1.

Submerged Arc Contact Assemblies

K231-[X/XX] CONTACT NOZZLE

The K231- [x/xx] is used for submerged arc welding with currents generally under 600 amps. Higher currents can be used but result in some what faster tip wear. The outer flux cone deposits flux around the arc for full coverage with minimum flux consumption.

Contact tips for the electrode diameter specified on the order are shipped with each nozzle. A different contact tip is required for each electrode diameter used.

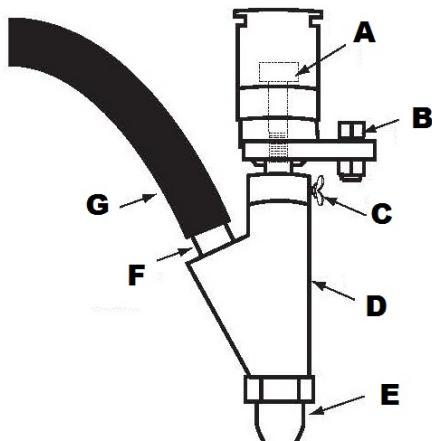
Installation - Nozzles ordered for 2.4 mm electrode include a liner and a contact tip adapter. Screw the adapter into the end of the nozzle and the contact tip into the adapter.

Insert the outgoing wire guide from the wire feed head into the top of the K231 and install the assembly in position on the bottom of the wire feed head. Lock it in position using the two clamps provided with the head.

Connect one end of the rubber flux hose to the tube at the bottom of the flux hopper. Fit the short copper tube in the other end of the rubber hose then insert the copper tube into the hole in the flux cone body. See Figure 16.

WARNING

Pushing the copper tube too far into the flux cone body will cause a short between the cone and nozzle if the cone touches the work.



- A. Socket head screw
- B. Weld cable connection
- C. Wing screw
- D. Flux cone body
- E. Flux cone
- F. Flux hose
- G. Copper tube

Figure 16 – K231

Connect the lug on the electrode cables from the power source to the tab on the contact nozzle and tighten the bolt and nut. See Figure 16

Operation - DO NOT completely straighten the electrode. A slight curvature is required in the electrode to insure good electrical contact inside the contact tip.

Maintenance - Replace the contact tip when it no longer provides accurate wire location or good electrical contact. Rusty and dirty wire or excessively high currents increase tip wear. Always keep replacement tips in stock.

To replace the contact tip, first loosen the retaining wing nut and remove the flux cone body. Then unscrew the tip and replace it.

A special socket head screw holds the nozzle body to the insulator. If the nozzle body becomes loose, remove the nozzle from the head, tighten the screw and reassemble nozzle.

Extensions - The K231 nozzle can be extended if necessary. Order part number S12003 for a 127mm extension or make any length per drawing in Figure 17.

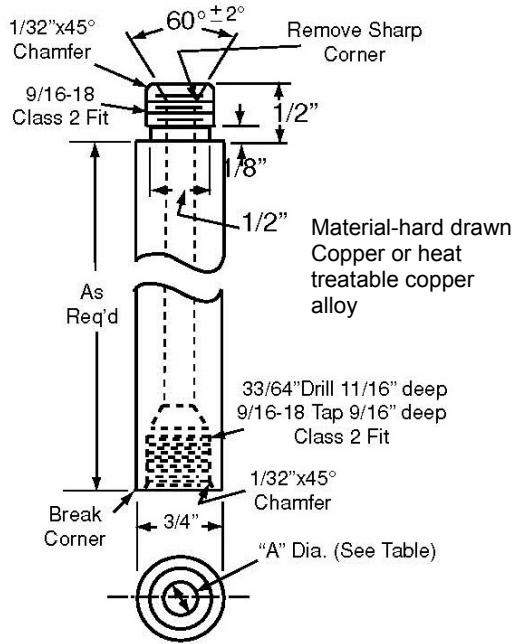


Figure 17 - Extension

Wire Size	"A" dim.
2.0-2.4mm	3.2mm
3.2-4.0mm	4.8mm
4.8-5.6mm	6.4mm

K226 CONTACT ASSEMBLY

The K226 assemblies are used for welding at currents from 600 to 1000 amps.

Model K226-T - (2 tapered jaws) 2.4 and 3.2mm electrode

Model K226-R - (1 tapered and 1 rectangular jaw) 3.2 - 5.6mm electrode.

Installation - Remove the two nozzle mounting clamps from the wire drive. Insert the outgoing wire guide from

the wire feed head into the top of the K226 and install the assembly in position on the bottom of the wire feed head. Use the two screws provided with the K226 to attach it to the wire drive. See Figure 18.

NOTE: Removing the 4 screws that hold the nozzle body to the mounting block allows the nozzle to be rotated to any of four positions 90° apart. See Figure 18.

Connect two electrode cables to the contact jaws (one under each 1/2-13 nut. Make sure that the cable lugs are flat against the copper and tighten the nuts securely. See Figure C.3.

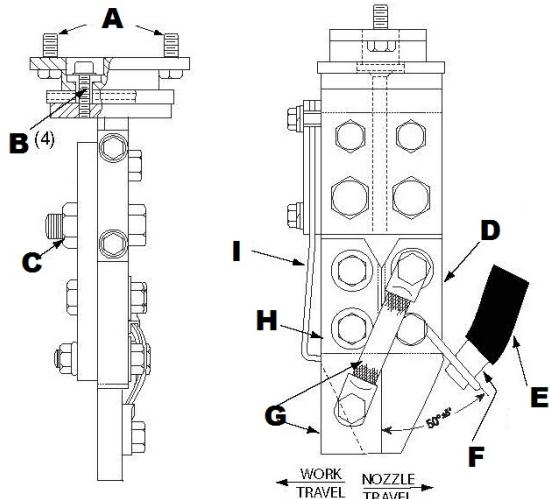
Slip the rubber flux hose that comes with the K226 onto the flux hopper valve. Fit the copper tube into the other end and place it in the clip on the lower jaw assembly. See Figure C.3.

Maintenance - Rusty or dirty wire and/or excessively high welding currents increase wear on the contact jaws. When arcing occurs or the electrode becomes loose in the jaws, remove the jaws and 'dress' them with a file. When necessary, the jaw inserts should be replaced.

NOTE: Units made prior to 1979 did not have inserts. The replacement jaws will have them.

The contact jaws must be kept in line with the wire guide. Align the jaws as follows: (See Figure C.3)

1. Loosen the stationary contact jaw screws.
2. Release the tension on the moveable jaw by loosening the screws holding the spring.
3. Place a straight 14" (or longer) piece of bare 4.0mm wire through the wire guide and into the drive rolls of the feed head.
4. Adjust the stationary contact so the wire touches the jaw at the center of the groove for the entire length of the jaw.
5. Tighten the screws, remove the wire and re-tighten the screws holding the spring to apply tension to the moveable jaw. The moveable jaw should move freely.



- A. Use to mount to wire drive
- B. Remove (4) screws to rotate nozzle
- C. Attach weld cables here
- D. Stationary contact
- E. Flux hose
- F. Copper tube
- G. K226-R only
- H. Moveable contact
- I. Spring.

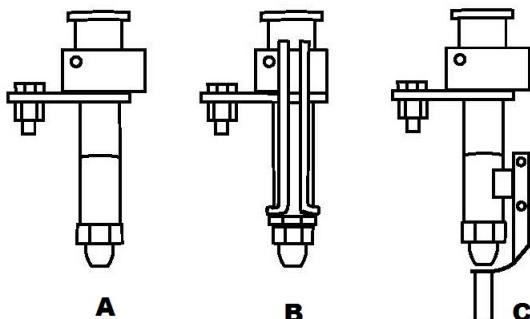
Figure 18 – K226 Contact nozzle assembly

K148 CONTACT NOZZLE AND K149 Linc-Fill™ LONG STICKOUT EXTENSION

(See Figure 19)

This nozzle is available in three models and can be used for Innershield® or submerged arc processes.

- K148-A - For 2.4 - 3.2mm wire.
- K148-B - For 4.0 - 4.8mm wire.
- K148-C - For 1.6 to 2.0mm wire.



- A. K148
- B. K148 with water cooling attachment
- C. K148 & K149

Figure 19 – Typical configurations

Current Ratings

- A. Without Linc-Fill Attachment:
 - Innershield Welding:
 - 600 amps, 100% duty, no water cooling
 - 1100 amps, 100% duty, with water cooling
 - Submerged arc welding:
 - 1100 amps, 100% duty, no water cooling.
- B. With K149 Line-Fill Attachment:

- Innershield or Submerged Arc Welding:
 - 1100 amps, 100% duty, no water cooling.

Water Cooling Attachment

When using currents over 600 amperes at high duty cycles water cooling always increases contact tip life. The cooling attachment, Part No. T12928 must be ordered separately. Installation instructions are included in the kit. Connect the attachment to the water supply and the drain with rubber tubing obtained locally. Water flow should be between 1.9 to 3.8l of tap water per minute.

K149

Installation (See Figure 20)

1. Install the K149 attachment before mounting the K148 nozzle on the welder.
2. Place a small C-clamp on the spring supporting members (A) and (B) in such a manner that the spring can be compressed. Look up into the hole in the end of contact tip and tighten the C-clamp until the tang lifts off the surface of the tip.
3. Remove the 9.5 mm set screw (C) in the body (A).
4. Remove the contact tip clamping nut (D) and the contact tip.
5. Remove the brass thread protecting collar (E).
6. Remove the dirt shield (F) from the barrel of the nozzle.
7. Slide the center guide (G) up out of the pivot body until the tang is above the window.
8. Place the Linc-Fill guide assembly into the nozzle window, and then lower the center guide tube (G) back down to its original position.
9. Line up the spot at the top of the center guide tube (G) with the 9.5 mm tapped hole in the upper pivot block (A) and put the 9.5 mm set screw (C) back into the hole and tighten securely.

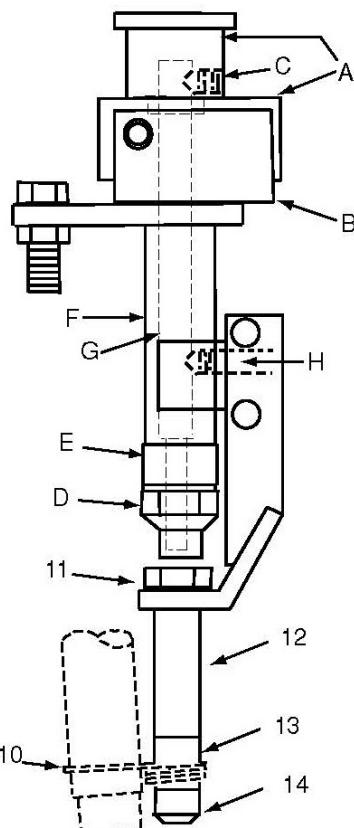


Figure 20 – K149 Installation

10. Line up the lower spot in the center guide tube (G) with the 9.5 mm set screw (H) and tighten the screw securely.
11. Replace the brass thread protecting collar (E). It is important that this protecting collar be pulled up against its locating shoulder, otherwise the tip locking nut will not clamp the tip securely.
12. Replace the contact tip and its clamping nut (D) and tighten securely.
13. Assemble the proper combination of extension guides (Items 12, 13 and 14) with locking nut (Item 11) for the welding procedure to be used.
14. For Submerged Arc welding, screw the flux hose clamp (Item 10) onto the extension housing.

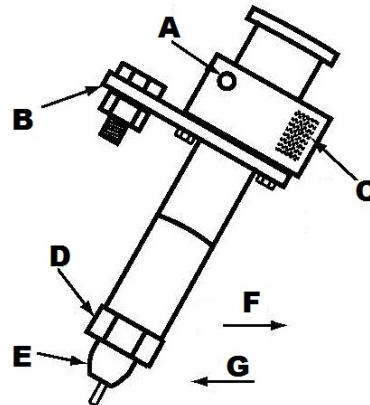
K148 Nozzle Installation

To install the nozzle on the head, insert the outgoing wire guide from the head into the nozzle assembly. Place the combined assembly in position on the bottom of the wire feed roll box. Clamp it in place using the two clamps supplied with the head.

Before pulling the clamps up tight the nozzle must be positioned relative to the travel direction as shown in Figure 21. This position is set so accidental contact between the work and the nozzle will not compress the contact pressure spring. If positioned otherwise, such accidental contact may cause arcing inside the contact tip.

After the nozzle is positioned in the proper relationship with the travel direction, the connector tab for the electrode cables can be moved to any of four positions 90 degrees apart. To change the tab, remove the two 1/4-

20 hex head screws at the connector tab to loosen it from the tapered collar on the nozzle body. Turn the tab to the desired position. Replace and tighten the 1/4-20 screws.



- A. Nozzle pivot
- B. Connector tab
- C. Contact pressure spring
- D. Locking nut
- E. Contact tip
- F. Nozzle travel
- G. Work travel

Figure 21

Operation

The same contact tip, S13763, is used for 2.4 mm through 4.8 mm diameter electrodes. S16388 is used for 1.6 mm and 2.0 mm electrode.

Loading of Wire

Straighten the start end of the coil for at least eight inches, pass the end down through the appropriate wire straightener. Inch the wire through the wire feeder and the nozzle. When using 1.6 mm or 2.0 mm Innershield electrode with a K148-C nozzle, make sure that the wire is in the "vee" groove of the pressure tang. For the 1.6 mm and 2.0 mm wire sizes, it may be necessary to back off on the idle roll pressure so that there is little or no flattening of the wire.

Because the electrode is held against one point of the contact tip, it wears a groove at that point. When the groove is about one half the diameter of the electrode, rotate the contact tip to a new position per the instructions below. Careful positioning of the contact tip will provide four to six wear spots depending upon the electrode size.

When welding with the small diameter electrodes, it will be necessary to change contact position more frequently since the amount of tip wear that can be tolerated is much less. The tang should never be allowed to touch the I.D. of the contact tip. If the groove is allowed to wear until the tang touches the I.D. of the contact tip, welding current passes through the tang. This causes electrical wear and overheating of the tang and the contact tip. See Figure 22.

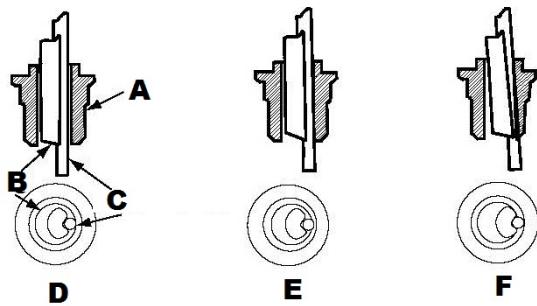


Figure 22

To rotate the tip, clip the end of the electrode and inch it up until it is free of the contact tip. Loosen the locking nut about one-half turn and pull the nozzle body to relieve the pressure of the tang against the inside of the contact tip hole. At this moment rotate the tip the proper amount and then retighten the locking nut.

To install a new contact tip proceed as follows:

1. Clip the end of the electrode and inch it up until it is free of the tip.
2. Remove the contact tip locking nut.
3. Relieve the spring pressure of the contact tip against the steel tang in the hole of the contact tip. To do this, push the nozzle body so the steel tang is approximately centered in the 9.5 mm hole in the contact tip. Under these conditions the contact tip can be easily removed from the nozzle body.
4.
 - a) Before installing the new tip, make sure the threads and the bottom surface of the nozzle are clean and bright. These surfaces are current carrying areas and must be clean.
 - b) Push the nozzle body to one side to relieve the pressure and insert the new contact tip.
5.
 - a) Check the locking ring threads making sure they are free of any foreign material. A small application of locally available high temperature anti-seize compound or graphite grease on these threads insure a longer thread life of the two mating parts.
 - b) Replace the locking ring and tighten securely.
6. Check the contact tip to be certain it is tight in the nozzle body. If the tip is not tight, arcing will take place between the tip contact surface and the nozzle contact surface which will damage the nozzle body.

K285 Concentric Flux Cone

The K285 Concentric Flux Cone is designed to fit on a K148 (with or without the K149 attachment) or on a K129 Tiny Twin-Arc® nozzle. This attachment deposits the flux so that it surrounds the electrode(s).

NOTE: If using a K149 extension, the electrical stick-out will be limited to 102mm.

The K285 consists of two pieces that are electrically isolated from each other. The stationary segment is clamped to the nozzle and the moveable portion which supports the flux hose and the concentric cone allows for vertical adjustment of the flux cone.

K285 Installation to the K148

1. Remove the tension on the center guide tube using a "C" clamp as shown in Figure 23. Apply only enough clamping force to relieve the tang pressure from the contact tip.
2. Remove the contact tip clamping nut and the contact tip.

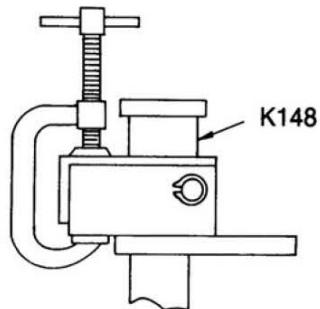
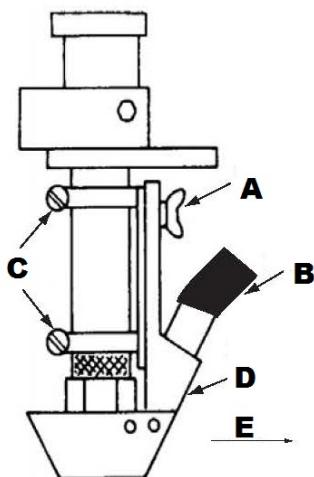


Figure 23

3. Remove the brass thread protecting collar and slide the dirt shield off of the nozzle.
4. Make sure that all the threads are clean and replace the collar, the contact tip and the clamping nut and remove the "C" clamp.
5. Loosen the hose clamps of the K285 entirely, place them around the nozzle and tighten them so that the stationary part of the K285 covers the opening in the nozzle body as shown in Figure 24.
6. Position the moveable section to the desired flux height and tighten the wing nut.
7. Cut the flux hose to required length and connect as shown.



- A. Wing nut
- B. Flux hose
- C. Hose clamps
- D. Moveable section
- E. Travel direction

Figure 24 – K148

K285 Installation with K149

1. Install the K149 to the K148 per the instructions.
 2. Loosen the hose clamps of the K285 entirely, place them around the nozzle and tighten them so that the stationary part of the K285 is directly opposite the K149 arm. See Figure 25.
- NOTE:** The lower hose clamp must be positioned so it does not touch the arm of the K149.
3. Position the moveable section to the desired flux height and tighten the wing nut. Use the center or lower tapped hole depending on the electrical stickout
 4. Cut the flux hose to required length and connect as shown.

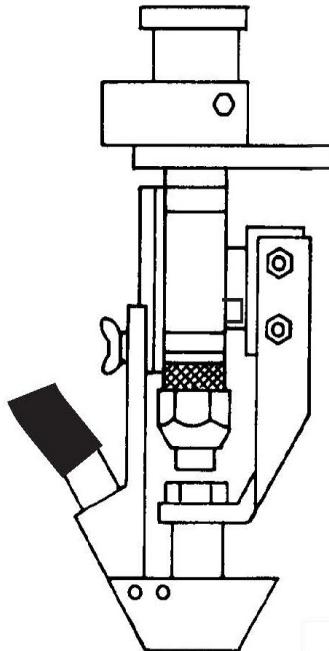


Figure 25 - K285/K149

K285 installation with the K129

1. Unscrew the hose clamps enough so they can slip over the tip holder clamping nut.
2. Position the stationary portion of the K285 as shown in Figure 26 and tighten the clamps.
3. Position the moveable section to the desired flux height and tighten the wing nut.
4. Due to the 7° angle of the tips it may be necessary to pivot the cone as shown. Remove the outermost screws from each side of the cone, tilt the cone and put the two screws into the rear of the cone. Tighten all 4 screws.
5. Cut the flux hose to required length and connect as shown.

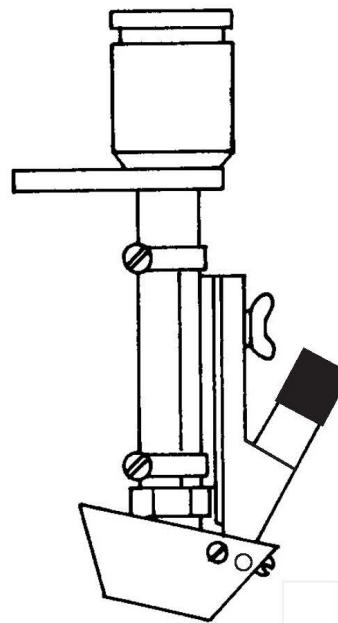


Figure 26 - K285/K129

K285 on ALL Nozzles

After the K285 is installed to any of the compatible nozzles, use an ohmmeter or a test light to insure proper insulation (no continuity) between the copper flux cone and the nozzle body.

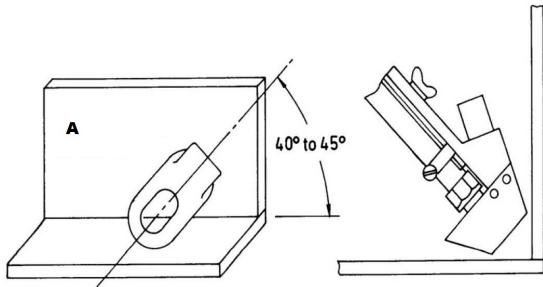
K285 Used in Horizontal Fillet Applications

1. **With K148 or K148/K149 combination** - After the K285 has been attached to the nozzle body:
 - a) Set the head and nozzle to the desired electrode angle.
 - b) Loosen the two hold down screws that hold the nozzle to the faceplate and rotate the entire assembly 40 to 45° and retighten the screws.
 - c) Feed the electrode to the proper stickout and position it in the joint.
 - d) Slide the K285 flux cone down to about 3.0mm away from both the vertical and horizontal plates and tighten the wing screw. See Figure C.27.
2. **With the K129 Tiny Twin-Arc® Nozzle** - After the K285 has been attached to the nozzle body:
 - a) Set the head and nozzle to the desired electrode angle.
 - b) Feed the electrode through the tips to the proper stickout and place the nozzle into the welding position.
 - c) Loosen the K285 hose clamps and rotate the flux cone unit about 40 to 45° and retighten the clamps.
 - d) Slide the K285 flux cone down to about 3.0mm away from both the vertical and horizontal plates and tighten the wing screw. See Figure C.27

K285 in Deep Narrow Gap Applications

For narrow, deep groove welds it may be necessary to remove the copper cone from the moveable arm of the K285.

NOTE: In Horizontal fillet applications, the flux hopper will not function properly if fastened to the faceplate of the wire drive. Mount the Flux hopper directly above the K285 flux entry point. Flux hose angles should be no greater than 35° to ensure good flux flow from the hopper to the cone.



- A. Flux cone position shown without nozzle asby.
Figure 27 – K285 in Horizontal fillet Application

K29 VERTICAL HEAD ADJUSTER

Automatic welding applications frequently require raising and/or lowering of the feed head assembly. The K29 provides an easy method of accomplishing this task by simply turning a crank handle. A height variation of 102mm is possible with this attachment.

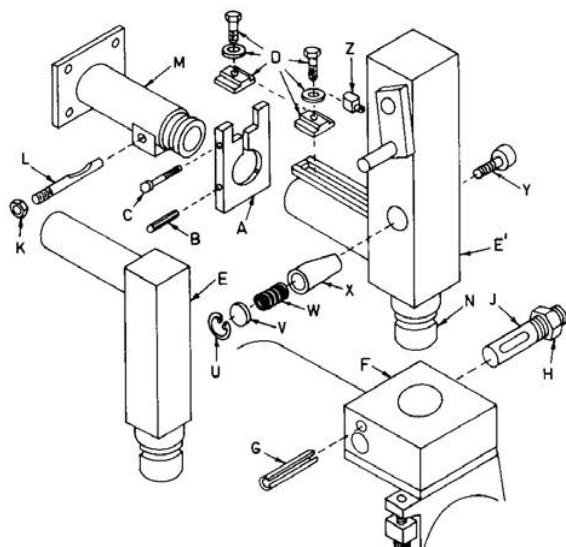


Figure 28 - K29

Installation

Check the package for the following items (See Figure 28):

1. Head Adjustment Lock (A).
2. 6.3mm diameter Roll Pin (B).
3. 12"-13x2.75" Hex Head Locking Screw (C).
4. Two adjustable clamps with hardware (D).
5. Vertical Head Lift Adjuster (E).

To install the K29, proceed as follows:

1. If the Feed Head (F) is already mounted to the Head Support (E), be sure that the lock nut (H) on the Feed Head Draw Bolt (J) is tight, and drive out the Roll Pin (G) with a 5/16" punch.
2. While supporting the Feed Head, loosen the locking nut (H) and remove the head from the Head

Support (E).

3. Loosen the Lock Nut (K) on the Draw Bolt (L) and remove the Head Support (E) from the Mounting Bracket (M).
 4. Slide the Head Adjustment Lock (A) over the end of the Mounting Bracket (M).
 5. Align the hole of the Head Adjustment Lock with the groove in the Mounting Bracket and drive in the 1/4" Roll Pin (B).
 6. Using the 1/2" x 2.75 Locking Screw, tighten the Head Adjustment Lock with the open slot in the up position.
 7. Slide the Vertical Head Lift Adjuster (E) into the Mounting Bracket (M) and tighten the Draw Bolt Nut (K).
 8. Install the two Clamps (D), one on each side of the Head Adjustment Lock with the hardware provided.
- NOTE:** If a K96 Horizontal Adjuster is to be used, install it now per the instructions provided. If not, proceed to Step 9.
9. With the Draw Bolt (J) and the Lock Nut (H) in place, raise the Feed Head in to position on the up and down lift shaft (N) and tighten the Lock Nut.
 10. Drive the 5/16" Roll Pin (G) back in to its original position.

Adjustment and Locking

Rotational movement of the lifting mechanism is kept to a minimum by the spring loaded, wedge shaped pin (X) that is always in contact with the vertical slide. The Socket Head Screw (Y) on the right side of the K29 housing is used as a locking mechanism to keep the head at a desired height.

NOTE: Extreme tightening of the locking screw may cause the wedge to jam so that the lift cannot move in either direction. If this occurs, back the screw out two turns and tap on it to release the wedge.

K96 HORIZONTAL HEAD ADJUSTER

The K96 provides an easy means of moving the Feed Head in a horizontal direction by simply turning a crank handle. It provides 2" (51mm) of travel and can be mounted directly to the Head Support or to a K29 Vertical Head Adjuster.

Installation (See Figure C.14)

1. If the Feed Head is already mounted, make sure that the Lock Nut (H) on the Feed Head Draw Bolt (J) is tight and drive out the Roll Pin (G) with a 5/16" punch.
2. While supporting the head, loosen the Lock Nut (H) and remove the Feed Head.

NOTE: If a K29 Vertical Head Adjuster is to be used, install it now per the instructions provided.

3. With the Draw Bolt (A) in place, fit the K96 Horizontal Adjuster (D) over the shaft of the Head Support (E) or the K29 (E') if used.
4. Drive in the 1/4" Roll Pin that comes with the K96.
5. With the Draw Bolt (J) and the Lock Nut (H) in place, raise the Feed Head in to position on the shaft of the Horizontal Adjuster and tighten the Lock Nut.
6. Drive the 5/16" Roll Pin (G) back in to its original position.

7. Mount the Crank Handle on whichever side is most convenient by removing the two bolts and rotating the housing 180° and replacing the bolts. See Figure 30.

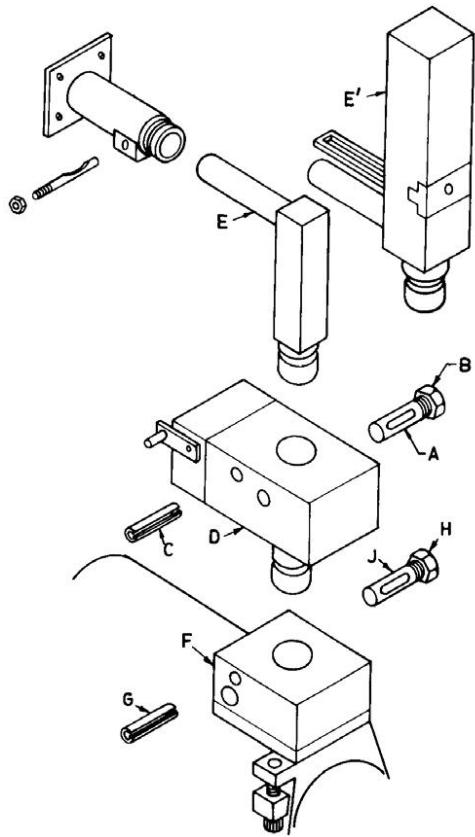
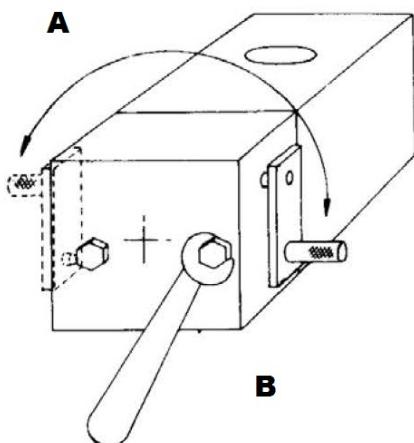


Figure 29 – K96



- A. Place handle in either of two positions
B. Remove two bolts and rotate housing

Figure 30

K129 TINY TWINARC® KIT

See Figure 31.

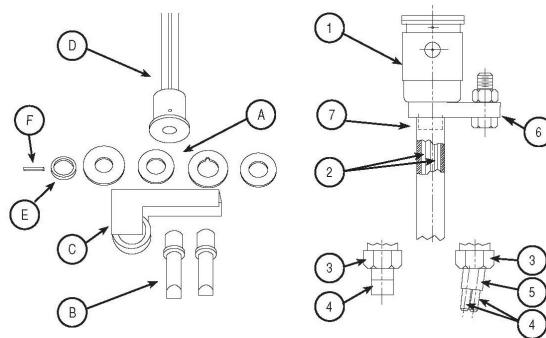


Figure 31 - K129 TINY TWINARC® COMPONENTS

Twin arc welding is a process where two wires of the same size are fed through a nozzle by a single wire drive. The K129-x/xx can be used for wire sizes 1.0 - 2.4mm.

The gear ratio of the MAXsa™ 29 WIRE DRIVE as shipped is 142:1. This may not provide enough wire speed for the procedure. Gears for 95:1 or 57:1 ratio are also shipped with the MAXsa™ 29 WIRE DRIVE units. See the instructions in this manual to change the gear ratio.

Each assembly listed below comes with a wire reel, a reel brake, shaft and mounting bracket and all of the wire drive components for the particular wire size.

- K129-1/16: 1.0 - 1.6mm Wires
- K129-5/64: 2.0mm Wire
- K129-3/32: 2.4mm Wire

NOTE: For .045" or .052" wire order KP1901-1 Wire Drive Kit for use with the K129-1/16 kit.

Installation

A. For 1.0-2.0mm Wires

1. Remove the following items from the standard Feed Head:
 - The wire straightener.
 - The nozzle assembly.
 - Both upper and lower guide tubes.
 - The drive rolls.
 - The idle roll assembly.
 - The tension spring assembly.

NOTE: The idle roll arm pivot pin is held in place by a set screw that is accessed from the outgoing surface of the faceplate.

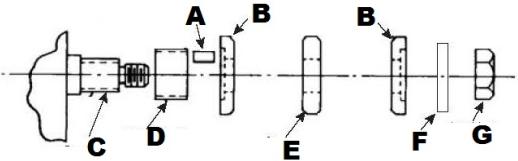
2. Place the new double grooved drive roll (A) on the shaft with the key. Replace the clamping washer and the locking nut and tighten securely.

B. For 2.4mm Wire

1. Remove the items listed in Step "A" plus:
 - The drive roll key.
 - The drive roll spacer.

NOTE: The set screw that holds the drive roll spacer in place is accessible once the idle roll assembly is removed.

2. Oil or grease the O.D. of the new shorter drive roll spacer (E) and place it on the output shaft. Push it back as far as it will go and tighten the set screw.
3. Place the new longer key (F) in the keyway.
4. Place the outer, center and second outer drive rolls (A) on the shaft. Replace the clamping washer and the locking nut and tighten securely. See Figure 32.



A. Key
B. Outer drive rolls
C. Output shaft
D. Drive roll spacer
E. Center drive roll
F. Clamping washer
G. Locking nut

Figure 32

C. Nozzle Installation

1. Install the new idle roll arm (C) using the pin and set screw from the original assembly.
2. Replace the tension spring and screw and adjust the tension screw to the .045-3/32 line on the indicator plate.
3. Insert one of the guide tubes (B) in the top of the faceplate. Line up the holes in the guide tube with the grooves in the drive rolls to insure proper wire feed.

NOTE: If using the K281 Twinarc Wire straightener, follow the supplied instructions and skip to Step 5.

4. Put the dual ingoing wire guide (D) over the ingoing guide tube and lock it down with the two "L" shaped clamps from the wire straightener.
5. Insert the two long insulated wire guides (2) into the Twinarc nozzle (1) making sure that they are seated in the holes in the mounting block (7). Place the contact tip (4) or tip holder (5) into the end of the nozzle making sure the tubes fit into the holes. Lock it securely in place with the lock-ing collar (3). See Figure 31.

NOTE: For applications that require staggered or cross seam wire placement rather than in-line, the contact tip or tip holder may be rotated. Re-adjust the head position to maintain the proper wire-to-work angle. For overlay applications a special "side by side" tip holder (part# S17728) that accepts standard contact tips is available.

6. Place the other guide tube (B) into the outgoing side of the faceplate. Place the nozzle over the guide tube and lock it in place with the two socket-head screws.
7. Bolt the electrode cable(s) of the proper size and number, to the connection tab (6) using the hardware provided. If using multiple cables, use both sides of the tab.

D. Maintenance

Replace the Contact Tip(s) when they no longer provide

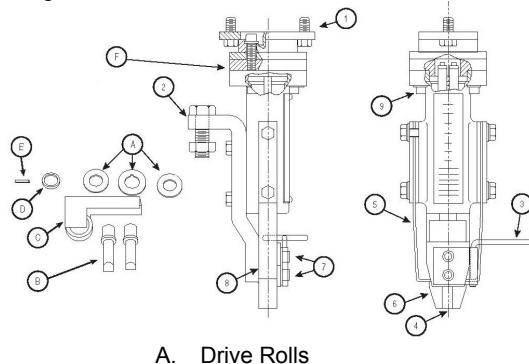
accurate wire placement or good electrical contact.

Before installing the new contact tip or tip holder:

1. Make sure that the threads and bottom surface of the nozzle are clean and bright. These are current carrying surfaces and must be clean.
2. Check that the locking collar is free of foreign material. A coating of locally available "anti-seize" compound or graphite grease will help insure longer thread life.
3. Before replacing the contact tip or tip holder:
 - a) Inch the wire past the end of the nozzle.
 - b) Slide the long wire guides on to the wire making sure they are properly seated in the mounting block (see Figure 31).
 - c) Slide the new contact tip or tip holder over the wires again making sure that the wire guides are properly seated.
 - d) Replace the locking collar and tighten securely.

K225 SUBMERGED ARC TWINARC® KIT

See Figure 33.



A. Drive Rolls
B. Guide Tubes
C. Idle Roll Arm
D. Drive Roll Spacer
E. Key
F. Nozzle Assembly

Figure 33 – K225 TWINARC® COMPONENTS

Twin arc welding is a process where two wires of the same size are fed through a nozzle by a single wire drive. The K225 Twinarc Kit can be used to weld with 2.0, 2.4 or 3.2mm electrodes. Both wires must be the same size.

The gear ratio of the MAXsa™ 29 WIRE DRIVE as shipped is 142:1. This may not provide enough wire speed for the procedure. Gears for 95:1 or 57:1 ratio are also shipped with the MAXsa™ 29 WIRE DRIVE units. See the instructions in this manual to change the gear ratio.

Each assembly comes with a wire reel, a reel brake, shaft and mounting bracket, a dual wire straightener and all of the wire drive components for the particular wire size. See Figure 34.

The Nozzle Assembly (F) has two spring loaded large copper jaws (6) that press the electrodes against the copper center block (4). This system provides good electrical contact and insures constant electrical stick-out (E.S.O.) It also helps to maintain acceptable nozzle temperatures during welding.

Installation

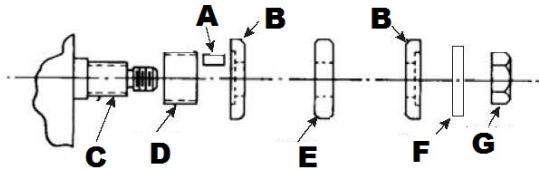
1. Remove the following items from the standard Feed Head.
 - The wire straightener.
 - The nozzle assembly.
 - Both upper and lower guide tubes.
 - The drive rolls.
 - The idle roll assembly.

NOTE: The idle roll arm pivot pin is held in place by a set screw that is accessed from the outgoing surface of the faceplate.

- The tension spring assembly.
- The Drive Roll Spacer.

NOTE: The set screw that holds the drive roll spacer in place is accessible once the idle roll assembly is removed.

2. Oil or grease the O.D. of the new shorter drive roll spacer (E) and place it on the output shaft. Push it back as far as it will go and tighten the set screw.
3. Place the new longer key (F) in the keyway.
4. Place the outer, center and second outer drive rolls (A) on the shaft. Replace the clamping washer and the locking nut and tighten securely. See Figure 34.



A. Key
B. Outer drive rolls
C. Output shaft
D. Drive roll spacer
E. Center drive roll
F. Clamping washer
G. Locking nut
Figure 34

Nozzle Installation

See Figure 33

1. install the new idle roll arm (C) using the pin and set screw from the original assembly.
2. Replace the tension spring and screw and adjust the tension screw to the proper line on the indicator plate.
3. Insert one of the guide tubes (B) in the top of the faceplate. Line up the holes in the guide tube with the grooves in the drive rolls to insure proper wire feed.
4. Put the Dual Wire Straightener over the ingoing guide tube and lock it down with the two "L" shaped clamps.
5. Place the other guide tube into the top of the K225 Nozzle Assembly (F) and slide the guide tube into the Wire Drive faceplate until the mounting screws (1) can be started into the tapped holes in the faceplate. Tighten both screws.

NOTE: For applications that require staggered or cross seam wire placement rather than in-line, the nozzle can be rotated by loosening the two 1/4-20 socket head screws (9) that hold the nozzle to the mounting base. If

the desired angle cannot be obtained, remove the screws and put them into alternate holes. Retighten when properly adjusted.

6. Connect the weld cables of the proper size and number to the copper bar (2). If using multiple cables, use both sides of the bar.
7. Route the flux hose from the flux hopper to the clip (3) on the K225 nozzle.
8. Spacing between the electrodes is maintained by the center block which comes in three sizes. The .50 " and .625" center blocks come with the kit. A .375" block is also available. See the parts list for the part number. To change the center block:
 - Loosen both of the Pressure Springs (5).
 - Remove the two Socket Head Screws (7).
 - Put a small amount of graphite grease on the screw threads and install the new copper block.
 - Replace the two screws and tighten securely.
 - Tighten the four screws holding the Pressure springs.

IMPORTANT

Make sure that the mating surface (8) between the Center Block (4) and the Copper Bar (2). is bright, clean and smooth. This junction carries the full weld current.

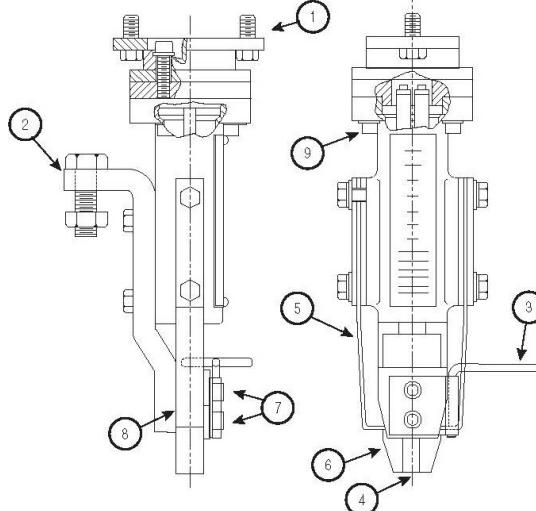


Figure 35

Maintenance

The most extensive contact wear takes place on the center contact block. The side pressure jaws are made of a harder longer lasting material. Replace the center block when there is no pressure on the wire from the side contact jaws.

Make sure that the mating surface (8) between the Center Block (4) and the Copper Bar (2). is bright, clean and smooth. This junction carries the full weld current.

K281 SOLID WIRE STRAIGHTENER FOR TINY TWINARC®

The K281 wire straightener can be used to straighten 1.0-2.4mm wires. It is recommended for applications requiring long stickout and/or where accurate wire placement is essential. The following table shows the recommended maximum electrical stick-out (ESO).

Wire Size mm	ESO – Standard Wire Guide mm	ESO - K281 Straightener mm
1.0	9.5	16.0
1.3	12.5	19.0
1.6	19.0	32.0
2.0	25.4	44.5
2.4	32	51.0

General Information (See Figure 36)

1. For best wire straightening the plane of the K281 rolls (A) should be as close as possible to the plane of the wire reels.
2. The K281 moving arm (B) should be pointing toward the wire reels and the adjusting knob (C) should be away from the reels.
3. The K281 can be mounted to the wire drive in two different positions. The head can then be positioned to meet the above requirements.

Installation

1. Remove the Spring Wire Guide if installed.
2. Remove the K129 Ingoing Guide Tube.
3. Insert the new Ingoing Wire Guide (with ceramic inserts) that comes with the K281.
4. Position the K281 over the wire guide as outlined above and tighten the two hex head screws.

Wire Loading and Adjustment

1. Turn the adjusting knob (C) to the maximum open position.
2. Remove the top ingoing guide block (D) by loosening the thumb screw (E).
3. Straighten the first 254mm of each wire (the straighter the wire the easier to load).
4. Insert one wire through each of the guide block holes.
5. Push both wires through and between the rollers and down through the guide tube until they touch the drive roll(s). Press the Cold Inch to start the wires through the wire drive.
6. Replace the upper guide block making sure that each wire is in its respective groove of both rollers. Tighten the thumb screw.
7. Turn the adjusting knob until the moving arm is approximately at the mid position of its total travel.

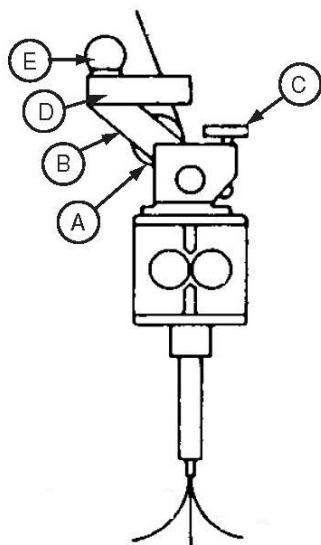


Figure 36

The tips should be in line with the O.D. of the drive rolls for initial straightening adjustment. If the wires bow to the right when inched down through the tips they are being over straightened. If the wires bow to the left, they are being under straightened. Adjust the knob until the wires come out parallel and uniform.

Depending on how the wire enters the K281, there may be some side bow. Slight rotation of the K281 may eliminate this condition.

Once the wire is sufficiently straight, the tip orientation can be changed to whatever angle between "in-line" and "cross seam" is required.

NOTE: For overlay applications with Tiny Twinarc, a special side by-side tip holder (Part # S17728 is available that accepts standard tips.