



OTTO ARC

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OPERATING INSTRUCTIONS

TPWH-C-3 Closed Weld Head



**REVISED DATE:
5.2013**

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ATTENTION – IMPORTANT WARRANTY INFO:

TO VALIDATE YOUR WARRANTY, PLEASE VISIT OUR WEBSITE WWW.OTTOARC.COM
TO COMPLETE AND SUBMIT OUR DIGITAL WARRANTY FORM. THANK YOU FOR YOUR COOPERATION.



Operating Manual

TPWH-C-3

Closed Weld Head 3"



- The operating instructions must be read before utilizing this equipment!
- Failure to do so may be dangerous!
- Machines may only be operated by personnel familiar with the appropriate safety regulations!

INDEX

SAFETY INSTRUCTIONS	4
DELIVERY INSPECTION	6
TECHNICAL DATA	7
EQUIPMENT DESCRIPTION	8
OPERATION INSTRUCTIONS	12
START WELDING	14
WELDING SET-UP INFORMATION	15
SERVICE AND MAINTENANCE	16
SERVICE	17
TPWH-C-3 EXPLODED VIEWS	20
PACKING LIST	26
MACHINE WARRANTY / REPAIRS	26

Safety Instructions



Warning: Observe accident prevention regulations. Ignoring the following safety procedures can be fatal. Before performing welding tasks ensure you are wearing appropriate dry oil free clothing, approved personal protective equipment such as gloves, flame retardant outerwear, hole free gloves, boots, etc. Protect eyes and face with approved safety glasses, welding hood and proper shade welding filter plate.



Electric shock can kill. The machine should only be connected to grounded power outlets. Only operate with an approved and serviceable main power cable and electrical power connection plug. Do not use an improperly repaired plug or damaged main power cable. Damaged and missing insulation can cause electric shock. Replace bare and damaged wires immediately before proceeding. Only qualified and authorized personnel may open the welding power supply and its' associated components and tooling. Before opening the machine remove the main power plug from the power source. Switching off the power alone is not sufficient. DC voltage can still be present in the power supply after the unit is disconnected. Wait at least 2 minutes until capacitors are discharged before opening and servicing the machine. Always put the welding head/torch down so it is insulated from the work piece contact.



Safeguard yourself against shock and resulting falls especially when working heights, or when working from a platform or scaffolding. Operate work clamps, welding heads/torches, and work piece materials properly. Do not touch live electrical connected parts with bare skin. Only replace electrodes when wearing dry gloves. Never use welding leads, work clamps, torches or ground cables with damaged insulation, worn or undersize components, or with poorly made electrical connections.



Fumes and gases can be dangerous to your health. Do not breathe in fumes and gases. Keep your head out of the welding fumes. Ensure that there is sufficient fresh air and proper ventilation in the work area. Keep solvent vapors away from the arc radiation area. Chlorinated hydrocarbon fumes can be converted into poisonous phosgene by ultraviolet radiation.



Flying sparks and molten droplets are hot. Keep children and animals well away from the working area. Their behavior is unpredictable. Remove all flammables, including closed containers with flammable or explosive liquids well away from the work area. There is always a danger of fire and explosions when welding. Always watch for fire and keep fire extinguishers close by. Never heat explosive liquids or gases by welding or cutting area. There is also a danger of explosion if harmless substances in closed containers are able to build up excess pressure when they are heated.



Avoid fire hazards. All fire hazards must be avoided. Flames can form when sparks are flying, when parts are glowing red hot, or when hot slag is present. A constant check must be kept on whether fire hazards have been created in the working area. Highly flammable objects such as matches and cigarette lighters must not be carried on your person while welding. You must ensure that proper fire extinguishing equipment (appropriate to the welding process) is available and close to the welding work area and that it is easy to access. Containers in which fuels or lubricants have been present must be thoroughly cleaned before welding begins. It is not sufficient simply for the receptacle to be empty.

After a work piece has been welded, it must only be touched or brought into contact with flammable material when it has cooled down sufficiently. Loose welding connections can completely destroy protective conductor systems of interior installations and cause fires. Before beginning welding work ensure that the ground clamp is properly connected to the work piece or welding bench, and that there is a direct electrical connection from the work piece to the power source.



Noise exceeding 70 dBA can cause permanent hearing damage. Wear suitable hearing protection such as ear muffs or ear plugs. Ensure that other people who are in the work area also wearing proper hearing protection and other required personal protective equipment.



Secure gas cylinder. Place shielding gas cylinders in the holders provided for them and secure with safety chains. Take proper care when handling gas cylinders. Only transport with gauges removed and safety caps securely in place. Do not drop, throw, or heat cylinders, and guard against them falling over at all times. When moving the power supply by crane remove the gas cylinder and any other equipment or tooling from the welding machine.



Caution: Electromagnetic energy fields and high frequency (HF) generated by welding equipment can interfere with other electronic equipment such as computers, computer controllers, radios, and other communication equipment.

As noted in Electromagnetic Compatibility Standard EN 50199, the machines are intended for use in industrial areas. If they are operated in residential environments problems can occur in ensuring electromagnetic compatibility. The functioning of heart pacemakers can be adversely affected when you are standing near the welding machine. Malfunctioning of electronic equipment in the vicinity of the welding location is possible. Other main power supply cables, safety equipment leads, signal and telecommunications leads above, under and near the welding device may be subject to interference. Ensure all systems are properly grounded and that cables do not touch and are not run on top of each other.



Warning: Electromagnetic interference must be reduced to such a level that it no longer constitutes interference.

Possible reduction measures: Welding machines should be regularly maintained and properly grounded. Welding leads should be as short as possible and run with separation (not touching) on or near to the ground. Selective shielding of other leads and equipment in the environment can reduce radiation.



Caution: Repairs and modifications may only be carried out by authorized and qualified personnel. The warranty becomes null and void in the event of unauthorized repairs or modifications.



Our operating instructions will provide you with an introduction to the safe use of the machine.

Please read them closely and only start with when you are familiar with them.

For additional welding safety information read:

American National Standard Z49.1 "Safety in Welding and Cutting" published by the American Welding Society, Miami, Florida; OSHA Safety and Health Standards, 29 CFR 1910, available from U.S. Government Printing Office, Washington DC.

Delivery Inspection

Before delivery from factory all the products are subject to strict quality control inspection. In order to ensure safe delivery we have enhanced the products packaging to avoid possible impact damage. Once the unit is unpacked check to make sure you have all the parts as listed below. If any piece is missing or broken please contact your dealer.

Upon receipt inspect for any damage that may have occurred in transportation and delivery. Check to see if any component is damaged or missing after receipt of inspection.

CHECK LIST

a. According to the packing list, check off the components received as follows:

TPWH-C-3 Closed Chamber Welding Head	1unit
Spares/Consumable Starter Kit	1 lot
Operation instruction	1manual
Quality Certificate	1piece
Packing list	1piece

In addition, check off any other items per the packing list not noted above:

- b. Check the model number and serial number of the unit and confirm it with your order.
- c. General appearance: check to ensure the power supply components are complete and that no damage has occurred during transportation.

Technical Data

Item	Technical data	
Suitable material types	Pipe and Tube – Ferrous and Non-Ferrous alloys	
Power source	OW-ARC-200, OW-ARC-400	
Rotation speed	0.22 - 4.46rpm	
Shielding Gas	Argon, or other suitable inert shielding gas	
Cooling	Water cooling circuit	
Water flow rate	≥ 0.118 gal/min (450ml/min)	
Tube wall thickness	≤ 0.080" (2mm)	
Tube outside diameter (OD) range	0.5" to 3.0" OD (12.7 - 76.2mm)	
Weight	14.33lb (6.5kg)	
Dimensions (see below diagram)	A 145mm (5.7") B 72mm (2.9") C 43mm (1.6") D 412mm (16.2") E 72.5mm (2.85")	
Duty cycle	100A	40%
	75A	60%
	55A	100%



Equipment Description

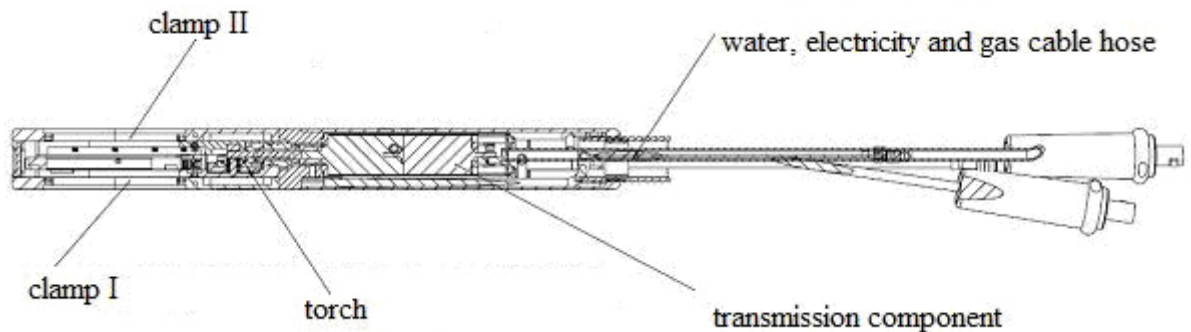
The welding head is specially designed for automatic orbital tube-to-tube Gas Tungsten Arc Welding (GTAW) without wire feeding. It is suitable for ferrous and non-ferrous alloy tubing and pipe using a closed-butt joint design. The tube diameter range is 19.05-76.2mm (.75" - 3"). The weld joint is surrounded by shielding gas inside the closed chamber of the welding head to ensure proper gas coverage and provide quality welds. The torch body and clamp housing are water cooled for long life and high duty cycle operation. Both standard and custom tube clamping collets are available for a wide variety of applications and materials. Tube clamping collets are designed for accurate tube-end alignment and long life.

INDUSTRY APPLICATIONS

Electronic	Heating and Air Conditioning
Chemical	Medical
Food/drinking water	Power Generation
Instrumentation	On-site installation and maintenance

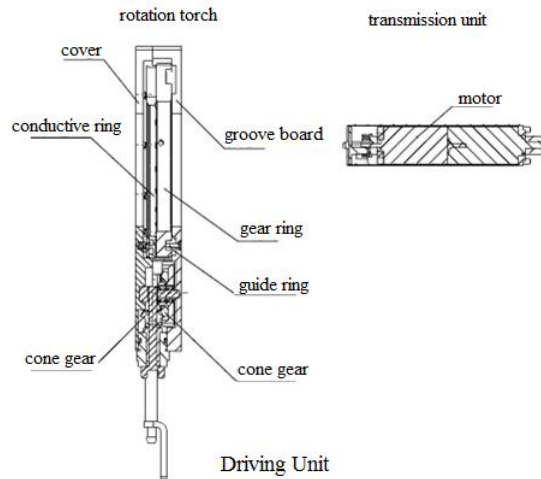
MAIN STRUCTURE

Three major components: driving unit, clamping unit, water, electricity and gas circuit unit.



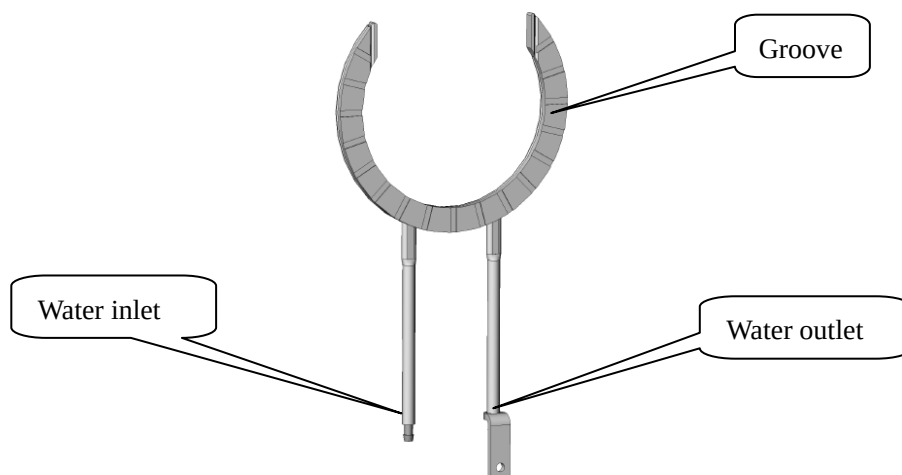
DRIVING UNIT

The driving unit includes the rotation torch and transmission unit.



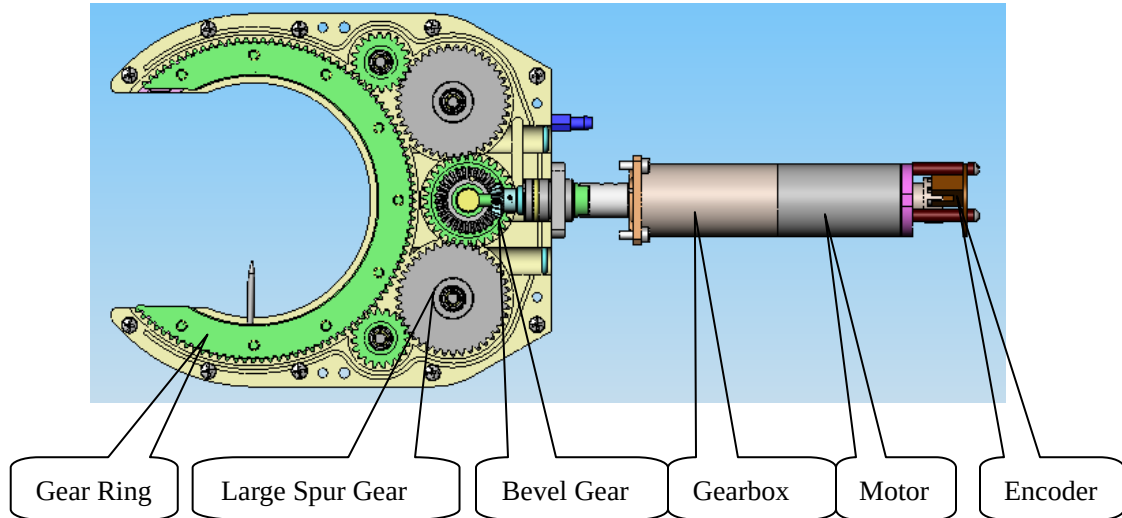
TORCH ROTATION

The rotating torch element is made of a groove board, gear cover, conductive ring and a gear ring. The groove board and the gear cover are made from electrically insulating material to ensure both side clamps are insulated. There is O ring in the groove of gear board to block air entrainment and ensure an inert welding atmosphere. The electrode is installed on the gear ring and is driven by a DC motor to achieve cycle rotation. There is a water-cooling circuit in the conductive ring to cool down the gear ring during the welding process. The groove on the gear ring is for protective gas.



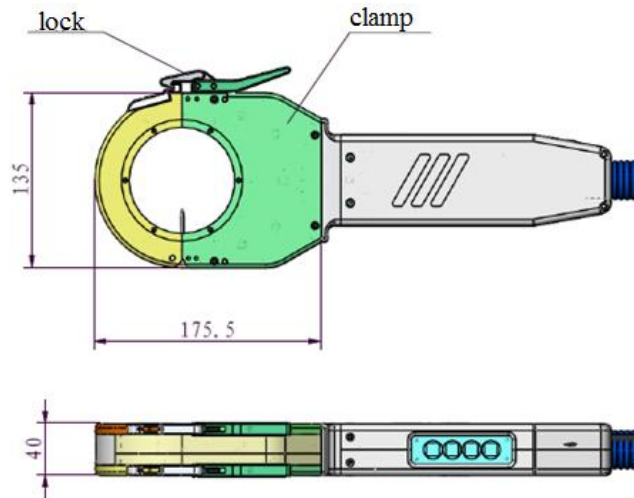
GEAR TRAIN

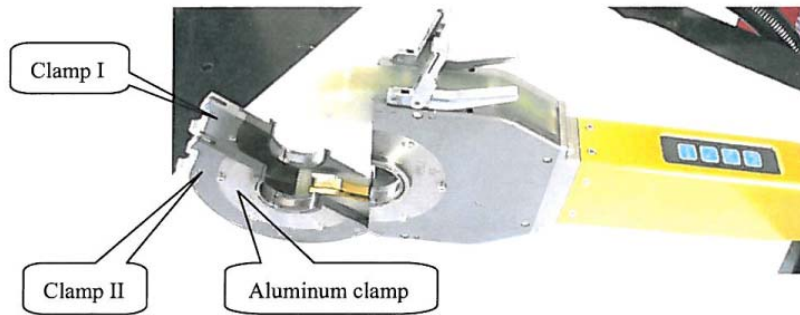
The DC motor drives the large spur gear and gear ring through a bevel gear. This drives the electrode around the tube for welding. There is an optical encoder mounted on the back of the motor to ensure accurate rotation speed.



CLAMPING UNIT

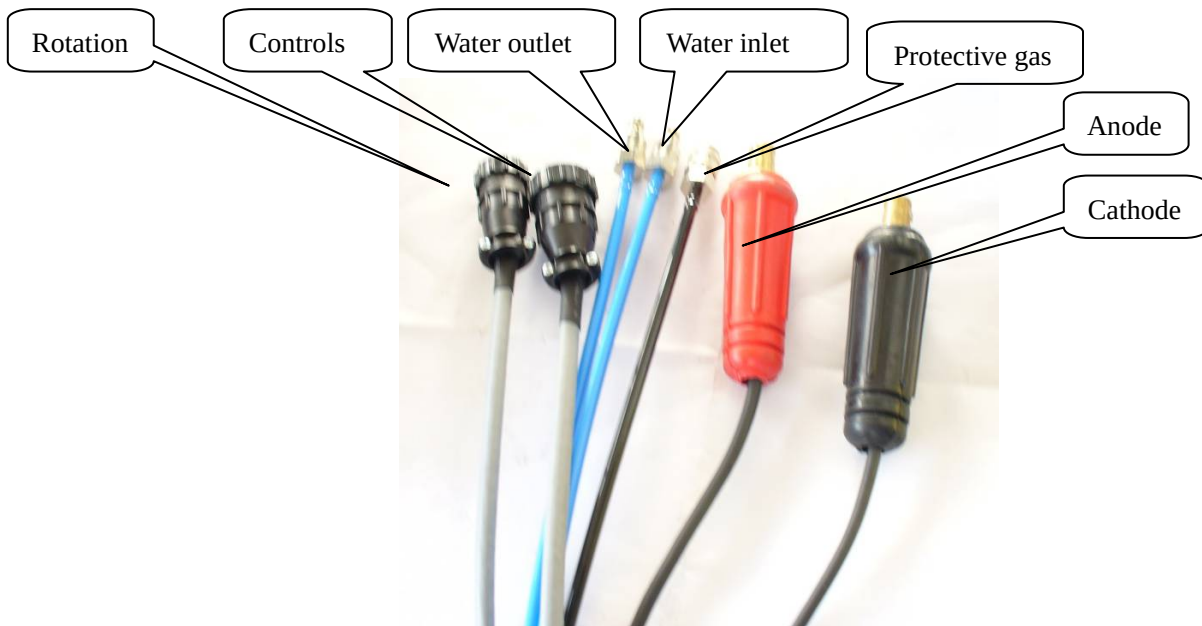
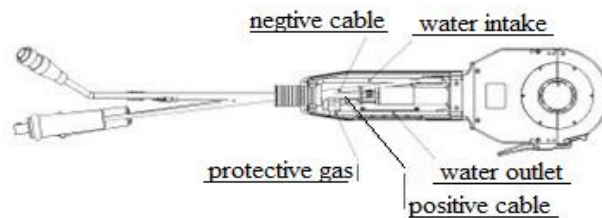
Two sets of tube clamping collets are installed, one set on each side of the weld head. Tube clamping collets are available in standard and custom sizes. Tube clamping collets are easy to install and are designed to provide a tightly sealed inert gas welding atmosphere. The locking clamps are adjustable to ensure proper alignment and clamping pressure.





TUBE CLAMPING COLLET

3.3 Water coolant, welding current and shielding gas circuits



Coolant, power, and shielding gas connections

Operation Instructions



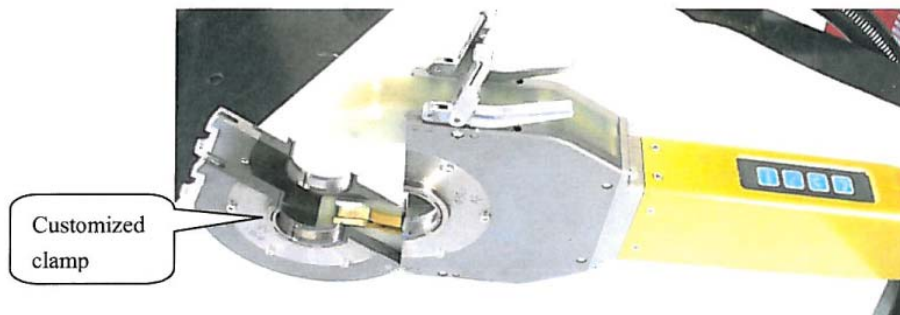
Attention: Please read all operating instructions carefully before using the welding head.

WELDING PREPARATION

- Prepare the following materials:
- Tubing with ends square faced, de-burred and cleaned
- Appropriate size tube clamping collets
- Tungsten electrode 3/32" or 1/16" (2.4mm or 1.6mm)
- Argon or appropriate inert shielding gas
- Essential tools
- Metric Allen wrench set
- Phillips screwdriver
- Narrow feeler gauge set
- Check and ensure enough coolant is in the tank and add as needed
- Ensure proper connection of welding head, power source and coolant tank

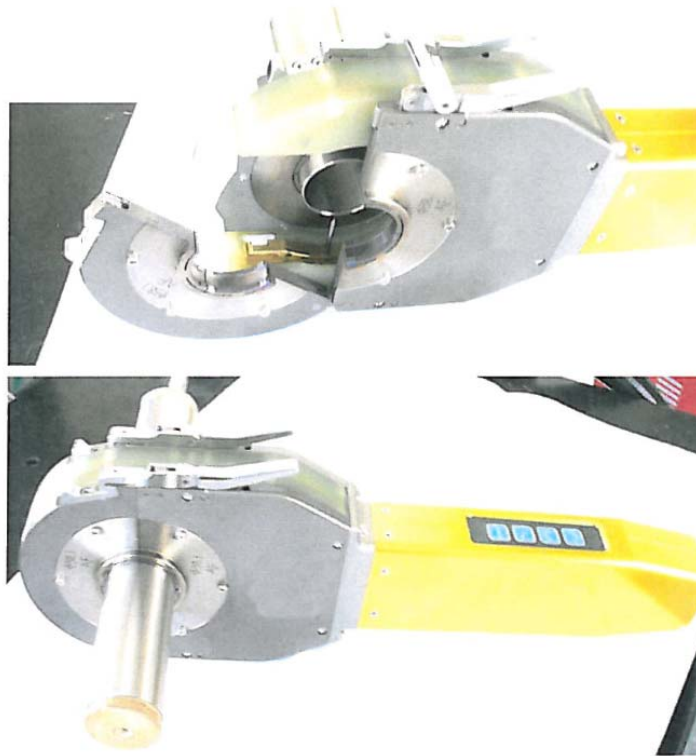
TORCH ADJUSTMENT

Use the appropriate tube clamping collets according to the work piece diameter



Use the suitable electrode type and diameter according to welding procedure specification (WPS)

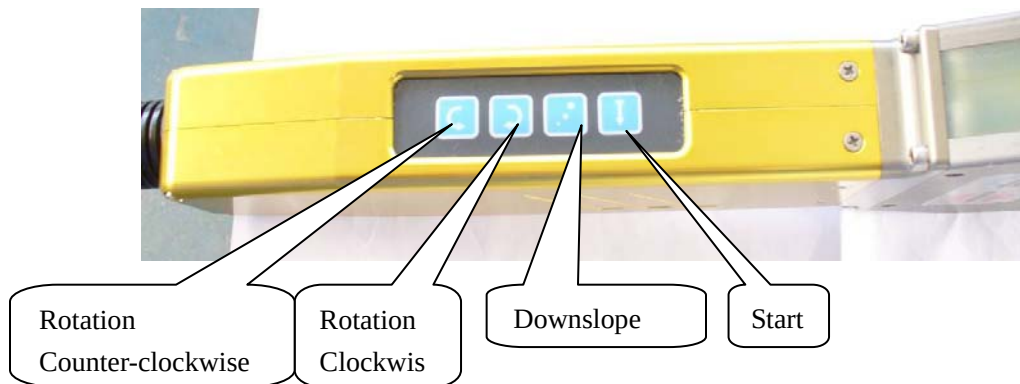
Adjust the gap between the electrode and the work piece according to the WPS. Approximately 0.060" to 0.080" (1.5 - 2mm). Open the clamp and rotate the gear ring into the torch body. Insert one end of the work piece and adjust it so the electrode is centered on the weld joint and clamp this side. Next insert the other end of the weldment, butt it against the first tube end and clamp the unit closed. Use backing gas to purge the inside of the work piece of oxygen to ensure sound weld quality on the inside diameter.



Tube clamping collets and accessories are also available for elbows, flanges, tee joints and custom applications.

START THE POWER SUPPLY

Turn on the welding power supply and check for normal rotation and other functions such as gas and coolant flow. (For remote pendant operation, please refer to the power supply operating manual)



Setup Welding Parameters (please refer to the power source manual)

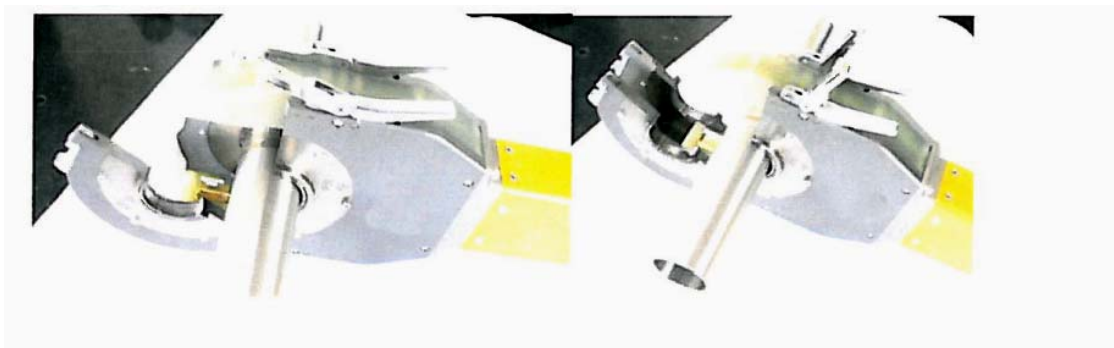
Start Welding

- Operate the welding head in test mode to ensure that the rotational drive unit, shielding gas and torch coolant are operational and working properly.
- Switch to the Welding position on the remote pendant, and press start to begin the welding process.
- Allow the weld program to run its' course and once the post purge cycle has completed the head can be opened and the weld inspected.
- Press the Weld stop switch if there is a minor problem or the red Emergency kill switch if there is a major problem.



REMOVING WORK PIECE

After the welding cycle is complete including post gas flow the welded tube can be removed. Open one side of the clamp and rotate the gear ring into the torch body, and then open the other side of the clamp to take out the work piece.



Welding Set-Up Information

The following are general guidelines and considerations specific to the welding process.

WELDING HEAD TRAVEL SPEED

Depending on the power source being used you may need to perform some calculations prior to programming the travel speed in the welding power supply. The OAW 400 uses a direct input of either inches per minute (IPM), or millimeters per minute for the surface travel speed on the tube. The OAW 200 uses a revolution per minute (RPM) input. To calculate the RPM for a desired travel speed of 5 IPM on a 1.00" OD Tube see the formula below:

$$\frac{\text{Desired Travel Speed}}{\text{Tube Diameter} \times \pi} = \text{RPM}$$

$$\frac{5.00}{1 \times 3.14} = 1.59$$

SHIELDING GAS

In order to ensure weld quality the welding program should use at least 20 seconds of pre-purge time to purge the welding chamber of air. The shielding gas flow is continuous throughout the welding cycle, and flow rates need to be sufficient for the application. After the weld is completed use at least 20 seconds of gas post-flow time.

GEAR RING

The gear ring must be inside the weld head torch body at the home or open position when loading or unloading parts to prevent damage to the unit.

TEMPERATURE

In order to ensure continuous welding quality and long life to the welding head ensure the clamping surface temperature is below 90°C when welding at higher current settings and during high duty cycle welding. Allow the welding head to cool to ambient temperature before continuing.

ELECTRODE POSITIONING

Ensure the electrode is secured tightly via the set screw in the gear ring, and ensure that the electrode does not protrude beyond the outside diameter of the gear ring. Replace the set screw immediately if it becomes stripped or damaged in any way.

Service and Maintenance

Under normal operating conditions the machine does not require high maintenance and only requires a minimum preventive care. However when operating the unit in areas with extreme environmental conditions such as high temperature, high dust levels and high duty cycle usage there are some points that should be observed to ensure error free operation. These include regular cleaning and inspection as described below.



Only qualified personnel should perform machine cleaning, testing, service and repair. If any failure occurs due to non-compliance with the following instructions do not use the machine again until the fault has been rectified.

CLEANING



Before cleaning disconnect the power. DISCONNECT THE POWER PLUG FROM THE POWER SOURCE! Note: Switching off the power or removing the fuse is not full isolation. Pull out all plugs that connect to the power source.

The individual components should be handled as follows:

- For internal cleaning of the power source it is recommended to vacuum dust and dirt if possible, otherwise clean dry compressed air may be used at low force to blow off system components.
- Use clean dry cloth to clean welding head surfaces.
- Use “Scotch-Brite” type pads to remove any surface imperfections on the gear ring, then wipe clean with a suitable solvent such as isopropyl alcohol and clean dry cloth.

MAINTENANCE

Cooling System

Check water circuit cooling system regularly to ensure there are no leaks under 0.5Mpa pressure. Check the water flow rate once per month to ensure not lower than 450ml/min. Change coolant quarterly with approved torch coolant. Typically 50% distilled or de-ionized water with 50% ethyl glycol. Do not use normal water or unclean coolant, which can cause damage to the coolant pumps, block coolant passages and result in damaging the welding head.

ROTATION SYSTEM

The rotation system should run smoothly without any roughness or jerky motions or abnormal sounds. Periodically clean and lubricate the two bearing units and gear units with a molybdenum bearing lubrication once per year.

Service



Repair and services should be conducted by qualified personnel. Your authorized supplier can provide repair and service for all system problems and failures. Recall deliveries of defective equipment are subject to warranty terms and are only available through your authorized dealer. Use the original spare parts for all necessary parts replacements. Spare parts may be ordered according to the following parts lists. Be sure to list the welding head model number and the product serial number. List item descriptions, part numbers and quantities clearly when ordering spare parts. If the part number is not clear please describe the part as clearly as possible. Repairs or services performed on this machine by unqualified personnel may void any warranty claims.

SPARE PARTS LIST (TPWH-C-3)

Name	Part Number
GROOVE BOARD	WCH3-10001
GEAR COVER	WCH3-10002
GEAR RING	WCH3-10003
GUIDE RING	WCH3-10004
GEAR	WCH3-10005
GEAR	WCH3-10006
GEAR	WCH3-10007
WASHER	WCH3-10008
FIXED SHAFT	WCH3-10009
COPPER SLEEVE	WCH3-10010
FIXED SEAT	WCH3-10011
WASHER	WCH3-10012
ADJUSTMENT SEAT	WCH3-10014
SRPING	WCH3-10015
GAS HOSE	WCH3-10016
CONDUCTIVE RING	WCH3-10017
SCREW	WCH3-10018
END CAP	WCH3-10019
LEFT COVER	WCH3-20000
CONNECTING JOINT	WCH3-20003
CONNECTING JOINT	WCH3-20004
LOCK	WCH3-20005
WRENCH	WCH3-20006
FIXER	WCH3-20007
WATER HOSE	WCH3-20008
WINDOW	WCH3-20009
PROTECTED LENS	WCH3-20010
RIGHT COVER	
LEFT FIXER	WCH3-30003
RIGHT FIXER	WCH3-30004
FIXER	WCH3-30005
CONNECTOR	WCH3-30006
SHIELDING GLASS	WCH3-30007
PIN	WCH3-30008
CONNECTION SEAT	WCH3-40001
BODY CASING	WCH3-40002
BODY CASING	WCH3-40003
CLAMP	WCH3-40004

RECOMMENDED CONSUMABLES LIST (TPWH-C-3)

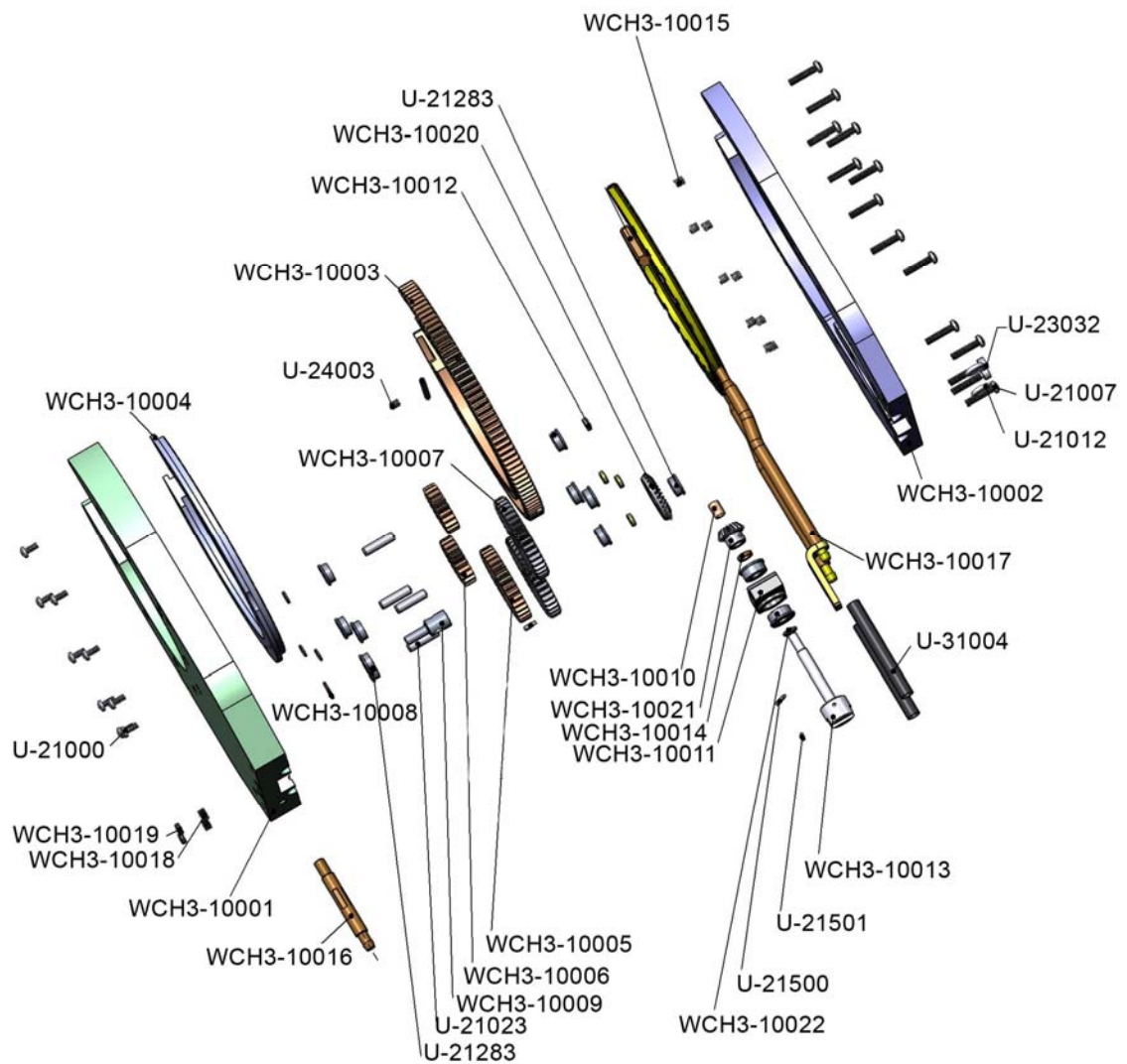
Name	Part Number	Qty	Note
Gear	WCH3-10006	2	
Gear	WCH3-10007	2	Polyformaldehyde
Gear	WCH3-10005	1	
Cone gear (big)	WCH3-10020	1	
Cone gear (small)	WCH3-10021	1	
Gear ring	WCH3-10003	1	
Guide ring	WCH3-10004	1	Teflon
Conductive ring	WCH3-10017	1	
Fixed seat	WCH3-10011	1	
Connection shaft	WCH3-10013	1	
Adjustment seat	WCH3-10014	1	
Sleeve	WCH3-10022	1	
Window	WCH3-20009	1	Teflon

TPWH-C-3 Exploded Views

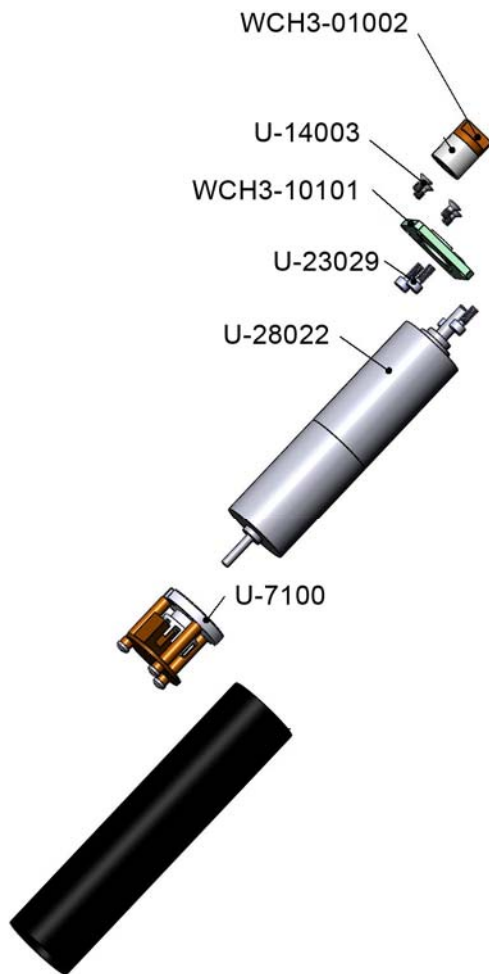
Exploded View 1



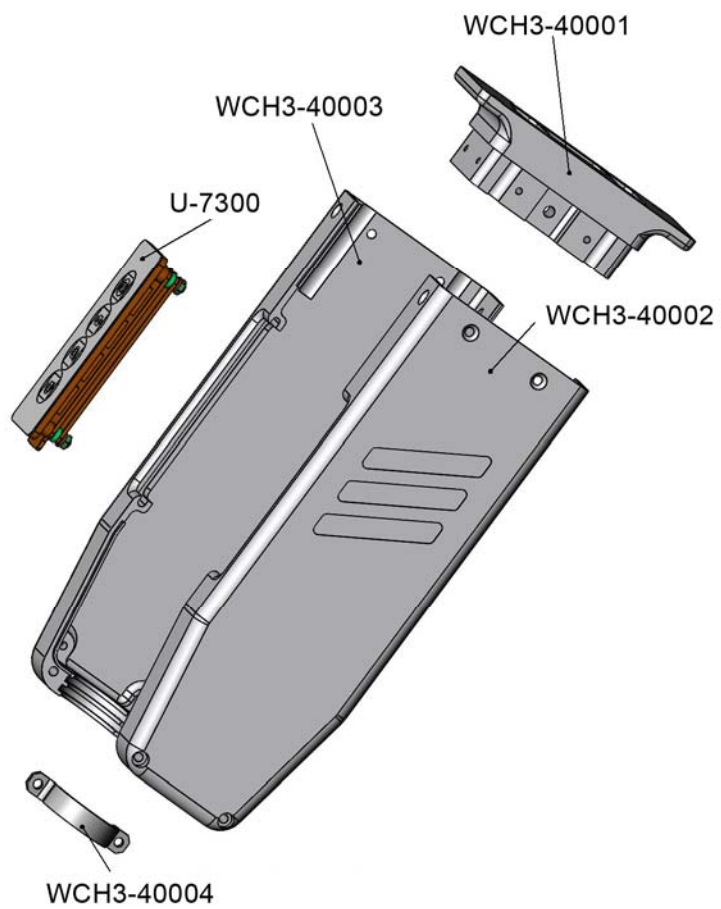
Exploded View 2



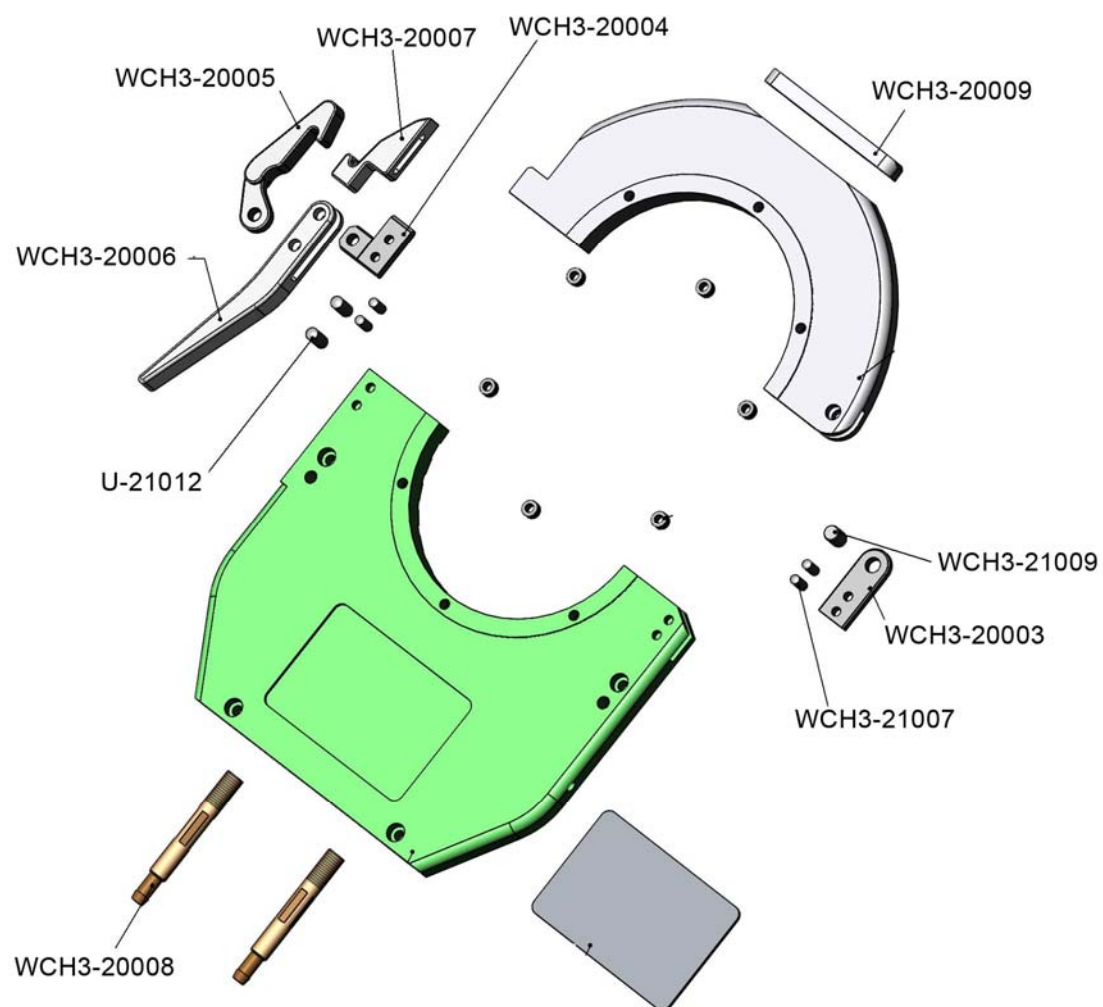
Exploded View 3



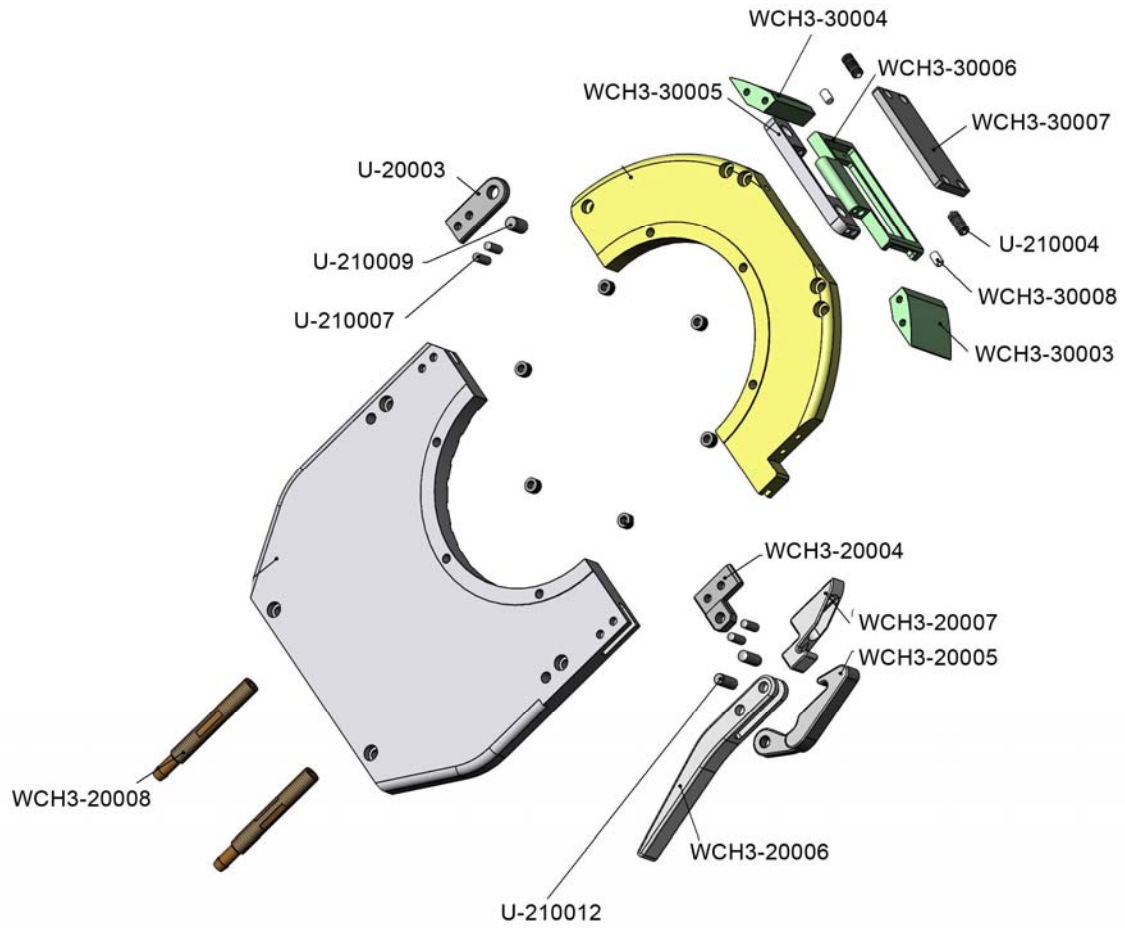
Exploded View 4



Exploded View 5



Exploded View 6



Packing List

No.	Name	Qty.	Note
1	TPWH-C-3 closed welding head	1set	
2	Spare parts	1set	
3	Operating manual	1set	
4	Certificate	1pcs.	
5	Packing list	1pcs.	

Machine Warranty / Repairs

Warranty is twelve months (12mo) 1 Year Warranty from date of purchase. Please review below information or refer to your owner's manual for a complete outline of the warranty.

FOR A PERIOD OF ONE YEAR FROM THE DATE OF PURCHASE THIS MACHINE IS UNDER WARRANTY. THIS DOES NOT INCLUDE TOOL BITS OR OTHER CONSUMABLE ITEMS.

WARRANTY DOES NOT APPLY IF:

- 1) REPAIRS OR ATTEMPTED REPAIRS HAVE BEEN MADE BY PERSONS OTHER THAN OTTO ARC PERSONNEL, OR AUTHORIZED SERVICE REPAIR PERSONNEL.
- 2) REPAIRS ARE REQUIRED BECAUSE OF NORMAL WEAR.
- 3) THE TOOL HAS BEEN ABUSED OR INVOLVED IN AN ACCIDENT.
- 4) MISUSE IS EVIDENT, SUCH AS CAUSED BY OVERLOADING THE TOOL BEYOND ITS RATED CAPACITY.
THE TOOL HAS BEEN USED AFTER PARTIAL FAILURE, OR THE TOOL HAS BEEN USED WITH AN IMPROPER ACCESSORY.
- 5) MOTOR WILL NOT BE COVERED IF DAMAGE IS CAUSED BY NOT USING OILER/MISTER WHILE USING.