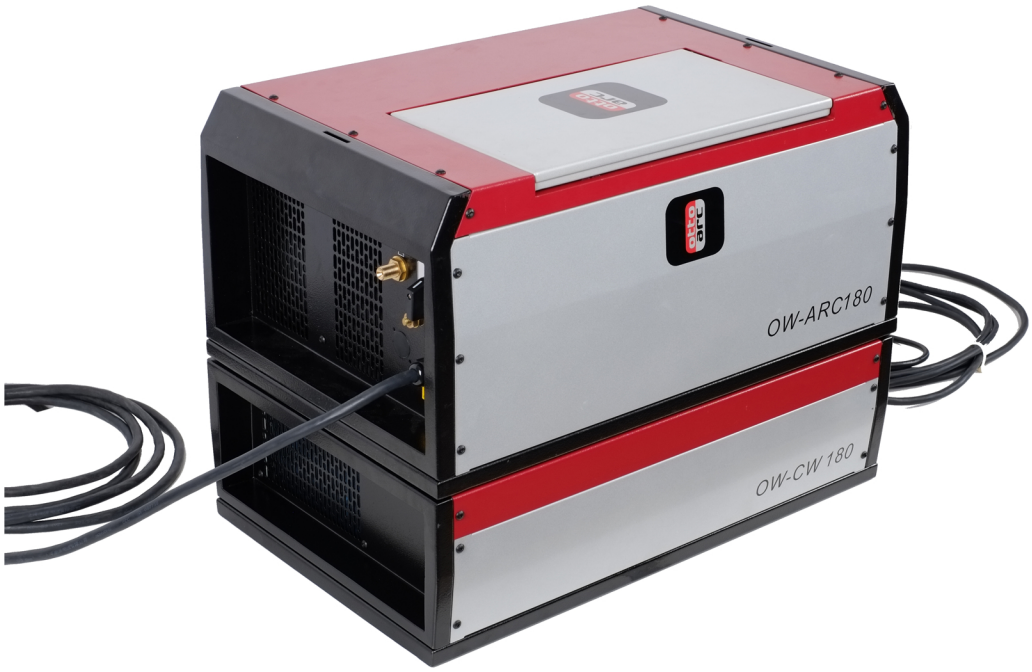
OTTO ARC

www.ottoarc.com

# OPERATING INSTRUCTIONS

# OW-ARC 180

## POWER UNIT




**REVISED DATE:**
**7.2014**

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# OPERATOR'S MANUAL

## PROGRAMMABLE DIGITAL WELDING POWER SUPPLY

## Series: Power Unit

## Model: OW-ARC 180

This manual contains important information for the safe and effective operation of the OW-ARC 180 power supply. Users should read and understand its contents before operating the OW-ARC 180 power supply.

**ATTENTION – IMPORTANT WARRANTY INFO:**

**TO VALIDATE YOUR WARRANTY. PLEASE VISIT OUR WEBSITE WWW.OTTOARC.COMTO COMPLETE AND SUBMIT OUR DIGITAL WARRANTY FORM.**

**THANK YOU FOR YOUR COOPORATION.**




**NOTICE**

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| REV | DCO# | CHANGE DESCRIPTION | DATE | APR |
|---|---|---|---|---|
| V1.0 | | First Edition | 8/28/13 | |
| V1.1 | | Add spare parts list and electrical diagram | 2/10/14 | GPE |
| V1.2 | | Update and clarify | 5/27/14 | SH |
| V1.3 | | Add arc fault risk pg. 20;  weld programming pg. 34 | 7/1/14 | SH |

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# Safety Instruction

### 2.1 Safety Summary

Arc Welding can be hazardous!



Read the entire safety information section and OW-ARC 180 Welding Power Supply User's Manual before using this product. Failure to do so can result in serious injury or death.

**Signal Words Used in this Manual:**

**WARNING:**

Statements that indicate a hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION:**

Statements that indicate a hazardous situation which, if not avoided, could result in minor or moderate injury.

**NOTICE:**

Statements that indicate a hazardous situation which, if not avoided, could result in damage to the equipment or other property.



**ELECTRIC SHOCK can kill.**



Touching energized electrical parts and failure to operate equipment properly can cause fatal shocks and burns. During welding the electrode and work piece are electrically energized. Incorrectly installed or improperly grounded equipment is a hazard. To avoid injury:

- Do not touch live electrical parts.
- Do not touch electrode connector, electrode, or rotor after pressing start. The electrode is electrically charged during the welding process.
- Follow local electrical codes and the guidelines in this manual when installing the OW-ARC 180 welding power supply. Shock hazards can exist even when equipment is properly installed, so it is important that the operator be trained in the proper use of the equipment and follow established safety practices.
- Frequently inspect input power cord for damage or bare wiring-replace immediately if damaged.

## FUMES AND GASES can be hazardous.



Welding produces fumes and gases. Breathing these fumes and gases may be hazardous to your health. Buildup of gases can displace oxygen and cause injury or death. To avoid injury:

- Do not breathe fumes or gases.
- Ventilate the area and/or use exhaust extraction near the arc to remove welding fumes and gases.
- Do not weld on coated (cad plate, galvanizing) tube or pipe, or on otherwise contaminated material. Always mechanically or chemically clean the weld area to remove plating, coating or contamination.
- Do not work in a confined space unless it is well ventilated or you are wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- The ultraviolet light emitted by the welding arc acts on the oxygen in the surrounding atmosphere to produce ozone. Test results①, based upon present sampling methods, indicate the average concentration of ozone generated in GTAW process does not constitute a hazard under conditions of good ventilation and welding practice.
- Shut off gas supply when not in use.



ARC RAYS can burn eyes.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes. The OW-ARC 180 welding power supply is meant for use only with enclosed OTTO ARC weld heads, which minimize exposure to these harmful rays. To avoid injury:

- Do not look at welding arc.
- Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
- Wear personal protective equipment, including eye protection. Suitable eye and skin protection must be worn.

Welding Handbook, Vol 2, 8th ed., American Welding Society.

## WELDING can cause fire or explosion.



Welding on closed containers, such as tanks, drums, or pipes, can cause them to explode. The hot work piece and hot equipment can cause fires and burns. Ensure the area is free of combustibles before welding. To avoid injury:

- Do not place the OW-ARC 180 welding power supply on a combustible surface.
- Do not weld in a combustible environment.
- Do not weld near flammable or explosive materials. Watch for fire, and keep a fire extinguisher nearby. Have the proper type of extinguisher in your work area.
- Do not use the OW-ARC 180 welding power supply to thaw frozen pipes.
- Do not use extension cords that are in poor physical condition or have insufficient current capacity. Failure to do so can pose fire and shock hazards.

## CYLINDERS may explode if damaged.



Gas cylinders used as part of the orbital GTAW process contain gas under high pressure. If damaged, a cylinder can explode. To avoid injury:

- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs. Follow all site safety precautions and protocol.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never weld on a pressurized cylinder—explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Keep head and face away from valve outlet when opening cylinder valve.
- Keep valve protective cap in place over valve except when cylinder is in use or connected for use.



## WARNING



This equipment is authorized to use a type of arc starter that produces a High Frequency Radio Wave (sometimes called HF or RF Starting). It can cause interference and sometimes even damage to nearby electronic equipment (such as computers) that are unprotected or poorly protected against such interference.



Magnetic fields from High Currents can affect pacemakers. Pacemaker wearers should avoid being in close proximity to welding systems.



Disconnect the input power to the machine before opening or servicing. Discharge all circuits that store high voltage such as capacitor packs. Only qualified service personnel should open this equipment.



Welding produces high temperatures in both the welded components and the welding equipment. Both can cause severe burns. Do not touch recently welded components. Avoid touching internal components of the welding system soon after use. Avoid touching torch components and welding fixtures soon after welding.



Some systems, such as the OW-ARC 180 Welding Power Supply are intended solely for indoor use and must be kept dry. Before operating, storing, or handling, always make sure that the OW-ARC 180, OW-CW 180, weld heads and cables are not exposed to rain or standing water. System components are not water proof.



Keep hands and fingers clear from moving parts such as fans, gears, rotors, and Rotation Mechanisms.



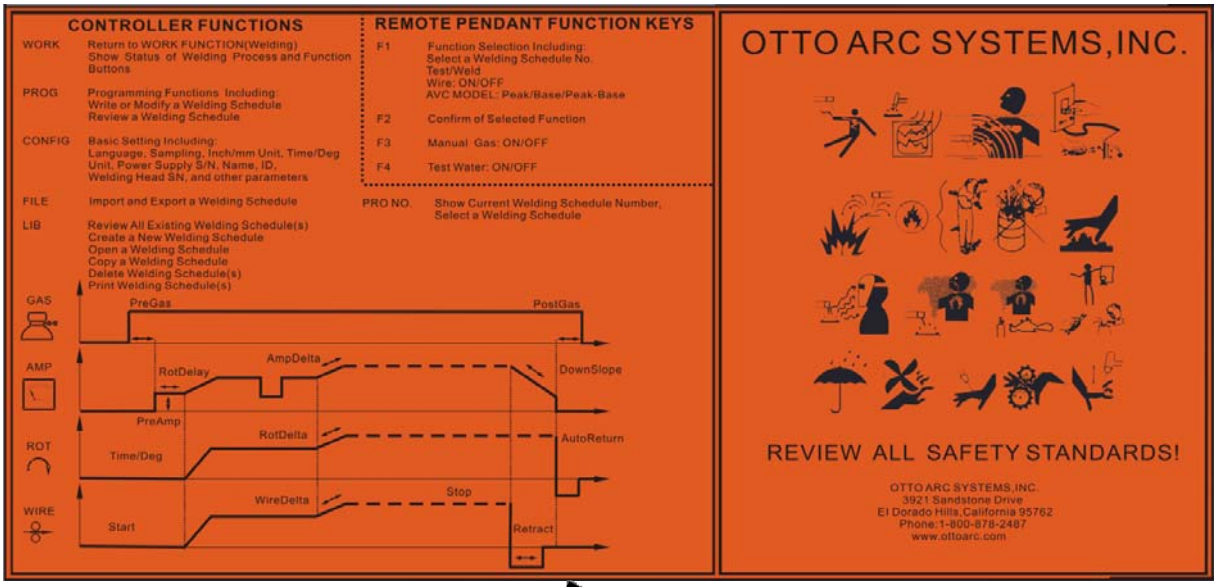
Must connect the ground cable before starting arc ignition, otherwise the equipment might be damaged.



OTTO ARC factory training is essential for all Welding Operators and Maintenance Technicians who operate OTTO ARC equipment. Consult factory for dates of training classes and other training information.

## 2.2 OW-ARC 180 Power Supply Warning Label

This Warning Label is attached to the inside of the cover (Fig.2-1)



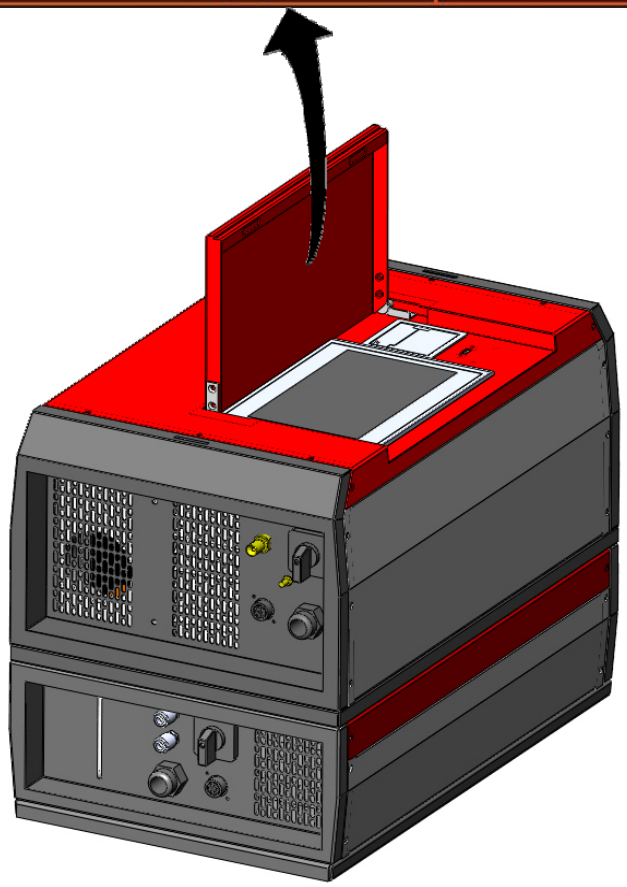



**Fig.2-1 OW-ARC 180 Power Supply Warning Label**

# Technical Parameters

### 3.1 OW-ARC 180 Power Supply

| Model | OW-ARC 180 | |
|---|---|---|
| Type | Inverter | |
| Mains power supply voltage | 230V | 115V |
| Welding current | 5A-180A | 5A-150A |
| Welding voltage | 10.2V-17.2V | 10.2V-16.0V |
| Duty cycle 20℃ | 180A/35%<br>150A/60%<br>120A/100% | 150A/35%<br>120A/60%<br>100A/100% |
| Duty cycle 40℃ | 180A/35%<br>150A/60%<br>120A/100% | 150A/35%<br>120A/60%<br>100A/100% |
| Open circuit voltage | 90V | |
| Mains power supply | 1×230V ( -20% to +15% )<br>1×240V ( -20% to +10% ) | 1×115V ( -15% to +15% )<br>1×110V ( -15% to +20% ) |
| Frequency | 50/60HZ | |
| Max. power | 6.2kVA | |
| Recommend power distribution box | 8.5kVA | |
| Cosφ/Efficiency | 0.99/89% | |
| Insulation/Protection | F/IP21S | |
| Working temperature | -10℃to+40℃ (14F to 104F) | |
| Power supply Cooling | Fan | |
| Welding head cooling | Air or Water | |
| Screen | 10” industrial touch screen | |
| Control function | Gas control/Current control/Rotation control/<br>Wire feeding control | |
| Program storage | 200 | |
| Section | 20 | |
| Printing | Integrated printer | |
| Dimension L/W/H | 620×400×285mm (24.4×15.8×11.2 inches) | |
| Weight[kg] | 33kg (73 lbs.) | |
| Standard | IEC 60974-1 | |

### 3.2 OW-CW 180 Water Cooler Description

| Model | OW-CW 180 | |
|---|---|---|
| Mains power voltage | 1×230V ( -20% to +15% )<br>1×240V ( -20% to +10% ) | 1×115V ( -15% to +15% )<br>1×110V ( -15% to +20% ) |
| Frequency | 50/60HZ | |
| Cooling power | 800W | |
| Max. flow | 8L/min (2.1 gal/min) | |
| Max. lift | 40m (131 ft.) | |
| Capacity | 6.8L (1.8 gal) | |
| Insulation /protection | F/IP21 | |
| Weight [kg] (include coolant) | 25kg (55 lbs.) | |
| Dimension L/W/H [mm] | 620×400×180mm (24.4×15.8×7.1 inches) | |
| Standard | IEC 60974-1 | |

### 3.3 Shipping info: Power Supply + Case

| | |
|---|---|
| Dimension L/W/H[mm] | 750×500×435mm (29.5×19.7×17.1 inches) |
| Weight [kg] | 58.5 kg (129 lbs.) |

### 3.4 Shipping info: Water Cooler + Case

| | |
|---|---|
| Dimension L/W/H[mm] | 750×500×435mm (29.5×19.7×17.1 inches) |
| Weight [kg] | 57.6 kg (127 lbs.) |

## Installation and Setup

The OTTO ARC Welding System OW-ARC 180 welding power supply provides precise control of weld current, travel speed, and shielding gas to produce consistent and repeatable weld results.

The unit features a touch-screen display for easy navigation and data input. To access menus and input weld data, the operator presses the touch screen over the selection. All parameter settings are entered by the touch screen controller.

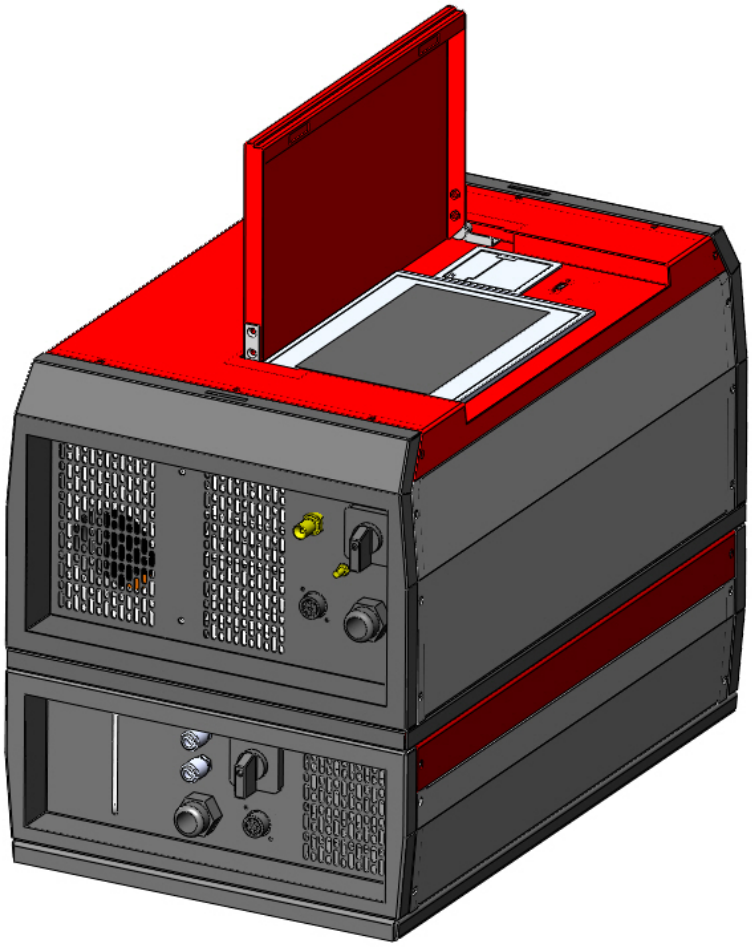


**Fig.4-1 OW-ARC 180 Welding Power Supply**

### 4.1 OW-ARC 180 Power Supply Description

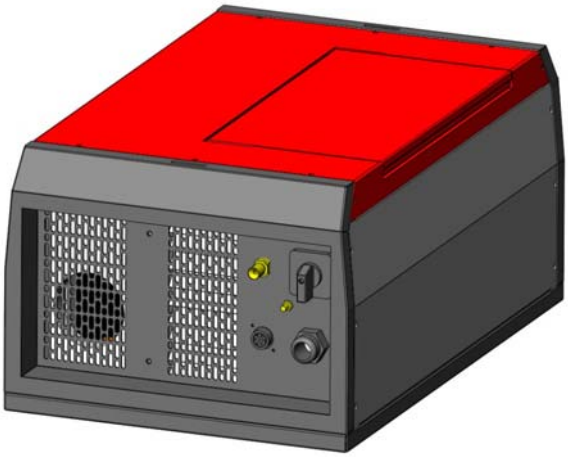


**Fig.4-2 OW-ARC 180 Power Supply**

#### 4.1.1 OW-ARC 180 Top Side

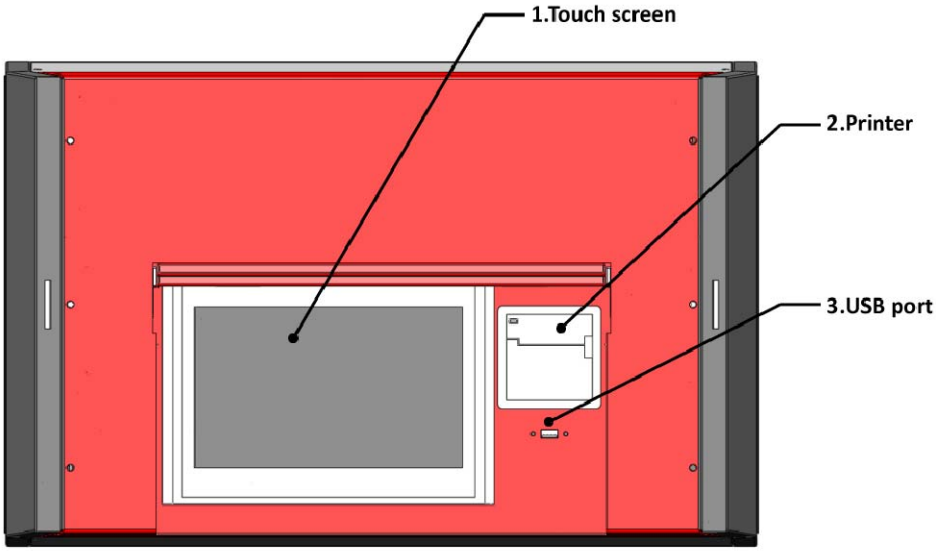



**Fig.4-3 OW-ARC 180 Power Supply Top Side**

| No. | Picture | Description |
|---|---|---|
| 1. | | Touch screen; edit program and control the welding process |
| 2. | | Printer |
| 3. |  | USB port |

### 4.1.2 OW-ARC 180 Right Side

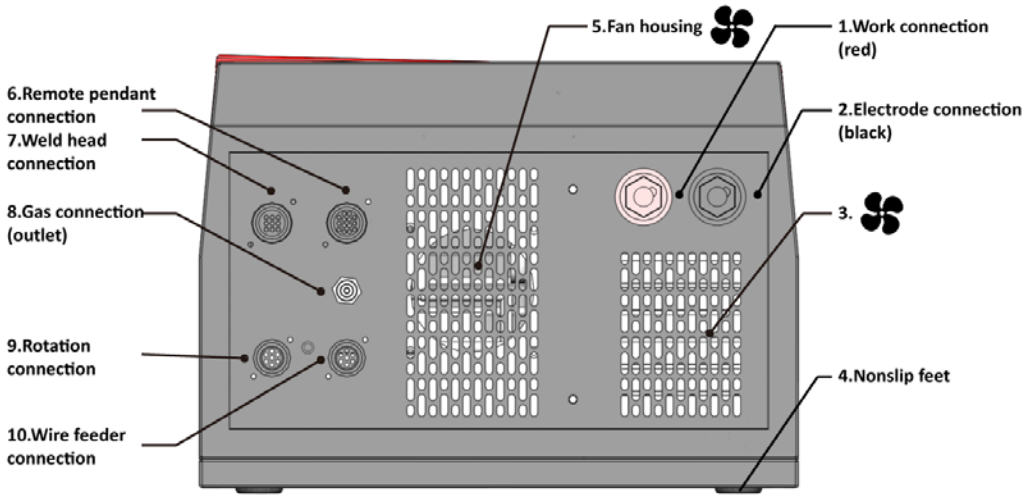



**Fig.4-4 OW-ARC 180 Power Supply Right Side**

| No. | Picture | Description |
|---|---|---|
| 1. |  | Work connection(red) |
| 2 |  | Electrode connection(black) |
| 3. |  | Fan housing for inverter |
| 4. | | Nonslip feet |
| 5. |  | Fan housing for controller |
| 6. |  | Remote pendant connection |
| 7. |  | Weld head connection |
| 8. |  | Gas connection (outlet) |
| 9. |  | Rotation connection |
| 10. |  | Wire feeder connection |

### 4.1.3 OW-ARC 180 Left Side

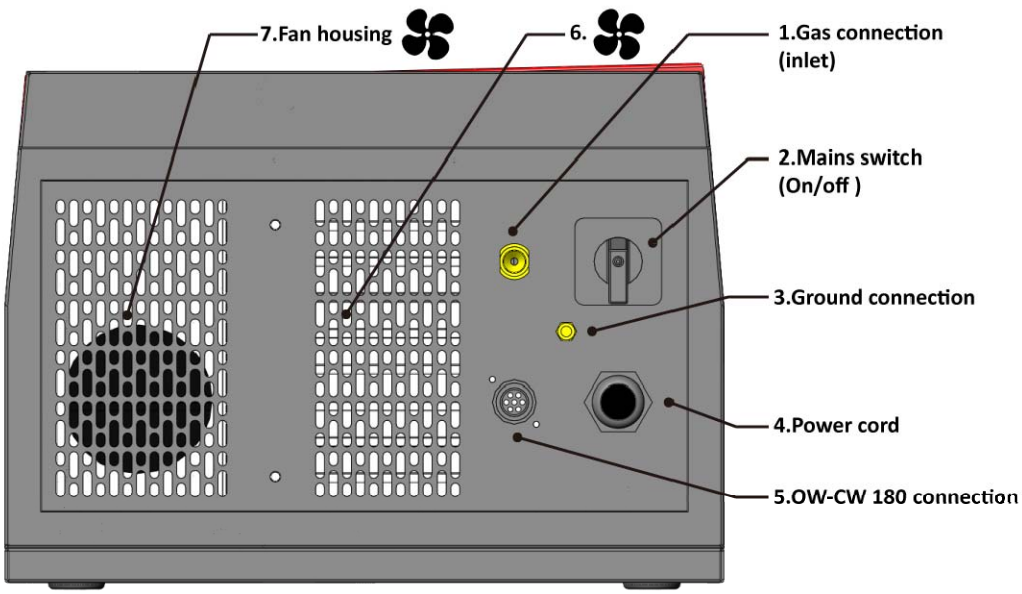



**Fig.4-5 OW-ARC 180 Power Supply Left Side**

| No. | Picture | Description |
|---|---|---|
| 1. |  | Gas connection (inlet) |
| 2. | | Mains switch (on/off) |
| 3. |  | Case ground connection |
| 4. | | Power cord |
| 5. | | OW-CW 180 (water cooler) connection |
| 6. |  | Fan housing for controller |
| 7. |  | Fan housing for inverter |

### 4.2 OW-CW 180 Water Cooler Description



Fig.4-6 OW-CW 180 Water cooler Description

### 4.2.1 OW-CW 180 Top Side

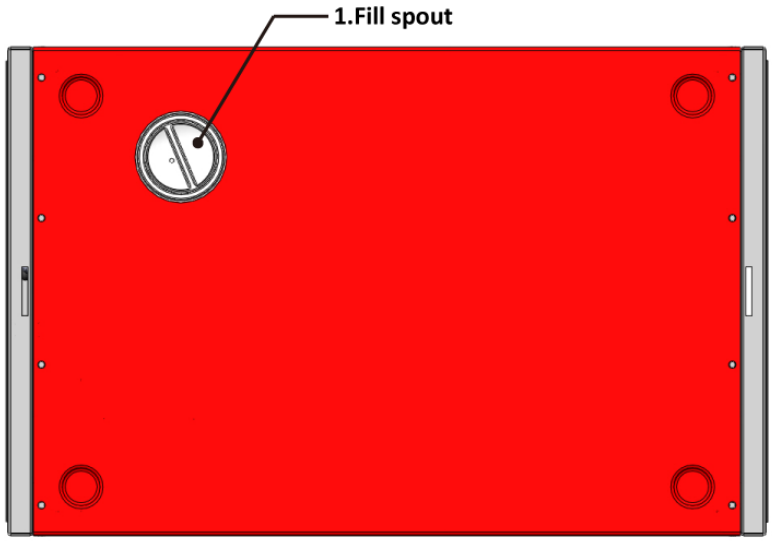



Fig.4-6 OW-CW 180 Top Side

| No. | Picture | Description |
|---|---|---|
| 1. | | Fill spout |

### 4.2.2 OW-CW 180 Left Side

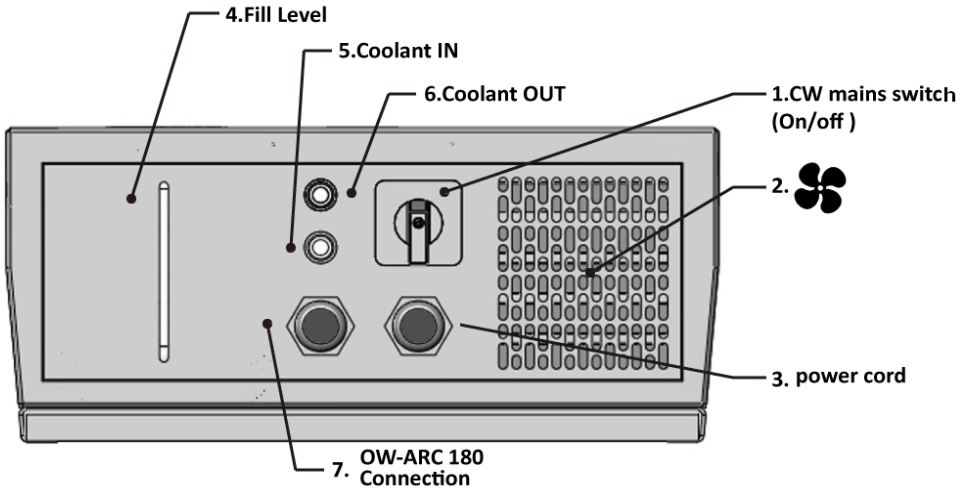



**Fig.4-7 OW-CW 180 Top Side**

| No. | Picture | Description |
|---|---|---|
| 1. | | CW mains switch(on/off) |
| 2. |  | Fan housing(CW) |
| 3. | | Power cord |
| 4. | | Fill level |
| 5. |  | Coolant IN |
| 6. |  | Coolant OUT |
| 7. | | OW-ARC 180 connection. |

### 4.2.3 OW-CW-180 Bottom Side

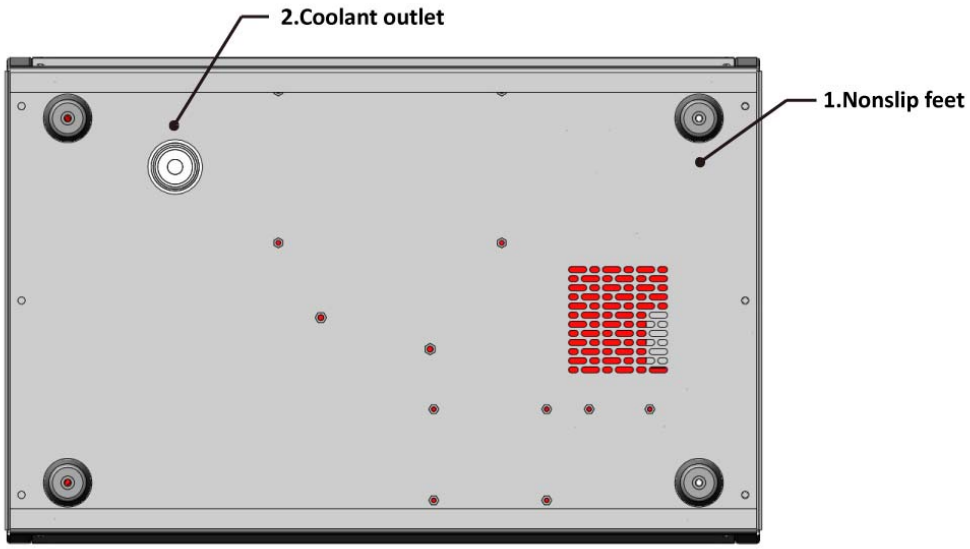



**Fig.4-8 OW-CW 180 Bottom Side**

| | Picture | Description |
|---|---|---|
| 1. | | Nonslip feet |
| 2. | | Coolant outlet |

## Registration Information

Your authorized OTTO ARC representative provides support and service for your OW-ARC 180 power supply and OTTO ARC weld heads.

Please take a moment to fill out the information listed on this page. See the rating label on the back of the OW-ARC 180 power supply for serial number (Fig. 4-9).

Keep this information available in case you need to contact your authorized OTTO ARC representative.

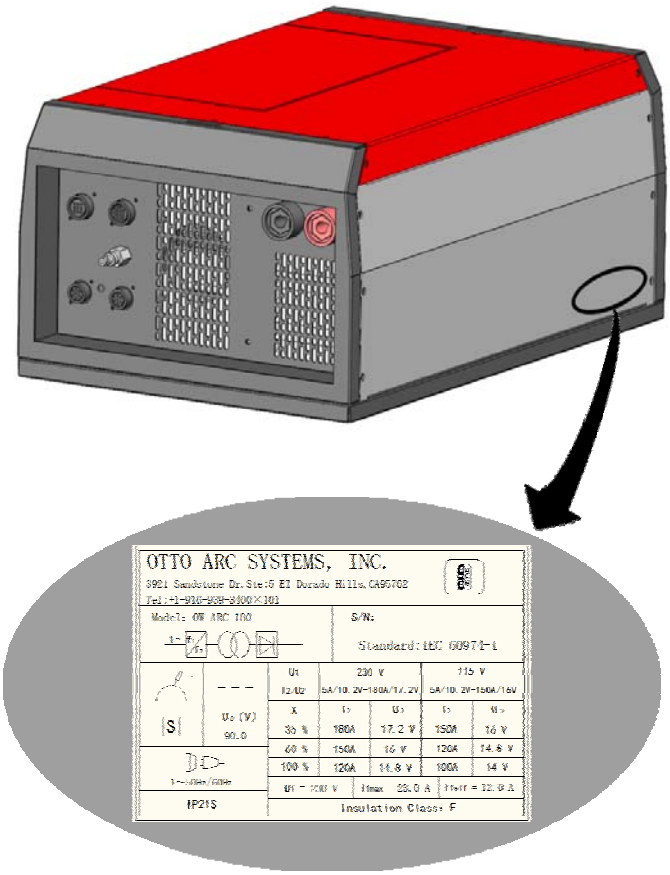



**Fig.4-9 OW-ARC 180 Power Supply Rating Label**

**Registration Information**

1. Date of Delivery: _____

2. Power Supply Model Number: OW-ARC180 Power Supply
Serial Number: _____

3. Weld Head Model Number: _____
Serial Number: _____

4. Weld Head Model Number: _____
Serial Number: _____

5. Weld Head Model Number: _____
Serial Number: _____

6. Weld Head Model Number: _____
Serial Number: _____

7. Sales agent:
_____

## Electrical Requirements

### 4.4.1 Setting up the OW-ARC 180 Power Supply

1. Position the OW-ARC 180 power supply so that both sides are accessible.

2. Make sure the mains switch on the left side of the OW-ARC 180 power supply is in the off (O) position.




3. The OW-ARC 180 power supply must be grounded or electrical shock can result.

### 4.4.2 Installing the Weld Head

The weld head assembly attaches to the right side of the OTTO ARC power supply with five separate connectors (Fig. 4-10):

**1.** Electrode (black) **2.** Weld head shield gas **3.** Weld head connector **4.** Work (red) **5.** Rotation connector

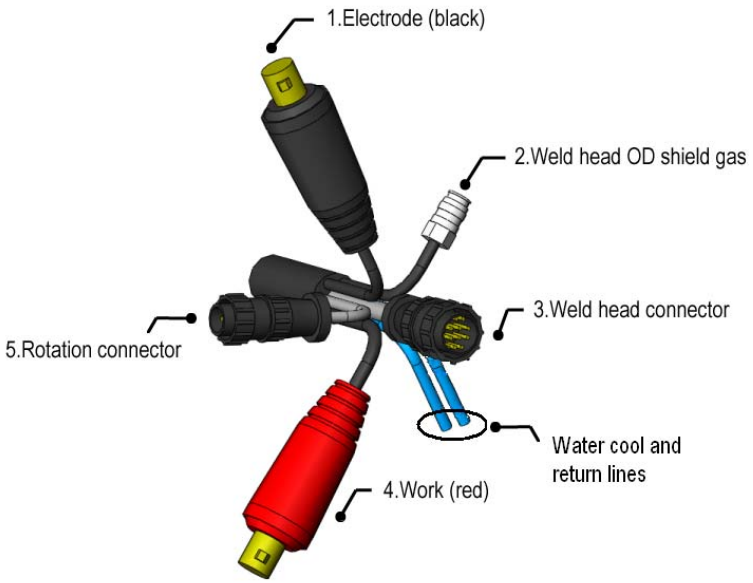



**Fig.4-10 Installing the Weld Head**

1. Insert the black connector arrow side up into the OW-ARC 180 power supply black socket labeled electrode. Turn the connector a half turn clockwise to lock it in place. This connection is the negative (–) terminal of the weld head.

2. Insert the red connector arrow side up into the OW-ARC 180 power supply red socket labeled work. Turn the connector a half turn clockwise to lock it in place. This connection is the positive (+) terminal of the weld head.

3. Insert the rotation connector into the OW-ARC 180 power supply AMP socket labeled rotation. Turn the connector lock ring three turns clockwise to lock it in place.

4. Insert the weld head OD shield gas quick-connect stem into the OW-ARC 180 power supply fitting (fig 4.4). This connection provides shielding gas to the weld head through the gas control in the power supply.

5. Connect the water in and out hoses to the OW-CW-180 water tank if using water cooled weld head.

**NOTE: DAMAGE TO MACHINE CAN OCCUR** if the operator attempts to weld with the ground (work) lead unattached or loosely connected. Damage can also occur without an electrode in place or with an excessively long arc gap.

# Operation

**5.1 Touch screen and remote pendant.**

5.1.1 The OW-ARC 180 power supply supports both remote pendant (Fig. 5.1) and touch screen control (Fig. 5.2).

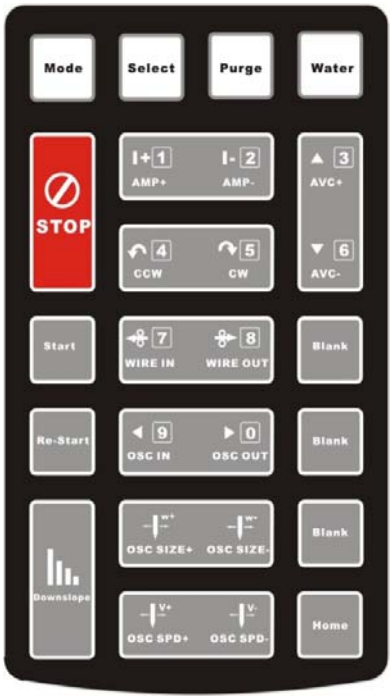



**Fig. 5.1 Remote pendant interface**

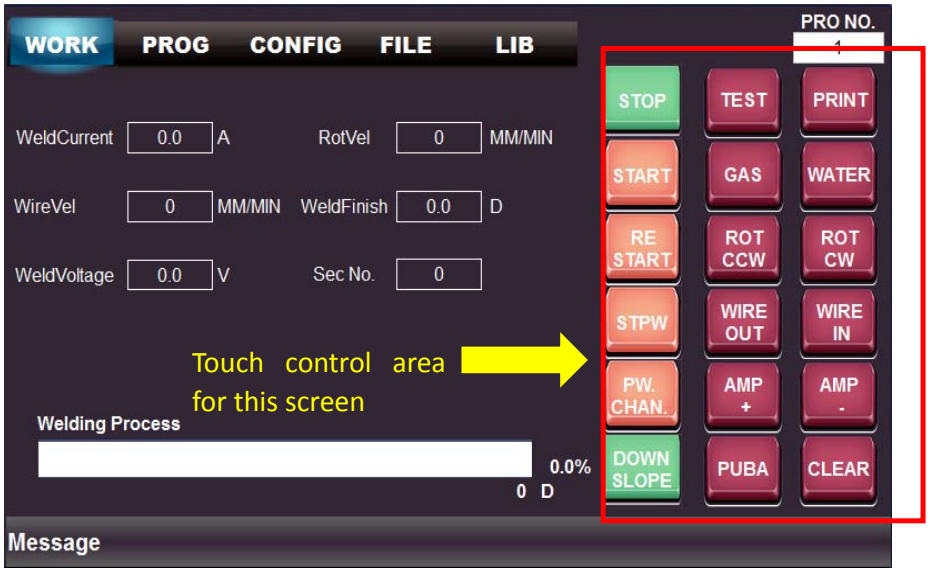



**Fig. 5.2 Touch screen interface**

| Button on the pendant | Button on the touch screen | Description |
|---|---|---|
|  | None | Moves between functions (pendant only). |
|  | None | Selects function (pendant only). |
|  |  | Shielding gas test |
|  |  | Cooling water test |
|  |  | Stop welding (E-stop) |
|  |  | Start welding |
|  |  | Restart previous welding process<br>Effective only after emergency stop |
|  |  | Downslope welding sequence (cannot use RESTART function after pressing downslope) |
| |  | Clears the HOME position |
| |  | 1) Sets HOME position after clearing it<br>2) Homes weld head |

| Button on the pendant | Button on the touch screen | Description | |
|---|---|---|---|
|  | | Sets the HOME position | |
|  |  | Current increase<br>Note 1 | |
|  |  | Current decrease<br>Note 1 | |
|  |  | Rotation speed increase:<br>Note 1 | rotation FWD/REV:<br>Note2 |
|  |  | Rotation speed decrease:<br>Note 1 | |
|  |  | Wire feed increment:<br>Note 1 | Wire retract/feed:<br>Note 2 |
|  |  | Wire feed decrease:<br>Note 1 | |

Note 1: Depressing a button one time during welding will increase (or decrease) that variable by the amount set in the program for ‘delta’.

Note 2: When in idle mode (not welding), depressing a wire feed, rotation, or oscillation button for a brief time will command a low speed move; holding the button longer will cause a high speed move.

| Button on the pendant | Button on the touch screen | Description |
|---|---|---|
| |  | Prints current program |
| |  <br>  <br>  | The three buttons shown are one button that toggles when pressed, scrolling through P/B (peak/base), PULS (peak), and BASE.<br><br>For example, selecting “P/B” and then pressing “Amp+” will increase both peak and base amperages by the amount set for “AmpDelta” in the weld program. |
| |  | STPW disables wire feed; pressing again displays WIRE and enables wire feed |
| |  | Change the password |

## Printer Operation

**5.2.1 Changing printer paper:**

STEPS:

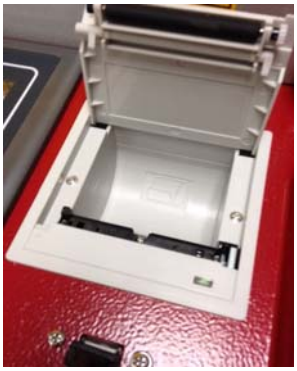
1. Locate the cover latch near bottom left corner of printer
2. Lift latch to open cover.
3. Remove old paper roll.
4. Insert new paper roll into cavity as shown.
5. Pull free end of paper forward and down.
6. Close cover while holding paper down.



STEP 1



STEP 2



STEP 3



STEP 4



STEP 5



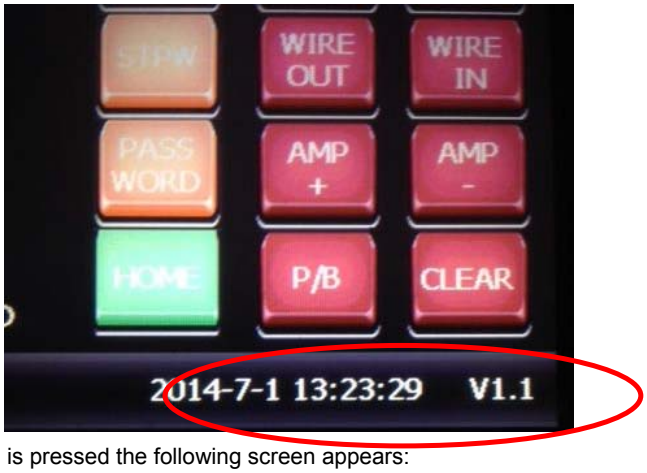
STEP 6

**NOTE:**

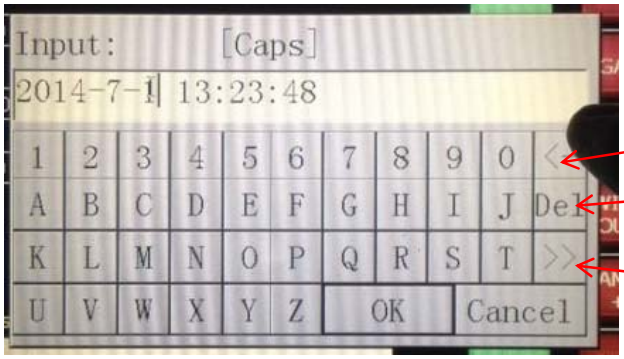
**Manually feed paper by pressing the lighted green button located at bottom right on the printer.**

Resetting Date and Time:

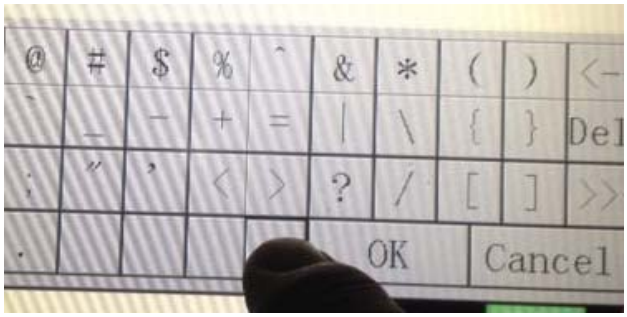
1. The date and/or time are easily reset from the WORK screen by pressing the bottom right area of the screen where the date and time appear:




2. After that area is pressed the following screen appears:




3. This small touch screen allows you to place the cursor in front of, or behind, any character of the date and time. Use your finger to place the cursor where you want (in the example the cursor appears after the “1” in the date). At that point you can use the backspace key or the delete key to erase the desired characters. Correct characters can be entered by touching them. Additional characters can be accessed by using the “NEXT PAGE” button shown above.
4. The space is appears as a blank key as shown below:




5. When the changes are complete, press the “OK”. There is no need to restart following changes.

# Function Description

## 6.1 Operation Interface

### 6.1.1 Overview

The OW-ARC 180 power supply controller has 5 touch screens, including WORK, PROG, CONFIG, FILE, and LIB.

**WORK:** Shows weld progress and displays function buttons (including start, stop, purge, water test, home, amp+/-, rotation +/-, and print).

**PROG:** Programming functions:

- Write or modify a weld program
- Review a welding schedule

**CONFIG:** Configuration settings:

- Language
- Data sampling
- Inch/mm unit, time/degree unit
- Power supply serial number
- Printout data:
  - name
  - Operator ID
  - Weld head serial number

**FILE:** Import and export weld programs

**LIB:** Library functions; allowing program operations:

- Review
- Creation
- Open
- Copy
- Delete
- Print

### 6.1.2 CONFIG

1. CONFIG is the configuration interface; the upper part of this screen sets key configuration values, while the lower part contains information that appears on a program printout.




**Fig. 6.1.1 CONFIG interface**

| WELD CONFIG | |
|---|---|
| Parameter | Description |
| Language | English only |
| Inc/mm | Select inch or mm |
| Sample | Data sampling not available |
| WeldNum | Enter number of weld |
| WeldUnit | Select degrees or seconds |
| Water | Set to on if using OW-CW 180 water cooler |
| Password | Set to on for password protection feature |

| PRINT CONFIG | |
|---|---|
| Parameter | Description |
| Serial NO. | Serial number of OW-ARC 180 |
| Operator Name | Operator name |
| Operator ID | Operator identification number |
| Customer NO. | Customer number |
| Job NO. | Job number |
| Assembly NO. | Assembly number |
| Elec Type | Electrode type |
| Elec DI | Electrode diameter |
| Elec Length | Electrode length |
| Elec Tip | Electrode tip size |
| Elec Angle | Electrode tip angle |
| Torch NO. | Weld head number |

### 6.1.3 LIB

1. “LIB” is the weld program library interface; functions include Open, New, SaveAs, Delete, Print and PrintLib. Buttons on the right control those functions, while the list of programs appears on the left.




**Fig. 6.1.2 LIB interface**

### 6.1.4 PROG

1. “PROG” is the programming interface. It is divided into two sections; the weld program configuration screen (Fig. 6.1.3) and the weld program variable screen (Fig. 6.1.4). The blue UP/DOWN arrows allow navigation between screens.

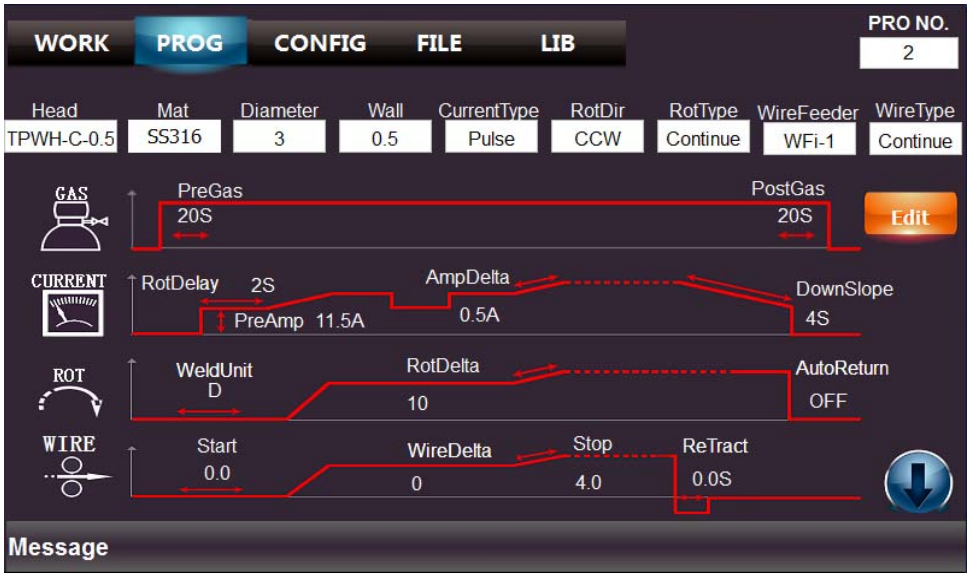
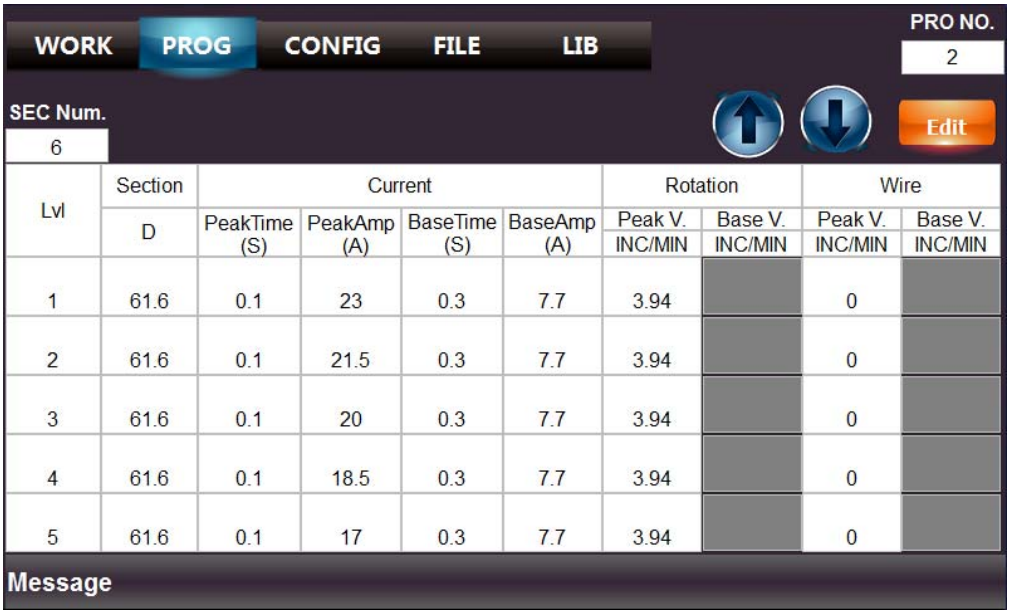



**Fig. 6.1.3 Weld program configuration settings**

| Weld program configuration settings | |
|---|---|
| Parameter | Description |
| Head | Weld head model (select from drop down list) |
| Mat | Material type (select from drop down list) |
| Diameter | Tube diameter |
| Wall | Wall thickness (0.02 to 0.118 inch) |
| CurrentType | Current type (DC or Pulse) |
| RotDir | Rotation direction (CW or CCW) |
| RotType | Rotation Type (Continuous or Pulse) |
| WireFeeder | Wire feeder model (select from drop down list; set to null if none) |
| WireType | Wire feed mode (Continuous or Pulse) |
| PreGas | Prepurge time (0 to 120 seconds) |
| PostGas | Postpurge time (0 to 120 seconds) |
| RotDelay | Rotation delay time; to allow melting before rotation start (0 to 60 seconds) |
| PreAmp | Current level prior to main welding sequence (5 to 180 amps) |
| AmpDelta | Amperage increment (0.1 to 20 amps). SEE NOTE BELOW. |
| DownSlope | Downslope time (0 to 60 seconds) |
| WeldUnit | Unit of rotation; Degree(D) or time in Seconds(S) |
| RotDelta | Rotation speed increment (0.04 to 3.94 inch). SEE NOTE BELOW. |
| AutoReturn | Auto-return to the start point (ON or OFF) |
| Start | Position to start wire feed (0 to 5000 seconds or degrees) |
| WireDelta | Wire feed speed increment (0.04 to 3.94 inch). SEE NOTE BELOW. |
| Stop | Position to stop wire feed (0 to 5000 seconds or degrees) |
| ReTract | Wire retract Time (0 to 60 seconds) |

**Note: "Delta" refers to the amount a value will change during welding when an increase or decrease button is pushed on either the remote pendant or control panel.**

**For example, with the value for AmpDelta in Fig 6.1.3 set to 0.5Amp, when the AMP+ button is pushed on either the pendant or touch screen during welding, welding amperage immediately increases 0.5 amps.**




| Lvl | Section | Current | | | | Rotation | | Wire | |
|---|---|---|---|---|---|---|---|---|---|
| | D | PeakTime (S) | PeakAmp (A) | BaseTime (S) | BaseAmp (A) | Peak V. INC/MIN | Base V. INC/MIN | Peak V. INC/MIN | Base V. INC/MIN |
| 1 | 61.6 | 0.1 | 23 | 0.3 | 7.7 | 3.94 | | 0 | |
| 2 | 61.6 | 0.1 | 21.5 | 0.3 | 7.7 | 3.94 | | 0 | |
| 3 | 61.6 | 0.1 | 20 | 0.3 | 7.7 | 3.94 | | 0 | |
| 4 | 61.6 | 0.1 | 18.5 | 0.3 | 7.7 | 3.94 | | 0 | |
| 5 | 61.6 | 0.1 | 17 | 0.3 | 7.7 | 3.94 | | 0 | |

**Fig. 6.1.4 Weld program variable page**

| Parameters | |
|---|---|
| **Parameter** | **Explanation** |
| SEC Num. | Total number of sections (1 to 20). Push to change the number. |
| Lvl | Number of section |
| Section | Rotation distance of section (total 5000 degrees or seconds) |
| D | Unit of rotation (Degrees or Seconds) |
| PeakTime | Peak amperage ON time (0.05 to 5 seconds) |
| PeakAmp | Peak amperage (5 to 180 amps) |
| BaseTime | Base amperage ON time (0.05 to 5 seconds) |
| BaseAmp | Base amperage (5 to 180 amps) |
| Rotation Peak V. | Peak rotation speed (speed range dependent on weld head and tube OD) |
| Rotation Base V. | Base rotation speed |
| Wire Peak V. | Peak wire feed speed; ranges:<br>WFi-1： 4.29 to 85.88 inches/minute<br>TB1501： 3.53 to 70.64 inches/minute<br>WFE-1： 2.98 to 59.56 inches/minute |
| Wire Base V. | Base wire feeding speed, range same as peak value |

### 6.1.5 WORK

1. “WORK” is the working interface. During welding, real-time welding parameters are displayed in the boxes on the left of the screen. Below that is the weld progress bar and message bar. Control buttons on the right side provide test functions as well as overrides during welding (see chapter 5).

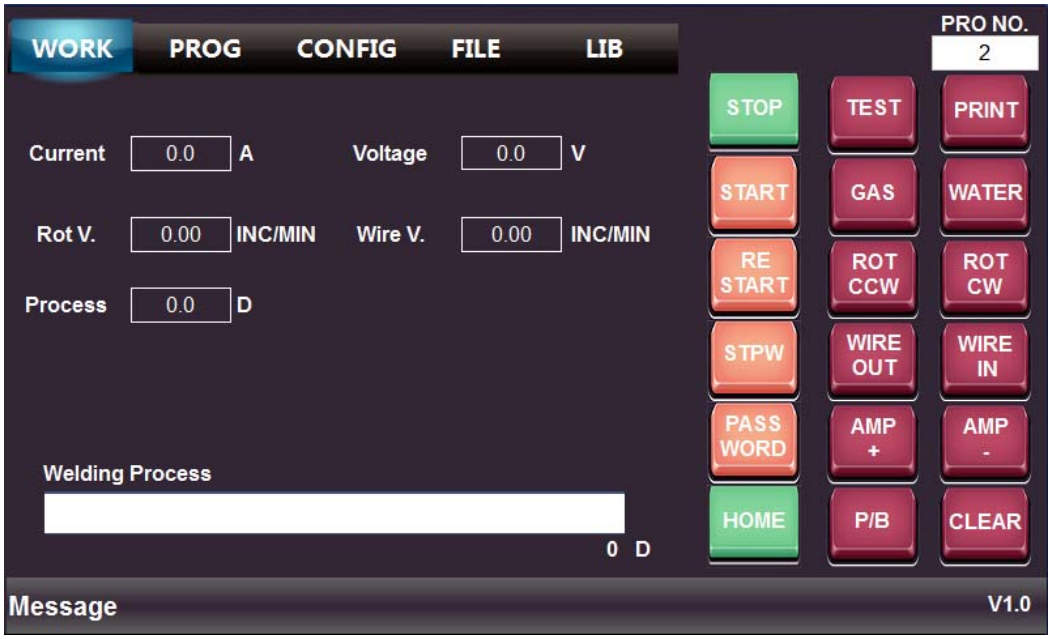



**Fig. 6.1.5 WORK interface**

| Display | |
|---|---|
| Parameter | Explanation |
| Current | Welding current (peak) |
| Voltage | Welding voltage |
| Rot V. | Rotation speed (peak) |
| Wire V. | Wire feeding speed (peak) |
| Process | Rotation degree |
| Welding Process | Rotation degree |

### 6.1.6 FILE

1. “FILE” is the function used to import and export weld programs (to a USB flash drive). See section 6.2.7 for details.

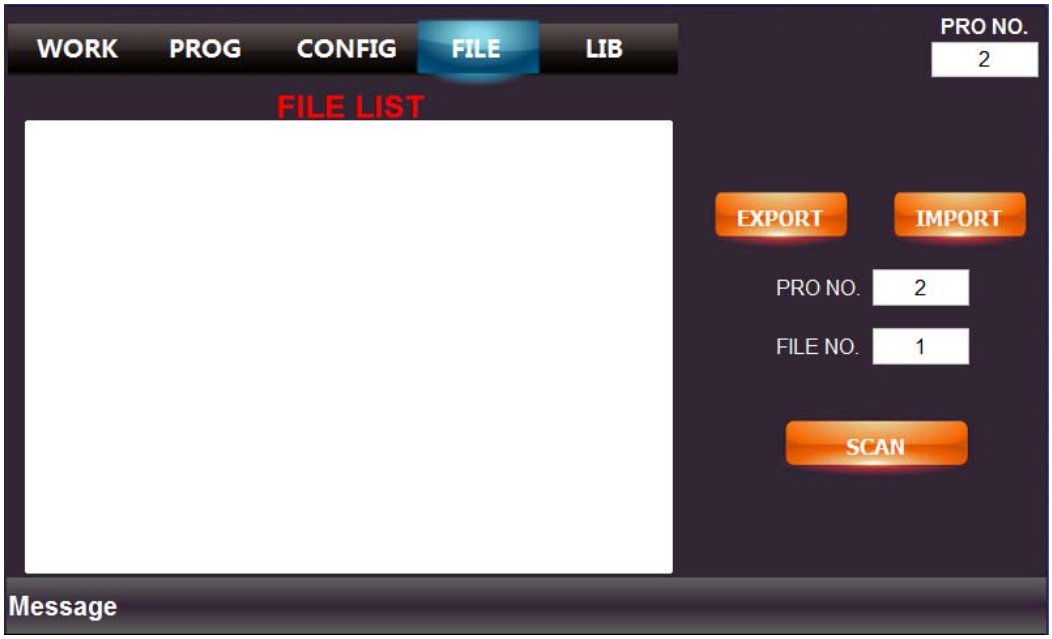



**Fig. 6.1.6 FILE interface**

### 6.2 Program creation: OVERVIEW

Information required for programming:

1. Tube O.D.
2. Weld head model.
   - Rotor Diameter.
   - RPM range
   - Gas flow rate.
   - Pre-purge/post-purge times.
3. Electrode length.
4. Arc gap.
5. Travel speed (inches per minute – IPM).
6. Rotation delay.
7. Downslope time.
8. Overlap.

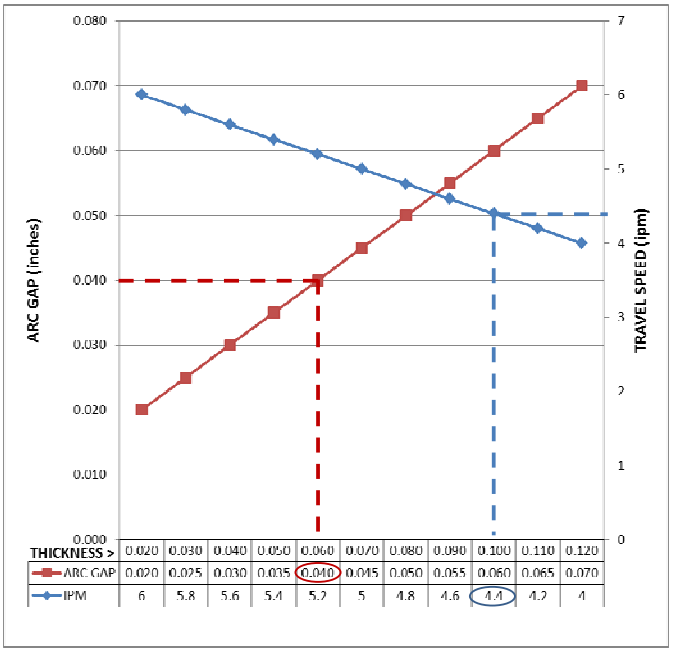
Reference information:

1. Weld head information:

| MODEL | RPM RANGE | ROTOR DIA. (in.) | GAS FLOW (cfh) | PRE-PURGE TIME (sec.) |
|---|---|---|---|---|
| TPWH-C-1 | 0.6 – 12.0 | 2.37 | 15-20 | 20 |
| TPWH-C-3 | 0.2 - 4.0 | 4.86 | 25-30 | 30 |
| TPWH-C-4 | 0.1 - 1.9 | 6.59 | 30-40 | 40 |
| TPWH-C-6 | 0.1 - 1.2 | 10.14 | 30-40 | 50 |

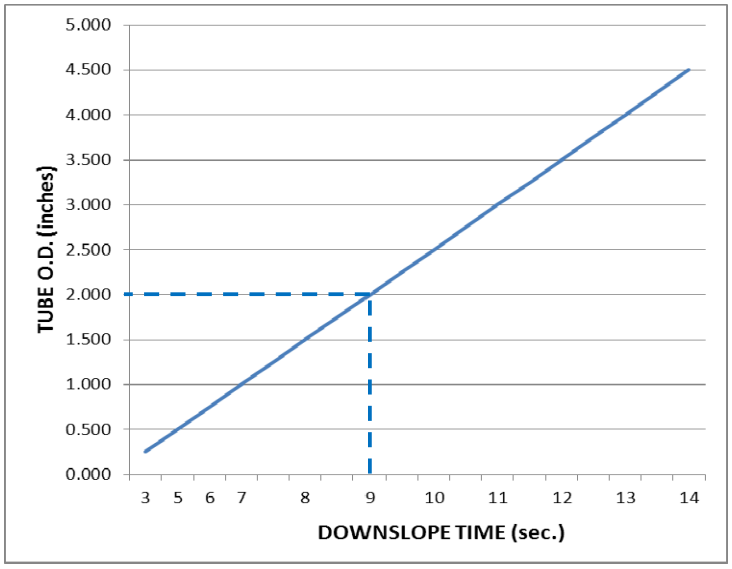
2. Electrode length: $\frac{\text{Rotor OD-Tube OD}}{2}$ - Arc length = Electrode length

3. Arc gap: The chart below shows arc gap in relation to wall thickness. The dotted red lines show an example of how to find the required arc gap for wall thickness = .060”



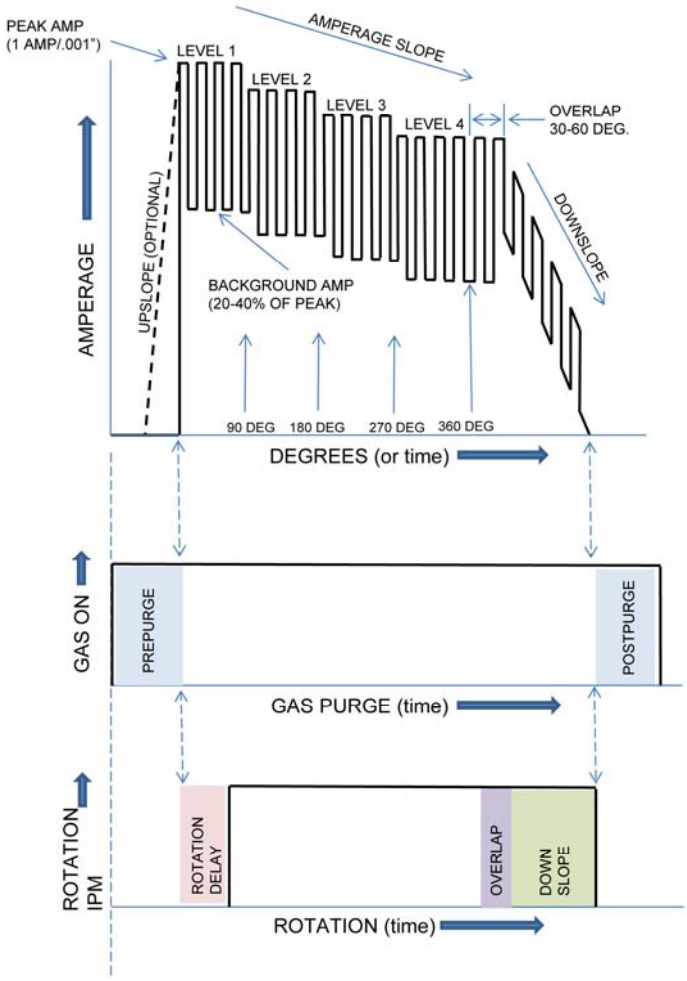
Required information (cont.):

4. Travel speed (inches per minute – IPM): The chart above also shows the relationship between travel speed for a given wall thickness. The example (dotted blue line) shows that for wall thickness .100" travel speed = 4.4 IPM.
5. Rotation delay: This function is used to attain required penetration at the beginning of the weld. Use 1 second rotation delay for each 0.025 inch of wall thickness.
6. Downslope time: Downslope reduces amperage gradually in order to terminate the weld without generating a crater crack or leaving a depression. The following chart shows the relationship between tube O.D. and downslope. The example (dotted blue line) shows that for tube O.D. of 2.0 inches, downslope time = 9.0 seconds:




7. Overlap: Increase overlap time as required to ensure full penetration all the way around the I.D.

**Typical orbital weld cycle:**



### 6.2.1 Create a new program

1. Before creating a new program, go to the CONFIG screen and enter the desired information for the choices “inches or millimeters” and “seconds or degrees.” Also check to make sure “water” is ON
2. Click the “NEW” button at the right side of the LIB interface; the basic configuration inputs appear as shown below (Fig 6.2.1-1).
3. Enter the information in the fields for:
   - Weld head; select the head model used from drop down list.
   - Program number; enter a number for the program. Any open slot between 1-200 can be used; additionally, if desired, an existing program number can be overwritten.
   - Wall thickness; enter the wall thickness.
4. Click “OK”; the controller will automatically calculate starting weld parameters, generate a program, and open the edit interface of the PROG screen (see figure 6.2.1-2).



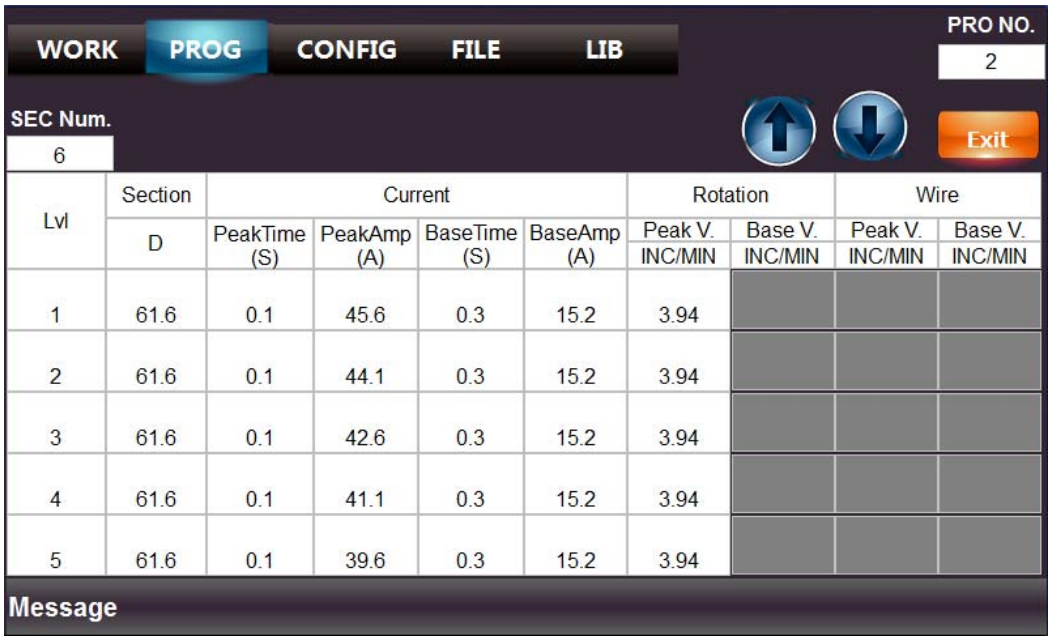

**Fig. 6.2.1-1 Create new program**




**Fig. 6.2.1-2 Weld program configuration screen**

5. The first page of the newly created program is shown above. The program is created with some default values, including:
    - CurrentType = Pulse
    - RotationType = Continuous
    - Wire feeder = Null
    - AutoReturn = Off (will not home the weld head)

6. As Fig. 6.2.1-3 shows, there are 6 sections in the new program, but only 5 are displayed on the first page. The remaining section(s) can be accessed by pressing the down arrow. A program can have 20 sections maximum.




| Lvl | Section | Current | | | | Rotation | | Wire | |
|---|---|---|---|---|---|---|---|---|---|
| | D | PeakTime (S) | PeakAmp (A) | BaseTime (S) | BaseAmp (A) | Peak V. INC/MIN | Base V. INC/MIN | Peak V. INC/MIN | Base V. INC/MIN |
| 1 | 61.6 | 0.1 | 45.6 | 0.3 | 15.2 | 3.94 | | | |
| 2 | 61.6 | 0.1 | 44.1 | 0.3 | 15.2 | 3.94 | | | |
| 3 | 61.6 | 0.1 | 42.6 | 0.3 | 15.2 | 3.94 | | | |
| 4 | 61.6 | 0.1 | 41.1 | 0.3 | 15.2 | 3.94 | | | |
| 5 | 61.6 | 0.1 | 39.6 | 0.3 | 15.2 | 3.94 | | | |

**Fig. 6.2.1-3 Weld program variables screen**

7. Click “EXIT” on the right to exit editing; this will save the program, exit the edit function, and take the user to the “WORK” screen, ready to weld.

### 6.2.2 Open a program




**Fig. 6.2.2-1 Open a program ( A )**

1. The first method is to click the “PRO NO.” in any screen; it will pop up an input box as shown above.
2. Input the program number and click “OK”.




**Fig. 6.2.2-2 Open a program ( B )**

3. The second method is click “OPEN” in the LIB screen as above.
4. Input the program number and click “OK”.

### 6.2.3 Edit a program

6.2.3.1 As an exercise, using program No. 2 as an example (see screens shown in Figs. 6.2.1-1, 6.2.1-2, and 6.2.1-3) edit the following parameters:

Step 1: Change weld head to TPWH-C-1.5 welding head.

Step 2: Set tube OD to 0.236 inch.

Step 3: Change rotation type to Pulse rotation.

Step 4: Add WFi-1 wire feeder.

Step 5: Set wire feed mode to continuous wire feeding.

Step 6: Revise the peak wire feed speed.

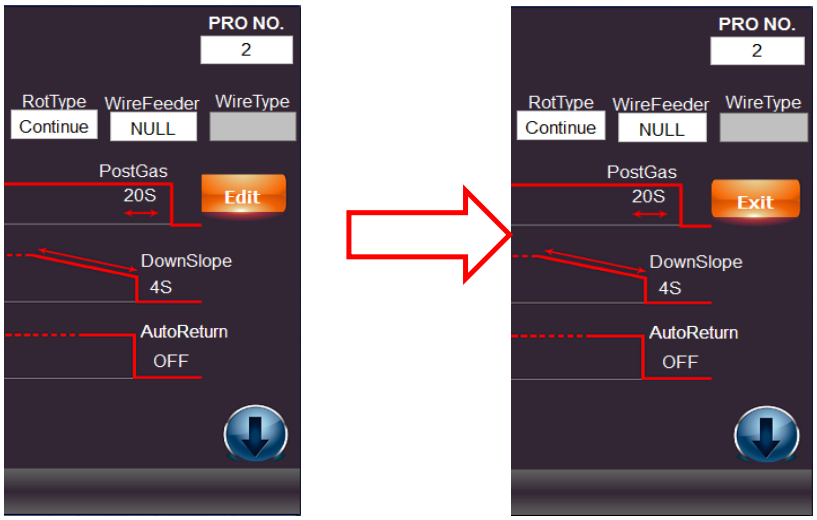



**Fig. 6.2.3-1 Program editing example**

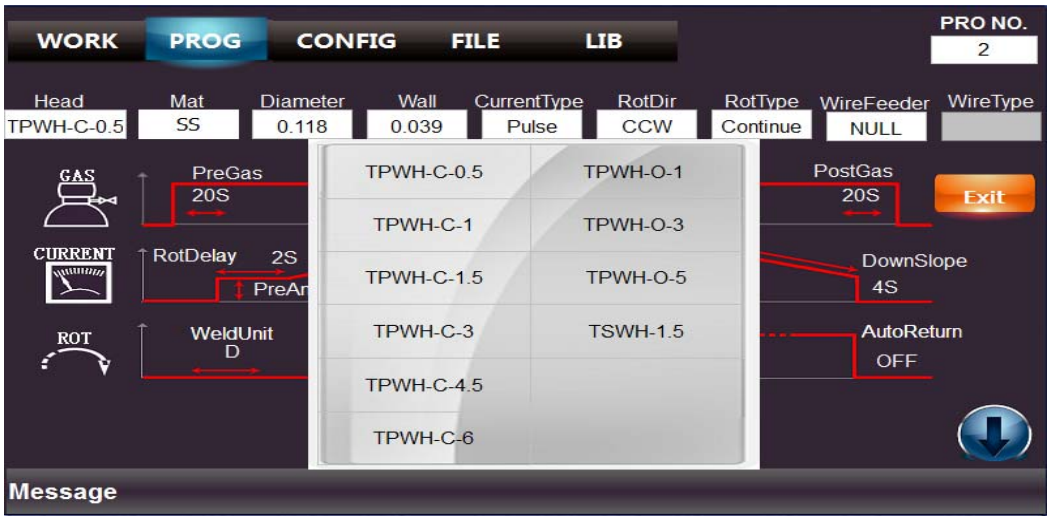
STEP 1 (change weld head to TPWH-C-1.5):

a. Open program no. 2.

b. Change to PROG interface.

c. Enter EDIT mode by pressing Edit key (button changes to “Exit”).

d. Click input box under “Head” and select TPWH-C-1.5 in pop box.



- STEP 2 (Set tube OD to 0.236 inch);
  a. Click the input box under “Diameter”.
  b. Enter 0.236 in the pop up box shown below.
  c. Click “OK”.




**Fig. 6.2.3-2 Editing tube diameter**

- Step 3 (Change rotation type to Pulse rotation):
  a. Click the box under “RotType”; the value will change from Continue to Pulse as shown below.




**Fig. 6.2.3-4 Edit rotation type**

- Step 4 (Add WFi-1 wire feeder):
  a. Click the box under “WireFeeder”.
  b. select WFi-1 in the pop up box as shown below.




**Fig.6.2.3-5 Edit wire feeder model.**

c. WFi-1 has now been added (below).




- Step 5 (Set wire feed mode to continuous wire feeding):
  a. Click the box under “WireType”.
  b. Click to change the value to “Continue”.

Note: when the wire feed function is turned on (by adding a wire feeder), all values related to wire feeding are “0” except “Stop” with a value 4.0.




**Fig.6.2.3-7 Revise the peak wire feed speed**

- Step 6 (Revise the peak wire feed speed):
  a. Click the down arrow to access the weld program variables page.
  b. Select the wire feed speed to edit; enter new value as shown above.
  c. Click “OK”.
  d. Click “Exit” to end editing.

### 6.2.4 Print program(s)

**Method I: Print the current program;**

1. From the WORK screen, Click “PRINT” on the right corner to print the current program as shown below.

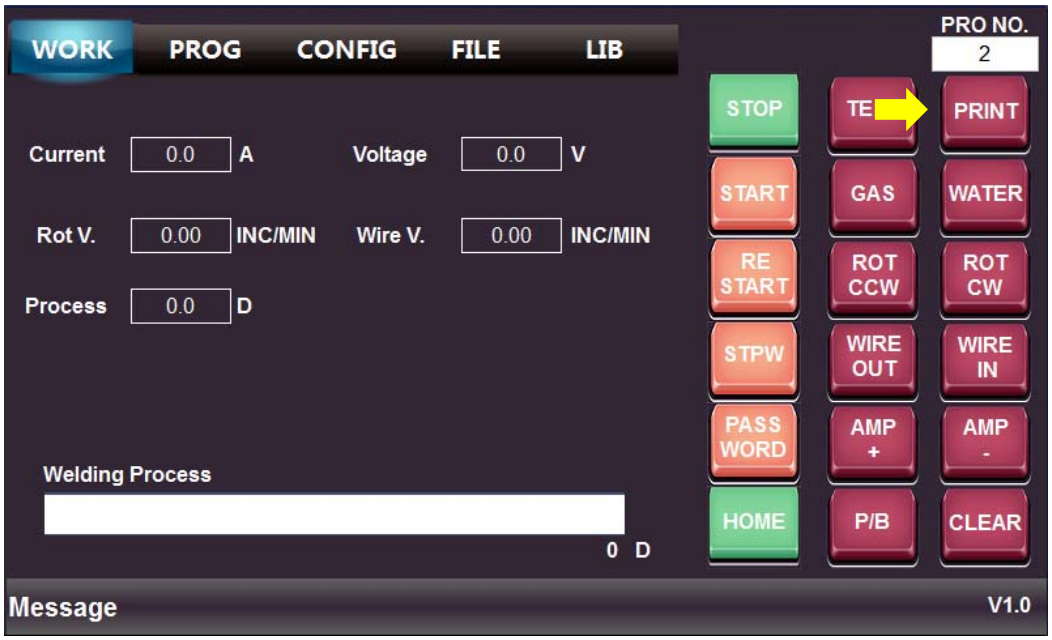



**Fig.6.2.4-1 Print function in WORK interface**

k PRG NO. 1
OTTO-ARC SYSTEMS, INC.
OW-ARC 180

******PROJECT DESCRIPTION******
DATA:2013-6-24
TIME:15:27:46
TORCH NAME:TPWH-C-0.5
PS. SERIAL NO.:0
OPERATOR NAME:0
OPERATOR ID:0
CUSTOMER NUMBER:0
JOB NUMBER:0
ASSEMBLY NUMBER:0
WELD NUMBER:0
MATERIAL TYPE:SS304
WALL THICHNESS:0.02
DIAMETER:0.118
ELECTRODE TYPE:0
ELECTRODE DI:0
ELECTRODE LENGTH:0
ELECTRODE TIP:0
ELECTRODE ANGLE:0
WELD HEAD NO.:0
SPECIAL NOTES:_____

**********INPUTS**********
PREGAS:20
POSTGAS:20
CURRENT TYPE:PULSE
PRE AMP:11.7
ROTATION DELAY:2
AMP DELTA:0.5
DOWNSLOPE:4
ROTATION TYPE:PULSE
ROTATION DIR:CCW
ROTATION DELTA:0.4
AUTO RETURN:YES-1
WF TYPE:PULSE
WF START:0
WF DELTA:0
WF STOP:4
WF RETRACT TIME:0

| LEVEL | DEG | PRI-TIME | BCK |
|---|---|---|---|
| 1 | 81.6 | 0.1 | 0.3 |
| 2 | 81.6 | 0.1 | 0.3 |
| 3 | 81.6 | 0.1 | 0.3 |
| 4 | 81.6 | 0.1 | 0.3 |
| 5 | 81.6 | 0.1 | 0.3 |
| 6 | 81.6 | 0.1 | 0.3 |

| LEVEL | PRI-AMP | BCK |
|---|---|---|
| 1 | 23.4 | 7.8 |
| 2 | 21.9 | 7.8 |
| 3 | 20.4 | 7.8 |
| 4 | 18.9 | 7.8 |
| 5 | 17.4 | 7.8 |
| 6 | 15.9 | 7.8 |

| LEVEL | PRI-ROT | BCK |
|---|---|---|
| 1 | 3.94 | 0.04 |
| 2 | 3.94 | 0.04 |
| 3 | 3.94 | 0.04 |
| 4 | 3.94 | 0.04 |
| 5 | 3.94 | 0.04 |
| 6 | 3.94 | 0.04 |

| LEVEL | PRI-WIRE | BCK |
|---|---|---|
| 1 | 8.12 | 4.29 |
| 2 | 8.12 | 4.29 |
| 3 | 8.12 | 4.29 |
| 4 | 8.12 | 4.29 |
| 5 | 8.12 | 4.29 |
| 6 | 8.12 | 4.29 |

**********END**********

Example:

| Items | Description |
|---|---|
| k | Print start |
| PRG NO. | Program number |
| OTTO-ARC SYSTEMS, INC. | Company name |
| OW-ARC 180 | Welder model number |
| DATA | Date of printing |
| TIME | Time of print |
| TORCH NAME | Weld head model |
| PS. SERIAL NO. | Serial number of OW-ARC 180 |
| OPERATOR NAME | Operator's name |
| OPERATOR ID | Operator's ID |
| CUSTOMER NUMBER | Customer Number |
| JOB NUMBER | Job Number |
| ASSEMBLY NUMBER | Assembly Number |
| WELD NUMBER | Starting number for sequential count of welds |
| MATERIAL TYPE | Material |
| WALL THICKNESS | Wall thickness |
| DIAMETER | Diameter of the tube |
| ELECTRODE TYPE | Type of electrode |
| ELECTRODE DI | Diameter of electrode |
| ELECTRODE LENGTH | Length of electrode |
| ELECTRODE TIP | Electrode Tip (blunt) Diameter |
| ELECTRODE ANGLE | Angle of electrode |
| WELD HEAD NO. | Serial Number of welding head |
| SPECIAL NOTES | Special notes by operator |
| PREGAS | Prepurge |
| POSTGAS | Postpurge |
| CURRENT TYPE | Type of current (pulse or continuous) |
| PRE AMP | Starting current |
| ROTATION DELAY | Rotation delay (used to achieve penetration) |
| AMP DELTA | Current increment |
| DOWNSLOPE | Downslope time |
| ROTATION TYPE | Type of rotation (Continuous or Pulse) |
| ROTATION DIR | Rotation direction(CW、CCW) |
| ROTATION DELTA | Increment of rotation speed |
| AUTO RETURN | Automatically return to the start point (Home) |
| WF TYPE | Null or per selection |
| WF START | Wire feed start position |
| WF DELTA | Wire feed speed increment |
| WF STOP | Wire feeding stop position |
| WF RETRACT TIME | Retract wire time |
| LEVEL... | Parameters in levels ( Time, AMP, ROT, WIRE ) |

**Method II: Print from LIB screen**

1. Click “PRINT” in LIB interface as shown below.
2. Select one or more programs to print by pressing on them individually. Selected programs turn red as shown in Fig. 6.2.4-3.
3. Print by pressing the “Print” button.




**Fig.6.2.4-2 LIB interface**




**Fig. 6.2.4-3 Printing interface**

**Method III. Print program library**

**Note: This function prints an abbreviated list of key information for each program selected. It does not print the entire weld program (that requires Method I or II).**

1. Click “PrintLib” in LIB interface.
2. Select one or more programs to print by pressing on them individually.




**Fig. 6.2.4-4 Print program library**

Example (printout from “PrintLib”):

k OTTO-ARC SYSTEMS, INC.
OW-ARC 180

DATA: 2013-8-24
TIME: 15:28:25
**********LIBRARY**********

| PRG NO. | OD | WALL |
|---|---|---|
| 1 | 0.118 | 0.02 |
| | MAT | HEAD |
| | SS304 | TPWH-C-0.5 |
| PRG NO. | OD | WALL |
| 2 | 0.5 | 0.118 |
| | MAT | HEAD |
| | SS316 | TPWH-C-1 |

**********END**********

### 6.2.5 Delete program(s)

1. Click “Delete” under the LIB interface.
2. Select one or more programs to print by pressing on them individually; note selected programs turn red.
3. Click “OK” to delete selected programs.




**Fig.6.2.5 Delete program interface**

### 6.2.6 Save a program as another program

1. At times it is convenient to modify an existing program. In this case use the “SaveAs” function to retain the original program.
2. Click “SaveAs” in LIB interface to access the SaveAs page (Fig. 6.2.6).
3. Enter the number of original program under (yellow arrow) and the number of then new program (red arrow).
4. Click “OK” to create the new program.

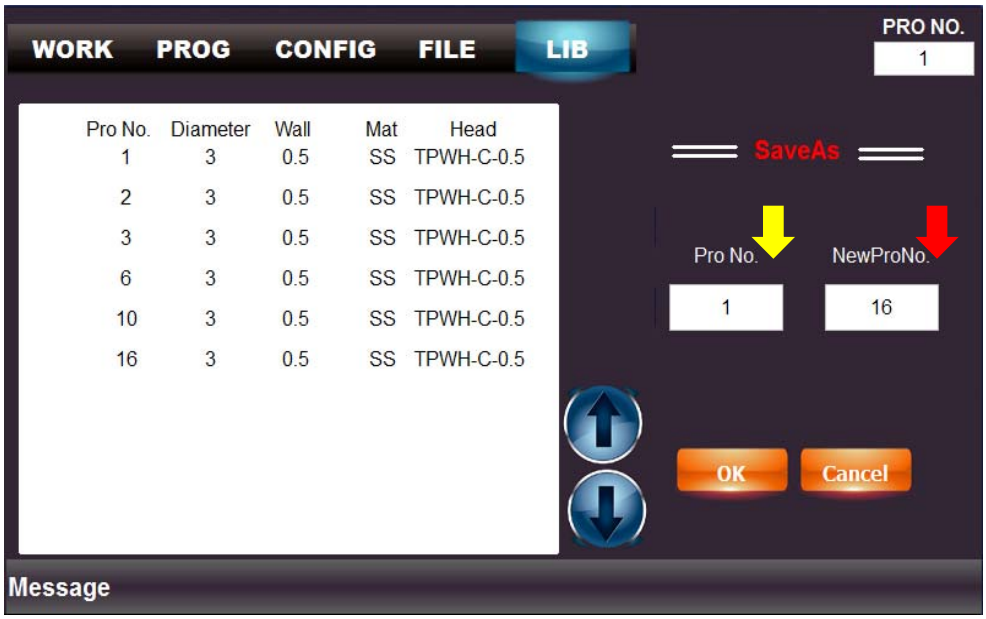



**Fig.6.2.6 Save a program as another program**

### 6.2.7 Import and Export Programs

1. Import/export of weld programs is accomplished from the “FILE” interface.
2. Plug a USB flash drive into the USB port (located below the printer).
3. Click “SCAN” to list the files on the USB flash drive.
4. TO EXPORT A PROGRAM TO THE FLASH DRIVE:
   a. Enter program number to EXPORT in the field “PRO NO.” (see yellow arrow). b. Enter the program number to *save as* in the field “FILE NO.” (see red arrow). c. Click “EXPORT” to save the program to the flash drive.
5. TO IMPORT A PROGRAM FROM THE FLASH DRIVE:
   a. Enter program number to IMPORT in the field “FILE NO.” (see red arrow).
   b. Enter the program number to *save as* in the field “PRO NO.” (see yellow arrow).
   c. Click “IMPORT” to save the program to the machine hard drive.




**Fig.6.2.7 Import and Export**

# Maintenance and Repair

### 7.1 Cleaning



**Disconnect the power supply from the main power source before cleaning. REMOVE THE POWER PLUG FROM THE SOURCE POWER! (Switching off or removing the fuse is not adequate isolation). Wait 2 minutes for the capacitors to discharge.**

Cleaning instruction:

After ensuring the power supply is disconnected from main power and has rested for at least 2 minutes:

1. Carefully remove the side panels.
2. Blow out any foreign material per recommendations below:
   a) Otto Arc recommends using canned compressed air (available for blowing out computers).
   b) Compressed air, if used, must be dry, at reduced pressure (not to exceed 50 psig), and delivered through a diffuser nozzle.

### 7.2 Maintenance

#### 7.2.1 Cooling System

1. Check that coolant level in water tank is at least ¾ full.
2. Change the coolant every quarter (when equipment is used regularly). The fill port is on top of the tank, while the drain is on the bottom.
3. Distilled water is the recommended coolant. Add anti-freeze as required to protect below freezing temperature.

#### 7.2.2 Repair

If the OW-ARC 180 power supply needs to be repaired, contact your authorized OTTO ARC representative. You will need to provide:

1. Serial and model number of the unit.
2. Complete description of the application.
3. Detailed description of the symptom.

Detailed information will help identify the exact problem and expedite the solution.

# Error Messages

### 8.1 Error Message display

Error messages appear in the “Message” bar of the WORK interface as shown below (Fig. 8.1). The error message will also show on the screen of RTC09 remote pendant.




**Fig. 8.1 Error message on the WORK interface**

1. The touch screen and pendant will display the first error if more than one error occurred. Once the first error is cleared the next error appears.
2. If unable to resolve an error, please record the error message and contact our service department.

### 8.1.1 Ignite Fail (Error 2)

If the touch screen shows “Ignite Fail” and the pendant shows “Error 2 Ignite Fail”, it means power source failed to start the arc. Check:

1. If using TPWH or TSWH weld head, is the ground firmly attached to the work piece (not fixturing or bench)?
2. Is the work piece rusted or otherwise contaminated?
3. Is the distance from electrode to work piece correct?
4. Is the protective gas flow correct?




---

### 8.1.2 Short Circuit (Error 3)

If the touch screen shows “Short Circuit” and the pendant shows “Error 3 Short Circuit”, it means the work piece is short circuited. Check:

1. Is the work piece stuck to the electrode? If so, separate them and replace the electrode.




---

### 8.1.3 Resource Error (Error 4)

If the touch screen shows “Resource Error” and the pendant shows “Error 4 Resource Error”, it means there is something wrong with the inverter.

This message will occur if the inverter is:

1. Overheated.
2. Over voltage.
3. Under voltage.

ALLOW THE POWER SOURCE TO COOL IF IT IS OVERHEATED, otherwise:

Turn off and disconnect the power source;

1. Check the power cable for damage.
2. Check the power cable plug for correct wiring.
3. Check primary voltage.




---

### 8.1.4 Lack Gas (Error 7)

If the touch screen shows “Lack gas” and the pendant shows “Error 7 Lack gas”, it means the gas flow was not enough. Check:

1. Is gas flow more than 10L/min (20cfh)?




---

### 8.1.5 Lack Water (Error 9)

If the touch screen shows “Lack Water” and the pendant shows “Error 9 Lack Water”, it means cooling water flow is insufficient. Check:

1. Turn off water function in “CONFIG” interface if there is no water tank in use.
2. If the OW-CW180 is being used, make sure water flow is more than 0.6L/min (0.6quart/min). Contact our service department if the flow is over 0.6L/min but error still occurs.




---

### 8.1.6 Arc Die (Error 17)

If the touch screen shows “Arc Die” and the pendant shows “Error 17 Arc die”, there was an arc fault that occurred during welding. Check:

1. Double check the work piece and weld head to ensure both are securely mounted.
2. If using TPWH or TSWH weld head, is the ground firmly attached to the work piece (not fixturing or bench)?
3. Is the work piece rusted or otherwise contaminated?
4. Is the distance from electrode to work correct?

Contact our service department if this error occurs repeatedly.




---

### 8.1.7 Communication Error (Error 18)

If the touch screen shows “Communication Error” it means there is an internal communication error. Turn off and restart the power source.




NOTICE: This error disables all touchscreen functions. It will be necessary to stop a weld by using the pendant STOP function (or by turning the welder off).

---

### 8.1.8 Beckhoff Module Error (Error 19)

If the touch screen shows “Beckhoff module error” and the pendant shows “Error 19”, it means there is an error in a Beckhoff control module. Turn off the power source and restart.




---

# Optional Accessories

## 9.1 Weld heads

### 9.1.1 TPWH-C series closed orbital tube weld head




**Fig. 9.1.1 TPWH-C**

This series of orbital TIG weld heads are designed to make the highest quality welds in butt joint tubing applications. Precise collet clamping, water cooling, and inert gas protection in the sealed weld cavity ensure precise and repeatable welding. Standard and special collets made to customers' requirements allow accurate positioning with no spot welding.

When used with the digitally controlled OW-Arc 180 Orbital Welding Power Source, superior quality welds at high production rates are made in many different industries and applications, including: Pharmaceutical, Food Service, Semiconductor, Process Piping, Chemical, Nuclear, and Power.

**Features:**

- The main structure is made of aluminum, and is very light.
- The weld chamber is fully enclosed and purged, ensuring complete gas shielding.
- Collets use an auto-alignment design for precise location; suitable for thin wall carbon steel, stainless steel, titanium and titanium alloy tube-to-tube and tube-to-fitting welding.
- Operation buttons on the weld head provide point-of-use flexibility for hard to reach locations.

| Model | TPWH-C-0.5 | TPWH-C-1 | TPWH-C-1.5 | TPWH-C-3 | TPWH-C-4.5 | TPWH-C-6 |
|---|---|---|---|---|---|---|
| Material | Stainless steel, titanium alloy | Carbon steel, stainless steel, titanium alloy | Carbon steel, stainless steel, titanium alloy | Carbon steel, stainless steel, titanium alloy | Carbon steel, stainless steel, titanium alloy | Carbon steel, stainless steel, titanium alloy |
| Tube OD(mm) | ϕ3～ϕ12.7 (1/8″～1/2″) | ϕ6～ϕ25.4 (1/4″～1″) | ϕ6～ϕ38.1 (1/4″～1 1/2″) | ϕ19.05～ϕ76.2 (3/4″～3″) | ϕ38.1～ϕ114.3 (1 1/2″～4 1/2″) | ϕ50.8～ϕ168.3 (2″～6 5/8″) |
| Tungsten OD (mm) | ϕ1.0 | ϕ1.0、ϕ1.6 | ϕ1.6、ϕ2.4 | ϕ1.6、ϕ2.4 | ϕ2.4、ϕ3.2 | ϕ2.4、ϕ3.2 |
| Rotation Speed (rpm) | 2.3～46.1 | 0.6～12 | 0.3～6 | 0.2～4 | 0.095～1.9 | 0.06～1.2 |
| Shield gas | Argon | Argon | Argon | Argon | Argon | Argon |
| Cooling | Air | Water | Water | Water | Water | Water |
| Flow volume (ml/min) | ———— | ≥600 | ≥600 | ≥600 | ≥600 | ≥600 |
| Rated current | 45A Duty cycle 60% | 60A Duty cycle 60% | 65A Duty cycle 60% | 75A Duty cycle 60% | 100A Duty cycle 60% | 100A Duty cycle 60% |
| Weight(kg) (exclude cable) | 0.85 (2 lbs.) | 2.0 (4.4 lbs.) | 2.0 (4.4 lbs.) | 3 (6.6 lbs.) | 6 (6.6 lbs.) | 10.5 (23 lbs.) |
| Dimension(mm) | 297×85×45 | 340×80×40 | 360×120×41 | 412×165×43 | 497×230×57 | 630×330×61 |
| Dimensions (inches) | 11"x 3.4" x 1.8" | 13.4" x 3.2" x 4" | 14.2" x 4.8" x 1.6" | 16.2" x 6.5" x 1.7" | 19.5" x 9" x 2.25" | 24.8" x 13" x 24" |
| Standard Cable Length | 6m (20') | 10m (33') | 10m (33') | 10m (33') | 10m (33') | 10m (33') |

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WWW.OTTOARC.COM

### 9.1.2 TPWH-O series Orbital Tube/Pipe weld head



**Fig. 9.1.2 TPWH-O**

The TPWH-O weld head series is designed to weld schedule 5&10 pipe. Typical applications include joining carbon steel and stainless steel pipe.

When paired with the OW-ARC180 Programmable Orbital Welding Power Source, these weld heads provide flexible solutions and high quality welds in a variety of industries, including: Chemical, Food, Medicine, Boiler, and Nuclear.

**Features:**

- Primarily made of aluminum, the weld head is very light.
- The low lash gear drive provides smooth, precise rotation.
- The adjustable clamping mechanism eliminates complex tooling.
- Water cooled low profile torch allows longer weld times.
- Optional wire feed provides additional flexibility.

| Model | TPWH-O-1 | TPWH-O-3 | TPWH-O-5 |
|---|---|---|---|
| Material | Carbon steel,<br>stainless steel | Carbon steel,<br>stainless steel | Carbon steel,<br>stainless steel |
| Tube OD<br>(mm) | Inner clamp:<br>φ15~φ25<br>(5/8″~1″)<br>Outer Clamp:<br>φ25~φ43<br>(1″~1 5/8″) | Inner clamp:<br>φ19.05~φ45<br>(3/4″~1 3/4″)<br>Outer Clamp:<br>φ45~φ77<br>(1 3/4″~3″) | Inner Clamp:<br>φ38.1~φ76<br>(1.5"-3")<br>Outer Clamp:<br>φ76~φ130<br>(3"-5") |
| Electrode OD(mm) | φ2.4<br>(3/32") | φ2.4<br>(3/32") | φ2.4, φ3.2<br>(3/32", 1/8") |
| Rotation Speed(rpm) | 0.37~7.45 | 0.19~3.8 | 0.11-2.2 |
| Shield gas | Ar / Mixed Gases | Ar / Mixed Gases | Ar / Mixed Gases |
| Cooling | Water | Water | Water |
| Cooling flow(ml/min) | ≥600 | ≥600 | ≥600 |
| Weight(kg)<br>(excluding cable) | 2.5kg (5.5lbs) | 4kg (9lbs) | 10.8kg (23lbs) |
| Dimension(mm) | 305×128×230 | 310×180×290 | 435 x 300 x 400 |
| Dimensions(inches) | 12" x 5" x 9" | 12" x 7" x 11" | 17"x12"x15.5" |

### 9.1.3 TSWH-1.5 Orbital Tube-to-Tube sheet weld head



**Fig. 9.1.3 TSWH-1.5**

This weld head is designed for TIG welding flush-designed Tube-to-Tubesheet applications without wire feed.

When paired with the OW-Arc180 Programmable Orbital Welding Power Source it is used successfully in industries ranging from: Chemical, Food, Pharmaceutical, Heat exchanger, Power plant, and Nuclear.

**Features:**

- Widely used in power plant condensers tube-to-Tubesheet welding.
- Small size and light weight make it easy to use.
- Expandable collet provides precise locating.
- Fully enclosed weld chamber provides complete gas purging and high quality welds.
- Water cooling allows for higher production rates.

| Model | TSWH-1.5 |
|---|---|
| Material | Carbon steel, stainless steel, Titanium alloy |
| Tube OD(mm) | φ16~φ38 ( 5/8″~1 1/2″ ) |
| Connection | Fusion |
| Electrode OD (mm) | φ2.4 |
| Rotation speed(rpm) | 0.6~12 |
| Torch angle | 0°、7° Optional<br>(standard is 7°) |
| Shield gas | Argon |
| Cooling | Water |
| Cooling flow(ml/min) | ≥600 |
| Rated current | 100A Duty cycle60% |
| Weight(kg) | 3.65 (excluding cable) |
| Dimension (mm) | 310×80×165 |

### 9.2 RTC09 Remote Pendant

The RTC09 remote pendant is a made for OW-ARC 180 power source.

**Features:**

- Small size and lightweight.
- Easy to use.
- Complete keypad provides start/stop, purge control, and rotation and amperage control.
- Easy to read lighted display shows key weld variable information.



**Fig. 9.2 RTC09**

### 9.3 OW-CW 180 Water Cooler

The OW-CW 180 water cooler is designed specifically for the OW-ARC 180 power source, and provides connections for torch cooling lines as well as the interface cable to the power supply. The power supply runs the water cooler on an as-needed basis, and turns it off when cooling is not required.



**Fig. 9.3 OW-CW 180 Water cooler Description**

# Spare Parts List

| Spare Parts for OW-ARC 180 | | | | |
|---|---|---|---|---|
| ITEM | Part number | Name | Identification | Function |
| 1 | 9060101317000 | Power amplifier board | DC182A MV | |
| 2 | 9060101318000 | Main control board | T320/1 180DC | Control inverter (current, voltage, etc.) |
| 3 | 9060101319000 | High frequency board | HFBTF1 | Suppy high efficiency |
| 4 | 9060101320000 | HF transformer | DROSSEL HF | Supply high efficiency to HF board |
| 5 | 9060101321000 | Saturation transformer | Saturation transformer | Current sampling |
| 6 | 9060101322000 | PCB current transformer | PCB current transformer | Current feedback |
| 7 | 3050101542000 | Controller | BC9020 | Main controller |
| 8 | 3050101543000 | Module | KL1512 | Digital counter |
| 9 | 3050101226000 | Module | KL1418 | Digital input |
| 10 | 3050101047000 | Module | KL2408 | Digital output |
| 11 | 3050101056000 | Module | KL3064 | Current, voltage feedback |
| 12 | 3050101569000 | Module | KL4404 | Current, voltage, rotation, wire feed control |
| 13 | 3050101541000 | Module | KL6001 | Remote pendant connector |
| 14 | 3050101274000 | Module | KL2622 | Signal for starting inverter |
| 15 | 3050101260000 | Module | KL9010 | End terminal |
| 16 | 2000100000130000 | Relay board | RCB-V0.1 | High frequency isolation |
| 17 | 2000100200120010 | DC driver board | DCPG-2 V1.3 | Rotation and wire feed driver |
| 18 | 3010224015000 | Argon flow sensor | 125-B(B727-10)REC.D | Argon flow sensor |
| 19 | OW-ARC | Printer paper | | Thermal printer paper |
| **Spart Parts for OW-COOLER** | | | | |
| ITEM | Part number | Name | Identification | Function |
| 1 | 2000100500130000 | Power supply board | WRB-V0.0 | 115V/230v switch |
| 2 | 3010212037000 | Water flow sensor | DW-K 1/4” | Water flow sensor |

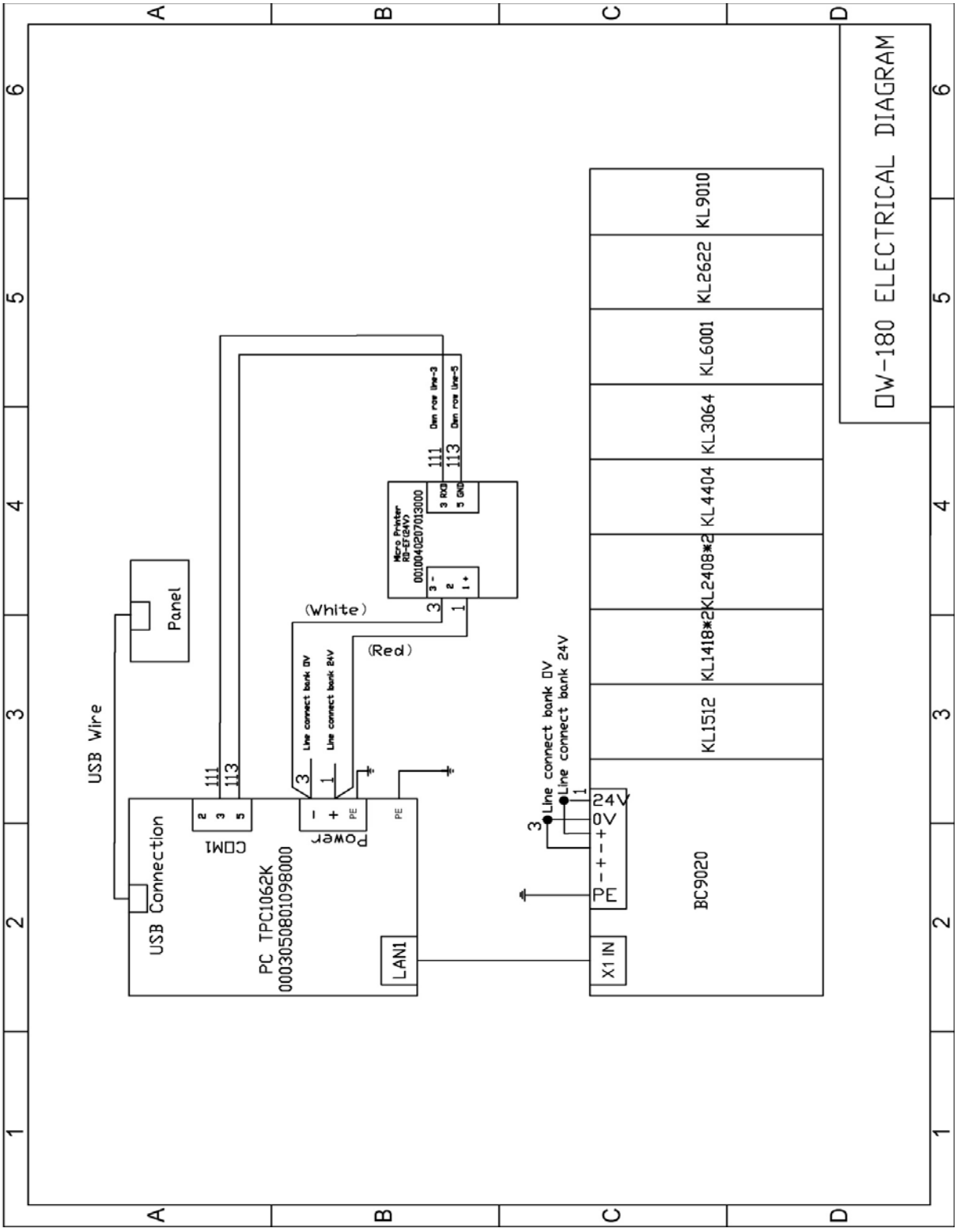
## Glossary

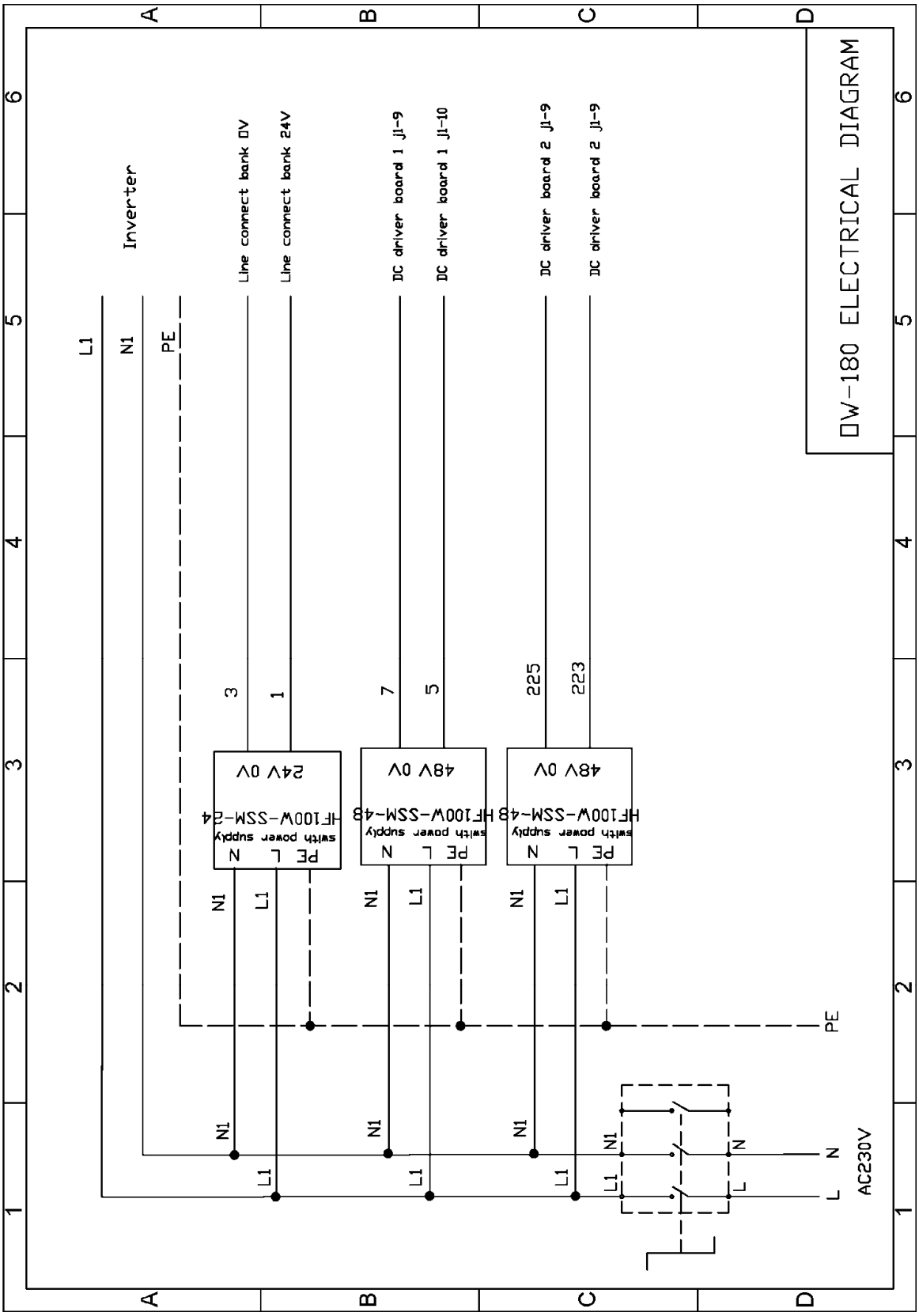
| TERM | ABBREVIATION | DEFINITION |
|---|---|---|
| Auto Return | | ***(PROG page1)*** A function that returns weld head to the home position upon weld completion. |
| Amperage Delta | AmpDelta | **(*PROG page1*)** A function that sets the amount of amperage change when the “AMP +/-“ button is pushed during welding. |
| Base Amperage | BaseAmp | ***(PROG page2)*** The low pulse value for amperage, called base or background amperage. |
| Base Amperage Time | | ***(PROG page2)*** The amount of time in seconds the base amperage is on. |
| Base Velocity | BaseV | ***(PROG page2)*** When rotation mode is set to “Pulse”, “BaseV” is the low (base) pulse velocity. |
| Current Type | | **(*PROG page1*)** Current type can be set to “DC” (no pulse), or “Pulse”. |
| Down Slope | | **(*PROG page1*)** When main welding sequence is over, the amount of time in seconds to decrease amperage until the arc stops. |
| Library | Lib | **(*LIB page*)** The library page, where programs are listed. |
| Material | Mat | **(*PROG page1*)** The material type being welded. The information is for record keeping only and has no bearing on the weld program. |
| Peak Amperage | PeakAmp | ***(PROG page2)*** The high pulse value for amperage, called peak amperage. |
| Peak Amperage Time | | ***(PROG page2)*** The amount of time in seconds peak amperage is on. |
| Peak Velocity | PeakV | ***(PROG page2)*** When rotation mode is set to “Pulse”, “PeakV” is the high (peak) pulse velocity. |
| Pre Amperage | PreAmp | **(*PROG page1*)** Pre Amperage is used in conjunction with Rotation Delay to ‘preheat’ the material before main welding sequence. |
| Postpurge | PostGas | **(*PROG page1*)** Inert gas purge time in seconds, after the weld completes. |
| Prepurge | PreGas | **(*PROG page1*)** Inert gas purge time in seconds, before the arc comes on. |
| Retract | | **(*PROG page1*)** Wire feeder pulls back the filler metal a small amount to keep it out of the arc. |
| Rotation Delay | RotDelay | **(*PROG page1*)** The amount of time in seconds, after the arc starts, before rotation begins. |
| Rotation Delta | RotDelta | **(*PROG page1*)** A function that sets the amount of rotation change when the “ROT CCW/CW” button is pushed during welding. |

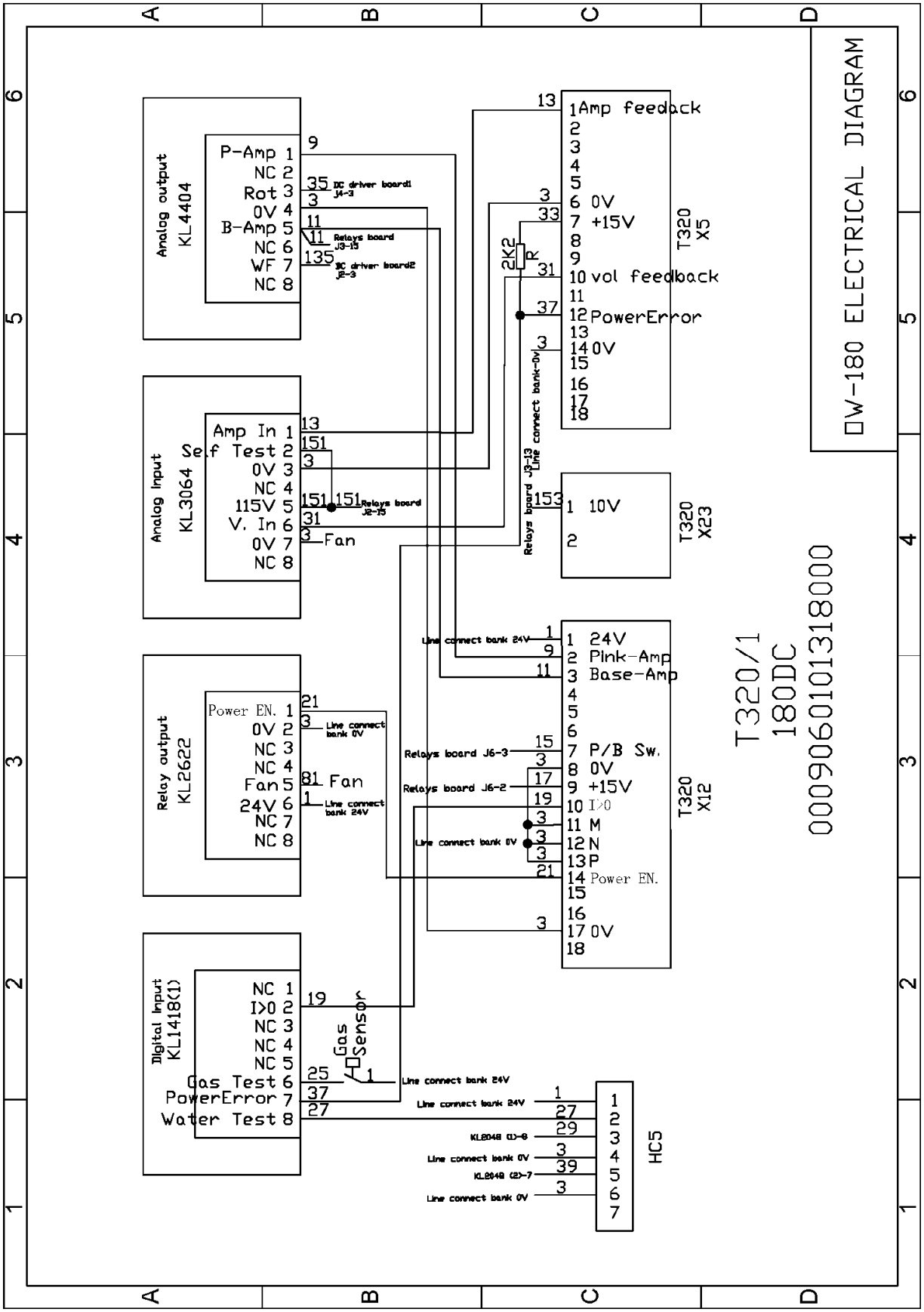
**Glossary (cont.)**

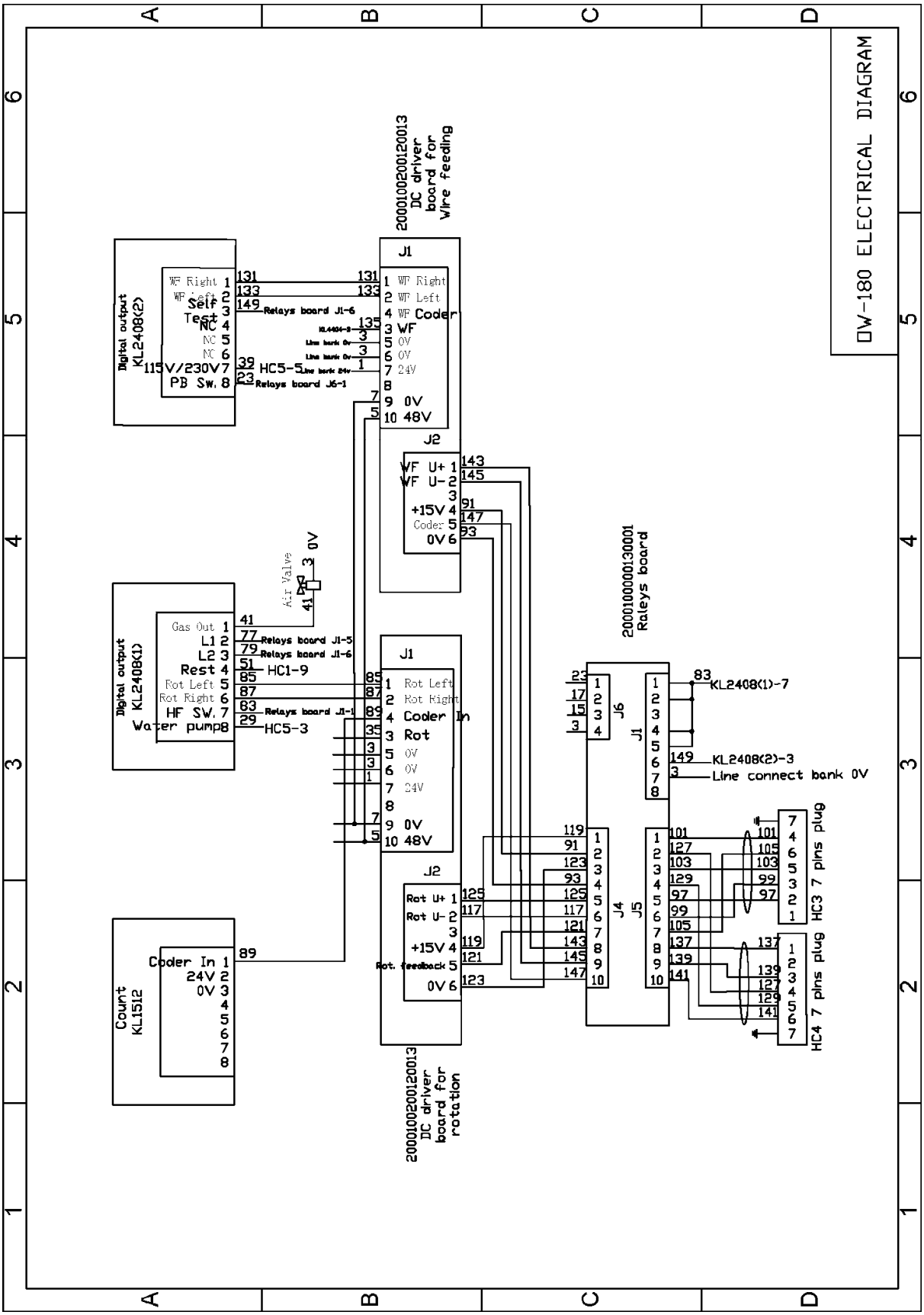
| TERM | ABBREVIATION | DEFINITION |
|---|---|---|
| Section | | ***(PROG page2)*** The degrees or seconds of travel per level. |
| Section Number | SecNum | ***(PROG page2)*** The number of sections that the weld is divided into. |
| Wire Delta | | **(*PROG page1*)** A function that sets the amount of wire feed change when the “Wire In/Out” button is pushed during welding. |

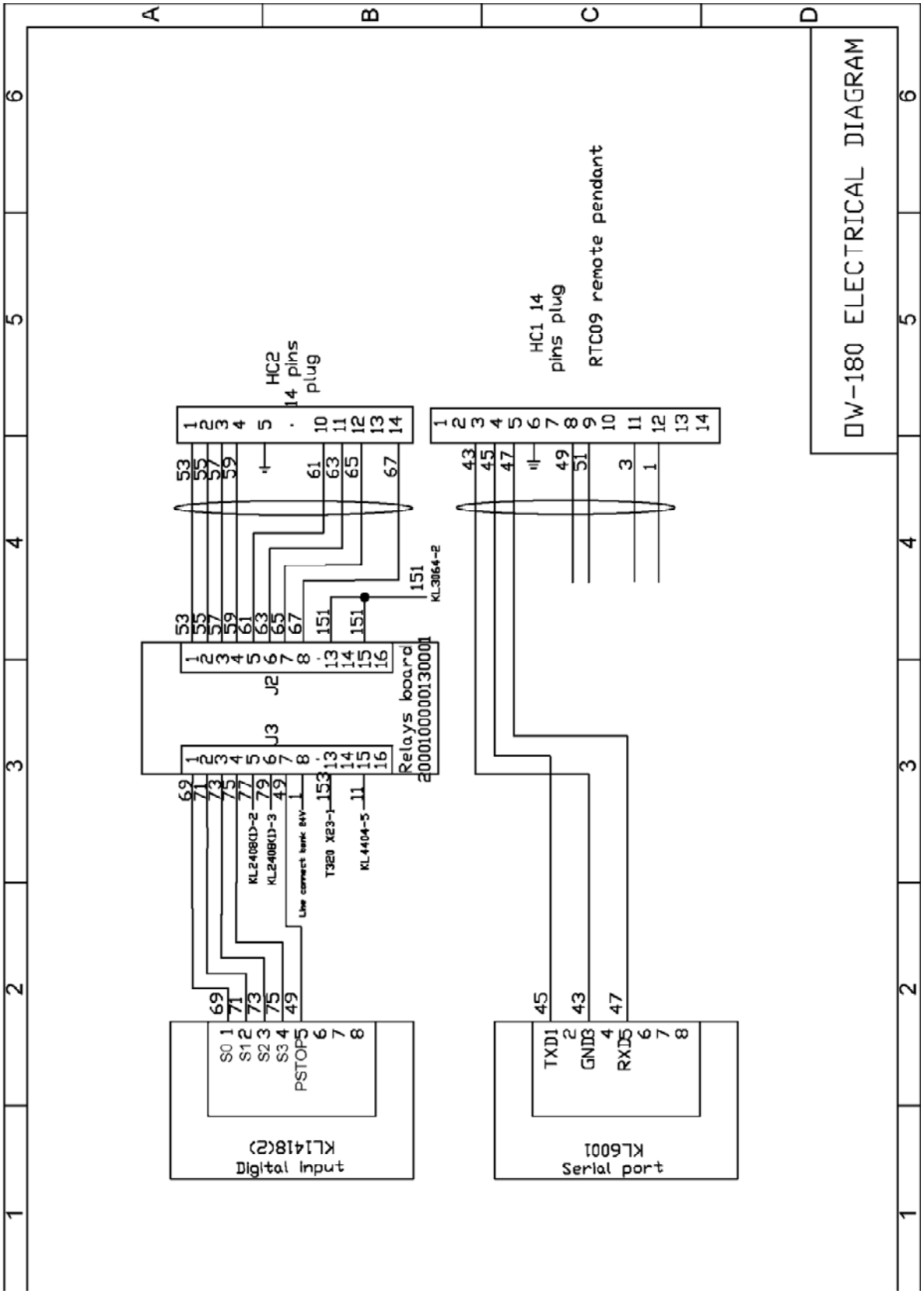
## Electrical Diagrams

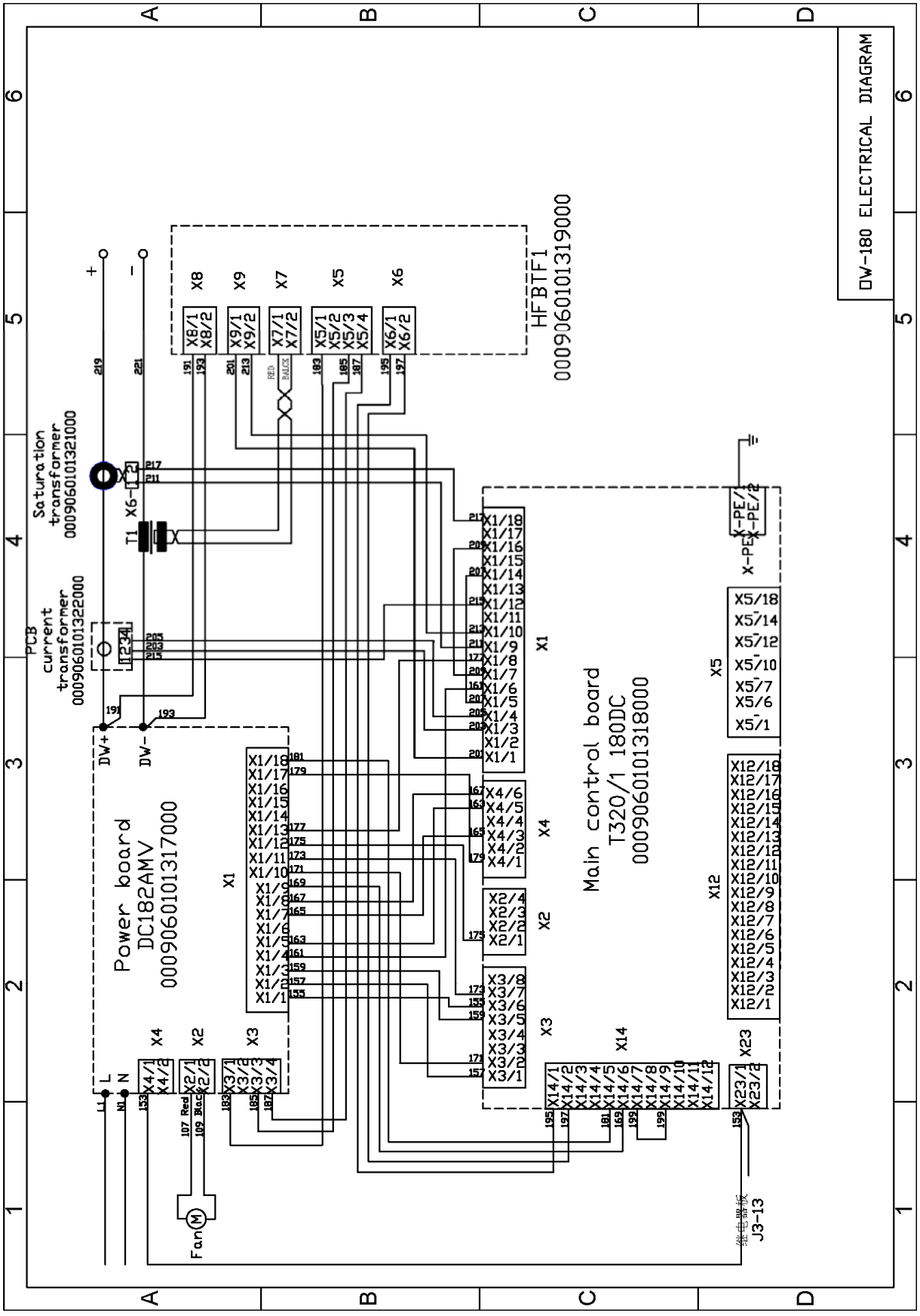



OW-180 ELECTRICAL DIAGRAM
Inverter
Line connect bank 0V
Line connect bank 24V
DC driver board 1 J1-9
DC driver board 1 J1-10
DC driver board 2 J1-9
DC driver board 2 J1-9
L1
N1
PE
3
1
7
5
225
223
24V 0V
48V 0V
48V 0V
HF100W-SSM-24
HF100W-SSM-48
HF100W-SSM-48
switch power supply
PE L N
N1
L1
PE
AC230V
L
N


OW-180 ELECTRICAL DIAGRAM
T320/1
180DC
000906010131800O
Analog output
KL4404
P-Amp 1
NC 2
Rot 3
0V 4
B-Amp 5
NC 6
WF 7
NC 8
Analog Input
KL3064
Amp In 1
Self Test 2
0V 3
NC 4
115V 5
V. In 6
0V 7
NC 8
Fan
Relay output
KL2622
Power EN. 1
0V 2
NC 3
NC 4
Fan 5
24V 6
NC 7
NC 8
Digital Input
KL1418(1)
NC 1
I>0 2
NC 3
NC 4
NC 5
Gas Test 6
PowerError 7
Water Test 8
Gas Sensor
T320 X5
1Amp feedback
6 0V
7 +15V
10 vol feedback
12 PowerError
14 0V
T320 X23
1 10V
2
T320 X12
1 24V
2 Plnk-Amp
3 Base-Amp
7 P/B Sw.
8 0V
9 +15V
10 I>0
11 M
12 N
13 P
14 Power EN.
17 0V
HC5
2K2
DC driver board1 J4-3
Relays board J3-15
DC driver board2 J2-3
Relays board J2-15
Relays board J3-13 Line connect bank-0V
Line connect bank 0V
Line connect bank 24V
Relays board J6-3
Relays board J6-2
KL2048 (1)-6
KL2048 (2)-7


OW-180 ELECTRICAL DIAGRAM
2000100200120013
DC driver board for Wire feeding
J1
J2
Digital output KL2408(2)
WF Right 1
WF Left 2
Self Test 3
NC 4
NC 5
NC 6
115V/230V 7
PB Sw. 8
Relays board J1-6
HC5-5
Relays board J6-1
WF U+ 1
WF U- 2
+15V 4
Coder 5
0V 6
WF Right
WF Left
WF Coder
WF
0V
24V
48V
Air Valve
Digital output KL2408(1)
Gas Out 1
L1 2
L2 3
Rest 4
Rot Left 5
Rot Right 6
HF SW. 7
Water pump8
Relays board J1-5
Relays board J1-6
HC1-9
Relays board J1-1
HC5-3
Rot Left
Rot Right
Coder In
Rot
Rot U+ 1
Rot U- 2
+15V 4
Rot. feedback 5
0V 6
Count KL1512
Coder In 1
24V 2
0V 3
2000100000130001
Raleys board
J6
J1
J4
J5
KL2408(1)-7
KL2408(2)-3
Line connect bank 0V
HC3 7 pins plug
HC4 7 pins plug
2000100200120013
DC driver board for rotation


OW-180 ELECTRICAL DIAGRAM
HC2
14 pins
plug
HC1 14
pins plug
RTC09 remote pendant
J2
J3
Relays board
KL3064-2
KL2408(1)-2
KL2408(1)-3
T320 X23-1
KL4404-5
KL1418(2)
Digital input
KL6001
Serial port
S0
S1
S2
S3
PSTOP
TXD
GND
RXD


DW-180 ELECTRICAL DIAGRAM
HFBTF1
000906010131900O
Saturation transformer
000906010132100O
PCB current transformer
000906010132200O
T1
Power board
DC182AMV
000906010131700O
Main control board
T320/1 180DC
000906010131800O
Fan(M)
DW+
DW-
L
N
J3-13

## Machine Warranty / Repairs

**Warranty is twelve months (12mo) 1 Year Warranty from date of purchase. Please review below information regarding repairs and returns.**

FOR A PERIOD OF ONE YEAR FROM THE DATE OF PURCHASE, THIS MACHINE IS UNDER WARRANTY.

**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 UNIT HAS BEEN ABUSED OR INVOLVED IN AN ACCIDENT

4) MISUSE IS EVIDENT OR IF THE UNIT HAS BEEN USED WITH AN IMPROPER ACCESSORY

5) UNIT IS DAMAGED DUE TO NOT FOLLOWING RECOMMENDED MAINTENANCE

**OTTO ARC SYSTEMS, INC.**
**3921 SANDSTONE DR.STE**
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**FAX: +1-916-939-0912**
**www.ottoarc.com**