



Automation™

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AP Automation Orbital TIG Product Brochure



Orbital TIG

Rugged, Compact Custom-Engineered Systems



Orbital TIG is a mechanized TIG welding process for joining pipe and tube using a clamp-on weld head. The pipe remains stationary and the welding torch automatically rotates around the weld joint, completing the entire weld. AP Automation offers tube-to-tube welding systems for welding 1/2" to 8-3/4" OD pipe and tube-to-sheet applications.

For more information about Orbital TIG, please visit www.ap-automation.com



Five Reasons for Orbital Welding

- 1. Beautiful, identical welds**
with accurate consistency
- 2. Easier to qualify welders on approval test.**
Process relies on automated equipment rather than on operator skill.
- 3. Less welder fatigue.**
Reduces the amount of operator attention necessary: principle task is to monitor the automated weld.
- 4. Difficult welds made easy.**
Tight clearances and hard-to-reach locations are the environments in which AP Automation weld heads excel.
- 5. Higher productivity.**
Much higher production output and lower rejection rates compared to manual welding. Accurate, simple production planning and calculation.

AP Automation Precision Weld Heads



TS 12-90



AP 18-40

AP 36-80

AP 70-160

AP 140-220

AP Automation orbital weld heads are extremely rugged, built to take abuse in the shop as well as in the demanding environments of the field.

Simple to service and maintain.

Simply clamp on, adjust above the weld joint, and begin welding. Setup for each weld takes about 30 seconds.



Lightweight and compact

Weld heads fit in tight-clearance locations.



Versatile

Weld heads for 1/2" to 8 5/8" tube-to-tube joints and tube-to-sheet welds on 1/2" to 4" tubes.

Adaptable to a wide variety of weld joints.

Optional accessories and special engineering available to tackle almost any job.

AP-1200 Orbital TIG Controller

The AP Automation Orbital TIG Control System (AP-1200) produces precise, timed welds by automatically regulating current and slope in six sectors. This allows the operator the flexibility of running a fully programmed weld and making needed adjustments easily. The AP-1200 System includes a controller and a remote pendant.

Automatic timed welds can be set up to run from .4 seconds to 66 minutes. Pulsed wire feed and pulsed rotation can also be synchronized with pulsed weld current for special welding conditions and root passes.



The AP-1200 regulates and synchronizes:

- *Weld Current Level*
- *Pulsed Current*
- *Wire Feed*
- *Rotation*
- *Auxiliary Equipment*



The remote pendant allows the operator these controls at the weld zone:

- *Start and Stop*
- *Rotation Jog—Forward and Reverse*
- *Wire Jog—Forward and Reverse*
- *Current Control*
- *Return to Home Position*
- *Emergency Stop*

WFP-4 Wire Feeder

- *Strong, 4-drive roll mechanism provides exact, stable wire speed of between 3 and 100 ipm.*
- *2, 10, or 40-pound wire spools.*
- *Enclosed to protect from dust and moisture.*
- *Rugged, portable case.*



Introducing Orbital TIG Welding in Your Shop:

Example: Custom-Engineering for heavy-wall, "hairpin" return bends



1

Customer contacts AP Automation with job requirements:

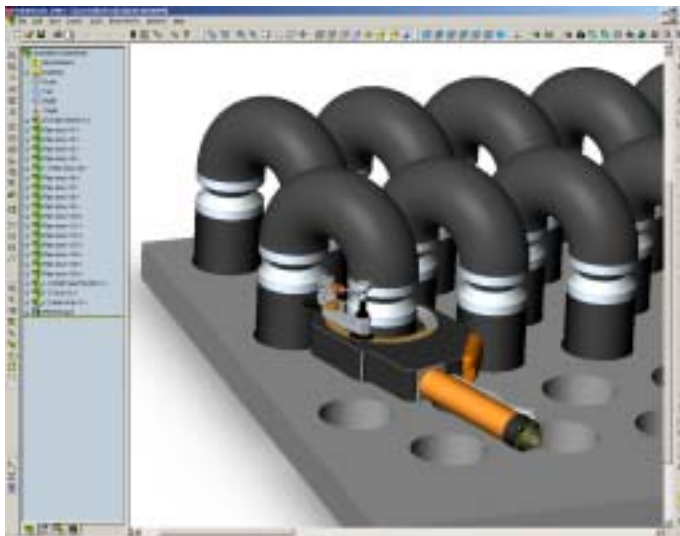
- Orbital welding on 3" schedule XX (.600" wall)
- Hairpin return bend heat exchanger
- 2 ½" radial clearance, 1 ¼" axial clearance and tight clearance between return bends.
- 100% X-Ray Orbital TIG required.

2

AP Automation Custom-Engineers a Welding System:

AP Automation determines that the smaller AP 36-80 weld head must be used instead of the AP 70-160 because of clearance restrictions. The AP 36-80, built for maximum 3 1/8" OD, is custom-modified to weld the 3 1/2" OD pipe. This enables a tight 1 3/4" radial clearance for the job.

Solidworks® 3D CAD model is created and emailed:



This allows the customer to view on his web browser an animated simulation of his job being welded with one of our weld heads. The customer can zoom in and manipulate the image to view all of his clearance requirements and verify our equipment for his job. No extra software is required to view the model. A PowerPoint® presentation detailing the system is also emailed.

3

Customer Review:

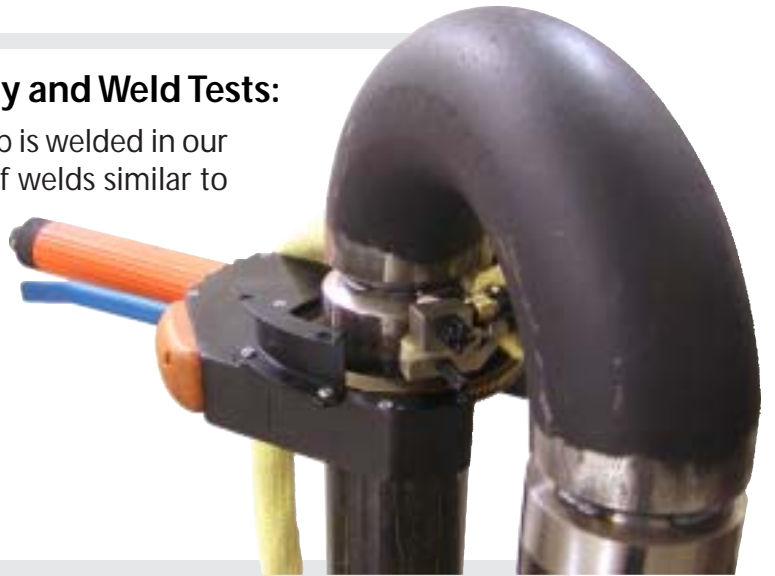
After necessary modifications and approval, AP Automation sends a quote for the system and optional lab work to the customer.

4

5

Job Simulation, Time Study and Weld Tests:

If necessary, a mock-up of the job is welded in our lab. After we perform a series of welds similar to the actual production environment, we produce a time study so the customer knows how many welds one operator can perform in an 8-hour day. 50% of the charge for this service is credited back with purchase of the equipment.

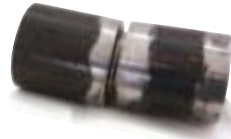


After the lab work is completed, the customer receives a full report with weld samples, joint design options, time study, weld parameters and video of the

parts being welded. Customer then completes a full inspection of the parts. Upon approval, a purchase order with deposit is issued.



Joint Design Options



Weld Samples



AP Automation builds, tests, and installs the customer's system:

After building the system, we perform extensive weld testing, then ship the system to the job site. Once equipment arrives, a technician from AP Automation works with the customer in three steps:

- 1) Equipment setup and installation
- 2) Operator Training: how to use and maintain the equipment.
- 3) Working with customer's technicians, we assist in developing weld parameters for the job.

6

AP Automation maintains customer service and technical support for immediate assistance.

Orbital TIG Systems are used in these industries:

- Dairy/Food Industries
- Refineries
- Oil/Gas Well Drillers
- Shipyards/Aircraft/Aerospace
- Pharmaceuticals
- Mechanical Contractors

Actual Jobs:



Orbital TIG Welding Tight-Clearance Fillet

Custom adjustable angle weld head is built for welding 2 3/8" stick-out stainless steel rod to flat stock or inside of a channel. Filler wire is automatically fed into weld pool.

Overhead Orbital TIG Welding Heat Exchanger

3" OD stainless steel tube in 2" thick tube-sheet with 100% argon purge. A custom torch head and centering mandrel were built. The custom locating fixture for positioning the weld head in each tube enables quick and accurate movement from one tube to the next.





Orbital TIG Welding Aluminum Heat Exchanger

Fluted tubes are seal welded to a tube-sheet using a high precision AC arc. The AP-1200 Orbital TIG Controller regulates pulsed current, wire feed and slope for an automated weld using our TS 12-90 tube-sheet weld head. The shape of the AC arc is completely controlled to produce high quality, narrow-bead aluminum orbital welding.



ID Fusion Welding 2" Deep inside Heat Exchanger

A custom water-cooled torch was built for welding the tube to the backside of tube-sheet. Torch heads are water-cooled and designed to weld at any depth.



Accessories & Specifications:

The Orbital TIG 1200 System includes:

- AP-1200 Controller
- Miller Dynasty LX Power Supply
- WFP4 Wire Feeder (Optional)
- Water Cooler
- Locking Tool Compartment for spare parts, tools, and up to 3 weld heads
- Equipment Cart: durable, easy-to-move, and compact (22" x 34" x 48"), perfect for harsh job site environments



Dynasty 300 LX Power Supply



- Miller's best 250 Amp inverter TIG power supply
- AC/DC Output: Exceptional arc performance
- HF Arc Start
- 230- 460V 3-phase or single phase
- Advanced automation interface

AP-1200 Front Panel

Amps, volts, wire speed and travel speed are displayed in real time during welding. These figures are continuously updated.

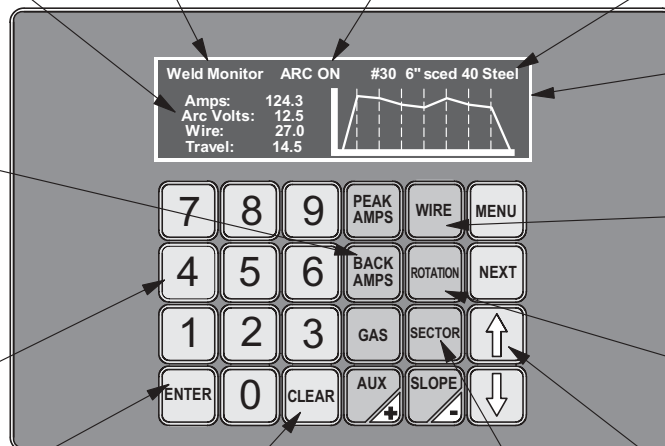
For security, weld parameters are created and modified only with supervisor password.

"ARC ON" indicates when arc is initiated.

Create up to 30 different weld programs and select them by program number or user-defined name.

Peak and background amps are for pulsed current applications.

Adjustment of high and low amperage levels, pulses per second (frequency), pulse width (% on time) is performed here.



Graph shows actual weld profile for the entire weld, plus initial and final settings.

Adjusts speed, wire slopes, and end-of-weld wire retract.

Adjusts rotation speed in each sector, as well as slope and end-of weld.

In each screen, weld parameters are entered and modified from the touch key pad.

"Enter" to store the value you have selected.

"Clear" to erase the value you have selected.

Quick sector selection for easy weld parameter development.

Up/down scroll keys allow for simple, quick selection of value to be modified.

AP-1200 Orbital TIG Controller

Rugged and reliable, our microprocessor-based AP-1200 Orbital TIG System Controller provides inexpensive, accurate integration and automation of the entire welding process. With a storage capacity for over 30 programs, the AP-1200 synchronizes all the components of your welding system for easy installation and operation.



- **Easy to Program**

On-screen graphics display and keypad on the front panel

- **Stores 30 Weld Programs**

User may select names or part numbers and descriptions

- **Complete Control of Weld Cycle**

Analog control of welding current, wire feed speed, desired welding arc voltage, and travel speed. Two auxiliary relays control power to additional equipment selectable throughout the welding cycle

- **Two Security Levels**

Operator and Supervisor login for development and modification of your programs

- **“Weld Enable” Switch**

Allows for testing without starting an arc

- **Flexible Control**

During Welding Using front panel or remote pendant

Orbital TIG System

Microprocessor-based Controller

- *Additional program storage capacity when interfaced with a PC*
- *16 digital I/O's (additional ports available)*
- *Large display screen with real-time weld profile graphics and text*
- *7 internal relays for controlling external equipment*
- *4 analog outputs*
- *Interfaces with all manufacturers of welding equipment and automation equipment*
- *HF protected*
- *8 hours of custom-programming available at no extra charge with each controller purchased*

Signal Isolation

- *Enclosed isolation interface board provides four I/O channels for complete isolation, eliminating all electrical noise and HF problems.*

Motor Controls

- *4 operating modes:*
 - 1) *I/R compensation (open loop)*
 - 2) *DC Tach feedback*
 - 3) *Encoder speed control*
 - 4) *Current feedback control*
- *Pulse width modulated motor control*
- *12 to 50 VDC operating range*
- *20A peak output current 10A continuous*
- *10 to 500 Watt motor capacity*

Remote Pendant

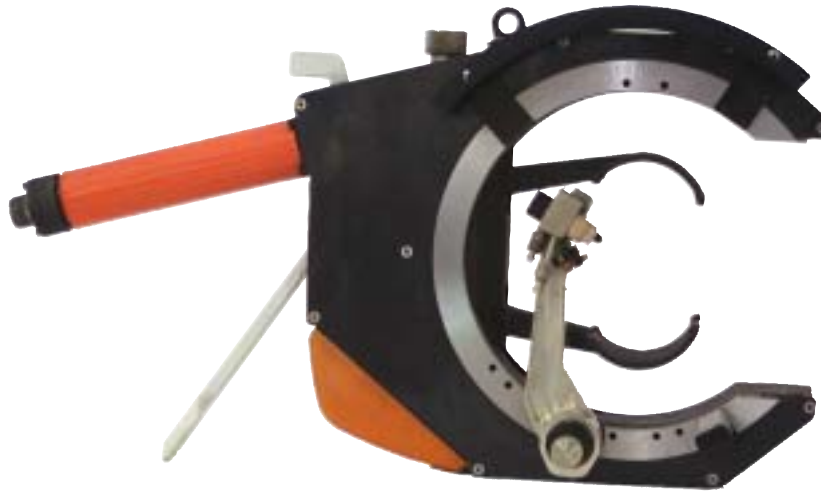
- *Hand-held or panel mount pendant included with Controller*
- *The operator can easily start and stop the weld from the portable, lightweight pendant. Custom controls can be added to the pendant for additional equipment control*

Precision Weld Heads



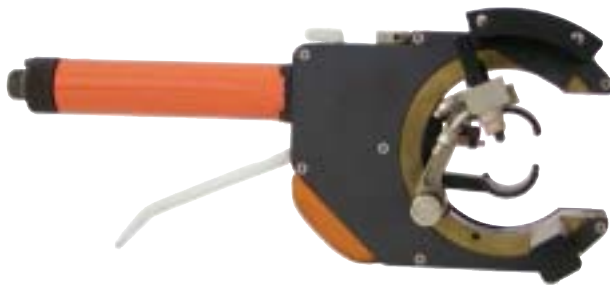
AP 140-220

Tube Dia. Range: 5 1/8" to 8 5/8"
Weight: 33.07 lbs
Current Rating: 250A/100%
Rotational Speed: 0.03 - 0.57 rpm.
Radial Clearance: 5.71" - Dia. / 2
Axial Clearance: 4.0"
Max Dimensions: 23.5" x 5.7" x 15.6"



AP 71-160

Tube Dia. Range: 2 7/8" to 6 1/4"
Weight: 25.35 lbs
Current Rating: 250A/100%
Rotational Speed: 0.04 - 0.62 rpm.
Radial Clearance: 3.15" - Dia. / 2
Axial Clearance: 4.0"
Max Dimensions: 20.9" x 5.7" x 13.2"



AP 36-80

Tube Dia. Range: 1 1/2" to 3 1/8"
Weight: 9.04 lbs
Current Rating: 250A/100%
Rotational Speed: 0.1 - 1.2 rpm.
Radial Clearance: 2.17" - Dia. / 2
Axial Clearance: 3.25"
Max Dimensions: 16.3" x 4.6" x 7.8"



AP 18-40

Tube Dia. Range: 3/4" to 1 1/2"
Weight: 4.85 lbs
Current Rating: 250A/100%
Rotational Speed: 0.15 - 2.3 rpm.
Radial Clearance: 2.17" - Dia. / 2
Axial Clearance: 2.5"
Max Dimensions: 13.4" x 3.7" x 4.3"



TS 12-90

Tube Dia. Range: 1/2" to 3 1/2"
Weight: 10.3 lbs
Current Rating: 200A/100%
Rotational Speed: 0.3 - 4.5 rpm.
Wire Feed Speed: 0 - 60 ipm.
Wire Diameters: 0.025 - 0.045
Max Dimensions: 15.5" x 3.9" x 6.5"

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