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Nippon Avionics Co., Ltd.

<http://www.avio.co.jp/english/>

High Reliability Welding of Aluminum Wires to Copper Terminals Ultrasonic Metal Welder SW-3500-20/SH-H3K7

Welds Copper/Aluminum Harnesses, Bus Bars, and Foil Laminates



Nippon Avionics Co., Ltd. (Head office: Shinagawa-ku, Tokyo, Japan; hereinafter referred to as "Avio"), a subsidiary of NEC Corporation, is proud to announce today's release of **Ultrasonic Metal Welder SW-3500-20/SH-H3K7**. This welder uses ultrasonic vibration to weld metallic materials such as copper and aluminum. These materials are used for manufacturing harnesses, secondary batteries and motors for the automotive industry, where the shift to lighter materials and improvement in electronics are accelerated in response to expanding market demand for eco-friendly cars.

Avio is the only comprehensive manufacturer of micro joining products in the world (*) offering four (4) types of micro joining solutions, including "Resistance welding", "Laser welding", "Pulse heat (hot bar/reflow) soldering" and "Ultrasonic welding". Avio provides the most suitable joining solution to meet the customer's needs by proposing a micro joining solution which meets the customer's requests of welding shape, size, strength and external appearance; also by proposing a compound joining solution which combines plural joining solutions.

With the global environmental/energy issue as a backdrop, power storage/distribution technology has become more important in recent years. As a result of the progress of motorization, welding techniques of aluminum and copper, which are the main material of power storage parts (battery, capacitor) and power distribution parts (harness, bus bar), become important especially in the automobile industry. In addition, harness material has been replaced from conventional copper to aluminum to improve fuel efficiency due to its lightweight and reduction of the material cost. Hence there is a large increase in aluminum wire to copper terminal welding requirements.

As new Avio Ultrasonic Metal Welder adopts a synchronization method to keep the pressure stable by using a spring, the slip of the tool and work is reduced during the welding of aluminum wire with large deformations and enables a steady welding.

Avio, with the introduction of the new Ultrasonic Metal Welder, has expanded the selections of the most suitable micro joining solution for welding aluminum and copper which also include Avio's conventional resistance welders and laser welders.

* As of November 2014, according to our own research.

<Benefits of Welding Applications by Using Avio's New Ultrasonic Metal Welder>

Aluminum Wire Harness

- Aluminum Wire × Copper Terminal

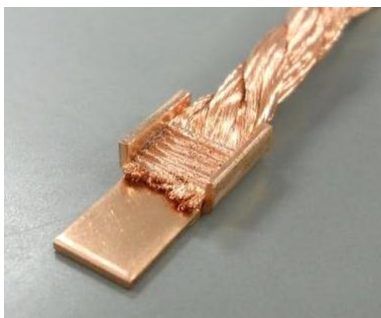


[Benefits]

- Copper wires can now be replaced by the aluminum wire
- Weight reduction – Aluminum wire is 1/2 the weight of copper wire of the same electrical capacity.
- Improvement in fuel efficiency
- Cost reduction - Aluminum wire is cheaper than the copper wire.

Copper Wire Harness

- Copper Wire × Copper Terminal



Bus Bar

- Aluminum Bus Bar × Copper Bus Bar



Compacting of Stranded Copper Wire



[Benefits]

- Preventing the unraveling of wire bonding improves micro joint reliability.

Secondary Battery, Capacitor, Multi-layer Weld with

60 Pieces of Cu Foils



[Benefits]

- Multi-layered foil enables larger power storage capacity.
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<New Product Features>

Highly reliable welding and quality control management functions improve yield rate and quality.

■ **High Reliability Welding**

1. Spring Pressure Sync Mechanism

By adopting a sync spring press mechanism on the ultrasonic head, the resulting pressure response suppresses slip between the horn and workpiece to improve welding stability.

2. High Rigidity Pressure Mechanism

By adopting a pressure mechanism with high rigidity, the deflection is small even at a high pressure and the welding surface pressure can be kept even.

3. Automatic Tuning Hold Master Oscillator System (ATHMOS)

Avio's unique ultrasonic oscillation control technology stabilizes ultrasonic vibration amplitude even during application of large loads. ATHMOS is ideal for applications requiring high output current and high load.

4. High Performance Depth Control

A one (1) μm resolution linear scale detects sinking displacements of the work and work height. Oscillation control interlocked with the depth detection value is also available.

5. Four (4) Types of Oscillation Control Methods

The optimal Oscillation Control method is selected among Timer (time), Depth (Sinking amount of the work), Height (Work height) and Energy (Applied energy), depending on the application.

■ **Quality Management Function / Operation Function / Communication Function**

1. Quality Management Using a Monitor Function

Ultrasonic peak output, ultrasonic energy, the sinking amount of the work, and the work height are graphically displayed and monitored for making good or bad judgments of the welding process.

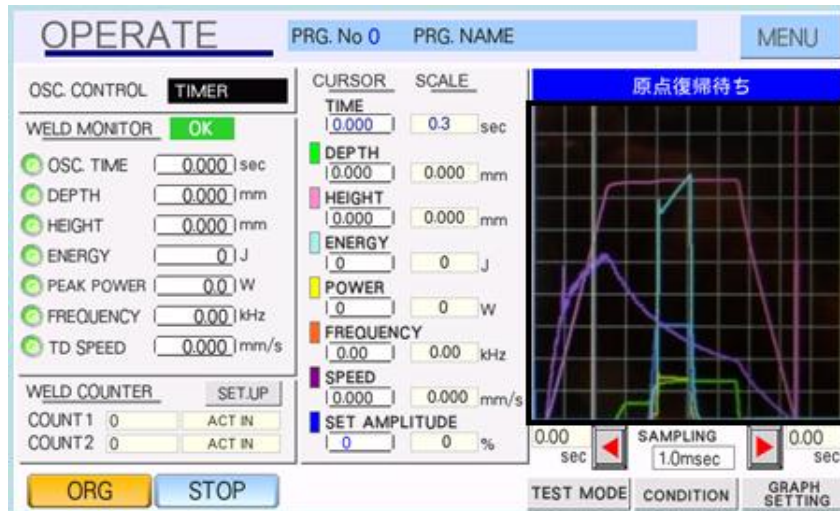
2. Simple Operation, Easy-to-Read Display

A seven (7) inch wide, color LCD touch panel allows intuitive operation. Results are viewed on the large color graphic LCD display.

3. Serial Communication (RS-232C)

Input of weld condition from an external device, such as a personal computer, and output of monitor value and judgment result to an external device is provided and compatible with quality control and automation.

<Operation Screen>



<Specifications>

	Feature	Avio Model SW-3500-20/SH-H3K7 Specification
Ultrasonic Generator	Model	SW-3500-20
	Maximum Output Power	3,500W
	Nominal Frequency	20kHz
	Oscillation Method	Automatic Tuning Hold Master Oscillator System (ATHMOS)
	Amplitude Adjustment	Variable (30 - 100%, 1% step)
	Control Mode	Time/Depth/Height/Energy
	Monitor	Time/Depth/Height/Energy
	Interface	I/O, RS-232C
	Power Source	3Φ AC200V
	Dimension	W250 x D450 x H375mm
	Weight	20kg

Ultrasonic Head	Model	SH-H3K7
	Pressure Follow-up Mechanism	Spring + Air
	Adjustable Pressure Range	1,700 N to 3,700N
	Stroke	50mm
	Supply Air Pressure	0.5MPa (Clean, Dry Air)
	Dimension	W380 x D600 x H935mm
	Weight	102kg (Horn and Anvil excluded)

<Free Sample Welding>

Avio offers free sample welding service performed by experienced, precision weld engineers so the customer can verify the performance of the Ultrasonic Metal Welder applied to their own sample. Please feel free to apply for this service.

For Questions Regarding the Above or the Request a Free Sample Weld Service, Please Contact:

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Incorporation: April 8, 1960
Paid in Capital: 5,895 million yen
Objectives: Manufacture and sales of data processing systems, micro joining equipment, electronic devices, infrared thermal camera, and industrial measuring instruments
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