AMADA

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TECHNICAL APPLICATION BRIEF

High Frequency Inverter Feedback Modes

GENERAL:
Controlling weld energy is a critical part of successful resistance welding. Repeatable weld energy provides for consistent welds. Amada Miyachi High Frequency Inverters offer a choice of three different feedback modes for controlling the weld energy: CONSTANT CURRENT, CONSTANT VOLTAGE and CONSTANT POWER. This Nugget will explain the difference between the three feedback modes and will help you to select the appropriate feedback mode for your application.

BACKGROUND:
The heat generated at the weld increases or decreases in direct proportion to the power applied to the weldments. An increase in power results in an increase in heat.

Amada Miyachi's High Frequency Inverters, including models HF2 and HF25 use an internal pick-up coil to measure the weld current. To measure the weld voltage, pick-up cables must be connected to the welding electrodes. Weld power is calculated as the product of weld current and weld voltage.

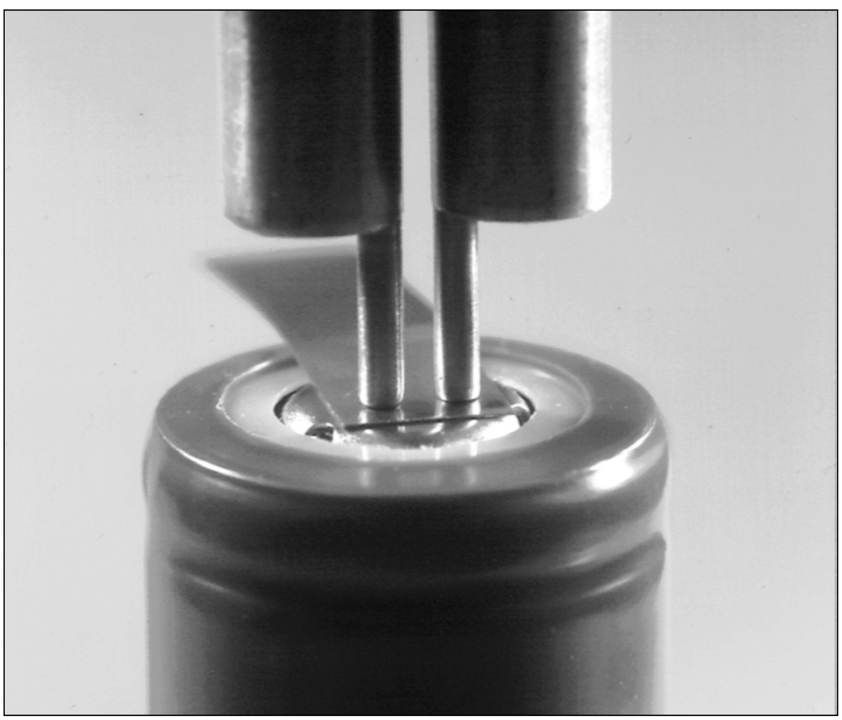

Figure 1: Nickel battery tab to nickel plated cold rolled steel battery cap using Constant Current mode. HF2 Power Supply, X11/4000A Transformer, 88A/24 Weld Head.

FEEDBACK MODES:
CONSTANT CURRENT can be used for 75% of all applications. It is the easiest to set up and install because no voltage pick-up leads are required. In the constant current mode, the same amount of current is passed through the parts for every weld. Weld strength will not be affected by small variations in part thickness. It should be used when welding flat parts together where the part-to-part contact and electrode-to-part contact is consistent. A typical constant current application is a nickel battery tab to a nickel plated cold rolled steel battery cap (Figure 1).

CONSTANT VOLTAGE should be used for welding non-flat parts where the electrical resistance changes dramatically during the weld. This can happen if the part-to-part or electrode-to-part contact area varies considerably during the weld. For instance, when welding round wires together, the contact resistance starts out high, but quickly decreases as the wires deform. As the parts melt, the resistance again increases due to the increase in the temperature of the wire. With constant voltage, the weld power (heat) will start out low, increase as the wire deforms, and decrease again as the temperature increases during the weld. Constant voltage is also preferred for welding non-flat parts where the electrode-to-part contact area can vary. An example of this is a stainless steel coil to a stainless steel tube (Figure 2).

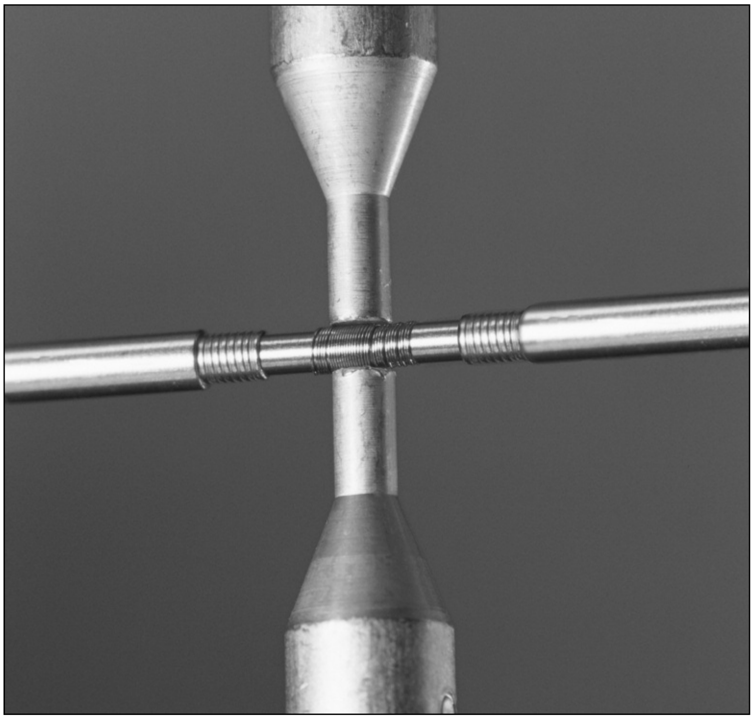

Figure 2: Stainless steel coil to stainless steel tube using Constant Voltage mode. HF25 Power Supply, Series 300 Weld Head.

CONSTANT POWER will compensate for changes in electrical resistance from weld to weld. This can be helpful in automated systems where the electrode heats up or excessive plating builds up on the electrode face over time. Plating build-up causes an increase of the electrical resistance at the electrode-to-part interface. This increase in resistance would cause sticking and part blow-outs if the power were not controlled. Consistent weld power results in consistent weld heat. This mode is very useful for welding a tin plated copper terminal to a tin plated brass terminal (Figure 3).

SUMMARY:
The three feedback modes for Amada Miyachi High Frequency Inverters are Constant Current, Constant Voltage, and Constant Power. Constant Current requires no voltage pick-up cables and can be used for 75% of all applications. Constant Voltage should be used for welding non-flat parts and applications where the electrical resistance changes dramatically during the weld. Constant Power can compensate for plating build-up on the electrodes and changes in electrical resistance from weld to weld.

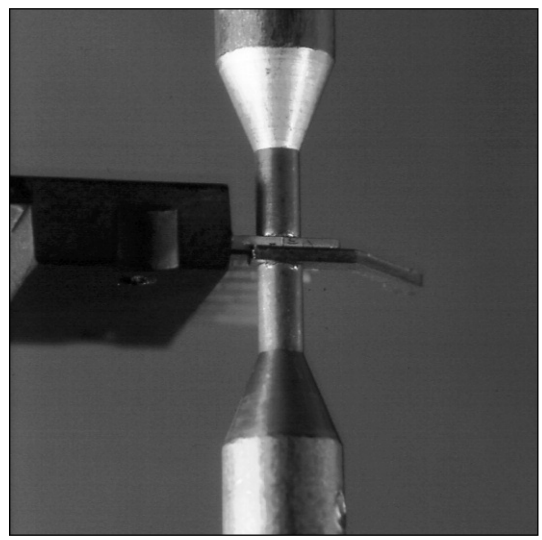

Figure 3: Tin plated brass terminal to tin plated copper terminal using Constant Power mode. HF2 Power Supply, X11/4000A Transformer, Series 300 Weld Head.

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