

# resistance welding

# HF27 / HF25 High Frequency Welding Control

## CONTROL FEATURES:

- Constant current, voltage, and power modes
- Monitors energy and resistance
- 2400A maximum
- 25kHz feedback

## WELD QUALITY PROCESS TOOLS:

- Active Part Conditioning (APC)
- Pre-Weld Check
- Weld to Limits

## HF27 ADVANCED FEATURES:

- **Displacement and force monitoring**
- **Force control**
- **Envelope function**
- **Combo mode**
- **Energy and time limits**



## High Reliability Microjoining

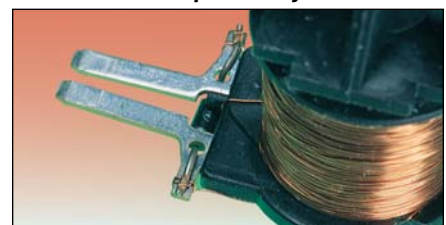
The HF Series High Frequency Weld Controls address the challenges of microjoining for a wide range of applications. Precise control of weld energy with high speed closed loop feedback and weld quality tools ensure high yields for the most demanding welding applications.

The weld control is also geared for automation with exceptional repetition rates, standard I/O connections and remote program capability.

## TYPICAL APPLICATIONS



*Lamp assembly*



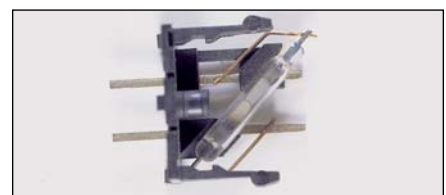
*Anti-lock brake system solenoid*



*Critical parts fabrication*



*Implantable device interconnects*



*Switch assembly*

# Intuitive, Easy-to-Use Programming



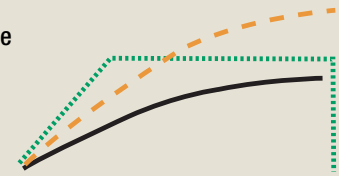
- Intuitive graphical user interface.
- Dual pulse waveforms programmed in current, voltage, or power control modes.
- Programming times to 100 μsec increments provides ultimate control.
- Accurate, built-in monitor displays the graphical “trace” of weld current, voltage, power and resistance, along with numerical peak and average values.
- Easy-to-set limits establish process window for acceptable quality.
- User programmable relays can be used in conjunction with visual and audible signals for operators and automation interface.

# Current, Voltage and Power Feedback Modes:

**Constant Voltage:** ..... (green dotted line)

- Compensates for parts misplacement and force problems
- Reduces weld splash
- Ideal for round (non-flat) parts

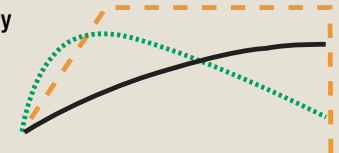
*Monitor current*



**Constant Power:** - - - - (orange dashed line)

- Varies current and voltage for consistent energy
- Breaks up surface oxides and plating
- Ideal for automation to extend electrode life

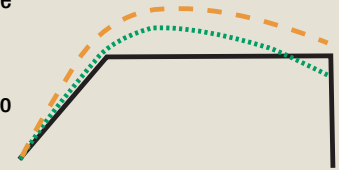
*Monitor current or voltage*



**Constant Current:** \_\_\_\_\_ (solid black line)

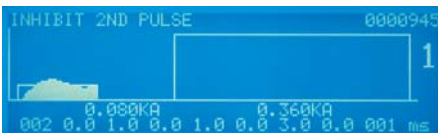
- Delivers same current regardless of resistance changes
- Compensates for part thickness changes
- Ideal for flat parts with consistent electrode to part fit-up

*Monitor voltage*

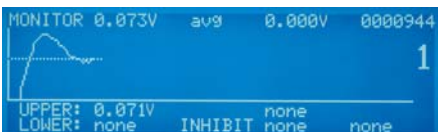


# Effective Weld Monitoring and Process Tools

## Pre-Weld Function



Run Screen – Shows that 2nd Pulse was inhibited from firing.



Monitor Screen – Shows 1st Pulse weld voltage exceeded limit.

Sends an initial short, low energy pulse through the assembly, tests key electrical parameters against pre-set limits, and inhibits operation if limits are exceeded.

### Advantages

- Prevents unacceptable welds.
- Prevents electrode damage.
- Alerts operator to weld fault.
- Relay outputs can signal automation.

## Active Part Conditioner (APC)



Run Screen – Constant power first pulse breaks through oxides.



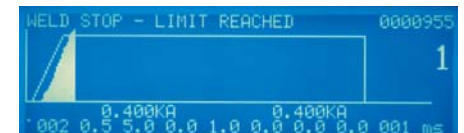
Monitor Screen – First pulse time automatically compensates for varying levels of oxides.

First pulse adapts weld time to displace oxides then terminates allowing a second pulse with upslope to complete the weld, thus avoiding weld splash.

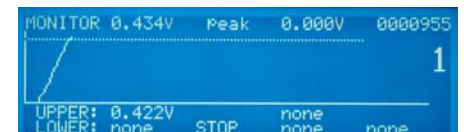
### Advantages

- Brings each part to the same resistance prior to application of welding current.
- Provides for consistent welding of difficult-to-weld oxidized parts.
- Prevents weld splash.
- Increases process yields.

## Weld Stop



Run Screen – Shows termination of weld current during weld pulse.



Monitor Screen – Shows weld voltage exceeding limit.

Terminates the weld energy during the welding process if pre-set weld current or voltage limits are exceeded.

### Advantages

- Prevents blow-outs and parts damage.
- Prevents electrode damage.
- Alerts operator to weld fault.
- Relay outputs can signal automation.



# SPECIFICATIONS

Model Number	HF25/240	HF25/400	HF25/480	HF27/240	HF27/400	HF27/480
Nominal Line Voltage (3 phase)	240 VAC	400 VAC	480 VAC	240 VAC	400 VAC	480 VAC
Line Voltage Range (VAC)	192 to 264	320 to 440	384 to 528	192 to 264	320 to 440	384 to 528
Input Circuit Rating (per phase)	25A	20A	13A	25A	20A	13A
Input KVA @ 3% duty cycle	30KVA					
Output KW @ Max. demand	12KW					
Output Transformer Voltage @ Max. Rated Output Current	5.2V					
Open Circuit Max. Output Voltage @ Nominal Line	11.5V					
Setting Ranges	Current – 100A to 2400A; Voltage – 0.2V to 10V; Power – 50W to 10kW					
Output Current	2400A @ 3% duty cycle					
Output Feedback Response Time (Current, Voltage, Power)	40 Microseconds					
Output Regulation versus Line Voltage Variance	2%					
Output Regulation versus Load Resistance Variance	2%					
Output Repeatability Current, Voltage, Power ± of Setting	2%					
Weld Period Ranges	All segments except squeeze and hold 0.10ms to 10ms, 0.1ms steps; 10 to 99ms, 1ms steps; squeeze and hold 0 to 999ms, 1ms steps					
Weld Energy Setting Accuracy	Current: 2% of setting or 2A, whichever is greater; Voltage: 2% of setting or 0.050V, whichever is greater; Power: 5% of setting or 20W, whichever is greater					

## FEATURES

Weld Heat Profile Functions	
Weld Pulse Control	Dual pulse with independent control of current, voltage, power or combo mode (HF27) on each pulse.
Programmable Weld Pulse Segments	Squeeze, upslope 1, weld 1, downslope 1, cool, upslope 2, weld 2, downslope 2, hold.
Weld Schedule Memory	Save up to 100 different weld schedules, protected from unauthorized changes.
Measurement Parameters	Independent monitor of current, voltage, power, and resistance on each pulse. Envelope, time limits and energy monitor (HF27).
Graphic Display	Back-lit LCD displays programmed and actual weld current, voltage or power, upper and lower limits, and resistance.
Measurement Selection	Peak or average
Current Measurement Range/Accuracy	50.0A to 2.400KA/±2% of reading or ±2A, whichever is greater.
Voltage Measurement Range/Accuracy	0.2V to 9.999V/±2% of reading or ±0.05V, whichever is greater.
Power Measurement Range/Accuracy	0.01KW to 9.999KW/±5% of reading or ±20W, whichever is greater.
Alarms	Display alert, four user programmable AC/DC relays; audio alarm.
Programmable Weld Energy Limit	Terminates weld energy when exceeding user defined current, voltage, or power limits.
Weld Pre-Check	Inhibit second weld pulse when first test pulse exceeds user programmed limits.
Active Part Conditioner	First pulse current limit in constant power allows second pulse to fire.
I/O and Data Communications	
Input	All inputs and outputs are fully isolated.
Control Voltages	Selectable: +5V, +24V, sourcing or sinking inputs.
Firing Switch Initiation	1-level foot switch, 2-level foot switch, mechanical or opto firing switch.
Remote Control	Remote weld schedule select, process inhibit, emergency stop.
RS232	Change weld schedules and individual parameters.
RS485	Change weld schedules and individual weld parameters; "Daisy Chain" unit to unit, unit(s) to host computer.
Electrode Voltage	Weld voltage signal for voltage feedback operation (0 to 10V peak).
Weld Head Air Valve Driver	24 VAC, 1A; timing controlled by HF25/HF27. Operates new EZ-Air.
Alarm Relays	Four user-programmable mechanical relays; programmable normally open or normally closed; contacts: 250 VAC at 5 A; 30 VDC at 5 A. Conditions: weld, end of weld, alarm, out of limits.
Displacement Option (HF27 only)	
Capabilities	Part detection, final thickness measurement, set down measurement, energy stop (weld to limit)
Accuracy of Displacement Readings Inches (mm)	± .003 (0.076)
Repeatability	± 1.0 %
Maximum Travel Inches (mm)	1 (25)
Alarm Relays	Additional conditions: Any LVDT, initial Lo/Hi, final Lo/Hi, displacement Lo/Hi, initial NG, displacement NG, energy stop
Data Output	Initial thickness, final thickness, displacement, and any alarm condition
80DSPK	Attaches to Miyachi Unitek Series 80 weld heads. Includes LVDT, interface cable, and mount
Force Control and Monitor (HF27 only)	
Force Input	0-10V input signal from signal conditioner or load cell
Force Measurement	End of squeeze, end of hold
Force Output	0-10V for use with proportional valve
Force Programming	lbs, kg, N. force can be stored b schedule
Physical Characteristics	
Dimensions (L x W x H) Inches (mm)	18 x 9 x 12.8 (460 x 230 x 325)
Weight – Lbs (Kg)	54 (25)

## ACCESSORIES ORDERING GUIDE

Included Accessories	All models listed above include: Control weld cable bolts, rear panel Phoenix connectors, voltage sense cable, manual, CE safety sheet.
Required Accessories	Weld head; Foot switch or Foot Pedal.
Optional Accessories	Weldstat software for data communication for HF27/HF25. Microscope. Built-in displacement option on HF27 includes software, requires LVDT, interface cable, and mount for Series 80 weld head (P/N 80DSPK). Load cell and proportional valve per specific weld head model.

Your Local Representative



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