



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 micro-joining 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.

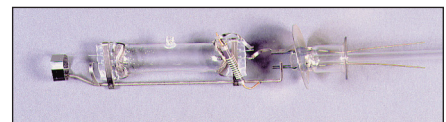


Critical parts fabrication

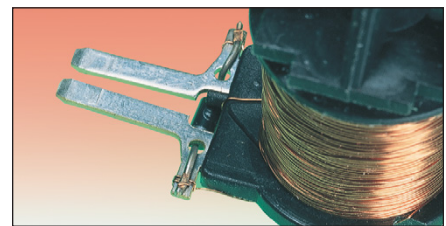


Implantable device interconnects

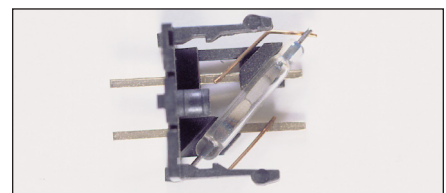
TYPICAL APPLICATIONS



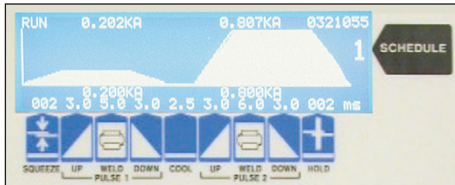
Lamp assembly



Anti-lock brake system solenoid



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:

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

Monitor current

Constant Power: - - - - -

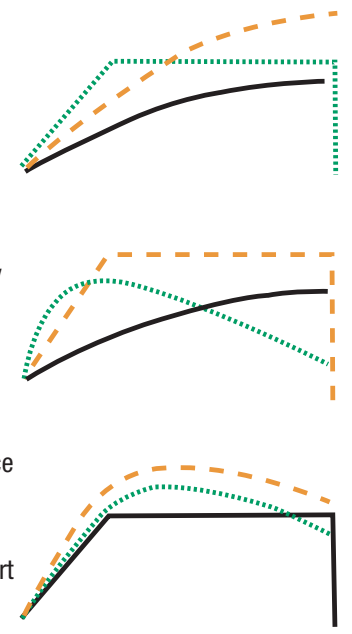
- Varies current and voltage for consistent energy
- Breaks up surface oxides and plating
- Ideal for automation to extend electrode life

Monitor current or voltage

Constant Current: —————

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

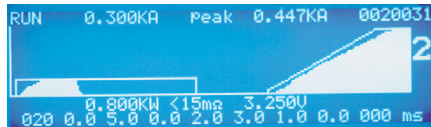
Monitor voltage



EFFECTIVE WELD MONITORING AND PROCESS TOOLS



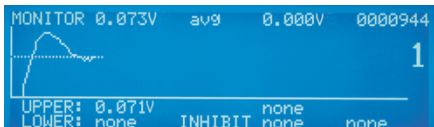
Run Screen – Shows that 2nd Pulse was inhibited from firing.



Run Screen – Constant power first pulse breaks through oxides.



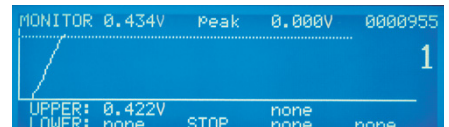
Run Screen – Shows termination of weld current during weld pulse.



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



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



Monitor Screen – Shows weld voltage exceeding limit.

PRE-WELD FUNCTION

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)

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

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.

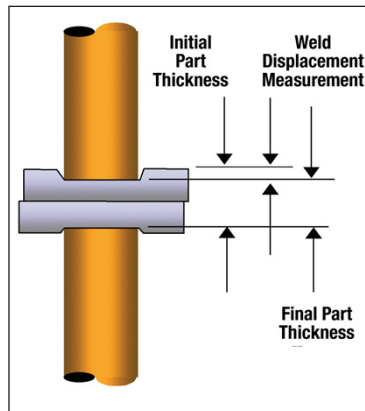
HF27'S ADVANCED PROCESS FEATURES

A New Generation of Weld Control Precisely Controls and Monitors Electrical and Mechanical Weld Parameters.

Displacement

- Initial Thickness (Part Detection)
- Final Thickness
- Weld Displacement (Set Down)
- Energy Stop (Weld to Limit)

Measurement of initial part thickness can confirm parts are present and aligned for welding. Settings limits on the mechanical displacement can confirm the electrical parameters have produced the correct part displacement and can also prove a good indication of weld quality.



LVDT provides vital process data.

```

LVDT POSITION +430 0000276
          LO LIM HI LIM LAST
INITIAL  +048 058 +054 STOP 1
FINAL    +000 +000 +047
DISPLC   +000 000 +007 13.0%
STOP ENERGY AT 004 IN/1000
NEW ELECTRODE: IS SET
SOURCE edit, RUN Run
    
```

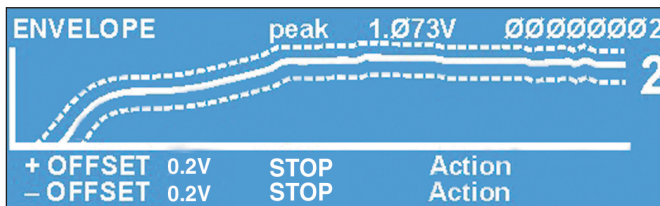
LVDT Screen – Program limits and view results.

```

< LVDT WHEN >
1. ANY
2. INITIAL LO
3. INITIAL HI
4. FINAL LO
5. FINAL HI
6. DISPLACEMENT LO
7. DISPLACEMENT HI
8. INITIAL NG
9. DISPLACEMENT NG
0. STOP ENERGY AT
Select, Previous menu
    
```

Program relay outputs to signal automation.

Envelope



The **Envelope Limits** enables upper and lower limits to be placed around an optimized weld signature. Any deviation across the envelope results in an alarm, and a specified action. This feature can detect even slight changes in the process that could lead to inconsistent welds. This high level of verification is preferred in many medical device and automotive welding applications, which must meet strict process control and quality requirements.

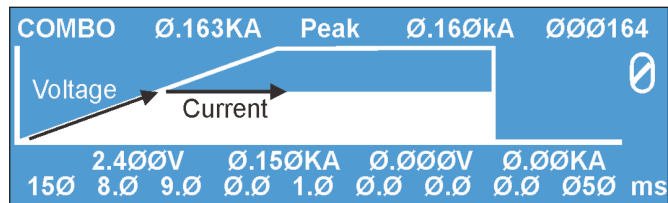
ADVANCED CONTROL MODES

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< FORCE & LIMITS >
PROP VALVE OUTPUT FORCE : 013.5 LBS
LAST WELD LIMITS
START : 013.7 LBS LOW : 013.4 LBS
END : 013.7 LBS FIRE : 013.5 LBS
HIGH : 014.0 LBS
ACTION: CONTINUE
    
```

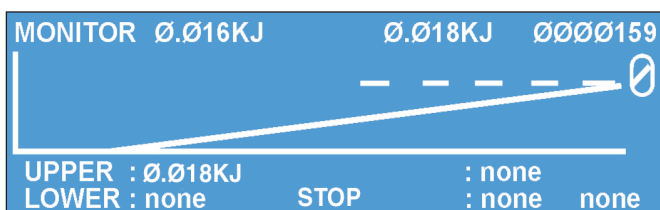
Force Control is accomplished using a proportional valve to set the air pressure on a pneumatic weld head. Force settings are schedule dependent, matched to different applications. Force Control can increase production rates by reducing down time and improving cycle times in automated systems.

The **Force Monitor** through a weld head mounted load cell eliminates the time consuming task of repeatedly verifying electrode forces on production lines with multiple welding stations.



The **Combo Function** allows a weld to be initiated in voltage or power mode, then switch to constant current when a preset limit is reached. The combo mode can reduce the occurrence of weld splash and over-melting of the parts. Typical applications for the Combo Mode include wire welds, tang welds, and motor fusing.

EXPANDED MONITORING OPTIONS



The **Weld Energy Monitor** calculates the energy in Joules that is delivered to each weld. This feature indicates changes in weld energy, and is typically implemented for operator dependent, manual welding stations where part fit-up can vary.

```

< TIME CUT OFF >
LO LIM HI LIM LAST
P1 026.0 ms 030.0 ms 028.0 ms
P2 030.0 ms 034.0 ms 032.0 Ms
    
```

Arrows to select field, **RUN** or **MENU**

Time limits can be programmed when welding to displacement or electrical limits. Monitoring the actual weld time can ensure consistency, adding an additional safety net to the weld process.

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

ORDERING GUIDE

Included Accessories Required Accessories Optional Accessories	All models listed above include: Control weld cable bolts, rear panel Phoenix connectors, voltage sense cable, manual, CE safety sheet. Weld head; Foot switch or Foot Pedal. 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.
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