

BRANSON

2000 SERIES

Ultrasonic Assembly Systems

2000f/aef

GENERAL DESCRIPTION

Branson introduces the 2000f/aef ultrasonic assembly systems, setting a new standard for users who want to optimize welding results utilizing force and/or amplitude stepping. Conventional welding modes, including distance, time, energy, energy compensation, or peak power, are included. Multiple modes are valuable for applications requiring a high level of process control and weld quality.

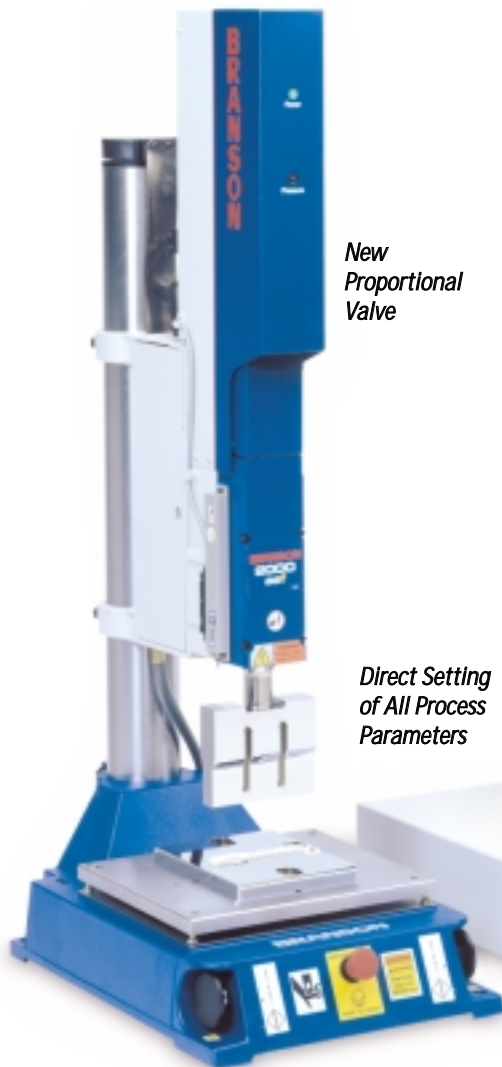
The 2000f/aef systems feature digital force setting, force stepping, and digital velocity control. Also included is new, improved power supply technology with Branson's patented closed loop circuitry, providing enhanced performance, consistency, and reliability.

The 2000f/aef includes a user interface with a 4-line vacuum fluorescent display designed for ease of use in setup, operation, and troubleshooting. The system also has enhanced data capabilities for information configuration and management.

The 2000f/aef systems are available in 20 KHz, 30 KHz, and 40 KHz. The power supplies have increased power output for 20 and 40 kHz frequencies: 20 kHz units are rated at 1100, 2200, and 3300 Watts; and 40 kHz are available in 400 and 800 Watts. 30 kHz is available in 1500 Watts.

The 2000f/aef system is designed for use in manual, semi-automated, or fully automated environments. The actuator may be mounted directly to a machine frame, with a fixed support on a column and hub, or as a stand-alone system on a base with ergonomic light-force palm button switches.

- ✓ *Force Control*
- ✓ *Force Stepping*
- ✓ *Downspeed/ Velocity Control*
- ✓ *Amplitude Stepping*
- ✓ *Data Management*



*New
Proportional
Valve*

*Direct Setting
of All Process
Parameters*

Applied
Technologies
Group

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welding • staking • insertion • swaging • forming • spot welding • degating • cutting & sealing

KEY FEATURES

Note: items in blue are unique to the 2000f/aef systems.

User Interface/Process Controls

- **New user interface featuring 4-line vacuum fluorescent (VF) display** makes setup, operation, diagnostics, and troubleshooting easier.
- **All operating parameters are set through the operator interface**, including weld force(s), hold force, and actuator down speed.
- **All settable parameters are saved to a preset** – no manual adjustment of controls required.
- **Closed loop pressure control** achieved with proportional valving.
- **Rapid traverse** feature provides option of increased downspeed of the actuator to a set distance for faster cycle rates when using slower downspeed for welding.
- **Digitally settable downspeed.**
- **Force stepping:** three discrete levels available – two during weld, and one at hold.
- **Force ramps** allow for optimization of force build-up.
- **1 ms sampling rate of data** provides superior performance, consistency, and finer control.
- **Multiple welding modes** including distance (collapse and absolute), time, energy, and peak power. Distance can be set in increments of 0.0001 inch. Energy is settable in increments of 0.1 joule. Peak power can be set in increments of 1%.
- **Force measurement capability** — set trigger force, and measure force for consistency and troubleshooting.
- **Force calibration** to compensate for variations in stack weight.
- **Amplitude Stepping** — Branson's patented real-time process control provides increased strength, control of flash, reduction of particulate, and reduced residual stress.
- **Expanded process control limits**, including distance (absolute and collapse), and energy compensation, provide more choices in application setup.
- **Expanded quality monitoring limits** to identify both “suspect” and “reject” parts.
- **Built-in digital amplitude control** - for fine tuning of critical applications, because amplitude is the most important variable in ultrasonic welding. The setting has a range of 10% to 100% in 1% increments.
- **Text alarm messages** for ease of troubleshooting, with links to additional information, and easy alarm correction.
- **Self-diagnostics and monitoring** - visual, audible, and logic output alarms.
- **Built-in frequency and memory bargraph** diagnostics for simplified troubleshooting of the converter/booster/ horn stack.
- **Nonvolatile storage of cycle parameters.**
- **Alarm and cycle counters** are built in for tracking production; works via a real time clock.
- **Built-in ground detect** with scrub time to increase tooling and converter life in cut and seal applications.
- **Selectable pretriggering** — including pretrigger by distance.



- **Printing capability** - Provides a record for future comparison and validation. Printout of last 50 cycle weld history. Power, frequency, amplitude, collapse, distance, velocity, and force graphs can be printed.
- **Password protection** feature for lock-out of unauthorized process changes once the equipment is set up for a specific application.
- **Optional monitor** for ease of setup and cycle information display.

Power Supply

- **Line / Load Regulation** - Corrects for variations due to power line fluctuations and varying load conditions through Branson's patented closed-loop amplitude control. Output amplitude is maintained with a variation of only $\pm 2\%$ with line voltage fluctuations of $\pm 10\%$, regardless of load. It ensures constant power in welding, and provides greater weld consistency and reliability.
- **Autotune plus Memory (AT/M)** - Provides fully-automatic tuning in a range of ± 500 Hz centered around 19.950 kHz for 20 kHz horns, ± 750 Hz centered around 30 kHz for 30 kHz horns, and ± 1000 Hz around 39.900 kHz for 40 kHz horns, and stores horn frequency at the end of each weld.
- **Selectable Starting Ramp** - Four selectable start rates—10, 35, 80, 105 milliseconds—to accommodate starting characteristics of a wide range of horns. This feature makes it easier to start more difficult horns or enables faster cycle rates.
- **Auto Seek** automatically measures stack frequency and stores it in memory. Four selectable Auto Seek choices are available:
 1. Externally with automation controller
 2. Depressing “test” switch
 3. By once/minute timer to track heating, cooling, and other effects
 4. Post weld seek.
- **System Protection Monitor (SPM)** Five levels of power supply protection are provided:

2000f/aef

2000 SERIES PRODUCT/PERFORMANCE ENHANCEMENTS

The following chart gives a comparison of the new 2000f/aef system with current 900 Series products. The benefits of the new features are highlighted.

900MA/AES	2000f/aef	Benefits
<i>Power levels</i>	<i>Increased power levels</i>	
20 kHz - 1000, 2000, 3000	20 kHz - increased to 1100, 2200, 3300	Higher available power for faster weld cycles
40 kHz - 700	40 kHz - increased to 400, 800	Higher available power for faster weld cycles
	30 kHz - new frequency, 1500 Watts	Higher power at higher frequencies; expands application range for delicate parts.
Single line VF display	Four-line VF display	More information visible; easier setup
Printing: setup and single line data	Printing: expanded setup and single line data	Easier setup and troubleshooting
Power, velocity, and force graphs	Power, velocity, force, frequency, amplitude, and distance graphs	Easier troubleshooting
20 presets	10 namable presets; preset downspeed, force, and hold	Ease of setup
Process alarm limits	Part monitoring limits: suspect and reject	Enhanced process monitoring
Alarm messages	Additional alarm messages, with specific support information	More specific information for easier troubleshooting and corrective action
Optional amplitude stepping	Built-in patented amplitude and force stepping	Increased strength of welds, control of flash, reduction of particulate, reduced residual stresses.
Weld by distance (absolute, collapse)	Distance mode: absolute, collapse, step amplitude or force at a distance	Enhanced use of distance function, enhanced process control
Multi-turn down speed control	Set through front panel	Easier to set up, easier to duplicate prior setup
Force set via pressure gauge/regulator	All force related parameters set via interface	Ease of use
	Digital amplitude setting with range of 10-100%	Fine tuning of critical applications
	Single 20 kHz converter at all power levels with 20% higher converter output amplitude	Eliminates setup errors, faster weld cycles
	Reporting of weld force	Additional weld data for SPC, troubleshooting
	Built-in force and pressure calibration capability	Satisfies agency requirements (e.g., FDA)
	User configurable password protection	Lock out unauthorized process changes

1) phasing, 2) over voltage, 3) over current, 4) over temperature, and 5) power. The benefits of this circuitry are to avoid equipment failures, and to provide greater weld accuracy and repeatability.

- **Automation interface** is available for direct hookup with PLCs and PCs. Required automation I/O's are provided through a 24V DC logic interface. Signals include weld on, general alarm, and external reset.

Actuator

- **Proportional valve with closed loop pressure control.**
- 4" diameter, 1/2" wall column for increased rigidity.
- **Faster actuator return speed**, not influenced by force/downspeed settings.



- Setup "dump" valve with soft start.
- **Linear optical encoder** measures weld "distance" enabling welding by specific part collapse (meltdown), or to a finished part height (absolute). Resolution on the encoder is 0.0001 inch.
- **A force transducer** provides digital setting of the Dynamic Trigger and allows the user to print out force data and graphs for performance evaluation and troubleshooting.
- **Precision system regulator** with 5 micron particulate and 0.5 micron coalescing filters
- **Pressure transducer** accurately monitors and displays system pressure.
- **A single 20 kHz converter** is used for all 20 kHz power supplies. This converter produces 20% higher output amplitude for faster weld cycles.
- **Converter cooling** - Cooling air is directed into the converter during each operating cycle.
- **Two air cylinder sizes** are available for better control of clamp force; sizes include: 2.0 and 3.0 inches. Two system pressures for force control: 60 and 80 psi.
- **"Horn down" function** enables ease of horn/fixture alignment.
- Electrical and air on indicators.

2000f/aef

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All units are CE compliant, and comply with FCC rules and regulations governing radio frequency interference.

SPECIFICATIONS

2000f Power Supply	20:1.1	20:2.2	20:3.3	30:1.5	40:0.4	40:0.8
Output power:	1100 Watts	2200 Watts	3300 Watts	1500 Watts	400 Watts	800 Watts
Line voltage:	117 V AC * 50/60 Hz, 1Ø	200-240 V AC 50/60 Hz, 1Ø	200-240 V AC 50/60 Hz, 1Ø	117 V AC * 50/60 Hz, 1Ø	117 V AC * 50/60 Hz, 1Ø	117 V AC * 50/60 Hz, 1Ø
Max. current:	14 amps max.	14 amps max.	17 amps max.	20 amps max.	6 amps max.	12 amps max.
Receptacle required:	NEMA 5-15R receptacle	NEMA L6-20R receptacle	NEMA L6-20R receptacle	NEMA L5-20R receptacle	NEMA 5-15R receptacle	NEMA 5-15R receptacle
Frequency:	20 kHz	20 kHz	20 kHz	30 kHz	40 kHz	40 kHz
Max. cycle rate:	80 cpm (application dependant)					
Ambient temp. range:	41-122° F (5-50°C)					
External inputs/outputs:	9-pin start connector; 44-pin user I/O connector					

* 200-240 V AC optional.

Actuator Model	aef2.0	aef3.0
Max. clamp force on part (digitally set)	154 lbs (685 N) at 60 psi (represents system setting) 217 lbs (965 N) at 80 psi (represents system setting)	378 lbs. (1.68 kN) at 60 psi (represents system setting) 519 lbs (2.31 kN) at 80 psi (represents system setting)
Dynamic Triggering range: (digitally set)	5 to max. lbf. available 22 to max N (based on system setting)	15 to max lbf. available 66.7 to max kN (based on system setting)
Stroke length:	4" (101.6 mm)	
Pneumatic requirement:	Clean (5 micron, filtered), dry, non-lubricated air at 100 psi (690 kPa). (For system setting of 60 psi, a minimum of 70 psi is required. For system setting of 80 psi, a minimum of 90 psi is required.)	

All specifications subject to change without notice. All dimensions are nominal.

Note: All sales shall be subject to the Supplier's terms and conditions of sale as described in Branson's quotations and sales contracts.

REGIONAL TECHNICAL CENTERS

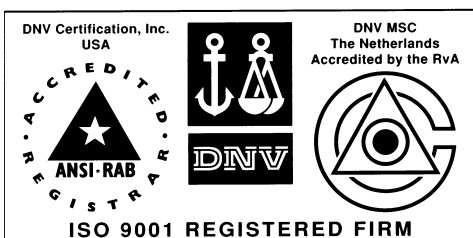
Headquarters:	Toll free: 888-BUC-JOIN (888-282-5646)	
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Atlanta:	770-962-2111	Fax: 770-962-3720
Los Angeles:	909-305-2080	Fax: 909-305-2060
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Detroit (Automotive):	248-299-0400	Fax: 248-299-9343
Rochester, NY:	716-624-8000	Fax: 716-624-1262
Toronto, Canada:	905-475-4640	Fax: 905-475-4637
Mexico City (Grupo Stevi):	011-52-5-581-5033	Fax: 011-52-5-582-6969

AVAILABLE OPTIONS

- S **Leveling fixture** - base-mounted plate for horn/fixture alignment.
- S **Solid mount boosters**
- S **Longer columns** - 4' to 6' lengths
- S **Printer with cable** - printing of setup and cycle information for comparison and troubleshooting.
- S **Monitor with cable** - for screen-driven setup
- S **Ground detect cable**

WARRANTY

The Branson 2000 Series f/aef ultrasonic assembly systems carry a three-year warranty on materials or workmanship. Note: This warranty applies to equipment purchased and operated in North America. For warranty information on units purchased and/or operated outside the U.S. contact your local representative.



Branson

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