

BRANSON

2000 SERIES

Ultrasonic Assembly Systems

2000ea/ae

GENERAL DESCRIPTION

Branson introduces the 2000ea/ae ultrasonic assembly systems. Multiple modes are valuable for applications requiring a high level of process control and weld quality. The 2000ea/ae systems set a new standard for users operating in the time, energy, energy compensation, or peak power welding modes. In addition, the 2000ea/ae systems feature Branson's patented Amplitude Stepping. These systems include the improved *UPS* power supply module with Branson's patented closed loop circuitry, providing enhanced performance, consistency, and reliability.

The 2000ea/ae 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 configuration and information management.

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

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



- ✓ *Integrated Patented Amplitude Stepping*
- ✓ *Multiple Welding Modes*
- ✓ *Multiple Language Choices*
- ✓ *Optional Display Terminal*
- ✓ *Graphing Capability*

Applied
Technologies
Group

41 Eagle Road
Danbury, CT
06813-1961
(203) 796-0349
fax (203) 796-9838
e-mail: info@bransonultrasonics.com

KEY FEATURES

Note: Items in blue are unique to the 2000ea/ae systems versus 2000t.

User Interface/Process Controls

- **User interface featuring 4-line vacuum fluorescent (VF) display** makes setup, operation, diagnostics, and troubleshooting easier.
- **1 ms sampling rate of all data** provides superior performance, consistency, and finer control.
- **Amplitude Stepping** — Branson's patented real-time process control provides increased strength, control of flash, reduction of particulate, and reduced residual stress.
- **Multiple welding modes**, including time, energy, and peak power. Energy can be set in increments of 0.1 joule. Peak power can be set in increments of 1%.
- **Expanded process control modes**, including energy compensation, provide more choices in application setup.
- **Part 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 increments of 1%.
- **True alarm messages** for ease of troubleshooting, with links to additional information.
- **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.
- **Up to 12 nameable presets** for ease of setup and changeover of applications.
- **Choice of language** for message display and printout—English, French, German, Italian, or Spanish—for ease of use in worldwide operations and multilingual workplaces.
- **Selectable pretriggering**
- **Printing capability** - Provides a record for future comparison and validation. Power, frequency, and amplitude graphs can be printed. Printout of last 50 cycle weld history. Added ESC/P and HPL drivers.
- **Password protection** feature for lock-out of unauthorized process changes once the equipment is set up for a specific application.
- **Optional terminal** 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 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: 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

- **Dynamic Triggering** provides consistent weld quality by triggering ultrasonic vibrations after a preset force is applied to the part.
- **Dynamic Follow-through** ensures the smooth, efficient transmission of ultrasonic energy into the part by maintaining horn/part contact and force.
- **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.



2000 SERIES PRODUCT/PERFORMANCE ENHANCEMENTS

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

900M/AE	900MA/AE	2000ea/ae	Benefits
Weld by time, energy, peak power	Weld by time, energy, peak power	Weld by time, energy, peak power	
<i>Power levels (Watts):</i>	<i>Power levels (Watts):</i>	<i>Increased power levels (Watts):</i>	
20 kHz - 1000, 2000, 3000	20 kHz - 1000, 2000, 3000	20 kHz - increased to 1100, 2200, 3300	Faster weld cycles
40 kHz - 350, 700	40 kHz - 700	40 kHz - increased to 400, 800	Faster weld cycles
		30 kHz - new frequency, 1500	Higher power at higher frequencies; expands application range for delicate parts.
Printing: setup and single line data	Printing: setup and single line data	Printing: setup and expanded single line data. Weld history - last 50 welds.	Easier setup and troubleshooting
Single line VF display	Single line VF display	Four-line VF display	More information visible; easier setup
Power graph	Power graph	Power, frequency, and amplitude graphs	Easier troubleshooting
20 presets	20 presets	12 nameable presets	Ease of setup
Autotune	Autotune with memory	Autotune with memory	Consistency and improved performance
TEC mode	TEC mode	Energy compensation	Helps compensate for part variations
Process alarm limits	Process alarm limits	Part monitoring limits: suspect and reject	Simplified troubleshooting
True alarm messages	True alarm messages	More true alarm messages, with additional support information	Easier troubleshooting; more specific information
	Line /load regulation	Line /load regulation	Consistency and improved performance
	Selectable starting ramps	Selectable starting ramps	Easier to start more difficult horns; faster cycle rates
	Optional amplitude stepping	Built-in amplitude stepping	Easier setup, more control
		Expanded process control limits	Expanded process control
		Digital amplitude setting with range of 10-100%	Fine tuning of critical applications
		Single 20 kHz converter at all power levels	Eliminates setup errors
		20% higher converter output amplitude at 20 kHz	Faster weld cycles
		Built-in ground detect with scrub time	Increased tooling and converter life
		Frequency and memory bargraph diagnostics built in	Simplified stack troubleshooting
		Power supply status indicators (run, seek, store, clear)	Easier power supply diagnostics and troubleshooting
		Password protection	Lock out unauthorized process changes
		Single-turn down speed control with lock	Easier to set up and adjust; lock-out of unauthorized process changes
		1 ms. sample rate: time, energy, power	Provides superior performance; consistency and finer control
		Horn down function	Ease of horn/fixture alignment

- **Five air cylinder sizes** are available for better control of clamp force. Sizes include: 1.5, 2.0, 2.5, 3.0, and 3.25 inches.
- **Custom single-turn flow control** provides for more accurate setting of downspeed, and easier resetting during application changeover.
- **Stroke indicator**
- **Calibratable pressure gauge**

AVAILABLE OPTIONS

- S **Leveling fixture** - base-mounted plate for horn/fixture alignment.
- S **Dump valve** - for release of cylinder pressure for ease of setup.
- 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 **Terminal** - for screen-driven setup
- S **Ground detect cable**

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SPECIFICATIONS

Most units are CE compliant, and comply with FCC rules and regulations governing radio frequency interference. Contact Branson, Danbury, for information.

2000ea 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, 1ph.	200-240 V AC 50/60 Hz, 1ph.	200-240 V AC 50/60 Hz, 1ph.	117 V AC * 50/60 Hz, 1ph.	117 V AC * 50/60 Hz, 1ph.	117 V AC * 50/60 Hz, 1ph.
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	NEMA L6-20R	NEMA L6-20R	NEMA 5-20R	NEMA 5-15R	NEMA 5-15R
Frequency:	20 kHz	20 kHz	20 kHz	30 kHz	40 kHz	40 kHz
Max. cycle rate:	80 cpm **					
Ambient temp. range:	41-122° F (5-50°C)					
External inputs/outputs:	9-pin start connector; 44-pin user I/O connector					
Actuator Model	ae1.5	ae2.0	ae2.5	ae3.0	ae3.2	
Max. clamp force on part (at 100 psig/ 690 kPa)	140 lbs. 623 N	270 lbs. 1.2 kN	440 lbs. 1.96 kN	650 lbs. 2.89 kN	770 lbs. 3.42 kN	
Dynamic Triggering range:	15-140 lbf. 67-623 N	15-180 lbf. 67-800 N	15-180 lbf. 67-800 N	15-180 lbf. 67-800 N	15-180 lbf. 67-800 N	
Dynamic Follow-through range:	15-140 lbf. 67-623 N	15-270 lbf. 67 N-1.2 kN	15-400 lbf. 67 N-1.78 kN	15-400 lbf. 67N-1.78 kN	15 lbf. -400 lbf. 67 N-1.78 kN	
Stroke length:	4" (101.6 mm)					
Pneumatic requirement:	Clean (5 micron, filtered), dry, non-lubricated air at 100 psi (690 kPa)					
<p>* 200-240 V AC optional.</p> <p>** Application dependent.</p> <p style="text-align: center;"><i>All specifications subject to change without notice. All dimensions are nominal.</i></p>						

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)	
Boston:	781-938-8168	Fax: 781-935-0535
Chicago:	847-229-0800	Fax: 847-229-0861
Atlanta:	770-962-2111	Fax: 770-962-3720
Los Angeles:	909-305-2080	Fax: 909-305-2060
Dallas:	972-484-9228	Fax: 972-484-9976
Detroit (Automotive):	248-299-0400	Fax: 248-299-9343
Rochester, NY:	585-624-8000	Fax: 585-624-1262
Toronto, Canada:	905-475-4640	Fax: 905-475-4637
Mexico City (Grupo Stevi):	011-52-5-581-5033	Fax: 011-52-5-582-6969

WARRANTY

The Branson 2000 Series ea/ae 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

Applied Technologies Group

41 Eagle Road, Danbury, CT 06813-1961
 (203) 796-0349 FAX (203) 796-9838
 E-mail: info@BransonUltrasonics.com
 www.Branson-PlasticsJoin.com

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