

BRANSON



HyLine-2i Series

Models VW-4i1 H, VW-6i2 H, and VW-6i3 H
Linear Vibration Welders

HyLine-2i Series Models VW-4i1 H, VW-6i2 H, and VW-6i3 H Linear Vibration Welders

GENERAL DESCRIPTION: Branson, the pioneer in vibration welding with over 40 years of production experience is proud to offer the enhanced version of our popular HyLine 2 Series linear vibration welder. Featuring the all-new I-Class weld heads, Branson's HyLine-2i Series welders are complete assembly systems designed to weld parts of various sizes and/or irregular shapes.

The **I-Class weld heads** offer multiple benefits including: increased tool weight capacities, increased tool weight to frequency ratios, higher power drives (more plastic joining capacity), PPL technology (see Machine Description section), interchangeable/common parts across weld head models, global commonality, and lower noise output.

Three models, VW-4i1 H, VW-6i2 H, and VW-6i3 H are available to handle parts up to 46" by 22" (1148 by 559 mm), or multiple smaller parts.

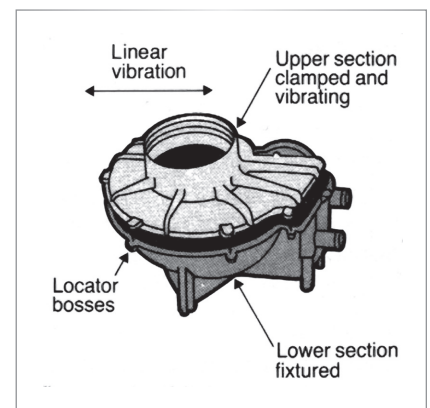
The Branson power supplies that drive the weld heads have an adjustable vibrating frequency range of 180 to 240 Hz. Modular construction allows the individual vibrator assembly and power supply/controller components to be adapted to automated or custom systems.



Process Description

Vibration welding is a proven welding technology capable of producing strong, pressure tight joints in thermoplastic parts.

Frictional heat is generated by pressing the surfaces of two plastic parts together and vibrating one of the parts through a small linear displacement in the plane of the joint. When a molten state is reached at the joint interface, vibration is stopped and the parts are automatically aligned. Clamping pressure is maintained briefly while the molten plastic solidifies to form a bond approaching or equal to the strength of the parent material.



Process Advantages

The major advantage of vibration welding lies in its application to large (up to 60"/1524 mm long or 24"/610 mm wide), irregularly-shaped parts. Even cross ribs which create separate compartments can be sealed. The process also works with multi-plane and curved surfaces.

The technology offers the capability of welding more than one part at a time; it also readily lends itself to automation.

Material Compatibility

Almost all thermoplastics can be vibration welded, regardless of whether they have been injection molded, extruded, foamed, or thermoformed. This process, when compared with ultrasonic assembly, is particularly advantageous for semi-crystalline resins such as acetal, nylon, thermoplastic polyester, and polypropylene; also polyvinyl chloride, cellulose, and elastomers, filled and reinforced resins, as well as those exhibiting hygroscopic properties.

Machine Sequence

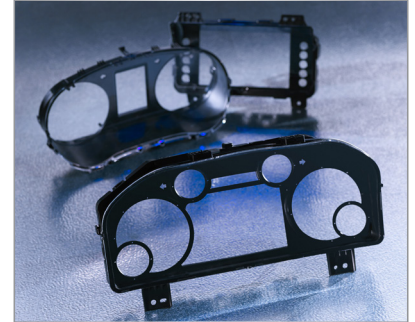
The operator manually loads the parts to be welded. The automatic sequence is initiated by activating the start buttons:

- Sound door closes.
- Lift table moves to weld position and applies pressure.
- Weld and hold times sequence.
- Lift table moves to home position.
- Sound door opens.
- Part manually unloaded.

Markets/Applications

Automotive

- Instrument panels
- Clusters
- Door panels
- Lighting
- Reservoirs
- HVAC ducts
- Intake manifolds
- Bumpers
- Glove boxes
- Air resonators



Instrument Panel

Medical

- Chest drainage units
- Filters
- I-V units
- Surgical instruments
- Insulated food trays
- Cassettes



Medical Fluid Meter

Appliance

- Pumps
- Shelving
- Liquid dispensers
- Small/large power tools
- Ducts
- Spray arms
- Fill funnels
- Water reservoirs
- Vacuum cleaner housings
- Vacuum cleaner accessories



Spray Arms

Business/Consumer Electronics

- Toner housings
- Door stiffeners
- Ink-jet cartridges
- Display assemblies
- Circuit board encapsulation

Packaging

- Pallets
- Point of purchase display blisters
- Display stands/shelves

Vibration Welding

Standard Machine Description

- **Machine Frame** - Welded construction of steel tubing and profiles incorporates four height-adjustable rubber mounts to allow both machine leveling and absorption of mechanical vibrations.
- **Vibrator Housing** - A rigid steel wassembly houses the individual vibrator components; the main assembly areas are precision machined.
- **Weld Head (Vibrator)** - The electromagnetic principle of Branson's vibrator assembly is patented and operates in a linear mode. The vibrator assembly consists of a set of laminations and cantilever springs suspended from the vibrator housing. Electromagnets mounted in the housing act directly upon the mechanical suspension producing a peak-to-peak reciprocating displacement of 0.020 to 0.070 inch (0.5 to 1.8 mm) at 240 Hz. The springs return the vibrator to the precisely-aligned position when the electro-magnets are de-energized, ensuring final part alignment.
- **PPL Technology (Weld Head Drive)** - The "Power Package Linear" approach delivers consistent power output to the weld head across the machine's frequency range. This prevents "out of phase" mechanical versus electrical resonances and ensures maximum plastic joining capacity across the tooling weight range of the weld head.
- **Sound Protection Cabinet** - The sound protection cabinet is lined with sound absorbing material. An automatic vertical sliding access door with acoustic lining is incorporated in the front of the cabinet. For operator safety, the door automatically retracts if the start buttons are released before the door is closed.
- **Door Drive** - The two major components for the door drive are an air cylinder and specially designed plastic and steel elements to provide smooth and consistent movement.
- **Rear Access Door** - The rear panel of the machine is fitted with a full-size, interlocked door to allow full access to tooling and other machine components.
- **Hydraulic Power Supply** - completely self-contained with drip pan, is located inside the rear access door.



Vibration Welding

Key Features

- **Controls system** using an Allen Bradley Compact Logix PLC. All system parameters are set through an Allen Bradley Panelview Plus 700 (optional 1000). The PLC system monitors the welding parameters and controls all functions of the machine including: frequency (direct reading in Hz), weld time, melt distance (collapse), hold time, amplitude, weld clamp forces, and hold clamp forces.
- **Storage of up to twenty sets of weld parameters.** By calling up one of these presets, the operator automatically programs the machine to the setpoints for that particular application.
- The system also provides **process verification during each weld cycle.** This verification is a live reading of the actual amplitude, force, weld time, and melt distance occurring during that cycle.
- **Linear displacement transducer** for table positioning and meltdown. The transducer provides a positioning repeatability of 0.001" over the length of the transducer and a meltdown resolution of 0.0005". This ensures tight control of the pre-weld stack-up height and precise meltdown capabilities, as well as the ability to set the table loading height.
- **SPC capabilities.** The PLC program can provide a data stream to a communications port to enable the user to connect to a computer and log the weld parameters over a period of time. The data can then be processed by the user's program to provide a printout in any number of forms: bar charts, histograms, range charts, etc.
- **Diagnostic program** which allows the machine to be compared against a known set of conditions. This enhances troubleshooting capabilities by matching the unit's current outputs with a standard set of values recorded during initial setup.
- **Digital power supply** provides increased starting power and better control of the weld process.
- **Self-tuning frequency program.** Pressing a button on the interface will allow the machine to automatically find and store the resonant frequency of the upper tooling mass. This known value can then be saved in a preset or manually input the next time the same upper tool is installed for production. The frequency range of the unit is variable between 200 Hz and 250 Hz.
- **Precise amplitude input and control** in a range between 0.020" and 0.70" (0.5 - 1.8 mm). The peak-to-peak welding amplitude can be set at the keypad in 0.001" increments.
- **Simple maintenance-free electromechanical vibrator** with only one moving part and no bearing surfaces to lubricate or wear.
- **Hydraulic lift/clamp system** includes two proportional valves to control the speed of the lift table and the clamp force applied to the parts.
- **Force profiling** - The HyLine control has up to four programmable weld forces to provide more accurate control of weld meltdown velocity. It also has one programmable hold force.
- **Amplitude profiling** - Four programmable amplitudes are available for controlling welding.
- **Configurable user I/O is available for tooling functions** - Up to 32 I/O's are optional.

Available Options

- Light curtain
- Light curtain protection guards
- Duplex electrical outlet (120 V)
- Dual lift cylinders (provides 21"/533 mm stroke and table opening depth of 12.5"/317 mm)
- Panel-mounted resettable cycle counter
- Exterior overhead light
- Air system for part eject from tools
- Air system for vacuum in upper tool
- Air system for slides in bottom tool
- Electrical tooling quick disconnect block (Turck) – 8-port
- Electrical tooling quick disconnect – HAN connector
- Pneumatic tooling quick disconnect manifold – 8-port
- Ext. PLC programming port
- Three-color light tower
- PLC window in electrical cabinet
- Light in e-box
- E-box fan
- E-box heat exchanger
- Custom color
- Machine crating, if required
- Hydraulic quick change clamping on lower table
- ECPL lockout tags

Specifications

	VW-4i1 H	VW-6i2 H	VW-6i3 H
MECHANICAL			
Weight	Approx. 4,500 lbs. (2,040 kg)	Approx. 5,000 lbs. (2,268 kg)	Approx. 5,000 lbs. (2,268 kg)
Overall Dimensions	76" wide x 77.5" high x 48" deep (1930 x 1969 x 1220 mm)	88" wide x 77.5" high x 48" deep (2235 x 1969 x 1220 mm)	88" wide x 77.5" high x 48" deep (2235 x 1969 x 1220 mm)
Lift table			
Overall	33.5" long x 21" deep (851 x 534 mm)	46" long x 21.5" wide (1168 x 546 mm)	46" long x 21.5" wide (1168 x 546 mm)
Central opening	23.5" long x 11.5" wide x 1.3" deep (597 x 292 x 33 mm)	38" long x 11.5" wide x 1.75" deep (965 x 292 x 44.4 mm)	38" long x 11.5" wide x 1.75" deep (965 x 292 x 44.4 mm)
Table to Spring Distance	24" (610 mm)	24" (610 mm)	24" (610 mm)
Head Lift Option	3" (76.2 mm)	3" (76.2 mm)	3" (76.2 mm)
Height to Adapter for Legacy Tooling	3" (76.2 mm) Old VW4 Tooling	1.5" (38 mm) Old VW6 Tooling	1.5" (38 mm) Old VW6 Tooling
Drive platen			
Overall	15.4" long x 14.8" wide (390 x 376 mm)	34.6" long x 14.8" wide (880 x 376 mm)	34.6" long x 14.8" wide (880 x 376 mm)
Front opening	39" wide x 25" high (991 x 635 mm)	51" wide x 25" high (1295 x 635 mm)	51" wide x 25" high (1295 x 635 mm)
Variable stroke	20" (508 mm) maximum	20" (508 mm) maximum	20" (508 mm) maximum
Noise level	83 dBA standard	83 dBA standard	83 dBA standard
Drive power	15 kW	15 kW	30 kW
Air Pressure Requirement	Minimum 80 PSI	Minimum 80 PSI	Minimum 80 PSI
ELECTRICAL			
Power requirements	480 VAC, 30 amps, 3 phase, 50/60 Hz	480 VAC, 30 amps, 3 phase, 50/60 Hz	480 VAC, 60 amps, 3 phase, 50/60 Hz
Output frequency	200 - 250 Hz variable	200 - 250 Hz variable	200 - 250 Hz variable
Ambient temp	32 - 105° F (0 - 40° C)	32 - 105° F (0 - 40° C)	32 - 105° F (0 - 40° C)
PERFORMANCE			
Driven platen fixture weight capacity	44-88 lbs. (20-40 kg)	77-143 lbs. (35 - 65 kg)	88-154 lbs. (40 - 70 kg)
Max. clamp force	4,000 lbs. (17.8 kN)	6,000 lbs. (26.7 kN)	6,000 lbs. (26.7 kN)
Amplitude range	0.020" to 0.070" (0.5 to 1.8 mm)	0.020" to 0.070" (0.5 to 1.8 mm)	0.020" to 0.070" (0.5 to 1.8 mm)
Lift table speed	10"/sec. (254 mm/sec.)	10"/sec. (254 mm/sec.)	10"/sec. (254 mm/sec.)
Total dry cycle time (without welding)	5.0 sec. (at 20" [508 mm max.] stroke)	5.0 sec. (at 20" [508 mm max.] stroke)	5.0 sec. (at 20" [508 mm max.] stroke)

Americas

Branson Ultrasonics Corp.
41 Eagle Road
Danbury, CT 06810, USA
T: 203-796-0400
F: 203-796-0450
www.bransonultrasonics.com

Europe

Branson Ultraschall
Niederlassung der Emerson
Technologies GmbH & Co. OHG
Waldstrasse 53-55
63128 Dietzenbach, Germany
T: +49-6074-497-0
F: +49-6074-497-199
www.branson.eu

Asia

Branson Ultrasonics (Shanghai) Co., Ltd.
758 Rong Le Dong Road
Song Jiang, Shanghai, PRC, 201613
T: 86-21-3781-0588
F: 86-21-5774-5100
www.branson-china.com

Note: All sales shall be subject to the Supplier's terms and conditions of sale as described in Branson's quotations and sales contracts.
Warranty: The HyLine-2i Vibration Welder Models VW-4i1 H, VW-6i2 H and VW-6i3 H are warranted to be free from defects two years for parts and one year for labor from the date of shipment.
ISO Certifications