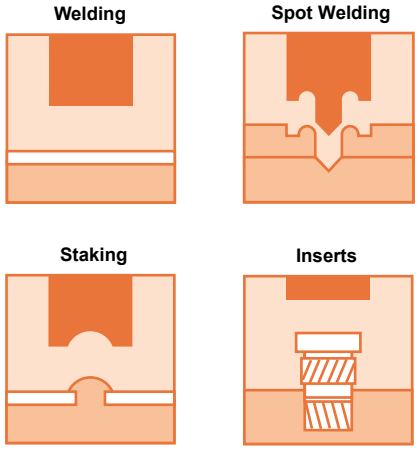
PAS

PLASTIC ASSEMBLY SYSTEMS

Ultrasonic Hand Held Welders For Plastic Assembly



General Description

PAS offers two 500 watt hand held ultrasonic welders for plastics assembly; a 20 kHz, Model 502HH and a 40 kHz, Model 504HH. These compact and portable units are rugged, reliable, and easy to operate. They are designed specifically for welding, staking, inserting, and spot welding applications. The lightweight hand pieces are ideally suited for manual operations with low volume production requirements or for assembling parts with difficult to reach weld areas. The units consist of an ultrasonic power supply and a 1.5 lbs. (.68 kg) hand gun with a straight diameter cable. The 20 kHz hand guns are supplied with integral 1/2" (12.7mm) diameter titanium front drivers with replaceable flat face tips. Other standard tips are available for various application requirements (See chart for tip information). In addition, custom tips can be designed for specific applications. The 40 kHz hand gun is supplied with a removable horn designed specifically for each customer's requirements.

Most manual applications can be performed with the 20 KHz model. However, the higher frequency and lower amplitude of the 40 kHz system makes it ideal for welding small assemblies that require gentler action. The hand gun systems are available to operate at a standard 120 volts or optional 220 volts nominal input voltage.

The power supply features autotune circuitry, which eliminates the need to retune the system each time it is turned on or when the horn/tip is changed. It also regulates the line voltage and provides constant amplitude throughout the weld process. The welders contain a microprocessor based programmable timer for weld times from 0.1 to 9.9 seconds. Another function of the microprocessor includes digital amplitude control. All of these beneficial features yield a more precise and repeatable cycle. Once set up, the user only needs to apply the tip of the hand gun to the parts being assembled and depress the switch on the gun's housing to operate the welder.

The 502HH and 504HH models have a standard DB9 I/O connector that can interface with automated machines via a PC of PLC. This connector allows the user to control amplitude and ultrasonics on/off times, as well as reset overload conditions. Users can, with the DB9 connector, monitor the output power (in watts) and hand gun frequency.

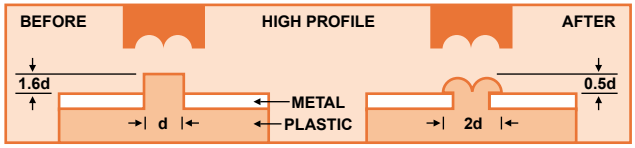
The 500 watt welders both contain two overload protection circuits, one for the power supply and the other for the converter. The system's overload circuit protects the power supply from exceeding its maximum wattage. The advanced converter protection circuit is designed to protect against excessive voltage or current caused by the application. With a response time of less than 2 micro seconds, these circuits instantaneously prevent internal component damage to the power supply and converter.

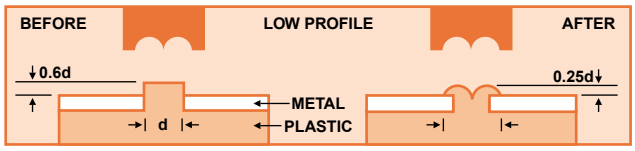
Ultrasonic Hand Held Welding Applications

STAKING

Standard Flared Stake

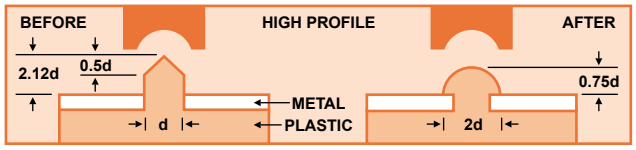
The standard flared stake satisfies the requirements of most applications. This stake is recommended for bosses with an O.D. of 1/16 inch (1.6mm) or larger, and is ideally suited for low density, nonabrasive amorphous plastics.

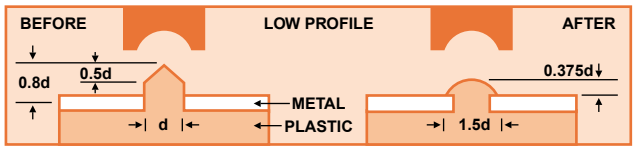




Spherical Stake

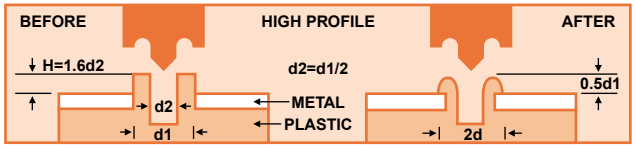
The spherical stake is preferred for bosses with an O.D. less than 1/16 inch (1.6mm). It is also recommended for rigid crystalline plastics with sharp highly defined melting temperatures, for plastics with abrasive fillers, and for materials that degrade easily.





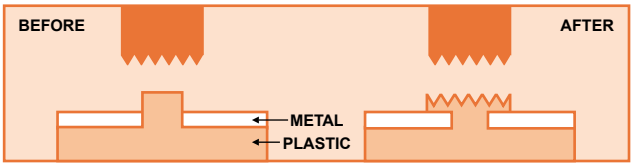
Hollow Stake

Bosses with an O.D. in excess of 5/32 inch (4mm) should be made hollow. Staking a hollow boss produces a large, strong head without having to melt a large amount of material. Also, the hollow stake avoids sink marks on the opposite side of the component, and enables the parts to be reassembled with self-taping screws, should repair and disassembly be necessary.



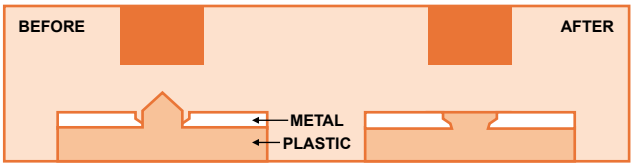
Knurled Stake

The knurled stake is used in applicaionts where apperarance and strength are not critical. Since alignment is not an important consideration, the knurled stake is ideally suited for high volume production, and is often recommended for use with a hand held ultrasonic welder. Knurled tips are available in a wide variety of fine, medium and course configurations.



Flush Stake

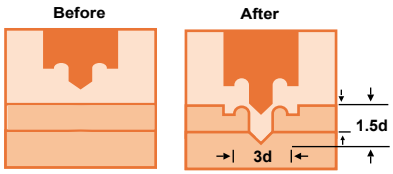
The flush stake is used for applications requiring a flush surface. The flush stake requires that the retained piece has sufficient thickness for a chamfer or counterbore.



Ultrasonic staking, also referred to as ultrasonic “heading” or “riveting”, controls the flow of the molten plastic used to capture or retain another component in place. Ultrasonic staking provides an alternative to welding wehn the two parts consist of dissimilar materials that cannot be welded or when simple mechanical retention of one part relative to another is inadequate (i.e. as distinct from molecular bonding). A common application is the attachment of plastic to metal. Typically a metal part, with location holes, is placed over a plastic part with molded bosses. The horn tip is then pressed against the plastic boss and the vibratory motion creates friction and localized heating. As the boss melts,the light pressure from the horn forms a head to a shape determined by the horn tip configuration. When the vibrations stop, the plastic material solidifies, and the dissimilar materials are fastened together.

With staking, tight assemblies are possible because mating parts are clamped under pressure of the horn until the rivet head solidifies. There is no elastic recovery as is the case with heat staking or cold forming. A major advantage of ultrasonic staking is that the ultrasonic staking tip remains relatively cool during the process, forming a clean head with no sticking or stringing during assembly.

SPOT WELDING



During spot welding, the horn tip penetrates through the top sheet and enters the bottom sheet to a depth of one half the top sheet thickness. The displaced molten plastic is shaped by a cavity in the tip to create an annular formation around the weld. Simultaneously, the molten plastic displaced from the second sheet flows into the preheated area and forms a permananet molecular bond. Large thermoplastic parts and applications with hard to reach joining surfaces can easily be welded together using an ultrasonic spot welder and standard replaceable tips.

ULTRASONIC INSERTION

Ultrasonic insertion involves a metal insert to be placed in a cored or drilled hole that is slightly smaller than the insert. This hole provides a certain degree of interference and also serve to guide the insert into place. The vibrating ultrasonic horn contacts the insert and the ultrasonic vibrations travel through the insert to the interface of the metal and plastic. Heat, generated by the insert vibrating against the plastic, causes the plastic to melt, and as the horn advances, the insert in embedded into the component. The molten plastic flows into the serrations, flutes, or undercuts of the inserts and, when the vibrations terminate, the plastic resolidifies and the insert is securely encapsulated in place. Inserts can be ultrasonically installed in most thermoplastics.

Ultrasonic insertion provides the high perfomance strength values of a molded-in insert while retaining all of the advantages of post-molded installation. Some of the advantages of ultrasonic insertion over other methods include rapid installation, minimal residual stresses in the component following insertion, elimination of potential mold damage, reduced most fabrication costs and increased productivity as a result of reduced mold cycle times.

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Optional Accessories Available for 20 kHz and 40 kHz Welders

Manual Press

A manual press is available for assembling parts where production volume does not justify more expensive pneumatic presses. The press provides a more controlled motion of the welder than is possible by just holding the hand gun, resulting in more consistent assemblies. This unit is available with foot switch or cam actuation. The trigger handle is removed from the hand gun housing when foot switch actuation is used.
Order No. - HH-ARB for 20 kHz and 40 kHz

Pneumatic Press

The pneumatic press is similar in style to the Manual Press, yet it contains dual anti-tie down palm buttons, a pressure regulator, and a pneumatic timer with all the required control.
Order No. - HH-ARBP for 20 KHz and 40 kHz

Stapler

A lightweight stapler attachment is optional for the Model CV52 and CV54 hand guns. It is ideally suited for sealing low production rate clamshell packages. The stapler is designed with a special privoting mechanism that is attached to the standard hand held welders. The mechanism contains a steel anvil that applies pressure to a small area on the flanged outer edge of the clamshell package. The anvil is supplied with two sealing patterns. The standard is a medium diamond knurl on one end and a course diamond knurl on the other. To switch from one sealing pattern to the other, the anvil can be rotated 180 degrees.
Order No. - HH-STAP for 20 kHz and 40kHz

Pistol Grip

The Pistol Grip is designed to provide a more ergonomic handling of the handpiece for certain applications. It is a lightweight device that simply slips onto the hand guns. The operator activates the ultrasonics by pulling on the "trigger."
Order No. - HH-PST for 20 kHz and 40 kHz

Staking / Spot Welding Tips Specifications

Standard threaded tips available for staking, spot welding, and inserting are listed below. Special carbide faced wear resistant, flat, knurled, and custom faced tips are also available upon request.

Heatstaking

Plastic Boss Diameter		Solid Boss Flare Head				Conical Boss Flare Head		Hollow Boss
		High Profile		Low Profile		High Profile	Low Profile	
inches	mm	Tip Size	Stud Height	Tip Size	Stud Height	Tip Size	Tip Size	
1/32	0.793	A	.050	G	.019	AA	GG	–
1/16	1.587	B	.100	H	.0375	BB	HH	–
3/32	2.381	C	.150	I	.056	CC	II	–
1/8	3.175	D	.200	J	.075	DD	JJ	R
5/32	3.969	E	.250	K	.094	EE	KK	S
3/16	4.762	F	.300	L	.112	FF	LL	T

Insertion

SAE			Metric		
Insert Size	Inner Diameter	Tip Pilot Diameter	Insert Size	Inner Diameter	Tip Pilot Diameter*
4-40	0.088	0.078	2.5 x 0.45	0.079	0.069
6-32	0.106	0.096	3 x 0.5	0.097	0.087
8-32	0.133	0.123	3.5 x 0.6	0.114	0.104
10-24	0.147	0.137	4 x 0.7	0.129	0.119
10-32	0.160	0.150	5 x 0.8	0.165	0.155
1/4-20	0.200	0.190	6 x 1	0.195	0.185
5/16-18	0.262	0.252	8 x 1.25	0.265	0.255

Spot Welding

Material Thickness		Tip Size
Inches	mm	
1/32	0.793	SA
3/64	1.190	SB
1/16	1.587	SC
5/64	1.984	SD
3/32	2.381	SE
7/64	2.778	SF

Ordering Information

Specify tip required using code letter.
Example:
Staking tip "A" indicates a tip used for staking - a 1/32" solid brass with a high profile flared head.
Spot weld tip "SA" indicates a tip used for spot welding - 1/32" thick material.

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Ultrasonic Hand Held Welder Specifications

Power Supply

20 kHz

Frequency / Power:	20 kHz: 500 watts
Input Voltage:	Standard 120 volts or optional 220 volts, 50/60 Hz Regulated between 95-135 volts or 190-265 volts
Weld Time:	0.1-9.9 seconds
Dimensions:	8.5 in. H x 13.5 in. W x 7.5 in. D (216mm H x 340mm W x 190mm D)
Weight:	10Lbs. (4.5kg)

40 kHz

Frequency / Power:	40 kHz: 500 watts
Input Voltage:	Standard 120 volts or optional 220 volts, 50/60 Hz Regulated between 95-135 volts or 190-265 volts
Weld Time:	0.1-9.9 seconds
Dimensions:	8.5 in. H x 13.5 in. W x 7.5 in. D (216mm H x 340mm W x 190mm D)
Weight:	10Lbs. (4.5kg)

Hand Gun

20 kHz

Dimensions:	1.9 in. (48.3 mm) D, 7.6 in. (193mm) L (with standard tip)
Weight:	1.5 Lbs. (0.68 kg)
Horn:	Integral with threaded end to accept replaceable tips
Material:	Titanium
Tip:	Standard - 1/2 “ (12.7mm) diameter flat faced titanium tip.
Cable Specifcations:	Hardwired into hand gun. Optional detachable cable available
Length:	10 ft. standard, optional 15 ft. or 25 ft. available

40 kHz

Dimensions:	1.9 in. (48.3 mm) D, 6.3 in. (160mm) L (without horn)
Weight:	1.5 Lbs. (0.68 kg)
Horn:	Supplied and priced separately
Material:	Titanium or Aluminum
Cable Specifcations:	Hardwired into hand gun. Optional detachable cable available.
Length:	10 ft. standard, optional 15 ft. or 25 ft. available

Warranty

PAS warrants its products for a period of one year from the date of shipment against defects in material and workmanship under normal installation, use, and maintenance.

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