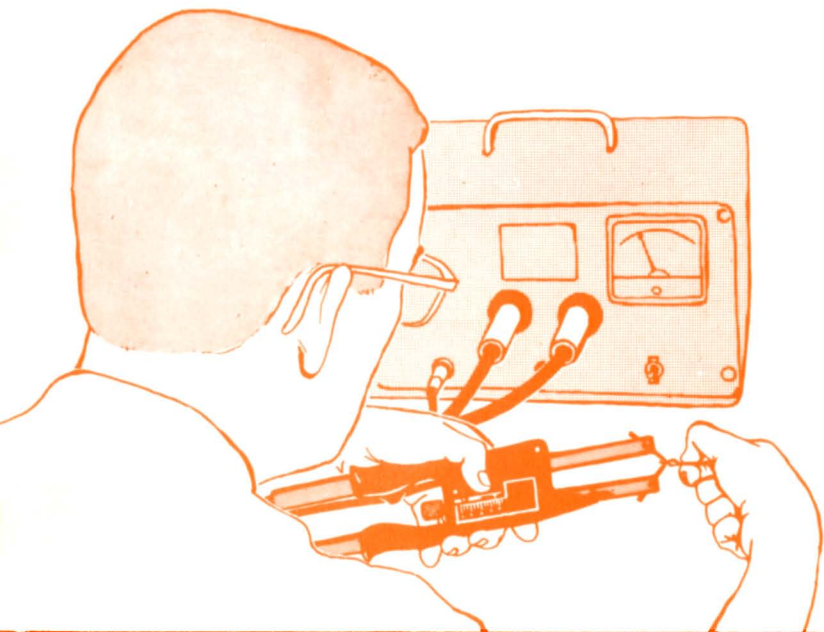


VACUUM TUBE PRODUCTS DIVISION

**MINIATURE
ELECTRONIC
WELDING
EQUIPMENT**

**WELDING
ACCESSORIES**



VTP WELDING HANDPIECES

FOR PRECISION WELDING

RUGGED CONSTRUCTION

VERSATILE – EASY TO USE

Precision welding requires equipment that is simple to operate with built-in reliability for continuous duty, yet versatile enough to work with different materials and gauges. Welding handpieces developed by Vacuum Tube Products give you all these advantages and more. They are light weight, constructed of high quality materials, and are virtually maintenance free. Each has been designed to enable precision welding of applications which can not be welded with standard bench welders.

VTA-24

**FULLY ADJUSTABLE PRECISION SPOT WELDING
HANDPIECE REQUIRING MINIMUM HAND PRESSURE.**

The new VTA-24 Welding Handpiece is far superior in ruggedness and versatility. It is no longer necessary for you to have three or four handpieces at each bench position to do different jobs. The VTA-24 is capable of welding wires, rods, foil and sheet materials from .0003 to .060 inches thick.

- A. Tip pressure adjustments of from .5 to 25 pounds may be rapidly made by a simple one-knob control, and hand pressure is only 4 pounds maximum. The pressure settings are clearly marked on the lower grip for the operator's convenience.
- B. The VTA-24 has been built for years of continuous service. Grips are made of high-impact plastic for greatest strength. Electrode holders are of high-conductivity light-weight aluminum with hex-socket screws for holding tips. Internally, a rugged multiple-leaf spring adjusted by the control knob is used to apply pressure to the welding electrodes.
- C. Three different tip configurations and a variety of electrodes are available to allow welding in tight areas with minimum of effort.



SPECIFICATIONS

<i>Electrode Pressure Range</i>	<i>.5 to 25 lbs.</i>
<i>Hand Pressure</i>	<i>4 lbs. maximum</i>
<i>Material Gauge Range</i>	<i>.0003-.060 inches</i>
<i>Weight (less cable)</i>	<i>2.5 lbs.</i>
<i>Length (less cable)</i>	<i>9½ inches</i>
<i>Cable</i>	<i>4½ feet, #4 welding cable</i>
<i>Connections</i>	<i>Cam-lok type B-002 male plugs</i>

VTA-13

The VTA-13 is a handpiece ground cable for use with the VTA-10 Spot Weld Handpiece or with the VTA-11 Seam Welding Handpiece. It is constructed of a fiber laminate handle holding a RWMA 2 pointed electrode rod connected to a six foot length of #4 welding cable with Cam-lok plugs.

In operation the VTA-13 is held against the material being welded by either the VTA-10 or VTA-11 handpieces. It functions both as the ground connection and as a source of back pressure on the metal being welded.

VTA-10

The VTA-10 is a spot welding handpiece identical to the VTA-11 except the electrode is pointed instead of the roller-type. The pointed electrode is made of a 5/16" diameter RWMA 2 rod.

The mahogany handpiece, actuation switch, and other features are identical with the VTA-11.

SPECIFICATIONS

Material Gauge Range	.0005-.060 inches
Weight	1.75 lbs.
Length (less cable)	10 inches
Cable	6 feet, #4 welding cable and 2 wire switch cord
Connections	Cam-lok type B-002 male plugs

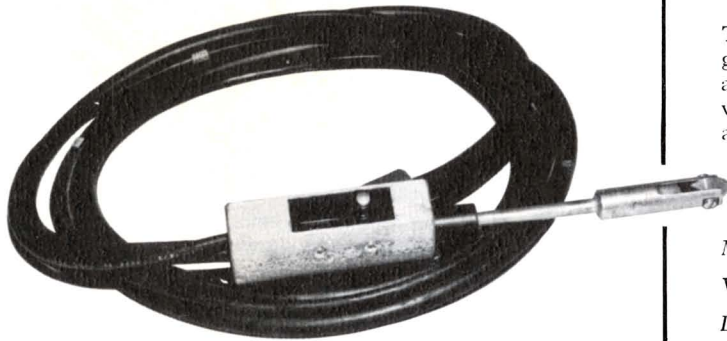


VTA-11

The VTA-11 handpiece is available for seam welding light gauge foils and sheets. It has a mahogany handle which houses a push button actuation switch and holds a sharp-edged roller wheel mounted in a copper yoke. The roller may be removed allowing the use of other electrode assemblies.

SPECIFICATIONS

Material Gauge Range	.0005-.060 inches
Weight (less cable)	1.75 lbs.
Length	10 1/2 inches
Cable	6 feet, #4 welding cable and 2 wire actuation cord
Connections	Cam-lok type B-002 male plugs



VTA-12

The VTA-12 is a Tweezer Welding Handpiece designed for extremely fine spot welding applications such as in vacuum tube assembly. The unit is easily held by the operator and is equipped with electrode tips angled to get at the hard-to-reach places.

Pressures up to 7 lbs. may be set by internal spring and screw adjustments. An internal microswitch regulates firing and over-travel.

SPECIFICATIONS

Electrode Pressure Range	0.5 to 7 lbs.
Material Gauge Range	.0005-.02 inches
Weight (less cable)	1.75 lbs.
Length (less cable)	5 1/2 inches
Cable	4 1/2 feet, #8 welding cable
Connections	Cam-lok type B-002 male plugs



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2020 SHORT STREET, OCEANSIDE, CALIFORNIA
TELEPHONE SARATOGA 2-2101

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VACUUM TUBE PRODUCTS DIVISION

MINIATURE
ELECTRONIC
WELDING
EQUIPMENT

**STORED ENERGY
POWER SUPPLIES**

MODEL VTW-33**500 WATT-SECOND STORED ENERGY WELDING POWER SUPPLY**

FEATURES

- 2 TO 500 WATT-SECONDS
– COMPLETE CONTROL OF WELD POWER
- RANGE SELECTION SWITCH
– GIVES FINER CONTROL AT LOW SETTINGS
- REGULATED VOLTAGE
– GIVES UNIFORMITY OF STORED ENERGY
- COMPLETE IN TWO VERTICAL CABINETS – INSTALL ON ANY BENCH
- WELDS IN 2½ MILLISECONDS
– PRODUCES NO UNWANTED HEAT
- AUTOMATIC LOCKOUT
– PREVENTS DISCHARGE UNTIL DESIRED ENERGY IS AVAILABLE

DESCRIPTION

Millisecond discharge time, oilfilled capacitors, electronic tubes for energy transfer, and packaged into two vertical bench top cabinets – these are the highlights of Hughes model VTW-33 500 watt-second power supply! The VTW-33 is the first electronic welding power supply to combine all these outstanding features.

These features and others add to the versatility and reliability of this fresh new unit, offering real benefits for you. For example:

Provision is made for automatic lockout of the firing control until the pre-selected energy has been stored. Faulty welds due to an incomplete energy recharge are thereby prevented.

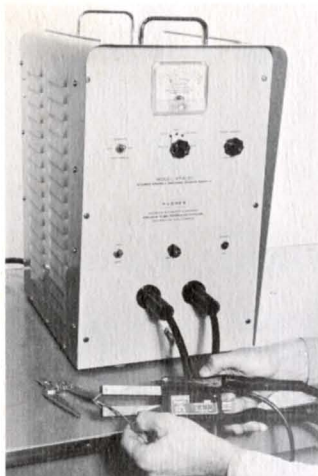
A range selection switch permits use of either a 2 to 50 or a 20 to 500 watt-second range. The 2 to 50 range has been added to provide an expanded meter scale and to increase the stability of the energy stored while operating in low ranges. Switching from one range to the other automatically discharges the energy stored, changes the meter calibration and allows the power supply to charge to the new setting.

Twin vertical style cabinets house the VTW-33. These cabinets are 21½" high by 12½" wide by 15" deep, making it possible to place both on any standard production bench. The main cabinet contains all of the electronic circuitry, transformers, controls and the meter. Because the second cabinet contains only the oilfilled capacitors, it may be readily placed in any convenient location within five feet of the main cabinet. High voltage insulation and a complete interlock system on both cabinets provides the optimum in safety.

A pulse width of only 2½ milliseconds at 500 watt-seconds is the shortest weld energy discharge of any stored energy welding equipment. With such an ultra short burst of weld energy, only the metal interface has time to heat. This highly efficient performance makes possible stronger, cleaner, more reliable welds than ever before, and heat damage to adjacent parts is eliminated.

Other standard features include an easy to read watt-second meter, a weld – set-up – discharge switch, a separate off-on switch, carrying handles, quick change cable receptacles and the ability to operate from any 105-130 volt AC line source.

WELDING .016" BRASS TO ITSELF TO FORM CRYSTAL CASES TAKES LESS THAN HALF THE ENERGY AVAILABLE FROM THE VTW-33 WHEN USING THE NEW WELD HEAD, MODEL VTA-42.



BY SELECTING THE LOW RANGE, 3 WATT-SECONDS CAN BE PRECISELY SET AND CONSISTENTLY REPEATED TO WELD A .004" COPPER-IRON THERMOCOUPLE JUNCTION WITH A VTA-24 HANDPIECE.

APPLICATION

Repeatably providing up to 500 watt-seconds of weld energy from any location with access to a 105-130 volt AC line, the model VTW-33 provides the answer for almost any resistance welding application in the electronic field.

Whether automated, mechanized or manually operated this new unit can weld metals ranging from 0.002 to 0.065 inch in thickness, at weld speeds up to 120 per minute at low output!

Plug in any handpiece, weld head or special tooling and you have a complete weld station, ready for your most demanding weld applications. High quality electron tubes, relay contacts and structural joints, honeycomb to edge members, and heavy duty wire wound resistors are just some of the possibilities. Weld any configuration of copper, spring steel, aluminum, brass, moly, silver, platinum with a minimum of deformation, discoloration, annealing or heat transfer.

EQUIPMENT

The VTW-33 is packaged in twin cabinets. It is a complete stored energy welding power supply, including all controls and the weld transformer. Add either a weld head or handpiece to have a complete resistance welder, ready to plug into any 105-130 volt AC line source.

SPECIFICATIONS

Energy Storage	2 to 500 watt-seconds
Discharge Time	Approximately 0.0025 second
Capacitor Bank	400 microfarads, 3500 volt rating
Capacitor Storage Voltage	100 to 1600 volts
Output Voltage	1-25 volts, DC, crest value at the welding electrodes
Speed of Operation	60 welds per minute, maximum charge 120 welds per minute, minimum charge
Input Voltage & Power	105-130 volts, AC, 50-60 cps Will not exceed 30 amp fuse
Voltage Regulation	± 1% with ± 10% line variation
Dimensions	Control Cabinet — 21½" high x 12½" wide x 15" deep Capacitor Cabinet — 21½" high x 12½" wide x 15" deep
Weight	Control Cabinet — 120 lbs. net, 140 lbs. shipping Capacitor Cabinet — 135 lbs. net, 155 lbs. shipping
Ventilation	Louvered metal cabinets — convection cooling
Accessories Required	Welding head or handpiece

For additional information, please write:

HUGHES AIRCRAFT COMPANY
VACUUM TUBE PRODUCTS DIVISION
MARKETING DEPARTMENT
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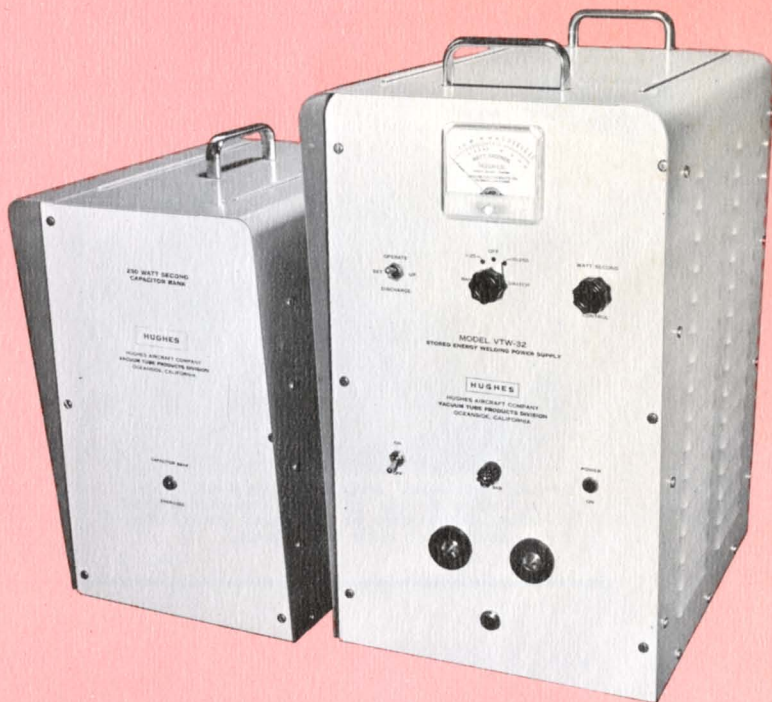
VACUUM TUBE PRODUCTS DIVISION

MINIATURE
ELECTRONIC
WELDING
EQUIPMENT

STORED ENERGY
POWER SUPPLIES

MODEL VTW-32**250 WATT-SECOND STORED ENERGY WELDING POWER SUPPLY****FEATURES**

- 1 TO 250 WATT-SECONDS
– COMPLETELY ADJUSTABLE ENERGY OUTPUT
- RANGE SELECTOR SWITCH
– FINER CONTROL AT LOW SETTINGS
- AUTOMATIC LOCKOUT
– PREVENTS DISCHARGE UNTIL DESIRED ENERGY IS AVAILABLE
- VOLTAGE REGULATION
– INSURES UNIFORMITY OF ENERGY STORED
- WELDS IN TWO MILLISECONDS
– ELIMINATES UNWANTED HEAT
- NO RELAYS IN ENERGY TRANSFER CIRCUIT – GIVES STABLE, TROUBLE-FREE SERVICE

**DESCRIPTION**

Feature after feature has been incorporated into Hughes new model VTW-32 250 watt-second stored energy power supply to make it the most outstanding medium range electronic welding power supply on the market.

An outstanding new feature is a range selector switch which allows use of either a 1 to 25 watt-second or a 10 to 250 watt-second range. The 1 to 25 watt-second range has been added to provide an expanded meter scale and to increase the stability of the energy stored at low ranges. Switching from one range to the other automatically discharges the energy stored, changes the meter calibration and allows the power supply to charge to the new setting.

Another new feature is automatic lockout of the firing circuit until the preset energy level is obtained. This design has been provided to eliminate the possibility of obtaining inferior welds due to discharging the power supply before it has reached its preset energy level.

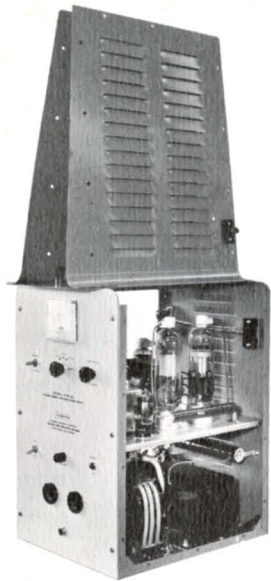
Complete weld energy discharge in only 0.002 second provides a tremendous energy burst to create weld heat in even the most difficult metal combinations – without component damage, annealing or excessive deformation or discoloration.

The VTW-32 is packaged in two vertical style cabinets. The main cabinet contains all controls, the weld transformer and all of the electronic components; the second cabinet houses only the oilfilled capacitors and is connected to the main cabinet with a five foot cable. This allows the main cabinet to be placed directly behind the weld head with all controls easily accessible. The capacitor bank can be located at any convenient location. Top hinged butterfly doors on both cabinets open completely for instant servicing, if required.

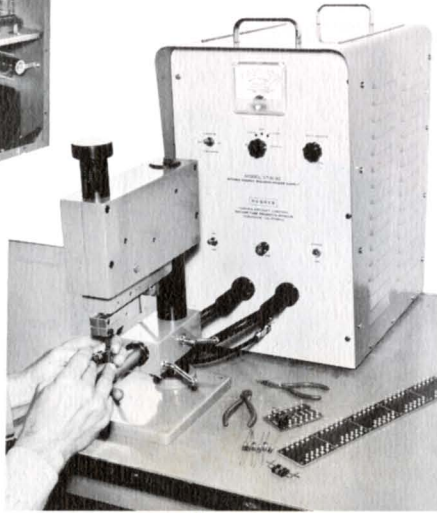
High voltage insulation and a complete interlock system on both cabinets, provides the optimum in safety.

Completely adjustable energy control permits selection of from 1/2% to 100% of the available energy. Other outstanding benefits include the use of over-size oilfilled capacitors and energy discharge through a thyatron switch tube.

Additional features include: voltage regulation, a large, easy to read meter, a weld – set-up – discharge switch, separate off-on switch, carrying handles, plug-in cable receptacles and the ability to operate from any 105 to 130 volt AC line source.



BUTTERFLY DOORS OPEN COMPLETELY TO ENABLE EASY ACCESS TO ANY PART OF THE ELECTRONIC CIRCUITRY.



STRONG, RELIABLE WELDS OF DIFFICULT MATERIALS SUCH AS .042" DIAMETER TINNED COPPER RESISTOR LEADS CAN BE ACHIEVED USING THE VTA-42 WELD HEAD WITH THE VTW-32.

APPLICATION

Hughes new model VTW-32 has been designed to be the most versatile electronic welding power supply available for either laboratory or production applications.

For laboratory-experimental work it is unequaled! Goes anywhere — plugs into any 105-130 volt AC line source. Its low range capabilities permit welding of wires as fine as 0.001 inch in diameter. Quick change connectors facilitate the use of any VTP handpiece or weld head. Welding of thermocouples, strain gages, strain gage leads and quick in-field repairs or experimental welds all may be accomplished with ease and reliability.

For production applications up to 7200 welds an hour can be made — with exact repeatability of the weld energy and with minimum maintenance. The main cabinet sits on any 30 inch or wider production bench and requires no special installation — just plug it in! The companion cabinet sits anywhere. You'll find the weld repeatability you've been looking for in producing miniature and sub-miniature relays, component assemblies, meter cases, electronic tubes, mechanical filters, etc.

Ultra-short pulse width, fast recharge time, exactly repeatable weld energy and rugged over-size components make the VTW-32 the right unit for any critical weld application — manual or mechanized!

EQUIPMENT

Packaged conveniently in two cabinets, the VTW-32 is a complete stored energy welding power supply, including all controls and the weld transformer. Add either a head or a handpiece and it becomes a complete welder — ready to plug into any 105-130 volt AC line source.

SPECIFICATIONS

Energy Storage	1 to 250 watt-seconds
Discharge Time	Approximately 0.002 second, with average load
Capacitor Bank	200 microfarads, 3500 volt rating
Capacitor Storage Voltage	100 to 1600 volts
Output Voltage	1-25 volts, DC, crest value at the welding electrodes
Speed of Operation	60 welds per minute, maximum charge 120 welds per minute, minimum charge
Input Voltage & Power	105-130 volts, AC, 50-60 cps Will not exceed 25 amp fuse
Voltage Regulation	$\pm 1\%$ with $\pm 10\%$ line variation
Dimensions	Main cabinet — 21½" high x 12½" wide x 15" deep Capacitor cabinet — 18" high x 10½" wide x 12" deep
Weight	Main cabinet — 117 lbs. net, 135 lbs. shipping Capacitor cabinet — 72 lbs. net, 90 lbs. shipping
Ventilation	Louvered metal cabinets — convection cooling
Accessories Required	Welding head or handpiece

W-13/5M/AL/9-60

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TELEPHONE SARATOGA 2-2101



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VACUUM TUBE PRODUCTS DIVISION



QUANTITY DISCOUNTS

Quantity discounts are available on all items. Contact your local representative or the factory for quotations.

EQUIPMENT SATISFACTION

Your Hughes VTP Miniature Electronic Welding Equipment must perform to your satisfaction. If for any reason the equipment does not meet your requirements, it may be returned for credit. To be eligible for full credit the equipment must be returned within 30 days, freight prepaid, to the factory at Oceanside, California.

EQUIPMENT WARRANTY

All Hughes VTP Miniature Electronic Welding Equipment is war-

ranted for one full year from date of shipment. A complete warranty agreement is available on request. It is also included in the operation and maintenance manual included with each shipment.

APPLICATION SERVICE

The service of our welding applications lab is available without charge to present and potential customers. To observe the potential of miniature electronic welding on your applications simply submit your materials, their composition and weld requirements to the factory. A complete report showing weld settings and equipment required will be returned along with the finished samples.

STOCK NO.	DESCRIPTION	INCLUDES	WEIGHT	PRICE
STORED ENERGY POWER SUPPLIES				
VTW-28	10 watt second stored energy power supply (electrolytic capacitors)	Voltage regulation, controls, meter & pulse transformer	Net: 35 lbs. Ship: 45 lbs.	325.00 (110V)
VTW-9	20 watt second stored energy power supply (oil filled capacitors)	Controls, meter and pulse transformer	Net: 35 lbs. Ship: 45 lbs.	295.00 (110V)
VTW-29	40 watt second stored energy power supply (electrolytic capacitors)	Controls, meter and pulse transformer	Net: 45 lbs. Ship: 55 lbs.	315.00 (110V)
VTW-30	100 watt second stored energy power supply (electrolytic capacitors)	Controls, meter and pulse transformer	Net: 55 lbs. Ship: 65 lbs.	435.00 (110V)
VTW-32	250 watt second stored energy power supply (oil filled capacitors)	Controls, meter and pulse transformer	Net: 190 lbs. Ship: 225 lbs.	1,085.00 (110V)
VTW-33	500 watt second stored energy power supply (oil filled capacitors)	Controls, meter and pulse transformer	Net: 255 lbs. Ship: 295 lbs.	1,395.00 (110V)
AC POWER SUPPLIES				
VTW-1	5 KVA, half cycle spot and seam welding AC power supply	All controls and welding transformer in one cabinet	Net: 125 lbs. Ship: 140 lbs.	595.00 (220V) 675.00 (440V)
VTW-1M	5 KVA, half cycle spot and seam welding AC power supply	All controls and welding transformer in one cabinet, mounted on 9" dia. semi-pneumatic wheels — telescoping hand-piece boom (handpieces not included)	Net: 205 lbs. Ship: 230 lbs.	675.00 (220V) 720.00 (440V)
VTW-500	5 KVA, half and full cycle seam welding AC power supply (special order only — not stocked)	All controls and welding transformer in one cabinet	Net: 105 lbs. Ship: 120 lbs.	545.00 (220V) 590.00 (440V)
VTW-501	5 KVA, half and full cycle spot and seam welding AC power supply	All controls and welding transformer in one cabinet	Net: 105 lbs. Ship: 120 lbs.	595.00 (220V) 645.00 (440V)

TERMS: Net 30 days, F.O.B. Oceanside, California

Prices subject to change without notice

STOCK NO.	DESCRIPTION	INCLUDES	WEIGHT	PRICE
AC POWER SUPPLIES (CONTINUED)				
VTW-600	10 KVA, half and full cycle seam welding AC power supply (special order only — not stocked)	All controls and welding transformer in one cabinet	Net: 140 lbs. Ship: 160 lbs.	770.00 (220V) 825.00 (440V)
VTW-601	10 KVA, half and full cycle spot and seam welding AC power supply	All controls and welding transformer in one cabinet	Net: 150 lbs. Ship: 170 lbs.	840.00 (220V) 895.00 (440V)
WELDING HEADS				
VTA-39	Welding head, miniature	2 ea. 12" welding cables, foot pedal, 1 pair RWMA2 electrodes	Net: 8 lbs. Ship: 15 lbs.	110.00
VTA-33	Welding Head, medium duty, foot operated	2 ea. 12" welding cables, foot pedal, 1 pair RWMA2 electrodes	Net: 20 lbs. Ship: 30 lbs.	225.00
VTA-34	Welding head, medium duty, air operated	2 ea. 12" welding cables, 1 pair RWMA2 electrodes; air system includes filter-regulator, air gauge, air speed control, electric solenoid actuating valve and foot switch	Net: 25 lbs. Ship: 35 lbs.	350.00
VTA-42	Welding head, precision, medium duty	2 ea. 12" welding cables, foot pedal, 1 pair RWMA2 electrodes	Net: 24 lbs. Ship: 35 lbs.	265.00
HANDPIECES				
VTA-10	Poke-type handpiece	6 ft. #4 cable and camlok connector	Net: 4 lbs.	26.50
VTA-11	Seam welding handpiece	6 ft. #4 cable and camlok connector	Net: 4 lbs.	37.50
VTA-13	Ground electrode for use with either the VTA-10 or VTA-11	6 ft. #4 cable and camlok connector	Net: 3 lbs.	15.00
VTA-12	Tweezer-type handpiece	4½ ft. #8 cable and camlok connector	Net: 2 lbs.	85.00
VTA-24	Welding handpiece	4½ ft. #4 cable and camlok connector	Net: 7 lbs.	145.00
ACCESSORIES, MISCELLANEOUS				
VTA-1	Control, timing, non-synchronous, 2-20 cycles		Net: 3 lbs. Ship: 6 lbs.	54.50
VTA-4	Transformer, welding, 2.5 KVA 120/240 primary (.75 volts/turn)		Net: 35 lbs. Ship: 50 lbs.	79.00
VTA-6	Transformer, welding, 5 KVA 240/480 primary (2.0 volts/turn)		Net: 65 lbs. Ship: 80 lbs.	120.00
VTA-21	Transformer, welding 2.5 KVA 550V primary (1.25 volts/turn)		Net: 25 lbs. Ship: 30 lbs.	79.00
VTA-22	Transformer, auto 205/215/225/235V input, 550 volt output, 100 amps max.		Net: 15 lbs. Ship: 20 lbs.	85.00
VTA-38	Bench, steel 42" H x 22" W x 15" D		Net: 50 lbs. Ship: 75 lbs.	115.00
VTA-41	Control, weld speed		Net: 5 lbs. Ship: 9 lbs.	97.50

W-12/4M/ECD/9-60

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