SECTION 14

STUD WELDING EQUIPMENT – RENTAL & NEW EQUIPMENT

FOR INQUIRIES, TO PLACE ORDERS,
SERVICE AND TECHNICAL SUPPORT CONTACT
ANY OF THE FOLLOWING:

OFFICE: 1-800-462-9353
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EMAIL: INFO@SUNBELTSTUDWELDING.COM

SECTION 14

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RENT STUD WELDERS

Sunbelt Stud Welding has CD, Arc and Short Cycle stud welders available for rent to satisfy all applications.

Common stud types / applications are listed below:

CD Applications:

- CD Threaded Studs
- CD Non Threaded Studs
- CD Tap Studs
- CD Cable Tie Bases
- CD Weld Pins
- Insulation Pins
- Power Point Pins
- Cupped Head Pins
- Tap studs

Arc Applications:

- Headed Concrete Anchors
- Headed Shear Connectors
- Weld Thru Deck
- Deformed Bar Anchors
- Threaded Weld Studs
- Non Threaded Weld Studs
- Boiler Tube Pins
- Rectangular Weld Studs
- Collar Studs
- Shoulder Studs

Short Cycle (SC) Applications:

- SC & CD Studs all types
- SC Collar Studs

We accept most major credit cards or we can assist with the credit approval process.

We have a full line of weld studs and accessories to go with your Stud Welder Rental!

For personnel assistance **call 1-800-462-9353** or email **info@sunbeltstudwelding.com**.
We have the expertise to determine the right equipment for your needs!

SECTION 14

STUD WELDING EQUIPMENT – PROCESS & CAPABILITY SUMMARY

CD EQUIPMENT • ARC EQUIPMENT • SHORT CYCLE EQUIPMENT

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Equipment Process And Capability Summary						
Model Designation	Page Number	Automation	Maximum Capacity by Stud Diameter			Comments
			CD	Arc	Short Cycle	
CDi 508 & C08-FS gun	14.7					120V - 10 amps
CDi 1502	14.8		1/4"			120V - 10 amps
CDi 2302	14.9		5/16"			120V - 10 amps
CDi 3102	14.10		3/8"			120V - 10 amps
Pegasar 500 accu	14.11					100 - 240V - 10 amps
C 06-3	14.12					
CI 03	14.13		12 gauge pins			CD Contact Gun
C 08	14.14		3/8"			CD Contact Gun
CA 08	14.15		3/8"			CD Gap Gun
Visar 650	14.16			3/8 "	1/4"	100-230V / 16 amps
Visar 650 & Visar 650 (Shield. gas version)	14.17 14.18					
ARC 800	14.19	Optional		1/2"	7/16"	230V / 50 amps - 400V / 35 amps - 575V / 25 amps
IT 1002	14.20	Optional		1/2"	1/2"	480 / 460 V / 35 amps
Visar 1200	14.21			5/8"	1/2"	200-600V (600V / 20 amps, 400V / 32 amps, 200V / 64 amps)
IT 2002	14.22	Optional		1"	5/8"	480 / 460 V / 63 amps
A 12	14.23			1/2"	1/2"	Arc Stud Welding Gun
A 16	14.24			5/8"	5/8"	Arc Stud Welding Gun
A 22	14.25			7/8"		Arc Stud Welding Gun
Nut Welding Systems	14.26					
A 12 M	14.28					
MARC Nut Welding System	14.29					
MARC Welding Nuts - Type Hex^{Nut}	14.30					

(continued on next page)

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Equipment Process And Capability Summary						
Model Designation	Page Number	Automation	Maximum Capacity by Stud Diameter			Comments
			CD	Arc	Short Cycle	
Automatic Components	14.31	Automation				
CDi 1502 AT	14.32	Automation	1/4"			120V / 10 amps
CDMi 2402	14.33	Automation				120V / 10 amps
CDMi 2402 - Technical Data Sheet	14.34	Automation				
CDMi 2402 - Technical Data Sheet	14.35	Automation				
CDMi 3202	14.36	Automation	3/8"			120V / 10 amps
CDMi 3202 - Technical Data Sheet	14.37	Automation				
CDMi 3202 - Technical Data Sheet	14.38	Automation				
IT 90	14.39	Automation		1"	5/8"	480 / 460V / 63 amps
KAH 412 LA	14.40	Automation	3/8"	1/2"	1/2"	Weld Head
KAH 412	14.41	Automation	3/8"	1/2"	1/2"	Weld Head
PAH-1	14.42	Automation	5/16"		5/16"	Weld Gun
VBZ-3	14.43	Automation	5/16"	5/16"	5/16"	Stud Feeder
PMB-LS2	14.44	Automation				Pneumatic Clamp
PMB-S	14.45	Automation				Pneumatic Clamp
CNC Auto Feed Systems	14.46	Automation				
PC-S Production Center	14.47	Automation	1/2"	1/2"	1/2"	
CPW Series	14.48	Automation				
MPW 1010 CNC Multi Production Welder	14.49	Automation	1/2"	1/2"	1/2"	
MPW 2010 CNC Multi Production Welder	14.49	Automation	1/2"	1/2"	1/2"	

Stud Welding Equipment - CD

CDI 508

- For construction sites and workshops (IP 23)
- Welds to M8 (5/16“) on thin sheets
- Inverter-Capacitor Charging Technology
- Digital Display

M3 to M8 #4 to 5/16”

Welding process	CD (Contact)
Welding material	Mild Steel - Stainless Steel
Welding range	M3 to M8, dia. 2 to 8 mm / #4 to 5/16“, dia. 14 ga to 5/16“
Welding rate	M8 / 5/16“ = 6 studs/min. (voltage 220 V)
Capacitance	50000 µF
Welding time	1 to 3 ms
Energy	1210 Ws
Charging voltage	54 to 220 V
Connection	1 ~, 100 bis 240 V, 50/60 Hz, 10 AT
Connected load	600 VA
Power source	Capacitor
Cooling type	F (temperature controlled cooling fan)
IP Code	IP 23
Dimension LxWxH (without handle)	363 x 163 x 257 mm / 14.3” x 6.4” x 10.1”
Weight	9.9 kg / 21.8 lbs
Order No.	92-10-0508 (Plug E+F; Europe + China), sticker welding parameters, metric“ *) 92-12-0508 (Plug B; USA + Canada), sticker welding parameters, imperial“ *) 92-40-095 (ground cable, 2.5 m, 25 mm², 2x 10“ vice grip)

C 08-FS

- Easy handling
- No settings necessary

M3 to M8 #4 to 5/16”

Welding process	CD (Contact)
Stud material	Mild Steel - Stainless Steel
Welding range	M3 to M8, dia. 2 to 8 mm / #4 to 5/16“, dia. 14 ga to 5/16“
Stud length	6 to 40 mm / 0.24” - 1.57”; longer studs (> 40 mm / 1.57”) with optional accessories
Stud type	Any type or shape (special chucks if required)
Spring pressure	- - -
Welding cable	6.5 m / 21.33‘; 25 mm², SK 50, 7 poles
Workplace noise level	> 90 dB (A) may occur during welding process
IP Code	IP 20
Dimension LxWxH (without cable)	170 x 40 x 140 mm / 6,7” x 1,6” x 5,5”
Weight	0,5 kg / 1,10 lbs
Order No.	92-20-290 (Leg assembly) 92-40-018 (accessories CD to 8 mm – chucks M3 to M8, socket wrench)

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CDI 1502 TECHNICAL DATA SHEET

CDi 1502

Stud Welding Unit (with digital display)
For CD stud welding (capacitor discharge welding) according to current standards

Only power unit in its class (66.000 µF), which officially fulfills the requirements of the Technical Bulletin 0903. Capacitor discharge stud welding with tip ignition" for studs diameter M8 with a required charging voltage of 220 V.

Inverter-Capacitor Charging Technology

- Maximum welding rates
- Minimum energy consumption
- Minimum weight
- Maximum efficiency

Technical Data	
Automatic	Option
Welding range	Studs #4 to 5/16", dia. 14 ga to 5/16"; cupped head pins dia. 14 ga and 12 ga; insulation pins dia. 14 ga and #4 (studs M3 to M8, dia. 2 to 8 mm; cupped head pins dia. 2 and 2.7 mm; insulation pins dia. 2 and 3 mm)
Welding material	Mild steel, stainless steel, aluminum and brass
Welding rate	M3 = 40 studs/min. (Charging voltage 60 V) M8 = 14 studs/min. (Charging voltage 200 V) M8 = 12 studs/min. (Charging voltage 220 V)
Capacitance	66,000 µF
Welding time	1 to 3 msec
Energy	1,600 Ws
Charging voltage	50 to 220 V (stepless voltage regulation)
Primary power	115 V, 50/60 Hz, 10 AT
Power source	Capacitor
Cooling type	F (temperature controlled cooling fan)
IP-code	IP 23 (92-12-1502), IP 21 (92-12-1504)
Dimension L x W x H	15.75" x 8.07" x 9.84" (400 x 205 x 250 mm) without handle
Weight	30.87 lbs (14 kg)
Order No	92-12-1502 92-12-1504 (Automatic)
General Information	
Application - Especially suitable for thin sheets (at least 0.5 mm) - ISO – especially suitable for fixing heating, ventilation and air-conditioning mats (HVAC)	
Process variants - Contact welding - Gap welding	

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CDI 2302 TECHNICAL DATA SHEET

CDi 2302

Stud Welding Unit (with digital display)
For CD stud welding (capacitor discharge welding) according to current standards

Inverter-Capacitor Charging Technology

- Maximum welding rates
- Minimum energy consumption
- Minimum weight
- Maximum efficiency

Technical Data	
Welding range	#4 to 5/16" (7/16" limited), dia. 14 ga to 5/16" (dia. 3/8" limited) (M3 to M8 (M10 limited), dia. 2 to 8 mm (dia. 10 mm limited))
Welding material	Mild steel, stainless steel, aluminum and brass
Welding rate	M3 = 33 studs/min. (Charging voltage 60 V) M8 = 12 studs/min. (Charging voltage 170V) M10 = 9 studs/min. (Charging voltage 210 V)
Capacitance	99,000 µF
Welding time	1 to 3 msec
Energy	2,400 Ws
Charging voltage	50 to 220 V (stepless voltage regulation)
Primary power	115 V, 50/60 Hz, 10 AT
Power source	Capacitor
Cooling type	F (temperature controlled cooling fan)
IP-code	IP 23
Dimension L x W x H	18.90" x 8.07" x 9.84" (480 x 205 x 250 mm) without handle
Weight	37.48 lbs (17 kg)
Order No	92-12-2302
General Information	
Application - Especially suitable for thin sheets (at least 0.5 mm)	
Process variants - Contact welding - Gap welding	

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CDI 3102 TECHNICAL DATA SHEET

CDi 3102

Stud Welding Unit (with digital display)
For CD stud welding (capacitor discharge welding) according to current standards

Inverter-Capacitor Charging Technology

- Maximum welding rates
- Minimum energy consumption
- Minimum weight
- Maximum efficiency

Technical Data	
Welding range	#4 to 7/16", dia. #4 to 3/8" (M3 to M10, dia. 3 to 10 mm)
Welding material	Mild steel, stainless steel, aluminum and brass
Welding rate	M3 = 20 studs/min. (Charging voltage 50 V) M8 = 10 studs/min. (Charging voltage 140 V) M10 = 6 studs/min. (Charging voltage 200 V)
Capacitance	132,000 µF
Welding time	1 to 3 msec
Energy	3,200 Ws
Charging voltage	50 to 220 V (stepless voltage regulation)
Primary power	115 V, 50/60 Hz, 10 AT
Power source	Capacitor
Cooling type	F (temperature controlled cooling fan)
IP-code	IP 23
Dimension L x W x H	18.90" x 8.07" x 9.84" (480 x 205 x 250 mm) without handle
Weight	39.68 lbs (18 kg)
Order No	92-12-3102
General Information	
Application - Especially suitable for thin sheets (at least 0.5 mm)	
Process variants - Contact welding - Gap welding	

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PEGASAR 500 ACCU – TECHNICAL DATA SHEET

Pegasar 500 accu

Battery-powered stud welding unit
For CD stud welding (capacitor discharge welding/ contact welding) according to current standards

Inverter-Capacitor Charging Technology

- Maximum welding rates
- Minimum energy consumption
- Minimum weight
- Maximum efficiency

Technical Data	
Welding range	Studs (mild steel, stainless steel): #4 to 1/4", dia. 1/8" to 1/4" (M3 to M6, dia. Ø 3 to 6 mm), Studs (aluminum): #4 to #6, dia. 1/8" to 5/32" (M3 to M4, dia. 3 to 4 mm)
Welding material	Mild steel, stainless steel, aluminum
Welding rate	M3 = 40 studs/min. (Charging voltage 55 V) M6 = 20 studs/min. (Charging voltage 95 V)
Sheet thickness workpiece	From 0.02" (0.5 mm)
Capacitance	100,000 µF
Welding time	1 to 3 ms
Energy	500 Ws
Charging voltage	50 to 100 V (stepless voltage regulation)
Primary power	100 V to 240 V, 50/60 Hz, 10 AT, in battery operation: 25.55 V
Ground cable	8.2´ (2.5 m), 25 mm², 1 vice grip 10" (not possible to extend), (not included in delivery)
Battery	25.55 V / 5.7 Ah / 145.64 Wh (LiNiCoAlO2) (not included in delivery)
Number of weldings per battery charge	400 welds M6
Battery charging time	Max. 2.5 h
Battery operating time	At least 400 charging cycles
Power source	Capacitor
Cooling type	F (temperature controlled cooling fan)
IP-code	With inserted battery: IP 44, without battery: IP 23
Dimension L x W x H	18.70" x 11.81" x 13.98" (475 x 300 x 355 mm) with handle
Weight	26.46 lbs (12 kg) incl. battery, 23.59 lbs (10.7 kg) without battery
Suitable stud welding gun	C 06-3, welding cable length 3 m (not possible to extend), (not included in delivery)
Order No	92-12-0500 (Pegasar 500 accu) 88-23-484 (Accu 150 – battery) 88-24-066 (ACCU CHARGER 150 - charging unit for battery type Accu 150) 92-40-154 (Ground cable) 92-20-275 (C 06-3 - stud welding gun) 92-40-050 (Accessories up to 6 mm - chucks M3 to M6, socket wrench) 92-40-118 (Accessories up to ¼" - chucks #4, #6, #8, #10, ¼", socket wrench)

C 06-3 – TECHNICAL DATA SHEET

C 06-3

Stud welding gun
for CD stud welding (contact welding)
according to current standards

Technical Data	
Welding range	#4 to 1/4", dia. 14 ga to 1/4" (M3 to M6, dia. 2 to 6 mm), depending on the used stud welding unit
Stud length	0.24" to 1.57" (6 to 40 mm); longer studs (> 40 mm) can be welded with optional accessories
Stud material	Depending on the used stud welding unit
Stud type	Any type or shape (special chucks if required)
Sheet thickness workpiece	From 0.02" (0.5 mm)
Welding cable	9.84´ (3 m)
IP Code	IP 20
Workplace noise level	> 90 dB (A) may occur during welding
Dimension L x W x H	6.70" x 1.57" x 5.51" (170 x 40 x 140 mm) without cable
Weight	1.10 lbs (0.5 kg) without cable
Suitable stud welding unit	Pegasar 500 accu
Order No	92-20-275 (C 06-3) 92-40-050 (Accessories up to 6 mm – chucks M3 to M6, socket wrench) 92-40-118 (Accessories up to ¼" – chucks #4, #6, #8, #10, ¼", socket wrench) 92-12-0500 (Pegasar 500 accu – stud welding unit)

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CI 03 STUD WELDING GUN (FOR INSULATION)

CI 03

Stud Welding Gun (for insulation)
for CD stud welding
according to current standards

Technical Data	
Welding range	Cupped head pins dia. 14 ga/12 ga (dia. 2/2.7 mm)
Pin length	0.37" to 6.00" (9.5 to 152.4 mm)
Pin material	Mild steel, stainless steel
Pin type	Cupped head pins
Spring pressure	Adjustable, arresting
Welding cable	32.81' (10 m)
IP Code	IP 20
Workplace noise level	> 90 dB (A) may occur during welding
Dimension L x W x H	6.89" x 1.97" x 5.71" (175 x 50 x 145 mm) without cable and tripod
Weight	1.54 lbs (0.7 kg) without cable and tripod
Order No	92-20-254

General Information

Application
- Especially suitable for thin sheets (at least 0.5 mm)
- ISO – especially suitable for welding on cupped head pins (for fixing heating, ventilation and air-conditioning mats - HVAC)
- Especially suitable for insulation mats with and without aluminum cover. The cupped head pin has a special tip which permits particularly easy penetration of the insulation materials. Variably adjustable spring pressure allows the stud welding gun to be optimally adjusted to a wide range of material densities
- The fixing method with cupped head pins replaces the complex procedure: weld on pin – press mat over pin – affix clip – pinch off or bend over projecting tip

Process variants
- Contact welding

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C 08 STUD WELDING GUN

C 08

Stud Welding Gun
for CD stud welding
according to current standards

Technical Data	
Welding range	#4 to 5/16", dia. 14 ga to 5/16" (M3 to M8, dia. 2 to 8 mm) other dimensions on request
Stud length	0.24" to 1.57" (6 to 40 mm); longer studs can be welded with optional accessories
Stud material	Mild steel, stainless steel
Stud type	Any type or shape (special chucks if required)
Spring pressure	Adjustable, arresting
Welding cable	21.33' (6.5 m)
IP-Code	IP 20
Workplace noise level	> 90 dB (A) may occur during welding process
Dimension LxWxH (without cable)	6.70" x 1.57" x 5.51" (170 x 40 x 140 mm) without cable
Weight	1.10 lbs (0.5 kg) without cable
Order No.	92-20-256

General Information

Application
- Especially suitable for thin sheets (at least 0.5 mm)
- ISO – especially suitable for welding on insulation pins with flange and ignition tip

Process variants
- Contact welding

Advantages

Structure
- Rigid casing made of impact-resistant plastic
- Torsion-resistant basic shell (casing) to accommodate all function elements (e.g. ball bearing guide) and accessories (e.g. foot ring)
- Zero-play ball linear bearing for guiding the welding piston
- Sealed welding piston guidance
- Ergonomic design
- Compact dimensions
- Stud length freely adjustable (up to 40 mm; from 40 mm with tripod)
- Mechanical structure tested in production

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CA 08 STUD WELDING GUN

CA 08

Stud Welding Gun
for CD and Arc stud welding
according to current standards

Technical Data	
Welding range	#4 to 5/16", dia. 14 ga to 5/16" (M3 to M8, dia. 2 to 8 mm) other dimensions on request
Stud length	0.24" to 1.57" (6 to 40 mm); longer studs can be welded with optional accessories
Stud material	Mild steel, stainless steel, aluminum, brass
Stud type	Any type or shape (special chucks if required)
Stroke	Adjustment range 0.18" (4.5 mm), lockable
Spring pressure	Adjustable, arresting
Welding cable	9.84' (3 m)
IP-Code	IP 20
Workplace noise level	> 90 dB (A) may occur during welding process
Dimension LxWxH (without cable)	7.48" x 1.57" x 5.51" (190 x 40 x 140 mm) without cable
Weight	1.54 lbs (0.7 kg) without cable
Order No.	92-20-255

General Information

Application
- Especially suitable for thin sheets (at least 0.5 mm)
- ISO – especially suitable for welding on insulation pins with flange and ignition tip

Process variants
- Gap welding
- Short cycle drawn arc welding

Advantages

Structure
- Rigid casing made of impact-resistant plastic
- Torsion-resistant basic shell (casing) to accommodate all function elements (e.g. ball bearing guide) and accessories (e.g. foot ring)
- Zero-play ball linear bearing for guiding the welding piston
- Sealed welding piston guidance
- Ergonomic design
- Compact dimensions
- Stud length freely adjustable (up to 40 mm; from 40 mm with tripod)
- Mechanical structure tested in production

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VISAR 650 – TECHNICAL DATA SHEET

Visar 650

Stud welding unit
For Arc stud welding
(short cycle drawn arc welding
(BH 10), drawn arc welding (BH 100))
according to current standards

Inverter-Capacitor Charging Technology

- Maximum welding rates
- Minimum energy consumption
- Minimum weight
- Maximum efficiency

Technical Data	
Welding range	BH 100: dia. 14 ga to 5/16" (dia. 2 to 8 mm), #4 to 3/8" (M3 to M10) (type RD) BH 10: dia. 14 ga to 1/4" (dia. 2 to 6 mm), #4 to 1/4" (M3 to M6)
Welding material	Mild steel, stainless steel
Welding rate	M3 = 40 studs/min M8 = 12 studs/min
Welding current	650 A (max.)
Current adjustment range	100 to 650 A
Welding time	5 to 200 ms (stepless)
Primary power	100 to 240 V, 1 phase, 50/60 Hz, 16 AT
Primary plug	2-pin grounded safety plug
Connected load	3 kVA
Cooling type	F (temperature controlled cooling fan)
IP-code	IP 44
Dimension L x W x H	18.66" x 13.27" x 13.82" (474 x 337 x 351 mm) with handle
Weight	39.68 lbs (18 kg)
Suitable stud welding gun	A 12, welding cable length 15.91' (4.8 m) (not possible to extend),
Order No	93-66-0650 (Visar 650) 93-40-020 (Ground cable) 93-20-270 (A 12 – Stud welding gun) 93-40-022 (PSC-1 – Ceramic leg assembly) 88-24-466 (Toolbag)

(Technical data may change)

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VISAR 650 | VISAR 650 (SHIELD GAS VERSION)

VISAR 650

• Robust inverter unit with single-phase mains connection (100 to 240 V)
• Compact lightweight unit (18 kg) with high protection class (IP 44)
• Current setting range from 25 to 650 A

M3 to M10 (type RD) - #4 to 7/16" (type RD)

VISAR 650 (SHIELD. GAS VERSION)

Further development:
• with display and shielding gas connection
• USB port for saving and loading welding programs
• Comprehensive customer-specific setting options as well as detailed process optimisation and control

M3 to M10 (type RD) - #4 to 7/16" (type RD)

Welding process	Arc = Drawn arc stud welding, SC = Short cycle stud welding				Arc = Drawn arc stud welding, SC = Short cycle stud welding			
Welding material	Mild Steel - Stainless Steel				Mild Steel - Stainless Steel - Aluminum [1] Welding element is not standardized according to DIN EN ISO 13918, but manufactured by the manufacturer's discretion. The welding parameters should be determined by test weldings.			
Technology	Inverter				Inverter			
Equipment Welding with ceramic ferrule Welding with shielding gas Process control	 x -- --				 x x x			
Display	--				Digital			
Welding range	Arc: M3 to M10 (type RD), dia. 2 to 8 mm / #4 to 7/16" (type RD), dia. 14 ga to 5/16" SC: M3 to M6, dia. 2 to 6 mm #4 to 1/4", dia. 14 ga to 1/4"				Arc: M3 to M10 (type RD), dia. 2 to 8 mm / #4 to 7/16" (type RD), dia. 14 ga to 5/16" SC: M3 to M6, dia. 2 to 6 mm #4 to 1/4", dia. 14 ga to 1/4"			
Welding rate (Duty cycle [2])	25 °C	100 %	50 %	35 %	25 °C	100%	50%	35%
	F [studs/min]	8/min.	14/min.	18/min.	F [studs/min]	8/min.	14/min.	18/min.
	t [ms]	160	160	160	t [ms]	160	160	160
	I_2 [A]	650	650	650	I_2 [A]	650	650	650
	U_2 [V]	30	30	30	U_2 [V]	30	30	30

2) The term "duty cycle" refers to the ratio of welding duration to work pause of a stud welding unit. It describes the uninterrupted operating time of a unit over a period of 10 minutes. The largest possible studs are used in the test.
100 % duty cycle = 10 min. of continuous welding, no shutdown due to over-temperature.
50 % duty cycle = 5 min. of welding followed by 5 min. pause.
35 % duty cycle = 3.5 min. of welding followed by 6.5 min. pause.

(continued on next page)

VISAR 650 | VISAR 650 (SHIELD GAS VERSION) – (CONTINUED)

VISAR 650

• Robust inverter unit with single-phase mains connection (100 to 240 V)
• Compact lightweight unit (18 kg) with high protection class (IP 44)
• Current setting range from 25 to 650 A

M3 to M10 (type RD) - #4 to 7/16" (type RD)

VISAR 650 (SHIELD. GAS VERSION)

Further development:
• with display and shielding gas connection
• USB port for saving and loading welding programs
• Comprehensive customer-specific setting options as well as detailed process optimization and control

M3 to M10 (type RD) - #4 to 7/16" (type RD)

Welding current	650 A (max.)	650 A (max.)
Current adjustment range	25 - 650 A	25 - 650 A
Welding time	5 - 200 ms (stepless)	5 - 200 ms (stepless)
Primary power	100 - 240 V, 1 phase, 50/60 Hz, 16 AT	100 - 240 V, 1 phase, 50/60 Hz, 16 AT
Primary plug	16 A, 2-pin grounded safety plug (plug type F; CEE 7/4)	16 A, 2-pin grounded safety plug (plug type F; CEE 7/4)
Connected load	3 kVA	3 kVA
Cooling type	F (temperature controlled cooling fan)	F (temperature controlled cooling fan)
IP Code	IP 44	IP 44
Dimension LxWxH (without handle)	474 x 337 x 351 mm / 18.66" x 13.27" x 13.82"	474 x 337 x 351 mm / 18.66" x 13.27" x 13.82"
Weight	18 kg / 40 lbs	18 kg / 40 lbs
Suitable guns	A 12, A 12-FL (welding cable not possible to extend)	A 12, A 12-FL (welding cable not possible to extend)
Order No.	93-60-0650 (Plug E+F; Europe + China) 93-66-0650 (Plug B; USA, Canada + China) 93-40-020 (Ground cable, 5 m, 25 mm², 2 vice grips 10") 88-24-466 (Toolbag) (Accessories and welding gun are not included)	93-60-0652 (Plug E+F; Europe + China) 93-66-0652 (Plug B; USA, Canada + China) 93-40-020 (Ground cable, 5 m, 25 mm², 2 vice grips 10") 88-24-466 (Toolbag) (Accessories and welding gun are not included)

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ARC 800 STUD WELDING UNIT

ARC 800

Stud Welding Unit
for Arc stud welding
according to current standards

Technical Data	
Gas/Automation	Series/Option
Welding range	#4 to 1/2", dia. 14 ga to 3/8" (M3 to MR12, dia. 2 to 10 mm)
Welding material	Mild steel, stainless steel
Welding rate	7 to 17 studs/min (depending on application and stud dia.)
Welding current	800 A
Welding time	5 to 1,000 msec
Primary power	230/460 V 3 phases, 50/60 Hz, 50/35 AT or 575 V, 3 phases, 50/60 Hz, 25 AT (alternative input voltages available)
Power source	Transformer/Rectifier
Cooling type	F (temperature controlled cooling fan)
IP-code	IP 23
Dimension L x W x H	18.50" x 9.06" x 8.66" (470 x 230 x 220 mm) without handle
Weight	81.57 lbs (37 kg)
Order No	93-16-0702A (Gas) 93-15-0702A (Gas) 93-16-0704A (Gas/Automation) 93-15-0704A (Gas/Automation)
General Information	
Application • Especially suitable for thicker sheets of about 2 mm or higher	
Process variants • Short cycle drawn arc welding • Drawn arc welding	
Equipment • Welding with ceramic ferrule (series) • Welding with shielding gas (series) • Automatic (optional)	

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IT 1002 STUD WELDING UNIT

IT 1002

Stud Welding Unit
for Arc stud welding
according to current standards

Inverter

- Maximum welding quality
- Maximum welding rates
- Minimum energy consumption
- Minimum weight
- Maximum efficiency

Technical Data	
Gas/Automation/Process control	Series/Option/Option
Welding range	#4 to 5/8", dia. 14 ga to 9/16" (M3 to MR16, dia. 2 to 14 mm)
Welding material	Mild steel, Stainless steel, Aluminum
Welding rate	1/2" (M12) = 25 studs/min
Welding current	1,000 A (max.)
Current adjustment range	Stud welding 100 to 1,000 A, electrode 50 to 400 A (stepless)
Welding time	5 to 1,000 msec (stepless)
Primary power	480/460 V, 3 phases, 50/60 Hz, 35 AT (alternative input voltages available)
Connected load	50 KVA (with 400 V mains), 40 kW
Cooling type	F (temperature controlled cooling fan)
IP-code	IP 23
Dimension L x W x H	26 " x 11" x 13.4" (660 x 280 x 340 mm) without handle
Weight	63.9 lbs (29 kg)
Order No	93-66-1202 (Gas) 93-66-1204 (Gas/Automation) 93-66-1206 (Gas/Automation/Process control)
General Information	
Application • Especially suitable for thicker sheets of about 2 mm or higher	
Process variants • Short cycle drawn arc welding • Drawn arc welding	
Equipment • Welding with ceramic ferrule (series) • Welding with shielding gas (series) • Automation (optional) • Process sequence control (optional)	

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VISAR 1200

- All-rounder for workshops and construction sites – whether with shielding gas or with ceramic ferrule
- Compact lightweight unit with power: 1 200 A but just 20.5 kg
- Extremely wide current setting range from 25 to 1 200 A
- USB port for saving and loading welding programs
- Comprehensive customer-specifi c setting options as well as detailed process optimisation and control

M3 to M16 - #4 to 5/8”

Welding process	Arc = Drawn arc stud welding, SC = Short cycle stud welding			
Welding material	Mild Steel - Stainless Steel - Aluminium [1] Welding element is not standardized according to DIN EN ISO 13918, but manufactured by the manufacturer‘s discretion. The welding parameters should be determined by test weldings.			
Technology	Inverter			
Equipment Welding with ceramic ferrule Welding with shielding gas Process control	 x x x			
Display	Digital			
Welding range	M3 to M16, dia. 2 to 16 mm / #4 to 5/8” , dia. 14 ga to 9/16”			
Welding rate (Duty cycle [2])	25 °C	100 %	50 %	35 %
	F [studs/min]	11	16	21
	t [ms]	600	600	600
	I_2 [A]	1200	1200	1200
	U_2 [V]	30	30	30
[2] The term “duty cycle” refers to the ratio of welding duration to work pause of a stud welding unit. It describes the uninterrupted operating time of a unit over a period of 10 minutes. The largest possible studs are used in the test. 100 % duty cycle = 10 min. of continuous welding, no shutdown due to overtemperature. 50 % duty cycle = 5 min. of welding followed by 5 min. pause. 35 % duty cycle = 3.5 min. of welding followed by 6.5 min. pause.				
Welding current	1 200 A (max.) at 50 V			
Current adjustment range	25 to 1 200 A (stepless)			
Welding time	5 to 1 500 ms (stepless)			
Primary power	200 to 600 V, 3 phases, 50/60 Hz			
Cooling type	F (temperature controlled cooling fan)			
IP Code	IP 43			
Dimension LxWxH (without handle)	472.5 x 355 x 358 mm / 18.60” x 13.98” x 14.09”			
Weight	20.5 kg / 45 lbs			
Suitable guns	A 12, A 12-FL, A 16			
Order No.	93-60-0120 (Europe + China) 93-66-0120 (USA, Canada + China) 93-40-020 (Ground cable, 5 m, 25 mm², 2x 10” vice grip) 88-24-466 (Toolbag) (Accessories and welding gun are not included)			

IT 2002 STUD WELDING UNIT

IT 2002

Stud Welding Unit
for Arc stud welding
according to current standards

Inverter

- Maximum welding quality
- Maximum welding rates
- Minimum energy consumption
- Minimum weight
- Maximum efficiency

Technical Data	
Gas	Option
Welding range	#4 to 1", dia. 14 ga to 1" (M3 to M24, dia. 2 to 25 mm)
Welding material	Mild steel, Stainless steel, Aluminum
Welding rate	Dia. 7/8" = 7 studs/min (dia. 22 mm = 7 studs/min)
Welding current	2,000 A (max.)
Current adjustment range	300 to 2,000 A (stepless)
Welding time	5 to 1,500 msec (stepless)
Primary power	480/460 V, 3 phases, 50/60 Hz, 63 AT (alternative input voltages available)
Connected load	100 KVA (with 400 V mains), 80 kW
Cooling type	F (temperature controlled cooling fan)
IP-code	IP 23
Dimension L x W x H	23.6" x 19.7" x 32.7 " (600 x 500 x 830 mm) without handle
Weight	209.4 lbs (95 kg)
Order No	93-66-2201 93-66-2202 (Gas)
General Information	
Application • Especially suitable for thicker sheets of about 2 mm or higher • Especially suitable for welding of concrete anchors/shear connectors for job site applications • Suitable for through deck welding	
Process variants • Short cycle drawn arc welding • Drawn arc welding	
Equipment • Welding with ceramic ferrule (series) • Welding with shielding gas (series)	

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A 12 STUD WELDING GUN

A 12

Stud Welding Gun
for Arc stud welding
according to current standards

Technical Data	
Welding range	#4 to 1/2", dia. 14 ga to 1/2" (M3 to M12, dia. 2 to 12 mm)
Stud length	0.39" to 15.74" (10 to 400 mm) depending on tripod
Stud material	Mild steel, Stainless steel
Stud type	Any type or shape (special chucks if required)
Length compensation	0.12" (3 mm) automatic
Stroke Adjustment range	0.12" (3 mm), lockable
Spring pressure	Adjustable, arresting
Welding cable	16.40' (5 m)
IP-code	IP 20
Workplace noise level	Up to 90 dB (A) may occur during welding
Dimension L x W x H	7.87" x 2.56" x 5.51" (200 x 65 x 140 mm) without cable, with foot piece
Weight	1.76 lbs (0.8 kg) without cable and tripod
Order No	93-20-270 (gun including foot piece) 93-40-021 (tripod gas complete) 93-40-022 (tripod ceramic ferrule (CF) complete)
General Information	
Application • Especially suitable for thicker metal sheets from approx. 2 mm • ISO – especially suitable for welding on ARC-ISO and Fiberfix pins • Automatic compensation of length tolerance of welding elements through integrated length adjustment	
Process variants • Short cycle drawn arc welding • Drawn arc welding with ceramic ring or shielded gas	

A 16 STUD WELDING GUN (DAMPED)

A 16

Stud Welding Gun (damped)
for Arc stud welding
according to current standards

Technical Data	
Welding range	Dia. #4 to 5/8" (dia. 3 to 16 mm)
Stud length	0.39" to 9.45" (10 to 240 mm) depending on tripod
Stud material	Mild steel, Stainless steel
Stud type	Any type or shape (special chucks if required)
Length compensation	0.24" (6 mm) automatic
Stroke Adjustment range	0.16" (4 mm), (0.01" (0.25 mm) steps, arresting)
Damping	Adjustable oildamper
Welding cable	15.91', 1/0 (4.85 m, 50 mm^2)
IP-code	IP 20
Workplace noise level	Up to 90 dB (A) may occur during welding
Dimension L x W x H	10.24" x 2.91" x 8.66" (260 x 74 x 220 mm) without cable, with foot piece
Weight	4.41 lbs (2 kg) without cable
Order No	93-21-280

General Information

Application
- Especially suitable for thicker metal sheets from approx. 2 mm
- Automatic compensation of length tolerance of welding elements through integrated length adjustment

Process variants
- Short cycle drawn arc welding
- Drawn arc welding with ceramic ring or shielded gas

Advantages

Structure
- Rigid casing made of impact-resistant plastic
- Slide bearing for guiding the welding piston
- Sealed welding piston guidance
- Ergonomic design
- Compact dimensions
- Lift adjustment
- Stud length freely adjustable
- Mechanical structure tested in production

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A 22 STUD WELDING GUN (DAMPED)

A 22

Stud Welding Gun (damped)
for Arc stud welding
according to current standards

Technical Data	
Welding range	Dia. 9/16" to 7/8" (dia. 1") (dia. 14 to 22 mm (dia. 25 mm))
Stud length	0.39" to 15.35" (10 to 390 mm) depending on tripod
Stud material	Mild steel, Stainless steel
Stud type	Any type or shape (special chucks if required)
Length compensation	0.35" (9 mm) automatic
Stroke Adjustment range	0.24" (6 mm), (0.01" (0.25 mm) steps, arresting)
Damping	Adjustable oildamper
Welding cable	15.91', 3/0 (4.85 m, 95 mm²)
IP-code	IP 20
Workplace noise level	Up to 90 dB (A) may occur during welding
Dimension L x W x H	10.24" x 2.91" x 8.66" (260 x 74 x 220 mm) without cable, with foot piece
Weight	4.41 lbs (2 kg) without cable
Order No	93-21-290

General Information

Application
- Especially suitable for thicker metal sheets from approx. 2 mm
- Especially suitable for through deck welding
- Automatic compensation of length tolerance of welding elements through integrated length adjustment

Process variants
- Drawn arc welding with ceramic ring

Advantages

Structure
- Rigid casing made of impact-resistant plastic
- Slide bearing for guiding the welding piston
- Sealed welding piston guidance
- Ergonomic design
- Compact dimensions
- Lift adjustment
- Stud length freely adjustable
- Mechanical structure tested in production
- Reduced heating of the stud welding gun body thanks to externally positioned welding current cable

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A 12 M – NUT & STUD WELDING GUN

A 12 M

For welding on weld nuts type Hex^{Nut}

For welding on perforated and unperforated sheet metal

Particularly suitable for workshop and assembly areas

Technical Data	
Welding range	MARC welding nuts type HexNut M6 to M12 Hexagon nuts DIN 934 M6 to M12 SC welding elements M5 to M10, dia. 5 to 8 mm / 3/16" to 3/8", dia. 3/16" to 5/16" CD welding elements M5 to M10, dia. 5 to 8 mm / 3/16" to 3/8", dia. 3/16" to 5/16"
Sheet metal thickness	Nut welding: 1 to 3 mm / 0.04" to 0.12" Stud welding: min. 1 mm / min. 0,04" (other sheet thicknesses on request)
Welding elements material	MARC welding nuts type HexNut: Stainless steel (A2-50) Hexagon nuts DIN 934: Stainless steel (A2-50,-70 / A4-50,-70, A5-50,-70) SC welding elements: Mild steel, stainless steel, type PT / UT / IT CD welding elements: Mild steel stainless steel, type PS / US / IS
Welding elements type	MARC welding nuts type HexNut, hexagon nuts according to DIN 934 SC welding elements and CD welding elements according to DIN EN ISO 13918
Welding sequence	Up to 4 weld nuts/min. The maximum welding sequence is limited by a large number of parameters.
Length compensation	3 mm / 0.12", automatic
Lift	Adjustment range 3 mm / 0.12", arresting
Spring force	Adjustable, arresting
Welding cable	Welding gun: 4.85 m connecting cable, 35 mm² 1.73 m field former cable, 10 mm² (0.61 m welding current connection, 0.85 m control cable connection) Ground cable: 5 m, 25 mm²
Workplace noise level	Up to 90 dB (A) may occur during welding
Dimension L x W x H	200 x 65 x 140 mm / 7.87" x 2.56" x 5.51" (without cable, with leg assembly) Shielding gas leg assembly D = 60 mm Protective hose L = 4300 mm
Weight	0.8 kg / 1.76 lbs (without cable)
General Information	
Design • Robust housing made of impact resistant plastic • Backlash-free ball linear bearing for guiding the welding piston • Sealed welding piston guide • Integrated lift and spring force adjustment	
Safety • Locking spring adjustment • High safety against unintentional change of selected settings • Guide protected against welding spatter	
Welding • Automatic length compensation	

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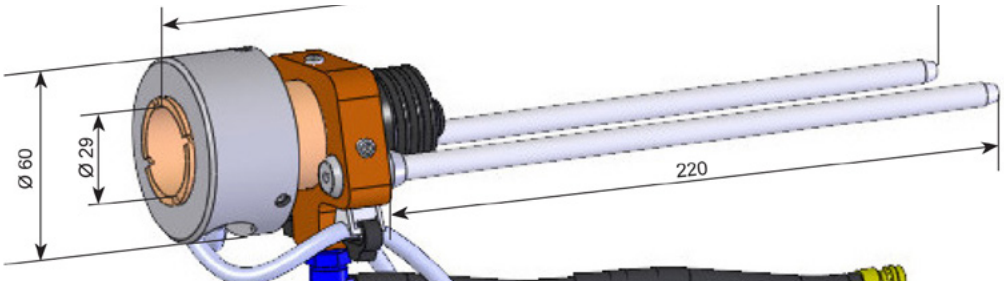
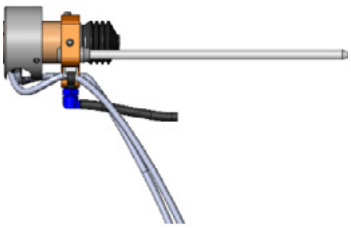
A 12 M – NUT & STUD WELDING GUN

Equipment for A 12 M

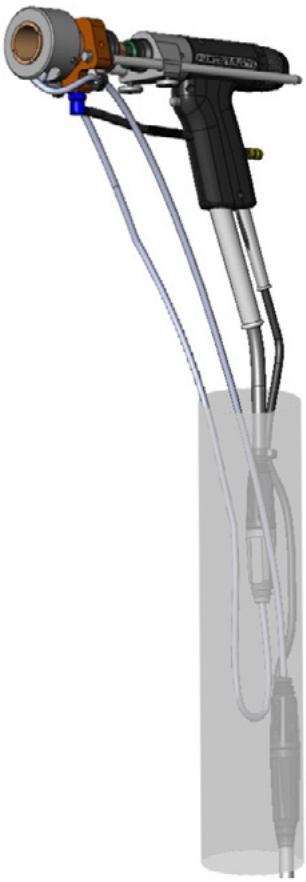




Shielding gas leg assembly with field former

D = 60,
Legs 8 x 220
With shielding gas connection

Order number: 88-26-880



Protective hose for A 12 M to protect the welding cables and the field former cable from dirt, dust and welding sparks

Length: 430 cm
Width: 13.5 cm

Order number: 80-10-2769

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MARC NUT WELDING SYSTEM

Nut welding systems for welding with magnetic rotating arc

- For welding of welding nuts of type Hex^{Nut}
- For welding on perforated and unperforated metal sheets
- Especially suitable for workshop and assembly area
- Up to 4 welding nuts/min

Nut and Stud Welding Gun - A 12 M

Stud Welding Unit - IT 1002

	Nuts M6 to M12 - Studs M5 to M10 / 3/16" to 3/8
Suitable stud welding unit	IT 1002
Welding process	Drawn arc welding with magnetically impelled electric arc and shielding gas
Welding range	MARC welding nuts type HexNut M6 to M12 Hexagon nuts DIN 934 M6 to M12 SC welding elements M5 to M10, dia. 5 to 8 mm / 3/16" to 3/8", dia. 3/16" to 5/16" CD welding elements M5 to M10, dia. 5 to 8 mm / 3/16" to 3/8", dia. 3/16" to 5/16"
Wall thickness	Nut welding: 1 to 3 mm / 0.04" to 0.12" Stud welding: min. 1 mm / min. 0,04" (other sheet thicknesses on request)
Welding element material	MARC welding nuts type HexNut: Stainless steel (A2-50) Hexagon nuts DIN 934: Stainless steel (A2-50,-70 / A4-50,-70, A5-50,-70) SC welding elements: Mild steel, stainless steel, type PT / UT / IT CD welding elements: Mild steel stainless steel, type PS / US / IS
Welding element type	MARC welding nuts type HexNut, hexagon nuts according to DIN 934 SC welding elements and CD welding elements according to DIN EN ISO 13918
Welding rate	Nut welding: up to 4 welding nuts/min. Stud welding: M10 = 25 studs/min The maximum welding sequence is limited by a number of parameters
Length compensation	3 mm / 0.12", automatic
Lift	Adjustment range 3 mm / 0.12", lockable
Spring pressure	Adjustable, arresting
Welding cable	Welding gun: 4.85 m connecting cable, 35 mm² 1.73 m field former cable, 10 mm² (0.61 m welding current connection, 0.85 m control cable connection) Ground cable: 5 m, 25 mm²
IP Code	IT 1002: IP 23, A 12 M: IP 20
Workplace noise level	Up to 90dB (A) may occur during welding
Dimension LxWxH	200 x 65 x 140 mm / 7.87" x 2.56" x 5.51" (without cable, with leg assembly) Shielding gas leg assembly D = 60 mm Protective hose L = 4300 mm
Weight	0.8 kg / 1.76 lbs (without cable)
Order No.	93-20-242 (Welding gun AM 12A) 93-60-1202 (Welding unit IT 1002) 93-40-020 (Ground cable, 5m 25 mm2, 2 vice grips 10") Complete equipment for AM 12 A: 93-40-0030068 for HexNut M6 93-40-003008 for HexNut M8 93-40-003010 for HexNut M10 93-40-003012 for HexNut M12

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MARC NUT WELDING SYSTEM

Order No.	93-20-242 (Welding gun AM 12A) 93-60-1202 (Welding unit IT 1002) 93-40-020 (Ground cable, 5m 25 mm2, 2 vice grips 10") Complete equipment for AM 12 A: 93-40-0030068 for HexNut M6 93-40-003008 for HexNut M8 93-40-003010 for HexNut M10 93-40-003012 for HexNut M12 Accessories – Nut welding 88-16-881 Nut fixture DIN 934 M6 88-16-882 Nut fixture DIN 934 M8 88-16-883 Nut fixture DIN 934 M10 88-16-884 Nut fixture DIN 934 M12

Dimension of welding element					
	Dimension	**M6**	**M8**	**M10**	**M12**
	Height HexNut	8	8	9	11
	Width across flats	AF14	AF14	AF17	AF19
Bore diameter	Bore diameter - metal sheet (based on DIN EN ISO 4032)	10.6+0.1…+0.4	10.6+0.1…+0.4	12.6+0.1…+0.4	14.9+0.1…+0.4
Tightening torque	(μ - 0,18)	3.8	9.5	19.0	33.0

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MARC WELDING NUTS – TYPE HEX^{NUT}

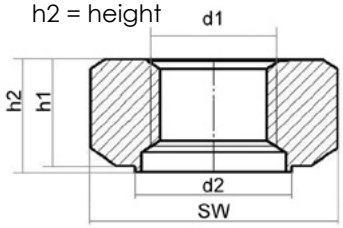
MATERIAL A2-50

Equipping the Welding Gun

Select a chuck and the corresponding chuck adaptor suitable for your welding element.

Welding elements for nut welding (MARC welding nuts):

d1 = size of the metric thread
WAF = width across flats
h1 = height in welded state
h2 = height



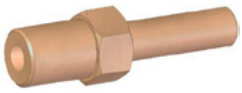
A 12 M - Suitable welding gun for manual stud feeding

WAF	d1	d2 $^{-0.1}$ in mm	Suitable for d_{hole} in mm	h1 in mm	h2 in mm
14	M6	10.5	10.7 to 11.0	7.5	8
14	M8	10.5	10.7 to 11.0	7.5	8
17	M10	12.5	12.7 to 13.0	8.5	9
19	M12	14.8	15.0 to 15.3	10.5	11

		Diameter			
		M6	M8	M10	M12
		Order No.	Order No.	Order No.	Order No.
Material	A2-50	60-06-0082*	60-08-0082A*	60-10-0092*	60-12-0112*

Sleeve Fixture	88-22-532	88-21-107	88-21-108	88-21-109
				

Chuck adapter - 88-26-647
for M8 - Internal thread



Hex^{Hut}

Hex^{Hut}	Nut fixture (Hex^{Nut})
0 d_1	
M6	88-22-532
M8	88-21-107
M10	88-21-108
M12	88-21-109

Chuck adapter for use with studs on only.

Minimum order quantity, delivery time and price upon request.

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SECTION 14

STUD WELDING EQUIPMENT – AUTOMATIC COMPONENTS

FOR INQUIRIES, TO PLACE ORDERS,
SERVICE AND TECHNICAL SUPPORT CONTACT
ANY OF THE FOLLOWING:

OFFICE: 1-800-462-9353
713-939-8903

EMAIL: INFO@SUNBELTSTUDWELDING.COM

CDI 1502 AT

Stud Welding Unit (with digital display)

For capacitor discharge stud welding according to current standards.

- Entry level automation for semi-automatic use.
- Simple library function for ease of use.

Unbeatable new power pack

- With efficient inverter-capacitor charging technology.
- Enormous time and energy savings (30 % less energy!)
- Highest cycle sequence of its class (up to 40 studs/min.)
- 20 % energy reserve due to 220 V charging voltage.
- Simple operation & minimal weight (20% lighter than previous model).
- Extreme long life due to robust and functional industrial design.

Highest level of quality and safety

- Capacitor formation recorded - Quality control for consistent capacitor quality through automated formation.
- Shock-proof capacitor battery - No contact of the capacitors to the device housing; sparkover (short circuit) is therefore not possible!
- Cooling channel - Protects the electronic components from getting soiled. Ideal cooling of the inverter charging p.c. board for high sequence cycles.

Technical Data	
Welding material	Mild steel, stainless steel, aluminum and brass
Equipment	Automation
Display	Digital
Welding range	Studs: M3 to M8, dia. 2 to 8 mm / #4 to 5/16", dia. 14 ga to 5/16" Cupped head pins: dia. 2 and 2.7 mm / 14 ga and 12 ga Insulation pins: dia. 2 and 3 mm / 14 ga and #4
Welding rate	M3 / #4 = 40 studs/min. (voltage 60 V) M8 / 5/16" = 14 studs/min. (voltage 200 V)
Capacitance	66,000 µF
Welding time	1 to 3 msec
Energy	1,600 Ws
Charging voltage	50 to 220 V (stepless voltage regulation)
Primary power	230 V/115 V*, 50/60 Hz, 10 AT (slow blow) (*alternative primary power see order number below)
Connected load	600 VA
Power source	Capacitor
Cooling type	F (temperature controlled cooling fan)
IP-code	IP 21
Dimension L x W x H	15.75" x 8.07" x 9.84" (400 x 205 x 250 mm) without handle
Weight	30.87 lbs (14 kg)
Suitable guns	PAH-1
Order No	92-10-1504B (230 V) 92-12-1504B (115 V) 92-13-1504B (100 V)

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CDMI 2402 TECHNICAL DATA SHEET

CDMi 2402

Stud Welding Unit
for CD stud welding
(capacitor discharge welding)
according to current standards

Inverter-Capacitor Charging Technology

- Maximum welding rates
- Minimum energy consumption
- Minimum weight
- Maximum efficiency

Technical Data	
Automation	Series
Welding range	#4 to 5/16" (7/16" limited), dia. 14 ga to 5/16" (dia. 3/8" limited) M3 to M8 (M10 limited), dia. 2 to 8 mm (dia. 10 mm limited)
Welding material	Mild steel, Stainless steel, Aluminum, Brass
Welding rate	M3 = 40 studs/min. (Charging voltage 60 V) M8 = 21 studs/min. (Charging voltage 170 V) (M10 = 17 studs/min. (Charging voltage 210 V))
Capacitance	99 000 µF/33 000 µF*
Welding time	1 to 3 msec
Energy	2 400 Ws/800 Ws*
Charging voltage	50 to 220 V (stepless voltage regulation)
Primary power	115 V, 50/60 Hz, 10 AT
Power source	Capacitor
Cooling type	F (temperature controlled cooling fan)
IP-Code	IP 21
Dimension L x W x H	22.44" x 11.22" x 11.42" (570 x 285 x 290 mm) without handle
Weight	57.32 lbs (26 kg) * with change over of capacitors
Order No	92-12-22412 (Automation)
General Information	
Application • Especially suitable for thin sheets (at least 0.5 mm)	
Process variants • Contact welding • Gap welding	
Equipment • Automation (series) • Menu navigation in various languages: German, English, French, Italian, Russian, Portuguese, Spanish and Chinese	

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CDMI 2402 TECHNICAL DATA SHEET

Advantages
Features • Microcontroller – for precise process times, optimal functional reliability and maximum operating convenience • Function monitoring – automatic function test following power-up; monitoring of all internal system functions • Display of error codes – on LCD display • Function control – All functions are visible on the operator panel via LED or display
Structure • Compact • Robust – metal housing withstands rough treatment in shop and on site • Industrial plugs – standardised and sturdy plugs • Two ground connections – direct coupling of several stud welding machines possible when installed in complex welding systems
Safety • With integrated mains filter (protection against voltage peaks) • Optimal for construction sites with large mains voltage fluctuations – use even with critical voltage supply (- 25 % + 20 %) • Fulfills the requirements according to DIN EN 60974-10: 2008-09 - EMC test • Fulfills the requirements according to DIN EN 60974-1: 2013-06 - Logged high voltage test • Logged capacitor forming for quality control of the stud welding capacitors • Controlled capacitor forming – step-by-step charging of capacitors after long standstill times for longer service life of capacitors • Retriggering lock-out – prevents welding on a welding element that has already been welded • Thermal control of inverter-capacitor charging unit and internal temperature of stud welding unit– automatic switch-off in the event of overheating • Temperature controlled cooling fan – reduces noise and dust in the stud welding unit (greater system reliability) • Control unit galvanically separated from welding lines – high degree of functional safety • Optimal cooling air stream – protection of the electronic components against contamination and ideal cooling of the inverter-capacitor charging circuit board for high cycle sequences • Shock-resistant operation panel – operation panel protected by protruding casing • Shock-resistant capacitors – capacitors protected by shock proofing elements • Accessory: Control guard made of acrylic glass (lockable) – prevents damage and unauthorised access
Welding • Graphic display – clear operator guidance via large LCD display • Setting of charging voltage in V and charging energy in Ws – when changing the charging voltage, the charging energy is automatically adjusted • Process sequence control – detection and evaluation of influencing variables of the welding process via the process control (CP); after every welding, a comparison of the reference CP value and the actual values is performed; display of the actual and target value; welding stop when limit values are exceeded can be activated; limit values can be selected in steps; manual entry of CP value possible • 15 programs can be stored – in every program, the parameters (charging voltage, capacity, CP settings and automatic settings) can be selected digitally via a superior control system and specific to the application • Remote control of the stud welding machines via standardised RS232 interface possible – the stud welding machines can be controlled directly via the PC or CNC welding systems • Library function – library with stored welding parameters for different diameter and material combinations for a quick start of the welding process • User-specific settings– weld counter (display of previously executed welds); menu navigation in various languages; units (metric, imperial); date; time; setting of the transmission rate of the interfaces

(continued on next page)

CDMI 2402 TECHNICAL DATA SHEET

Advantages
Welding Gun / welding head test – functionality check of the welding guns or the welding heads with a lifting test (check of the lifting function of the gap welding guns and bolt welding heads without contact with the workpiece); functionality check of the welding guns or the welding heads by recording the movement time of the solenoid from triggering to the contact with the workpiece • Reading out of CP values via standardised RS232 interface – for the output of data such as the date, time and welding parameters of each weld with the superior control system; welding parameters of every weld are logged • Powerful – built-in power reserves • Inverter-capacitor charging technology – makes high cycle rates possible • Trouble-free changing of welding voltage polarity possible by reconnecting welding current and ground cables • Use of special capacitors (developed for stud welding) • Capacitance switching – 33 000 µF or 99 000 µF
Suitable stud welding guns/heads • C 08 • CA 08 • PAH-1 • KAH 412 • KAH 412 LA

Issue 06/14
(Technical data may change)

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CDMI 3202 TECHNICAL DATA SHEET

CDMi 3202

Stud Welding Unit
for CD stud welding
(capacitor discharge welding)
according to current standards

Inverter-Capacitor Charging Technology

- Maximum welding rates
- Minimum energy consumption
- Minimum weight
- Maximum efficiency

Technical Data	
Automation	Series
Welding range	#4 to 7/16", dia. 14 ga to 3/8" M3 to M10, dia. 2 to 10 mm
Welding material	Mild steel, Stainless steel, Aluminum, Brass
Welding rate	M3 = 43 studs/min. (Charging voltage 50 V) M8 = 25 studs/min. (Charging voltage 140 V) (M10 = 18 studs/min. (Charging voltage 200 V))
Capacitance	132 000 µF/66 000 µF*
Welding time	1 to 3 msec
Energy	3 200 Ws/1 600 Ws*
Charging voltage	50 to 220 V (stepless voltage regulation)
Primary power	115 V, 50/60 Hz, 10 AT
Power source	Capacitor
Cooling type	F (temperature controlled cooling fan)
IP-Code	IP 21
Dimension L x W x H	22.44" x 11.22" x 11.42" (570 x 285 x 290 mm) without handle
Weight	59.53 lbs (27 kg) * with change over of capacitors
Order No	92-12-23212 (Automation)
General Information	
Application • Especially suitable for thin sheets (at least 0.5 mm)	
Process variants • Contact welding • Gap welding	
Equipment • Automation (series) • Menu navigation in various languages: German, English, French, Italian, Russian, Portuguese, Spanish and Chinese	

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CDMI 3202 TECHNICAL DATA SHEET

Advantages
Features • Microcontroller – for precise process times, optimal functional reliability and maximum operating convenience • Function monitoring – automatic function test following power-up; monitoring of all internal system functions • Display of error codes – on LCD display • Function control – All functions are visible on the operator panel via LED or display
Structure • Compact • Robust – metal housing withstands rough treatment in shop and on site • Industrial plugs – standardised and sturdy plugs • Two ground connections – direct coupling of several stud welding machines possible when installed in complex welding systems
Safety • With integrated mains filter (protection against voltage peaks) • Optimal for construction sites with large mains voltage fluctuations – use even with critical voltage supply (- 25 % + 20 %) • Fulfils the requirements according to DIN EN 60974-10: 2008-09 - EMC test • Fulfils the requirements according to DIN EN 60974-1: 2013-06 - Logged high voltage test • Logged capacitor forming for quality control of the stud welding capacitors • Controlled capacitor forming – step-by-step charging of capacitors after long standstill times for longer service life of capacitors • Retriggering lock-out – prevents welding on a welding element that has already been welded • Thermal control of inverter-capacitor charging unit and internal temperature of stud welding unit– automatic switch-off in the event of overheating • Temperature controlled cooling fan – reduces noise and dust in the stud welding unit (greater system reliability) • Control unit galvanically separated from welding lines – high degree of functional safety • Optimal cooling air stream – protection of the electronic components against contamination and ideal cooling of the inverter-capacitor charging circuit board for high cycle sequences • Shock-resistant operation panel – operation panel protected by protruding casing • Shock-resistant capacitors – capacitors protected by shock proofing elements • Accessory: Control guard made of acrylic glass (lockable) – prevents damage and unauthorised access
Welding • Graphic display – clear operator guidance via large LCD display • Setting of charging voltage in V and charging energy in Ws – when changing the charging voltage, the charging energy is automatically adjusted • Process sequence control – detection and evaluation of influencing variables of the welding process via the process control (CP); after every welding, a comparison of the reference CP value and the actual values is performed; display of the actual and target value; welding stop when limit values are exceeded can be activated; limit values can be selected in steps; manual entry of CP value possible • 15 programs can be stored – in every program, the parameters (charging voltage, capacity, CP settings and automatic settings) can be selected digitally via a superior control system and specific to the application • Remote control of the stud welding machines via standardised RS232 interface possible – the stud welding machines can be controlled directly via the PC or CNC welding systems • Library function – library with stored welding parameters for different diameter and material combinations for a quick start of the welding process • User-specific settings– weld counter (display of previously executed welds); menu navigation in various languages; units (metric, imperial); date; time; setting of the transmission rate of the interfaces

(continued on next page)

CDMI 3202 TECHNICAL DATA SHEET

Advantages
Welding Gun / welding head test – functionality check of the welding guns or the welding heads with a lifting test (check of the lifting function of the gap welding guns and bolt welding heads without contact with the workpiece); functionality check of the welding guns or the welding heads by recording the movement time of the solenoid from triggering to the contact with the workpiece • Reading out of CP values via standardised RS232 interface – for the output of data such as the date, time and welding parameters of each weld with the superior control system; welding parameters of every weld are logged • Powerful – built-in power reserves • Inverter-capacitor charging technology – makes high cycle rates possible • Trouble-free changing of welding voltage polarity possible by reconnecting welding current and ground cables • Use of special capacitors (developed for stud welding) • Capacitance switching – 66 000 µF or 132 000 µF
Suitable stud welding guns/ heads • C 08 • CA 08 • PAH-1 • KAH 412 • KAH 412 LA

Issue 06/14
(Technical data may change)

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IT 90 STUD WELDING UNIT

IT 90

Stud Welding Unit
for Arc stud welding
according to current standards

Inverter

- Maximum welding quality
- Maximum welding rates
- Minimum energy consumption
- Minimum weight
- Maximum efficiency

Technical Data	
Gas/Automation/Process control	Series/Series/Series
Welding range	#4 to 1", dia. 14 ga to 7/8" (M3 to M24, dia. 2 to 22 mm)
Welding material	Mild steel, Stainless steel, Aluminum
Welding rate	Dia. 7/8" = 7 studs/min (dia. 22 mm = 7 studs/min)
Welding current	2,000 A (max.)
Current adjustment range	300 to 2,000 A (stepless)
Welding time	5 to 1,500 msec (stepless)
Primary power	480/460 V, 3 phases, 50/60 Hz, 63 AT (alternative input voltages available)
Connected load	100 KVA (with 400 V mains) 80 kW
Cooling type	F (temperature controlled cooling fan)
IP-Code	IP 21
Dimension L x W x H	25.6" x 22" x 50.8" (650 x 560 x 1,290 mm) without handle
Weight	93-66-12096: 315.26 lbs (143 kg) 93-66-42096: 363.76 lbs (165 kg)
Order No	93-66-12096 (Gas/Automation/Process control/1 Gun connection) 93-66-42096 (Gas/Automatic/Process control/4 Gun connections)
General Information	
Application • Especially suitable for thicker sheets of about 2 mm or higher	
Process variants • Short cycle drawn arc welding • Drawn arc welding	
Equipment • Welding with ceramic ferrule (series) • Welding with shielding gas (series) • Automation (series) • Process sequence control (series)	

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KAH 412 LA AUTOMATIC STUD WELDING HEAD WITH LENGTH COMPENSATION

KAH 412 LA

Automatic Stud Welding Head with length compensation for CD or Arc stud welding with automatic stud feeding according to current standards

Technical Data	
Welding range	#4 to 5/16", dia. #4 to 5/16" (M3 to M8, dia. 3 to 8 mm); dia. 3/8" to 1/2" (dia. 10 to 12.7 mm) with modification only
Stud length	0.31" to 1.57" (8 to 40 mm) other lengths on request
Stud material	Mild steel, Stainless steel, Aluminum, Brass
Total stroke of piston	0.28"
Spring pressure	Arresting
IP-Code	IP 20
Workplace noise level	> 90 dB (A) may occur during welding
Dimension L x W x H	14.76" x 2.60" x 5.71" (375 x 66 x 145 mm) with chuck and quick change system
Weight	7.50 lbs (3.4 kg)
Order No	94-37-412 (with length compensation)

General Information

Application
- Especially suitable for thin sheets (at least 0.5 mm)
- Automatic compensation of length tolerance of welding elements and height tolerance of the work piece through integrated length adjustment

Process variants
- Gap welding
- Short cycle drawn arc welding
- Drawn arc welding (optional)

Advantages

Structure
- Rigid casing made of metal
- Torsion-resistant aluminum-casing to accommodate all function elements and accessories
- Zero-play ball linear bearing for guiding the welding piston, to ensure maximum precision and reproducibility for welds
- Sealed welding piston guidance
- Compact dimensions
- Integrated lift and spring-loaded adjustment
- Stud length is freely adjustable (up to 40 mm; other lengths available on request)
- Infinitely adjustable spring-loaded adjustment can be read off the scale directly
- Prisma clamping system for fast exchange of the complete stud welding head
- Pushbutton detent system to facilitate changing the feeding tube
- Mechanical structure tested in production

KAH 412 AUTOMATIC STUD WELDING HEAD WITH DIGITAL DISPLAY

KAH 412

Automatic Stud Welding Head with Digital Display
for CD or Arc stud welding with automatic stud
feeding according to current standards

Technical Data	
Welding range	#4 to 5/16", dia. #4 to 5/16" (M3 to M8, dia. 3 to 8 mm); dia. 3/8" to 1/2" (dia. 10 to 12.7 mm) with modification only
Stud length	0.31" to 1.57" (8 to 40 mm) other lengths on request
Stud material	Mild steel, Stainless steel, Aluminum, Brass
Stroke	Adjustment range 0.20" (5 mm), arresting
Spring pressure	Arresting
IP-Code	IP 20
Workplace noise level	> 90 dB (A) may occur during welding
Dimension L x W x H	14.76" x 2.60" x 5.71" (375 x 66 x 145 mm) with chuck and quick change system
Weight	7.50 lbs (3.4 kg)
Order No	94-31-412C

General Information

Application
- Especially suitable for thin sheets (at least 0.5 mm)

Process variants
- Contact welding (optional)
- Gap welding
- Short cycle drawn arc welding
- Drawn arc welding (optional)

Advantages

Structure
- Rigid casing made of metal
- Torsion-resistant aluminum-casing to accommodate all function elements and accessories
- Zero-play ball linear bearing for guiding the welding piston, to ensure maximum precision and reproducibility for welds
- Sealed welding piston guidance
- Compact dimensions
- Integrated lift and spring-loaded adjustment
- Stud length is freely adjustable (up to 40 mm; other lengths available on request)
- Digital display (1/100 mm) for the position of the welding piston using integrated measuring system
- Direct reading for the adjusted plunge and lift dimension
- Infinitely adjustable spring-loaded adjustment can be read off the scale directly
- Prisma clamping system for fast exchange of the complete stud welding head
- Push button detent system to facilitate changing the feeding tube

PAH-1 STUD WELDING GUN

PAH-1

Stud Welding Gun
for CD or Arc stud welding with automatic stud feeding according to current standards

Technical Data	
Welding range	#4 to 5/16", dia. #4 to 5/16" (M3 to M8, dia. 3 to 8 mm)
Stud length	0.31" to 1.18" (8 to 30 mm)
Stud material	Mild steel, Stainless steel, Aluminum, Brass
Stroke	Adjustment range 0.20" (5 mm)
Welding cable	9.84' (3 m)
IP-Code	IP 20
Workplace noise level	> 90 dB (A) may occur during welding
Dimension L x W x H	11.61" x 2.36" x 6.70" (295 x 60 x 170 mm) without cable
Weight	3.09 lbs (1.4 kg) without cable
Order No	94-20-025

General Information

Application
- Especially suitable for thin sheets (at least 0.5 mm)

Process variants
- Contact welding (optional)
- Gap welding
- Short cycle drawn arc welding

Advantages

Structure
- Rigid casing made of impact-resistant plastic
- Slide bearing for guiding the welding piston
- Sealed welding piston guidance
- Ergonomic design
- Adjustable lift
- Stud length convertible (up to 30 mm)
- Mechanical structure tested in production
- Electronically controlled

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VBZ-3 FULLY AUTOMATIC STUD FEEDER

VBZ-3

Fully Automatic Stud Feeder
for welding elements with flange
according to current standards

Technical Data	
Stud diameter	#4 to 5/16", dia. #4 to 5/16" (M3 to M8, dia. 3 to 8 mm) other diameter on request
Stud length	0.31" to 1.97" (8 to 50 mm)
Feed speed	Up to 30 studs/min (depending on welding element and feeding tube)
Air pressure connection	6 bar/800 liter/min
Electrical supply	115 V, 60 Hz, 1.8 A (alternative input voltages available)
IP-Code	IP 20
Dimension L x W x H	18.50" x 12.20" x 11.02" (470 x 310 x 280 mm)
Weight	52.91 lbs (24 kg)
Order No	94-66-103B (for dia. 3 mm) 94-66-104B (for dia. 4 mm) 94-66-105B (for dia. 5 mm) 94-66-106B (for dia. 6 mm) 94-66-171B (for dia. 7,1 mm) 94-66-108B (for dia. 8 mm) 94-66-153B (for X-mas tree stud dia. 5) 94-66-163B (for X-mas tree stud dia. 6)

General Information

Application
- Feeding unit VBZ-3 for quick, fully automatic feeding for welding elements with flange according to current standards
- Fully automatically feeding of welding elements from dia. 3 to dia. 8 mm (with flange); (other dia. on request)
- Length from 8 to 50 mm (no rebuilding)

Options
- Additional regulation of exhaust air by a throttle is possible; this allows ideal adjustment of air flow required for various sizes of welding elements
- Special feeding units on request

Advantages

Features
- Feeding bowl with special coating, to reduce abrasion and noise
- Exhaust air is pulse controlled, no permanent air consumption

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PMB-LS2 PNEUMATIC CLAMP

PMB-LS2
Pneumatic Clamp

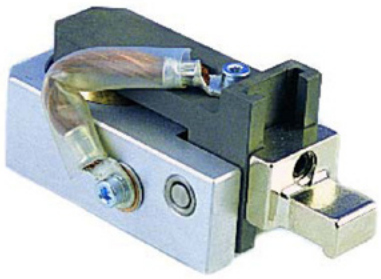
Technical Data	
Clamping movement	Double action air cylinder through curved sector control
Horizontal clamping way	0.30" (7.5 mm)
Vertical clamping way	0.16" (4 mm)
Max. thickness of work piece	Through elevation adjustment of clamp up to 0.39" (10 mm)
Width of clamp	0.59" (15 mm)
Air pressure connection	Up to 6 bar
Clamp pressure	300 N at 6 bar
Dimension L x W x H	3.54" x 1.97" x 1.97" (90 x 50 x 50 mm)
Weight	1.10 lbs (500 g)
Order No	90-60-120

General Information

Description
- Pneumatic work piece clamps PMB-LS2 guarantees fast and accurate clamping of the work
- The patented horizontal and vertical movement of clamp fingers allow work piece loading from top or front
- Integrated ground connection to the clamp
- Forward- and clamp-movement through curved sector control
- Bellows are protecting the motor apparatus of fouling

Issue 04/08
(Technical data may change)

PMB-S PNEUMATIC CLAMP



PMB-S
Pneumatic Clamp

Technical Data	
Clamping movement	Single action air cylinder
Vertical clamping way	0.16" (4 mm)
Max. thickness of work piece	Through elevation adjustment of clamp up to 0.79" (20 mm)
Width of clamp	0.59" (15 mm)
Air pressure connection	Up to 6 bar
Clamp pressure	300 N at 6 bar
Dimension L x W x H	3.86" x 1.77" x 1.65" (98 x 45 x 42 mm)
Weight	1.01 lbs (460 g)
Order No	90-60-011

General Information

Description
- Compact pneumatic clamp with vertical movement
- Ground connection to the clamp
- In- and output of the work piece only from the front side

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SECTION 14

STUD WELDING EQUIPMENT – CNC AUTO FEED SYSTEMS

FOR INQUIRIES, TO PLACE ORDERS,
SERVICE AND TECHNICAL SUPPORT CONTACT
ANY OF THE FOLLOWING:

OFFICE: 1-800-462-9353
713-939-8903

EMAIL: INFO@SUNBELTSTUDWELDING.COM

PC-S PRODUCTION CENTER STANDARD MANUAL

PC-S

Production Center Standard Manual

Technical Data	
T-slot work plate	19.69" x 14.76" (500 x 375 mm)
Welding range	#4 to 5/16", dia. #4 to 5/16" (M3 to M8, dia. 3 to 8 mm); dia. 3/8" to 1/2" (dia. 10 to 12.7 mm) only possible with modification
Stud length	0.31" to 1.57" (8 to 40 mm) other dimensions on request
Stud feeding *)	Manual or automatic stud feeding (optional) *) not included in delivery
Positioning (accuracy) of welded studs	± 0.008" (± 0.2 mm)
Working stroke of stud welding head	Z-max. = 4.92" (125 mm), z-adjustable = 0.16" to 1.77" (4 to 45 mm) bottom end stop
Stud welding head *)	KAH 412 alternative: KAH 412 LA (mechanical length compensation - gap), *) not included in delivery
Max. number of stud welding heads	1
Connection	Electrical: 115 V, 16 A, 60 Hz Pneumatic: 6 bar min/10 bar max./inner hose dia. 1/4" (dia. 6 mm)
Dimension L x W x H	47.24" x 39.37" x 78.74" (1,200 x 1,000 x 2,000 mm) without cover, 55.12" x 39.37" x 86.61" (1,400 x 1,000 x 2,200 mm) with cover
Weight Approx.	330.69 lbs (150 kg)
Order No	90-70-5028D

General Information
Application • All variations of stud welding • With manual or automatic stud feeding (30% faster)
Options • Different stud welding units • Automatic stud feeder VBZ-3 • Work piece fixtures • Machine protection cover • Custom made handling systems • Pneumatic clamp

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CPW SERIES

CNC Production Welder

- Entry-level CNC stud welding machine with 1 welding head
- High speed with highest positioning accuracy by robust machine base frame
- Working with different work piece heights on a working range of 600 x 420 x 120 mm

M3 to M8 (dia. 10/12/12,7 mm
only possible with modification)

#4 to 5/16" (dia. 3/8" to 1/2"
only possible with modification)

Working range	600 x 420 x 120 mm / 23.6" x 16.5" x 4.7"
T-slot work plate	800 x 490 mm / 31.5" x 19.3"
Welding range	M3 to M8, dia. 3 to 8 mm (dia. 10/12/12,7 mm only possible with modification) #4 to 5/16", dia. #4 to 5/16" (dia. 3/8" to 1/2" only possible with modification)
Stud length	8 to 40 mm / 0.31" to 1.57" (other lengths on request)
Welding capacity	Up to 30 studs/min (depending on configuration)
Traverse speed	25 m/min (X-Y), 20 m/min (Z) / 82'/min X-Y, 65,6'/min Z
Stud feeding	Automatic stud feeding (up to 3 different stud length per welding head)
Positioning accuracy of welded stud	± 0,2 mm / ± 0,008"
Positioning and repeat accuracy	± 0,05 mm / ± 0,002"
Stud welding head	KAH 412 KAH 412 LA (mechanical length compensation - gap)
Max. number of stud welding heads	1
Connections	Electrical: 400 V, 16 A, 50 Hz; Pneumatic: 6 bar min./ 10 bar max./ inner hose dia. 6 mm
Motor-driven Z-axis	Z = 0 to 120 mm / 0 to 4.7" (free programmable because of servo drive technology)
Controller	High performance PLC IEC 61131-3
Display	9" Touchscreen
Keyboard	Touch
Dimension LxWxH	1600 x 950 x 1900 mm / 63" x 37.4" x 74.8"
Weight	Approx. 640 kg / 1410,96 lbs
Order No.	According to project

SUNBELT STUDWELDING INC.
website www.sunbeltstudwelding.com **email** info@sunbeltstudwelding.com
6381 Windfern Road, Houston, TX 77040 **telephone** 1.800.462.9353 - Houston 713.939.8903 **fax** 713.939.9013

MPW 1010/2010 CNC MULTI PRODUCTION WELDER

MPW

CNC Multi Production Welder

Technical Data	
Working range	49.21" x 41.34" (1,250 x 1,050 mm) MPW 1010; 49.21" x 88.58" (1,250 x 2,250 mm) MPW 2010 (maximum working range for up to 3 welding heads)
Welding range	#4 to 5/16", dia. #4 to 5/16" (M3 to M8, dia. 3 to 8 mm); dia. 3/8" to 1/2" (dia. 10 to 12.7 mm) only possible with modification
Stud length	0.31" to 1.57" (8 to 40 mm) other lengths on request
Welding capacity	Up to 40 studs/min (depending on stud welding unit, stud type and positioning of stud)
Traverse speed	196.85'/min (60 m/min)
Stud feeding	Automatic stud feeding (up to 3 different stud length per welding head)
Positioning accuracy of welded stud	± 0.0059" (± 0.15 mm) for steel and ± 0.008" (± 0.2 mm) for aluminum (depending on work piece and stud geometry)
Positioning and repeat accuracy	± 0.002" (± 0.05 mm)
Stud welding head	KAH 412 Optional: KAH 412 LA (mechanical length compensation - gap)
Max. number of stud welding heads	4 (up to 3 stud lengths per welding head possible)
Connections	Electrical: 400 V, 16 A (32 A), 50 Hz Pneumatic: 6 bar min./10 bar max./inner hose dia. 1/4" (dia. 6 mm)
Motor-driven Z-axis	Z = 0 to 4.53" (0 to 115 mm) free programmable because of servo drive technology
Dimension LxWxH	90.55" x 92.52" x 86.61" (2,300 x 2,350 x 2,200 mm) MPW 1010; 137.80" x 92.52" x 86.61" (3,500 x 2,350 x 2,200 mm) MPW 2010
Order No.	According to project
General Information	
Application • Basic milling operations (optional) • Special applications like gluing, foaming etc. (on request)	
Process variants • Tip ignition (CD) • Drawn arc welding (Arc) • Short cycle drawn arc welding (SC)	

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