

Manual

CD Stud Welding Machine

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Preface

Thank you for choosing the stud welding machine.

While the equipment is received, please check carefully whether the equipment is damaged during transportation or is not consistent with the assembly list. If there is problem, please contact us in time.

This manual provides users with installation, technical parameters, abnormal diagnosis, troubleshooting and daily maintenance of the equipment. Please read this manual carefully before installing, using and maintaining.

This equipment should be maintained by professional maintenance personnel. The rest of the personnel do not disassemble the machine.

Please understand if there is any omission in the manual. Welcome users to provide us with valuable suggestions, so that we can do better for you and provide better services.

This manual is subject to change without prior notice.

Introduction of Products

Main products include:

CD Stud Welding Machine – RSR-1600/2500/3500/5000

Arc Welding Machine - RSN7-1600I/2500I/4000I

Marine Heat Preservation Nail Welding Machine – GB-25000CY/35000CY Pipeline

Heat Preservation Nail Welding Machine – GB-BW01-BW01B/BW01G

Plate Welding Machine – BP-15/15G RSR-DPI

Operation Cautions

The end user is responsible for the use of the welder.

The contents of this manual are essential information for the safe operation and operation of equipment. The operator must be able to read the instruction. Considering the safety, the operator should be able to check the instruction at any time.

If the equipment is sold or transferred, please send the manual to new users. Before installing the equipment, please read the manual carefully and strictly observe the safety instructions to protect yourself and others. Read and understand the safety precautions.

1. Electrical

No professional person is allowed to disassemble the welding controller (power supply). The disassembly is strictly prohibited before the power is cut off. Disconnect the power plug from the socket. Dangerous!

Attention! The energy storage equipment is equipped with a sealed power module operating on the basis of the high-frequency inverter principle. Since the module has potentially fatal voltage, it does not advocate dismantling the module without permission. It can be safely dismantled and replaced through our factory switching system.

Attention! The capacitor stores electrical energy. The remaining charge must be inspected before starting the internal maintenance. It is not allowed to use any liquid to clean electrical components, because it will permeate the electrical system.

2. Fireproof

While welding, there are very hot metal particles splashing. **It is necessary to ensure that no flammable material is ignited by them.**

3. Personal Safety

Arc may burn your eyes and skin. Noise may damage your hearing. Operators near must take appropriate measures to protect their eyes, ears and body.

Smoke and fog are very harmful to the body. This equipment should be used in a well ventilated place. If ventilation is not good, a smoke extraction equipment is required.

Hot metal welding spark will cause fire and burn. Wear protective clothing. But flammable clothing should not be worn. There must be a flame damper nearby and know how to use it.

High current magnetic fields can affect cardiac pacemakers or other electrically controlled medical facilities. It should warn people walking into the welding area that they are in danger before entering.

4. Maintenance

All cables must be inspected regularly to see if there is any old damage and whether there is any damage to the insulation material or circuit connection. The connection cables with welding guns are most vulnerable to damage. Damaged cables may be overheated or sparkled with fire.

5. Training

This equipment only allows authorized personnel who are trained to read and understand this instruction. This manual must

ensure that the operator can check at any time. More instructions are required to be purchased from manufacturers. Corresponding measures should be taken to prohibit unauthorized personnel from using this equipment.

6. Installation

To ensure that the working place of the equipment can support the weight of the equipment so that it will not fall down or be in danger during use. It is strictly prohibited to hang cables on sharp edges, and it is not allowed to be installed near a heat source or in a traffic channel, because the cables will be damaged by the passing of road personnel or vehicles.

7. Interference

Inevitably, strong magnetic fields and electric fields will be generated during welding, which may interfere with other sensitive electrical appliances. As mentioned before, all persons wearing cardiac pacemakers or other medical devices should be far away from the welding area.

The welding equipment shall be installed at a minimum of 5 meters away from the computer equipment to minimize mutual interference. Note that the cables that transmit signals between electrical facilities may be disturbed and damage their functions, and they should also be placed beyond 5 meters.

8. Waste

All or part of the equipment will be treated as industrial waste or transferred to a waste purchaser. The materials used in the production of this equipment are not toxic, carcinogenic and harmful to the body.

Introduction to Stud Welding Machine

Capacitor discharge type stud welding machine is a compact and portable stud welding equipment. The equipment is specially designed to weld small diameter black and non-ferrous metal bolts to thin, polished and precoated materials. In most cases, there is little trace on the back of the welded parts.

Capacitor discharge stud welding is a welding process that requires energy to be obtained from the charging capacitor. When the two welding surfaces are close to each other, the capacitor storage energy is released in the gap between them, the generated arc heating the two welding surfaces, and melting their respective layers of metal film, and the thrust of the two metal surface is closed to form the weld seam.

During contact welding, the bolt is pressed by the spring pressure to the plate. The arc gap between the two parts is guaranteed by a small tip of the bolt head. When the capacitor generates a high current pulse, the pin vaporizes and the arc is drawn between the workpiece and the bolt. While the spring pressure in the welding gun rapidly pushes the bolt towards the workpiece, the energy generated by the arc directly melts the base of the bolt and the surface area under the bolt.

Within 3-4 milliseconds, the bolt will reach the workpiece and the arc will disappear. All the kinetic energy of the bolt in action with the remaining spring pressure causes the melting zone to fuse to form the weld. It can improve the efficiency of production, decrease production links, reduce the production cost (materials, labor, electricity), high welding strength, no deformation of workpiece and various positions can be convenient for welding, easy to operate, was quick to learn.

It can take the place of riveting, drilling and other fastening methods. The welding time is only 3-6ms. The stud welding can be on the thickness of only 0.3mm sheet, does not cause deformation, discoloration or burn through, and will not damage the paint or coating layer on the reverse of the welding.

The equipment is widely used in locomotive and vehicle, automobile manufacturing, chemical industry, electrical industry, instrument and instrument, kitchen utensils, metal utensils, hardware and other industries, with high economic benefits.

It is mainly used for welding carbon steel, stainless steel, copper and copper alloy, aluminum and aluminum alloy, without any flux and protection measures, with the required strength and metallographic structure. The combination of several major materials is shown in Table 1.

Table 1

Stud, Workpiece	Carbon Steel	Stainless Steel	Copper Alloy	Aluminum Alloy
Carbon Steel	Excellent	Good	Weldable	——
Stainless Steel	Good	Excellent	Weldable	——
Copper Alloy	Weldable	Weldable	Excellent	——
Aluminum Alloy	——	——	——	Excellent

Features

The device is novel in design, compact in structure, reliable in use, with stepless regulation of charging voltage, wide range of adjustment and convenient adjustment of all parameters. The welding gun is dual-use and has a wide range of use.

Reference Standard for Production

Machinery Industry Standards of People's Republic of China – Stud Welding Machine

Standard number J64-JB/T8323-96

Specification

Input Voltage/Frequency	AC220V-2P; 50Hz			
Input Rated Fuse	10A			
Power Source	Electrolytic Capacitor			
Output Voltage	35-200V DC			
Enclosure	Steel			
IP Grade	IP31			
Welding Speed	Max. 40pcs/min (based on the output voltage and diameter of bolt)			
Welding Range	2mm - 10mm			
Bolt Length Range	35mm			
Welding Gun Electric Cable Length	3m (standard)			
Type	CD-72	CD-108	CD-144	CD-144-Z
Charging Capacitance	72,000 uf	108,000 uf	144,000 uf	144,000 uf
Charging Voltage	35-200V	35-200V	35-200V	35-200V
Welding Time	0.001-0.003S	0.001-0.003S	0.001-0.003S	0.001-0.003S
Input Power	500W	500W	800W	1000W
Low Carbon Steel	2-6mm	2-8mm	2-10mm	2-10mm
Stainless Steel	2-6mm	2-8mm	2-8mm	2-10mm
Aluminum Alloy	2-6mm	2-8mm	2-8mm	2-8mm
Zinc	2-6mm	2-8mm	2-8mm	2-10mm
Net Weight	16KG	18KG	22KG	28KG
Dimension (LxWxH-Including Handle)	480x220x300	480x220x300	600x220x300	600x220x300

Welding Process Guidance

- 1) The shape of the stud can be of various shapes of use value. According to the required length of the standard straight stud (with or without threads), the diameter range is between M3-M10. In addition to threaded fasteners, round inner threaded screws can be used, most of which have flanges.
- 2) Stud materials are shown in table 1. (Low carbon steel stud requires copper plating on the surface for conductive purposes.)
- 3) The workpiece shall meet the requirement of weldability, and the surface shall not be rusted, so it shall be properly cleaned, otherwise the dirt will be stuck in the weld and the weld strength will be affected.
- 4) The thickness of workpiece is between 0.5mm and 3mm.
- 5) The reference value of charging voltage required by various studs is shown in the table:

Table 2

Diameter of Stud	Charging Voltage (V)	Remark
M3	55-65	Adjust parameters according to actual demand strength
M4	65-75	Adjust parameters according to actual demand strength
M5	70-85	Adjust parameters according to actual demand strength
M6	90-120	Adjust parameters according to actual demand strength
M8	130-160	Adjust parameters according to actual demand strength
M10	160-180	Adjust parameters according to actual demand strength

The above are the parameters of steel or stainless steel. The welding aluminum or zinc transfer plate should be increased by about 10V. The specific operating parameters are adjusted according to the actual demand strength.

Welding Machine Operating Procedures and Precautions

1. Preparation before Welding

- (1) Insert the welding gun, control line and ground wire quick joint into the wiring port of welding machine control panel.
- (2) Insert the power incoming line into the power supply input port of the welding machine and switch on the power control switch.

Note: This equipment belongs is a low frequency equipment. Please do not share power interface with argon arc welding machine and other high frequency equipment, and make the equipment distanced from the above equipment.

- (3) Check whether all indicator lights are on.
- (4) The voltage adjustment knob is rotating to check whether the working voltage can normally charge and discharge.
- (5) Adjust charging voltage.

Before switching on the power supply, the charging voltage adjustment knob should be adjusted to a smaller value and then connected to the power supply. Adjust the knob slowly by clockwise and watch the charging voltmeter to adjust to the required working voltage. After the working voltage is set, the welder can automatically charge to the set value after each welding.

2. Welding Gun Adjustment

According to the diameter of the welding studs, the corresponding stud collet is selected and mounted on the welding torch. According to the diameter of the welding stud, the welding pressure is adjusted, the pressure of the axle sleeve is increased by clockwise rotation, and the pressure of the axle sleeve is reduced when rotating.

The three pillars of the welding gun are laid flat to the workpiece. Increase the pressure slightly and press the switch. The stud can be welded to the workpiece in an instant (3-6 milliseconds).

Notes

The contact resistance in the circuit should be reduced as far as possible to ensure sufficient welding energy. The clamping holes of stud collet should not be too large and should be replaced in time when wear is serious.

Tighten the lock nut when replacing the stud collet. Each time the stud is placed, it must be pushed into contact with the positioning column to ensure the welding quality. The three pillars must be laid flat to touch the workpiece before pressing the button on the gun.

Welding Tutorial Illustration

1. The ground wire and the main cable of the welding gun shall be tightened with inner hexagon rotation.



2. Insert the switch line of the welding gun into the air joint and tighten the lock nut.



3. Adjust the pin of stud collet to the right position.



4. After pin adjustment, it is necessary to be able to remove the convex edge of the stud from the stud collet 1-2mm.



5. When the adjustment is completed, tighten the retaining nut at the end of the clamping head.



6. Insert the fitting stud collet that will weld.



7. When the collet is inserted into the core, the tip of the stud needs to be higher than the vertical plane 2-3mm.



8. After loading the stud collet, turn the sleeve clockwise to tighten the lock.



9. Rotate the gun tail pressure regulator to moderate pressure, lock tight.



10. Find a piece of iron plate to clamp the ground clamp diagonally, so as to balance the arc.



11. Plug in the power line interface.



12. Check it out, turn on the rear ship type switch, and the equipment is powered on.



13. Turn the voltage adjustment button clockwise and adjust to the reference voltage.



14. Hold the welding gun tightly and press it down vertically so that all three legs are compacted evenly.



15. Lightly button the welding gun switch and weld. Please pull the gun vertically after welding.



16. Welding is done, visual inspection, and an iron hammer is used to bend the studs to 30 degrees.



17. Conduct destructive inspection on the welded nail.



Finish.

Welding Quality Evaluation

1. Visual inspection: The result of visual inspection depends on the inspector's judgment on the weld around the bottom of the stud. The high quality weld shall be vertical to the workpiece with the stud, less splatter around the bottom of the weld, and the formed angular weld shall be shallow and smooth.

2. Mechanical test: Mechanical test can be divided into two methods: static tensile test and bending test.

In the static tensile test, the commonly used stud is usually selected, and the corresponding thickness of the plate is selected to make a standard sample, and then the welding machine is adjusted to the appropriate parameters for welding. After welding, the sample is installed into a special fixture and tested on the tensile testing machine. In practical application, the stud cannot be selected at the yield point, and a safety factor must be considered. Generally, it is recommended that the welding tensile strength is 60% of the tensile strength of the stud, that is, the tensile strength of the stud with the welding tensile strength greater than 60% is qualified. If M6 low carbon steel stud is selected, its tensile load is 8.04KN(coarse tooth 4.6), and the welding strength should be only greater than 4.8KN.

- a) Bending test: Bending test is a practical and effective method for field inspection. The bending test is carried out on the tested stud with bending tool. Before the stud is damaged by welding end or matrix metal, it is qualified to bend the stud to 10-30 degrees from its axis line.
- b) Welding result: When the stud and workpiece are determined, choose the proper welding energy, namely charging voltage, and make welding. The following is the test data of welding test.

Table 3

No.	Plate Thickness (mm)	Stud Diameter (mm)	Voltage (V)	Static Tensile (KN)	Remark
1	1.2	6	95	4.7	Plate is worn
2	3	6	125	8.85	
3	3	6	130	8.63	
4	2.5	6	115	7.93	
5	3	6	100	8.49	
6	2	6	110	12.5	
7	2.5	8	145	11.28	
8	2.5	8	165	13.65	
9	1.2	8	150	8.0	Plate is worn

The above measured static tension data are obtained by averaging over 5 welding data. In addition to the 1.2mm plates being pulled through, 90% of them were broken on the stud and 10% on the weld. According to the welding results, the average tensile load of M6 stud is 8.475KN, and that of M8 stud is 12.35KN. According to the standards of GB3098\1-82 fastener mechanical performance bolts, screws and studs, the minimum tensile load of M6 stud is 6.63KN, and that of M8 is 8.04KN. The above test data meet the usage requirements.

Conclusion: The capacitor is used as the energy storage element to achieve the purpose of fast welding studs. The fastness of the stud welding can meet the needs of production, and it has the characteristics of energy saving, material saving, low labor intensity and high efficiency.

Troubleshooting and Handling Guidance

Fault	Inspection	Method
Power indicator is off	1. Check whether the power is on and the power cord is in good condition.	Switch on and replace
	2. Check whether the fuse in the welding machine is damaged.	Change the fuse
	3. Check whether the power control switch is damaged.	Change the switch
	4. Check whether the power line falls off	Install and fasten
Automatic charging and discharging of power supply (frequently)	1. Check whether the two-way rectifier tube is connected.	Replace
	2. Check whether the working voltage is too low.	Make higher
	3. Whether it is accidental or periodic.	Restart the power supply
Power indicator is on but cannot be charged properly	1. Check whether the ripple diode is in good condition.	Replace
	2. Check whether the main transformer is in good condition.	Replace or overhaul
	3. Check whether the whole bridge is damaged.	Replace
	4. Check whether the main control circuit board is out of order.	Replace or overhaul
Power is automatic discharging	1. Check whether the SCR is connected.	Replace
	2. Check whether the welding gun switch unable to be disconnected.	Replace
	3. Check whether the main control circuit board is out of order.	Replace or overhaul
Power charge is normal but it can't discharge normally	1. Check whether the main SCR breaks down or fails.	Replace
	2. Check whether the welding gun control switch and cable are normal.	Replace
	3. Check whether the main cable and grounding cable are disconnected.	Replace
	4. Check whether the auxiliary control wire in the gun barrel falls off.	Connect or replace
	5. Check whether the workpiece has insulation layer or corrosion.	Polish
Operating voltage cannot be lowered	1. Check whether the potentiometer is in good condition.	Replace
	2. Check whether the relay and wiring are in good condition.	Replace and fasten
Weak welding	1. Check whether the working voltage is too low.	Adjust higher
	2. Welding gun pressure is too high or too low.	Adjust the pressure of welding gun higher or lower
	3. Check whether the welding nail quality meets the standards.	Change standard stud
	4. Check whether the plate is coated or corroded.	Polish
	5. Check whether the plates are within the weldable range.	Change material
Welding is still not strong after the adjustment	Check whether there is failure of the circuit board.	Replace or overhaul
Working voltage lamp is not on	1. Check whether the auxiliary transformer is in good condition.	Replace or overhaul
	2. Check whether the voltage indicator is damaged.	Replace
Voltage lamp is not on but can be welded	Check whether the voltage indicator is damaged.	Replace

Product Configuration List 1.

Welding Power Source	1 SET
2. Welding Gun with Cable (PH-10-3M)	1 PIECE
3. Set of Ground Wire (3m)	1 PIECE
4. Standard Stud Collet	(M3 – M8) (Change specifications according to customer requirements)
5.Stud for Testing	Some
6. Using Manual	1 PIECE
7. Product Warranty Card, Product Qualification Certificate	As Below