



AUTOWELD-631/1001 IGBT

**INVERTER AUTOMATIC SUBMERGED ARC WELDING
MACHINE**

OPERATOR'S MANUAL

(PLEASE READ IT CAREFULLY BEFORE OPERATION)

Safety Depends on You

Our arc welding and cutting equipments are designed and built with ample safety consideration. However, proper installing and operating the machine can increase your safety.

DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT CASUALLY WITHOUT READING THIS MANUAL THROUGHOUT.

Special Notes (Very Important):

1. Pay attention to avoiding the machine falling down when it is placed on the gradient ground.
2. It is forbidden to unfreeze the pipeline by the cutter.
3. The shield rank of this series of cutter is IP21S, so working in rain is not suitable.
4. The external static characteristic of this series welding machine includes CC and CV mode. The rated duty cycle is 100%, which means the machine can work continuously at the rated cutting current. The machine has the function of thermal protection. When the internal temperature exceeds a set temperature, thermal protection moves on and the abnormality indicator lamp on the panel turns ON, then there is no output in machine. The machine can become normal and work only after the internal temperature drops down and the abnormality indicator lamp on the panel turns OFF.

Purchase Date : _____

Serial Number : _____

Machine Model : _____

Purchase Place : _____



Cautions

Arc and arc rays can hurt.

All performing welding workers ought to have health qualification from the authority organization to prevent you and others from arc radiation and burn. It should be prevented for children to enter into dangerous area as well.

Be careful reading the following important items and the welder safety byelaw from the authority organization. Be sure that qualified professionals perform all installation, maintenances and repair procedures.



1 Electric shock: The welding circuits are not insulated when welding. If you touch the two output electrodes of the machine with your bare skin at the same time, it will lead to electric shock, sometimes even fatal dangers. Users

need to follow the items below to avoid electric shocks:

If possible, lay some insulating materials, which are dry and large enough, in your working field. Otherwise, use the automatic or semiautomatic welding machine, DC welding machine as possible as you can.

Components in the automatic and semiautomatic welding machine such as the welding wire reel, feed wheel, contact tip and welding head are all electriferous.

Always be sure the machine has been connected perfectly to the work piece with the work cables and should be as close as possible to the working area.

The work piece should be grounded perfectly.

Make sure that the insulating material of the electrode holder, the grounding clamp, the welding cable and the welding head are not affected by damp, mildewed or spoilt, and be replaced momentarily.

Never dip the electrode in water for cooling.

Never touch electriferous parts of two welding machines at the same time, because this voltage is supposed to be two times of welding voltage while the grounding mode is not clear.

While working high above the ground or other places having the risk of falling, please be sure to wear safety belt to avoid losing balance caused by electric shock.



2 Arc: Use an arc welding mask to protect your eyes and skin from sparks and the rays of the arc, pay special attention to the filter glass, which must be conformable to the national standard.

Use clothing made from durable flame-resistant material or sailcloth to protect your skin from hurting by the arc rays.

Remind other nearby personnel before working lest arc rays hurt them by accident.



3 Fumes and Gases: Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. While working in limited room, use enough ventilation and/or exhaust to keep fumes and gases away from the breathing zone, or use the respirator. Do not weld at the same time when using of degreasing, cleaning or spraying operations. The heat and rays of the arc can react with these gases to form phosgene, a highly toxic gas,

Some protective gases used in welding might displace the oxygen in the air, and can lead to hurt or even death.

Read and understand the manufacturer's instructions for this equipment, and validate the health certification of consumptive materials, make sure they are innocuous.



4 Spatter: Spatter can cause fire or explosion.

Remove fire hazards from the welding area. Remember that spatter from welding can easily go through small cracks and touch fire hazards. Protect all kinds of lines going though welding area, including hydraulic lines in the wild.

Where compressed gases are to be used in the field, special precautions should be used to prevent explosion.

When welding stops, make certain that no live part is touching the work piece or the work stage. Accidental contact can create a fire hazard.

Do not weld containers or lines, which are not proved to be innocuous.

It is very dangerous to heat, cut or weld tanks or containers at entry holes. Does not start work until the proper steps have been taken to insure that there is no flammable or toxic gas.

Spatter might cause burn. Wear leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair to prevent from burning by spatter. Wear the ear shield when performing sideways or face up welding. Always wear safety glasses with side shields when being in a welding area.

The welding cables should be as close to the welding area as possible, and the short, the better. Avoid welding cables going through the building framework, lifting chains, AC or DC cables of other welding machines and appliances. The welding current is strong enough to damage them while having short circuit with them.



5 Cylinder: Damage of it might cause explosion.

Make sure that the gas in the storage cylinder is qualified for welding, and the decompression flow-meter, the adapter and the pipe are all in good condition.

Make sure that the installation of cylinder is by the wall and bundled tightly by a chain.

Be sure to put the cylinder in the working space with no crash or shake, and far from welding area.

It is forbidden to touch cylinder with the welding clamp or the work cables.

Avoid facing the cylinder while installing the decompression flow-meter or the gasometer.

When not working, please tighten the valve.



6 Power: (For electrically powered welding and cutting equipment) Turn off input power before installation, maintenance's and repair, so that avoid accident.

Ourwelding equipment is I class safeguard equipment; please install the equipment in accordance with the manufacturer's recommendations by specific persons.

Ground the equipment perfectly in accordance with the manufacturer's recommendations.



7 Power:(For engine driven welding and cutting equipment)

Work in ventilated place or outdoors.



Do not add fuel near to fire or during engine starting or welding. When not working, add fuel after engine is cooling down; otherwise, the evaporation of hot fuel would result in dangers. Do not splash fuel out of the fuel tank, and do not start the engine until complete evaporation of the outside fuel.



Make sure that all the safeguard equipment's, machine cover and devices are all in a good condition. Be sure that arms, clothes and all the tools do not touch all the moving and rotating components including V belt, gear and fan etc.

Sometimes having to dismantle some parts of the device during maintenance, but must keep safety awareness strongly every time.

Do not put your hand close to fans and do not move the brake handle while operating.

Please remove the connection between the engine and the welding equipment to avoid sudden starting during maintenance's.

When engine is hot, it is forbidden to open the airtight cover of the radiator water tank to avoid hurt by the hot vapor.



8 Electromagnetic: Welding current going though any area can generate electromagnetic, as well as the welding equipment itself.

Electromagnetic would affect cardiac pacemaker, the cardiac pacemaker users should consult one's doctor first.

The effect of electromagnetic to one's health is not confirmed, so it might have some negative effect to one's health.

Welders may use following method to reduce the hazardous of electromagnetic:

- a. Bundle the cable connected to the work piece and the welding cable together.
- b. Do not enwind partially or entirely your body with the cable.
- c. Do not place yourself between the welding cable and the ground (work piece) cable, if the welding cable is by your left side, then the ground cable should be by your left side too.
- d. The Welding cable and the ground cable are as short as possible.
- e. Do not work near to the welding power source.



9 Lift Equipment: carton or wooden boxes package the welding machines supplied by HUAYUAN. There is no lifting equipment in its wrapper. Users can move it to the prospective area by a fork-lift truck, and then open the box.



If having rings, the machine can be transited using rings. While OurWelding Machine Manufacture reminds users, there is possible risk to damage the welding machine. It is better to push the welding machine moving in use of its rollers unless special situations.

Be sure that the appurtenances are all removed off when lifting.



When lifting, make sure that there is no person below the welding machine, and remind people passing by at any moment.

Do not move the hoist too fast.



10 Noise: OurWelding Machine Manufacture reminds users: Noise beyond the limit (over 80 db) can cause injury to vision, heart and audition depending on oneself. Please consult local medical institution. Use the equipment with doctor's permission would help to keeping healthy.

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WARNING

If the electrical wires and terminals inside the welding machine is over the safe voltage, only the trained personnel should open the machine cover to check it.

1 Product Introduction

1.1 Instruction on Model

Machine model is AUTOWELD 631 I / 1001 I

The main difference between AUTOWELD 631 I / 1001 I is their different rated output current.

1.2 Usage & Features

AUTOWELD series inverter multi-function power source can be used for automatic submerged arc welding, electro-slag welding, sticking welding and arc air gouging, it also has good performance on DC single wire welding and strip surfacing. The main circuit of power source is IGBT inverter circuit with high reliability, fast response speed, good dynamic characteristic, and it can auto-compensate the fluctuation of grid voltage, ensure arc burning steadily, good-shaped welding seam.

1.3 Working condition and environment

1.3.1 Power supply

1.3.1.1 Input voltage wave should be sine wave, the frequency fluctuation should be less than $\pm 1\%$ of the rated value.

1.3.1.2 Input voltage should be 380vac to 440vac.

1.3.1.3 Three phrase power supply unbalance rate $\leq 5\%$.

1.3.2 Environment

1.3.2.1 Ambient temperature range :When welding $-10 \sim +40^{\circ}\text{C}$;transport and store $-25 \sim +55^{\circ}\text{C}$

1.3.2.2 The dust, corrosive and acid air or material should be within normal range, except the air come from the welding process.

1.3.3 The elevation should be less than 1000m ;

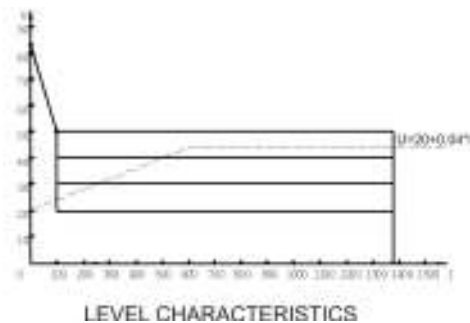
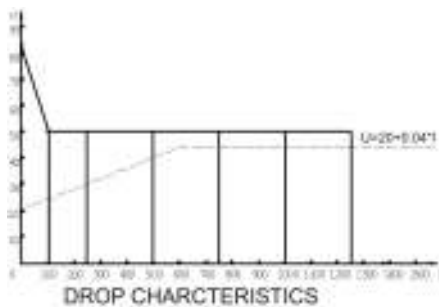
1.3.4 It should be stored in a dry and windy place to prevent the sunshine and rain.

1.4 Product model and parameter

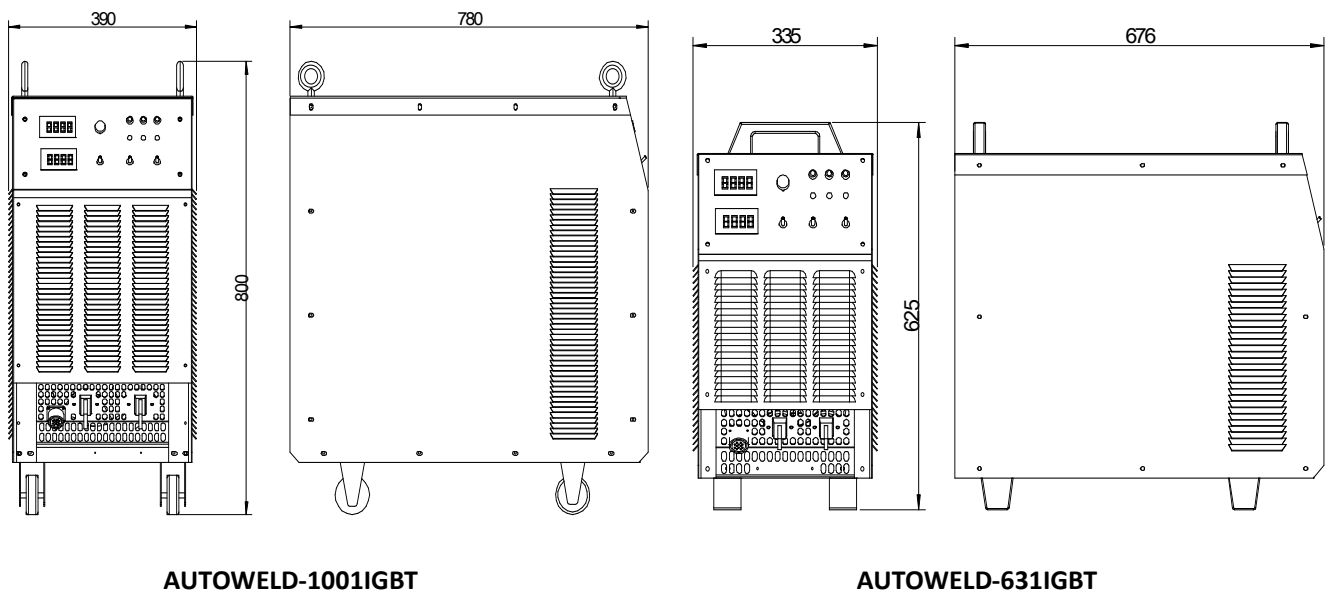
Model Parameters	AUTOWELD-630IGBT	AUTOWELD-1000IGBT
Input power	3 PHASE 380VAC - 440VAC / 50HZ	
Rated input capacity (KVA)	33	53
Rated input current (A)	50	80
Power factor ($\cos\phi$)	0.92	0.93
Efficiency (η)	0.87	0.88
No-load voltage (V)	80	83
No-load current (A)	0.7	1.0
No-load loss (W)	306	484

Current adj. range (A)	60 ~ 630	100 ~ 1000
Rated welding voltage(V)	44	
Rated duty cycle (%)	100	
Weight (kg)	68	125
Dimension (L×W×H)	676×335×625	780×390×800
Insulation grade	F	
Protection grade	IP21S	
Cooling mode	Air cooling	

1.5 Static characteristic graph



2 Outer dimension:



3 Machine instruction

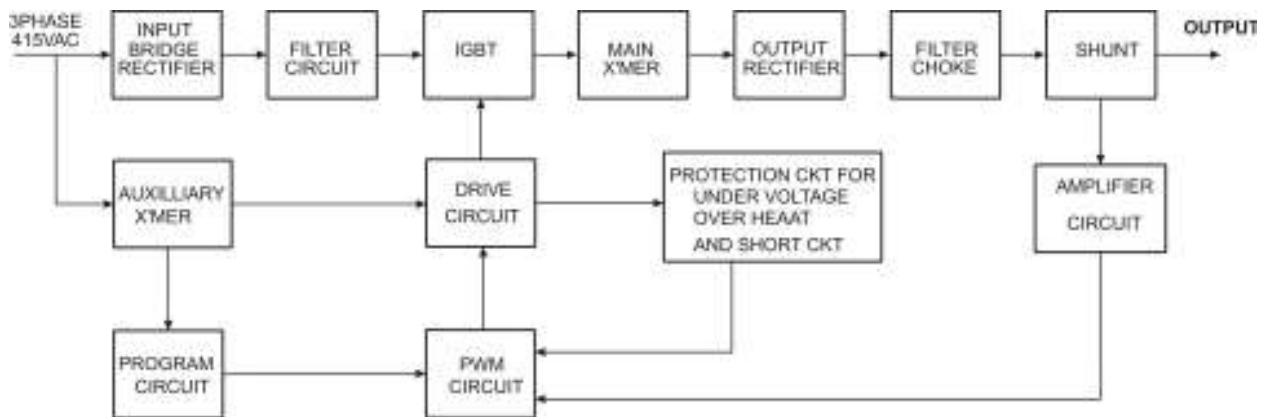
3.1 Work principle

Autoweld series inverter multi-function welding machine adopts the inverter main circuit. Three-phase AC power is converted to 20KHz high-frequency DC current after being rectified by three phase rectifier. Then under the function of IGBT inverter the DC current is inverted to AC high frequency current, which is inverted to DC current after experiencing voltage reduction in high frequency transformer, current rectifying in fast recovery diode. This DC current is filtered through reactor, and controlled by current negative feedback, then the stepless adjustable

current which can meet the welding requirement is obtained.

Control circuit controls the output current through adjusting the pulse width of driving signal. The current negative feedback signal is checked on output wire, then after enlarging it is input into inverting end of error amplifier by using pulse width adjusting integrated circuit, then it can control the conductive time of IGBT, hence inverter rectifier can get the required external characteristic.

Electric principle :



4 Control panel function and operation

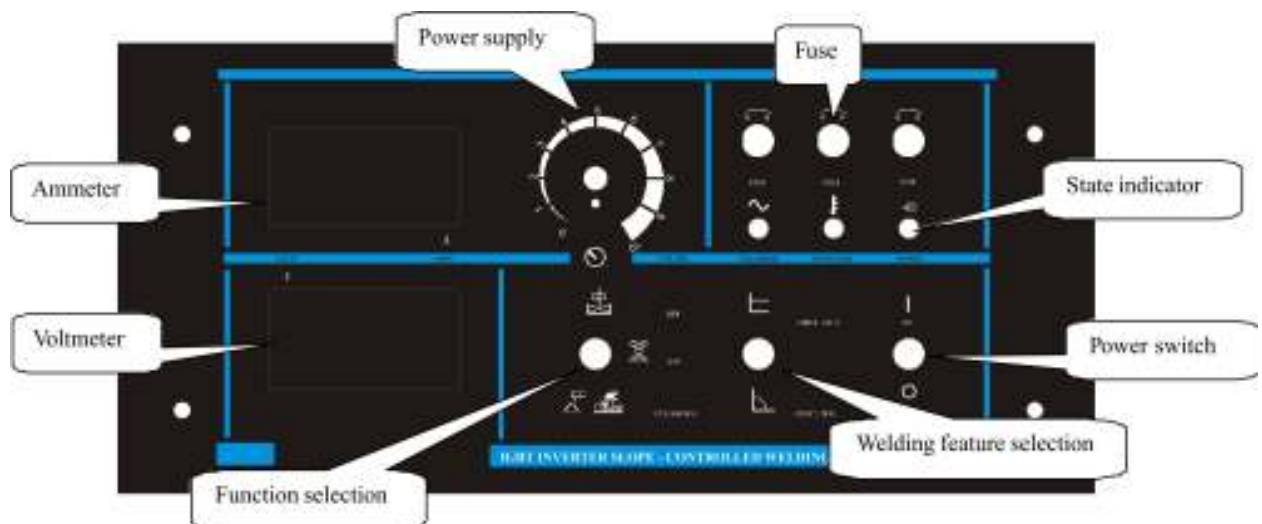


Figure 2 : Panel

- 4.1 Ammeter : Indicate the actual welding current; ;
- 4.2 Voltmeter : Indicate the actual welding voltage;
- 4.3 Power supply adjustment : adjust the welding current when the machine is under stick welding& carbon arc air gouging ;
- 4.4 State indicator :
 - 4.4.1 Power supply indicator : to indicate if the power is energized;
 - 4.4.2 Over-load indicator : when machine is under over-load, the indicator lamp is on ;

4.4.3 Voltage abnormal indicator : when the voltage is abnormal, the indicator lamp is on ;

4.5 Fuse: inner control power fuse, the fuse is 3A ;

4.6 Function selection switch: selection of the welding mode, stick/air carbon arc gouging/SAW/electro-slag welding ;

4.7 Welding characteristic selection: control the output characteristic when on SAW ;

4.8 Power supply switch: control the power supply ;

5 Installation

5.1 For Autoweld-631IGBT/ Autoweld-1001IGBT power source, the input wire cross section should be more than 16 mm²/25 mm²/35mm² ;

5.2 Connect the input wire of Autoweld-631IGBT/ Autoweld-1001IGBT to the output terminal of 63A/100A/125A breaker , the fuse capacity is 100A/150A/200A separately ;

5.3 For the input wires of Autoweld-631IGBT , green and yellow is grounding wire which cross section should be more than 6 mm² . There is a special grounding screw on the back of Autoweld-1001IGBT power source which should be connected ground firmly, and the cable cross section should be more than 16 mm²/25 mm² ;

5.4 Connect the welding cable to output terminal of Autoweld power source firmly. The cable cross section of Autoweld-1001 should be more than 140mm², the cable cross section of Autoweld-631IGBT should be more than 70mm².

5.5 Notice : the positive output of Autoweld power source is “ + ” , right side“ - ” is negative output.

5.6 When Autoweld power source is used as SAW, connect the multi-core control cable pin to the control socket, connect the welding cable(connect tractor) to the positive output terminal, connect the grounding cable (connect workpiece) to the negative output terminal.

6 Troubleshooting and Repair

Attention: The power supply should be cut off first before maintaining and repairing.

6.1 Maintenance

✘ The customer should periodically open the machine shell to clear the dust according to the usage state and the environment conditions, in order to prevent the electric parts of the machine from being affected by damp dust, which may cause short-circuit and break down the machine;

✘ The customer should periodically check the connecting cable to ensure the cable installed reliably.

6.2 Repair

Attention: Only qualified technicians should perform troubleshooting work on the machine.

✘ Before open the machine shell, please check as follows at first:

- a. Please check the three phases voltage, which should meet national standard.
- b. Check if the fuse on the front control panel is fused or not.
- c. Be sure the welding cable and work cable connected reliably.

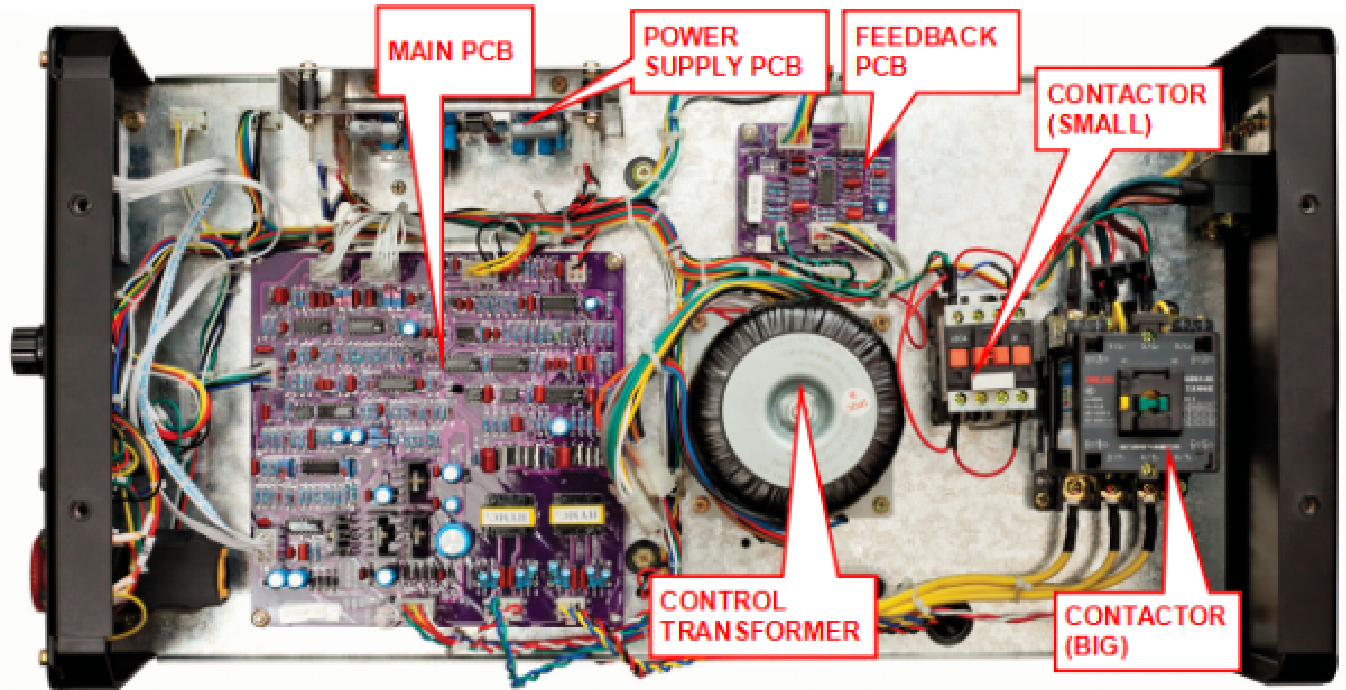
Troubleshooting & repair

Fault	Cause	Troubleshooting
1. Turn on the power source, the indicator does not illuminate	<ol style="list-style-type: none"> 1. The input wire of three phase power source is under trouble. 2. The fuses on the front panel is broken ; 3. Toggle switch is broken ; 4. The indicator lamp is damaged ; 5. Control circuit is under trouble. 	<ol style="list-style-type: none"> 1. Check the three phase power source. 2. Replace the fuse (3A) ; 3. Check the toggle switch ; 4. Replace the power supply indicator lamp ; 5. Check the control circuit.
2. Turn on the power source, the cooling fan doesn't work	<ol style="list-style-type: none"> 1. The input wire of three phase power source is under trouble. 2. The fuses on the front panel is broken ; 3. Toggle switch is broken ; 4. The cooling fan is damaged. 	<ol style="list-style-type: none"> 1. Check the three phase power source. 6. Replace the fuse (3A) ; 7. Check the toggle switch ; 1. Repair or replace the cooling fan.
3. Power source is no-load, there is abnormal voice or power switch tripping when setting the function switch to stick & air carbon arc gouging	<ol style="list-style-type: none"> 1. Three phase rectifier bridge is damaged ; 2. I G B T is damaged. 	<ol style="list-style-type: none"> 1. Check the three phase rectifier bridge ; 2. Check I G B T .
4. Welding current is out of control.	<ol style="list-style-type: none"> 1. The connection of hall sensor for current checking installed inside machine output terminal is loosen. 2. The main control board is damaged ; 3. The connection of remote control cable is 	<ol style="list-style-type: none"> 1. Check the Hall sensor, and ensure it is connected firmly ; 2. Repair or replace the main control board ; 3. Well connect the remote control cable.

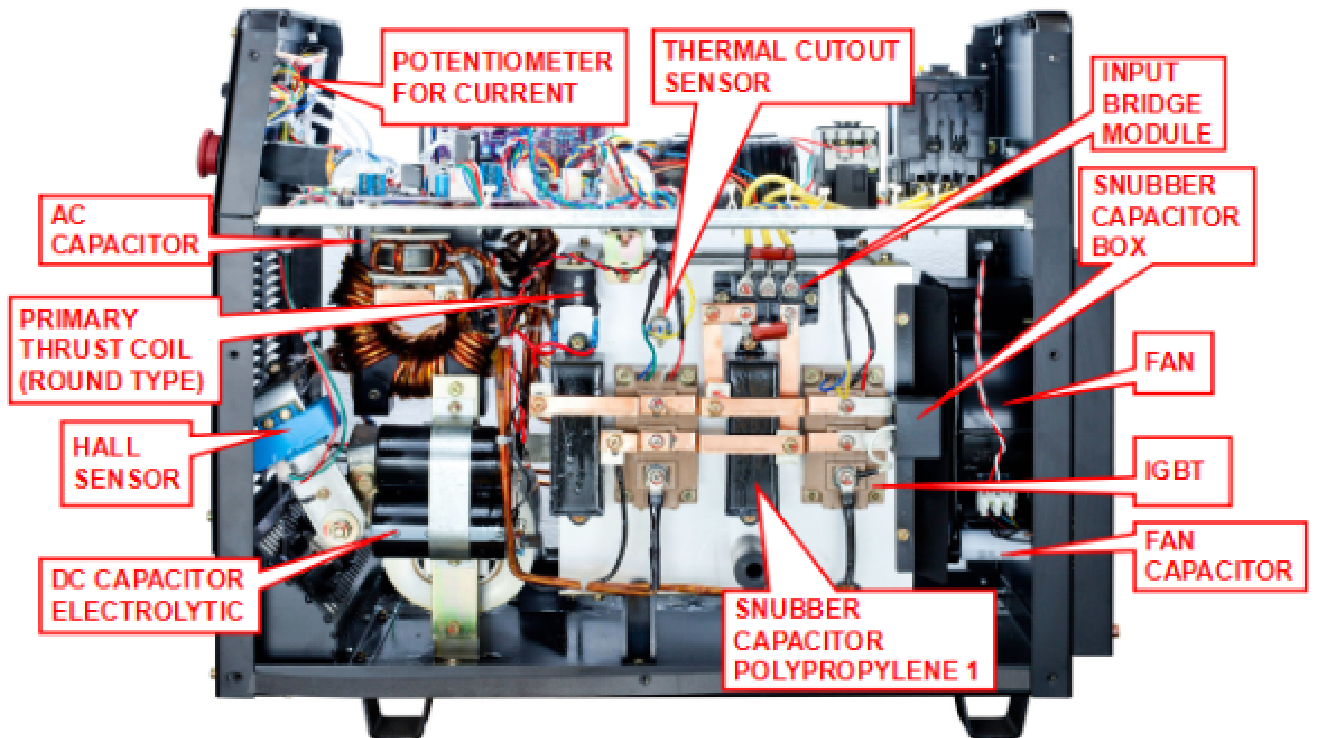
	loosen.	
5. Turn on the power switch, there is no striking arc under stick welding & air carbon arc gouging mode	<ol style="list-style-type: none"> 1. Over load or under voltage protection ; 2. The main control board is damaged ; 	<ol style="list-style-type: none"> 1. Check if the welding machine is under protection. 2. Repair or replace the main control board.
5. During welding, the arc extinguishes suddenly and no arc striking immediately, after a moment the machine work normally again.	<ol style="list-style-type: none"> 1. The machine is over load, which cause over heat protection of temperature relay. 2. The temperature relay is damaged. 	<ol style="list-style-type: none"> 1. Pay attention to ambient temperature and rated duty cycle. 2. Replace the temperature relay with same model.

※Attention: If the troubles cannot be resolved, please inform our local agent of the specific problems or contact us directly.

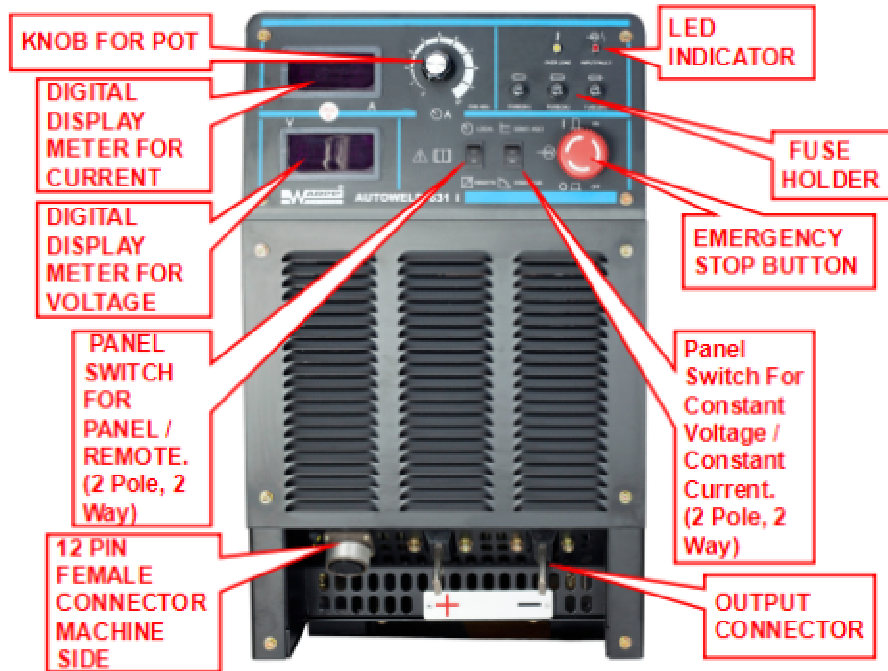
1. Top view.



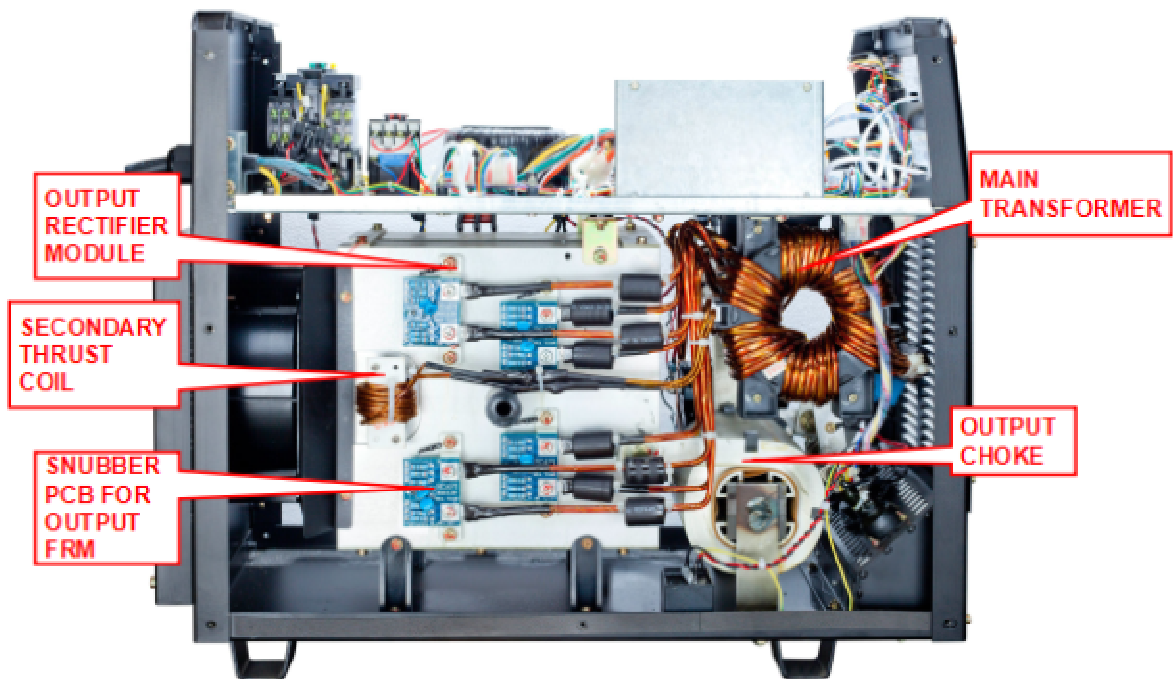
2. Right view.



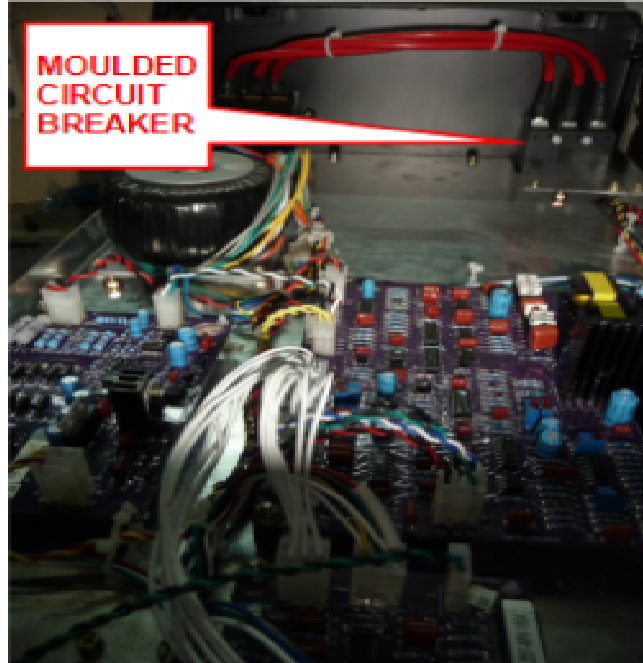
3. Front view.



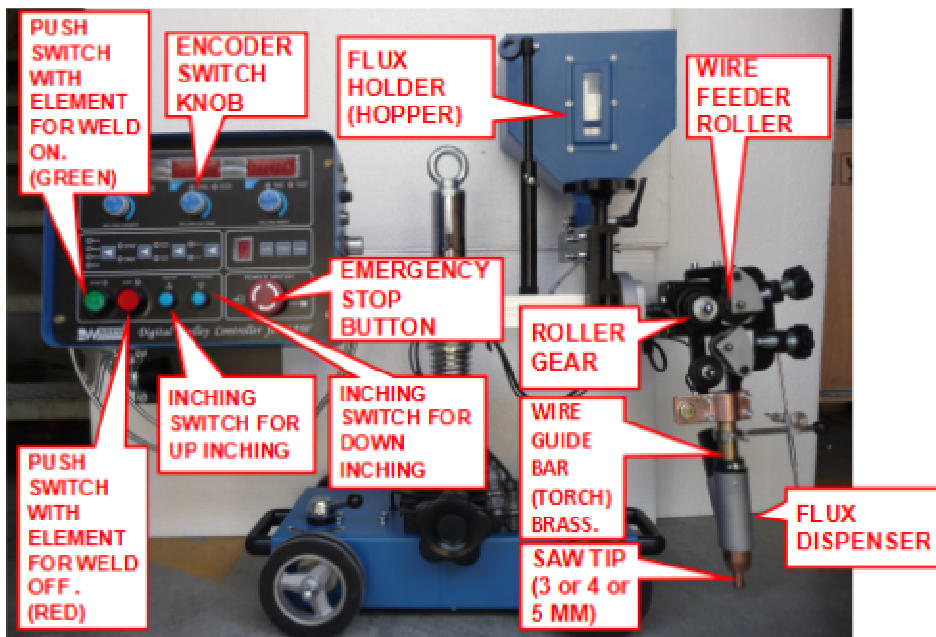
4. Left view.



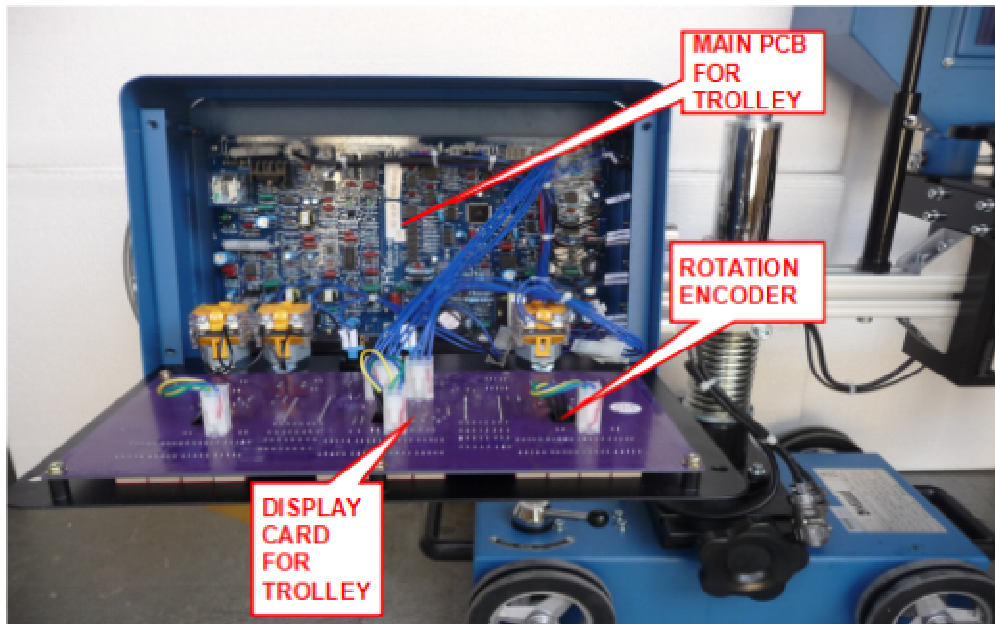
5. Top view.



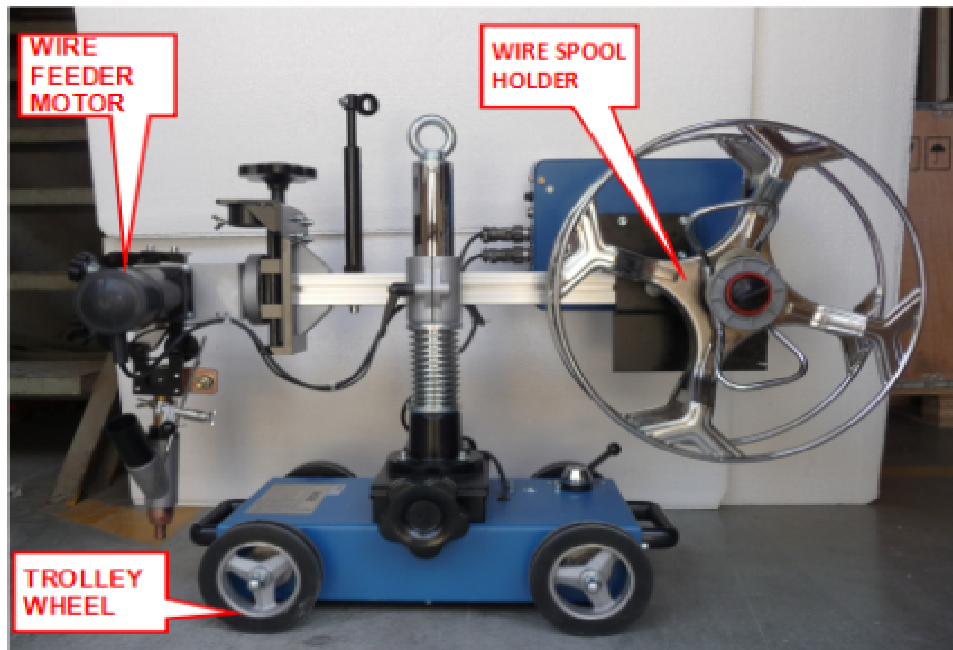
6. Trolley Left view.



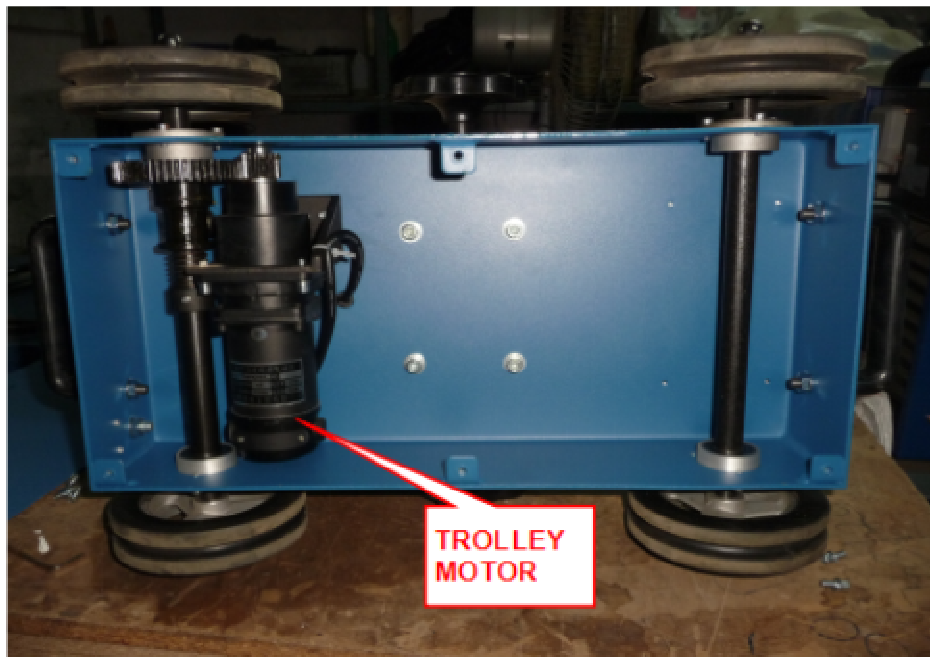
7. Trolley Control Panel.



8. Trolley Right view.



9. Trolley Bottom view.



19. Trolley Connection.



Part list of spare parts for AUTOWELD 631I,1001 I.
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S.No	Description	Autoweld 631 I.		Autoweld 1001 I.	
		Part Code	Part Code	Part Code	Part Code
1.	12 PIN FEMALE CONNECTOR MACHINE SIDE	CON12PNF		CON12PNF	
2.	12 PIN MALE CONNECTOR CABLE SIDE	CON-12-CM-M-01		CON-12-CM-M-01	
3.	AC CAPACITOR	C-4UF/1000VAC		C-5UF/1000VAC	
4.	CONTROL TRANSFORMER	CTRAXB48		CTRAXB48	
5.	CONTACTOR (SMALL)	CON-0.95A-360V		NA	
6.	CONTACTOR (BIG)	CON-45A-380V		NA	
7.	DC CAPACITOR ELECTROLYTIC	C-2200UF / 400 V		C-1000UF/400V	
8.	DIGITAL DISPLAY METER FOR CURRENT	DSP005		DSP005	
9.	DIGITAL DISPLAY METER FOR VOLT	DSP005		DSP005	
10.	EMERGENCY STOP BUTTON.	<u>E/STOP-BUTTON</u>		NA	
11.	FAN	FAN005-AC240V		FAN005-AC240V	
12.	FAN CAPACITOR	C-2UF-630V		C-2UF-630V	
13.	FEEDBACK PCB	PCB-FEEDBACK		PCB-FEEDBACK	
14.	FUSE HOLDER.	FUSE-HOLDER-02		FUSE-HOLDER-02	
15.	HALL SENSOR	CS-BSL -1000IOV2L		CS-BSL -1000IOV2L	
16.	IGBT	IGBT15012		IGBT-FF200R12KT4	
17.	INPUT BRIDGE MODULE	IBDG003		IBDG007	
18.	KNOB FOR POT	KNOB001		KNOB001	
19.	LED INDICATOR	LED-R-5MM, LED-Y-5MM		LED-R-5MM, LED-Y-5MM	
20.	MAIN PCB	PCB-AUTO-631I		PCB-AUTO-1000I	
21.	MAIN TRANSFORMER	MTRXB48		MTRXB45	
22.	MOULDED CIRCUIT BREAKER	NA		MCB-B45	
23.	OUTPUT CHOKE	CHOKE-AUTOWELD -631I		CHOKE-AUTOWELD -1001I	
24.	OUTPUT CONNECTOR	OUTCON001		OUTCON003	
25.	OUTPUT RECTIFIER MODULE.	FRM001		FRM001	
26.	PANEL SWITCH FOR CONSTANT VOLTAGE / CONSTANT CURRENT (2 POLE, 2 WAY)	PSW001		PSW001	
27.	PANEL SWITCH FOR PANEL / REMOTE (2 POLE, 2 WAY)	PSW001		PSW001	

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28.	POTENTIOMETER FOR CURRENT	POT001	POT001
29.	POWER SUPPLY PCB	PCB-SUPP-AUTO-631I	PCB-SUPP-AUTO-1001I
30.	PRIMARY THRUST COIL (ROUND TYPE)	THCL-P-631I	NA
31.	PRIMARY THRUST COIL	NA	THCL-P-1001
32.	SECONDARY THRUST COIL	THCL-S-631	THCL-S-1001
33.	SNUBBER CAPACITOR BOX.		
34.	SNUBBER CAPACITOR POLYPROPYLENE 1	C-40UF/500VAC	
35.	SNUBBER CAPACITOR POLYPROPYLENE 2	NA	
36.	SNUBBER PCB FOR OUTPUT FRM	PCB-SNB-OUT-05	PCB-SNB-OUT-05
37.	THERMAL CUTOUT SENSOR	C2373	C2373
38.			

AUTOWELD I Series Trolley Part list.

		Autoweld 631 I.	Autoweld 1001 I.
S.No	DESCRIPTION	Part Code	Part Code
1.	12 PIN FEMALE MILITARY CONNECTOR FOR CONTROL SIGNAL (CABLE SIDE)	CON12PNF	CON12PNF
2.	12 PIN MALE MILITARY CONNECTOR FOR CONTROL SIGNAL (TROLLEY SIDE)	CON12PNM	CON12PNM
3.	2 PIN FEMALE CONNECTOR FOR 5 VOLT SUPPLY (CABLE SIDE)	C2422	C2422
4.	2 PIN MALE CONNECTOR FOR 5 VOLT SUPPLY (TROLLEY SIDE)	C2421	C2421
5.	3 PIN FEMALE MILITARY CONNECTOR FOR WIRE FEEDER MOTOR & ARC VOLTAGE (TROLLEY SIDE)	CON-3-PM-F-01	CON-3-PM-F-01
6.	3 PIN MALE MILITARY CONNECTOR FOR WIRE FEEDER MOTOR & ARC VOLTAGE (CABLE SIDE)	CON-3-PM-M-01	CON-3-PM-M-01
7.	4 PIN FEMALE MILITARY CONNECTOR FOR WALKING MOTOR (TROLLEY SIDE)	CON-4-PM-F-01	CON-4-PM-F-01
8.	4 PIN MALE MILITARY CONNECTOR FOR WALKING MOTOR (CABLE SIDE)	CON-4-PM-M-01	CON-4-PM-M-01

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9.	DISPLAY CARD FOR TROLLEY.	PCB-DSP-AUTOWELD-TROLLEY-631I	PCB-DSP-AUTOWELD-TROLLEY-1001I
10.	EMERGENCY STOP BUTTON	E/STOP-BUTTON	E/STOP-BUTTON
11.	ENCODER SWITCH KNOB	KNOB001	KNOB001
12.	FLUX DISPENSER	FLDS-01	FLDS-01
13.	FUSE HOLDER.	FUSE-HOLDER-01	FUSE-HOLDER-01
14.	INCHING SWITCH FOR DOWN INCHING.	SW-PUSH-02	SW-PUSH-02
15.	INCHING SWITCH FOR UP INCHING	SW-PUSH-02	SW-PUSH-02
16.	MAIN PCB FOR TROLLEY	PCB-TROLLY-AUTOWELD631I	PCB-TROLLY-AUTOWELD1001I
17.	PUSH SWITCH WITH ELEMENT FOR WELD OFF (RED)	SW-PUSH-02-R	SW-PUSH-02-R
18.	PUSH SWITCH WITH ELEMENT FOR WELD ON (GREEN)	SW-PUSH-02-G	SW-PUSH-02-G
19.	ROLLER GEAR	AUTO-631-ROLLER-GEAR	NA
20.	ROLLER ASSEMBLY	NA	AUTO-1001-WF-RLRASB
21.	ROTATION ENCODER	C2373	C2373
22.	SAW TIP 3MM.	TIP-SAW-3.	TIP-SAW-3.
23.	SAW TIP 4MM	TIP-SAW-4.	TIP-SAW-4.
24.	SAW TIP 5MM	TIP-SAW-5.	TIP-SAW-5.
25.	TROLLEY MOTOR.	TRMTR-02	TRMTR-02
26.	TROLLEY WHEEL.	SAW-WHL-02	SAW-WHL-02
27.	WIRE FEEDER MOTOR	WFDMTR-SAW-04	WFDMTR-SAW-04
28.	WIRE FEEDER ROLLER.	SAW-RLR-05	SAW-RLR-05
29.	WIRE GUIDE BAR (TORCH) BRASS.	SAW-TRCH-02	SAW-TRCH-02
30.	WIRE SPOOL HOLDER	SPOOLBRACKET-TROLLEY-01	SPOOLBRACKET-TROLLEY-01
32.	FLUX Holder (HOPPER)	SAW-TROLLEY-FLUX HOPPER	SAW-TROLLEY-FLUX HOPPER