IM7904-1 A
Septemper, 2012
Rev. 02

PowerCRAFT™ 130, 160,180

For use with machine Part Number：

PowerCRAFT130	K69016-1
PowerCRAFT160	K69018-1
PowerCRAFT180	K69019-1

Safety Depends on You

PowerCRAFT machine is designed and built with safety in mind. However, your overall safety can be increased by proper installation and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.

OPERATOR'S MANUAL

POWERCRAFT™

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THE LINCOLN ELECTRIC COMPANY PTY LTD
35 Byrant Street Padstow NSW 2211
www.lincolnelectric.com.au

Thank you for selecting QUALITY PowerCRAFT® products.

- Please examine the packaging and equipment for damage. Claims for material damaged in shipment must be notified immediately to the authorized dealer from whom you purchased the machine.
- For future reference, please record your equipment identification information in the table below. Model Name, Code & Serial Number can be found on the machine rating plate.

Model Name		
☐ PowerCRAFT® 130	☐ PowerCRAFT® 160	☐ PowerCRAFT® 180
Code & Serial number		
Date & Where Purchased		
Authorized dealer's shop		

Declaration of conformity

THE SHANGHAI LINCOLN ELECTRIC COMPANY

Designed in conformance with the following norm:

AS 60974.1
GB15579.1
IEC 60974-1

THE SHANGHAI LINCOLN ELECTRIC COMPANY
No. 195, Lane 5008, Hu Tai Rd. Baoshan, Shanghai, PRC 201907

⚠ WARNING

ARC WELDING CAN BE HAZADOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

ELECTRIC AND MAGNETIC FIELDS may be dangerous.

1.a Electric current flowing through any conductor causes localized Electric and Magnetic Field (EMF). Welding current creates EMF fields around welding cables and welding machines.

1.b EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physican before welding.

1.c All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1.d.1 Route the electrode and work cables together – Secure them with tape when possible.

1.d.2 Never coil the electrode lead around your body.

1.d.3 Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

1.d.4 Connect the work cable to the workpiece as close as possible to the area being welded.

ARC RAYS can burn.

2.a Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc. Headshield and filter lens should conform to AS 1338.1 standard.

2.b Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

2.c Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

ELECTRIC SHOCK can kill.

3.a The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hand.

3.b Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, grating or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- **Semiautomatic DC Constant Voltage (Wire) Welder.**
- **DC Manual (Stick) Welder.**
- **AC Welder with Reduced Voltage Control.**

3.c In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.

3.d Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e Ground the work or metal to be welded to a good electrical (earth) ground.

3.f Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g Never dip the electrode in water for cooling.

3.h Never simultaneously touch electrically “hot” parts of electrode holder to two welders because voltage between the two can be total of the open circuit voltage of both welders.

FUMES AND GASES can be dangerous.

4.a Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of fume. Use enough ventillation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and below Threshold Limit Values (TLV) using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**

4.b Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays or the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

4.c Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

4.d Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer's safety practices. MSDS forms are available from your welding distributor or from the manufacturer.

FOR ELECTRICALLY powered equipment.

5.a Turn off input power using the disconnect switch at the fuse box before working on the equipment.

5.b Install equipment in accordance with the national standard, all local standards and the manufacturer's recommendations.

5.c Earth (ground) the equipment in accordance with the national standards and the manufacturer's recommendations.

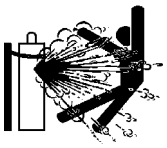
WELDING SPARKS can cause fire or explosion.

6.a Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

6.c Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from subtances inside. They can cause an explosion even though they have been "cleaned".

6.d Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trouses, high shoes and a cap over your hair.



CYLINDER may explode if damaged.

7.a Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c Cylinder should be located:

- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.

7.e Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

GENERAL INTRODUCTION

The PowerCRAFT™-series machine is a general MMA (Manual Metal Arc) arc welding power source which utilizes single phase input power. PowerCRAFT™ inverter machines adopt the latest Pulse Width Modulation (PWM) technology and Insulated Gate Bipolar Transistor (IGBT) power module. The welding response of the inverter machines has been optimized for stick(SMAW) and TIG(GTAW). They are an ideal choice for maintenance, small repairs & general fabrication where portability is important.

The PowerCRAFT™ 130, 160, 180,are recommended for stick welding with such popular electrodes as 6011, 6013 and 7018. It features automatic arc control to adjust the arc force, hot start and anti sticking.

The PowerCRAFT™ 130, 160, 180 performs DC TIG starting with excellent results.

MMA - Manual Metal Arc welding;

PWM - Pulse-Width Modulation;

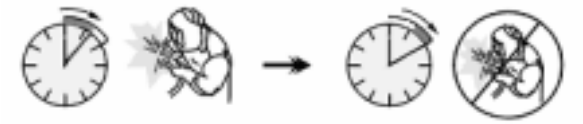
IGBT - Insulation Gate Bipolar Transistor;

TIG - Tungsten Inert Gas welding.

WELDING CAPABILITY

Please see Technical Specifications in the Installation Section for rated outputs for PowerCRAFT™ inverter machines. It is capable of higher duty cycles at lower output currents. If the duty cycle is exceeded, a thermal protector will shut off the output until the machine cools.

A Duty Cycle of 30% is:-

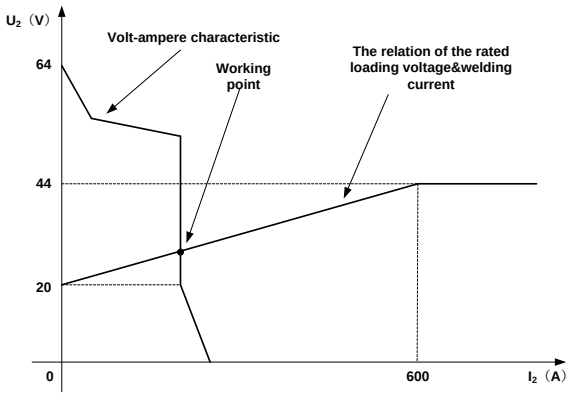


Weld for 3 minutes Break for 7 minutes

VOLT-AMPERE CHARACTERISTIC

PowerCRAFT™-series machine has excellent volt-ampere characteristic, refer to the following graph. In MMA welding, the relationship between rated loading voltage U_2 and welding current I_2 is as follows:

When $I_2 \leq 600A$, $U_2 = 20 + 0.04\ I_2$ (V) ;
When $I_2 > 600A$, $U_2 = 44$ (V)



STACKING

The PowerCRAFT™ inverters cannot be stacked when welding.

TILTING

Place the machine directly on a secure, level surface. Do not place or operate the machines on a surface with an incline greater than 15° from horizontal. The machine may topple over if this procedure is not followed.

TECHNICAL SPECIFICATIONS

INPUT – SINGLE PHASE ONLY				
	Standard Voltag/Phase/ Frequency	Input Power@ Duty Cycle	Maximum Supply Current	Maximum Effective Supply Current
PowerCRAFT™ 130	240V (±10%)/ 1/50/60 Hz	15%/5.86KVA/4.15KW	26.1A	10A
PowerCRAFT™ 160	240V(±10%)/ 1/50/60 Hz	21%/7.34KVA/5.29KW	32.4A	15A
PowerCRAFT™ 180	240V(±10%)/ 1/50/60 Hz	16.5%/8.45KVA/6.11KW	36.6A	15A

RATED OUTPUT – DC ONLY				
		Duty Cycle(1)	Amperes	Volts at Rated Amperes
PowerCRAFT™ 130	SMAW	15% 60% 100%	130A 65A 50A	25.2V 22.6V 22V
	GTAW	17.5% 60% 100%	130A 70A 53A	15.2V 12.8V 12.1V
PowerCRAFT™ 160	SMAW	21% 60% 100%	160A 100A 75A	26.4V 24V 23V
	GTAW	25% 60% 100%	160A 112A 88A	16.4V 14.5V 13.5V
PowerCRAFT™ 180	SMAW	16.5% 60% 100%	180A 100A 85A	27.2V 24V 23.4V
	GTAW	22% 60% 100%	180A 112A 88A	17.2V 14.5V 13.5V

OUTPUT RANGE				
		Open Circuit Voltage	Welding Current Range	Welding Voltage Range
PowerCRAFT™ 130	SMAW	66V	20A ~ 130A	20.8 V ~ 25.2V
	GTAW		10A~130A	10.4 V ~ 15.2V
PowerCRAFT™ 160	SMAW	71V	20A ~ 160A	20.8 V ~ 26.4V
	GTAW		10A~160A	10.4 V ~ 16.4V
PowerCRAFT™ 180	SMAW	71V	20A ~ 180A	20.8V ~ 27.2V
	GTAW		10A~180A	10.4V ~ 17.2V

OTHER PARAMETERS				
	Power Factor	Efficiency	Protection Class	Insulation Class
PowerCRAFT™ 130	0.71	≥80%	IP21S	H
PowerCRAFT™ 160	0.72	≥80%	IP21S	H
PowerCRAFT™ 180	0.72	≥80%	IP21S	H

PHYSICAL DIMENSIONS				
	Length	Width	Height	Weight
PowerCRAFT™ 130	360mm	110mm	190mm	4.7Kg(2)
PowerCRAFT™ 160	360mm	140mm	230mm	6.8Kg(2)
PowerCRAFT™ 180	360mm	140mm	230mm	6.8Kg(2)

Temperature Range	
Operating Temperature Range	-10°C ~ +40°C(14°F~104°F)
Storage Temperature Range	-25°C ~ +55°C(-13°F~131°F)

(1) Based upon 10 minute time period(i.e., for 30% duty cycle, it is 3 minutes on and 7 minutes off)

(2) Power Source only.

Note: The above parameters are subject to change with the improvement of mach

SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF at the main switch or fuse box before working on this equipment.**
- **Do not touch electrically live parts or electrode with skin or wet clothing.**
- **Insulate yourself from work and ground.**
- **Always wear dry insulating gloves.**

FUMES AND GASES can be dangerous.

- **Keep your head out of fumes.**
- **Use ventilation or exhaust to remove fumes from breathing zone.**

WELDING SPARKS can cause fire or explosion.

- **Keep flammable material away.**
- **Do not weld on closed containers.**

PLEASE SEE ADDITIONAL WARNING INFORMATION AT THE FRONT OF THIS OPERATOR'S MANUAL.

SELECT SUITABLE LOCATION

This power source should not be subjected to rain, nor should any parts of it be submerged in water. Doing so may cause improper operation as well as pose a safety hazard. The best practice is to keep the machine in a dry, sheltered area.

⚠ CAUTION

The bottom of machine must always be placed on a firm, secure, level surface. There is a danger of the machine toppling over if this precaution is not taken.

Place the welder where clean cooling air can freely circulate in through the front louvers and out through the rear side. Water, dirt, dust or any foreign material that can be drawn into the welder should be kept to a minimum. Failure to observe these precautions can result in excessive operating temperatures and nuisance shutdowns.
Locate the PowerCRAFT™ machine away from radio controlled machinery. Normal operation of the welder may adversely affect the operation of RF controlled equipment, which may result in bodily injury or damage to the equipment.

INPUT CONNECTIONS

ELECTRIC SHOCK can kill.

- Have a qualified electrician install and service this equipment.
- Disconnect input power by removing plug from receptacle before working inside machines. Allow machine to sit for 5 minutes minimum to allow the power capacitors to discharge before working inside this equipment.
- Do not touch electrically live parts.

INPUT POWER CONNECTION

Check the input voltage, phase, and frequency supplied to this machine before turning it on. The allowable input voltage is indicated in the technical specification section of this manual and on the rating plate of the machine. Be sure that the machine is earthed (grounded).

INPUT VOLTAGE

The PowerCRAFT™ 130/160/180 machine is provided with a 240V±10% input voltage, 50/60Hz.
An output guide is provided in the technical specification section of this manual.

ENGINE DRIVEN GENERATOR

The machine is designed to operate on engine driven generators as long as the auxiliary can supply adequate voltage, frequency and power as indicated in the "Technical Specification" Installation Section of this manual. The auxiliary supply of the generator must also meet the following conditions:

Frequency: in the range of 50 and 60 Hz
RMS voltage of the AC waveform: 180-260V
Peak voltage max. 367V
Generator Minimum 7kVA

It is important to check these conditions because many engine driven generators produce high voltage spikes. Operation of this machine with engine driven generators not conforming to these conditions is not recommend and may damage the machine and is also NOT covered by warranty.

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Keep the electrode holder and cable insulation in good condition.**
- **Do not touch electrically live parts or electrode with skin or wet clothing.**
- **Insulate yourself from work and ground.**
- **Turn the input line Switch on the PowerCRAFT machines "Off" before connecting or disconnecting output cables or other equipment.**

⚠ CAUTION

For secure electrical connection, the power source output sockets connecting cable plugs must be tightened. Damage may occur to the output socket or welding performance maybe compromised.

To avoid interference problems with other equipment and to achieve the best possible operation, route all cables directly to the work. Avoid excessive lengths and do not coil excess cable.

OUTPUT CONNECTIONS

A quick disconnect system using Twistmate cable plugs is used for the welding cable connections. Refer to the following sections for more information on connecting the machine for operation of stick welding(SMAW) or TIG welding (GTAW).

STICK WELDING (SMAW)

First determine the proper electrode polarity for the electrode to be used. Consult the electrode data for this information. Then connect the output cables to the output terminals of the machine for the selected polarity. Shown here is the connection method for DC(+) welding. (See Figure B.1)

Connect the welding cable to the (+) terminal and the work clamp to the (-) terminal. Insert the connector with the key lining up with the keyway and rotate approximately 1/4 turn clockwise. Do not over tighten.

For DC(-) welding, switch the cable connections at the machine so that the welding cable is connected to (-) and and the work clamp is connected to (+). (See Figure B.2)

Figure B.1

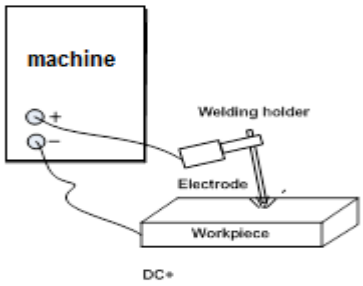


Figure B.2

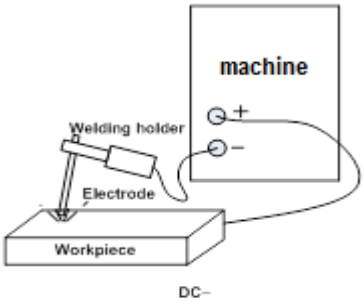
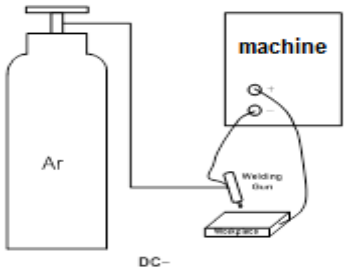


Figure B.3



TIG WELDING (GTAW)

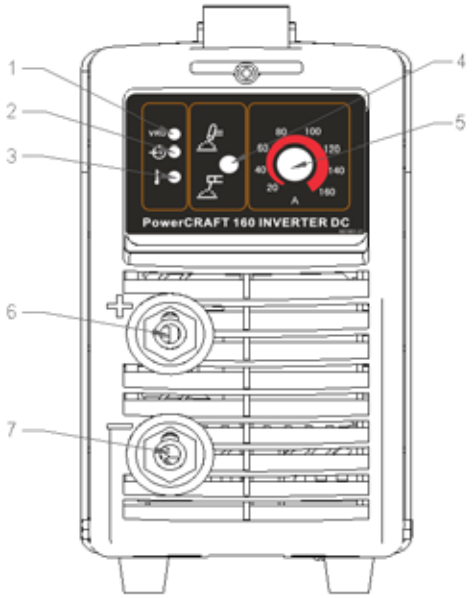
The PowerCRAFT™ machine does not have a built in Gas Solenoid so a one piece gas valve TIG Torch is required. A TIG Torch apapter is also required. Refer to the accessories section for more informatin about TIG Torches and required adapter. Most TIG welding is done with DC(-) polarity shown here.(See Figure B.3) If DC(+) polarity is necessary switch the cable connections at the machine.

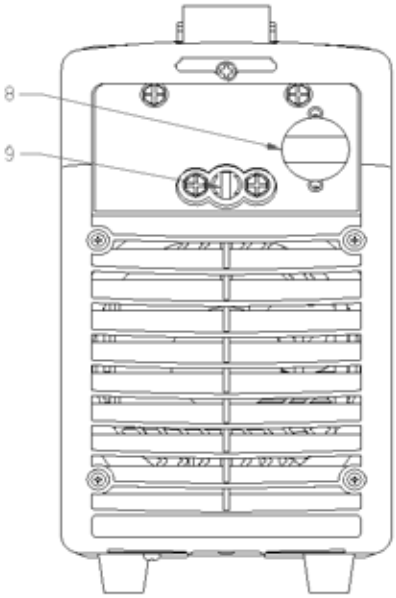
Connect the torch cable to the (-) terninal of the machine and the work clamp to (+) terminal. Insert the connector with key lining up with the key way and rotate approximately 1/4 turn clockwise. Do not over tighten. Finally, connect the adapter gas hose to the gas regulator on the cylinder of gas to be used.

Striking arc of TIG operation

When the tungsten electrode touches the workpiece, the short-circuit current is only 20A. After generating arc, current can rise to the preset welding current. If the tungsten electrode touches the workpiece during welding, the current will drop to 20A within 2s, which can reduce tungsten damage and prolong the tungsten electrode life.

CONTROLS AND OPERATIONAL FEATURES (Take PowerCRAFT™ 160 for example)





1. **VRD Light**
   The machine is working in VRD voltage range when this light is on.
2. **Power On/Off**
   This pilot lamp illuminates when the power source is on.
3. **Thermal LED**
   This indicator will turn on when the machine is overheated and the output has been disabled. This normally occurs when the duty cycle of the machine has been exceeded. Leave the machine on to allow the internal components to cool. When the indicator turns off, normal operation is again .
4. **Welding Mode Switch**
   Select the desired welding mode of the machine: SMAW for Stick welding and Touch TIG for TIG welding.

   SMAW

   Touch TIG

   When the mode switch is in the TIG position, the stick welding functions are disabled and the machine is ready for TIG welding.
5. **Output Current Knob**
   Potentiometer used to set the output current used during welding.
6. **Positive Output Terminal**
   Positive output connector for the welding circuit.
7. **Negative Output Terminal**
   Negative output connector for the welding circuit.
8. **Power Switch**
   It turns ON/OFF the input power to the machine.
9. **Input Cable**
   PowerCRAFT machines are provided with a plugged input cord, Connect it to the mains.

Auto Adaptive Arc Force (with stick welding)
The arc force function is activated during stick welding. This function increases temporary the output current, used to clear intermittent connections between the electrode and the weld puddle that occur during stick welding.

This is an active control feature that guarantees the best arrangement between the arc stability and spatter presence. The control determines the amount of current to apply to break the metal drop that is being transferred from the electrode to the work piece to guarantee the arc stability, but not too high so as to minimize spatter around the welding puddle. That means:

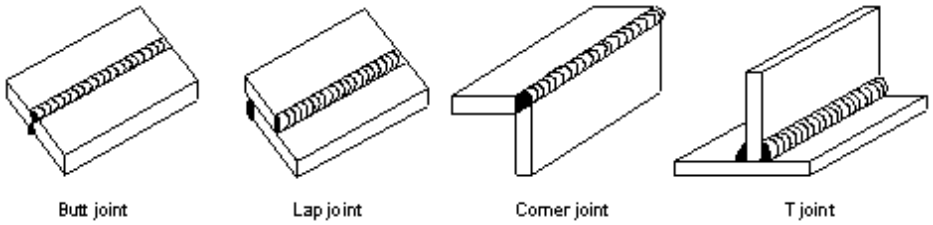
- Electrode/work piece sticking prevention, also with low current values
- Spatter reduction

The welding operations are simplified and the welded joints looks better, if not cleaned after the welding.

The Stick welding mode also includes the following features:

- Hot Start: This is a temporary increase in the initial welding current. This helps ignite the arc quickly and reliably.

- Anti-Sticking: This is a function that decreases the output current of the machine to a low level when the operator makes an error and sticks the electrode to the work piece. This decrease in current allows the operator to remove the electrode from the electrode holder without creating large sparks that can damage the electrode holder.



Common basic joint form: butt joint, lap joint, corner joint & T joint.

Electrode selection

The electrode diameter selection is based on the workpiece thickness, welding position, joint form, welding layer, etc. Please refer to the following table.

Electrode diameter selection guide:

Workpiece thickness/mm	2	3	4~5	6~12	＞13
Electrode diameter/mm	2.5	3.2	3.2~4	4~5	4~6

The welding current reference for different electrode diameter:

Workpiece thickness/ mm	1.6	2.0	2.5	3.2	4.0
Welding current/A	25~40	40~60	50~80	100~ 130	160~ 210

1. Electrode should be dryed according to user manual before using. This reduces the hydrogen introduced to the molten pool and welding seam, and avoiding prorosity and cold cracking.

2. In the welding process, the arc must not be too long; otherwise, it will cause unstable arc burning, large spatter, light penetration, undercut, prorosity, etc. If the arc is too short, it will cause electrode stick.

3. In MMA welding the arc length is usually equal to 0.5~1.0 time of the electrode diameter. The basic electrode's arc length is not beyond the electrode diameter, it's better to choose the short arc welding; the electrode's arc length is equal to the electrode diameter.

OPERATION ENVIRONMENT

Height above sea level: - below 1000m.
Operation temperature range: -10^0C～$+40^0$C.
Relative humidity: below 90 %($+20^0$C).

Preferably sit the machine level, however ensure the maximum angle does not exceed 15^0 .

Protect the machine against rain or in hot circumstance against direct sunshine.

The content of dust, acid, corrosive gas in the surrounding air can not exceed normal standard.

Take care that there is sufficient ventilation during welding. There is at least 30cm free distance between the machine and wall.

Operation Notice

Read the Safety Section carefully before attempting to use this equipment.

Input power must be AC, single phase, 50/60Hz, 240V and correctly earthed.

When the power switch is closed, no-load voltage is present. Do not touch the output electrode with any part of your body.

Do not watch the arc with unprotected eyes.
Ensure good ventilation of the machine to improve duty cycle.

Turn off the machine when finished to save energy.

MAINTENANCE

In order to guarantee the arc welding machine works efficiently and safely, it must be maintained regularly. Refer to the maintenance items in the following table.

● **Warning: For safety while maintaining the machine, please shut off the supply power and wait for 5 minutes, until capacitor voltage drops to safe voltage.**
All service work should be conducted by an authorised Lincoln Electric field service agent

	Maintenance items
Daily examination	Check operation of the panel knob and switch on the front and at the back of arc welding machine are operational and operate correctly. If the switch is not operational, please replace immediately. Check the function of the LED display. If it doesn't work, maintain or replace the display PCB. Check fan is operating normally. If the fan is damaged, change immediately. If the fan does not rotate after the arc welding machine is overheated, check if something blocking the fan blade, if it is blocked, remove obstruction. If the fan still does not rotate try to spin the blade in the rotation direction of fan. If the fan rotates normally, the start capacitor should be replaced; If not, change the fan. Check the output terminals for overheating, if so change output terminals. Ensure welding lead plugs are connected tightly. Check welding leads for damage. If damaged replace leads.
Monthly examination	Using the dry compressed air to clear the inside of arc welding machine. Especially for removing dust from heat sinks, main voltage transformer, inductance, IGBT module, the fast recover diode and PCB, etc.
Yearly examination	Have a Lincoln Field service ship perform an insulation resistance test.

ARCWELDING DEFECT AND PREVENTION METHOD

Problem	Possible Cause	What to do
Welding seam doesn't meet the requirement	The groove angle is not correct The root face and assembly gap is not equal Welding technics parameters are unreasonable	Choosing the proper groove angle & assembly gap, improve the assembly quality Choosing the correct welding parameters Improve the operation skill of welders
Undercut	Over current Arc length is too long The electrode angle is wrong Manipulation of electrode is not correct	Choosing the correct welding current & travel speed Shorten the arc length The electrode angle should be correct Manipulation of electrode should be correct
Incomplete penetration	The groove angle or gap is too small, the root face is too big Welding parameters are not suitable, or the assembly is not good The welder's operation skill is lower	Choose the correct process and groove size Correctly assemble and ensure clearance Choose the suitable welding current & speed Improve the operation skill of welders
Incomplete fusion	The welding thermal input is too low There is rust or contamination on the side of groove The slag between the layers is not cleared well enough	Choose the correct welding parameters Ensure joint is clean prior to welding Enhance the cleanlyness between layers
Overlap	The temperature of molten pool is too high The liquid metal concretes slowly	Choosing parameters based on the welding different position Strictly control the molten pool size
Crater	The crater time is too short Over current in the welding of thin plate	In the crater, electrode should be held for a short time or round to manipulate electrode after the molten pool is filled in by metal, take to the side for crater
Prorosity	There is some contamination on the work piece surface and groove The coating of electrode is damp Under current or over speed in the welding The arc is too long or lean burning, the molten pool protection is not sufficent Over current, the coating of electrode falls off and lose protection Manipulation of electrode is not proper	Clean around joint for about 20～30mm Strictly to dry the electrode according to manual Choosethe correct welding parameters and travel speed Using the short arc operation Welding operation in the field should have protection from wind
Inclusion & slag inclusion	The slag sticks to the middle layer in the welding process Under current or over speed in the welding Welding operation is not proper The welding material does not match the work piece The groove design & processing are not correct	Choose the electrode with good slag removal Ensure all slag is removed between runs Choose correct welding parameters Use the correct electrode angle
Hot cracking	In the process of solidification, the inter crystal segregation is caused. At the same time, with the effect of welding stress, the hot crack is formed.	Strictly control the percentage of S and P in welding material. Adjust the structure of welding material. Use low hydrogen electrodes.
Cold cracking	Three reasons will cause cold cracking: The structure turned from the martensite The residual stress caused by over restraint The residual hydrogen in welding gap.	Use low hydrogen type basic electrode. Bake electrodes per the instruction before use. Reduce the percentage of hydrogen Adopt appropriate parameters and heat input After welding, do dehydrogenation at once.

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

Before arc welding machines are dispatched from the factory, they have already been tested. Therefore no unauthorised modifications are allowed.
Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

Step 1. LOCATE PROBLEM(SYMPTOM).
Look under the column labeled “PROBLEM (SYMPTOMS)”. This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

Step 2. POSSIBLE CAUSE
The third column labeled ”POSSIBLE CAUSE” lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COUSE OF ACTION
This column provides a course of action for the Possible Cause.

If you do not understand or are unable to perform the Recommended Course of Action safely, contact your local Lincoln Authorized Field Service Facility.

⚠ WARNING

ELECTRIC SHOCK can kill.
1. Have an electrician install and service this equipment.
2. Turn the input power off at the fuse box before working on equipment.
3. Do not touch electrically hot parts.

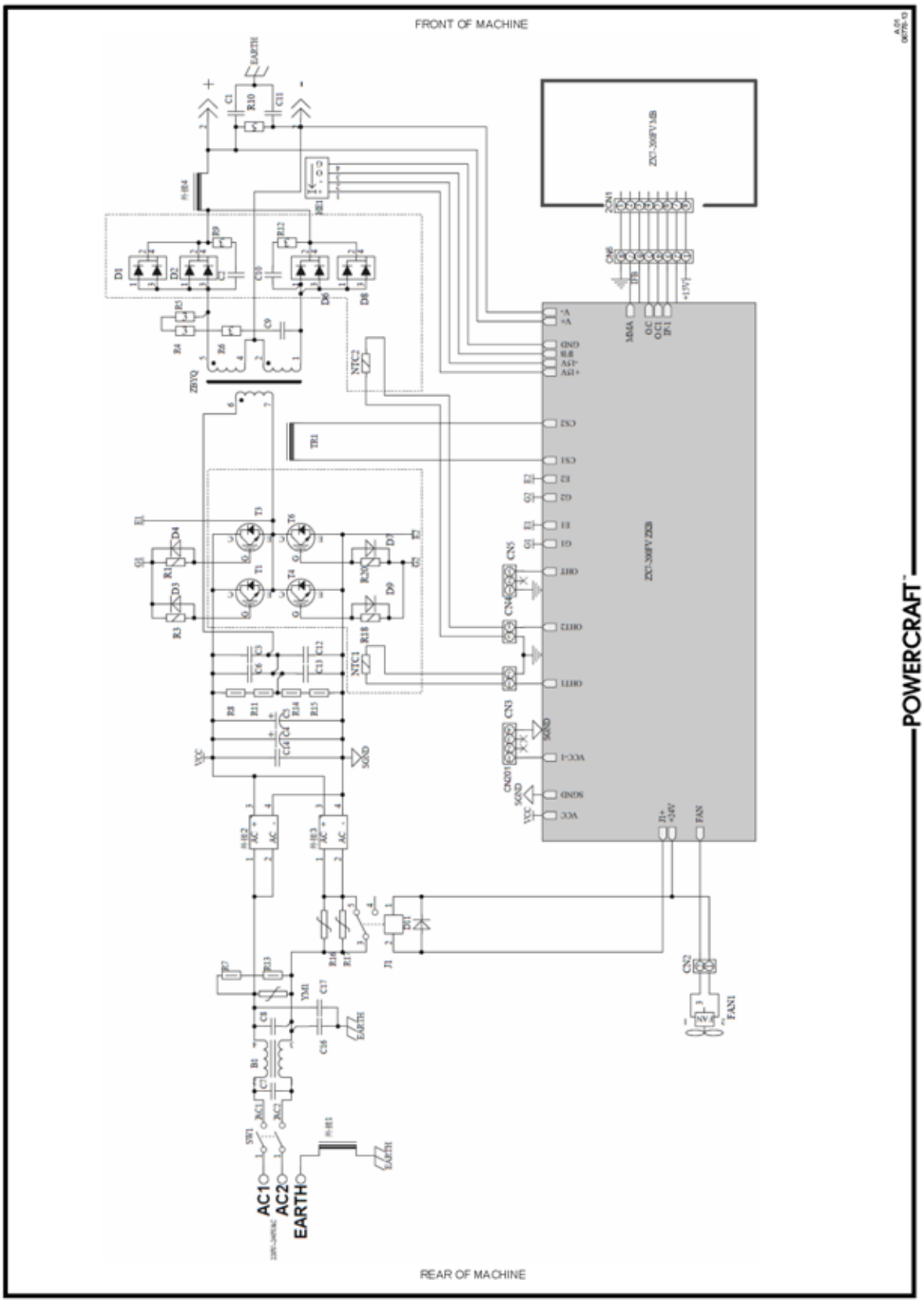
⚠ CAUTION

If for any reason you do not understand the test procedure or are unable to perform the tests/repairs safely, contact your Local Lincoln Authorized Field Service Facility for technical troubleshooting assistance before you proceed.

TROUBLESHOOTING

Item	PROBLEMS(SYMPTOMS)	POSSIBLE CAUSE		RECOMMENDED COURSE OF ACTION
1	Turn on the power source, and fan works, but the power light is not on.	The power light damaged or connection is faulty		Test and repair the circuit of power light Pr3
		Power PCB failures		Repair or change power PCB Pr2
2	Turn on the power source, and the power light is on, but fan doesn't work	Fan blocked.		Remove blockage
		The fan motor damaged		Change fan motor
3	Turn on the power source, and the power light is not on, and fan doesn't work	No input voltage		Check whether there is input voltage
		Overvoltage (Input voltage is either too high or too low)		Check input voltage
4	No no-load voltage output	There is trouble inside the machine		Check the main circuit, Pr1 and Pr2
5	No welding output	Welding cable is not connected too the output terminals.		Connect the welding cable to the output terminals
		Welding cable is broken		Repair or replace the welding cable
		Work cable is not connected or loosen		Check connection of the work clamp
6	Not easy to start arc welding, or easy to cause sticking	The plug loose or poor connect		Check and tighten the plug
		Contamination on the workpiece		Check and clean joint
		SMAW/GTAW welding selection is wrong		Select the SMAW welding mode
7	Arc break during welding	The welding current adjusted too low		Increase the welding current
8	The welding current can not be adjusted	The welding current potentiometer in the front panel damaged		Repair or change the potentiometer
9	The penetration of molten pool is not enough(MMA)	The welding current adjusted too low		Increase the welding current
10	Arc blow	Airflow disturbance		Use the shelter from airflow
		The electrode eccentricity		Adjust the electrode angle
				Change the electrode
		Magnetic effect		Incline the electrode to the opposite side of the magnetic blow
				Change the position of work clamp or add work cable in the second side of workpiece
				Use the short arc operation
11	The alarm light is on	Over heat protection	Over welding current	Reduce the welding current output
			Exceed duty cycle	Reduce the duty cycle (interval of weld time)
		Over current protection	Unusual current in the main circuit	Test and repair the main circuit and drive PCB (Pr1)

PowerCRAFT™ 130/160/180 WIRING SCHEMATIC



Warranty Terms & Conditions – Lincoln Electric Limited Warranty

STATEMENT OF LIMITED WARRANTY

This warranty is given by The Lincoln Electric® Company (Australia) Pty Limited ("Lincoln®"), 35 Bryant St, Padstow NSW 2211, Tel: 1300 LINCOLN (1300 546 265).

Under this warranty, Lincoln® warrants all new machinery and equipment ("goods") manufactured by Lincoln® against defects in workmanship and material subject to certain limitations hereinafter provided.

The benefits to the purchaser given by this warranty are in addition to other rights and remedies of the purchaser under a law in relation to the goods.
Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

This warranty is void if Lincoln® or Lincoln's Authorised Service Facility finds that the equipment has been subjected to improper installation, improper care or abnormal operations. Further, this warranty does not apply to:

- cable wear and consequential damage resulting from cable wear due to flexing and abrasion. The purchaser is responsible for routine inspection of cables for possible wear and to remedy the issue prior to cable failure;
- engines and engine accessories;
- any batteries supplied with the goods;
- repairs done to the goods and undertaken by the purchaser outside Lincoln's premises without written authority from Lincoln® obtained prior to any such repair; or
- any damage or failure of the goods as a result of normal wear and tear or the neglect misuse abuse or failure to properly service goods by any purchaser.

PERIOD OF WARRANTY "LINCOLN® BRANDED GOODS"

Lincoln® will assume both the parts and labour expense of correcting defects during this warranty period. All warranty periods under this warranty start from the date of purchase from a Lincoln® Authorised Distributor or Lincoln® Authorised Service Facility to the original end user or from the date of manufacture if proof of purchase is not available and are as follows:

Three Years

- All Lincoln® welding machines, wire feeders and plasma cutting machines unless listed below.

Two Years

- Ranger 405D®, Italian Invertec® Welders & Plasmas machines unless listed below.

One Year

- Kjellberg Plasma Cutting Equipment.
- Fanuc Robotic Equipment.
- Genesis Systems Group Equipment.
- Weld Engineering Flux Recovery Equipment.
- Binzel Robotic Cleaning Stations & Associated Equipment.
- PCA Profile Cutting Machines.
- All PowerCRAFT Welding Machines
- All water coolers (internal and external).
- Arc welding and cutting robots and robotic controllers.
- All stick electrodes, welding wires and fluxes.

- All Environmental Systems equipment, including portable units, central units and accessories. (Does not include consumable items listed under 30-day warranty).
- All welding and cutting accessories including wire feed modules, undercarriages, field installed options that are sold separately, unattached options, welding supplies, standard accessory sets, replacement parts. (Does not include expendable parts and guns/torches listed under 90 and 30 day warranties).

90 Days

- All Gun and Cable Assemblies (manufactured by Lincoln®) and Spool guns.
- All MIG, TIG and Plasma Torches.
- All "Pro Torch" TIG Torches.

30 Days

- All consumable items that may be used with the environmental systems described above. This includes hoses, filters, belts and hose adapters.
- Expendable Parts - Lincoln® is not responsible for the replacement of any expendable part that is required due to normal wear.

WARRANTY CLAIM PROCESS

The purchaser must contact Lincoln® (see contact details above) within the applicable warranty period about any defect claimed under this warranty. Lincoln® may direct the purchaser to one of Lincoln's Authorised Service Facilities.

Determination of warranty on welding and cutting equipment will be made by Lincoln® or one of Lincoln's Authorised Service Facilities as directed by Lincoln®.

At Lincoln's request, the purchaser must return, to Lincoln® or Lincoln's Authorised Service Facility, at the purchaser's cost, any goods claimed defective under this warranty, or permit Lincoln® or Lincoln's Authorised Service Facility to inspect the goods at the purchaser's premises.

Lincoln® may at its absolute discretion repair or replace the goods at its own premises or at such other premises as Lincoln® may designate provided that all freight charges to and from Lincoln's premises or such other premises as Lincoln® may designate shall be paid by the purchaser.

If Lincoln® or Lincoln's Authorised Service Facility confirms the existence of a defect covered by this warranty; the defect will be corrected by repair or replacement at Lincoln's option.

CUSTOMER ASSISTANCE POLICY

Lincoln's business is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln® for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln® is not in a position to warrant or guarantee such advice and to the extent permitted by law assumes no liability, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given. The provision of information or advice does not create, expand or alter this warranty.

Lincoln® is a responsive manufacturer, but the selection and use of specific products sold by Lincoln® is solely within the control of, and remains the sole responsibility

NOTE

THE LINCOLN ELECTRIC COMPANY PTY LTD
35 Bryant Street Padstow NSW
www.lincolnelectric.com.au