



FDIS 20160-E

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Inverter Welding Machine

USER'S MANUAL

Thank you for purchasing this Inverter Welding Machine. Before you start using it, please carefully read this user's manual and save it for possible future use.

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1. GENERAL SAFETY INSTRUCTIONS

⚠ WARNING!

On the process of welding or cutting, there will be possibility of injury, so please take protection into consideration during operation. For more details please review the Operator Safety Guide, which complies with the preventive requirements of the manufacturer.

ELECTRIC SHOCK — MAY LEAD TO DEATH!!

- ✿ Set the earth fitting according to applying standard.
- ✿ Forbidden to touch the bare electric parts and electrode with uncovered skin, wet gloves or clothes.
- ✿ Make sure you are insulated from the ground and the workshop.
- ✿ Make sure you are in safe position.
- ✿ Contact with live components may result in death due to electric shock or burns.
- ✿ Set the grounding according to the standards used.
- ✿ It is forbidden to touch electrical parts and electrodes without working protection (welding gloves or clothing).
- ✿ Contact with live components may result in death due to electric shock or burns.
- ✿ Output voltage of the device when idle is dangerous. Do not touch the components that are under the current.
- ✿ Before starting up, make sure that the instrument and the base material are grounded.
- ✿ Turn off the power and unplug the power cord while installing and repairing the device.
- ✿ Welding cables with insufficient performance and damaged or old insulation must not be used.
- ✿ Wear dry and well-insulated work gloves.
- ✿ Do not operate the unit if its cover has been removed.
- ✿ If you are using the device in a narrow or Very high, work with protective aids.
- ✿ When the welding is complete, turn off the power.
- ✿ Do not use the appliance in rain or in places with relatively high humidity.

GASES AND FUMES — MAY BE HARMFUL TO HEALTH!

- ✿ Keep your head out of the gases and fumes.
- ✿ When arc welding, ventilators or air extractors should be used to avoid breathing gases.

ARC RAYS — HARMFUL TO YOUR EYES, BURN YOUR SKIN

- ✿ Wear suitable protective mask, light filter and protective garment to protect eyes and body.
- ✿ Prepare suitable protective mask or curtain to protect looker-on.

FIRE

- ✿ Welding spark may cause fire, make sure there is no tinder stuff around the welding area.

NOISE — EXCESSIVE NOISES WILL BE HARMFUL TO HEARING

- ✿ Use ear protector or others means to protect ear.
- ✿ Warn looker-on that noise is harmful to hearing.

MALFUNCTION — WHEN TROUBLE HAPPENS, CONTACT WITH AUTHORIZED PROFESSIONALS

- ✿ If trouble happens during installation and operation, please follow this manual instruction to check up.
- ✿ If you fail to fully understand the manual, or fail to solve the problem with the instruction, you should contact the suppliers or the service center for professional help.

⚠ WARNING!

Creepage-protecting switch should be added when using the machine!!!

WELD IN A WELL-VENTILATED ROOM!

- ✿ The welding area must be well ventilated.
- ✿ Use a belt or chain to attach the gas bottle to the instrument. The gas bottle must stand on a level ground.
- ✿ Protect the gas bottle from heat, sunlight and rain. Dangerous, eg flammable objects should not be stored near the device.
- ✿ Use sufficient ventilation with forced circulation or local exhaust (forced suction) on the arc to remove vapors.

IN THE EVENT OF A MALFUNCTION, ALWAYS CONTACT THE SPECIALISTS!

- ✿ If you notice any problems during installation or operation, please follow these instructions.
- ✿ If the manual fails to fully understand or fails to solve the problem, contact your inverter supplier or the Sharks Service Center for professional help.

⚠ WARNING!

When using electric machinery and power tools, it is important to abide by and adhere to the following safety instructions for reasons of protection against injury caused by electric current, injury of persons and risk of starting fire. The term “power tools” used in the instructions below refers to power tools that are plugged into a power supply (by a power cord) as well as tools running on a battery pack (cordless). Keep all warnings and instructions for further use.

Work environment

- ✿ Keep the work area clean and well lit. Untidiness and dark places on the job site are usually causes of accidents. Store tools that are not used.
- ✿ Do not use power tools in an environment where there is risk of starting a fire or explosion; this refers to places where there are flammable liquids, gases or dust. Sparks from the power tool's commutator, which can cause dust or fume ignition.
- ✿ When using power tools, unauthorized persons, especially children, should be denied entry to the job site! In case you are interrupted, you can lose control of the current activity. In any case.

⚠ WARNING!

Carefully read the instruction manual before use.

Important safety warnings

- ✿ Unpack the product carefully and be sure not to throw away any part of the package before having found all components of the product.
- ✿ Keep the product in a dry place out of reach of children.

- ✿ Read all cautions and instructions. The failure to adhere to warning cautions and instructions may result in an accident, fire and/or a serious injury.

Packaging

The product is placed in a package preventing damage during transport. This package is a raw material therefore it can be handed-over for recycling.

Instructions for use

- ✿ Before beginning to work with the machine, read the following safety rules and instructions for use. Familiarize with operating elements and the proper use of the device. Keep the manual in a safe place for future reference.
- ✿ We recommend keeping the original package including the inner packaging materials, cash voucher and guarantee card for a period of warranty at minimum.
- ✿ For a case of transportation, pack the machine into the original box from the manufacturer, thus ensuring a maximum protection of the product during a possible transport (e.g. moving or sending into a service station).

Note:

If you hand the machine over to next persons, hand it over together with the manual. Adherence to the attached instructions for use is a precondition for the proper use of the machine. The operation manual includes also instructions for operation, maintenance and repairs. The manufacturer does not take any responsibility

Service

- ✿ Do not change parts of the tool, do not perform repairs on your own and do not interfere with the tool's construction in any way. Leave tool repairs to qualified persons.
- ✿ Each repair or product modification performed without our company's permission is inadmissible (it can cause injury or harm to the user).
- ✿ Always leave tools to be repaired in a certified service centre. Use only original or recommended spare parts. This will ensure your and your tool's safety.

Personal safety

- ✿ When using a power tool, be careful and alert, pay special attention to the activity you are doing. Concentrate on your work. Do not work with power tools if you are tired or if you are under the influence of drugs, alcohol or medication. When using power tools, even a momentary lapse in attentiveness can lead to severe personal injury. Do not eat, drink or smoke while working with power tools.
- ✿ Use protective gear. Always use eye protection. Use protective gear corresponding to the type of work you are doing. Protective gear such as respirators, safety shoes with antiskid treatment, head protection or ear protection, used in accordance with working conditions, lower the risk of personal injury.
- ✿ Avoid unintentional operation of tools. Do not carry tools that are plugged into the electric grid with your finger on the switch or release trigger. Before connecting the tool to a power supply, make sure that the switch or release trigger are in the "off" position. Carrying tools with your finger on the switch or plugging the tool into an outlet with the switch in the "on" position can cause serious injury.
- ✿ Before turning tools on, remove all adjustment wrenches and tools. The adjustment wrench or tool that stays connected to the rotating part of the power tool can cause personal injury.

- ✿ Always stand firmly and keep your balance. Work only in places that you can reach safely. Never overestimate your own strength. Do not use power tools if you are tired.
- ✿ Dress appropriately. Use working clothes. Do not wear loose clothing or jewellery. Make sure that your hair, clothing, gloves or other body parts do not come overly close to rotating or heated parts of the power tool.
- ✿ Connect the equipment to the dust exhaust. If the tool offers the possibility to connect equipment for capturing dust or dust suction, make sure that it is properly connected and used. Using this equipment can reduce danger resulting from dust.
- ✿ Firmly fasten the workpiece. Use a carpenter's clamp or vice to secure the piece you will be cutting.
- ✿ Do not use power tools if you are under the influence of alcohol, drugs, medication or other narcotics or addictive substances.
- ✿ This equipment is not intended to be used by persons with limited physical, sensory or mental abilities (including children) or persons with insufficient experience and knowledge, unless they are supervised or received instructions to use the equipment from a person responsible for his/her safety. Children must be supervised in order to ensure that they are not playing with the equipment.

Using power tools and their maintenance

- ✿ Always disconnect the power tool from the electric grid if there is any problem during work, before every cleaning or maintenance, during every shift and after finishing work! Never work with power tools if they are damaged in any way. If the tool starts emitting abnormal noises or odours, immediately stop working.
- ✿ Do not overload power tools. The power tool will function better and more safely if it operates at speeds for which it was designed. Use correct tools that are designated for the given activity. The correct tool works better and more safely.
- ✿ Do not use power tools that cannot be turned on safely and cannot be turned on and off with a control switch. Using this type of tool is dangerous. Faulty switches must be repaired at a certified service centre.
- ✿ Disconnect the tool from the power supply before you start setting, changing accessories or maintenance. This measure will prevent the risk of accidental start-up.
- ✿ Store unused power tools so that they are out of the reach of children and unauthorized persons. Power tools in the hands of inexperienced users can be dangerous. Store power tools in a dry and safe place. Keep power tools in good condition. Regularly check the setting of moving parts and their movability. Check if the protective cover or other parts that can limit the safe functioning of the power tool are not damaged. If the tool is damaged, ensure its proper repair before the next use. Many injuries are caused by poorly maintained power tools.
- ✿ Keep cutting tools sharp and clean. Properly maintained and sharpened tools make work easier, limit the risk of injury and work with them is much more easily controlled. Using other accessories than those listed in the instruction manual can cause damage to the tool and can cause injury.
- ✿ Use power tools, accessories, work tools, etc. in accordance with these instructions and in a way that is described for the specific power tool and with regard to the given working conditions and the type of job.
- ✿ Using tools for other purposes than those intended can lead to dangerous situations.

Electrical safety

- ✿ The power tool's power plug must correspond to the power outlet. Never alter the plug in any way. If the tool's plug has a safety peg, never use an adapter of any kind. Undamaged plugs and corresponding outlets prevent the risk of injury by electric current. If the power cord is damaged, it must be replaced by a new power cord that can be obtained from an authorized service centre or the importer.

- ✿ Avoid bodily contact with grounded items, e.g. piping, radiators, kitchen ranges and refrigerators. The risk of injury by electric current is greater if your body is connected to the ground.
- ✿ Do not expose power tools to rain, moisture or dampness. Never touch power tools with wet hands. Never wash power tools with running water and never submerge them into water.
- ✿ Do not use the power cord for any other purpose than originally intended. Never carry or pull the power tools by the power cord. Do not pull the plug out of the outlet by pulling on the cord. Avoid mechanical damage to the power cord by sharp or hot objects.
- ✿ Power tools were manufactured exclusively for the AC power supply. Always check if the electrical voltage corresponds to the data printed on the tool's serial number label.
- ✿ Never work with a tool that has a damaged power cord or plug, or that has fallen on the ground and is damaged in any way.
- ✿ In the case of using an extension cord, always check that its technical parameters correspond to the data printed on the tool's serial number label. If the power tool is used outdoors, use an extension cord that is appropriate for exterior use. When using an extension cable drum, the cord must be unwound to prevent the cord from overheating.
- ✿ If the power tool is used in moist areas or outdoors, it is permitted to use it only if it is plugged into an electric circuit with a residual current device ≤ 30 mA. Using a circuit with an RCD lowers the risk of injury by electric current. Grasp hand power tools at the designated isolated grip areas because, during operation, one may come into contact with the cutting or drilling fittings with a hidden conductor or with the power cord.

2. MACHINE DESCRIPTION

The welding machine is a rectifier adopting the most advanced inverter technology.

The development of inverter gas-shielded welding equipment benefits from the development of the inverter power supply theory and components. Inverter gas-shielded welding power source utilizes high-power component MOSFET to transfer 50/60HZ frequency up to 100KHz, then reduce the voltage and commutate, and output high-power voltage via PWM technology. Because of the great reduce of the main transformer's weight and volume; the efficiency increases by 30%. The appearance of inverter welding equipment is considered to be a revolution for welding industry.

The welding power source can offer stronger, more concentrated and more stable arc. When stick and work piece get short, its response will be quicker. It means that it is easier to design into welding machine with different dynamic characteristics, and it even can be adjusted for specialty to make arc softer or harder.






MMA welding machine has the following characteristics; effective, power saving, compact, stable arc, good welding pool, high no-load voltage, and good capacity of force compensation and multi-use. It can weld stainless steel, alloy steel, carbon steel, copper and other color metal. It can apply to electrode of different specifications and materials, including acidity, alkalescence, and fibre. It can apply in high altitude, the open air and inside and outside decoration. Compared with the same products of home and abroad, it is compact in volume, light in weight, easy to install and operate.

Thanks for purchasing our product and hope for your precious advice. We will dedicate to produce the best products and offer the best service.

WARNING!

The machine is mainly used in industry. It will produce radio wave, so the worker should make fully preparation for protection.

Package contains

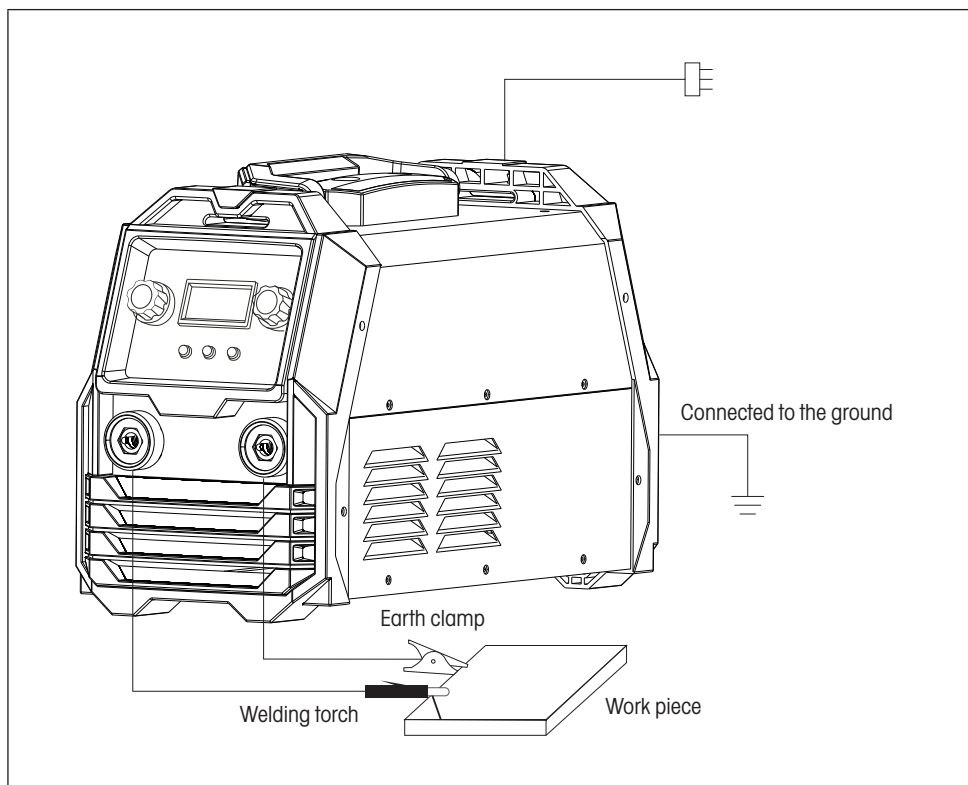
-  welder
-  welding shield
-  brush
-  1 pc of earthing cable
-  1 pc of welding cable

3. INSTALLATION INSTRUCTION

The machine is equipped with power voltage compensation equipment. When the power voltage fluctuation is between $\pm 15\%$ of rated voltage, it still can work normally.

When the machine is used with long cables, in order to prevent voltage from going down, bigger section cable is suggested. If the cable is too long, it may affect the performance of the power system. So cables of configured length are suggested.

1. Make sure the intake of the machine is not blocked or covered to avoid malfunction of cooling system.
2. Ground the cables with section area no less than 6mm² to the housing, the way is connecting screw in the back of the power source to ground device.
3. Correctly connect the arc torch or holder according to the sketch. Make sure the cable, holder and fastening plug have been connected with the ground. Put the fastening plug into the fastening socket at the "-" terminal and fasten it clockwise.
4. Put the fastening plug of the cable to fastening socket of "+" terminal at the front panel, fasten it clockwise, and the earth clamp at the other terminal clamps the work piece.



5. Please pay attention to the connecting terminal, DC welding machine has two connecting ways: positive connection and negative connection. Positive connection: holder connects with "-" terminal, while work piece with the "+" terminal. Negative connection: work piece with the "-" terminal, holder with the "+" terminal. Choose suitable way according to the working situation. If unsuitable choice is made, it will cause unstable arc, more spatters and conglutination. If such problems occur, please change the polarity of the fastening plug.
6. According to input voltage grade, connect power cable with power supply box of relevant voltage grade. Make sure no mistake is made and make sure the voltage difference is among permission range. After the above job, installation is finished and welding is available.

⚠ WARNING!

If distance of work piece and machine is too far (50–100m), and the cables (torch cable and earth cable) are too long, please choose cable of bigger section to minimize the reduction of the voltage.

4. OPERATION INSTRUCTION

1. Turn on the power switch, the screen will show set current value and ventilator is beginning to run.
2. Adjust knobs of welding current and arc-striking push, make welding function complies with demands.
3. Generally, welding current is adequate to welding electrode according with as following:

Specification	Φ 3.2	Φ 4.0
Current	130–140A	150–160A

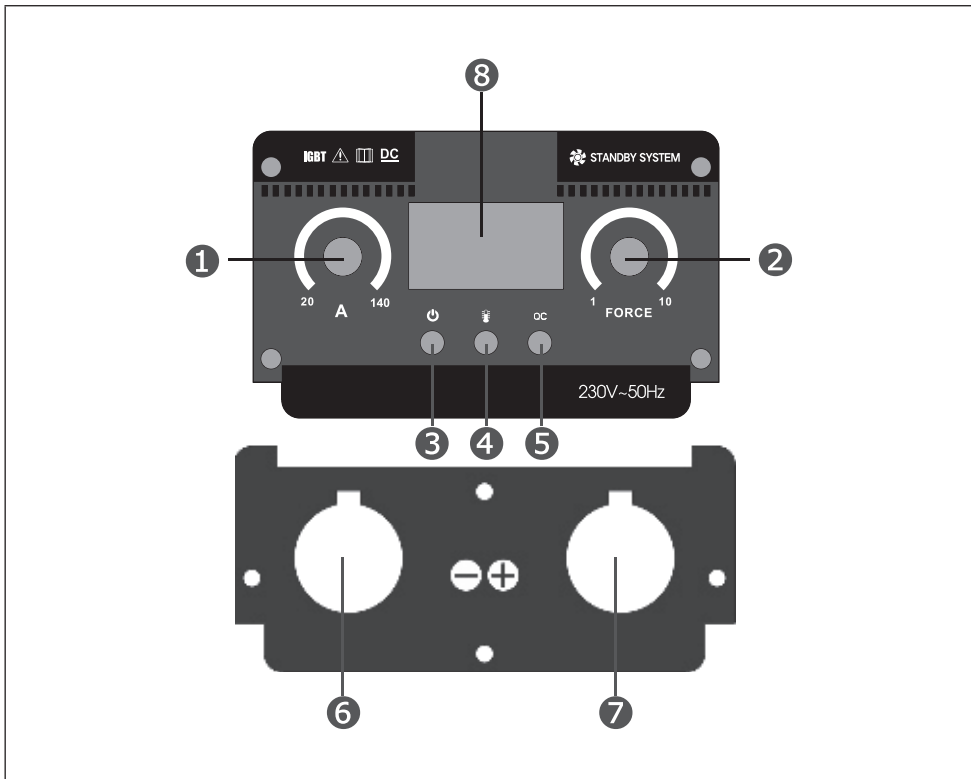
4. Knob of arc-striking drive is use to adjust welding function, specially in low current arrange, that is cooperated with knob of welding current adjustment, they may adjust current of arc striking and be out of control of knob of welding current adjustment. So machine can grain powerful energy and push current can achieve effect that may.
5. If the VRD equipment is installed in the machine. When the switch of back panel is put "ON" position, the VRD indicator is lit, and when the switch is put "OFF" position, the VRD indicator is off, then the no-load voltage is 67V. switch of VRD is put inside the machine, with the "on" condition, the no-load voltage changes to be less than 15V, which is safe for people.
6. The welding machine has been coordinated with remote control device:
 - 1) Check the switch position of remote control device before operation. If the switch is on "OFF" Position then is out of remote control. Switch is on "ON" position then is using remote control device.
 - 2) Insert plug of remote control in socket of remote control correctly and tighten firmly in order to prevent poor contact
 - 3) If remote control device is not used, make sure the switch is on "OFF" position, or welding current will not be able to be adjusted on panel.

WARNING!

Before connecting operation please make sure all the power is turned off. The right order is to connect the welding cable and ground cable to the machine first, and make sure they are firmly connected and then put the power plug to the power source.

5. PANEL FUNCTION INSTRUCTION

FRONT PANEL



1. Welding current adjustment
2. ARC force current adjustment
3. Power indicator
4. Temperature indicator
5. Abnormal indicator
6. Negative output terminal
7. Positive output terminal
8. Current meter

The panel picture above is for reference only, if any difference with the real machine, please follow with the real machine.

6. NOTES OR PREVENTIVE MEASURES

ENVIRONMENT

1. The machine should be operated in dry environments with humidity levels of max 90%.
2. Ambient temperature should be between -10 to 40 degrees centigrade.
3. Avoid welding in sunshine or drippings. Do not let water infiltrate the machine.
4. Avoid welding in dust area or the environment with corrosive gas.
5. Avoid gas welding in the environment with strong airflow.

SAFETY NORMS

The welding machine is installed with protection circuit of over voltage, over current and over heat. When voltage, output current and temperature of machine exceed the required standard, welding machine will stop working automatically. However, overuse (such as over voltage) will still result in damage to the welding machine. To avoid this, the user must pay attention to the following.

1. The working area is adequately ventilated!
The welding machine is powerful machine, when it is being operated, it generated by high currents, and natural wind will not satisfy machine cool demands. So there is a fan in inner- machine to cool down machine. Make sure the intake is not in block or covered, it is 0.3 meter from welding machine to objects of environment. User should make sure the working area is adequately ventilated. It is important for the performance and the longevity of the machine.
2. Do not over load!
The operator should remember to watch the max duty current (Response to the selected duty cycle). Keep welding current is not exceed max duty cycle current. Over-load current will damage and burn up machine.
3. No over voltage!
Power voltage can be found in diagram of main technical data. Automatic compensation circuit of voltage will assure that welding current keeps in allowable range. If power voltage is exceeding allowable range limited, it will damage to components of machine. The operator should understand this situation and take preventive measures.
4. There is a grounding screw behind welding machine, with a grounding marker on it. Before operation, welding crust must be grounded reliable with cable which section is over 6 square millimeter, in order to prevent from static electricity, and accidents because of electricity leaking.
5. If welding time is exceeded duty cycle limited, welding machine will stop working for protection. Because machine is overheated, temperature control switch is on "ON" position and the indicator light is red. In this situation, you don't have to pull the plug, in order to let the fan cool the machine. When the indicator light is off, and the temperature goes down to the standard range, it can weld again.

7. FAQ AND SOLUTIONS

Fittings, welding materials, environment factor, supply powers maybe have something to do with welding. User must try to improve welding environment.

A. Arc-striking is difficult and easy to pause

1. Make sure quality of tungsten electrode is high.
2. If the electrode is not dried, it will cause unstable arc, welding defect increases and the quality is down.
3. If use extra-long cable, the output voltage will decrease, so please shorten the cable ected with the positive polarity. So please change the polarity.

B. Output current not to rated value:

When power voltage departs from the rated value, it will make the output current not matched with rated value; when voltage is lower than rated value, the max output may lower than rated value.

C. Current is not stabilizing when machine is been operating:

It has something with factors as following:

1. Electric wire net voltage has been changed.
2. There is harmful interference from electric wire net or other equipment

D. Too much spatter when use MMA welding,

1. Maybe current is too big and stick's diameter is too small.
2. Output terminal polarity connection is wrong, it should apply the opposite polarity at the normal techniques, which means that the stick should be connected with the negative polarity of power source, and work piece should be conn.

8. MAINTENANCE

1. Remove dust by dry and clean compressed air regularly, if welding machine is operating in environment where is polluted with smokes and pollution air, the machine need remove dust every month.
2. Pressure of compressed air must be within the reasonable range in order to prevent damaging to small components of inner-machine.
3. Check internal circuit of welding machine regularly and make sure the circuit connections are connected correctly and tightly (especially plug-in connector and components). If scale and rust are found, please clean it, and connect again tightly.
4. Prevent water and steam from entering into the machine. If that happens, please blow it dry and check insulation of machine.
5. If welding machine will not be used for long time, it must be put into the packing box and stored in dry and clean environment.

9. TROUBLESHOOTING

⚠ WARNING!

The following operations must be performed by qualified electricians with valid certifications. Before maintenance, please contact with us for professional suggestion.

Fault symptom	Remedy
Power indicator is not lit, fan is not working, no welding output.	A. Make sure power switch is close. B. Make sure the electric wire net connecting to input cable is working alright
Power indicator is lit, fan doesn't work, no welding output.	A. Input cable is possibly connected to 380V power, which causes over voltage protection circuit is starting. Connect input cable to 220V power, then restart the machine. B. Erratic 220V power supply (input cable is too thin and long) or input cable is connected to electricity network would start overload voltage protection circuit. Increase section of input cable or tighten input contact. Turn off machine for 2–3 min and restart it. C. Turn on and off power switch continuously would start overload voltage protection circuit. Turn off machine for 2–3 min and restart it. D. Cables are loosed between power switch and power source board, tighten them again.
Erratic welding output current or out of control of potentiometer.	A. 1K potentiometer is damaged, replace it. B. Terminal of output is broken circuit or poor connect.
Fan is working and abnormal indicator is not lit, no welding output.	A. Check if components are poor connects. B. Check if connector of output terminal is break circuit and poor connect. C. Check voltage between power source board and MOS board (VH-07) is about DC 308V. D. If green indicator is not lit in assistant power of MOS board, please connect with seller or our company and replace it. E. If there is some question in control circuit, please connect with seller or our company and replace it.

Fault symptom	Remedy
<p>Fan is working and abnormal indicator is lit, no welding output.</p>	<p>A. Overload current protection may start, please turn off machine first, then restart it after abnormal indicator is off.</p> <p>B. Overheat protection may start, it will become normal in 2–3min</p> <p>C. Inverter circuit may go wrong. Please disconnect the power supply plug of the main transformer on MOS board (near fan VH-07), then restart the machine.</p> <p> a) If abnormal indicator is still lit, that means some fieldistors on MOS board are damaged, check and replace it.</p> <p> b) If abnormal indicator is off:</p> <p> 1) Maybe transformer of middle board is damaged, measure primary inductance value and Q value of main transformer by inductance bridge.</p> <p> 2) Primary value is parallel circuit, $L=1.2\sim2.0\text{mH}$, $Q>40$ If inductance value and Q value is low, replace it.</p> <p> 3) Maybe some of secondary rectifier tube of transformer is broken, check and replace rectifier tube.</p> <p>D. Maybe feedback circuit is in fault.</p>

10. TECHNICAL SPECIFICATION

Model	FDIS 20160-E
Power voltage (V)	AC 230V
Frequency (Hz)	50
Rated input current (A)	33
No-load voltage (V)	35–50
Output current (A)	20–160
Rated output voltage (V)	26.4
Electrode diameter	1,6–4,0 mm
Duty cycle (%)	60
No-load loss (W)	40
Efficiency (%)	80
Power factor	0.8
Insulation grade	F
Housing protection grade	IP21

11. DISPOSAL

INSTRUCTIONS AND INFORMATION ON DISPOSING OF USED PACKAGING MATERIALS

Dispose of used packaging material at a site designated for waste in your municipality.



The appliance and its accessories are manufactured from various materials, e.g. metal and plastic.

Take damaged parts to a recycling centre. Inquire at the relevant government department.



This appliance meets all the basic requirements of the EU directives.



Use welding mask.



Read the Instruction Manual attentively prior to use.

Changes in the text, design and technical specifications may be made without prior notice and we reserve the right to make these changes.

User manual in the original language.

12. DECLARATION OF CONFORMITY

FAST®

FAST ČR, a.s.
Černokostelecká 1621, 251 01 Říčany, Czech Republic
tel.: +420 323 204 111, fax: +420 323 204 110

EU Declaration of Conformity

Product/ brand: Manual Arc Welding Machine/ **FIELDMANN**

Type/ model: **FDIS 20160-E** as factory model MMA 160-A-C
Input AC 220V +- 10%; 31,4A
Output DC 20,8-26,4V; 20-160A

Manufacturer: FAST ČR, a.s.
Černokostelecká 2111, 100 00 Praha 10, Czech Republic
VAT no: CZ26726548

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Directive LVD 2014/35/EU
Directive EMC 2014/30/EU
Directive RoHS 2011/65/EU

The relevant harmonised standards and the other technical specifications:

EN 60974-1:2012
EN 50445:2008
EN 60974-10:2014+A1
EN 61000-3-11:2000
EN 61000-3-12:2011



Place of issuance: Prague

Name: Ing. Zdeněk Pech
Chairman of the Board

Date of issuance: 10. 6. 2020

Signature:

FAST® FAST ČR, a.s.
Černokostelecká 1621, 251 01 Říčany
IČO: 26726548 tel.: +420/ 323 204 111
DIČ: CZ26726548 fax: +420/ 323 204 110

IČO: 26 72 65 48, DIČ: C7-26 72 65 48

Bankovní spojení: Komerční banka Praha 1, č.ú. 89309011/0100, Česká spořitelna Praha 4, č.ú. 2375682/0800, ČSOB Praha 1, č.ú. 8010-0116233383/0300