

# HOT ROD 500S

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## OPERATOR'S MANUAL



ENGLISH

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**LINCOLN**<sup>®</sup>  
**ELECTRIC**  
THE WELDING EXPERTS

Lincoln Electric Bester Sp. z o.o.  
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Declaration of conformity



**Lincoln Electric Bester Sp. z o.o.**

Declares that the welding machine:

**K14089-2 HOT ROD 500S 220/380/440V**

conforms to the following directives:

**2014/35/EU , 2014/30/EU**

and has been designed in compliance with the  
following standards:

**EN 60974-1:2012; EN 60974-10:2014**

A handwritten signature in black ink, appearing to be 'Piotr Spyttek', is written over a faint, light-colored circular stamp or watermark.

20.04.2016

Piotr Spyttek  
Operations Director

Lincoln Electric Bester Sp. z o.o., ul. Jana III Sobieskiego 19A, 58-263 Bielawa, Poland

12/05

**THANKS!** For having chosen the QUALITY of the Lincoln Electric products.

- Please Examine Package and Equipment for Damage. Claims for material damaged in shipment must be notified immediately to the dealer.
- For future reference record in the table below your equipment identification information. Model Name, Code & Serial Number can be found on the machine rating plate.

Model Name:
Code & Serial Number:
Date & Where Purchased

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## WARNING

This equipment must be used by qualified personnel. Be sure that all installation, operation, maintenance and repair procedures are performed only by qualified person. Read and understand this manual before operating this equipment. Failure to follow the instructions in this manual could cause serious personal injury, loss of life, or damage to this equipment. Read and understand the following explanations of the warning symbols. Lincoln Electric is not responsible for damages caused by improper installation, improper care or abnormal operation.

	<p><b>WARNING:</b> This symbol indicates that instructions must be followed to avoid serious personal injury, loss of life, or damage to this equipment. Protect yourself and others from possible serious injury or death.</p>
	<p><b>READ AND UNDERSTAND INSTRUCTIONS:</b> Read and understand this manual before operating this equipment. Arc welding can be hazardous. Failure to follow the instructions in this manual could cause serious personal injury, loss of life, or damage to this equipment.</p>
	<p><b>ELECTRIC SHOCK CAN KILL:</b> Welding equipment generates high voltages. Do not touch the electrode, work clamp, or connected work pieces when this equipment is on. Insulate yourself from the electrode, work clamp and connected work pieces.</p>
	<p><b>ELECTRICALLY POWERED EQUIPMENT:</b> Turn off input power using the disconnect switch at the fuse box before working on this equipment. Ground this equipment in accordance with local electrical regulations.</p>
	<p><b>ELECTRICALLY POWERED EQUIPMENT:</b> Regularly inspect the input, electrode, and work clamp cables. If any insulation damage exists replace the cable immediately. Do not place the electrode holder directly on the welding table or any other surface in contact with the work clamp to avoid the risk of accidental arc ignition.</p>
	<p><b>ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS:</b> Electric current flowing through any conductor creates electric and magnetic fields (EMF). EMF fields may interfere with some pacemakers and welders having a pacemaker shall consult their physician before operating this equipment.</p>
	<p><b>CE COMPLIANCE:</b> This equipment complies with the European Community Directives.</p>
	<p><b>ARTIFICIAL OPTICAL RADIATION:</b> According with the requirements in 2006/25/EC Directive and EN 12198 Standard, the equipment is a category 2. It makes mandatory the adoption of Personal Protective Equipment (PPE) having filter with a protection degree up to a maximum of 15, as required by EN169 Standard.</p>
	<p><b>FUMES AND GASES CAN BE DANGEROUS:</b> Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. To avoid these dangers the operator must use enough ventilation or exhaust to keep fumes and gases away from the breathing zone.</p>
	<p><b>ARC RAYS CAN BURN:</b> Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing. Use suitable clothing made from durable flame-resistant material to protect you skin and that of your helpers. Protect other nearby personnel with suitable, non-flammable screening and warn them not to watch the arc nor expose themselves to the arc.</p>

	<p><b>WELDING SPARKS CAN CAUSE FIRE OR EXPLOSION:</b> Remove fire hazards from the welding area and have a fire extinguisher readily available. Welding sparks and hot materials from the welding process can easily go through small cracks and openings to adjacent areas. Do not weld on any tanks, drums, containers, or material until the proper steps have been taken to insure that no flammable or toxic vapors will be present. Never operate this equipment when flammable gases, vapors or liquid combustibles are present.</p>
	<p><b>WELDED MATERIALS CAN BURN:</b> Welding generates a large amount of heat. Hot surfaces and materials in work area can cause serious burns. Use gloves and pliers when touching or moving materials in the work area.</p>
	<p><b>CYLINDER MAY EXPLODE IF DAMAGED:</b> 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. Always keep cylinders in an upright position securely chained to a fixed support. Do not move or transport gas cylinders with the protection cap removed. Do not allow the electrode, electrode holder, work clamp or any other electrically live part to touch a gas cylinder. Gas cylinders must be located away from areas where they may be subjected to physical damage or the welding process including sparks and heat sources.</p>
	<p><b>SAFETY MARK:</b> This equipment is suitable for supplying power for welding operations carried out in an environment with increased hazard of electric shock.</p>

The manufacturer reserves the right to make changes and/or improvements in design without upgrade at the same time the operator's manual.

## Installation and Operator Instructions

Read this entire section before installation or operation of the machine.

### Location and Environment

 **WARNING**

Do not lift this machine using lift bail if it is equipped with a heavy accessory such as trailer or gas cylinder. Lift only with equipment of adequate lifting capacity. Be sure machine is stable when lifting.

The **HOT ROD 500S** welders can be stacked three high when the following precautions are observed:

- Be sure the bottom machine is on a firm, level surface suitable for the total weight (610kg) of the stacked machines.
- Stack the machine with the fronts flush.
- Be certain the pins on the top front corners of the lower machines fit through the holes in the base rails of the upper machines.

This machine will operate in harsh environments. However, it is important that simple preventative measures are followed to assure long life and reliable operation:

- Do not place or operate this machine on a surface with an incline greater than 15° from horizontal.
- Do not use this machine for pipe thawing.
- This machine must be located where there is free circulation of clean air without restrictions for air movement to and from the air vents. Do not cover the machine with paper, cloth or rags when switched on.
- Dirt and dust that can be drawn into the machine should be kept to a minimum.
- This machine has a protection rating of IP23. Keep it dry when possible and do not place it on wet ground

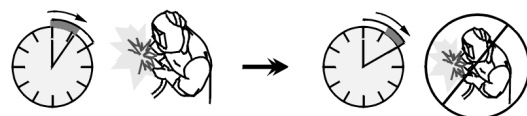
or in puddles.

- Locate the machine away from radio controlled machinery. Normal operation may adversely affect the operation of nearby radio controlled machinery, which may result in injury or equipment damage. Read the section on electromagnetic compatibility in this manual.
- Do not operate in areas with an ambient temperature greater than 55°C.

### Duty cycle and Overheating

The duty cycle of a welding machine is the percentage of time in a 10 minute cycle at which the welder can operate the machine at rated welding current.

Example: 60% duty cycle:



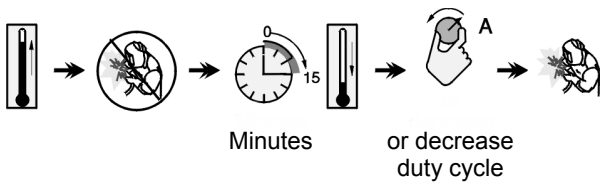
Welding for 6 minutes

Break for 4 minutes

Excessive extension of the duty cycle will cause the thermal protection circuit to activate.

The machine is protected from overheating by a temperature sensor.

When the machine is overheated the output of the machine will turn "OFF", and the Thermal Indicator Light will turn "ON". When the machine has cooled to a safe temperature the Thermal Indicator Light will go out and the machine may resume normal operation.



## Input Supply Connection

### WARNING

Only a qualified electrician can connect the welding machine to the supply network. Installation the outlet plug to power lead and connecting the welding machine had to be made in accordance with the appropriate National Electrical Code and local regulations.

Check the input voltage, phase, and frequency supplied to this machine before turning it on. Verify the connection of grounding wires from the machine to the input source. The allowable input voltages are 3x220V 50/60Hz, 3x380V 50/60Hz and 3x440V 50/60Hz (3x440V: factory default). For more information about input supply refer to the technical specification section of this manual and to the rating plate of the machine.

If it is necessary to change the input voltage:

- The input cable must be disconnected from the mains supply and the machine switched OFF.
- Remove the rear shield from the machine.
- Reconnect X4, X5 or X8 according to the diagram below:

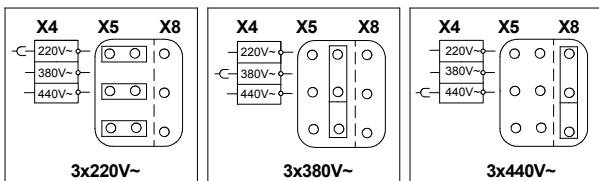


Figure 1.

- Replace the rear shield.

Make sure that the amount of mains power available from the input supply is adequate for normal operation of the machine. The necessary delayed fuse (or circuit breaker with "D" characteristic) and cable sizes are indicated in the technical specification section of this manual.

Refer to points [1], [13] and [14] of the images below.

### WARNING

When powering welder from a generator be sure to turn off welder first, before generator is shut down, In order to prevent damage to welder!

## Output Connections

Refer to points [10], [11] and [12] of the images below.

The recommended output cable size can be found in the Table below:

Cable length	Up to 10 m	10 – 50 m	50 – 75 m
Cable size	70 mm <sup>2</sup>	95 mm <sup>2</sup>	120 mm <sup>2</sup>

## Controls and Operational Features

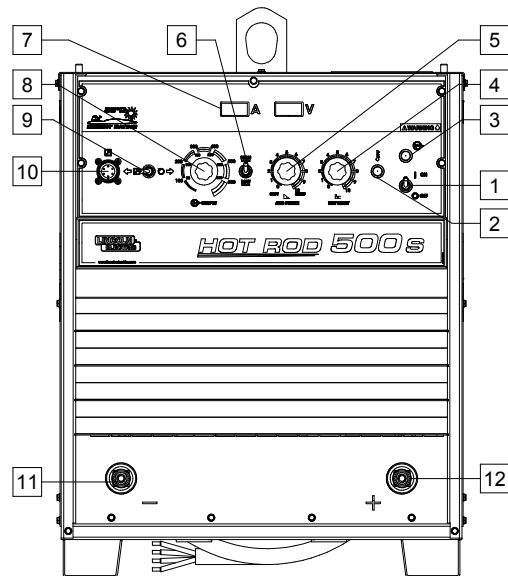


Figure 2.

1. **Power Switch ON/OFF (I/O):** Controls the input power to the machine. Be sure the power source is connected to the mains supply before turning power on ("I").



2. **Thermal Overload Indicator:** This lamp will light up when the machine is overheated and the output has been turned off. This can occur if the ambient temperature is above 55°C or the duty cycle of the machine has been exceeded. Leave the machine on to allow the internal components to cool, when the lamp turns off normal operation is possible.



3. **Power Indicator Light:** After input power is connected and the power switch is turned on, this lamp will light up to indicate the machine is ready to weld.



4. **HOT START Control:** Value in percentage of nominal value welding current during arc start current. The control is used to set the level of the increased current and arc start current is made easy.



5. **ARC FORCE Control:** The output current is temporarily increased to clear short circuit connections between the electrode and the workpiece.

6. **Output Current Control Range Switch:** It allows selection of the desired welding current range:

- LOW range (50A - 320A)
- HIGH range (50A - 625A).

7. **Digital Welding Current and Voltage Meter with memory feature (available as an option: see "Accessories" chapter):** Shows the present value of the welding current and voltage during welding; after welding it continues to display the average welding current and voltage for 5 seconds.



8. **Welding Current Knob Control:** Potentiometer used to set the output current on the range 50A - 625A (also

during welding).

9. **Local/Remote Switch:** Remote Control Unit K10095-1-15M and K870 can be used with this machine. It changes control of the Output Current from the machine Welding Current [8] to the K10095-1-15M or K870 and vice versa.



10. **Remote Control Connector:** If a remote control is used, it will be connected to the remote connector (see "Accessories" chapter).



11. **Negative Output Terminal:** Negative output connector for the welding circuit (M12 bolt).



12. **Positive Output Terminal:** Positive output connector for the welding circuit (M12 bolt).

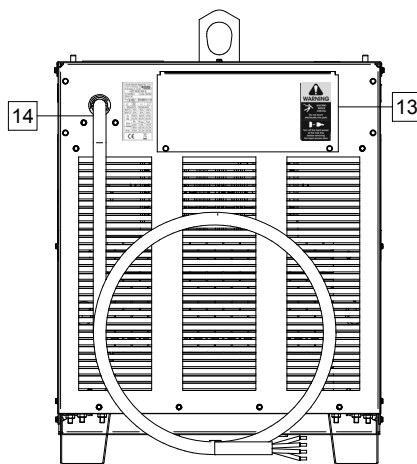


Figure 3.

13. **Rear Shield:** Remove to install the reconnect panel for the proper input voltage (3x220V or 3x380V or 3x440V).
14. **Power lead (5m):** Connect the supply plug to the existing input cable that is rated for the machine as indicated in this manual, and conforms to all applicable standards. This connection shall be performed only by a qualified person.

## Welding SMAW (MMA) Process

**HOT ROD 500S** does not include the electrode holder with lead necessary and the work lead for SMAW welding, but the one can be purchased separately (see "Accessories" chapter).

For starting welding process with SMAW process you should:

- First turn the machine off.
- Determine the electrode polarity for the electrode to be used. Consult the electrode data for this information.
- Depending on the polarity of using electrode, connect the work lead and the electrode holder with lead to output socket [11] or [12] and lock them. See the Table 1.

Table 1.

		Output socket	
POLARITY	DC (+)	The electrode holder with lead to SMAW	[12]
		Work lead	[11]
POLARITY	DC (-)	The electrode holder with lead to SMAW	[11]
		Work lead	[12]

- Connect the work cable to the welding piece with the work clamp.
- Install the proper electrode in the electrode holder.
- Connect the main plug to the outlet mains socket.
- Turn the welding machine on.
- Set the Local/Remote Switch in required position: local or remote.
- Set the required welding current by welding current knob control [8].
- The welding machine is now ready to weld.
- By applying the principle of occupational health and safety at welding, welding can be begun.

## International Symbology Reference

The **HOT ROD 500S** name plates feature international symbols in describing the function of the various components. Below are the symbols used and an explanation of what each represents.

### POWER ON-OFF SWITCH

- On
- Off
- Input

### CONTROL DIALS

- Arc Force
- Hot Start
- Output Current

### OUTPUT CURRENT CONTROL RANGE SWITCH

- LOW** Output Current Control Dial Range Low
- HIGH** Output Current Control Dial Range High

### OUTPUT CURRENT CONTROL "MACHINE-REMOTE" SWITCH

- Remote Output Current Control
- Machine Output Current Control

### RATING PLATE

- Three Phase Power
- Transformer
- Rectifier
- Rectifier DC Output
- Constant Current Characteristic
- Shielded Metal Arc Welding
- Line Connection

## HIGH TEMPERATURE WARNING LIGHT



High Temperature Limit

## WARNING



Warning Identification

## GROUND



Signifying the Earth (Ground) Connection

## Maintenance



### WARNING

For any repair operations, modifications or maintenances, it is recommended to contact the nearest Technical Service Center or Lincoln Electric. Repairs and modifications performed by unauthorized service or personnel will cause, that the manufacturer's warranty will become null and void.

Any noticeable damage should be reported immediately and repaired.

### Routine maintenance (everyday)

- Check condition of insulation and connections of the work leads and insulation of power lead. If any insulation damage exists replace the lead immediately.
- Check the welding gun condition: replace it, if necessary.
- Check condition and operation of the cooling fan. Keep clean its airflow slots.

### Periodic maintenance (every 200 working hours but at list once every year)

Perform the routine maintenance and, in addition:

- Keep the machine clean. Using a dry (and low pressure) airflow, remove the dust from the external case and from the cabinet inside.
- If it is required, clean and tighten all weld terminals.

The frequency of the maintenance operations may vary in accordance with the working environment where the machine is placed.



### WARNING

Do not touch electrically live parts.



### WARNING

Before the case of machine will be removed, the machine had to be turned off and the power lead had to be disconnected from mains socket.



### WARNING

Mains supply network must be disconnected from the machine before each maintenance and service. After each repair, perform proper tests to ensure safety.



# Electromagnetic Compatibility (EMC)

11/04

This machine has been designed in accordance with all relevant directives and standards. However, it may still generate electromagnetic disturbances that can affect other systems like telecommunications (telephone, radio, and television) or other safety systems. These disturbances can cause safety problems in the affected systems. Read and understand this section to eliminate or reduce the amount of electromagnetic disturbance generated by this machine.



This machine has been designed to operate in an industrial area. To operate in a domestic area it is necessary to observe particular precautions to eliminate possible electromagnetic disturbances. The operator must install and operate this equipment as described in this manual. If any electromagnetic disturbances are detected the operator must put in place corrective actions to eliminate these disturbances with, if necessary, assistance from Lincoln Electric.

Before installing the machine, the operator must check the work area for any devices that may malfunction because of electromagnetic disturbances. Consider the following.

- Input and output cables, control cables, and telephone cables that are in or adjacent to the work area and the machine.
- Radio and/or television transmitters and receivers. Computers or computer controlled equipment.
- Safety and control equipment for industrial processes. Equipment for calibration and measurement.
- Personal medical devices like pacemakers and hearing aids.
- Check the electromagnetic immunity for equipment operating in or near the work area. The operator must be sure that all equipment in the area is compatible. This may require additional protection measures.
- The dimensions of the work area to consider will depend on the construction of the area and other activities that are taking place.

Consider the following guidelines to reduce electromagnetic emissions from the machine.

- Connect the machine to the input supply according to this manual. If disturbances occur it may be necessary to take additional precautions such as filtering the input supply.
- The output cables should be kept as short as possible and should be positioned together. If possible connect the work piece to ground in order to reduce the electromagnetic emissions. The operator must check that connecting the work piece to ground does not cause problems or unsafe operating conditions for personnel and equipment.
- Shielding of cables in the work area can reduce electromagnetic emissions. This may be necessary for special applications.

## **WARNING**

The Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There can be potential difficulties in ensuring electromagnetic compatibility in those locations, due to conducted as well as radio-frequency disturbances.







## **WARNING**

This equipment complies with IEC 61000-3-12 provided that the short-circuit power  $S_{sc}$  is greater than or equal to:

HOT ROD 500S:  $S_{sc} \geq 12 \text{ MVA}$

at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short circuit power  $S_{sc}$  greater than or equal to data on the table above.

# Technical Specifications

NAME		INDEX		
HOT ROD 500S		K14089-2		
INPUT				
HOT ROD 500S	Input Voltage $U_1$	EMC Group / Class		Frequency
	220/380/440V / 3~	II / A		50 / 60 Hz
HOT ROD 500S	Input Power at Rated Cycle	Input Amperes $I_{1max}$		$\cos \varphi$
	43 kVA @ 35 Duty Cycle (40°C)	220V 3~	114A	0,89
		380V 3~	65,5A	
		440V 3~	57A	
RATED OUTPUT				
HOT ROD 500S	Duty Cycle 40°C / 55°C (based on a 10 min. period)	Output Current		Output Voltage
	35% / 25%	600A		44 V 
	60% / 35%	500A		40 V 
	100% / 60%	375A		35 V 
OUTPUT RANGE				
HOT ROD 500S	Welding Current Range		Peak Open Circuit Voltage	
	50A - 625A		65,5 V 	
RECOMMENDED INPUT CABLE AND FUSE SIZES				
HOT ROD 500S	Fuse or Circuit Breaker Size			Power Lead
	220V~	380V~	440V~	4 Conductor, 16mm <sup>2</sup>
	D 125 A	D 63 A	D 63 A	
DIMENSION				
HOT ROD 500S	Weight	Height	Width	Length
	203 kg	795 mm	566 mm	813 mm
Protection Rating		Operating Humidity (t=20°C)	Operating Temperature	Storage Temperature
IP23		≤ 90 %	from -10 °C to +55 °C	from -25 °C to +55 °C

# WEEE

07/06

English



Do not dispose of electrical equipment together with normal waste!  
 In observance of European Directive 2012/19/EC on Waste Electrical and Electronic Equipment (WEEE) and its implementation in accordance with national law, electrical equipment that has reached the end of its life must be collected separately and returned to an environmentally compatible recycling facility. As the owner of the equipment, you should get information on approved collection systems from our local representative.  
 By applying this European Directive you will protect the environment and human health!

## Spare Parts

12/05

### Part list reading instructions

- Do not use this part list for a machine if its code number is not listed. Contact the Lincoln Electric Service Department for any code number not listed.
- Use the illustration of assembly page and the table below to determine where the part is located for your particular code machine.
- Use only the parts marked "●" in the column under the heading number called for in the assembly page (# indicate a change in this printing).

First, read the Part List reading instructions above then refer to the "Spare Part" manual supplied with the machine, which contains a picture-descriptive part number cross-reference).

## Electrical Schematic

Refer to the "Spare Parts" manual supplied with the machine.

## Accessories

	K10376	Adapter M14/DINSe (F) (to connect the welding cables).
	*E/H-400A-70-5M	The electrode holder with lead - 5m.
	*GRD-600A-95-5M	Work Lead with the Work Clamp - 5m.
	FL060583010	FLAIR 600 Gouging torch with mounted monocable - 2,5m.
	* N/B-600A-95-5M	5m-extension cable for gouging torch.
	K14090-1	AV Meter Kit
	K10095-1-15M	Hand Amptrol.
	K870	Foot Amptrol.
	K10398	15m-extension cable for remote ctrl box.

\* Co-operates with K10376