

# INVERTEC® 161S

## OPERATOR'S MANUAL



ENGLISH





**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:	
.....	.....

## ENGLISH INDEX

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# Technical Specifications

NAME		INDEX	
INVERTEC® 161S		K14293-1	
INPUT			
Input Voltage	EMC Class	Frequency	
230 V ±20% Single Phase	A	50Hz	
Input Power at Rated Output	Input Amperes I <sub>1max</sub>		
3.9 kVA @ 100% Duty Cycle (40°C)	16 A		
4.6 kVA @ 60% Duty Cycle (40°C)	20 A		
4.8 kVA @ 50% Duty Cycle (40°C)	21 A		
RATED OUTPUT AT 40°C			
	Duty Cycle (Based on a 10 min. period)	Output Current	Output Voltage
SMAW	100%	130A	25,2Vdc
	60%	150A	26,0Vdc
	50%	160A	26,4Vdc
	Duty Cycle (Based on a 10 min. period)	Output Current	Output Voltage
GTAW	100%	130A	15,2Vdc
	60%	160A	16,4Vdc
WELDING CURRENT RANGE			
	Welding Current Range	Maximum Open Circuit Voltage U <sub>0</sub>	
SMAW	5A÷160A	75Vdc	
GMAW	5A÷160A	75Vdc	
RECOMMENDED INPUT CABLE AND FUSE SIZES			
Fuse (delayed) or Circuit Breaker ("D" characteristic) Size		Input Power Cable	
16 A		3 x 25 mm <sup>2</sup>	
PHYSICAL DIMENSIONS			
Height	Width	Length (case only, without torch)	Weight
330mm	210mm	480mm	9.0kg
Operating Temperature		Storage Temperature	
-10°C to +40°C		-25°C to +55°C	

# ECO design information

The equipment has been designed in order to be compliant with the Directive 2009/125/EC and the Regulation 2019/1784/EU.

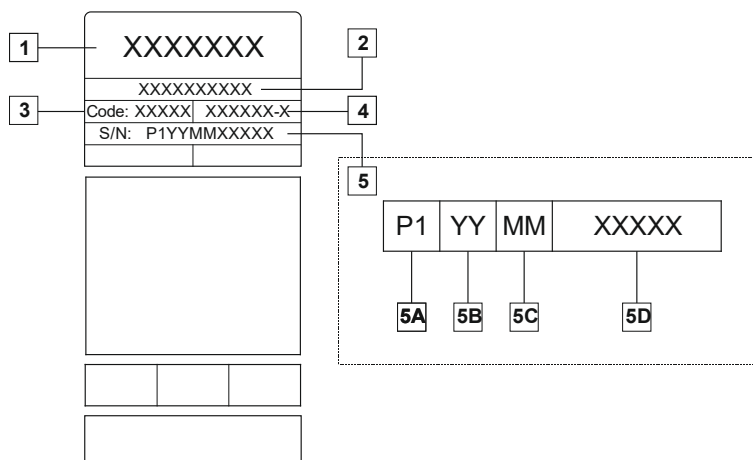
Efficiency and idle power consumption:

Index	Name	Efficiency when max power consumption / Idle power consumption	Equivalent model
K14293-1	INVERTEC® 161S	84,3% / -	No equivalent model

“-“ equipment doesn't have idle state

The value of efficiency and consumption in idle state have been measured by method and conditions defined in the product standard EN 60974-1:20XX

Manufacturer's name, product name, code number, product number, serial number and date of production can be read from rating plate.



Where:

- 1- Manufacturer name and address
- 2- Product name
- 3- Code number
- 4- Product number
- 5- Serial number
  - 5A- country of production
  - 5B- year of production
  - 5C- month of production
  - 5D- progressive number different for each machine

Typical gas usage for **MIG/MAG** equipment:

Material type	Wire diameter [mm]	DC electrode positive		Wire Feeding [m/min]	Shielding Gas	Gas flow [l/min]
		Current [A]	Voltage [V]			
Carbon, low alloy steel	0,9 ÷ 1,1	95 ÷ 200	18 ÷ 22	3,5 – 6,5	Ar 75%, CO <sub>2</sub> 25%	12
Aluminium	0,8 ÷ 1,6	90 ÷ 240	18 ÷ 26	5,5 – 9,5	Argon	14 ÷ 19
Austenic stainless steel	0,8 ÷ 1,6	85 ÷ 300	21 ÷ 28	3 - 7	Ar 98%, O <sub>2</sub> 2% / He 90%, Ar 7,5% CO <sub>2</sub> 2,5%	14 ÷ 16
Copper alloy	0,9 ÷ 1,6	175 ÷ 385	23 ÷ 26	6 - 11	Argon	12 ÷ 16
Magnesium	1,6 ÷ 2,4	70 ÷ 335	16 ÷ 26	4 - 15	Argon	24 ÷ 28

**Tig Process:**

In TIG welding process, gas usage depends on cross-sectional area of the nozzle. For commonly used torches:

Helium: 14-24 l/min

Argon: 7-16 l/min

**Notice:** Excessive flow rates causes turbulence in the gas stream which may aspirate atmospheric contamination into the welding pool.

**Notice:** A cross wind or draft moving can disrupt the shielding gas coverage, in the interest of saving of protective gas use screen to block air flow.



**End of life**

At end of life of product, it has to be disposal for recycling in accordance with Directive 2012/19/EU (WEEE), information about the dismantling of product and Critical Raw Material (CRM) present in the product, can be found at <https://www.lincolnelectric.com/en-gb/support/Pages/operator-manuals-eu.aspx>

# Electromagnetic Compatibility (EMC)

01/11

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. 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. This equipment is compliant with EN 61000-3-12 and EN 61000-3-11.

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 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>Optical radiation emission Category 2 (EN 12195)</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 Equipments (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.



# Introduction

## General description

The system consists of a modern direct current generator for the welding of metals, developed via application of the inverter. This special technology allows for the construction of compact light weight generators with high performance. Its adjust ability, efficiency and energy consumption make it an excellent work tool suitable for coated electrode and GTAW (TIG) welding.

In addition to these characteristics this model has the VRD function. VRD stands for: "Voltage Reduction Device". The VRD is a risk reduction device for the welding unit that considerably reduces the risk of an electric shock from the secondary welding circuit. The VRD cuts off the power supply for welding and supplies.

The welding machines **INVERTEC® 161S** enables welding:

- SMAW (MMA)
- GTAW (arc ignition using lift TIG)

Recommended equipment, which can be bought by user, was mentioned in the "Accessories" chapter.

## Installation and Operator Instructions

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

### Location and Environment

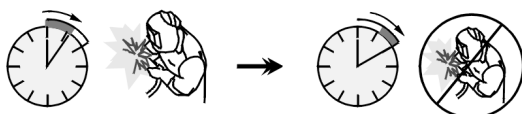
This machine will operate in harsh environments. However, it is important that simple preventative measures are followed to assure long life and reliable operation.

- 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 40°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.

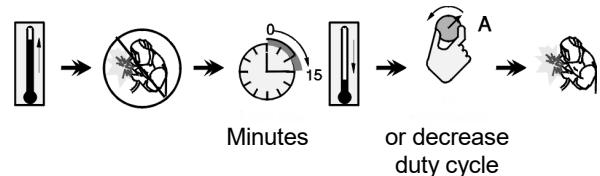
Example: 60% duty cycle



Welding for 6 minutes.

Break for 4 minutes.

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



### 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.

#### ⚠ WARNING

Before inserting the mains plug, in order to avoid the fail of power source, check if the mains corresponds to the wished main supply.

Check the input voltage, phases, and frequency supplied to this machine before turning it on. Verify the connection of grounding wires from the machine to the input power source. Be sure that **INVERTEC®C 161S** is grounded. Input voltage is 230V 50Hz. For more information about input supply please refer to the technical specification section of this manual and to the rating plate of the machine.

Make sure that the amount of mains power available from the input supply is adequate for normal operation of the machine. The type of protection and cable sizes are indicated in the technical specification section of this manual.

The machine can be connected to a motor generator of power meeting the dataplate specifications and having the following characteristics:

- Output voltage between 185 and 275 Vac.
- Frequency between 50 and 60 Hz.

**⚠ WARNING**

The welding machine can be supplied from a power generator of output power at least 30% larger than input power of the welding machine. See "Technical Specifications" chapter.

**⚠ WARNING**

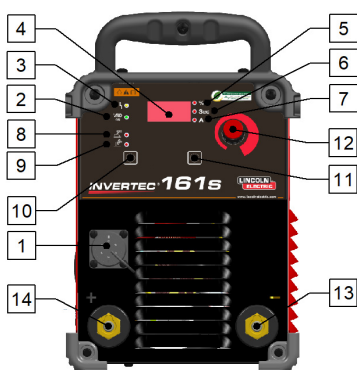
In case of powering welder from a generator make sure to turn off welding machine first, before generator is shut down, in order to prevent damage to welding machine!

## Output Connections

## Output Connections

Refer to points [13] and [14] of the figure below.

## Controls and Operational Features





**Figure 1**

1. Remote Connector: the remote control can be connected by means of this connector. With this accessory the welding current can be varied with continuity without leaving the work zone. To use this functionality it is necessary to use 6-PIN adapter that is included in machine packaging. Remote control connection is signalled on the display for a few seconds by the message "rEn" ON digital display.
2. VRD Function Indicator (Green): this indicator light up when VRD function is activated.
3. Alarm Indicator (Yellow): this indicator lights up when the generator does not work due to an alarm. Given below are the possible alarms signalled on the display, their meaning and operations to be carried out to restore generator operation.

**Table 1**

SIGNALLING ON THE DISPLAY (Meaning)	Causes - Cure
---	Power supply voltage, main switch off or no phase. Restore the correct generator power supply.
(Line larm)	Fault in supply/control stage. Contact Technical Assistance.

<b>thA</b> (Thermal alarm)	Power converter overtemperature due to excessive work cycle. Stop welding and leave the generator on until the alarm ceases.
<b>ScA</b> (Short circuit alarm)	Generator output terminals short-circuited. Eliminate the short circuit.
<b>PiF</b> (Inverter alarm)	Inverter stage fault. Contact Technical Assistance.
<b>FXX</b> (Hardware anomaly)	Malfunction in generator control stage ("XX" is a number identifying the type of fault). Contact Technical Assistance.
<b>EEE</b> (Software anomaly)	Contact Technical Assistance.

4. Digital Display: indicates the set welding current, in particular:
  - During welding it indicates the generator output current.
  - In the welding parameter modification phase it indicates the actual value of the quantity selected.
  - In alarm conditions it identifies the type
5. HOT START/ARC FORCE Rate Indicator: this indicator lights up when the HOT START or ARC FORCE percentage value set for the MMA welding process is being displayed.
6. UP/DOWN Slope Time: this indicator lights up when the up/down time (in seconds) of the current slopes associated with the LIFT TIG welding process is being displayed.
7. Welding Current Indicator: this indicator lights up when the set current value (in amperes) or read value (in the case of welding in progress) is being displayed.
8.  SMAW Welding Indicator: normal basic and rutile coated electrodes can be welded in this mode.
9.  GTAW With Lift Start Indicator
10. Welding Process Selection Key: press this key to select the welding process (SMAW or LIFT GTAW).
11. Welding Process Selection Key: press this key to select the welding process (SMAW or LIFT GTAW).
12. Adjustment Knob: this knob is used to adjust the welding current and the value of parameters associated with the selected process.
13. Positive Output Socket for the Welding Circuit: For connecting an electrode holder with lead / work lead.
14. Negative Output Socket for the Welding Circuit: For connecting an electrode holder with lead / work lead.

**⚠ WARNING**

The generator has an antisticking device that disables the power in case of output short circuit or sticking of the electrode, thus allowing the electrode to easily detach from the workpiece.

This device cuts in when the generator is powered, hence also during the initial test period, therefore any inclusion of load or short circuit in this period is seen as an anomaly that causes disabling of output power (the message "ScA" is displayed).

**Welding SMAW (MMA) Process**

**INVERTEC® 161S** does not include the electrode holder with lead necessary for SMAW welding, but the one can be purchased separately.

Procedure of begin welding of SMAW process:  
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 [13] or [14] and lock them. See the Table 3.

**Table 2**

		Output socket		
POLARITY	DC (+)	The electrode holder with lead to SMAW	[8]	+
		Work lead	[9]	-
	DC (-)	The electrode holder with lead to SMAW	[9]	-
		Work lead	[8]	+

- Connect the work lead to the welding piece with the work clamp.
- Install the proper electrode in the electrode holder.
- Turn the welding machine on.
- Select SMAW welding mode [8].
- Set the welding parameters.
- The welding machine is now ready to weld.
- By applying the principle of occupational health and safety at welding, welding can be begun.

**⚠ WARNING**

Remote control connection. To use the remote control, connect the remote control connector to the socket on the front panel. In this condition the current can be adjusted independently of the setting made on the generator.

The user can set functions:

- The welding current
- HOT START - 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.
- ARC FORCE - the output current is temporarily increased to clear short circuit connections between the electrode and the workpiece. Lower values will provide less short circuit current and a softer arc. Higher settings will provide a higher short circuit current, a more forceful arc and possibly more spatter.

**Welding GTAW Process**

**INVERTEC® 161S** can be used to GTAW process with DC (-). Arc ignition can be achieved only by lift TIG method (contact ignition and lift ignition).

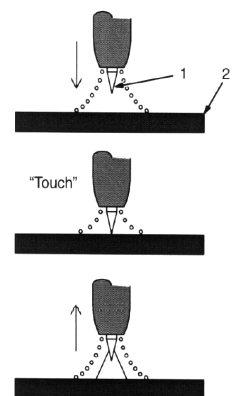
**INVERTEC® 161S** does not include the torch to GTAW welding, but the one can be purchased separately. See "Accessories" chapter.

Procedure of begin welding of GTAW process:

- First turn the machine off.
- Connect GTAW torch to [13] output socket.
- Connect the work lead to [14] output socket.
- Connect the work lead to the welding piece with the work clamp.
- Install the proper tungsten electrode in the GTAW torch.
- Connect the gas pipe to the regulator on the gas bottle.
- Turn the machine on.
- Select TIG LIFT welding mode [9].
- Set the welding parameters [12].
- Open the gas cock.
- The welding machine is now ready to weld.
- By applying the principle of occupational health and safety at welding, welding can be begun.

GTAW welding with lift start indicator is carried out with the following procedure:

- **ARC STRIKING:** touch the workpiece with the electrode to cause short-circuiting between the workpiece (2) and electrode (1) then lift it to strike the arc. The integrity of the electrode tip is guaranteed by a low striking current during the short circuit between workpiece and electrode. Striking is always perfect even at minimum welding current setting and enables work to be performed without polluting the surrounding environment with the very strong electromagnetic interference typically caused by high frequency discharge. The advantages can be summarized as follows:
  1. Start without requiring high frequency.
  2. Start without ruining the electrode tip at any current setting, therefore there is no inclusion of tungsten inside the workpiece (a phenomenon that occurs with stroke start).
- **ARC EXTINGUISHING:** To exit the welding phase the operator can use the conventional lift method or, alternatively, a new method that simulates the torch button. This method, called "Fuzzy Exit" enables a downslope without torch button to be obtained. During the welding phase the operator only has to move away from the workpiece to start a downslope. To interrupt the slope (without waiting the time necessary for its closing) the operator only has to lift the arc (like with the classic Tig Lift procedure). Downslope duration can be displayed and modified by pressing the key 11.



## 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 be lost.

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.
- Remove the spatters from the welding gun nozzle. Spatters could interfere with the shielding gas flow to the arc.
- 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 a 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 according to the working environment where the machine is placed.

### **WARNING**

Do not touch electrically live parts.

### **WARNING**

Before the case of welding machine will be removed, the welding machine has 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.

## Customer Assistance Policy

The business of The Lincoln Electric Company 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 Electric 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 Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, 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, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to [www.lincolnelectric.com](http://www.lincolnelectric.com) for any updated information.

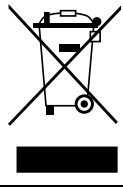
## Types of malfunctioning/ welding faults – causes – remedies

Table 3

Types of malfunctioning welding faults	Possible causes	Controls and remedies
The generator does not weld: the digital instrument does not light up.	<ul style="list-style-type: none"> <li>The main switch is off.</li> <li>Power cable interrupted.</li> <li>Other</li> </ul>	<ul style="list-style-type: none"> <li>Turn the main switch on.</li> <li>Check and remedy.</li> <li>Request a check by the Assistance Centre.</li> </ul>
The generator does not weld: the display shows “- -”.	<ul style="list-style-type: none"> <li>Insufficient power supply voltage.</li> <li>A phase is missing.</li> <li>Other</li> </ul>	<ul style="list-style-type: none"> <li>Check and remedy.</li> <li>Check and remedy.</li> <li>Request a check by the Assistance Centre.</li> </ul>
During welding the output current suddenly stops, the green LED goes off, the yellow LED lights up and the display shows the message “thA”.	<ul style="list-style-type: none"> <li>The thermal trip switch has cut-in due to an overtemperature (See duty cycles).</li> </ul>	<ul style="list-style-type: none"> <li>Leave the generator on and wait for it to cool (10-15 minutes) until the protector is reset and the corresponding yellow LED goes off.</li> </ul>
Reduced welding power	<ul style="list-style-type: none"> <li>Output connection cables not connected correctly</li> </ul>	<ul style="list-style-type: none"> <li>Check the condition of the cables, make sure the earth clamp is adequate and that it is applied on the workpiece cleaned of any rust, paint or grease.</li> </ul>
Excessive jets	<ul style="list-style-type: none"> <li>Welding arch too long</li> <li>Welding current too high</li> <li>Excessive Arc Force</li> </ul>	<ul style="list-style-type: none"> <li>Wrong torch polarity, lower the current values.</li> <li>Wrong torch polarity, lower the current values.</li> <li>Lower the Arc Force rate.</li> </ul>
Craters	<ul style="list-style-type: none"> <li>Rapid moving away of electrode on lifting.</li> </ul>	
Inclusions	<ul style="list-style-type: none"> <li>Poor cleaning or distribution of passes. Faulty electrode movement.</li> </ul>	
Insufficient penetration	<ul style="list-style-type: none"> <li>High feed speed. Welding current too low.</li> </ul>	
Sticking	<ul style="list-style-type: none"> <li>Welding arc too short</li> <li>Current too low</li> </ul>	<ul style="list-style-type: none"> <li>Increase the set current value</li> <li>Increase the set current value</li> </ul>
Blowholes and porosity.	<ul style="list-style-type: none"> <li>Wet electrodes. Long arc. Incorrect torch polarity.</li> </ul>	
Cracks	<ul style="list-style-type: none"> <li>Current too high. Dirty materials.</li> </ul>	
In TIG the electrode melts	<ul style="list-style-type: none"> <li>Incorrect torch polarity. Type of gas unsuitable.</li> </ul>	

## WEEE

07/06



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 "X" 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, that contains a picture-descriptive part number cross-reference.

## REACH

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### Communication in accordance with Article 33.1 of Regulation (EC) No 1907/2006 – REACH.

Some parts inside this product contain:

Bisphenol A, BPA,	EC 201-245-8, CAS 80-05-7
Cadmium,	EC 231-152-8, CAS 7440-43-9
Lead,	EC 231-100-4, CAS 7439-92-1
Phenol, 4-nonyl-, branched,	EC 284-325-5, CAS 84852-15-3

in more than 0,1% w/w in homogeneous material. These substances are included in the "Candidate List of Substances of Very High Concern for Authorisation" of REACH.

Your particular product may contain one or more of the listed substances.

Instructions for safe use:

- use according to Manufacturer instructions, wash hands after use;
- keep out of reach of children, do not put in mouth,
- dispose in accordance with local regulations.

## Authorized Service Shops Location

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- The purchaser must contact a Lincoln Authorized Service Facility (LASF) about any defect claimed under Lincoln's warranty period.
- Contact your local Lincoln Sales Representative for assistance in locating a LASF or go to [www.lincolnelectric.com/en-gb/Support/Locator](http://www.lincolnelectric.com/en-gb/Support/Locator).

## Electrical Schematic

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

## Accessories

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W10529-17-4V	TIG torch with tap, 4m.
W000278885	TIG torch with tap, 4m.