

POWERTEC 365S, 425S & 505S

OPERATOR'S MANUAL



ENGLISH



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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		
POWERTEC 365S			K14061-2A		
POWERTEC 425S			K14062-2A		
POWERTEC 505S			K14063-2A		
INPUT					
365S	Input Voltage U_1		EMC Group / Class		Frequency
	220 / 380 / 440V \pm 10% 3 - phase		II / A		50 / 60 Hz
	Input Power at Rated Cycle		Input Amperes I_{1max}		$\cos \varphi$
425S	16 kVA @ 40% Duty Cycle		43 A		0,95
505S	21 kVA @ 40% Duty Cycle		62 A		0,96
365S	29,9 kVA @ 40% Duty Cycle		79 A		0,96
RATED OUTPUT					
365S	Duty Cycle 40°C (based on a 10 min. period)		Output Current		Output Voltage
	40%		350 A		31,5 Vdc
	60%		285 A		28,2 Vdc
	100%		220 A		25 Vdc
425S	40%		420 A		35 Vdc
	60%		345 A		31,3 Vdc
	100%		265 A		27,3 Vdc
505S	40%		500 A		39 Vdc
	60%		410 A		34,5 Vdc
	100%		315 A		29,8 Vdc
OUTPUT RANGE					
365S	Welding Current Range			Open Circuit Voltage	
	35 A ÷ 350 A			16 ÷ 48 Vdc	
425S	35 A ÷ 420 A			15 ÷ 56 Vdc	
505S	40 A ÷ 500 A			18 ÷ 60 Vdc	
RECOMMENDED INPUT CABLE AND FUSE SIZES					
365S	Fuse or Circuit Breaker Size			Power Lead	
	220V	380V	440V	365S	4 Conductor, 4 mm ²
	D 40 A	D 25 A	D 25 A		
425S	D 50 A	D 32 A	D 32 A		
505S	D 63 A	D 40 A	D 40 A	505S	4 Conductor, 6 mm ²
DIMENSION					
365S	Weight		Height	Width	Length
	141 kg		880 mm	700 mm	1030 mm
425S	151 kg		880 mm	700 mm	1030 mm
505S	159,5 kg		880 mm	700 mm	1030 mm
Protection Rating		Operating Humidity (t=20°C)		Operating Temperature	
IP23		≤ 90 %		from -10 °C to +40 °C	
Storage Temperature					
from -25 °C to +55 °C					

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:

POWERTEC 365S:	$S_{sc} \geq 2,0 \text{ MVA}$
POWERTEC 425S:	$S_{sc} \geq 3,0 \text{ MVA}$
POWERTEC 505S:	$S_{sc} \geq 4,21 \text{ MVA}$




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.



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>WARNING: 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>READ AND UNDERSTAND INSTRUCTIONS: 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>ELECTRIC SHOCK CAN KILL: 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>ELECTRICALLY POWERED EQUIPMENT: 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>ELECTRICALLY POWERED EQUIPMENT: 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>ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS: 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>ARTIFICIAL OPTICAL RADIATION: 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>FUMES AND GASES CAN BE DANGEROUS: 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>ARC RAYS CAN BURN: 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>WELDING SPARKS CAN CAUSE FIRE OR EXPLOSION: 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>WELDED MATERIALS CAN BURN: 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>CYLINDER MAY EXPLODE IF DAMAGED: 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>SAFETY MARK: 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

The welding sources of the **POWERTEC S** family are designed to work with wire feeder:

- LF 22M
- LF 24M
- LF 24M PRO

POWERTEC S + LF enables welding:

- MGAW (MIG/MAG)
- FCAW-GS / FCAW-SS

The following equipment has been added to **POWERTEC 365S, 425S, 505S**:

- Operator's Manual
- Work lead - 3m
- Slow-blow fuse - 2A

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- Work lead - 3m
- Slow-blow fuse - 3A

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

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.

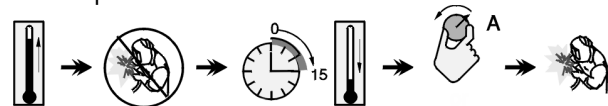
Example: 60% duty cycle:



Welding for 6 minutes

Break for 4 minutes

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



Minutes

or decrease
duty cycle

The machine is protected from overheating by a temperature sensor.

Input Supply Connection



WARNING

Only a qualified electrician can connect the welding machine to the supply network. Installation 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 left side panel from the machine.
- Reconnect X6 and X7 according to the diagram below:

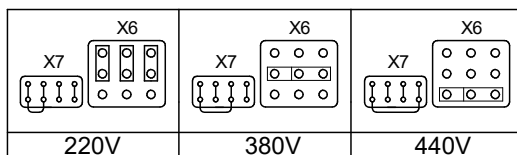


Figure 1

- Replace the left side panel.

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.

Output Connections

Refer to point [2], [3], [4] and [5] of the Figure below.

Controls and Operational Features

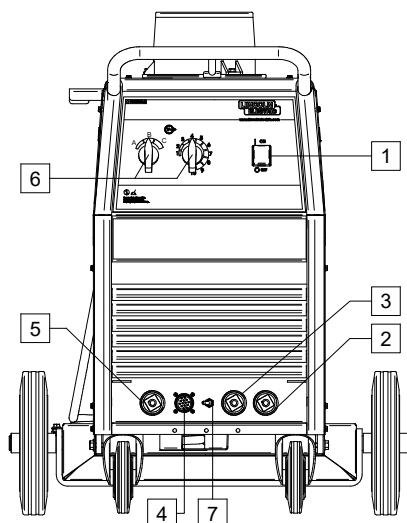


Figure 2

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"). After input power is connected and the power switch is turned on, the indicator will light up to indicate the machine is ready to weld.
2. High Inductance Output Socket: For the work lead connection.
3. Low Inductance Output Socket: For the work lead connection.
4. Wire Feeder Receptacle: 14-pins receptacle for wire feeder. Provides connections for auxiliary power of wire feeder.
5. Positive Output Socket: For the source/wire feeder cable connection.
6. Welding Load Voltage Switch: Adjust the welding load voltage.
7. Wire Feeder Voltmeter Switch: This switch selects the polarity of the wire feeder voltmeter, if so equipped. When the welding torch is positive (MIG, Outershield and some Innershield processes), set the switch to "+". When the welding torch is negative (most Innershield applications), set the switch to "-".

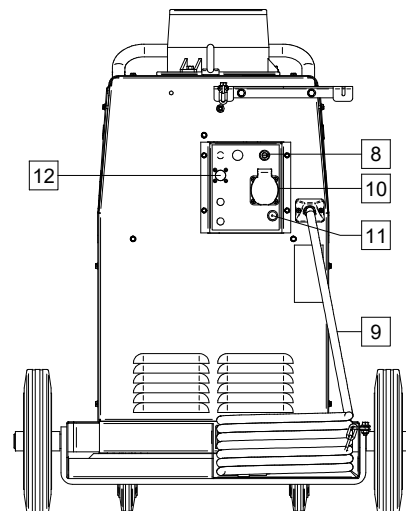


Figure 3

8. Fuse: Use slow-blow fuse (see "Spare Parts" section):

POWERTEC		
365S	425S	505S
3A	3A	3A

9. 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.
10. Cooler Power Supply Socket: For supplying the cooler unit only.



WARNING

The socket has an output of 230V, 2.5A and is protected by the circuit breaker [11].

11. Circuit Breaker: Protects the Cooler Power Supply socket [10]. It shuts off the power supply when the current exceeds 2.5A. Press it to restore the power supply.
12. Hole Plug: For CO₂ gas heater socket (see "Accessories" chapter - K14009-1 CO₂ Socket Kit).

Welding Cables Connections

Insert the plug of the work lead into the socket [2] or [3]. The other end of this lead connects to the work piece with the work clamp.

Connect the wire feeder to the power source:

- insert the positive welding cable into the output socket [5].
- insert the wire feeder control cable into the socket [4] (see "Accessories" chapter, Source/wire feeder cable K10347-PG-xM or K10347-PGW-xM).

Use the shortest possible cable lengths

Setting Welding Voltage

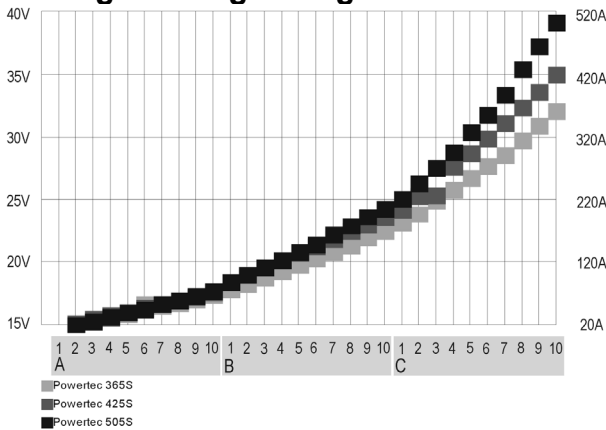


Figure 4

Machine and Circuit Protection

The **POWERTEC S** is protected against overheating, overload and accidental short-circuits

If the machine is overheated, the thermal protection circuit will decrease the output current to 0. Overheating is flashing by Thermal Overload Indicator on the front panel of wire feeder. The thermal protection circuit will turn on the output current again, when the machine is cooled.

The **POWERTEC S** is also electronically protected against overload and accidental short-circuit. The overload and short-circuit protection circuit automatically reduces the output current to a safe value when it detects an overload.

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.
- 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 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 welding machine will be removed, the welding 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.

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.

Electrical Schematic

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

Suggested Accessories

	K10347-PG-xxM	Source/wire feeder cable (gas). Available in 5, 10, 15m
	K10347-PGW-xxM	Source/wire feeder cable (gas and water). Available in 5, 10 or 15m.
	K14018-1	Work lead 3m (POWERTEC 365S, 425S)
	K14033-1	Work lead 3m (POWERTEC 505S)
	K14009-1	CO2 Socket Kit
	K14082-1	AV Meter Kit
	K14071-2	Grill Kit
	K14037-1	Cooler COOLARC-25