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POWER WAVE®
S350 CE & S500 CE

OPERATOR'S MANUAL

ENGLISH

LINCOLN® ELECTRIC
THE WELDING EXPERTS

THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Ave., Cleveland Ohio 44117-1199 USA
www.lincolnelectric.eu

THE LINCOLN ELECTRIC COMPANY

EC DECLARATION OF CONFORMITY

Manufacturer and technical documentation holder:	The Lincoln Electric Company
Address:	22801 St. Clair Ave. Cleveland Ohio 44117-1199 USA
EC Company:	Lincoln Electric Europe S.L.
Address:	c/o Balmes, 89 - 8º 2ª 08008 Barcelona SPAIN
Hereby declare that welding equipment:	Power Wave S350 CE, including options and accessories, Power Wave S500 CE, including options and accessories, STT Module
Sales code:	K2823, code may also contain prefixes and suffixes K3168, code may also contain prefixes and suffixes K2921, code may also contain prefixes and suffixes
Is in conformity with Council Directives and amendments:	EMC Directive 2004/108/EC Low Voltage Directive 2006/95/EC
Standards:	EN 60974-1, Arc Welding Equipment – Part 1: Welding Power Sources, 2005 EN 60974-10 Arc Welding Equipment – Part 10: Electromagnetic compatibility (EMC) requirements, 2003

CE

‘12 (K3168)
‘10 (K2823)
‘10 (K2921)

Frank Stupczy, Manufacturer

Compliance Engineering Manager
2 November 2012

Dario Gatti, European Community Representative
European Engineering Director Machines
6 November 2012

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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Safety

11/04

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.

	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.
	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.
	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.
	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.
	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.
	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.
	CE COMPLIANCE: This equipment complies with the European Community Directives.
	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 Equipment (PPE) having filter with a protection degree up to a maximum of 15, as required by EN169 Standard.
	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.
	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.
	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.

	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.
	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.
S	SAFETY MARK: This equipment is suitable for supplying power for welding operations carried out in an environment with increased hazard of electric shock.

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

THE POWER WAVE® S350/S500 CE will operate in harsh environments. Even so, it is important that simple preventative measures are followed in order to assure long life and reliable operation.

- The machine must be located where there is free circulation of clean air such that air movement in the back, out the sides and bottom will not be restricted. 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. The use of air filters on the air intake is not recommended because normal air flow may be restricted. Failure to observe these precautions can result in excessive operating temperatures and nuisance shutdown.
- This machine has a protection rating of IP23. Keep machine dry. Shelter from rain and snow. Do not place on wet ground or in puddles.
- Do not use this machine for pipe thawing.
- Do not mount the POWER WAVE® S350/S500 CE over combustible surfaces. Where there is a combustible surface directly under stationary or fixed electrical equipment, that surface shall be covered with a steel plate at least 1.6mm thick, which shall extend not less than 150mm beyond the equipment on all sides.
- 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.

Lifting

⚠ WARNING

FALLING EQUIPMENT can cause injury.

- Lift only with equipment of adequate lifting capacity.
- Be sure machine is stable when lifting.
- Do not operate machine while suspended when lifting.

Both handles should be used when lifting POWER WAVE® S350/S500 CE. When using a crane or overhead device a lifting strap should be connected to both handles. Do not attempt to lift the POWER WAVE® S350/S500 CE with accessories attached to it.

Stacking

The POWER WAVE® S350/S500 CE cannot be stacked.

Tilting

Place the machine directly on a secure, level surface or on a recommended undercarriage. The machine may topple over if this procedure is not followed.

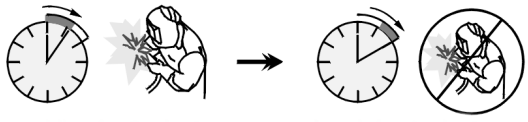
Duty Cycle and Overheating

The POWER WAVE® S350/S500 CE is rated:

- S350: 300A/29 V @ 100% duty cycle, 350A/31,5V @ 40% duty cycle
- S500: 450A/36,5 V @ 100% duty cycle, 500A/39V @ 60% duty cycle

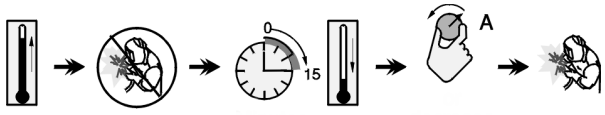
The duty cycle of a welding machine is the percentage of time in a 10 minute cycle at which the welder can operate the machine at rated welding current.

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

Preparation for Work

Input and Ground Connections

⚠ WARNING

Only a qualified electrician should connect the input leads to the POWER WAVE® S350/S500 CE. Connections should be made in accordance with all local and national electrical codes and the connection diagram located on the inside of the reconnect access door of the machine. Failure to do so may result in bodily injury or death.

Machine Grounding

The frame of the welder must be grounded. A ground terminal marked with a ground symbol is located next to the input power connection block. See your local and national electrical codes for proper grounding methods.

High Frequency Protection

The EMC classification of the POWER WAVE® S350/S500 CE are Industrial, Scientific and Medical (ISM) group 2, class A. The POWER WAVE® S350/S500 CE is for industrial use only (see Electromagnetic Compatibility EMC Safety Section).

Locate the POWER WAVE® S350/S500 CE away from radio controlled machinery. The normal operation of the POWER WAVE® S350/S500 CE may adversely affect the operation of RF controlled equipment, which may result in bodily injury or damage to the equipment.

Input Connection

- 4.6m power cord is provided and wired into the machine.
- Single Phase Input - Not supported.
- Three Phase Input - Connect green/yellow lead to ground per National Electric Code. Connect grey, brown and black leads to power.
- The POWER WAVE® S350/S500 CE automatically adjusts to work with different input voltages. No reconnect switches settings are required.

⚠ WARNING

The POWER WAVE® S350/S500 CE ON/OFF switch is not intended as a service disconnect for this equipment.

Power Cord Replacement

If the input power cord is damaged or needs to be replaced an input power connection block is located in the access panel under the wire spool.

⚠ WARNING

ALWAYS CONNECT THE POWER WAVE GROUNDING LUG (LOCATED INSIDE THE ACCESS PANEL) TO A PROPER SAFETY (EARTH) GROUND.

Operation – General

Power-up Sequence

When the POWER WAVE® S350/S500 CE is powered it can take as long as 30 seconds for the machine to be ready to weld. During this time period the user interface will not be active.

Product Description

The POWER WAVE® S350/S500 CE is a high performance multi-process machine with GMAW, FCAW, SMAW, DC TIG, and pulse capability. It will offer a premier welding performance solution for specific areas such as aluminum, stainless, nickel where size and weight are an issue.

The POWER WAVE® S350/S500 CE will provide the following:

- Power – S350 CE: 350A @ 40%, 300A @ 100%, S500 CE: 500A @ 60%, 450A @ 100%
- Multi Input Voltage with no reconnect - 208-575V, 50-60 Hz input, 3Phase Power.
- < 95% Power factor – optimizes available electrical capacity.
- Ethernet connectivity – allows access to the Power Wave utilities software tools.
- Line Voltage Compensation.
- ArcLink® platform.
- Electronic over current protection.
- Input over voltage protection.
- F.A.N. (fan as needed). Cooling fan runs when the output is energized 15 seconds following the strike of the welding arc and will continue to run 5 minutes following the end of the weld.

The following capabilities are supported:

- Water cooler CoolArc 50.
- Wire Feeders: LF45, LF45S, Power Feed™ systems including future versions of ArcLink® feeders.
- Production Monitoring™ 2.2 & Checkpoint
- STT® module.

Welding Cables Connections

Connect the electrode and work cables between the appropriate output studs of the Power Wave® S350/S500CE per the following guidelines:

- Most welding applications run with the electrode being positive (+). For those applications, connect the electrode cable between the wire drive feed plate and the positive (+) output stud on the power source. Connect a work lead from the negative (-) power source output stud to the work piece.
- When negative electrode polarity is required, such as in some Innershield applications, reverse the output connections at the power source (electrode cable to the negative (-) stud, and work cable to the positive (+) stud). Negative electrode polarity operation WITHOUT use of a remote work sense lead requires the Negative Electrode Polarity attribute to be set.

Voltage Sensing Overview

The Power Wave® S350/S500CE has the ability to automatically sense when remote sense leads are connected.

With this feature there are no requirements for setting up the machine to use remote sense leads. This feature can be disabled through the Weld Manager Utility (available at www.powerwavesoftware.com) or through the set up menu (if a user interface is installed into the power source).

⚠ WARNING

If the auto sense lead feature is disabled and remote voltage sensing is enabled but the sense leads are missing, improperly connected extremely high welding outputs may occur.

While most applications perform adequately by sensing the work voltage directly at the output stud, the use of a remote work voltage sense lead is recommended for optimal performance. The remote WORK sense lead can be accessed through the four-pin voltage sense connector located on the control panel by using the K940 Sense Lead Kit. It must be attached to the work as close to the weld as practical, but out of the weld current path.

Voltage Sensing Considerations for Multiple Arc Systems

Special care must be taken when more than one arc is welding simultaneously on a single part. Multiple arc applications do not necessarily dictate the use of remote work voltage sense leads, but they are strongly recommended.

If Sense Leads ARE NOT Used:

- Avoid common current paths. Current from adjacent arcs can induce voltage into each other's current paths that can be misinterpreted by the power sources, and result in arc interference.

If Sense Leads ARE Used:

- Position the sense leads out of the path of the weld current. Especially any current paths common to adjacent arcs. Current from adjacent arcs can induce voltage into each other's current paths that can be misinterpreted by the power sources, and result in arc interference.
- For longitudinal applications, connect all work leads at one end of the weldment, and all of the work voltage sense leads at the opposite end of the weldment.

Perform welding in the direction away from the work leads and toward the sense leads. See of the Figure 1.

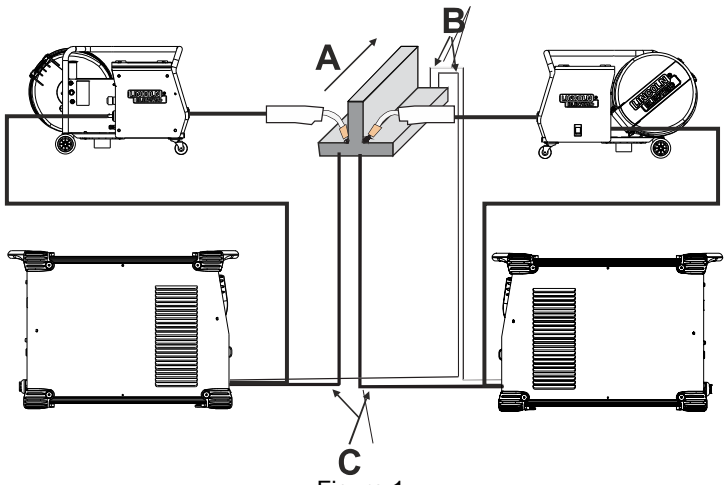


Figure 1.

A – Direction of travel

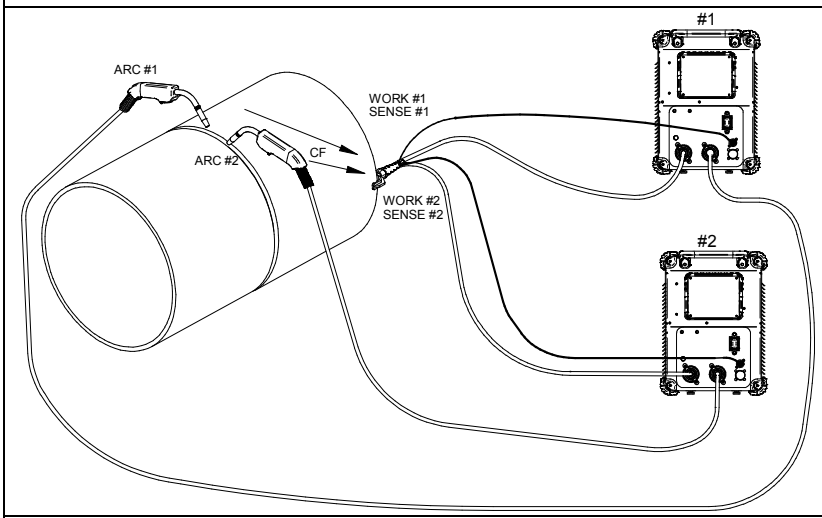
B – Connect all sense leads at the end of the weld

C – Connect all work leads at the beginning of the weld

- For circumferential applications, connect all work leads on one side of the weld joint, and all of the work voltage sense leads on the opposite side, such that they are out of the current path. See the Table 1.

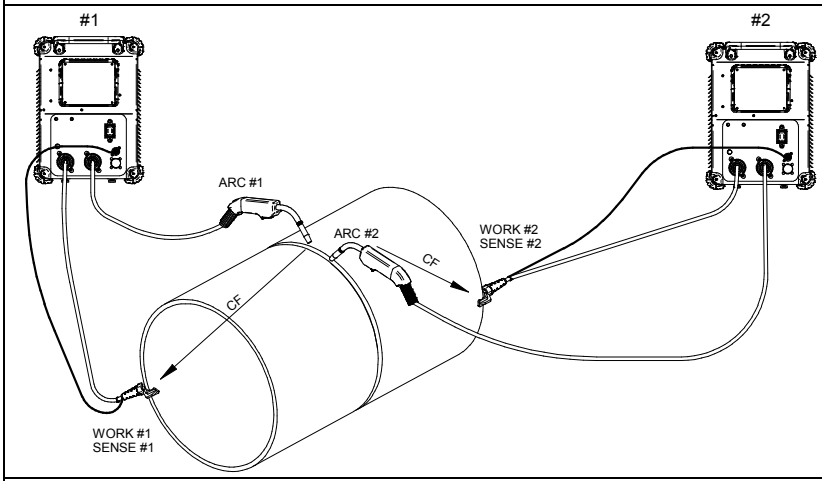
Table 1

LEGEND	
#1 – Power source 1 ; #2 – Power source 2 ; WORK #1 – Work lead of power source 1 ; WORK #2 – Work lead of power source 2 ; CF – Current flow	SENSE #1 – Sense lead of power source 1 SENSE #2 – Sense lead of power source 2 ARC #1 – Welding gun of power source 1 ARC #2 – Welding gun of power source 2



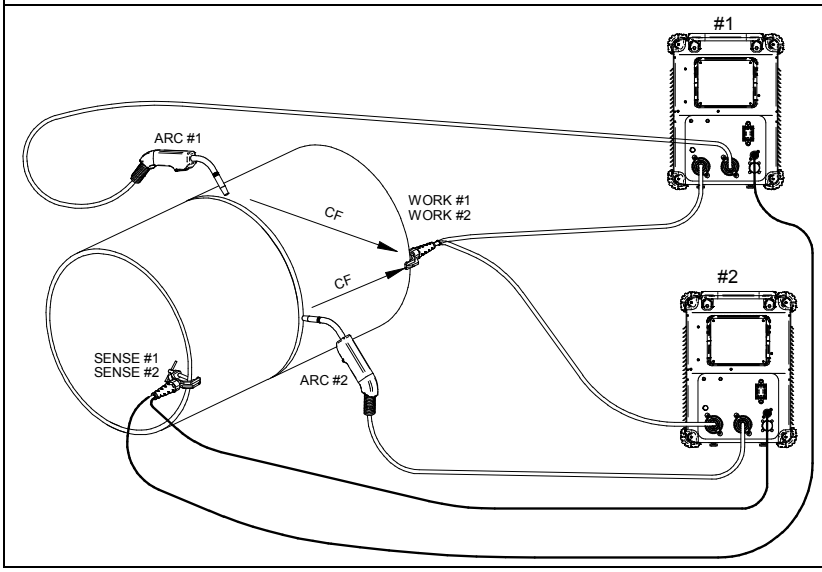
BAD

- Current flow from ARC #1 affects sense lead #2.
- Current flow from ARC #2 affects sense lead #1.
- Neither sense lead picks up the correct work voltage, causing starting and welding arc instability.



BETTER

- Sense lead #1 is only affected by current flow from ARC #1.
- Sense lead #2 is only affected by current flow from ARC #2.
- Due to voltage drops across the workpiece arc voltage may be low, causing need for deviation from standard procedures.



BEST

- Both sense leads are out of the current paths.
- Both sense leads detect arc voltage accurately.
- No voltage drop between arc and sense lead.
- Best starts, best arcs, most reliable results.

Case Front Controls

All operator controls and adjustments are located on the case front of the Power Wave.

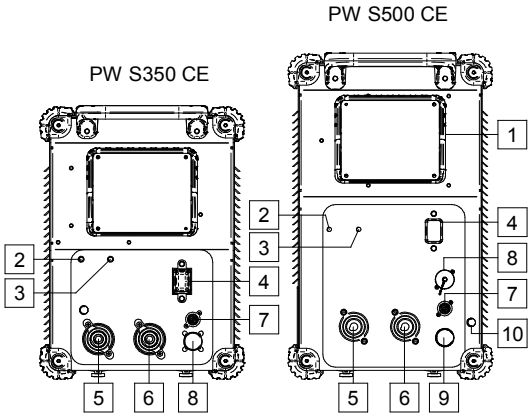


Figure 2.

1. OPTIONAL USER INTERFACE (optional for S500 CE only)
2. STATUS LED
3. THERMAL LED - Indicates when machine has thermal fault
4. POWER SWITCH
5. WORK STUD
6. ELECTRODE STUD
7. WORK SENSE LEAD
8. ARCLINK RECEPTACLE
9. 12-PIN REMOTE (optional for S500 only)
10. GAS OUTLET (optional for S500 only)

Case Back Controls

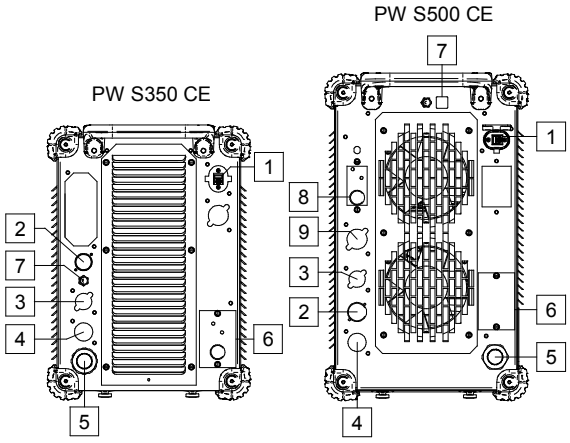


Figure 3.

1. ETHERNET
2. ARCLINK (OPTIONAL)
3. SYNC-PULSE/TANDEM (OPTIONAL)
4. DEVICENET KIT (OPTIONAL)
5. INPUT POWER CORD
6. COOLER OUTPUT POWER PANEL (OPTIONAL)
7. CIRCUIT BREAKER
8. GAS INLET (optional for S500 only)
9. RESERVED FOR FUTURE DEVELOPMENT

COMMON WELDING PROCEDURES

Choose the electrode material, electrode size, shielding gas, and process (GMAW, GMAW-P etc.) appropriate for the material to be welded.

Select the weld mode that best matches the desired welding process.

The standard weld set shipped with the POWER WAVE® S350 / S500CE encompasses a wide range of common processes that will meet most needs. If a special weld mode is desired, contact the local Lincoln Electric sales representative. All adjustments are made through the user interface. Because of the different configuration options your system may not have all of the following adjustments.

See Accessories Section for Kits and Options available to use with the POWER WAVE® S350 / S500CE.

Definition of Welding Modes

Non-Synergic Welding Modes

- A Non-synergic welding mode requires all welding process variables to be set by the operator.

Synergic Welding Modes

- A Synergic welding mode offers the simplicity of single knob control. The machine will select the correct voltage and amperage based on the wire feed speed (WFS) set by the operator.

Basic Welding Controls Weld Mode

Selecting a weld mode determines the output characteristics of the Power Wave power source. Weld modes are developed with a specific electrode material, electrode size, and shielding gas. For a more complete description of the weld modes programmed into the POWER WAVE® S350/S500CE at the factory, refer to the Weld Set Reference Guide supplied with the machine or available at www.powerwavesoftware.com.

Wire Feed Speed (WFS)

In synergic welding modes (synergic CV, GMAW-P), WFS is the dominant control parameter. The user adjusts WFS according to factors such as wire size, penetration requirements, heat input, etc. The POWER WAVE® S350 / S500CE then uses the WFS setting to adjust the voltage and current according to settings contained in the Power Wave. In non-synergic modes, the WFS control behaves like a conventional power source where WFS and voltage are independent adjustments. Therefore, to maintain proper arc characteristics, the operator must adjust the voltage to compensate for any changes made to the WFS.

Amps

In constant current modes, this control adjusts the welding amperage.

Volts
In constant voltage modes, this control adjusts the welding voltage.

Trim
In pulse synergic welding modes, the Trim setting adjusts the arc length. Trim is adjustable from 0.50 to 1.50. 1.00 is the nominal setting and is a good starting point for most conditions.

UltimArc™ Control
UltimArc™ Control allows the operator to vary the arc characteristics. UltimArc™ Control is adjustable from –10.0 to +10.0 with a nominal setting of 0.0.

SMAW (Stick) Welding
The welding current and Arc Force settings can be set through a Power Feed 10M, LF45, LF45S or Power Feed 25M wire feeder.

Alternatively an optional Stick / TIG UI (K2828-1) can be installed into the power source to control these settings locally.

In a SMAW (STICK mode), Arc Force can be adjusted. It can be set to the lower range for a soft and less penetrating arc characteristic (negative numeric values) or to the higher range (positive numeric values) for a crisp and more penetrating arc.

Normally, when welding with cellulosic types of electrodes (E6010, E7010, E6011), a higher energy arc is required to maintain arc stability. This is usually indicated when the electrode sticks to the work-piece or when the arc becomes unstable during manipulative technique. For low hydrogen types of electrodes (E7018, E8018, E9018, etc.) a softer arc is usually desirable and the lower end of the Arc Control suits these types of electrodes. In either case the arc control is available to increase or decrease the energy level delivered to the arc.

GTAW (TIG) WELDING
The welding current can be set through a Power Feed 10M, LF45, LF45S or Power Feed 25M wire feeder. Alternatively an optional Stick / TIG UI (K2828-1) can be installed into the power source to control these settings locally.

The TIG mode features continuous control from 5 to 350A with the use of an optional foot amptrol (K870).

The POWER WAVE® S350/S500CE can be run in either a Touch Start TIG mode or Scratch start TIG mode.

CONSTANT VOLTAGE WELDING
Synergic CV
For each wire feed speed, a corresponding voltage is preprogrammed into the machine through special software at the factory.

The nominal preprogrammed voltage is the best average voltage for a given wire feed speed, but may be adjusted to preference.

When the wire feed speed changes, the POWER WAVE® S350/S500CE automatically adjusts the voltage level correspondingly to maintain similar arc characteristics throughout the WFS range.

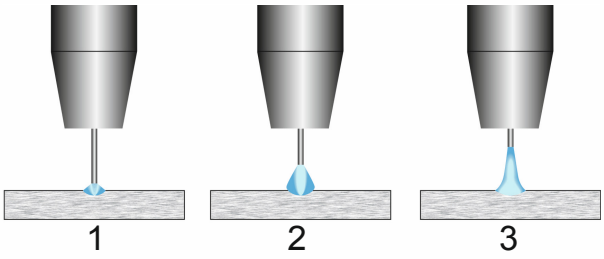
Non Synergic CV
In non-synergic modes, the WFS control behaves more like a conventional CV power source where WFS and voltage are independent adjustments.

Therefore to maintain the arc characteristics, the operator must adjust the voltage to compensate for any changes made to the WFS.

All CV Modes
Pinch adjusts the apparent inductance of the wave shape. The “pinch” function is inversely proportional to inductance. Therefore, increasing Pinch Control greater than 0.0 results in a crisper arc (more spatters) while decreasing the Pinch Control to less than 0.0 provides a softer arc (less spatter).

Pulse welding
Pulse welding procedures are set by controlling an overall “arc length” variable. When pulse welding, the arc voltage is highly dependent upon the waveform.

The peak current, back ground current, rise time, fall time and pulse frequency all affect the voltage. The exact voltage for a given wire feed speed can only be predicted when all the pulsing waveform parameters are known. Using a preset voltage becomes impractical and instead the arc length is set by adjusting “trim”. Trim adjusts the arc length and ranges from 0.50 to 1.50 with a nominal value of 1.00. Trim values greater than 1.00 increase the arc length, while vales less than 1.00 decrease the arc length (see figure below).



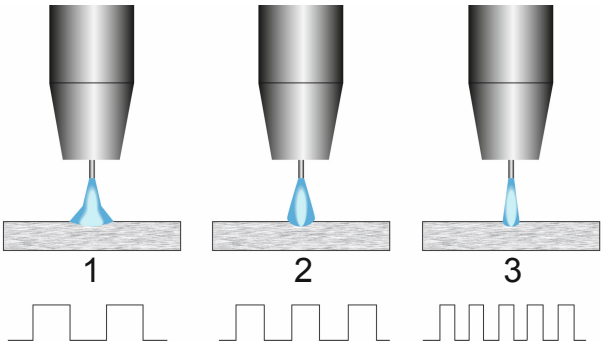
1. Trim 0.50: Arc Length Short.
2. Trim 1.00: Arc Length Medium.
3. Trim 1.50: Arc Length Long.

Most pulse welding programs are synergic. As the wire feed speed is adjusted, the POWER WAVE® S350/S500CE will automatically recalculate the waveform parameters to maintain similar arc properties.

The POWER WAVE® S350/S500CE utilize “adaptive control” to compensate for changes in the electrical stick out while welding (Electrical stick-out is the distance from the contact tip to the work piece).

The POWER WAVE® S350/S500CE waveforms are optimized for a 19mm stick-out. The adaptive behavior supports a range of stick-outs from 13 to 32mm. At very low or high wire feed speeds, the adaptive range may be less due to reaching physical limitations of the welding process.

UltimArc™ Control adjusts the focus or shape of the arc. UltimArc™ Control is adjustable from -10.0 to +10.0 with a nominal setting of 0.0. Increasing the UltimArc™ Control increases the pulse frequency and background current while decreasing the peak current. This results in a tight, stiff arc used for high speed sheet metal welding. Decreasing the UltimArc™ Control decreases the pulse frequency and background current while increasing the peak current. These results in a soft arc good for out of position welding (see figure below).



1. UltimArc™ Control -10.0: Low Frequency, Wide.
2. UltimArc™ Control OFF: Medium Frequency and Width.
3. UltimArc™ Control +10.0: High Frequency, Focused.

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.

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 if 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.

Technical Specifications

POWER WAVE® S350CE

POWER SOURCE – INPUT VOLTAGE AND CURRENT					
Model	**Duty Cycle**	**Input Voltage**	**Input Amperes**	**Idle Power**	**Power Factor @ Rated Input**
K2823-2	40%	230/380-415/460/575 50/60 Hz	35/20/17/14	300 W Max. (fan on)	0,95
	100%		28/16/14/11		

RATED OUTPUT									
Input Voltage/ Phase / Frequency	GMAW			SMAW (STICK)			GTAW (TIG)-DC		
	40%	60%	100%	40%	60%	100%	40%	60%	100%
230/3/50/60 380-415/3/50/60 460/3/50/60 575/3/50/60	350A / 31,5V	320A / 30V	300A / 29V	325A / 33V	275A / 31V	250A / 31V	350A / 24V	325A / 23V	300A / 22V

RECOMMENDED INPUT WIRE AND FUSES SIZES[1]			
Input Voltage/ Phase/Frequency	**Maximum Input Ampere Rating and Duty Cycle**	**Cord Size AWG Sizes (mm^2)**	**Time Delay Fuse or Breaker Sizes[2] (A)**
230/3/50/60	35A, 40%	8 (10)	45
380-415/3/50/60	19A, 40%	12 (4)	30
460/3/50/60	17A, 40%	12 (4)	25
575/3/50/60	14A, 40%	14 (2,5)	20

[1] Cord and Fuse Sizes based upon the U.S. National Electric Code and maximum output for 40°C (104°) ambient.

WELDING PROCESS			
Process	**Output Range (A)**	**OCV (U_0) (V)**	
		Mean	**Peak**
GMAW GMAW-Pulse FCAW GTAW-DC SMAW	5 – 350A	40-70V 40-70V 40-70V 24V 60V	100V

PHYSICAL DIMENSIONS				
Model	**Height (mm)**	**Width (mm)**	**Depth (mm)**	**Weight (kg)**
K2823-2	518	356	630	46.6

TEMPERATURE RANGES	
Operating Temperature Range (ºC)	**Storage Temperature Range (ºC)**
-20 to +40	-40 to +80

IP23 155º(F) Insulation Class

POWER WAVE® S500CE

POWER SOURCE – INPUT VOLTAGE AND CURRENT					
Model	**Duty Cycle**	**Input Voltage**	**Input Amperes**	**Idle Power**	**Power Factor @ Rated Input**
K3168-1	40%	230/380-415/460/575 50/60 Hz	67/41/34/27	300 W Max. (fan on)	0,95
	100%		50/30/25/20		

RATED OUTPUT									
Input Voltage/ Phase / Frequency	GMAW			SMAW (STICK)			GTAW (TIG)-DC		
	40%	60%	100%	40%	60%	100%	40%	60%	100%
230/3/50/60 380-415/3/50/60 460/3/50/60 575/3/50/60	550A / 41,5V	500A / 39V	450A / 36,5V	550A / 42V	500A / 40V	450A / 38V	550A / 32V	500A / 30V	450A / 28V

RECOMMENDED INPUT WIRE AND FUSES SIZES[1]			
Input Voltage/ Phase/Frequency	**Maximum Input Ampere Rating and Duty Cycle**	**Cord Size AWG Sizes (mm^2)**	**Time Delay Fuse or Breaker Sizes[2] (A)**
230/3/50/60	67A, 40%	2 (35)	90
380-415/3/50/60	41A, 40%	6 (13)	60
460/3/50/60	34A, 40%	8 (10)	45
575/3/50/60	27A, 40%	8 (10)	35

[1] Cord and Fuse Sizes based upon the U.S. National Electric Code and maximum output for 40°C (104°) ambient.

WELDING PROCESS			
Process	**Output Range (A)**	**OCV (U_0) (V)**	
		Mean	**Peak**
GMAW GMAW-Pulse FCAW	40-550A	60V	100V
GTAW-DC	5-550A	24V	
SMAW	15-550A	60V	

PHYSICAL DIMENSIONS				
Model	**Height (mm)**	**Width (mm)**	**Depth (mm)**	**Weight (kg)**
K3168-1	570	356	630	68

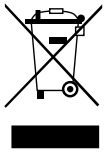
TEMPERATURE RANGES	
Operating Temperature Range (ºC)	**Storage Temperature Range (ºC)**
-20 to +40	-40 to +80

IP23 155º(F) Insulation Class

WEEE

07/06

English



Do not dispose of electrical equipment together with normal waste!
In observance of European Directive 2002/96/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, which contains a picture-descriptive part number cross-reference).

Electrical Schematic

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

Accessories

K14085-1	CART PW S CE
K14050-1	Coolarc 50
K14072-1	LF-45
K14083-1	LF-45S
K2461-2	PF 10M Dual
K2921-1	STT module CE
K10349-PGW-XM	Cable IC Water Cooled X=3,5,10,15m
K10349-PG-Xm	Cable IC Air Cooled X=3,5,10,15m
K10420-1	COOLANT ACOROX (2X5L)
K10095-1-15M	Remote control 6-pins, 15m
K870	FOOT AMPTROL
K2909-1	6-Pin(F) to 12-Pin(M) CE Adapter for Remote Applications - 0,5m
K14091-1	REMOTE MIG LF45PWC300-7M
KP10519-8	Adapter TIG EURO
K10413-360GC-4M	LG360GC 4meter with cross switch
K10413-420GC-3M	LG420GC 3meter with cross switch
K10413-420GC-4M	LG420GC 4meter with cross switch
K10413-420GC-6M	LG420GC 6meter with cross switch
K10413-505WC-4M	LG505WC 4meter with cross switch
K3004-1	Autodrive 19
K3171-1	Autodive 19 Tandem
K2827-1	DeviceNet KIT
K3001-1	Kit optional components (S-Series User Interface Kit).