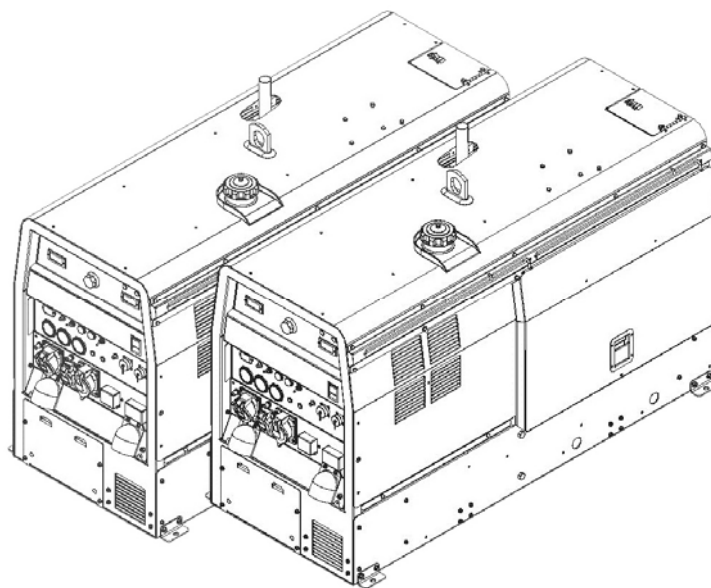


IM2005
07/2015
REV03

VANTAGE® 400 & 500 CE

OPERATOR'S MANUAL



ENGLISH

LINCOLN®
ELECTRIC

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

THE LINCOLN ELECTRIC COMPANY

EC DECLARATION OF CONFORMITY

Manufacturer and technical documentation holder: The Lincoln Electric Company
22801 St. Clair Ave.
Cleveland Ohio 44117-1199 USA

EC Company: Lincoln Electric Europe S.L.
c/o Balmes, 89 - 80 2a
08008 Barcelona SPAIN

Hereby declare that welding equipment: Vantage 400 with CE marking, K2502 (may contain prefixes and suffixes)

Fulfills all relevant provisions of listed Council Directives, amendments and standards: Machinery Directive 2006/42/EC;
Low Voltage Directive (LVD) 2006/95/EC;
Electromagnetic Compatibility (EMC) Directive 2004/108/EC;
Noise emission in the environment by equipment for use outdoors 2000/14/EC; Annex VI, procedure 1;

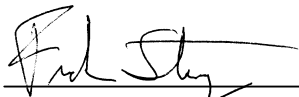
EN12601: 2010, Reciprocating internal combustion engine driven generating sets – Safety;
EN 60974-1:2005, Safety requirements for arc welding equipment, power sources;
EN 60974-10: 2007, Arc Welding Equipment-Part 10: Electromagnetic compatibility (EMC) requirements;
EN ISO 3744, Acoustic – Determination of sound power levels of noise sources using sound pressure ... 1995

Notified body (for 2000/14/EC Conformity): LNE – Number: 0071
ZA de Trappes-Élancourt
29, avenue Roger Hennequin
78197 TRAPPES Cedex

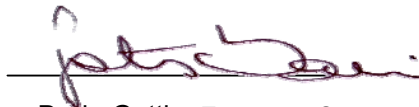
Guaranteed sound power level: LWA 96 dB (net power P_{el} = 11.9 kW)

Measured sound power level: LWA 95 dB (net power P_{el} = 11.9 kW)

CE marking affixed in 15



Frank Stupczy, Manufacturer
Compliance Engineering Manager
28 January 2015
Place: 22801 St. Clair Ave.
Cleveland Ohio 44117-1199 USA



Dario Gatti, European Community Representative
European Engineering Director Machines
30 January 2015
Place: Via Fratelli Canepa, 8
16010 Serra Riccò – Genova - Italy



LNE

Le progrès, une passion à partager

LABORATOIRES DE TRAPPES
29 av. Roger Hennequin - 78197 Trappes Cedex
Tél. : 01 30 69 10 00 - Fax : 01 30 69 12 34

CONFORMITY CERTIFICATE

Certificat de conformité / Konformitätsbescheinigung



Manufact. : LINCOLN ELECTRIC COMPANY <i>Fabricant / Hersteller</i> 22801 Saint Clair Ave, CLEVELAND Ohio 44177-1199 USA	Number : 2000-14/G031542/1 <i>Numéro / Nummer</i>			
Applicant : LINCOLN ELECTRIC France <i>Demandeur / Antragsteller</i> avenue Franklin Roosevelt B.P. 214 76121 LE GRAND QUEVILLY Cedex FRANCE	Notified body : N° 0071 <i>Organisme notifié / Ausstellende Prüfstelle</i> EC Directive applicable : 2000/14/EC <i>Directive CE applicable / Anwendbare EG-Richtlinie</i> modified by 2005/88/EC			
Guaranteed sound power level : Lwa 96 dB <i>Niveau de puissance acoustique garanti / Garantierter schalleistungspegel</i> To be affixed on pictogram	Conformity assessment procedure : Annex VI <i>Procédure d'évaluation de la conformité / Konformitätsbewertungsverfahren</i>			
Description of equipment <i>Description de l'équipement / Beschreibung des geräts bzw. der Maschine :</i> - Type of equipment : Welding generator Directive definition item : 57 - Make - Trade name : LINCOLN Type - Model : VANTAGE 400 (K2502-1 or 2) - Drive engine <i>Moteur / Motoren :</i> Make : PERKINS Model - Type : 404C-22 Net installed power : 20.6 kW Rated speed : 1500 r.p.m Energy : Diesel - Other required technical characteristics : Pe1 = 11.9 kW (power generator: 13.2kW involving the same permissible level)				
Reference documentation <i>Documents de référence / Prüfgrundlagen :</i> - Laboratory report : LINCOLN: U1060117850/1/2 Measured sound power level : 95 dB(A) <i>Rapport de laboratoire / Prüfbericht</i> 22 and 23 February 2006 <i>Niveau de puissance acoustique mesuré / Gemessener schalleistungspegel</i> (Definition : Art. 3.e) - Other technical documentation : LINCOLN : 23 March 2006 LNE : G031542				
<table border="0"> <tr> <td style="width: 33%; vertical-align: top;"> This certificate is issued under the following conditions : 1. It applies only to the recorded type, without any change in the above referenced technical file, subjected to the LNE examination. 2. It implies that a follow-up of the manufacturing is performed with a LNE control, carried out at least once every three years. Without this control or in case of nonconformity, the LNE is bound to inform the French Ministry in charge of environment. </td> <td style="width: 33%; vertical-align: top;"> Ce certificat est délivré dans les conditions suivantes : 1. Il ne s'applique qu'au type mentionné, sans changement dans le dossier technique soumis au LNE et référencé ci-dessus. 2. Il implique qu'une surveillance de production est mise en place avec un contrôle par le LNE au moins tous les 3 ans. Sans ce contrôle ou en cas de non conformité, le LNE est engagé à en informer le Ministère Français chargé de l'Environnement. </td> <td style="width: 33%; vertical-align: top;"> Diese Bescheinigung wird unter folgenden Bedingungen ausgestellt: 1. Sie gilt für das geprüfte Baumuster, ohne Änderung der technischen Dokumentation die dem LNE übermittelt wurde. 2. Ein Überwachungsverfahren der Herstellung wurde durchgeführt mit einer Überprüfung von LNE mindestens alle 3 Jahre. Ohne diese Überprüfung oder im Falle einer Unkonformität hat sich LNE verpflichtet diesen Zustand dem französischen Ministerium für Umwelt zu melden. </td> </tr> </table>		This certificate is issued under the following conditions : 1. It applies only to the recorded type, without any change in the above referenced technical file, subjected to the LNE examination. 2. It implies that a follow-up of the manufacturing is performed with a LNE control, carried out at least once every three years. Without this control or in case of nonconformity, the LNE is bound to inform the French Ministry in charge of environment.	Ce certificat est délivré dans les conditions suivantes : 1. Il ne s'applique qu'au type mentionné, sans changement dans le dossier technique soumis au LNE et référencé ci-dessus. 2. Il implique qu'une surveillance de production est mise en place avec un contrôle par le LNE au moins tous les 3 ans. Sans ce contrôle ou en cas de non conformité, le LNE est engagé à en informer le Ministère Français chargé de l'Environnement.	Diese Bescheinigung wird unter folgenden Bedingungen ausgestellt: 1. Sie gilt für das geprüfte Baumuster, ohne Änderung der technischen Dokumentation die dem LNE übermittelt wurde. 2. Ein Überwachungsverfahren der Herstellung wurde durchgeführt mit einer Überprüfung von LNE mindestens alle 3 Jahre. Ohne diese Überprüfung oder im Falle einer Unkonformität hat sich LNE verpflichtet diesen Zustand dem französischen Ministerium für Umwelt zu melden.
This certificate is issued under the following conditions : 1. It applies only to the recorded type, without any change in the above referenced technical file, subjected to the LNE examination. 2. It implies that a follow-up of the manufacturing is performed with a LNE control, carried out at least once every three years. Without this control or in case of nonconformity, the LNE is bound to inform the French Ministry in charge of environment.	Ce certificat est délivré dans les conditions suivantes : 1. Il ne s'applique qu'au type mentionné, sans changement dans le dossier technique soumis au LNE et référencé ci-dessus. 2. Il implique qu'une surveillance de production est mise en place avec un contrôle par le LNE au moins tous les 3 ans. Sans ce contrôle ou en cas de non conformité, le LNE est engagé à en informer le Ministère Français chargé de l'Environnement.	Diese Bescheinigung wird unter folgenden Bedingungen ausgestellt: 1. Sie gilt für das geprüfte Baumuster, ohne Änderung der technischen Dokumentation die dem LNE übermittelt wurde. 2. Ein Überwachungsverfahren der Herstellung wurde durchgeführt mit einer Überprüfung von LNE mindestens alle 3 Jahre. Ohne diese Überprüfung oder im Falle einer Unkonformität hat sich LNE verpflichtet diesen Zustand dem französischen Ministerium für Umwelt zu melden.		
<p>Trappes, 2 May 2006</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 40%; vertical-align: top;"> Vice Director of Centre for Qualification of Products and Equipment  Lionel DREUX </td> <td style="width: 20%; text-align: center;">  </td> <td style="width: 40%; vertical-align: top;"> Technical Responsible Officer  Patrick CELLARD </td> </tr> </table>		Vice Director of Centre for Qualification of Products and Equipment  Lionel DREUX		Technical Responsible Officer  Patrick CELLARD
Vice Director of Centre for Qualification of Products and Equipment  Lionel DREUX		Technical Responsible Officer  Patrick CELLARD		


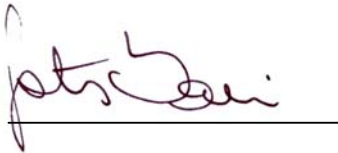
Publication or reproduction of this document is allowed only in the form of an integral photocopy - File G031542 - Document CQPE/1 - Page 1/1

Laboratoire national de métrologie et d'essais

Établissement public à caractère industriel et commercial • Siège social : 1, rue Gaston Boissier - 75724 Paris Cedex 15 • Tél. : 01 40 43 37 00

THE LINCOLN ELECTRIC COMPANY

EC DECLARATION OF CONFORMITY

Manufacturer and technical documentation holder:	The Lincoln Electric Company 22801 St. Clair Ave. Cleveland Ohio 44117-1199 USA
EC Company:	Lincoln Electric Europe S.L. c/o Balmes, 89 - 80 2a 08008 Barcelona SPAIN
Hereby declare that welding equipment:	Vantage 500 with CE marking, K2503 (may contain prefixes and suffixes)
Fulfills all relevant provisions of listed Council Directives, amendments and standards:	Machinery Directive 2006/42/EC; Low Voltage Directive (LVD) 2006/95/EC; Electromagnetic Compatibility (EMC) Directive 2004/108/EC; Noise emission in the environment by equipment for use outdoors 2000/14/EC; Annex VI, procedure 1; EN12601: 2010, Reciprocating internal combustion engine driven generating sets – Safety; EN 60974-1:2005, Safety requirements for arc welding equipment, power sources; EN 60974-10: 2007, Arc Welding Equipment-Part 10: Electromagnetic compatibility (EMC) requirements; EN ISO 3744, Acoustic – Determination of sound power levels of noise sources using sound pressure ... 1995
Notified body (for 2000/14/EC Conformity):	LNE – Number: 0071 ZA de Trappes-Élancourt 29, avenue Roger Hennequin 78197 TRAPPES Cedex
Guaranteed sound power level:	LWA 95 dB (net power P_{el} = 17.1 kW)
Measured sound power level:	LWA 94 dB (net power P_{el} = 17.1 kW)
CE marking affixed in 15	
 Frank Stupczy, Manufacturer Compliance Engineering Manager	 Dario Gatti, European Community Representative European Engineering Director Machines
30 January 2015	30 January 2015
Place: 22801 St. Clair Ave. Cleveland Ohio 44117-1199 USA	Place: Via Fratelli Canepa, 8 16010 Serra Riccò – Genova - Italy

MCD80c



LNE

Le progrès, une passion à partager

LABORATOIRES DE TRAPPES
29 av. Roger Hennequin - 78197 Trappes Cedex
Tél. : 01 30 69 10 00 - Fax : 01 30 69 12 34

CONFORMITY CERTIFICATE

Certificat de conformité / Konformitätsbescheinigung



Manufact. : LINCOLN ELECTRIC COMPANY <i>Fabricant / Hersteller</i> 22801 Saint Clair Ave, CLEVELAND Ohio 44177-1199 USA		Number : 2000-14/G031542/2 <i>Numéro / Nummer</i>
Applicant : LINCOLN ELECTRIC France <i>Demandeur / Antragsteller</i> avenue Franklin Roosevelt B.P. 214 76121 LE GRAND QUEVILLY Cedex FRANCE		Notified body : N° 0071 <i>Organisme notifié / Ausstellende Prüfstelle</i>
Guaranteed sound power level : Lwa 95 dB <i>Niveau de puissance acoustique garanti / Garantierter schalleistungspegel</i> To be affixed on pictogram		EC Directive applicable : 2000/14/EC <i>Directive CE applicable / Anwendbare EG-Richtlinie</i> modified by 2005/88/EC
Description of equipment <i>Description de l'équipement / Beschreibung des geräts bzw. der Maschine</i> : - Type of equipment : Welding generator Directive definition item : 57 - Make - Trade name : LINCOLN Type - Model : VANTAGE 500 (K2503 -1 or 2) - Drive engine <i>Moteur / Motoren</i> : Make : PERKINS Model - Type : 404C-22T Net installed power : 27.7 kW Rated speed : 1500 r.p.m Energy : Diesel - Other required technical characteristics : Pe1 = 17.1 kW (power generator: 14.5 kW involving the same permissible level)		
Reference documentation <i>Documents de référence / Prüfgrundlagen</i> : - Laboratory report : LINCOLN: 3 data sheets Measured sound power level : 94 dB(A) <i>Rapport de laboratoire / Prüfbericht</i> 9 and 10 May 2006 <i>Niveau de puissance acoustique mesuré / Gemessener schalleistungspegel</i> (Definition : Art. 3.e) - Other technical documentation : LINCOLN : 26 June 2006 LNE : G031542		
This certificate is issued under the following conditions : 1. It applies only to the recorded type, without any change in the above referenced technical file, subjected to the LNE examination. 2. It implies that a follow-up of the manufacturing is performed with a LNE control, carried out at least once every three years. Without this control or in case of nonconformity, the LNE is bound to inform the French Ministry in charge of environment.		
Ce certificat est délivré dans les conditions suivantes : 1. Il ne s'applique qu'au type mentionné, sans changement dans le dossier technique soumis au LNE et référencé ci-dessus. 2. Il implique qu'une surveillance de production est mise en place avec un contrôle par le LNE au moins tous les 3 ans. Sans ce contrôle ou en cas de non conformité, le LNE est engagé à en informer le Ministère Français chargé de l'Environnement.		
Diese Bescheinigung wird unter folgenden Bedingungen ausgestellt: 1. Sie gilt für das geprüfte Baumuster, ohne Änderung der technischen Dokumentation die dem LNE übermittelt wurde. 2. Ein Überwachungsverfahren der Herstellung wurde durchgeführt mit einer Überprüfung von LNE mindestens alle 3 Jahre. Ohne diese Überprüfung oder im Falle einer Unkonformität hat sich LNE verpflichtet diesen Zustand dem französischen Ministerium für Umwelt zu melden.		
Trappes, 3 July 2006		
The Head of Electronic and Multimedia Division  Jean-Marc MOSCHETTA		The technical Responsible Officer  Patrick CELLARD
		

Publication or reproduction of this document is allowed only in the form of an integral photocopy - File G031542 - Document CQPE/2 - Page 1/1

Laboratoire national de métrologie et d'essais

Établissement public à caractère industriel et commercial • Siège social : 1 rue Gaston Brissler - 75774 Paris Cedex 15 • Tél. : 01 40 43 37 00



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

Technical Specifications.....	1
Electromagnetic Compatibility (EMC).....	3
Safety	5
Installation and Operator Instructions	6
Diagrams	21
WEEE	25
Spare Parts	25
Electrical Schematic.....	25
Suggested Accessories.....	25

Technical Specifications

VANTAGE® 400 (CE) (K2502-1, -2, -3, -4)

VANTAGE® 500 (CE) (K2503-1, -2, -3, -4)

INPUT – DIESEL ENGINE						
Model	Description	Speed rpm	Displacement	Starting system	Capacities	
VANTAGE 400 CE Perkins 404C-22 K2502-1,-2 11296, 11297 Perkins 404D-22 K2502-3,-4 11463, 11464 12195, 12308	4 cylinder 1500 rpm Water cooled Diesel Engine VANTAGE 400 CE 27.6HP Naturally aspirated	VANTAGE 400 CE High Idle 1565 Full Load 1500 Low Idle 1200 VANTAGE 500 CE High Idle 1575 Full Load 1575 Low Idle 1200	2200 cm ³ Bore and Stroke 87,1 x 92,5 mm	12Vdc Battery and Starter (Group 34;650) 65A Alternator with build in regulator	Oil: 8.0l	Fuel: 57l
					VANTAGE 500 CE Perkins 404C-22T Codes 11299 and below Perkins 404D-22T Codes 11299	VANTAGE 500 CE 37.2HP Turbo Charged
RATED OUTPUT @ 40°C - WELDER						
	Welding Process	Welding Output Current/Voltage/Duty Cycle	Output Range	Max. Weld OCV@Rated Load RPM		
VANTAGE 400 CE	DC Constant Current	350/34V/100%	30 TO 400 AMPS	60V ⁽²⁾		
	DC Pipe Current	300/32V/100%	40 TO 300 AMPS			
VANTAGE 500 CE	Touch-Start™ TIG	250/30V/100%	20 TO 250 AMPS	60V ⁽²⁾		
	DC Constant Voltage	350/34V/100%	14 TO 34V			
	Arc Gouging	350/34V/100%	90 TO 400 AMPS			
	DC Constant Current	400/36V/100%	30 TO 400 AMPS	60V ⁽²⁾		
	DC Pipe Current	450/38V/60%	40 TO 300 AMPS			
Touch-Start™ TIG	300/38V/60%	20 TO 250 AMPS	60V			
DC Constant Voltage	250/30V/100%	14 TO 34V				
Arc Gouging	400/36V/100%	450/38V/60%	90 TO 500 AMPS			
RATED OUTPUT @ 40°C - GENERATOR						
	Auxiliary Power⁽¹⁾					
VANTAGE 400 & 500 CE	6,900 Watts Peak ⁽³⁾ / 6,900 Watts Continuous, 50 Hz 230 Volts 1-Phase (Euro) 3,400 Watts Peak ⁽³⁾ / 3,400 Watts Continuous, 50 Hz 230 Volts 1-Phase (UK) 3,400 Watts Peak ⁽³⁾ / 3,400 Watts Continuous, 50 Hz 115 Volts 1-Phase (UK) Sound Levels (Sound power: 96 dB Lwa)					
VANTAGE 400 CE	14,000 Watts Peak / 13,200 Watts Continuous, 50 Hz 400 Volts 3-Phase (Euro/UK)					
VANTAGE 500 CE	16.5000 Watts Peak / 14,500 Watts Continuous, 50 Hz 400 Volts 3-Phase (Euro/UK)					
ENGINE						
LUBRICATION	EMISSIONS		FUEL SYSTEM		GOVERNOR	
Full Pressure with Full Flow Filter	(VANTAGE 400: Codes 11296, 11297 VANTAGE 500: Codes 11299 and below): EPA Tier II		Mechanical Fuel Pump, Auto air bleed system, Electric shutoff solenoid, Indirect fuel injector.		VANTAGE 400: Mechanical VANTAGE 500: Electronic	
	(VANTAGE 400: Codes 11463, 11464, 12195, 12308 VANTAGE 500: Codes above 11299) EPA Tier IV Interim Compliant					
AIR CLEANER	ENGINE IDLER		MUFFLER		ENGINE PROTECTION	
Single Element	Automatic Idler		Low noise Muffler: Top outlet can be rotated. Made from long life, aluminized steel.		Shutdown on low oil pressure & high engine coolant temperature	

ENGINE WARRANTY: 2 years / 2000 hours, all non-electric components, 3 years major non-electric components . See Perkins warranty for details.

PHYSICAL DIMENSIONS				
	Height	Width	Length	Weight
VANTAGE 400 CE	913mm ⁽⁴⁾	686 mm	1524 mm	559 kg
VANTAGE 500 CE	913mm ⁽⁴⁾	687 mm	1590 mm	586 kg

⁽¹⁾Output rating in watts is equivalent to volt-amperes at unity power factor. Output voltage is within $\pm 10\%$ at all loads up to rated capacity. When welding, available auxiliary power will be reduced.

⁽²⁾Reduced to less than (32V for Codes VANTAGE 400: 11296, 11297,VANTAGE 500: 11298,11299)(30V for Codes VANTAGE 400: 11463, 11464 and VANATAGE 500: 11524,11525, 11574, 11575) in the CC-stick Mode when VRD (VOLTAGE REDUCTION DEVICE) is on.

⁽³⁾Maximum per circuit breaker rating.

⁽⁴⁾To Top of enclosure. Add 7.35 (186.7mm) to top of exhaust. Add 3.87”(98.3mm) to top of Lift Bail.

MACHINE SPECIFICATIONS		
MODEL NUMBERS	VANTAGE 400 K2502-1, -3 (UK) VANTAGE 500 K2503-1, -3 (UK)	VANTAGE 400 K2502-2,-4 (EUROPE) VANTAGE 500 K2503-2, -4 (EUROPE)
Receptacles	400V (3 phase) x 1 230V (1 phase) x 1 115V x 1 ⁽⁵⁾ 14 Pin connector 6 Pin connector	400V (3 phase) x 1 230V (1 phase) x 1 14 Pin connector 6 Pin connector
Residual Current Device (RCD)	4-pole, 25A (30mA trip current)	
Circuit Breakers (Thermal/Magnetic)	3 phase, 25 A x 1 1 phase, 15 A x 1 for 203V 30A x 2 fpr m115V	3 phase, 25 A x 1 1 phase, 15 A x 2
Other Circuit Breakers	10A for Battery Charging Circuit 10A for Wire Feeder Power	

⁽⁵⁾ Center-Tapped to ground



Equipped with VRD (VOLTAGE REDUCTION DEVICE)
See Installation and Operation sections for an explanation

Electromagnetic Compatibility (EMC)

Conformance

Products displaying the CE mark are in conformity with European Community Council Directive of 15 Dec 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility, 2004/108/EC. It was manufactured in conformity with a national standard that implements a harmonized standard: EN 60974-10 Electromagnetic Compatibility (EMC) Product Standard for Arc Welding Equipment. It is for use with other Lincoln Electric equipment. It is designed for industrial and professional use.

Introduction

All electrical equipment generates small amounts of electromagnetic emission. Electrical emission may be transmitted through power lines or radiated through space, similar to a radio transmitter. When emissions are received by other equipment, electrical interference may result. Electrical emissions may affect many kinds of electrical equipment; other nearby welding equipment, radio and TV reception, numerical controlled machines, telephone systems, computers, etc.

WARNING

This 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 may be potential difficulties in ensuring electro-magnetic compatibility in those locations, due to conducted as well as radiated disturbances.

Installation and Use

The user is responsible for installing and using the welding equipment according to the manufacturer's instructions.

If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing (grounding) the welding circuit, see Note. In other cases it could involve constructing an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

Note: The welding circuit may or may not be earthed for safety reasons. Follow your local and national standards for installation and use. Changing the earthing arrangements should only be authorized by a person who is competent to access whether the changes will increase the risk of injury, e.g., by allowing parallel welding current return paths which may damage the earth circuits of other equipment.

Assessment of Area

Before installing welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

- a) other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment;
- b) radio and television transmitters and receivers;
- c) computer and other control equipment;
- d) safety critical equipment, e.g., guarding of industrial equipment;
- e) the health of the people around, e.g., the use of pacemakers and hearing aids;
- f) equipment used for calibration or measurement
- g) the immunity of other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;
- h) the time of day that welding or other activities are to be carried out.

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

Methods of Reducing Emissions

Public Supply System

Welding equipment should be connected to the public supply system according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the system. Consideration should be given to shielding the supply cable of permanently installed welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

Maintenance of the Welding Equipment

The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturer's instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

Welding Cables

The welding cables should be kept as short as possible and should be positioned close together, running at or close to floor level.

Equipotential Bonding

Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

Earthing of the Workpiece

Where the workpiece is not bonded to earth for electrical safety, not connected to earth because of its size and position, e.g., ships hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

Screening and Shielding

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications¹.




¹ Portions of the preceding text are contained in EN 60974-10: "Electromagnetic Compatibility (EMC) product standard for arc welding equipment."



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 Equipments (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.

	<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>
	<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>EQUIPMENT WEIGHT OVER 30kg: Move this equipment with care and with the help of another person. Lifting may be dangerous for your physical health.</p>

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

Installation and Operator Instructions

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

In this manual the written "Vantage are" refers to both Vantage 400 & 500.

General Description

The VANTAGE® 400 CE & 500 CE are diesel engine powered DC multi-process welding power sources and AC power generator. The engine drives a generator that supplies three phase power for the DC welding circuit, single phase and three Phase power for the AC auxiliary outlets. The DC welding control system uses state of

the art Chopper Technology  for superior welding performance.

The VANTAGE® 400&500 CE are fitted with a selectable VRD (Voltage Reduction Device). The VRD operates in the CC-Stick mode reducing the OCV to (<32 volts for Codes VANTAGE® CE 400: 11296, 11297), (<30 volts for Codes VANTAGE® CE 400: 11463,11464), (<13V for VANTAGE ® 500 CE), increasing operator safety when welding is performed in environments with increased hazard of electric shock such as wet areas and hot, humid sweaty conditions.

VRD (Voltage Reduction Device)

The VRD feature provides additional safety in the CC-Stick mode especially in an environment with a higher risk of electric shock such as wet areas and hot humid sweaty conditions.

The VRD reduces the OCV (Open Circuit Voltage) at the welding output terminals while not welding to less than:

- VANTAGE® 400: **13VDC** when the resistance of the output circuit is above 200Ω (ohms).
- VANTAGE® 500 Codes 11299 and below: **32V** when the resistance of the output circuit is above 200Ω (ohms).
- VANTAGE® 500 Codes above 11299: **30V** when the resistance of the output circuit is above 200Ω (ohms).

The VRD requires that the welding cable connections be kept in good electrical condition because poor connections will contribute to poor starting. Having good

electrical connections also limits the possibility of other safety issues such as heat-generated damage, burns and fires.

The machine is shipped with the VRD switch in the "Off" position. To turn it "On" or "Off":

- Turn the engine "Off".
- Disconnect the negative battery cable.
- Lower the control panel by removing 4 front panel screws. (See Figure 1)
- Place the VRD switch in the "On or "Off" position. (See Figure 1)

With the VRD switch in the "On" position, the VRD lights are enabled.

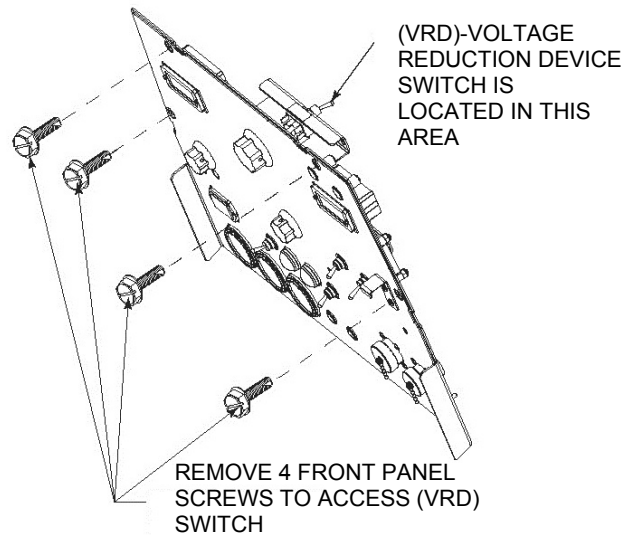


Figure 1

Location and Ventilation

The welder should be located to provide an unrestricted flow of clean, cool air to the cooling air inlets and to avoid restricting the cooling air outlets. Also, locate the welder so that the engine exhaust fumes are properly vented to an outside area.

Stacking

VANTAGE® 400 CE & 500 CE machines cannot be

stacked.

Angle of Operation

Engines are designed to run in the level condition which is where the optimum performance is achieved.

The maximum angle of continuous operation is 25 degrees in all directions, 35 degrees Intermittent (less than 10 minutes continuous) in all directions. If the engine is to be operated at an angle, provisions must be made for checking and maintaining the oil level at the normal (FULL) oil capacity in the crankcase. When operating the welder at an angle, the effective fuel capacity will be slightly less than the amount specified.

Lifting

The VANTAGE® 400 CE weighs approximately 611kg (for codes 11296, 11297) and 627kg (for codes 11463, 11464) with a full tank of fuel. 559kg less fuel.

The VANTAGE® 500 CE weighs approximately 638kg (for Codes 11299 and below), and 653kg for (Codes above 11299) with a full tank of fuel. 586kg less fuel.

A lift bail is mounted to the machine and should always be used when lifting the machine.



⚠ WARNING

Falling equipment can cause injury.

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

High Altitude Operation

At higher altitudes, output derating may be necessary. For maximum rating, derate the machine:

- For VANTAGE® 400: 2.5% to 3.5% for every 305 m.
- For VANTAGE® 500: 1.0% for every 610m up to 1828m and 2.0% for every 610m over 1828m.

Due to new EPA and other local emissions regulations, modifications to the engine for high altitude are restricted within the United States. For use above 1828 m an authorized Perkins engine field service shop should be contacted to determine if any adjustments can be made for operation in higher elevations.

High Temperature Operation

At temperatures above 40°C, Welder output derating is necessary. For maximum output ratings, derate the welder output 2 volts for every 10°C above 40°C.

Cold Weather Starting

With a fully charged battery and the proper oil, the engine should start satisfactorily down to -26°C. If the engine must be frequently started at or below -18°C, it may be desirable to install cold starting aides. The use of No. 1D diesel fuel is recommended in place of No. 2D at temperatures below -5°C. Allow the engine to warm up before applying a load or switching to high idle.

Note: Extreme cold weather starting may require longer

glow plug operation.

⚠ WARNING

Under no conditions should ether or other starting fluids be used with this engine.

Towing

Use a recommended trailer for use with this equipment for road, in-plant and yard towing by a vehicle⁽¹⁾. If the user adapts a non-Lincoln trailer, he must assume responsibility that the method of attachment and usage does not result in a safety hazard or damage the welding.

Some of the factors to be considered are as follows:

1. Design capacity of trailer vs. weight of Lincoln equipment and likely additional attachments.
2. Proper support of, and attachment to, the base of the welding equipment so there will be no undue stress to the framework.
3. Proper placement of the equipment on the trailer to insure stability side to side and front to back when being moved and when standing by itself while being operated or serviced.
4. Typical conditions of use, i.e., travel speed; roughness of surface on which the trailer will be operated; environmental conditions; like maintenance.
5. Conformance with federal, state and local laws ⁽¹⁾

⁽¹⁾Consult applicable federal, state and local laws regarding specific requirements for use on public highways.

Vehicle Mounting

⚠ WARNING

Improperly mounted concentrated loads may cause unstable vehicle handling and tires or other components to fail.

- Only transport this Equipment on serviceable vehicles which are rated and designed for such loads.
- Distribute, balance and secure loads so vehicle is stable under conditions of use.
- Do not exceed maximum rated loads for components such as suspension, axles and tires.
- Mount equipment base to metal bed or frame of vehicle.
- Follow vehicle manufacturer's instructions.

Pre-Operation Engine Service

Read the engine operating and maintenance instructions supplied with this machine.

⚠ WARNING

- Stop engine and allow to cool before fueling
- Do not smoke when fueling.
- Fill fuel tank at a moderate rate and do not over-fill.
- Wipe up spilled fuel and allow fumes to clear before starting engine.
- Keep sparks and flame away from tank.



Oil

The VANTAGE are shipped with the engine crankcase filled with high quality SAE 10W-30. Oil that meets classification CG-4 or CH-4 for diesel engines. Check the oil level before starting the engine. If it is not up to the full mark on the dip stick, add oil as required. Check the oil level every four hours of running time during the

first 50 running hours. Refer to the engine Operator's Manual for specific oil recommendations and break-in information. The oil change interval is dependent on the quality of the oil and the operating environment. Refer to the Engine Operator's Manual for more details on the proper service and maintenance intervals.



Fuel

WARNING

USE DIESEL FUEL ONLY. Low sulphur fuel or ultra low sulphur fuel in U.S.A. and Canada.

Fill the fuel tank with clean, fresh fuel. The capacity of the tank is:

- **57l** for Codes Vantage® 400: 11296, 11297 and for Codes VANTAGE® 500 11299 and below.
- **75.7l** for codes Vantage® 400: 11463, 11464 and for Codes VANTAGE® 500 above 11299.

When the fuel gauge reads empty the tank contains approximately 7.6 l of reserve fuel.

Note: A fuel shut off valve is located on the pre-filter/sediment filter. Which should be in the closed position when the welder is not used for extended periods of time.

Engine Cooling System

Air to cool the engine is drawn in the side and exhausted through radiator & case back. It is important that the intake and exhaust air is not restricted. Allow a minimum clearance of 305mm for and for Codes VANTAGE® 400, and 600mm for and for Codes VANTAGE® 500 from the case back and 406mm from either side of the base to a vertical surface.

Battery Connection

WARNING

Use caution as the electrolyte is a strong acid that can burn skin and damage eyes.

The VANTAGE are shipped with the negative battery cable disconnected. Make certain that the RUN-STOP switch is in the STOP position. Remove the two screws from the battery tray using a screwdriver or a 10mm socket. Attach the negative battery cable to the negative battery terminal and tighten using a 13mm socket or wrench.

Note: This machine is furnished with a wet charged battery; if unused for several months, the battery may require a booster charge. Be careful to charge the battery with the correct polarity. (See Battery in "Maintenance Section")

Muffler Outlet Pipe

Using the clamp provided secure the outlet pipe to the outlet tube with the pipe positioned such that it will direct the exhaust in the desired direction. Tighten using a 14mm socket or wrench.

Spark Arrester

Some federal, state or local laws may require that gasoline or diesel engines be equipped with exhaust spark arresters when they are operated in certain locations where unarrested sparks may present a fire

hazard. The standard muffler included with this welder does not qualify as a spark arrester. When required by local regulations, a suitable spark arrester, such as the K903-1 must be installed and properly maintained.

WARNING

An incorrect spark arrester may lead to damage to the engine or adversely affect performance.

Remote Control

The Vantage are equipped with a 6-pin and a 14-pin connector. The 6-pin connector is for connecting the K857 or K857-1 Remote Control or for TIG welding, the K870 foot Amptrol or the K963-3 hand Amptrol. When in the CC-STICK, ARC GOUGING or CV-WIRE modes and when a remote control is connected to the 6-pin Connector, the auto-sensing circuit automatically switches the OUTPUT control from control at the welder to remote control.

When in the DOWNHILL PIPE mode and when REMOTE CONTROL is connected to the 6-Pin or 14-pin Connector, the OUTPUT CONTROL dial is used to set the maximum current range of the OUTPUT CONTROL of the REMOTE.

Example: When the OUTPUT CONTROL on the welder is set to 200 amps the current range on the REMOTE CONTROL will be 40-200 amps rather than the full 40-300 amps. Any current range that is less than the full range provides finer current resolution for more fine tuning of the output.

When in TOUCH START TIG mode and when a Amptrol is connected to the 6-Pin Connector, the OUTPUT dial is used to set the maximum current range of the CURRENT CONTROL of the Amptrol.

The 14-pin connector is used to directly connect a wire feeder control cable. In the CV-WIRE mode, when the control cable is connected to the 14-pin connector, the auto-sensing circuit automatically makes the Output Control inactive and the wire feeder voltage control active.

WARNING

NOTE: When a wire feeder with a built in welding voltage control is connected to the 14-pin connector, do not connect anything to the 6-pin connector.

Electrical Connections Machine Grounding



Because this portable engine driven welder creates its own power, it is not necessary to connect its frame to an earth ground, unless the machine is connected to premises wiring (home, shop, etc.).

To prevent dangerous electric shock, other equipment to which this engine driven welder supplies power must:


WARNING

- Be grounded to the frame of the welder using a grounded type plug or be double insulated.
- Do not ground the machine to a pipe that carries explosive or combustible material.

When this welder is mounted on a truck or trailer, its frame must be electrically bonded to the metal frame of the vehicle. Use a #8 or larger copper wire connected between the machine grounding stud and the frame of

the vehicle. When this engine driven welder is connected to premises wiring such as that in a home or shop, its frame must be connected to the system earth ground. See further connection instructions in the section entitled "Standby Power Connections" as well as the article on grounding in the latest National Electrical Code and the local code.

In general, if the machine is to be grounded, it should be connected with a #8 or larger copper wire to a solid earth ground such as a metal water pipe going into the ground for at least ten feet and having no insulated joints, or to the metal framework of a building which has been effectively grounded.

The National Electrical Code lists a number of alternate means of grounding electrical equipment. A machine grounding stud marked with the symbol  is provided on the front of the welder.

Welding Terminals

The Vantage are equipped with a toggle switch for selecting "hot" welding terminal when in the "WELD TERMINALS ON" position or "cold" welding terminal when in the "REMOTLY CONTROLLED" position.

Welding Output Cables

With the engine off connect the electrode and work cables to the output studs. The welding process dictates the polarity of the electrode cable. These connections should be checked periodically and tightened with a 19mm wrench.

Table below lists recommended cable sizes and lengths for rated current and duty cycle. Length refers to the distance from the welder to the work and back to the welder. Cable diameters are increased for long cable lengths to reduce voltage drops.

Total Combined Length of Electrode and Work Cables	
Cable Length	Cable Size for 400 A @ 60%Duty Cycle
0-30 meters	2/0 AWG
30-46 meters	2/0 AWG
46-61 meters	3/0 AWG

Cable Installation

Install the welding cables to your Vantage as follows:

1. The engine must be OFF to install welding cables.
2. Remove the flanged nuts from the output terminals.
3. Connect the electrode holder and work cables to the weld output terminals. The terminals are identified on the case front.
4. Tighten the flanged nuts securely.
5. Be certain that the metal piece you are welding (the "work") is properly connected to the work clamp and cable.
6. Check and tighten the connections periodically.

WARNING

- Loose connections will cause the output terminals to overheat. The terminals may eventually melt.
- Do not cross the welding cables at the output terminal connection. Keep the cables isolated and separate from one another.

Auxiliary Power

The auxiliary power capacity is:

- For VANTAGE® 400: 14000W Peak, 13200W continuous of 50Hz, three phase power.
- For VANTAGE® 500: 16500WpEAK, 14500W Continuous of 50Hz, three phase power.

The auxiliary power capacity rating in watts is equivalent to volt-amperes at unity power factor. The max permissible current of the 400 VAC output is 22A. Output voltage is within ±10% at all loads up to the rated capacity.

Single phase power is:

- 6,900 Watts Peak / 6,900 Watts Continuous, 50 Hz 230 Volts 1-Phase (Euro).
- 3,400 Watts Peak / 3,400 Watts Continuous, 50 Hz 230 Volts 1-Phase (UK).
- 3,400 Watts Peak / 3,400 Watts Continuous, 50 Hz 115 Volts 1-Phase (UK).

Standby Power Connections

The machine is suitable for temporary, standby or emergency power using the engine manufacturer's recommended maintenance schedule.

The machine can be permanently installed as a standby power unit for 400 VAC, three phase, 22A service, for VANTAGE® 400, and 21A service for VANTAGE® 500.

WARNING

Connections must be made by a licensed electrician who can determine how the power can be adapted to the particular installation and comply with all applicable electrical codes.

- Take necessary steps to assure load is limited to the capacity of the Vantage.
- Only a licensed, certified, trained electrician should install the machine to a premises or residential electrical system. Be certain that:
- The installation complies with the National Electrical Code and all other applicable electrical codes.
- The premises is isolated and no feedback into the utility system can occur. Certain laws require the premises to be isolated before the generator is linked to the premises. Check your local requirements.

Connection of Lincoln Electric Wire Feeders

Connection of the LN-15 to the Vantage.

- Shut the welder off.
- For electrode Positive, connect the electrode cable to the "+" terminal of the welder and work cable to the "-" terminal of the welder. For electrode Negative, connect the electrode cable "-" terminal of the welder and work cable to the "+" terminal of the welder.

Across The-Arc Model:

- Attach the single lead from the front of the LN-15 to work using the spring clip at the end of the lead. This is a control lead to supply current to the wire feeder motor; it does not carry welding current.
- Set the "WELD TERMINALS" switch to "WELD TERMINALS ON".
- When the gun trigger is closed, the current sensing circuit will cause the VANTAGE 400 (CE) engine to go to the high idle speed, the wire will begin to feed and the welding process started. When welding is

stopped, the engine will revert to low idle speed after approximately 12 seconds unless welding is resumed.

Control Cable Model:

- Connect Control Cable between Engine Welder and Feeder.
- Set the MODE switch to the "CV-WIRE" position.
- Set the "WELD TERMINALS" switch to "REMOTELY CONTROLLED".
- Set the "WIRE FEEDER VOLTMETER" switch to either "+" or "-" as required by the electrode polarity being used.
- Set the "ARC CONTROL" knob to "0" initially and adjust to suit.
- Set the "IDLE" switch to the "AUTO" position.
- When the gun trigger is closed, the current sensing circuit will cause the VANTAGE 400 (CE) engine to go to the high idle speed, the wire will begin to feed and the welding process started. When welding is stopped, the engine will revert to low idle speed after approximately 12 seconds unless welding is resumed.

Connection of the LN-25 to the Vantage

WARNING

Shut off welder before making any electrical connections.

The LN-25 with or without an internal contactor may be used with the Vantage. See the appropriate connection diagram.

NOTE: The LN-25 (K431) Remote Control Module and (K432) Remote Cable are not recommended for use with the Vantage.

- Shut the welder off.
- For electrode Positive, connect the electrode cable from the LN-25 to the "+" terminal of the welder and work cable to the "-" terminal of the welder. For electrode Negative, connect the electrode cable from the LN-25 to the "-" terminal of the welder and work cable to the "+" terminal of the welder.
- Attach the single lead from the front of the LN-25 to work using the spring clip at the end of the lead. This is a control lead to supply current to the wire feeder motor; it does not carry welding current.
- Set the MODE switch to the "CV-WIRE" position.
- Set the "WELD TERMINALS" switch to "WELD TERMINALS ON"
- Set the "ARC CONTROL" knob to "0" initially and adjust to suit.
- Set the "IDLE" switch to the "AUTO" position. When not welding, the VANTAGE 400 (CE) engine will be at the low idle speed. If you are using an LN-25 with an internal contactor, the electrode is not energized until the gun trigger is closed.
- When the gun trigger is closed, the current sensing circuit will cause the VANTAGE 400 (CE) engine to go to the high idle speed, the wire will begin to feed and the welding process started. When welding is stopped, the engine will revert to low idle speed after approximately 12 seconds unless welding is resumed.

WARNING

If you are using an LN-25 without an internal contactor, the electrode will be energized when the Vantage are started.

For Auxiliary Power

Start the engine and set the IDLER control switch to the desired operating mode. Full power is available regardless of the welding control settings providing no welding current is being drawn.

Engine Operation

Before Starting the Engine:

- Be sure the machine is on a level surface.
- Open side engine doors and remove the engine oil dipstick and wipe it with a clean cloth. Reinsert the dipstick and check the level on the dipstick.
- Add oil (if necessary) to bring the level up to the full mark. Do not overfill. Close engine door.
- Check radiator for proper coolant level. (Fill if necessary).
- See Engine Owner's Manual for specific oil and coolant recommendations.

Add Fuel

WARNING

ADD FUEL – DIESEL FUEL CAN CAUSE FIRE

- Stop engine while fueling.
- Do not smoke when fueling.
- Keep sparks and flame away from tank.
- Do not leave unattended while fueling
- Wipe up spilled fuel and allow fumes to clear before starting engine.
- Do not overfill tank, fuel expansion may cause overflow.

DIESEL FUEL ONLY-Low sulphur fuel or ultra low sulphur fuel in U.S.A. and Canada.

- Remove the fuel tank cap.
- Fill the tank. DO NOT FILL THE TANK TO THE POINT OF OVERFLOW.
- Replace the fuel cap and tighten securely.
- See engine Owner's Manual for specific fuel recommendations.
- Remove the fuel tank cap.
- Fill the tank. DO NOT FILL THE TANK TO THE POINT OF OVERFLOW.
- Replace the fuel cap and tighten securely.
- See Engine Owner's Manual for specific fuel recommendations.

Break-in Period

Any engine will use a small amount of oil during its "break-in" period. Break-in is about 50 running hours.

Check the oil every four hours during break-in. Change the oil after the first 50 hours of operation, every 100 hours (for VANATAGE® 400) and 200 hours (for VANTAGE® 500) thereafter. Change the oil filter at each oil change.

WARNING

During break-in, subject the Welder to moderate loads. Avoid long periods running at idle. Before stopping the engine, remove all loads and allow the engine to cool several minutes.

Controls and Operational Features

Welding Controls

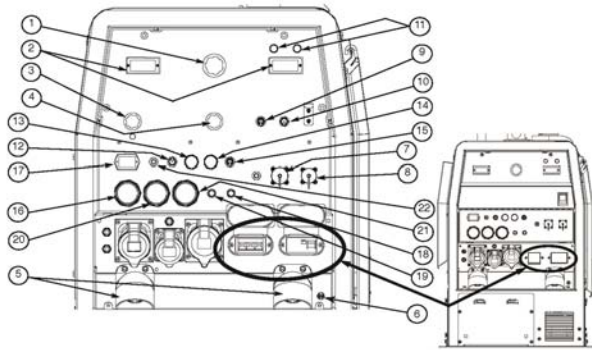


Figure 2

Figure 2a

Figure 2:

- VANTAGE® 400: for codes 11296, 11297, 11463, 11464
- VANTAGE® 500: for codes 11298, 11299, 11524, 11525, 11574, 11575, 11963.

Figure 2a:

- VANTAGE® 400: for code 12195.
- VANTAGE® 500: for code 12196

1. **Output Control:** The OUTPUT dial is used to preset the output voltage or current as displayed on the digital meters for the five welding modes. When in CC-STICK, ARC GOUGING or CV- WIRE modes and when a remote control is connected to the 6-Pin or 14-Pin Connector, the auto-sensing circuit automatically switches the OUTPUT CONTROL from control at the welder to the remote control.

When in DOWNHILL PIPE mode and when REMOTE CONTROL is connected to the 6-Pin or 14-Pin Connector, the OUTPUT CONTROL is used to set the maximum current range of the OUTPUT CONTROL of the REMOTE.


Example: when the OUTPUT CONTROL on the welder is set to 200 amps the current range on the REMOTE CONTROL will be 40-200 A rather than the full 40-300A. Any current range that is less than the full range provides finer current resolution for more fine tuning of the output.

In the CV-WIRE mode, if the feeder being used has a voltage control when the wire feeder control cable is connected to the 14Pin Connector, the auto-sensing circuit automatically makes OUTPUT CONTROL inactive and the wire feeder voltage control active. Otherwise, the OUTPUT CONTROL is used to preset the voltage when in the TOUCH START TIG mode and when an Amptron is connected to the 6-Pin Connector, the OUTPUT dial is used to set maximum current range of the CURRENT CONTROL of the Amptron.

2. **Digital Output Meters:** the digital meters allow the output voltage (CV-WIRE mode) or current (CC-STICK, DOWNHILL PIPE, ARC GOUGING and TIG modes) to be set prior to welding using the OUTPUT control dial. During welding, the meter display the actual output voltage (VOLTS) and current (AMPS). A memory feature holds the display

of both meters on for seven seconds after welding stopped. This allows the operator to read the actual current and voltage just prior to when welding was ceased.

While the display is being held the left-most decimal point in each display will be flashing. The accuracy of the meters is +/- 3%.

3. **Weld Mode Selector Switch:** Provides five selectable welding modes.
 - CV-WIRE;
 - ARC GOUGING;
 - DOWNHILL PIPE
 - CC-STICK
 - TOUCH START TIG
4. **Arc Control:** The ARC CONTROL dial is active in the CV-WIRE, CC-STICK and DOWNHILL PIPE modes, and has different functions in these modes. This control is not active in the TIG and ARC GOUGING mode.
 - **CC-STICK mode:** In this mode, the ARC CONTROL dial sets the short circuit current (arc-force) during stick welding to adjust for a soft or crisp arc. Increasing the dial from -10 (soft) to +10 (crisp) increases the short circuit current and prevents sticking of the electrode to the plate while welding. This can also increase spatter. It is recommended that the ARC CONTROL be set to the minimum number without electrode sticking. Start with a Setting at 0.
 - **DOWNHILL PIPE mode:** In this mode, the ARC CONTROL dial sets the short circuit current (arc-force) during stick welding to adjust for a soft or a more forceful digging arc (crisp). Increasing the number from -10 (soft) to +10 (crisp) increases the short circuit current which results in a more forceful digging arc. Typically a forceful digging arc is preferred for root and hot passes. A softer arc is preferred for fill and cap passes where weld puddle control and deposition ("stacking" of iron) are key to fast travel speeds. It is recommended that the ARC CONTROL be set initially at 0.
 - **CV-WIRE mode:** In this mode, turning the ARC CONTROL clock wise from -10 (soft) to +10 (crisp) changes the arc from soft and washed-in to crisp and narrow. It acts as an inductance/pinch control. The proper setting depends on the procedure and operator preference. Start with a setting of 0.
5. **Weld Output Terminals with Flang Nut:** Provides a connection point for the electrode and work cables.
6. **Ground Stud** : Provides a connection point for connecting the machine case to earthground.

7. **14-Pin Connector:** For attaching wire feeder control cables. Includes contactor closure circuit, auto-sensing remote control circuit, and 42V power. The remote control circuit operates the same as the 6 Pin Amphenol.
8. **6-Pin Connector:** For attaching optional remote control equipment. Includes auto-sensing remote control circuit.
9. **Weld Terminals Control Switch:** In the WELD TERMINALS ON position, the output is electrically hot all the time. In the REMOTELY CONTROLLED position, the output is controlled by a wire feeder or amptrol device, and is electrically off until a remote switch is depressed.
10. **Wire Feeder Voltmeter Switch:** Matches the polarity of the wire feeder voltmeter to the polarity of the electrode.
11. **VRD (Voltage Reduction Device) Indicator Lights:** On the front panel of the Vantage are two indicator lights. A red light when lit indicates OCV (Open Circuit Voltage) is equal to or greater than 32V(Δ), 30V(\diamond) and a green light when lit indicates OCV(Open Circuit Voltage) is less than 32V(Δ), 30V(\diamond).

The VRD "On/Off" switch inside the control panel must be "On" for the VRD function to be active and the lights to be enabled. When the machine is first started with VRD enabled, both lights will illuminate for 5 seconds.

These lights monitor the OCV (Open Circuit Voltage) and weld voltage at all times. In the CC-Stick mode when not welding the green light will illuminate indicating that the VRD has reduced the OCV to less than 32V(for all VANTAGE® 500 and for VANTAGE ® 400 see Δ), 30V (for VANTAGE ® 400 see \diamond). During welding the red light will illuminate whenever the arc voltage is equal to or greater than 32V(for all VANTAGE® 500 and for VANTAGE ® 400 see Δ), 30V (for VANTAGE ® 400 see \diamond). This means that the red and green light may alternate depending on the weld voltage. This is normal operation.

If the red light remains illuminated when not welding in the CC-stick mode, the VRD is not functioning properly. Please refer to your local field service shop for service.

If the VRD is turned "On" and the lights don't come "On."

Δ : For Codes:

- 11296, 11297 for VANTAGE® 400
- 11299 and below for VANTAGE ® 500


\diamond : For Codes:


- 11463, 11464 for VANTAGE® 400.
- Above 11299 for VANTAGE ® 500.

VRD INDICATOR LIGHTS		
MODE	VRD "ON"	VRD "OFF"
CC-STICK	OCV	Green (OCV Reduced)
	While Welding	Red or Green (Depends on Weld Voltage) *
CV-WIRE	OCV	Red (OCV not Reduced) Weld Terminals ON
		Red (OCV not Reduced) Weld Terminals Remotely controlled Gun trigger Closed
		Green (No OCV) Weld Terminals Remotely controlled Gun trigger Open
	While Welding	Red or Green * (Depends on Weld Voltage) *
PIPE	OCV	Green (No Output)
	While Welding	Not Applicable (No Output)
ARC GOUGING	OCV	Green (No Output)
	While Welding	Not Applicable (No Output)
TIG	OCV	Green (Process is low voltage)
	While Welding	Green (Process is low voltage)

* It is normal for the lights to alternate between colors while welding.

Engine Controls

12. **Run/Stop Switch:** RUN position energises the engine prior to starting. STOP position stops the engine. The oil pressure interlock switch prevents battery drain if the switch is left in the RUN position and the engine is not operating. 

13. **Glow Plug Push Button:** When pushed activates the glow plugs. Glow plug should not be activated for more than 20 seconds continuously. 

14. **Start Push Button:** Energizes the starter motor to crank the engine.

15. **Idler Switch:**  Has two positions:

1. In the HIGH position, the engine runs at the high idle speed controlled by the engine governor.
2. In the AUTO position, the idler operates as follows:
 - When switched from HIGH to AUTO or after starting the engine, the engine will operate at full speed for approximately 12 seconds and then go to low idle speed.
 - When the electrode touches the work or power is drawn for lights or tools (approximately 100 Watts minimum), the engine accelerates and operates at full speed.
 - When welding ceases or the AC power load is turned off, a fixed time delay of approximately 12 seconds starts. If the welding or AC power load is not restarted before the end of the time delay, the idler reduces the engine speed to low idle speed.
 - The engine will automatically return to high idle speed when there is welding load or AC power load reapplied.

16. **Electric Fuel Gauge:** The electric fuel gauge gives accurate and reliable indication as to how much fuel is in the fuel tank.
17. **Engine Hour Meter:** Displays the total time that the engine has been running. This meter is useful for scheduling prescribed maintenance.

TYPICAL VANTAGE 400® (CE) FUEL CONSUMPTION			
	PERKINS (404C-22), (404D-22) Liters/Hr	Running time hours	
		Codes 11296, 11297	Codes 11463, 11464
		15 gallon tank	20 gallon tank
Low Idle - No Load 1200 R.P.M.	1.10	51.93	68.96
High Idle - No Load 1565 R.P.M.	1.63	34.96	46.51
DC Weld Output 350A @ 34V	4.81	11.80	15.75
13200 Watts, 3 Phase	5.11	11.11	14.81

Note: this data is for reference only. Fuel consumption is approximate and can be influenced by many factors, including engine maintenance, environmental conditions and fuel quality.

TYPICAL VANTAGE® 500 (CE) FUEL CONSUMPTION			
	PERKINS (404C-22T) Liters/Hr	Running time hours	
		Codes 11298	Codes 11524, 11525, 11574, 11575
		15 gallon tank	20 gallon tank
Low Idle - No Load 1200 R.P.M.	1.16	49.13	65.50
High Idle - No Load 1575 R.P.M.	1.78	31.89	42.52
DC Weld Output 450A @ 38V	6.87	8.26	11.01
14500 Watts, 3 Phase	5.46	10.60	14.18

Note: this data is for reference only. Fuel consumption is approximate and can be influenced by many factors, including engine maintenance, environmental conditions and fuel quality.

18. **Engine Protection Light:** A warning indicator light for Low Oil Pressure and/or Coolant Over Temperature. The light is off when the systems are functioning properly. The light will come on and the engine will shutdown when there is Low Oil Pressure and/or the Coolant is Over Temperature.

Note: The light remains off when the RUN-STOP switch is in the "ON" position prior to starting the engine. However if the engine is not started within 60 seconds the light will come on. When this happens the RUN-STOP switch must be returned to the "OFF" position to reset the engine protection

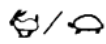
system and light.

19. **Battery Charging Light:** A warning indicator light for Low/No battery charge. The light is off when the systems are functioning properly. The light will come on if there is a Low/No battery condition but the machine will continue to run.

Note: The light may or may not come on when the RUN-STOP switch is in the "ON" position. It will come on during cranking and stay on until the engine starts. After starting the engine the light will go off unless a Low/No battery charge condition exists.

20. **Coolant Temperature Gauge:** A indicator of engine coolant temperature.
21. **Oil Pressure Gauge:** An indicator of engine Oil pressure.
22. **Circuit Breaker**

Starting the Engine

1. Remove all plugs connected to the AC power receptacles.
2. Set IDLER switch to AUTO. 
3. Press Glow Plug Button and hold 15 to 20 seconds.
4. Set the RUN/STOP switch to RUN.
5. Press START button until the engine starts or for up to 10 seconds. Continue to hold the glow plug button for up to an additional 10 seconds.
6. Release the engine START button immediately when the engine starts.
7. The engine will run at high idle speed for approximately 12 seconds and then drop to low idle speed. Allow the engine to warm up at low idle for several minutes before applying a load and/or switching to high idle. Allow a longer warm up time in cold weather.

Note: If the unit fails to start repeat step 4 through step 7 after waiting 30 seconds

WARNING

- Do not allow the starter motor to run continuously for more than 20 seconds.
- Do not push the START button while the engine is running because this can damage the ring gear and/or the starter motor.
- If the Engine Protection or Battery Charging Lights do "not" turn off shortly after starting the engine shut off the engine immediately and determine the cause.

Note: When starting for the first time, or after an extended period of time of not operating, it will take longer than normal to start because the fuel pump has to fill the fuel system. For best results, bleed the fuel system as indicated in Maintenance Section of this manual.

Stopping the Engine

Remove all welding and auxiliary power loads and allow the engine to run at low idle speed for a few minutes to cool the engine.

STOP the engine by placing the RUN-STOP switch in the STOP position.

Note: A fuel shut off valve is located on the fuel pre-filter. Turn on Fuel shut-off valve on the fuel pre-filter.

Welder Operation

Duty Cycle

Duty Cycle is the percentage of time the load is being applied in a 10 minute period. For example a 60% duty cycle, represents 6 minutes of load and 4 minutes of no load in a 10 minute period.

Electrode Information

For any electrode the procedures should be kept within the rating of the machine. For information on electrodes and their proper application see www.lincolnelectric.com or the appropriate Lincoln publication.

The Vantage can be used with a broad range of DC stick electrodes. The MODE switch provides two stick welding settings as follows:

CONSTANT CURRENT (CC-STICK) Welding

The CC-STICK position of the MODE switch is designed for horizontal and vertical-up welding with all types of electrodes, especially low hydrogen. The OUTPUT CONTROL dial adjusts the full output range for stick welding.

The ARC CONTROL dial sets the short circuit current (arc force) during stick welding to adjust for a soft or crisp arc. Increasing the dial from -10 (soft) to +10 (crisp) increases the short circuit current and prevents sticking of the electrode to the plate while welding. This can also increase spatter. It is recommended that the ARC CONTROL be set to the minimum number without electrode sticking. Start with a setting at 0.

NOTE: Due to the low OCV with the VRD on, a very slight delay during striking of the electrodes may occur. Due to the requirement of the resistance in the circuit to be low for a VRD to operate, a good metal-to-metal contact must be made between the metal core of the electrode and the job. A poor connection anywhere in the welding output circuit may limit the operation of the VRD. This includes a good connection of the work clamp to the job. The work clamp should be connected as close as practical to where the welding will be performed.

A. For New Electrodes

E6010-Touch, Lift to Start the Arc.
E7018, E7024-Touch, Rock Back and Forth in Joint, Lift.

Once the arc is started, normal welding technique for the application is then used.

B. For Re-Striking Electrodes

Some electrodes form a cone at the end of the electrode after the welding arc has been broken, particularly iron powder and low hydrogen electrodes. This cone will need to be broken off in order to have the metal core of the electrode make contact.

E6010-Push, Twist in Joint, Lift.
E7018, E7024-Push, Rock Back and Forth in Joint, Lift.

Once the arc is started, normal welding technique for the application is then used.

For other electrodes the above techniques should be tried first and varied as needed to suit operator preference. The goal for successful starting is good metal to metal contact.

For indicator light operation, see table above.

DOWNHILL PIPE Welding

This slope controlled setting intended for "out-of-position" and "down hill" pipe welding where the operator would like to control the current level by changing the arc length.

The OUTPUT CONTROL dial adjusts the full output range for pipe welding. The ARC CONTROL dial sets the short circuit current (arc-force) during stick welding to adjust for a soft or more forceful digging arc (crisp). Increasing the number from -10 (soft) to +10 (crisp) increases the short circuit current which results in a more forceful digging arc. Typically a forceful digging arc is preferred for root and hot passes. A softer arc is preferred for fill and cap passes where weld puddle control and deposition ("stacking" of iron) are key to fast travel speeds. This can also increase spatter.

It is recommended that the ARC CONTROL be set to the minimum number without electrode sticking. For indicator light operation, see table above.

NOTE: With the VRD switch in the "ON" position there is no output in the DOWNHILL PIPE mode. For indicator light operation, see table above.

TIG WELDING

The TOUCH START TIG setting of the MODE switch is for DC TIG (Tungsten Inert Gas) welding. To initiate a weld, the OUTPUT CONTROL dial is first set to the desired current and the tungsten is touched to the work. During the time the tungsten is touching the work there is very little voltage or current and, in general, no tungsten contamination. Then, the tungsten is gently lifted off the work in a rocking motion, which establishes the arc.

When in the TOUCH START TIG mode and when an Amptrol is connected to the 6-pin Connector the OUTPUT dial is used to set the maximum current range of the CURRENT CONTROL of the Amptrol.

The ARC CONTROL is not active in the TIG mode. To STOP a weld, simply pull the TIG torch away from the work.

When the arc voltage reaches approximately 30 V the arc will go out and the machine will reset the current to the TOUCH START level.

To reinitiate the arc, retouch the tungsten to the work and lift. Alternatively, the weld can be stopped by releasing the Amptrol or arc start switch.

The Vantage can be used in a wide variety of DC TIG welding applications. In general the "Touch Start" feature allows contamination free starting without the use of a Hi frequency unit. If desired, the K930-2 TIG Module can be used with the Vantage. The settings are for reference.

Vantage settings when using the K930-2 TIG Module with an Amptrol or Arc Start Switch:

- Set the MODE Switch to the TOUCH START TIG setting.
- Set the "IDLER" Switch to the "AUTO" position.

- Set the "WELDING TERMINALS" switch to the "REMOTELY CONTROLLED" position. This will keep the "Solid State" contactor open and provide a "cold" electrode until the Amptrol or Arc Start Switch is pressed.

This will keep the "Solid State" contactor open and provide a "cold" electrode until the Amptrol or Arc Start Switch is pressed.

When using the TIG Module, the OUTPUT CONTROL on the Vantage is used to set the maximum range of the CURRENT CONTROL on the TIG Module or an Amptrol if connected to the TIG Module.

NOTE: The TIG process is to receive a low voltage welding process. There is no difference in operation with the VRD "On" or "Off" for this mode. For indicator light operation, see table above.

TYPICAL CURRENT RANGES ⁽¹⁾ FOR TUNGSTEN ELECTRODES ⁽²⁾					
Tungsten Electrode Diameter mm	DCEN (-)	DCEP (+)	Approximate Argon Gas Flow Flow Rate C.F.H. (l/min)		TIG TORCH Nozzle Size (4), (5)
	1%, 2% Thoriated Tungsten	1%, 2% Thoriated Tungsten	Aluminum	Stainless Steel	
.25	2-15	(3)	2-4	2-4	#4, #5, #6
.50	5-20	(3)	3-5	3-5	
1.0	15-80	(3)	3-5	3-	
1.6	70-150	10-20	3-5	4-6	#5, #6
2.4	150-250	15-30	6-8	5-7	#6, #7, #8
3.2	250-400	25-40	7-11	5-7	
4.0	400-500	40-55	10-12	6-8	#8, #10
4.8	500-750	55-80	11-13	8-10	
6.4	750-1000	80-125	13-15	11-13	

(1) When used with argon gas. The current ranges shown must be reduced when using argon/helium or pure helium shielding gases.

(2) Tungsten electrodes are classified as follows by the American Welding Society (AWS):

Pure EWP
 1% Thoriated EWTh-1
 2% Thoriated EWTh-2

Though not yet recognized by the AWS, Ceriated Tungsten is now widely accepted as a substitute for 2% Thoriated Tungsten in AC and DC applications.

(3) DCEP is not commonly used in these sizes.

(4) TIG torch nozzle "sizes" are in multiples of 1/16ths of an inch:

4 = 6 mm
 # 5 = 8 mm
 # 6 = 10 mm
 # 7 = 11 mm
 # 8 = 12.5 mm
 #10 = 16 mm

(5) TIG torch nozzles are typically made from alumina ceramic. Special applications may require lava nozzles, which are less prone to breakage, but cannot withstand high temperatures and high duty cycles.

Wire Welding-CV

Connect a wire feeder to the Vantage according to the instructions in INSTALLATION INSTRUCTIONS Section.

The Vantage in the CV-WIRE mode, permit it to be used with a broad range of flux cored wire (Innershield and Outershield) electrodes and solid wires for MIG welding (gas metal arc welding). Welding can be finely tuned using the ARC CONTROL. Turning the ARC CONTROL clockwise from -10 (soft) to +10 (crisp) changes the arc from soft and washed-in to crisp and narrow. It acts as an inductance/pinch control. The proper setting depends on the procedure and operator preference. Start with the dial set at 0.

NOTE: In the CV-Mode with VRD "On", the OCV (Open Circuit Voltage) is not reduce. For indicator light operation, see table above.

Arc Gouging

The Vantage can be used for arc gouging. For optimal performance, set the MODE switch ARC GOUGING.

Set the OUTPUT CONTROL knob to adjust output current to the desired level for the gouging electrode being used according to the ratings in the following table:

Carbon Diameter (mm)	Current Range (DC, electrode positive) (A)
3.2	60 - 90
4.0	90 - 150
4.8	200 - 250
6.4	300 - 400
10.0mm ⁽¹⁾	400-Max. Amps ⁽¹⁾

⁽¹⁾: only for VANTAGE® 500 CE

The ARC CONTROL is not active in the ARC GOUGING Mode. The ARC CONTROL is automatically set to maximum when the ARC GOUGING mode is selected which provides the best ARC GOUGING performance.

NOTE: with the VRD switch in the "On" position there is no output in the ARC GOUGING Mode. For indicator light operation, see table above.

Auxiliary Power

Start the engine and set the IDLER control switch to the desired operating mode. Full power is available regardless of the welding control settings providing no welding current is being drawn.

Simultaneous Welding and Auxiliary Power Loads

The auxiliary power ratings are with no welding load. Simultaneous welding and power leads are specified in the table below.

Welding Output (A)	Auxiliary Power Output (W)		Auxiliary Power Output (A@400V, 3-PHASE)	
	VANTAGE 400	VANTAGE 500	VANTA GE 400	VANTA GE500
0	13200	14500	19.0	21.0
100	10600	11100	15.3	17.5
200	7400	8900	10.7	12.8
300	3400	4900	4.9	7.1
350	1100	--	1.6	--
400	--	700	--	1.1
450	--	0	--	0
MAX	0	0	0	0

Vanatage Extension Cord Length Recommendations

(use the shortest length extension cord possible sized per the following table)

Current A	Voltage V	Load W	Maximum Allowable Cord Length in m for Conductor Size					
			14 AWG	12 AWG	10 AWG	8 AWG	6 AWG	4 AWG
15	120	1800	9	12	23	38	53	91
20	120	2400		9	15	27	42	69
15	240	3600	18	23	46	69	107	183
20	240	4800		18	30	53	84	137
44	240	9500			15	27	46	69

Conductor size is based on maximum 2.0% voltage drop.

Maintenance

⚠ WARNING

- Have qualified personnel do all maintenance and troubleshooting work.
- Turn the engine off before working inside the machine or servicing the engine.
- Remove guards only when necessary to perform maintenance and replace them when the maintenance requiring their removal is complete. If guards are missing from the machine, obtain replacements from a Lincoln Distributor. (See Operating Manual Parts List.)
- Read the Safety Precautions in the front of this manual and in the Engine Owner's Manual before

working on this machine.

- Keep all equipment safety guards, covers, and devices in position and in good repair. Keep hands, hair, clothing, and tools away from the gears, fans, and all other moving parts when starting, operating, or repairing the equipment.

Routine Maintenance

At the end of each day's use, refill the fuel tank to minimize moisture condensation in the tank. Running out of fuel tends to draw dirt into the fuel system. Also, check the crankcase oil level and add oil if indicated.

Engine service (NOTE 2)							
Every day or every 8 hours	First service 20 / 50 hours	Every 100h or 3 months	Every 250 h or 6 months	Every 500 h or 12 months	Every 1000h	Maintenance Items	Type or quantity
I						Coolant level	
			I			Concentration of antifreeze	50/50 Water/Ethylene Glycol
					R	Coolant (NOTE 3)	9.5qt., 9.0l
I						Engine Oil level (NOTE 1)	
	R			R		Engine Oil (NOTE 1&3)	8.45qt., 8l (refill amount)
	R			R		Engine Oil Filter	Perkins #140517050
C						Drain water separator & fuel strainer	
				R		Water separator element	Lincoln #M20840-A
				R		Fuel filter canister	Perkins #130366120
			I			Tension of alternator drive belt	
			I			Alternator drive belt wear	
					R	Alternator drive belt	Perkins #080109107
C						Air filter (earlier check may be req'd)	
				R		Air filter element	Donaldson #P821575
					R	Renew the engine breather	
					I	Tighten cylinder head	
					I	Valve clearances	Intake .008", exhaust .008"
					I	Electrical systems	
					I	All nuts and bolts for tightness	
				I		Injector performance	Contact Perkins
I						Leaks or engine damage	
				I		Battery	
					C	Clean turbocharger impeller casting and the turbocharger compressor casting	Only for VANTAGE® 500

Legenda:

I = Inspect

C = Clean

R = Replace

(NOTE 1): Consult Engine Operators Manual for oil recommendations.

(NOTE 2): Consult Engine Operators Manual for additional maintenance schedule information.

(NOTE 3): Fill slowly! Ensure correct quantity is used.

Above operations to be carried out by trained personnel with reference to the workshop manual where necessary. These preventative maintenance periods apply to average conditions of operation. If necessary use shorter periods.

Engine Oil Change



Drain the engine oil while the engine is warm to assure rapid and complete draining. It is recommended that each time the oil is changed the oil filter be changed as well.

- Be sure the unit is off. Disconnect the negative battery cable to ensure safety.
- Locate oil drain hose and valve in bottom of base and pull through the hole in the battery access panel on the welder.
- Open oil drain valve by lifting up spring loaded lever and rotate 90° counterclockwise. Pull to open and drain the oil into a suitable container for disposal.
- Close the drain valve by rotating lever 90° clockwise.
- Re-fill the crankcase to the upper limit mark on the dipstick with the recommended oil (see engine operation manual OR engine service items decal OR below). Replace and tighten the oil filler cap securely.
- Push oil drain hose and valve back into unit, reconnect negative battery cable, and close doors and engine top cover before restarting unit. Wash your hands with soap and water after handling used motor oil. Please dispose of used motor oil in a manner that is compatible with the environment. We suggest you take it in a sealed container to your local service station or recycling center for reclamation. DO NOT throw it in the trash; pour it on the ground or down a drain.

Use motor oil designed for diesel engines that meets requirements for API service classification CC/CD/CE/CF/CF-4/CG-4 or CH-4. ACEA E1/E2/E3. Always check the API service label on the oil container to be sure it includes the letters indicated. (**Note:** An S-grade oil must not be used in a diesel engine or damage may result. It IS permissible to use an oil that meets S and C grade service classifications.) SAE 10W30 is recommended for general, all temperature use, -15C to 40C (5F to 104F). See engine owner's manual for more specific information on oil viscosity recommendations.

Oil Filter Change

- Drain the oil
- Remove the oil filter with an oil filter wrench and drain the oil into a suitable container. Discard the used filter. **Note:** Care should be taken during filter removal to not disrupt or damage in any way the fuel lines.
- Clean the filter mounting base and coat the gasket of the new filter with clean engine oil.
- Screw the new filter on by hand until the gasket contacts the mounting base. Using an oil filter wrench, tighten the filter an additional 1/2 to 7/8 of a turn.
- Refill the crankcase with the specified amount of the recommended engine oil. Reinstall the oil filler cap and tighten securely.
- Start the engine and check for oil filter leaks.
- Stop the engine and check the oil level. If necessary, add oil to the upper limit mark on the dipstick.

⚠ WARNING

Never use gasoline or low flash point solvents for cleaning the air cleaner element. A fire or explosion could result.

⚠ WARNING

Never run the engine without the air cleaner. Rapid engine wear will result from contaminants, such as dust and dirt being drawn into the engine.

Air Cleaner

The diesel engine is equipped with a dry type air filter. Never apply oil to it. Service the air cleaner as follows:

- Replace the element at least every 500 hours of operation. Under dusty conditions, replace sooner.

Cooling System

⚠ WARNING

HOT COOLANT can burn skin.

- Do not remove cap if radiator is hot.



Check the coolant level by observing the level in the radiator and recovery bottle. Add 50/50 antifreeze/water solution if the level is close to or below the "LOW" mark. do not fill above the "FULL" mark. Remove radiator cap and add coolant to radiator. Fill up to the top of the tube in the radiator filler neck which includes a connecting hose coming from the thermostat housing.

To drain the coolant, open the valve at the bottom of the radiator. Open the radiator cap to allow complete drainage. (Tighten the valve and refill with a 50/50 antifreeze/water solution.) Use an automotive grade (low silicate) ethylene glycol antifreeze. The cooling system capacity is 7.6l. Squeeze upper and lower radiator hoses while filling to bleed air from system coolant. Replace and tighten the radiator cap.

⚠ WARNING

Always premix the antifreeze and clean tap water before adding to the radiator. It is very important that a precise 50/50 solution be used with this engine year round. This gives proper cooling during hot weather and freezing protection to -37° C.

Cooling solution exceeding 50% ethylene glycol can result in engine overheating and damage to the engine. Coolant solution must be premixed before adding to radiator.

Periodically remove the dirt from the radiator fins.

Periodically check the fan belt and radiator hoses. Replace if signs of deterioration are found.

Tightening the Fan Belt

If the fan belt is loose, the engine can overheat and the battery lose its charge. Check tightness by pressing on the belt midway between the pulleys. It should deflect about 6.4mm under a load of 9 Kg.

Fuel



DIESEL FUEL ONLY- low sulphur fuel or ultra low sulphur fuel in U.S.A. and Canada.

At the end of each day's use, refill the fuel tank to minimize moisture condensation and dirt contamination in the fuel line. Do not overfill; leave room for the fuel to expand.

Use only fresh, No. 2D DIESEL fuel, THE USE OF No. 1D diesel fuel is recommended in place of No. 2D at temperature below -5°C. Do not use kerosene.

See the Engine Operator's Manual for instructions on replacing the fuel filter.

Bleeding the Fuel System

You may need to bleed air from the fuel system if the fuel filter or fuel lines have been detached, the fuel tank has been ran empty or after periods of long storage. It is recommended that the fuel shutoff valve be closed during periods of non-use.

WARNING

To avoid personal injury, do not bleed a hot engine. This could cause fuel to spill onto a hot exhaust manifold, creating a danger of fire.

Bleed the fuel system as follows:

- Fill the fuel tank with fuel.
- Open the fuel shut off valver.
- Loosen bleed fitting on the fuel injector manifold.
- Operate hand priming lever until fuel comes out the bleed screw on the injector manifold. This could take 20-30 seconds of rapid operation of the priming lever. Tighten bleed fitting on injector manifold.
- Follow the normal STARTING procedures until engine starts.

Fuel Filter

- Check the fuel filter and fuel pre-filter for water accumulation or sediment.
- Replace the fuel filter if it is found with excessive water accumulation or sediment. Empty fuel pre-filter.

WARNING

OVERSPEED IS HAZARDOUS. The maximum allowable high idle speed for this machine is 1890 RPM, no load. Do NOT tamper with governor components or setting or make any other adjustments to increase the maximum speed. Severe personal injury and damage to the machine can result if operated at speeds above maximum.

Engine Adjustment

Adjustments to the engine are to be made only by a Lincoln Service Center or an authorized Field Service Shop.

Battery Maintenance

To access the battery, remove the battery tray from the front of the machine with 3/8" nut driver or flat head screw driver. Pull the tray out of machine far enough to disconnect the negative and then positive battery cables. The tray can then be tilted and lifted to remove the entire tray and battery from the machine for easy service.

WARNING

GASES FROM BATTERY can explode.

Keep sparks, flame and cigarettes away from battery.



To prevent EXPLOSION when:

- **INSTALLING A NEW BATTERY** – disconnect negative cable from old battery first and connect to new battery last.
- **CONNECTING A BATTERY CHARGER** - remove battery from welder by disconnecting negative cable first, then positive cable and battery clamp. When reinstalling, connect negative cable last. Keep well ventilated.
- **USING A BOOSTER** — connect positive lead to battery first then connect negative lead to negative battery lead at engine foot.
- **BATTERY ACID** can burn eyes and skin- wear gloves and eye protection and be careful when working near battery.
- Follow instructions printed on battery.



Cleaning the Battery

Keep the battery clean by wiping it with a damp cloth when dirty. If the terminals appear corroded, disconnect the battery cables and wash the terminals with an ammonia solution or a solution of 0.1113 kg of baking soda and 0.9461L of water. Be sure the battery vent plugs (if equipped) are tight so that none of the solution enters the cells.

After cleaning, flush the outside of the battery, the battery compartment, and surrounding areas with clear water. Coat the battery terminals lightly with petroleum jelly or a non-conductive grease to retard corrosion. Keep the battery clean and dry. Moisture accumulation on the battery can lead to more rapid discharge and early battery failure.

Checking the Electrolyte Level

If battery cells are low, fill them to the neck of the filler hole with distilled water and recharge. If one cell is low, check for leaks.

Charging the Battery

When you charge, jump, replace, or otherwise connect battery cables to the battery, be sure the polarity is correct. Improper polarity can damage the charging circuit. The VANTAGE positive (+) battery terminal has a red terminal cover.

If you need to charge the battery with an external charger, disconnect the negative cable first, then the positive cable before you attach the charger leads. After the battery is charged, reconnect the positive battery cable first and the negative cable last. Failure to do so can result in damage to the internal charger components. Follow the instructions of the battery charger manufacturer for proper charger settings and charging time.

Servicing Optional Spark Arrestor

Clean every 100 hours.

WARNING

MUFFLER MAY BE HOT.

Allow engine to cool before installing the spark arrester!
Do not operate engine while installing the spark arrester!

Welder / Generator Maintenance

Storage: Store in clean, dry protected areas.

Cleaning: Blow out the generator and controls periodically with low pressure air. Do this at least once a week in particularly dirty areas.

Brush Removal and Replacement: It's normal for the brushes and slip rings to wear and darken slightly. Inspect the brushes when a generator overhaul is necessary.

WARNING

Do not attempt to polish slip rings while the engine is running.

WARNING

Service and Repair should only be performed by Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions.

Diagrams

Engine Welders/LN-25 across the Arc Connection Diagram with Optional K857 Remote Control

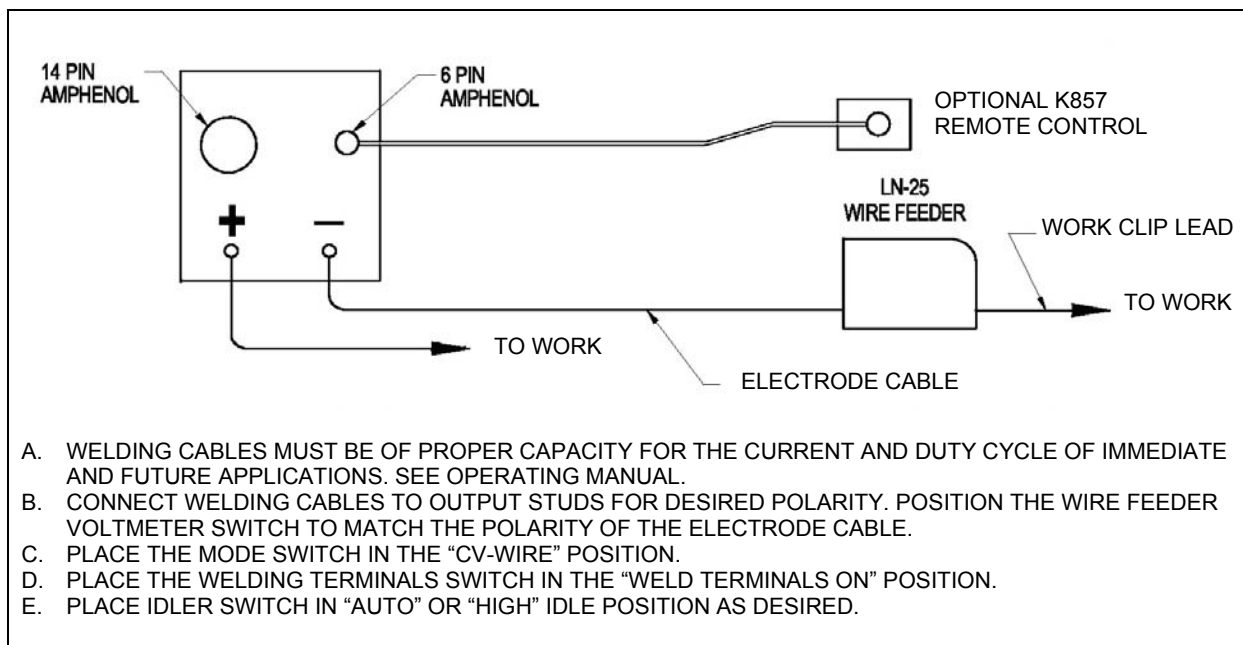
⚠ WARNING

Do not operate with panels open.
Disconnect NEGATIVE (-) Battery lead before servicing.
Do not touch electrically live parts.



⚠ WARNING

Keep guards in place
Keep away from moving parts.
Only qualified personnel should install, use or service this equipment



S24787-1

Engine Welders/LN-25 across the Arc Connection Diagram with Optional K444-1 Remote Control

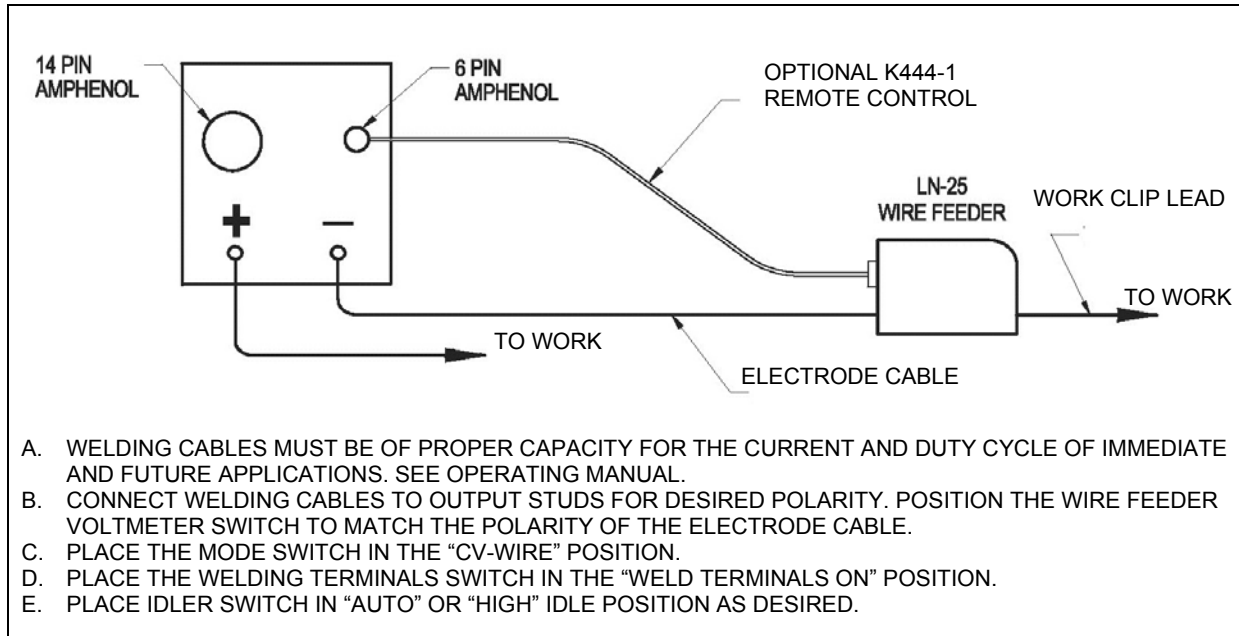
WARNING

Do not operate with panels open.
Disconnect NEGATIVE (-) Battery lead before servicing.
Do not touch electrically live parts.



WARNING

Keep guards in place
Keep away from moving parts.
Only qualified personnel should install, use or service this equipment



S24787-2

Engine Welders/LN-25 with K624-1 42V Remote Output Control Module Connection Diagram



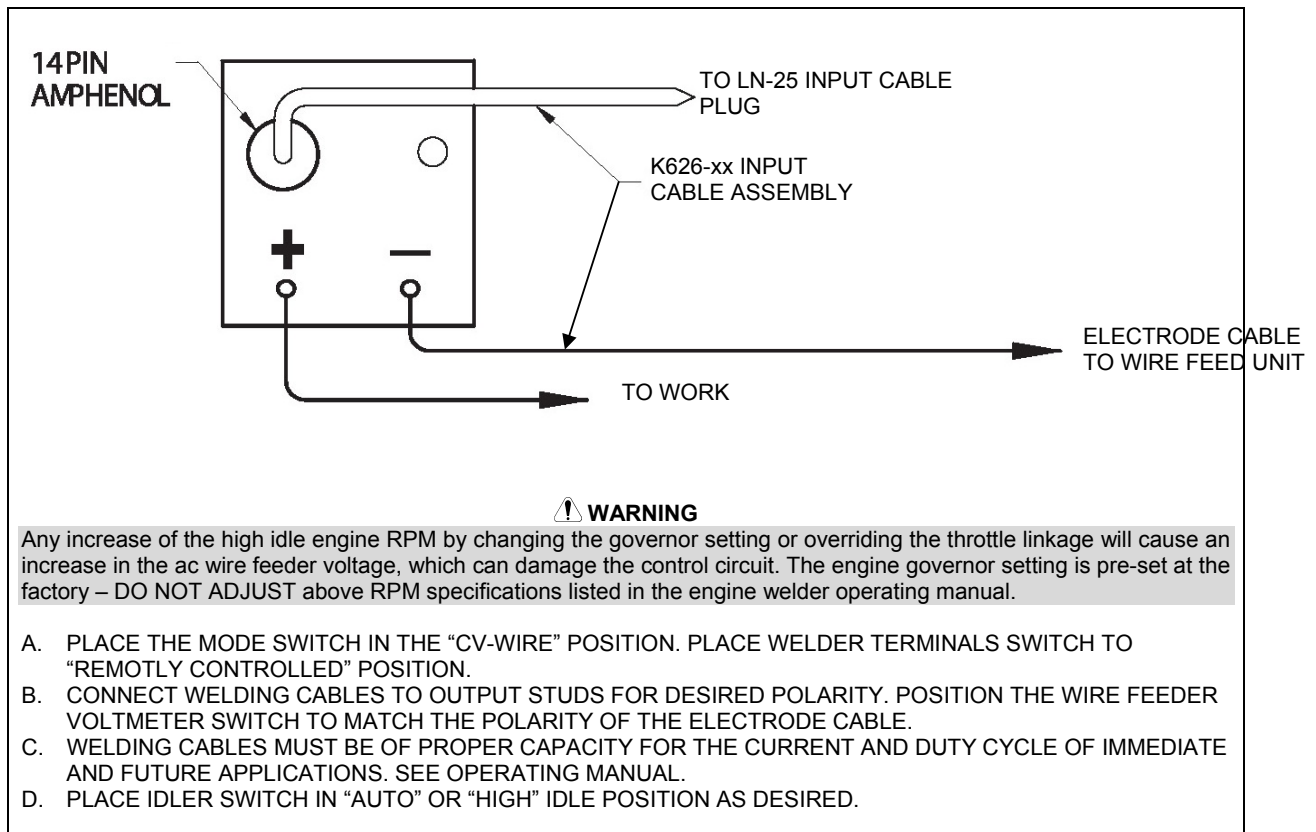
WARNING

Do not operate with panels open.
Disconnect NEGATIVE (-) Battery lead before servicing.
Do not touch electrically live parts.



WARNING

Keep guards in place
Keep away from moving parts.
Only qualified personnel should install, use or service this equipment



S24787-3

Engine Welders/LN-742 Connection Diagram

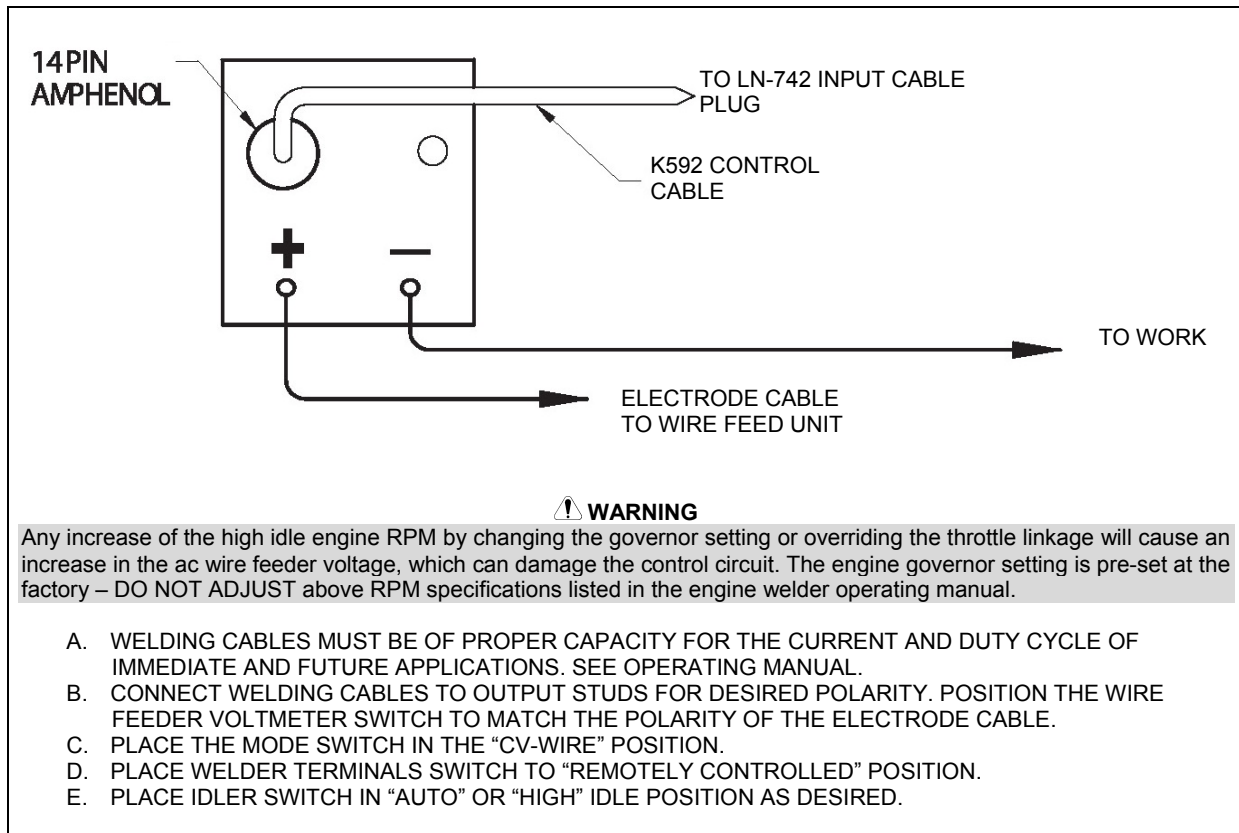
⚠ WARNING

Do not operate with panels open.
Disconnect NEGATIVE (-) Battery lead before servicing.
Do not touch electrically live parts.



⚠ WARNING


Keep guards in place
Keep away from moving parts.
Only qualified personnel should install, use or service this equipment



S24787-5

WEEE

07/06



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

Electrical Schematic

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

Suggested Accessories

K903-1	VANTAGE® 400&500 CE	Spark Arrestor: Includes a heavy gage steel, approved spark arrestor, clamp and adapter for mounting to the muffler exhaust pipe.
K704	VANTAGE® 400&500 CE	Accessory Set: Includes 35 ft. (10m) of electrode cable and 30 ft. (9.1m) of work cable, headshield, work clamp electrode holder. Cables are rated at 400 amps, 100% duty cycle.
K857: 25 ft (7.6m) or K857-1: 100 ft. (30.4m)	VANTAGE® 400&500 CE	Remote Control: Portable control provides same dial range as the output control on the welder. Has a convenient 6 pin plug for easy connection to the welder.
K1858-1	VANTAGE® 400&500 CE	Service Indicator Kit: Provides a GO / NO-GO visual indication of air cleaner element useful service life. Filter service based on restriction readings allows the longest life possible from the filter and best engine protection.
K2641-2	VANTAGE® 400&500 CE	Trailer: A 4-wheel steerable trailer for in-plant and yard towing. Comes standard with a Duo-Hitch™, a 2" Ball and Lunette Eye combination hitch
K2642-1	VANTAGE® 400	Polarity/Multi-Process Switch: For easy polarity switching. Example: DC- stick root pass on pipe and DC+ stick for hot, fill and cap passes. Also for an easy process change. Example DC+ stick root pass on pipe and DC innershield self shielded flux core wire for hot, fill and gap passes. 6 and 14 pin remote connections can be made to this unit. For all Lincoln Chopper technology engine-drive welders Mounts on roof with Docking Kit.
K2663-1	VANTAGE® 400	Docking Kit: Secures Polarity/Multi-Process Switch, mounts on the roof of all Lincoln Chopper technology engine-drives.
K2627-2	VANTAGE® 400	Remote Output Control with 120V AC Receptacle: Remote Output Control box with two 120V AC receptacles having GFCI (Ground Fault Circuit Interrupter) protection.

WIRE FEEDER OPTIONS		
K2613-1	VANTAGE® 400	LN-25 Pro Portable Wire Feeder: The MAXTRAC® wire drive enhances performance, while the replacement case, and many other upgrade options that can be installed in less than five minutes aid in the serviceability.
KP1697-5/64	VANTAGE® 400	Drive Roll Kit Includes: 2 polished U groove drive rolls, outer wire guide and inner wire guide for solid core wire. (Used on LN-25 Pro)
KP1697-068	VANTAGE® 400	Drive Roll Kit: Includes: 2 polished U groove drive rolls, outer wire guide and inner wire guide for solid core wire. (Used on LN-25 Pro)
KP1696-1	VANTAGE® 400	Drive Roll Kit: Includes: 2 V groove drive rolls and inner wire guide for Steel Wires. (Used on LN-25 Pro)
K449	VANTAGE® 400&500 CE	LN-25: Includes internal contactor for across the arc operation (no control cable). Provides “cold” electrode until gun trigger is pressed. Includes gas solenoid. For spools up to 20Kg.
K1870-1	VANTAGE® 400&500 CE	LN-15 Across the Arc Wire Feeder: Portable, lightweight, compact CC/CV unit for flux-cored and MIG welding. Includes Gas Solenoid, adjustable flow meter and internal contactor. For 4.5-6.8kg spools.
Magnum Gun and Magnum Gun Connector Kit are required for gas-shielded welding. Innershield Gun is required for gasless welding		
K126-2	VANTAGE® 400&500 CE	Magnum 350 Innershield Gun
K1802-1	VANTAGE® 400&500 CE	Magnum 300 MIG Gun (for LN-25)
K470-2	VANTAGE® 400&500 CE	Magnum 300 MIG Gun (for LN-15, Includes Connector Kit).
K466-10	VANTAGE® 400&500 CE	Connector Kit (for LN-15, K470-2)
K1500-1	VANTAGE® 400&500 CE	Gun Receiver Bushing (for LN-15 and K126-2).
Note: see Wire Feeder IM manuals for appropriate Drive Roll and Guide Tubes.		
TIG OPTIONS		
K1783-9	VANTAGE® 400&500 CE	Pro -Torch® PTA-26V TIG Torch: Air Cooled 200 amp torch (2 piece) equipped with valve for gas flow control. 7.6m length.
KP509	VANTAGE® 400&500 CE	Magnum Parts Kit for PTA-26V TIG Torch: Magnum Parts Kit provides all the torch accessories you need to start welding. Parts kit provides collets, collet bodies, a black cap, alumina nozzles and tungstens in a variety of sizes, all packaged in an easy to carry reclosable sack
K870	VANTAGE® 400&500 CE	Foot Amptrol®
K963-3	VANTAGE® 400&500 CE	Hand Amptrol®
K2535-1	VANTAGE® 400	Precision TIG 225 Ready-Pak(For AC TIG)
K2350-2	VANTAGE® 400	Invertec® V205-T AC/DC One-Pak™ Package (For AC TIG)
K2347-1	VANTAGE® 500	Precision TIG 185 Ready-Pak(For AC TIG)
K2350-1	VANTAGE® 500	Invertec® V205-T AC/DC One-Pak™ Package (For AC TIG)
PLASMA CUTTING		
K1601-1	VANTAGE® 400&500 CE	Pro-Cut 55: Cuts metal using the 3-phase AC gen-erator power from the engine driven welder. Accepts 3-phase power.

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 for any updated information.