

LINC 405

OPERATOR'S MANUAL

MANUALE OPERATIVO

BEDIENUNGSANLEITUNG

MANUAL DE INSTRUCCIONES

MANUEL D'UTILISATION

BRUKSANVISNING OG DELELISTE

GEBRUIKSAANWIJZING

BRUKSANVISNING

INSTRUKCJA OBSŁUGI

KÄYTTÖOHJE



LINCOLN®
ELECTRIC

LINCOLN ELECTRIC BESTER S.A.
ul. Jana III Sobieskiego 19A, 58-260 Bielawa, Poland
www.lincolnelectriceurope.com

Declaration of conformity
Dichiarazione di conformità
Konformitätserklärung
Declaración de conformidad
Déclaration de conformité
Samsvars erklæring
Verklaring van overeenstemming

Försäkran om överensstämmelse
Deklaracja zgodności
Vakuutus yhteensopivuudesta

LINCOLN ELECTRIC BESTER S.A.



Declares that the welding machine:
Dichiara che il generatore per saldatura tipo:
Erklärt, daß die Bauart der Maschine:
Declara que el equipo de soldadura:
Déclare que le poste de soudage:
Bekrefter at denne sveisemaskin:
Verklaart dat de volgende lasmachine:

Försäkrar att svetsomriktaren:
Deklaruje, że spawalnicze źródło energii:
Vakuuttaa, että hitsauskone:

LINC 405-S, LINC 405-SA

conforms to the following directives:
è conforme alle seguenti direttive:
den folgenden Bestimmungen entspricht:
es conforme con las siguientes directivas:
est conforme aux directives suivantes:
er i samsvar med følgende direktiver:
overeenkomt conform de volgende richtlijnen:

överensstämmer med följande direktiv:
spełnia następujące wytyczne:
täyttää seuraavat direktiivit:

73/23/CEE, 89/336/CEE

and has been designed in compliance with the following standards:
ed è stato progettato in conformità alle seguenti norme:
und in Übereinstimmung mit den nachstehenden normen hergestellt wurde:
y ha sido diseñado de acuerdo con las siguientes normas:
et qu'il a été conçu en conformité avec les normes:
og er produsert og testet iht. følgende standarder:

en is ontworpen conform de volgende normen:
och att den konstruerats i överensstämmelse med följande standarder:
i że zostało zaprojektowane zgodnie z wymaganiami następujących norm:
ja on suunniteltu seuraavien standardien mukaan:

EN 60974-1, EN 60974-10

(2003)

Tomasz Domagalski
Operations Director

LINCOLN ELECTRIC BESTER S.A., ul. Jana III Sobieskiego 19A, 58-260 Bielawa, Poland

<p>THANKS! For having chosen the QUALITY of the Lincoln Electric products.</p> <ul style="list-style-type: none"> • 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.
<p>GRAZIE! Per aver scelto la QUALITÀ dei prodotti Lincoln Electric.</p> <ul style="list-style-type: none"> • Esamini Imballo ed Equipaggiamento per rilevare eventuali danneggiamenti. Le richieste per materiali danneggiati dal trasporto devono essere immediatamente notificate al rivenditore. • Per ogni futuro riferimento, compilare la tabella sottostante con le informazioni di identificazione equipaggiamento. Modello, Codice (Code) e Matricola (Serial Number) sono reperibili sulla targa dati della macchina.
<p>VIELEN DANK! Dass Sie sich für ein QUALITÄTSPRODUKT von Lincoln Electric entschieden haben.</p> <ul style="list-style-type: none"> • Bitte überprüfen Sie die Verpackung und den Inhalt auf Beschädigungen. Transportschäden müssen sofort dem Händler gemeldet werden. • Damit Sie Ihre Gerätedaten im Bedarfsfall schnell zur Hand haben, tragen Sie diese in die untenstehende Tabelle ein. Typenbezeichnung, Code- und Seriennummer finden Sie auf dem Typenschild Ihres Gerätes.
<p>GRACIAS! Por haber escogido los productos de CALIDAD Lincoln Electric.</p> <ul style="list-style-type: none"> • Por favor, examine que el embalaje y el equipo no tengan daños. La reclamación del material dañado en el transporte debe ser notificada inmediatamente al proveedor. • Para un futuro, a continuación encontrará la información que identifica a su equipo. Modelo, Code y Número de Serie los cuales pueden ser localizados en la placa de características de su equipo.
<p>MERCI! Pour avoir choisi la QUALITÉ Lincoln Electric.</p> <ul style="list-style-type: none"> • Vérifiez que ni l'équipement ni son emballage ne sont endommagés. Toute réclamation pour matériel endommagé doit être immédiatement notifiée à votre revendeur. • Notez ci-dessous toutes les informations nécessaires à l'identification de votre équipement. Le nom du Modèle ainsi que les numéros de Code et Série figurent sur la plaque signalétique de la machine.
<p>TAKK! For at du har valgt et KVALITETSPRODUKT fra Lincoln Electric.</p> <ul style="list-style-type: none"> • Kontroller emballsjen og produktet for feil eller skader. Eventuelle feil eller transportskader må umiddelbart rapporteres dit du har kjøpt din maskin. • For fremtidig referanse og for garantier og service, fyll ut den tekniske informasjonen nedenfor i dette avsnittet. Modell navn, Kode & Serie nummer finner du på den tekniske platen på maskinen.
<p>BEDANKT! Dat u gekozen heeft voor de KWALITEITSPRODUCTEN van Lincoln Electric.</p> <ul style="list-style-type: none"> • Controleert u de verpakking en apparatuur op beschadiging. Claims over transportschade moeten direct aan de dealer of aan Lincoln electric gemeld worden. • Voor referentie in de toekomst is het verstandig hieronder u machinegegevens over te nemen. Model Naam, Code & Serienummer staan op het typeplaatje van de machine.
<p>TACK! För att ni har valt en KVALITETSPRODUKT från Lincoln Electric.</p> <ul style="list-style-type: none"> • Vänligen kontrollera förpackning och utrustning m.a.p. skador. Transportskador måste omedelbart anmälas till återförsäljaren eller transportören. • Notera informationen om er utrustnings identitet i tabellen nedan. Modellbeteckning, code- och serienummer hittar ni på maskinens märkplåt.
<p>DZIĘKUJEMY! Za docenienie JASKOŚCI produktów Lincoln Electric.</p> <ul style="list-style-type: none"> • Proszę sprawdzić czy opakownie i sprzęt nie są uszkodzone. Reklamacje uszkodzeń powstałych podczas transportu muszą być natychmiast zgłoszone do dostawcy (dystrybutora). • Dla ułatwienia prosimy o zapisanie na tej stronie danych identyfikacyjnych wyrobów. Nazwa modelu, Kod i Numer Seryjny, które możecie Państwo znaleźć na tabliczce znamionowej wyrobu.
<p>KIITOS! Kiitos, että olet valinnut Lincoln Electric LAATU tuotteita.</p> <ul style="list-style-type: none"> • Tarkista pakkaus ja tuotteet vaurioiden varalta. Vaateet mahdollisista kuljetusvaurioista on ilmoitettava välittömästi jälleenmyyjälle. • Tulevaisuutta varten täytä alla oleva lomake laitteen tunnistusta varten. Mallin, Koodin ja Sarjanumeron voit löytää konekilvestä.

<p>Model Name, Modello, Typenbezeichnung, Modelo, Nom du modèle, Modell navn, Model Naam, Modellbeteckning, Nazwa modelu, Mallinimi:</p> <p>.....</p>
<p>Code & Serial number, Code (codice) e Matricola, Code- und Seriennummer, Code y Número de Serie, Numéros de Code et Série, Kode & Serie nummer, Code en Serienummer, Code- och Serienummer, Kod i numer Seryjny, Koodi ja Sarjanumero:</p> <p>.....</p>
<p>Date & Where Purchased, Data e Luogo d'acquisto, Kaufdatum und Händler, Fecha y Nombre del Proveedor, Lieu et Date d'acquisition, Kjøps dato og Sted, Datum en Plaats eerste aankoop, Inköpsdatum och Inköpsställe, Data i Miejsce zakupu, Päiväys ja Ostopaikka:</p> <p>.....</p>



WARNING

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

	<p>WARNING: This symbol indicates that instructions must be followed to avoid serious personal injury, loss of life, or damage to this equipment. Protect yourself and others from possible serious injury or death.</p>
	<p>READ AND UNDERSTAND INSTRUCTIONS: Read and understand this manual before operating this equipment. Arc welding can be hazardous. Failure to follow the instructions in this manual could cause serious personal injury, loss of life, or damage to this equipment.</p>
	<p>ELECTRIC SHOCK CAN KILL: Welding equipment generates high voltages. Do not touch the electrode, work clamp, or connected work pieces when this equipment is on. Insulate yourself from the electrode, work clamp, and connected work pieces.</p>
	<p>ELECTRICALLY POWERED EQUIPMENT: Turn off input power using the disconnect switch at the fuse box before working on this equipment. Ground this equipment in accordance with local electrical regulations.</p>
	<p>ELECTRICALLY POWERED EQUIPMENT: Regularly inspect the input, electrode, and work clamp cables. If any insulation damage exists replace the cable immediately. Do not place the electrode holder directly on the welding table or any other surface in contact with the work clamp to avoid the risk of accidental arc ignition.</p>
	<p>ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS: Electric current flowing through any conductor creates electric and magnetic fields (EMF). EMF fields may interfere with some pacemakers, and welders having a pacemaker shall consult their physician before operating this equipment.</p>
	<p>CE COMPLIANCE: This equipment complies with the European Community Directives.</p>
	<p>FUMES AND GASES CAN BE DANGEROUS: Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. To avoid these dangers the operator must use enough ventilation or exhaust to keep fumes and gases away from the breathing zone.</p>
	<p>ARC RAYS CAN BURN: Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing. Use suitable clothing made from durable flame-resistant material to protect you skin and that of your helpers. Protect other nearby personnel with suitable, non-flammable screening and warn them not to watch the arc nor expose themselves to the arc.</p>
	<p>WELDING SPARKS CAN CAUSE FIRE OR EXPLOSION: Remove fire hazards from the welding area and have a fire extinguisher readily available. Welding sparks and hot materials from the welding process can easily go through small cracks and openings to adjacent areas. Do not weld on any tanks, drums, containers, or material until the proper steps have been taken to insure that no flammable or toxic vapors will be present. Never operate this equipment when flammable gases, vapors or liquid combustibles are present.</p>
	<p>WELDED MATERIALS CAN BURN: Welding generates a large amount of heat. Hot surfaces and materials in work area can cause serious burns. Use gloves and pliers when touching or moving materials in the work area.</p>
	<p>SAFETY MARK: This equipment is suitable for supplying power for welding operations carried out in an environment with increased hazard of electric shock.</p>

Installation and Operator Instructions

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

Location and Environment

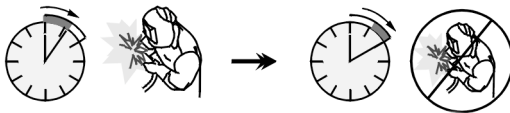
This machine will operate in harsh environments. However, it is important that simple preventative measures are followed to assure long life and reliable operation.

- Do not place or operate this machine on a surface with an incline greater than 15° from horizontal.
- Do not use this machine for pipe thawing.
- This machine must be located where there is free circulation of clean air without restrictions for air movement to and from the air vents. Do not cover the machine with paper, cloth or rags when switched on.
- Dirt and dust that can be drawn into the machine should be kept to a minimum.
- This machine has a protection rating of IP23. Keep it dry when possible and do not place it on wet ground or in puddles.
- Locate the machine away from radio controlled machinery. Normal operation may adversely affect the operation of nearby radio controlled machinery, which may result in injury or equipment damage. Read the section on electromagnetic compatibility in this manual.
- Do not operate in areas with an ambient temperature greater than 40°C.

Duty cycle and Overheating

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

60% duty cycle:

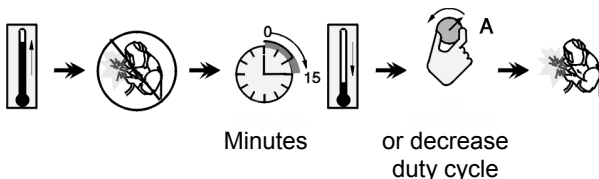


Welding for 6 minutes.

Break for 4 minutes.

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

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



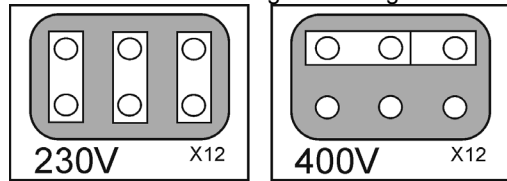
Input Supply Connection

Installation and mains outlet socket shall be made and protected according to appropriate rules.

Check the input voltage, phase, and frequency supplied to this machine before turning it on. Verify the connection of grounding wires from the machine to the input source. The allowable input voltages are 3x230V and 3x400V 50Hz (400V: factory default). For more information about input supply refer to the technical specification section of this manual and to the rating plate of the machine.

If it is necessary to change the main supply voltage:

- Ensure that the input cable must be disconnected from the main supply and the machine switched OFF.
- Remove the top panel from the machine.
- Reconnect X12 according to the diagram below.



- Replace the top panel.

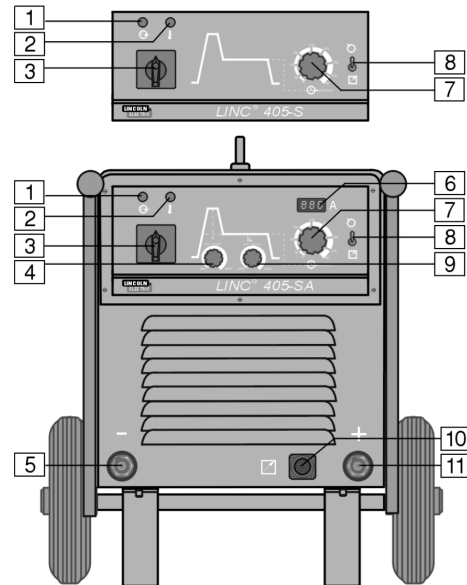
Make sure the amount of power available from the input connection is adequate for normal operation of the machine. The necessary delayed fuse (or circuit breaker with "D" characteristic) and cable sizes are indicated in the technical specification section of this manual.

Refer to points 1, 3, 12 and 13 of the images below.

Output Connections

Refer to points 5, 10 and 11 of the images below.

Controls and Operational Features



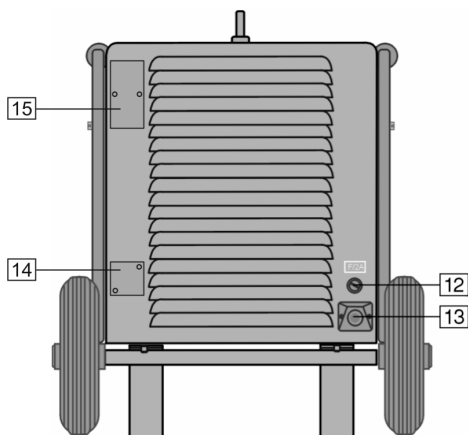
1. **Power Indicator:** After input power is connected and the power switch is turned on, this lamp will light up to indicate the machine is ready to weld.
2. **Thermal Overload Indicator:** This lamp will light up when the machine is overheated and the output has

been turned off. This can occur if the ambient temperature is above 40°C or the duty cycle of the machine has been exceeded. Leave the machine on to allow the internal components to cool, when the lamp turns off normal operation is possible.

- **Thermostatic fan:** the fan is additionally controlled by the thermal protection circuit. This feature saves energy and also minimizes the amount of dirt and other air borne particles being drawn into the machine.

The fan is operating only while cooling is needed.

3. **Power on/off Switch:** Controls the input power to the machine.
4. **Hot Start Control (LINC 405-SA only):** Hot Start is a temporary increase in the output current during the start of stick (MMA) welding that helps ignite the arc quickly and reliably. The potentiometer is used to set the level of the increased current.
5. **Negative Quick Disconnect:** Negative output connector for the welding circuit.
6. **Digital Welding Current Meter with memory feature (LINC 405-SA only):** Shows present the value of the welding current during welding; after welding it continues to display the average welding current.
7. **Output Current Control:** Potentiometer used to set the output current (also during welding), from 15A to 400A.
8. **Local/Remote Switch:** Remote Control Unit K10095-1-15M and K870 can be used with this machine. It changes control of the Output Current from the machine Output Control (point 7) to the K10095-1-15M or K870 and vice versa.
9. **Arc Force Control (LINC 405-SA only):** It is a function used during stick (MMA) welding in which the output current is temporarily increased to clear short circuit connections between the electrode and the weld puddle that occur during normal welding.
10. **Remote Control Connection:** If a remote control is used, it will be connected to the remote connector.
11. **Positive Quick Disconnect:** Positive output connector for the welding circuit.



12. **Fuse:** This fuse protects the Fan Circuit.
13. **Power Input Socket:** Connect the supply plug to the existing input cable, that is rated for the machine as indicated in this manual, and conforms to all applicable standards. This connection shall be performed only by a qualified person.
14. **Hole covered:** For 48Vac socket K14027-1.
15. **Hole covered:** For circuit breaker which protects the 48Vac socket K14027-1.

Stick Welding (MMA)

For starting welding process with MMA method you should:

- Insert welding cable plugs into output sockets and twist to lock them in place.
- Connect the work cable to the welding piece with the work clamp.
- Fasten a correct coated electrode into the electrode holder.
- Connect the main plug to the outlet mains socket.
- Set the Local/Remote Switch in required position: local or remote.
- Turn the Power on/off Switch on.
- Set required welding current by knob of the Output Current Control.
- Obeying appropriate rules you can begin to weld.

Maintenance

⚠ WARNING

For any maintenance or repair operations it is recommended to contact the nearest technical service center or Lincoln Electric. Maintenance or repairs performed by unauthorized service centers or personnel will null and void the manufacturers warranty.

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

Any noticeable damage should be reported immediately.

Routine maintenance (everyday)

- Check cables and connections integrity. Replace, if necessary.
- Check condition and operation of the cooling fan. Keep clean its airflow slots.

Periodic maintenance (every 200 working hours but not more rarely than once a year)

Perform the routine maintenance and, in addition:

- Keep clean the machine. Using a dry (and low pressure) airflow, remove the dust from the external case and from inside of the cabinet.
- Check and tighten all screws.

⚠ WARNING

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

Electromagnetic Compatibility (EMC)

11/04

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



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

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

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

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

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

Technical Specifications

INPUT			
Input Voltage 230 / 400V ± 10% Three Phase	Input Power at Rated Output 34 kVA @ 35% Duty Cycle	Frequency 50 Hertz (Hz)	
RATED OUTPUT AT 40°C			
Duty Cycle (Based on a 10 min. period)	Output Current	Output Voltage	
35%	400A	36.0 Vdc	
60%	315A	33.0 Vdc	
100%	240A	29.0 Vdc	
OUTPUT RANGE			
Welding Current Range 15 – 400 Amps		Maximum Open Circuit Voltage 78 Vdc	
RECOMMENDED INPUT CABLE AND FUSE SIZES			
Fuse or Circuit Breaker Size 63A Superlag (230V input) 40A Superlag (400V input)		Input Power Cable 4 Conductor, 6 mm ²	
PHYSICAL DIMENSIONS			
Height 640 mm	Width 580 mm	Length 1150 mm (700 mm without handles)	Weight 126 Kg
Operating Temperature -10°C to +40°C		Storage Temperature -25°C to +55°C	