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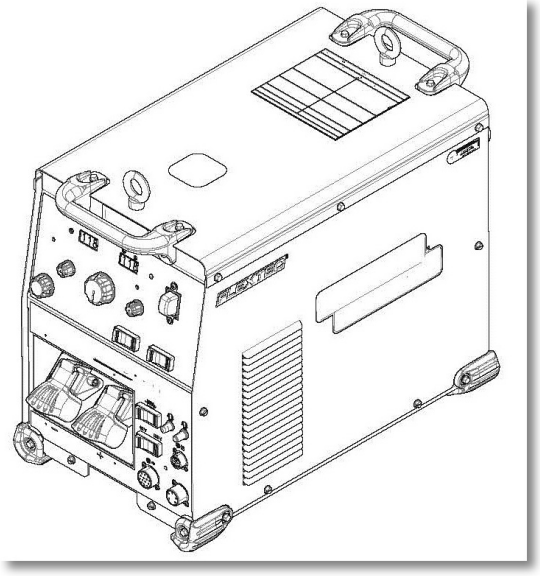
FLEXTEC® 650x CE

OPERATOR'S MANUAL



ENGLISH

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

THE LINCOLN ELECTRIC COMPANY
EC DECLARATION OF CONFORMITY

Manufacturer and technical documentation holder:	The Lincoln Electric Company 22801 St. Clair Ave. Cleveland Ohio 44117-1199 USA
EC Company:	Lincoln Electric Europe S.L. c/o Balmes, 89 - 8^0 2^a 08008 Barcelona SPAIN
Hereby declare that welding equipment:	Flextec 650 plus CE filter
Product numbers:	1. K3278-x or 2. K3060-x plus K3129-x or 3. K3425-x plus K3129-x or 4. K3533-x or 5. K3515-x (Product numbers may contain suffixes and prefixes.)
Is in conformity with Council Directives and amendments:	Electromagnetic Compatibility (EMC) Directive 2014/30/EU; Low Voltage Directive (LVD) 2014/35/EU;
Standards:	EN 60974-1:2012, Arc Welding Equipment – Part 1: Welding Power Sources; EN 60974-10:2014 Arc Welding Equipment – Part 10: Electromagnetic compatibility (EMC) requirements;

CE marking affixed in '09

Samir Farah, Manufacturer

Compliance Engineering Manager

1 June 2017

Jacek Stefaniak, European Community Representative

European Product Manager Equipment

12 Jun 2017

MCD390c

12/05

THANKS! For having chosen the QUALITY of the Lincoln Electric products.

- Please Examine Package and Equipment for Damage. Claims for material damaged in shipment must be notified immediately to the dealer.
  - For future reference record in the table below your equipment identification information. Model Name, Code & Serial Number can be found on the machine rating plate.

Model Name:	
.....	
Code & Serial number:	
.....	.....
Date & Where Purchased:	
.....	.....

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Technical specifications

FLEXTEC® 650x CE

POWER SOURCE – INPUT VOLTAGE AND CURRENT					
Model	**Duty Cycle**	**Input Voltage ±10%**	**Input Amperes**	**Idle Power (W)**	**Power Factor@ Rated Input**
K3425-1	60% rating	380/460/575/3/50/60	61/50/40	230 MAX (Fan On)	88%
	100% rating		57/47/38	100 MAX. (Fan Off)	

RATED OUTPUT			
Process	**Duty Cycle**	**Amperes**	**Volts at Rated Amperes**
GMAW (CV)	60%	750 *	44V
	100%	650 *	
GTAW (CC)	60%	750	34V
	100%	650	
SMAW (CC)	60%	750 *	44V
	100%	650 *	
FCAW-GS (CV)	60%	750 *	
	100%	650 *	
FCAW-S (CV)	60%	750 *	
	100%	650 *	
SAW (CV)	60%	750 *	
	100%	650 *	

*** Output is limited to 600A/100% and 700A/60% when used with K3091-1 Multi-Process Swith.**

RECOMMENDED INPUT WIRE AND FUSES SIZES[1]					
VOLTAGE 50/60Hz	**Maximum Input Amperes**	**Cord Size [3] AWG SIZES (mm)**	**Type 75°C Copper Wire in Conduit AWG (mm^2)**	**COPPER GROUNDING CONDUCTOR AWG (mm^2)**	**Fuse (Super Lag)or Breaker Sizes[2]**
380/3/50	70A	4 (21)	4 (21)	8 (8)	90
460/3/60	58A	4 (21)	6 (13)	8 (8)	80
575/3/60	46A	6 (13)	8 (8)	10 (5)	60

[1] Cord and Fuse Sizes based upon the U.S. National Electric Code and maximum output for 40°C (104°) ambient.
[2] Also called “inverse time” or “thermal/magnetic” circuit breakers; circuit breakers that have a delay in tripping action that decreases as the magnitude of current increases.
[3] Type SJ cord or similar in 30°C ambient

WELDING PROCESS			
Process	**Output Range (A)**	**OCV (U_0)**	**OCV (U_r)**
GMAW (CV)	40-815	60	--
GTAW (CC)	10-815	24	15
SMAW (CC)	15-815	60	15
FCAW-GS (CV)	40-815	60	--
FCAW-SS (CV)	40-815	60	--
SAW (CV)	40-815	60	--

PHYSICAL DIMENSIONS				
Model	**Height**	**Width**	**Depth**	**Weight**
K3425-1	554 mm	410mm	754mm	74.8kg*

TEMPERATURE RANGES	
Operating Temperature Range**	**Storage Temperature Range**
Environmentally Hardened: 14°F to 131°F (-10°C to 55°C**)	Environmentally Hardened: -40°F to 185°F (-40°C to 85°C)

IP23 180º(H) Insulation Class
*Weight does not include input cord.
**Power Source is derated at Temperatures above 40°C.

AUXILIARY RECONNECT INPUT RANGES		
"A" LED POSDITION	**VRD Enabled**	**VRD Disabled**
380 Volt Reconnect	Low Limit - 340 Vac High Limit - 420 Vac	Low Limit - 340 Vac High Limit - 455 Vac
460 Volt Reconnect	Low Limit - 390 Vac High Limit - 505 Vac	Low Limit - 390 Vac High Limit - 520 Vac
575 Volt Reconnect	Low Limit - 485 Vac High Limit - 620 Vac	Low Limit - 485 Vac High Limit - 655 Vac

Electromagnetic Compatibility (EMC)

01/11

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

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

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

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

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

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

WARNING

EMC classification of this product is class A in accordance with electromagnetic compatibility standard EN 60974-10 and therefore the product is designed to be used in an industrial environment only.

WARNING

The Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There can be potential difficulties in ensuring electromagnetic compatibility in those locations, due to conducted as well as radio-frequency disturbances.

WARNING

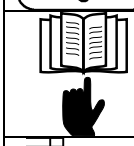
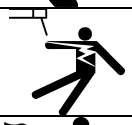
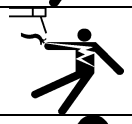
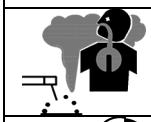
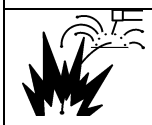
For Flextec® 650x CE input filter kit K3129-1 must be installed. Instructions how to install the CE filter kit are provided with the kit.

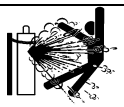
Safety

11/04

WARNING

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

	WARNING: This symbol indicates that instructions must be followed to avoid serious personal injury, loss of life, or damage to this equipment. Protect yourself and others from possible serious injury or death.
	READ AND UNDERSTAND INSTRUCTIONS: Read and understand this manual before operating this equipment. Arc welding can be hazardous. Failure to follow the instructions in this manual could cause serious personal injury, loss of life, or damage to this equipment.
	ELECTRIC SHOCK CAN KILL: Welding equipment generates high voltages. Do not touch the electrode, work clamp, or connected work pieces when this equipment is on. Insulate yourself from the electrode, work clamp, and connected work pieces.
	ELECTRICALLY POWERED EQUIPMENT: Turn off input power using the disconnect switch at the fuse box before working on this equipment. Ground this equipment in accordance with local electrical regulations.
	ELECTRICALLY POWERED EQUIPMENT: Regularly inspect the input, electrode, and work clamp cables. If any insulation damage exists replace the cable immediately. Do not place the electrode holder directly on the welding table or any other surface in contact with the work clamp to avoid the risk of accidental arc ignition.
	ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS: Electric current flowing through any conductor creates electric and magnetic fields (EMF). EMF fields may interfere with some pacemakers, and welders having a pacemaker shall consult their physician before operating this equipment.
	CE COMPLIANCE: This equipment complies with the European Community Directives.
	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.
	SAFETY MARK: This equipment is suitable for supplying power for welding operations carried out in an environment with increased hazard of electric shock.

	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.
	MOVING PARTS ARE DANGEROUS: There are moving mechanical parts in this machine, which can cause serious injury. Keep your hands, body and clothing away from those parts during machine starting, operating and servicing.
	EQUIPMENT WEIGHT OVER 30kg: Move this equipment with care and with the help of another person. Lifting may be dangerous for your physical health.

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

Installation

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

Select Suitable Location

Location and Ventilation for Cooling

Place the welder where clean cooling air can freely circulate in through the rear louvers and out through the case sides. Dirt, dust, or any foreign material that can be drawn into the welder should be kept at a minimum. Failure to observe these precautions can result in excessive operating temperatures and nuisance shutdowns.

Lifting

The FLEXTEC® 650x CE has 2 lifting eyelets and 2 handles that can be used to lift the machine. Both handles or both eyelets should be used when lifting the FLEXTEC® 650x CE.

When using a crane or overhead device to lift using the handles, a lifting strap should be connected to both handles. Do not attempt to lift the FLEXTEC® 650x CE with accessories attached to it.

Stacking

The FLEXTEC® 650x CE cannot be stacked.

Environmental Limatations

The FLEXTEC® 650x CE is IP23 rated for use in an outdoor environment. The FLEXTEC® 650x CE should not be subjected to falling water during use nor should any parts of it be submerged in water. Doing so may cause improper operation as well as pose a safety hazard. The best practice is to keep the machine in a dry, sheltered area.

⚠ WARNING

Do not mount the FLEXTEC® 650x CE over combustible surfaces. Where there is a combustible surface directly under stationary or fixed electrical equipment, that surface shall be covered with a steel plate at least 1.6mm thick, which shall extend not less than 150mm beyond the equipment on all sides.

Input and Grounding Connections

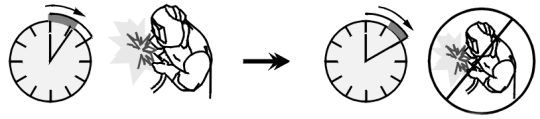
Machine Grounding

The frame of the welder must be grounded. A ground terminal marked with the symbol shown is located inside the reconnect/input connection area for this purpose. See your local and national electrical codes for proper grounding methods.

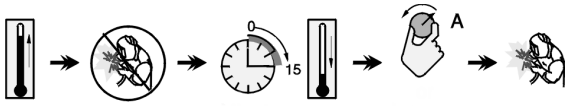
Duty Cycle

The FLEXTEC® 650x CE is capable of welding at a 100% duty cycle (continuous welding) at 650 amps rated output. The 60% duty cycle rating is 750 amps (based off of a ten minute cycle – 6 minutes on time and 4 minutes off time). The maximum output of the FLEXTEC® 650x CE is 815 amps.

Example: 40% Duty Cycle:



Welding for 4 minutes. Break for 6 minutes.



Minutes or decrease Duty Cycle

The FLEXTEC® 650x CE is also rated for Desert Duty, elevated temperature operation, in a 55°C ambient. The machine is de-rated for this application. (See Table below).

High Temperature Operation

FLEXTEC® 650x CE

WELDER OUTPUT RATINGS AT 55°C ELEVATED TEMPERATURES			
AMPS	DUTY CYCLE	VOLTS	TEMPERATURES
600	100%	44V	55°C
650	50%		

750	30%		

High Frequency Protection

Locate the FLEXTEC® 650x CE away from radio controlled machinery. The normal operation of the FLEXTEC® 650x CE may adversely affect the operation of RF controlled equipment, which may result in bodily injury or damage to the equipment.

⚠ WARNING

ELECTRIC SHOCK can kill. Only a qualified eletrician should connect the input leads to the FLEXTEC® 650x CE. Connections should be made in accordance with local and national electrical codes and the connection diagram located on the inside of the reconnect/input access door of the machine. Failure to do so may result in bodily injury or death.

Input Connection

Use a three-phase supply line.
For FLEXTEC® 650x CE (see figure #1): a 45 mm diameter access hole for the input supply is located on the case back. Remove the reconnect access panel located on the case back and connect W, V, U and ground according to the Input Supply Connection Diagram decal.

For CE markets: CE input filter kit (K3129-1) must be installed. Instructions how to install the CE filter kit are provided with the kit.

Input Fuse and Supply Wire Considerations

Refer to Specification in this Installation Section for recommended fuse, wire sizes and type of the copper wires. Fuse the input circuit with the recommended super lag fuse or delay type breakers (also called "inverse time" or "thermal/magnetic" circuit breakers). Choose input and grounding wire size according to local or national electrical codes. Using input wire sizes, fuses or circuit breakers smaller than recommended may result in "nuisance" shut-offs from welder inrush currents, even if the machine is not being used at high currents

Input Voltage Selection

Welders are shipped connected for 460 Volt input voltage. To accomodate different input voltages, move the reconnect lead to the corresponding voltage (see Figure A.1) Refer to Auxiliary Reconnect Input Ranges table in the Technical Specification Section. If the Auxiliary lead (indicated as 'A') is placed in the wrong position and power is applied to the machine, the machine will protect itself and display an error message:

- "Err" "713 or 714" will be shown on the display.
- The control board and switch boards will blink out error 713 or 714 on their status leds.
- The weld output will be turned off and the control board will force itself into an idle state.
- The machine will need to have the misconnect condition removed before it will recover. Power must be removed prior to changing reconnect position

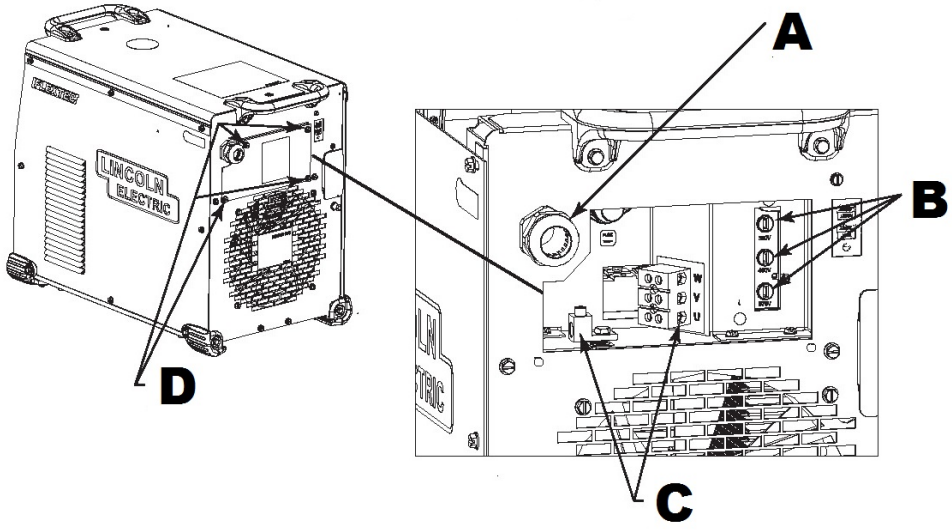


Figure #1: FLEXTEC® 650x CE

A: POWER SUPPLY ACCESS HOLE:

- Route input power cable through this hole.
- Strain relief required. See your local and National Electrical codes for proper strain relief.

B: RECONNECT TERMINAL BLOCK:

- Reconnects auxiliary transformer for the proper input voltage.

C: POWER SUPPLY TERMINAL BLOCK:

- Line Cord/Cable attaches here.
- A ground terminal marked with the symbol shown is provided separate from this block for connecting the ground lead of the line cord. (see your local and national electrical codes for proper grounding methods).

D: REMOVE FOUR SCREWS AND ACCESS PANEL.

Recommended Electrode and Work Cable Sizes for Arc Welding

General Guidelines

Connect the electrode and work cables between the appropriate output studs of the Flextec® 650x CE per the following guidelines:

- Most welding applications run with the electrode being positive (+). For those applications, connect the electrode cable between the wire drive feed plate and the positive (+) output stud on the power source. Connect a work lead from the negative (-) power source output stud to the work piece.
- When negative electrode polarity is required, such as in some Innershield applications, reverse the output connections at the power source (electrode cable to the negative (-) stud, and work cable to the positive (+) stud).

The following recommendations apply to all output polarities and weld modes:

- **Select the appropriate size cables per the "Output Cable Guidelines" (See table 1).** Excessive voltage drops caused by undersized welding cables and poor connections often result in unsatisfactory welding performance. Always use the largest welding cables (electrode and work) that are practical, and be sure all connections are clean and tight.

Note: Excessive heat in the weld circuit indicates undersized cables and/or bad connections.

- **Route all cables directly to the work and wire feeder, avoid excessive lengths and do not coil excess cable.** Route the electrode and work cables in close proximity to one another to minimize the loop area and therefore the inductance of the weld circuit.
- **Always weld in a direction away from the work (ground) connection.**

(See table 1)

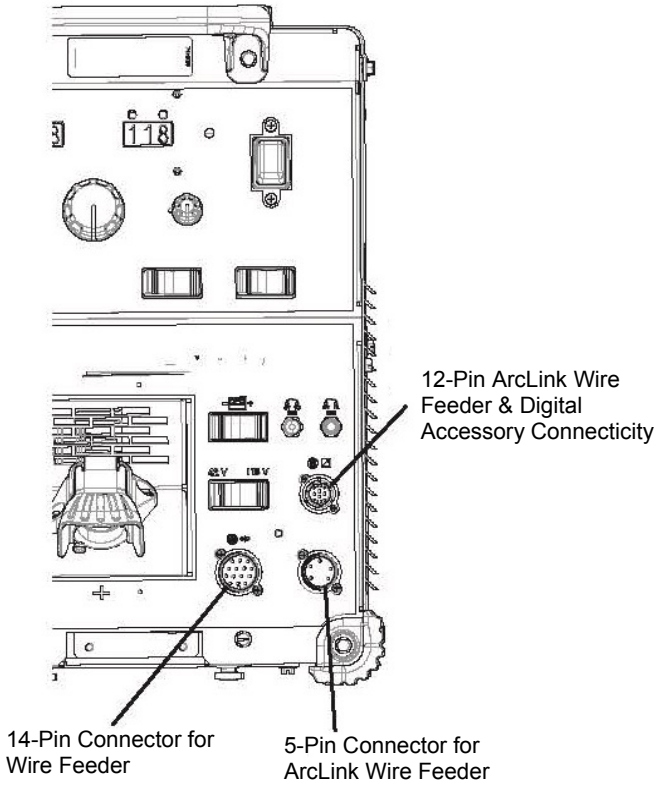
Table 1

OUTPUT CABLE GUIDELINES						
AMPERES	**PERCENT DUTY CYCLE**	**CABLE SIZES FOR COMBINED LENGTHS OF ELECTRODE AND WORK CABLES** (RUBBER COVERED COPPER – RATED 75°C)				
		0 to 15m	**15 to 30m**	**30 to 46m**	**46 to 61m**	**61 to 76m**
200	60	35mm2	35mm2	35mm2	50mm2	70mm2
200	100	35mm2	35mm2	35mm2	50mm2	70mm2
250	30	35mm2	35mm2	35mm2	50mm2	70mm2
250	40	35mm2	35mm2	50mm2	50mm2	70mm2
250	60	50mm2	50mm2	50mm2	50mm2	70mm2
250	100	50mm2	50mm2	50mm2	50mm2	70mm2
300	60	50mm2	50mm2	50mm2	70mm2	70mm2
300	100	70mm2	70mm2	70mm2	70mm2	95mm2
350	40	70mm2	70mm2	70mm2	70mm2	95mm2
400	60	70mm2	70mm2	70mm2	95mm2	120mm2
400	100	70mm2	95mm2	95mm2	95mm2	120mm2
500	60	70mm2	70mm2	95mm2	95mm2	120mm2
600	60	95mm2	95mm2	95mm2	120mm2	120mm2
600	80	95mm2	95mm2	120mm2	120mm2	120mm2
600	100	120mm2	120mm2	120mm2	150mm2	150mm2
650	60	95mm2	95mm2	120mm2	120mm2	120mm2
650	80	120mm2	120mm2	120mm2	150mm2	150mm2
700	100	120mm2	150mm2	150mm2	185mm2	185mm2
800	80	150mm2	150mm2	150mm2	185mm2	185mm2
800	100	150mm2	185mm2	240mm2	240mm2	240mm2

** Tabled values are for operation at ambient temperatures of 104°F(40°C) and below. Applications above 104°F(40°C) may require cables larger than recommended, or cables rated higher than 167°F(75°C).

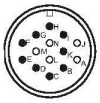
Cable Connections

See Figure #2 for locating 5, 12 and 14 pin connctors on the front of the FLEXTEC® 650x CE.



12-PIN ACCESSORY CONNECTIVITY			
Picture	**Function**	**Pin**	**Wiring**
	12-PIN REMOTE CONTROL CONNECTOR FOR REMOTE OR HAND/FOOT AMPTROL AND DIGITAL ACCESSORIES	A	ARCLINK CAN
		B	ARCLINK CAN
		C	REMOTE POTENTIOMETER COMMON
		D	REMOTE POTENTIOMETER WIPER
		E	REMOTE POTENTIOMETER +10V
		F	ALPS CONNECTION
		G	TRIGGER
		H	TRIGGER
		J	40VDC COMMON
		K	40VDC
		L	NOT USED
		M	NOT USED

5-PIN CONNECTOR FOR WIRE FEEDER			
Picture	**Function**	**Pin**	**Wiring**
	5-PIN CONNECTOR FOR WIRE FEEDER CONNECTIVITY .	A	ARCLINK CAN
		B	ARCLINK CAN
		C	ELECTRODE SENSE LEAD
		D	40VDC
		E	40VDC COMMON

14-PIN CONNECTOR FOR WIRE FEEDER			
Picture	**Function**	**Pin**	**Wiring**
	14-PIN CONNECTOR FOR WIRE FEEDER CONNECTIVITY	A	115 VAC
		B	GROUND
		C	TRIGGER COMMON
		D	TRIGGER INPUT
		E	77 REMOTE POTENTIOMETER, 5K
		F	76 REMOTE POTENTIOMETER, WIPER
		G	75 REMOTE POTENTIOMETER, COMMON
		H	VOLTAGE SENSE (21)
		I	42 VAC
		J	40 Vdc
		K	42 VAC
		L	
		M	
		N	

Control Cable Connections

General Guidelines

Genuine Lincoln control cables should be used at all times (except where noted otherwise). Lincoln cables are specifically designed for the communication and power needs of the FLEXTEC® 650x CE. Most are designed to be connected end to end for ease of extension. Generally, it is recommended that the total length not exceed 100 feet (30.5 m). The use of non-standard cables, especially in lengths greater than 25 feet, can lead to communication problems (system shutdowns), poor motor acceleration (poor arc starting), and low wire driving force (wire feeding problems). Always use the shortest length of control cable possible, and DO NOT coil excess cable.

Regarding cable placement, best results will be obtained when control cables are routed separate from the weld cables. This minimizes the possibility of interference between the high currents flowing through the weld cables, and the low level signals in the control cables.

Paralleling Machines

FLEXTEC® 650x CE power sources may be paralleled for increased output requirements. No kit is required for paralleling of FLEXTEC® 650x CE power sources. The FLEXTEC® 650X CE can only be paralleled for constant current processes (mode switch must be in the SMAW position). Connect the power sources as shown, and set the output control of each power source to one half of the desired arc current. (See Figure #3).

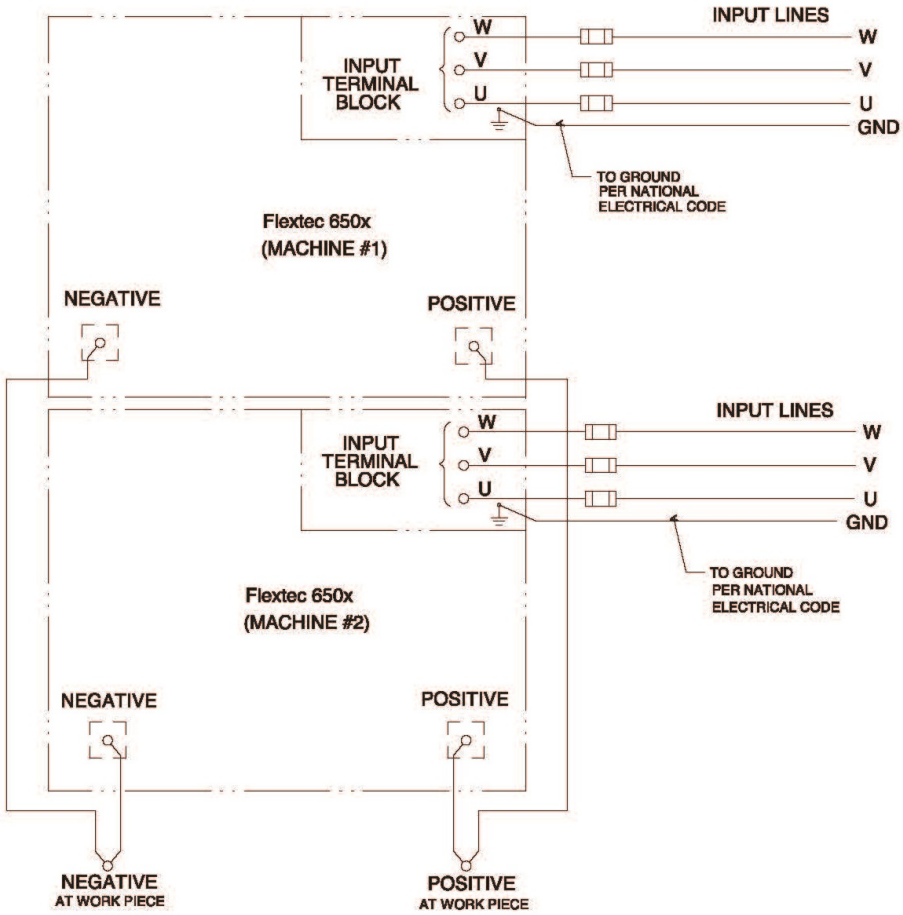
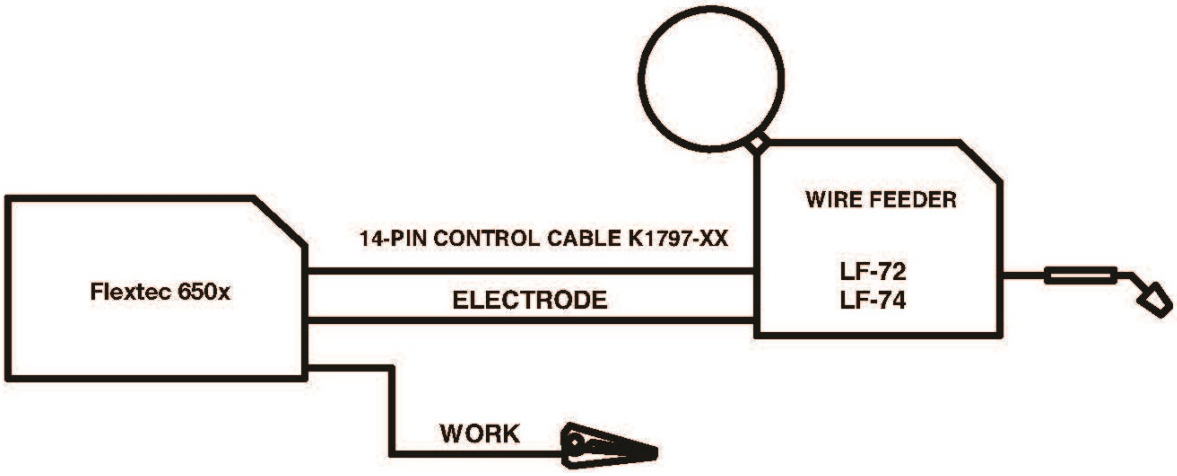


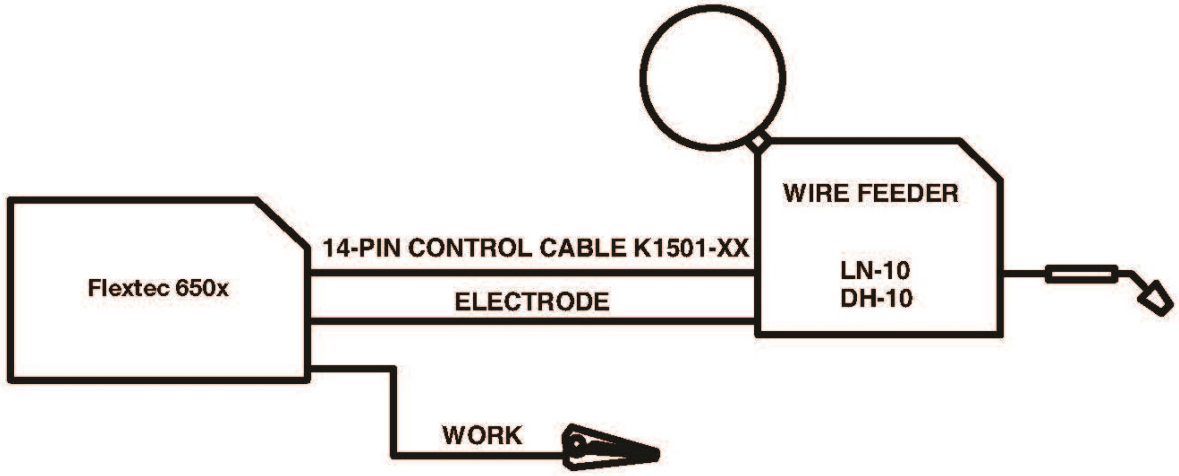
Figure #3

Connecting LF-72 and LF-74 to the Flextec® 650x CE



CONTROL SETTING	
WELD MODE	CV, CV-INNERSHIELD
WELD TERMINALS	OFF
REMOTE/LOCAL	LOCAL
	(REMOTE IF K2329-1 INSTALLED)
VOLTMETER POLARITY	PROCESS DEPENDENT

Connecting LN-10 and DH-10 to the FLEXTEC® 650x CE



CONTROL SETTING	
WELD MODE	CV, CV-INNERSHIELD
WELD TERMINALS	OFF
REMOTE/LOCAL	REMOTE
VOLTMETER POLARITY	PROCESS DEPENDENT

LN-10,DH-10 Control Switch Setup

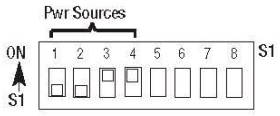
Initial set up of the LN-10, DH-10 control for the system components being used and for general operator preferences is done using a pair of 8-pole DIP switches located inside the LN-10, DH-10 control box.

Setup DIP Switch Access

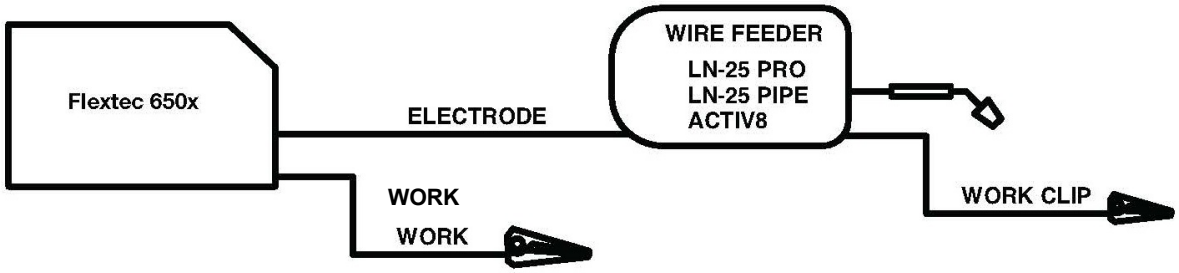
1. Shut off the input power to the LN-10, DH-10 control by turning off the power at the welding power source it is connected to.
2. Remove the two screws on the top of the LN-10, DH-10 control box door and swing the door down to open.
3. Locate the two 8-pole DIP switches, near the top left corner of the LN-10, DH-10 Control P.C. board, labeled S1 and S2.
4. Switch settings are only programmed during input power-up restoration.

Setting the DIP Switches

The DIP switches are each labeled with an “ON” arrow showing the on direction for each of the 8 individual switches in each DIP switch (S1 and S2). The functions of these switches are also labeled and set as described below:

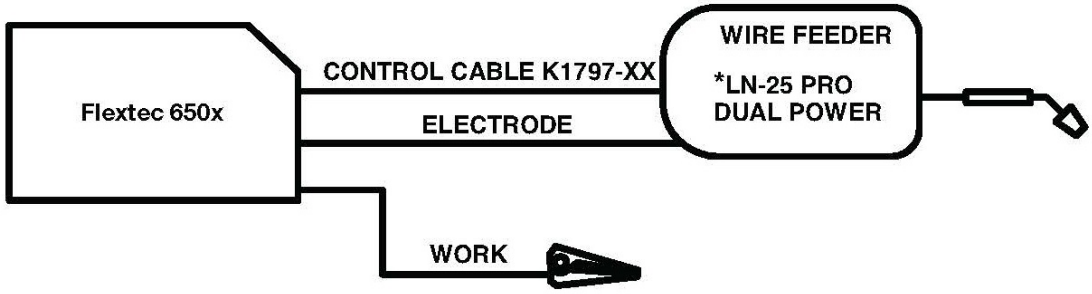


Connecting LN-25 PRO, LN-25 PIPE, ACTIV8 and LN-25x to the FLEXTEC® 650x CE



CONTROL SETTING	
WELD MODE	CV, CV-INNERSHIELD
WELD TERMINALS	ON
REMOTE/LOCAL	LOCAL
VOLTMETER POLARITY	PROCESS DEPENDENT

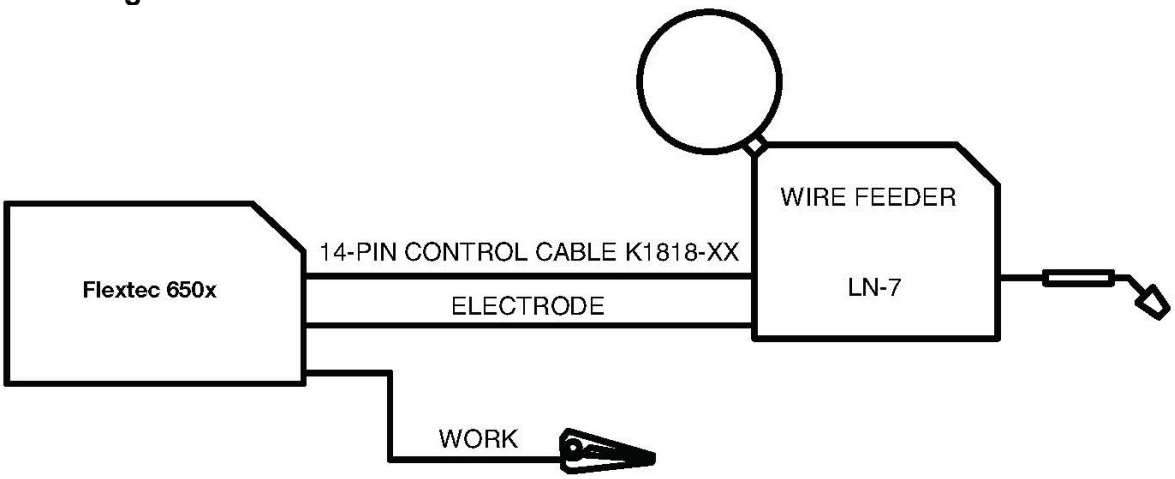
Connecting LN-25 Pro Dual Power to the FLEXTEC® 650x CE



CONTROL SETTING	
WELD MODE	CV, CV-INNERSHIELD
WELD TERMINALS	OFF
REMOTE/LOCAL	REMOTE
VOLTMETER POLARITY	PROCESS DEPENDENT

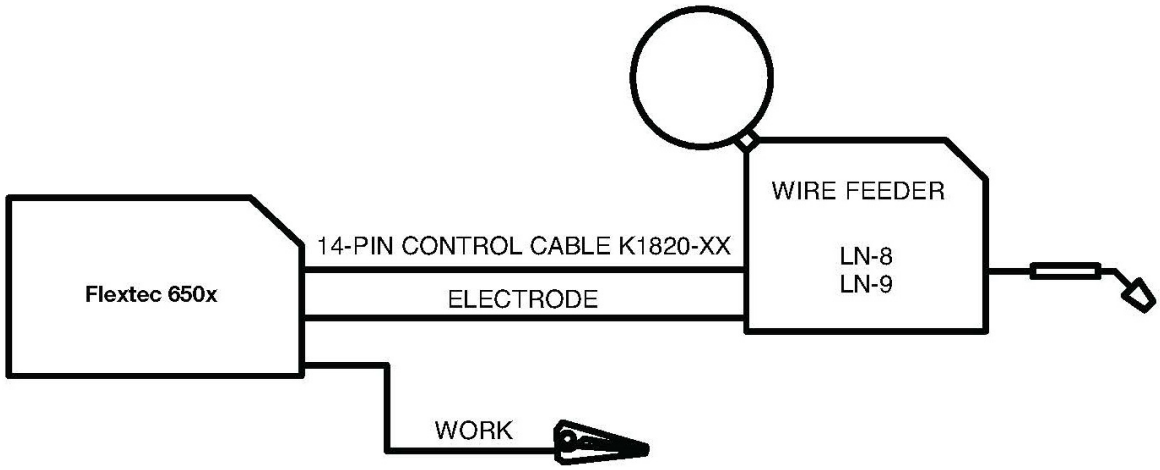
*CONTROL CABLE SETUP SHOWN. REFER TO LN-25 PRO CONNECTION DIAGRAM IF SETTING UP "ACROSS-THE-ARC" FEEDER.

Connecting LN-7 to the FLEXTEC® 650x CE



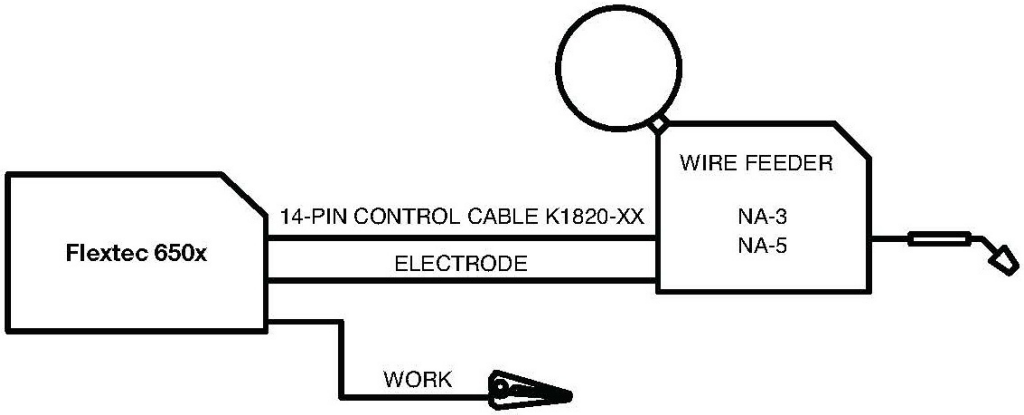
CONTROL SETTING	
WELD MODE	CV, CV-INNERSHIELD
WELD TERMINALS	OFF
REMOTE/LOCAL	LOCAL
VOLTMETER POLARITY	PROCESS DEPENDENT

Connecting LN-8 and LN-9 to the FLEXTEC® 650x CE



CONTROL SETTING	
WELD MODE	CV, CV-INNERSHIELD
WELD TERMINALS	OFF
REMOTE/LOCAL	REMOTE
VOLTMETER POLARITY	PROCESS DEPENDENT

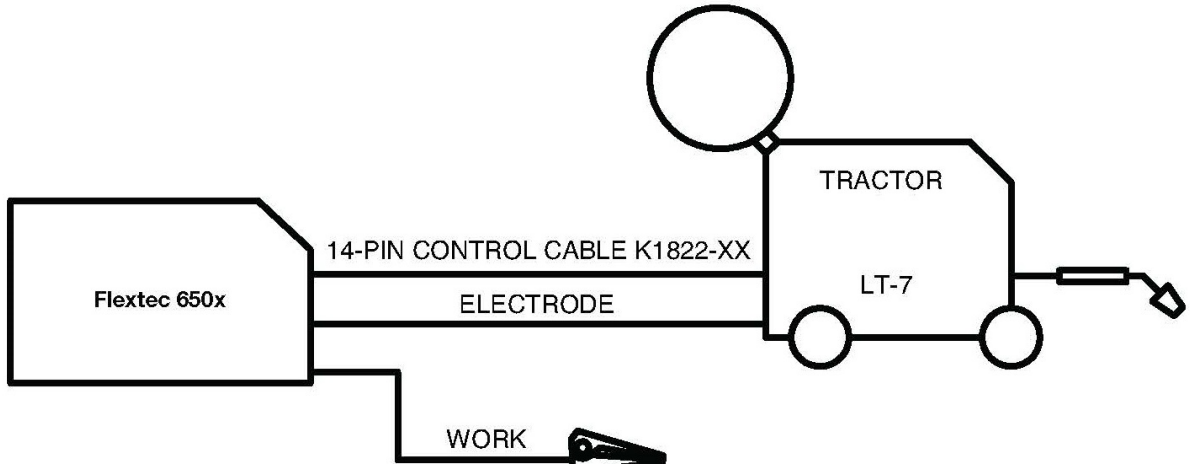
Connecting NA-3, NA-5 to the FLEXTEC® 650x CE



FOR NA-3, NA-4 WIRE FEEDER ONLY:
- MOVE JUMPER LEAD ON VARIABLE VOLTAGE BOARD TO "L" PIN
FOR NA-5 WIRE FEEDER ONLY:
- MOVE "BLUE" JUMPER LEAD ON VOLTAGE BOARD TO "AUTO" TERMINAL

CONTROL SETTING	
WELD MODE	CV-SAW
WELD TERMINALS	OFF
REMOTE/LOCAL	REMOTE
VOLTMETER POLARITY	PROCESS DEPENDENT

Connecting LT-7 to the FLEXTEC® 650x CE



CONTROL SETTING	
WELD MODE	CV-SAW
WELD TERMINALS	OFF
REMOTE/LOCAL	REMOTE
VOLTMETER POLARITY	PROCESS DEPENDENT

Product Description

The FLEXTEC® 650x CE is a multi-process CC/CV DC inverter and is rated for 650 amps, 44 volts at a 100% duty cycle. The FLEXTEC® 650x CE is intended for both factory and field operation. It comes in a compact, rugged case that is designed for portability and outdoor use with an IP23 environmental rating. The user interface of the FLEXTEC® 650x CE is simple and intuitive. Weld modes are selected via a 6 position selector switch. Volts and Amps are displayed on an easy to view LED display, and the amps and volts are set via a large output control knob. A hot start and an arc control knob allow for finer tuning of the welding arc for the application.
The FLEXTEC® 650x CE is designed for the North America and export markets and operates on 3 phase 380V, 460V, or 575V 50hz or 60hz power.

Design Features

- Severe Duty Design for outdoor use (IP23 rating)
- Passive Power Factor Correction – reliably gives 88% power factor for lower installation costs.
- 91% Efficiency rating – reduces electrical utility costs.
- F.A.N. (fan as needed). Cooling fan runs when the output is energized and for a 5 minute cool down period after output is disabled.
- Thermal protection by thermostats with Thermal Indicator LED.
- Reversible handles for ease of lifting and transporting
- Multiple options for lifting / transporting: Reversible handles; eyelet lifting bolts; and single forklift fork access
- Error Codes display on LED screen for ease of trouble shooting
- Electronic over current protection.
- Input voltage mis-connection protection.
- Utilizes digital signal processing and microprocessor control.
- VRD™ (Voltage Reduction Device)- Enable this function for reduced OCV in CC modes for added safety.

Recommended Processes

The FLEXTEC® 650x CE is designed for CC-SMAW, CC-GTAW (lift tig), CV-GMAW, CV-FCAW-S, CV-FCAW-G and CV-SAW welding processes. CAG (arc gouging) is also supported.

Process Limitations

The FLEXTEC® 650x CE is suitable only for the processes listed. Note: When used with K3091-1 Multi-Process Switch, the output is limited to 600A / 100% and 700A / 60%.

Equipment Limitations

Operating Temperature Range is -10° C to + 55° C.
Output De-rated at Temperatures above 40°C

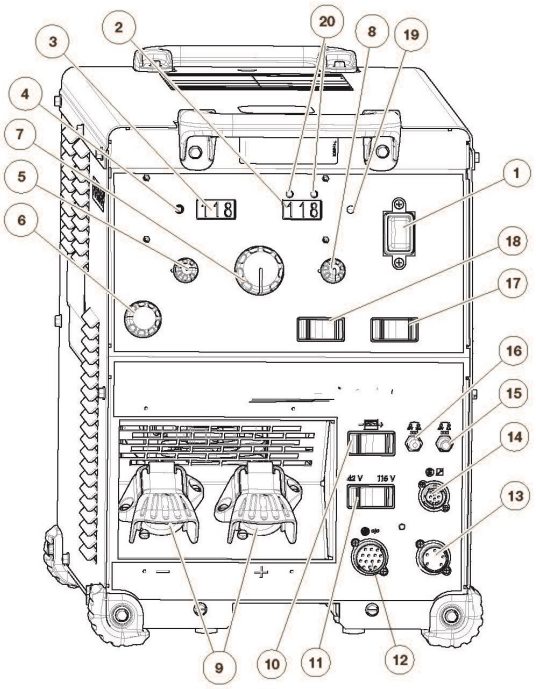
Equipment Packages

K3515-1	**Flextec® 650x CE contain:**
K3425-1	Flextec® 650x
K3129-1	CE Filter Kit

COMPATIBLE EQUIPMENT

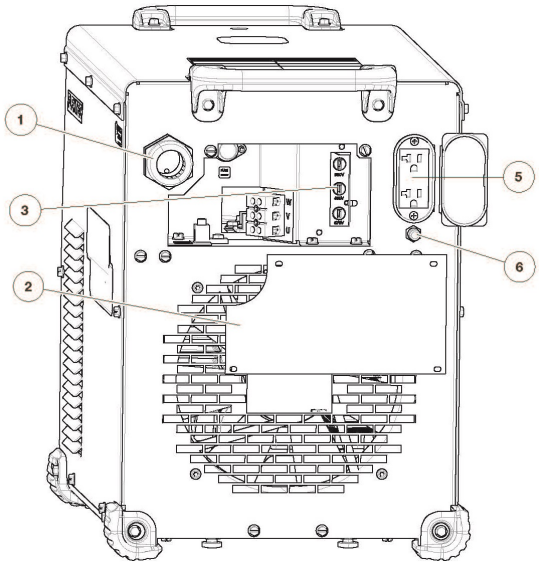
All Models	LF-72
	LF-74
	LN-10
	DH-10
	LN-25 Pro
	LT-7 Tractor
	LN-8
	LN-9
	NA Series
	LN-25x
	Flex Feed 74HT
	Flex Feed 84
	Power Feed 84
	Power Feed 25M
	Maxsa 10 (latest K#)
	Multi-Weld
	Power Feed 41, 42, 44, 46
	Power Feed 22, 26

Case Front Control Descriptions



1. **Power Switch**: Controls input power to the Flextec® 650x.
2. **Voltage Display Meter**
3. **Current Display Meter**
4. **Thermal LED:** A yellow light that comes on when an over temperature situation occurs. Output is disabled until the machine cools down. When coll, the light goes out and output is enabled.
5. **Hot Start Control Dial**
6. **Weld Process Selector Switch**: A rotary switch that toggles through the six available weld modes for the Flextec® 650x CE: – CC-SMAW, CC-GTAW, CV, CV-Innershield, CV-SAW, ArcLink.
7. **Output Control Dial:** sets the output current or voltage for the selected weld process.
8. **Arc Force Control Dial**.
9. **Positive and Negative Welding Output Studs.**
10. **Wire Feeder Voltmeter Polarity Selection Switch**.
11. **115V or 42V Wire Feeder Selector Switch**.
12. **14 pin Wire Feeder Circular Connector.**
13. **5 pin ArcLink Wire Feeder Circular Connector.**
14. **12 pin Remote Circular Connector**
15. **Circuit Breaker Reset Button for the 12 pin Remote Circular Connector**.
16. **Circuit Breaker Reset Button for the 5 and 14 pin Wire Feeder Connector**.
17. **Weld Terminals On/Remote Selector Switch.**
18. **Local/Remote Selector Toggle Switch: Sets the control of the outoput to local (output control knob) or remote (K857-2 hand amptrol, K870-2 foot amptrol or 14 pin wire feeder).**
19. **CrossLinc Communication Indicator.**
20. **VRD™ (Voltage Reduction Device) Indicator Lights.**

Case Back Control Descriptions



1. **Input Power Cord Access Hole**
2. **Access Panel** – Allows access for connecting input power and configuring the machine.
3. **Input Power Reconnect** – Configures the machine for the input supply voltage.
4. **OPTION** – GFCI protection for the 115V auxiliary output.
5. **115 volt**, **15 amp auxiliary output duplex with protective environmental cover.**
6. 15 Amp Circuit Breaker for the 115V auxiliary power.

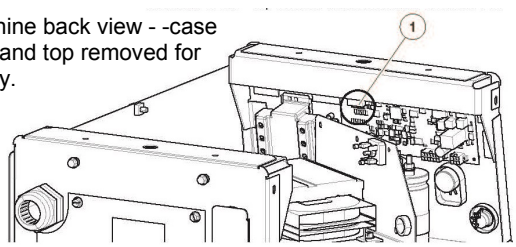
Internal Controls – Enabling VRD, Multi-Weld and Current/Voltage Calibration

Internal Controls Description

The User Interface pc board has one bank of dip switches (See Figure #4 Item 1). As shipped from the factory and under normal conditions, dip switch #2 is 'on' position and all others are in the 'off' position (Figure #5). There are 3 instances that require a change of the dip switch.

1. Enter VRD Mode (VRD Enabled).
   Turn switch #5 to the 'ON' Position (See Figure #6).
2. Enable Multi-Weld Mode.
   Turn switch #3 to the 'ON' Position (See Figure #7).
3. Current/Voltage Calibration Setting
   Turn switch #1 to the 'ON' Position (See Figure #8).

Machine back view - -case side and top removed for clarity.



Figure#4: Dip Switch Location on User Interface PCB.

Factory Default Setting
Switch #2 in the 'ON' Setting.

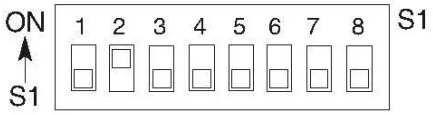


Figure #5

VRD Enabled Setting
Switch #2 and #5 in the 'ON' Setting.

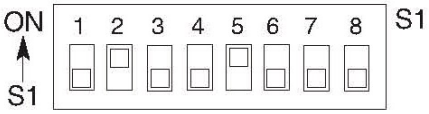


Figure #6

Multi-Weld Enabled Setting
Switch #2 and #3 in the 'ON' Setting.

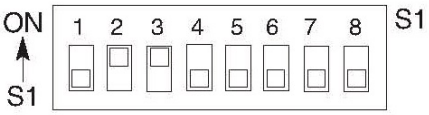


Figure #7

Current/Voltage Calibation Setting
Switch #1 and #2 in the 'ON' Setting.

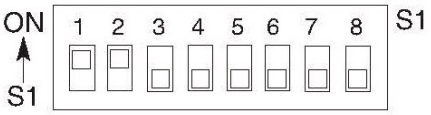


Figure #8

Power-Up Sequence

When power is applied to the FLEXTEC® 650x CE, the displays will illuminate and display the voltage and/or amperage settings.

Common Welding Procedures

⚠ WARNING

The serviceability of a product or structure utilizing the welding programs is and must be the sole responsibility of the builder/user. Many variables beyond the control of The Lincoln Electric Company affect the results obtained in applying these programs. These variables include, but are not limited to, welding procedure, plate chemistry and temperature, weldment design, fabrication methods and service requirements. The available range of a welding program may not be suitable for all applications, and the build/user is and must be solely responsible for welding program selection.

The FLEXTEC® 650x CE IS a multi-process inverter welder. The **Weld Process Selector Switch** is used to set the desired weld mode. The FLEXTEC®650x CE has 6 selectable welding modes,

1. **SMAW –** This is a CC (constant current) weld mode used for the SMAW stick welding process.
2. **GTAW –** This is a CC (constant current) weld mode used for the GTAW TIG welding process.
3. **CV –** This is CV (constant voltage) weld mode used for welding the GMAW MIG welding process and the FCAW-G flux cored gas shielded welding process.
4. **CV-Innershield –** This is a CV (constant voltage) weld mode used for welding the FCAW-S, flux cored self shielded welding process.
5. **CV-SAW –** This is a CV (constant voltage) weld mode used for welding the SAW submerged arc welding process.
6. **ArcLink –** This weld mode position is used to unlock Synergic modes when combined with ArcLink feeder.

The FLEXTEC® 650x CE is also capable of gouging. Gouging can be done in either the SMAW mode or the CV and CV-Innershield modes.

In addition to the weld process selector switch, a hot start control dial, output control dial and arc control dial are provided to setup and fine tune the welding procedure.

Weld Controls and Displays

Weld Process Selector Switch
6 Position switch used to select the welding process.

Hot Start Control Dial (only for Flextec™650)
- The Hot Start control regulates the starting current at arc initiation. Hot Start can be set to "0" and no additional current is added at arc start. Increasing from 0 to 10 will increase the additional current (relative to the preset current) that is added at arc initiation.

Arc Control Dial
- Full range selection of arc control from -10 to +10. In CV mode, this control is an inductance control. In stick mode, the control adjusts the arc force.

Output Control Dial
- Output control is conducted via a single turn potentiometer.
- Adjustment is indicated by the meters.
- When in REMOTE modes, this control sets the maximum welding current. Full depression of a foot or hand amptrol results in the preset level of current.
  NOTE: this is the case for CC modes only. In CV modes, maximum voltage is determined by the remote.

Voltage Display Meter
- Prior to CV operation (current flow), the meter displays desired preset voltage value (+/- .5V).
- Prior to STICK or TIG operation, the meter displays three.
- During welding, this meter displays actual average volts.
- After welding, the meter holds the actual voltage value for 5 seconds. The displays blink indicating that the machine is in the "Hold" period.
- Output adjustment while in the "Hold" period results in the "prior to operation" characteristics.

Amperage Display Meter

- Prior to STICK or TIG operation (current flow), the meter displays preset current value (either 2 amps or +/- 3% (e.g. 3 amps on 100), whichever is greater).
- Prior to CV operation, the meter displays three dashes indicating non-presettable AMPS.
- During welding, this meter displays actual average amps.
- After welding, the meter holds the actual current value for 5 seconds. The displays blink indicating that the machine is in the "Hold" period.
- Output adjustment while in the "Hold" period results in the "prior to operation" characteristics.

Weld Terminals On/Remote Toggle Switch

- This switch determines the trigger location.
- When set to the “ON” position, the weld terminals are at OCV (open circuit voltage) and ready to weld.
- When set to the “REMOTE” position, output is enabled through a remote trigger.

Control - Local/Remote Toggle Switch

- Set the switch to “LOCAL” to control output at the Flextec via the Output Control dial.
- Set the switch to “REMOTE” to control output via a remote device (K857-2 hand amptrol or K870-2 foot amptrol) connected to the 12-pin remote connector or a wire feeder connected to the 14-pin connector.

Wire Feeder Selector Switch

- This switch configures wire feeder supply voltage in the 14 pin connector to either 42 volt or 115 volt.
- If the switch is in the incorrect position for the attached wire feeder, there will be no power supplied to the wire feeder.

Wire Feeder Voltmeter Polarity Switch

- This switch configures the 21 sense lead in the 14 pin connector to the work weld terminal of the machine. It also configures the 292 lead to the User Interface board to determine if voltage sensing needs to be configured for Electrode Negative Polarity operation in “ArcLink” mode.

Thermal Light

- This status light indicates when the power source has been driven into thermal overload. If the output terminals were "ON", the output will be turned back on once the unit cools down to an acceptable temperature level. If the unit was operating in the "REMOTE" mode, the trigger will need to be opened before or after the thermal has cleared and closed after the machine has cooled down to an acceptable temperature to establish output.

VRD™ (Voltage Reduction Device) Indicator Light

- There are 2 indicator lights on the case front of the Flextec® 650xCE above the Voltage LED Display to indicate the status of VRD™ operation. As shipped, the VRD™ function is disabled. VRD™ is enabled by setting dip switches on the Control P.C. board (See Internal Controls Figure B.3 in this Operation Section). When VRD™ is active:
  - A green light indicates the OCV (open circuit voltage) is less than 35V peak.
  - A red light indicates the OCV is at or above 35V peak.
  - Both lights will illuminate for 5 seconds at power up.

For each weld mode, the VRD™ lights function as shown in Table below.

VRD™ INDICATOR LIGHTS

MODE		VRD™ "ON"	VRD™ "OFF"
CC-SMAW CC-GTAW	OCV	GREEN (OCV REDUCED)	NO LIGHTS ARE ACTIVE
	WHILE WELDING	GREEN OR RED (DEPENDS ON WELD VOLTAGE)*	
CV-GAS CV-INNERSHIELD CV-SAW	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	GREEN OR RED (DEPENDS ON WELD VOLTAGE)*	

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

Basic Modes of Operation

SMAW

This weld mode is a constant current (CC) mode featuring continuous control from 15 – 815 amps. It is intended for the SMAW stick welding processes and arc gouging.

Output Control Local/Remote – When the control is set to “LOCAL” (no remote potentiometer/control plugged into the 12 pin or 14 pin connectors), the output is controlled through the Output Control Dial on the front of the FLEXTEC® 650x CE. Set this switch to “REMOTE” when an external potentiometer/control is connected.

- When a remote potentiometer is connected, the output control on the FLEXTEC® 650x CE and the remote act as a master/slave configuration. Use the control dial on the FLEXTEC® 650x CE to set the maximum welding current. The remote will control output from minimum to the pre-set maximum.

Hot Start - The Hot Start control regulates the starting current at arc initiation. Hot Start can be set to “0” and no additional current is added at arc start. For Flextec 650x CE: increasing from 0 to 10 will increase the additional current (relative to the preset current) that is added at arc initiation.

Arc Control - The Arc Control regulates the Arc Force to adjust the short circuit current. The minimum setting (-10) will produce a "soft" arc and will produce minimal spatter. The maximum setting (+10) will produce a "crisp" arc and will minimize electrode sticking.

Weld Terminals On/Remote – Set to “ON” and the machine is in the ready to weld state.

Voltage Display Meter – This display will display three dashed lines when the machine is in the idle state. This indicates that voltage is not settable in this weld mode. While output is enabled, the actual welding voltage will be displayed. After welding, the meter holds the actual voltage value for 5 seconds. Output adjustment while in the "hold" period results in the "prior to operation" characteristics stated above. The displays blink indicating that the machine is in the "hold" period.

GTAW

This weld mode is a constant current (CC) mode featuring continuous control from 10 – 815. It is intended for the GTAW tig welding processes.

Hot Start - The Hot Start control regulates the starting current. A setting of+10 results in the most positive arc initiation.

Arc Control – This control is not used in the GTAW mode.

Weld Terminals On/Remote

- When set to the “ON” position, the weld terminals are at OCV (open circuit voltage) and ready to weld.
- When set to the “remote” position, output is enabled through a remote trigger.

Voltage Display Meter – This display will display three dashed lines when the machine is in the idle state. This indicates that voltage is not settable in this weld mode. While output is enabled, the actual welding voltage will be displayed. After welding, the meter holds the actual voltage value for 5 seconds. Output adjustment while in the "hold" period results in the "prior to operation" characteristics stated above. The displays blink indicating that the machine is in the "hold" period.

Amperage Display Meter – This display will display the pre-set welding current when the machine is in the idle state. After welding, the meter holds the actual amperage value for 5 seconds. Output adjustment while in the "hold" period results in the "prior to operation" characteristics stated above. The displays blink indicating that the machine is in the "hold" period.

Output Control Local/Remote – When the control is set to “LOCAL” (no remote potentiometer/control plugged into the 12 pin or 14 pin connectors), the output is controlled through the Output Control Dial on the front of the FLEXTEC® 650x CE. Set this switch to “REMOTE” when an external potentiometer/control is connected.

- When a remote potentiometer is connected, the output control on the FLEXTEC® 650X CE and the remote act as a master/slave configuration. Use the control dial on the FLEXTEC® 650X CE to set the maximum welding current. The remote will control output from minimum to the pre-set maximum.

Output Control Dial

- When the Local/Remote is set to “LOCAL”, this dial sets the welding amperage.
- When the Local/Remote is set to “REMOTE”, this dial sets the maximum welding amperage. The remote potentiometer controls the amperage from minimum to this pre-set maximum.

CV-Gas

This weld mode is a constant voltage (CV) mode featuring continuous control from 10 to 45 volts. It is intended for the GMAW, FCAW-G, MCAW welding processes and arc gouging.

Hot Start – Rotate from the “0” position to the “10” position to provide more energy during the start of a weld.

Arc Control – The Arc Control regulates pinch effect. At the minimum setting (-10), minimizes pinch and results in a soft arc. Low pinch settings are preferable for welding with gas mixes containing mostly inert gases. At the maximum setting (+10), maximizes pinch effect and results in a crisp arc. High pinch settings are preferable for welding FCAW and GMAW with CO_2.

Weld Terminals On/Remote

- When set to the “ON” position, the weld terminals are at OCV (open circuit voltage) and ready to weld. This selection is used for across the arc wire feeders.
- When set to the “REMOTE” position, output is enabled through a remote trigger.

Amperage Display Meter – This display will display three dashed lines when the machine is in the idle state. This indicates that amperage is not settable in this weld mode. While output is enabled, the actual welding amperage will be displayed. After welding, the meter holds the actual amperage value for 5 seconds. Output adjustment while in the "hold" period results in the "prior to operation" characteristics stated above. The displays blink indicating that the machine is in the "hold" period.

Voltage Display Meter – This display will display the pre-set welding voltage when the machine is in the idle state. After welding, the meter holds the actual voltage value for 5 seconds. Output adjustment while in the "hold" period results in the "prior to operation" characteristics stated above. The displays blink indicating that the machine is in the "hold" period.

Output Control Local/Remote – When the control is set to “LOCAL” (no remote potentiometer/control plugged into the 12 pin or 14 pin connectors), the output is controlled through the Output Control Dial on the front of the FLEXTEC® 650x CE. Set this switch to “REMOTE” when an external potentiometer/control is connected or using CrossLinc™ feeder.

Output Control Dial

- When the Local/Remote is set to “LOCAL”, this dial sets the welding voltage.
- When the Local/Remote is set to “REMOTE”, this dial is disabled.

CV-Innershield

This weld mode is a constant voltage (CV) mode featuring continuous control from 10 to 45 volts. It is intended for the FCAW-S welding process and arc gouging.

Hot Start – toggle from the “0” position to the “10” position to provide more energy during the start of a weld.

Arc Control – The Arc Control regulates pinch effect. At the minimum setting (-10), minimizes pinch and results in a soft arc. At the maximum setting (+10), maximizes pinch effect and results in a crisp arc.

Weld Terminals On/Remote

- When set to the “ON” position, the weld terminals are at OCV (open circuit voltage) and ready to weld. This selection is used for across the arc wire feeders.
- When set to the “REMOTE” position, output is enabled through a remote trigger.

Amperage Display Meter – This display will display three dashed lines when the machine is in the idle state. This indi-cates that amperage is not settable in this weld mode. While output is enabled, the actual welding amperage will be displayed. After welding, the meter holds the actual amperage value for 5 seconds. Output adjustment while in the "hold" period results in the "prior to operation" characteristics stated above. The displays blink indicating that the machine is in the "hold" period.

Voltage Display Meter – This display will display the pre-set welding voltage when the machine is in the idle state. After welding, the meter holds the actual voltage value for 5 seconds. Output adjustment while in the "hold" period results in the "prior to operation" characteristics stated above. The displays blink indicating that the machine is in the "hold" period.

Output Control Local/Remote – When the control is set to “LOCAL” (no remote potentiometer/control plugged into the 12 pin or 14 pin connectors), the output is controlled through the Output Control Dial on the front of the FLEXTEC® 650X CE . Set this switch to “REMOTE” when an external potentiometer/control is connected.

Output Control Dial

- When the Local/Remote is set to “LOCAL”, this dial sets the welding voltage.
- When the Local/Remote is set to “REMOTE”, this dial is disabled.

CV-SAW

This weld mode is a constant voltage (CV) mode featuring continuous control from 10 to 45 volts. It is intended for the CV-SAW submerged arc welding process.

Hot Start – Not used for this welding process.

Arc Control – Not used for this welding process .

Weld Terminals On/Remote

- When set to the “ON” position, the weld terminals are at OCV (open circuit voltage) and ready to weld. This selection is used for across the arc wire feeders.
- When set to the “REMOTE” position, output is enabled through a remote trigger.

Amperage Display Meter – This display will display three dashed lines when the machine is in the idle state. This indicates that amperage is not settable in this weld mode. While output is enabled, the actual welding amperage will be displayed. After welding, the meter holds the actual amperage value for 5 seconds. Output adjustment while in the "hold" period results in the "prior to operation" characteristics stated above. The displays blink indicating that the machine is in the "hold" period.

Voltage Display Meter – This display will display the pre-set welding voltage when the machine is in the idle state. After welding, the meter holds the actual voltage value for 5 seconds. Output adjustment while in the "hold" period results in the "prior to operation" characteristics stated above. The displays blink indicating that the machine is in the "hold" period.

Output Control Local/Remote – When the control is set to “LOCAL” (no remote potentiometer/control plugged into the 12 pin or 14 pin connectors), the output is controlled through the Output Control Dial on the front of the FLEXTEC® 650x CE. Set this switch to “REMOTE” when an external potentiometer/control is connected.

Output Control Dial

- When the Local/Remote is set to “LOCAL”, this dial sets the welding voltage.
- When the Local/Remote is set to “REMOTE”, this dial is disabled

ArcLink

This weld mode is a constant voltage (CV) mode featuring continuous control from 10 to 45 volts. It is intended for the FCAW-S welding process and arc gouging.

Hot Start – Not used for this welding process.

Arc Control – Not used for this welding process .

Weld Terminals On/Remote - Not used for this welding process.

Amperage Display Meter – This display will display three dashed lines when the machine is in the idle state. This indicates that amperage is not settable in this weld mode. While output is enabled, the actual welding amperage will be displayed. After welding, the meter holds the actual amperage value for 5 seconds. Output adjustment while in the "hold" period results in the "prior to operation" characteristics stated above. The displays blink indicating that the machine is in the "hold" period.

Voltage Display Meter – This display will display the pre-set welding voltage when the machine is in the idle state. After welding, the meter holds the actual voltage value for 5 seconds. Output adjustment while in the "hold" period results in the "prior to operation" characteristics stated above. The displays blink indicating that the machine is in the "hold" period.

Output Control Local/Remote – Not used for this welding process.

Output Control Dial - Not used for this welding process.

CrossLinc™

CrossLinc™ is a new welding system communication technology. When using a CrossLinc™ enabled power source such as the Flextec® 650x CE and a CrossLinc™ enabled wire feeder such as the LN-25X, welding voltage can be controlled remotely without the use of an additional control cable.

The digital meters on the LN-25X will show the pre-set values for wire feed speed and voltage prior to welding. During welding, the meters will show actual current and voltage present at the wire feeder. After welding the meters will then flash the last welding current and voltage that was present during welding for 10-seconds after welding. If WFS or voltage is adjusted during this 10 second period, the meters will go back to the pre-set value.

- When a LN-25X enabled feeder is connected with the Flextec® 650x CE using the standard weld power cable and the LN-25X sense lead is attached to the work piece, the CrossLinc™ light will automatically illuminate on both the Flextec® 650x CEand the LN-25X. No additional pairing of the machine to the feeder is needed. This light indicates the CrossLinc connection is active and that control of the Flextec® 650x CE voltage can be made at the LN-25X feeder.
- The Flextec® 650x CE Weld Terminals On/Remote toggle should be set to 'ON'. This powers the weld terminals for an across-the-arc LN-25X wire feeder.
- The Flextec® 650x CE Output Control Local/Remote switch is ignored once a CrossLinc peripheral is detected by the power source.

Maintenance

⚠ WARNING

Before carrying out service, maintenance and/or repair jobs, fully disconnect power to the machine.

⚠ WARNING

Use Personal Protective Equipment (PPE), including safety glasses, dust mask and gloves to avoid injury. This also applies to persons who enter the work area.

⚠ WARNING

MOVING PARTS can injure.

- Do not operate with doors open or guards off.
- Stop engine before servicing.
- Keep away from moving parts

⚠ WARNING

Have qualified personnel do all maintenance and troubleshooting work.

Visual Inspection

Clean interior of machine with a low pressure air stream. Make a thorough inspection of all components. Look for signs of overheating, broken leads or other obvious problems. Many problems can be uncovered with a good visual inspection.

Routine Maintenance

VRD™ Functionality should be checked once per day or once per shift. VRD™ functionality can be verified by the indicator lights on the front of the power source. One of the lights will be illuminated at all times when VRD™ is enabled. No lights will be illuminated when VRD™ is disabled. VRD™ can be verified by cycling power as well. When VRD™ is enabled, the VRD™ indicator lights will illuminate for 5 seconds at power up and one light will remain illuminated.

1. Every six months or so the machine should be cleaned with a low pressure airstream. Keeping the machine clean will result in cooler operation and higher reliability. Be sure to clean the following areas:
   - All printed circuit boards
   - Power switch
   - Main transformer
   - Input rectifier
   - Heatsink fins
   - Auxiliary Transformer
   - Fans (Blow air through the rear louvers)
   - Reconnect switch area

2. Examine the sheet metal case for dents or breakage. Repair the case as required. Keep the case in good condition to ensure that high voltage parts are protected and correct spacing is maintained throughout. All external sheet metal screws must be in place to ensure case strength and electrical ground continuity.

Periodic Maintenance

Thermal Protection

Thermostats protect the machine from excessive operating temperatures. Excessive temperatures may be caused by a lack of cooling air or operating the machine beyond the duty cycle and output rating. If excessive operating temperature should occur, the thermostat will prevent output voltage or current. The meter will remain energized during this time. Thermostats are self-resetting once the machine cools sufficiently. If the thermostat shutdown was caused by excessive output or duty cycle and the fan is operating normally, the Power Switch may be left on and the reset should occur within a 15 minute period.

Current Calibration

1. Connect a resistive load bank to the machine configured for 300A/20V (750A/50V equivalent).
2. Connect a certified calibrated current probe or current meter and shunt to the output circuit.
3. Disconnect input power from the machine being calibrated; remove the right case side to provide access to the User Interface. Set position “1” on the dip switch to “ON” as shown in Figure B.7. (Note: additional dip switch positions may be different than pictured below depending on the configuration of your machine. Refer to INTERNAL CONTROLS – ENABLING VRD, MULTI-WELD sections of the manual). Replace the right case side.
4. Rotate the Hot Start control and Arc Control knobs completely counter-clockwise.
5. Replace the right case side; reconnect input power to the machine and energize.
6. The display should read “Cur CAL”.
7. Rotate the Hot Start knob clockwise to enable the output which will be indicated by the scrolling message “AdJ Pot So rEAL Cur = 300 A” on the display.
8. The actual output current should be 300 +/- 2 A. If the actual output current is within the specified limits, skip to step 8.3. If the actual output current is not accurate perform the following:
   - Adjust the output control knob until the actual output current reading is within the specified range.
   - Toggle the Local/Remote switch to save the calibration. The display should flash “CAL SEt”.
   - Rotate the Hot Start knob counter-clockwise to disable the output.
9. Disconnect input power from the machine being calibrated; remove the right case side to provide access to the User Interface. Set position “1” on the dip switch back to “OFF”.

CURRENT CALIBRATION COMPLETE

Voltage Calibration

1. Connect a resistive load bank to the machine configured for 300A/20V (750A/50V equivalent).
2. Connect a certified calibrated voltmeter to the output circuit. Note: High speed voltage transients associated with inverter welders output can adversely affect the accuracy of some metering equipment. The M25303 low pass filter supplied with the K4171-1 Power Wave Calibration Kit is strongly recommended between the meter and the power source to reduce this effect.
3. Disconnect input power from the machine being calibrated; remove the right case side to provide access to the User Interface. Set position “1” on the dip switch to “ON” as shown in Figure #8. (Note: additional dip switch positions may be

different than pictured below depending on the configuration of your machine. Refer to INTERNAL CONTROLS – ENABLING VRD, MULTI-WELD sections of the manual). Replace the right case side.
4. Rotate the Hot Start control and Arc Control knobs completely counter-clockwise.
5. Replace the right case side; reconnect input power to the machine and energize.
6. The display should read “Cur CAL”.
7. Rotate the Arc Control knob until the display reads “VoL CAL”.
8. Rotate the Hot Start knob clockwise to enable the output which will be indicated by the scrolling message “AdJ Pot So rEAL VoL = 20 VoL” on the display.
9. The actual output voltage should be 20 +/- 0.5 V. If the actual output voltage is within the specified limits, skip to step 9.3. If the actual output voltage is not accurate perform the following:
    - Adjust the output control knob until the actual output voltage reading is within the specified range.
    - Toggle the Local/Remote switch to save the calibration. The display should flash “CAL SEt”.
    - Rotate the Hot Start knob counter-clockwise to disable the output.
10. Disconnect input power from the machine being calibrated; remove the right case side to provide access to the User Interface. Set position “1” on the dip switch back to “OFF”.

VOLTAGE CALIBRATION COMPLETE

To Restore Factory Current Calibration

1. Connect the resistive load bank and test voltmeter to the welding output terminals.
2. Disconnect input power from the machine being calibrated; remove the right case side to provide access to the User Interface. Set position “1” on the dip switch to “ON” as shown in Figure #8.
3. Rotate the Hot Start control and Arc Control knobs completely counter-clockwise.
4. Reconnect input power to the machine and energize.
5. The display should read “Cur CAL”.
6. Rotate the Arc Control knob until the display reads “Fct Cur”.
7. Rotate the Hot Start knob clockwise until a message scrolls across the screen.
8. Toggle the Local/Remote switch to save the calibration. The display should flash “CAL SEt”.
9. Rotate the Hot Start knob counter-clockwise to disable the output.
10. Disconnect input power from the machine; remove the right case side to provide access to the User Interface. Set position “1” on the dip switch back to “OFF”.

To Restore Factory Voltage Calibration

1. Connect the resistive load bank and test voltmeter to the welding output terminals.
2. Disconnect input power from the machine being calibrated; remove the right case side to provide access to the User Interface. Set position “1” on the dip switch to “ON” as shown in Figure#8.
3. Rotate the Hot Start control and Arc Control knobs completely counter-clockwise.
4. Reconnect input power to the machine and energize.
5. The display should read “Cur CAL”.
6. Rotate the Arc Control knob until the display reads “Fct Vol”.
7. Rotate the Hot Start knob clockwise until a message scrolls across the screen.
8. Toggle the Local/Remote switch to save the calibration. The display should flash “CAL SEt”.
9. Rotate the Hot Start knob counter-clockwise to disable the output.
10. Disconnect input power from the machine; remove the right case side to provide access to the User Interface. Set position “1” on the dip switch back to “OFF”.

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 respon- sibility 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.

WEEE

07/06

English

Do not dispose of electrical equipment together with normal waste!
In observance of European Directive 2012/19/EC on Waste Electrical and Electronic Equipment (WEEE) and its implementation in accordance with national law, electrical equipment that has reached the end of its life must be collected separately and returned to an environmentally compatible recycling facility. As the owner of the equipment, you should get information on approved collection systems from our local representative.
By applying this European Directive you will protect the environment and human health!

Spare Parts

12/05

For Spare Parts references visit the Web page: https://www.lincolnelectric.com/LEExtranet/EPC/

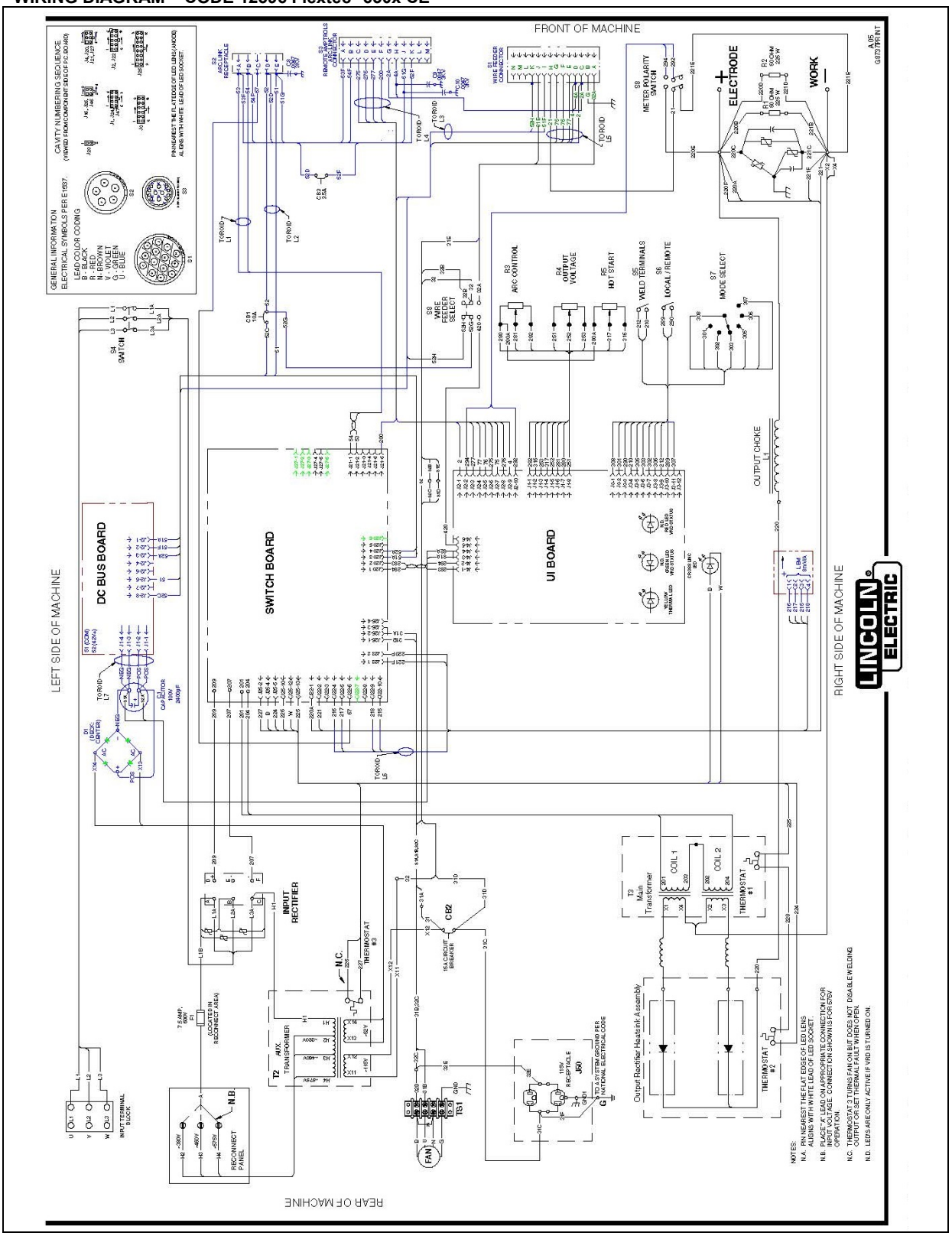
Authorized Service Shops Location

09/16

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

Electrical Schematic

WIRING DIAGRAM – CODE 12596 Flextec® 650x CE



NOTE: this diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a partiuclar code is pasted inside the machine on one of the enclosure panels. If the diagram is ellegible, write to the Service Department for a raplacement. Give the equipment code number.

Suggested Accessories

Optional Kits & Accessories.		
Item	**Description**	**Picture**
K3059-4	**Inverter and Wire Feeder Cart.** Rear-wheeled cart with front casters and gas bottle platform. Convenient handles allow for easy cable storage. Small footprint fits through 30 in. (762 mm) door. Not intended for use with double head wire feeders.	
K3091-1	**Multi-Process Switch.** Easily switch between CC and CV processes. Requires Locking Foot Kit (K4424-1).	
K10376	**Adapter M14/Dinse(F)** (2 pieces necessary)	
K2909-1	**12-pin to 6-pin Adapter**	
K2910-1	**7-pin to 12-pin Adapter**	
K1842-10 (3m) K1842-35 (10.6m) K1842-60 (18.3m) K1842-110 (33.5m)	**Weld Power Cable - Lug to Lug** **600A 60%**	

Stick Options		
K857-2	**12-pin Remote Output Control with Universal Connector.** Permits remote adjustment of output.	
K10095-1-15M	**Remote control** (6PIN, 15m)	
K10398	**Extension cable** for remote control box K10095-1-15M, 15m	
GRD-400A-70-xM*	**Ground cable** 400A 70 mm²; x=5/10/15 m	
E/H-400A-70-xM*	**Electrode holder** 400A/70mm²; x=5/10m	
KIT-400A-70-5M	**Cable kit** 400A, 70mm2, 5m	
Tig Options		
K870-2	**Foot Amptrol®.** Provides 25 ft. (7.6 m) of remote current control for TIG welding. (12-pin plug connection).	

K963-4	**Hand Amptrol®** - Provides 25 ft. (7.6 m) of remote current control for TIG welding. (12-pin plug connection)	
K10529-26-4V	**Linc Torch Premium LTP 26 GV**, manual valve 4m	
FL060583010	**FLAIR 600** Gouging torch with mounted lead 2,5m