LINCOLN ELECTRIC

Operator's Manual

Cooper Welding Cart - FANUC CRX Operator's Manual

GENUINE LINCOLN PARTS™

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THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com

THANK YOU FOR SELECTING A QUALITY PRODUCT BY LINCOLN ELECTRIC.

PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

SAFETY DEPENDS ON YOU

Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.

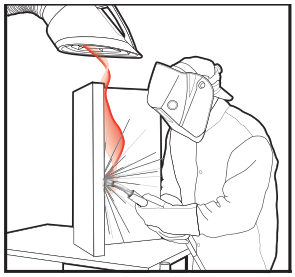
⚠ WARNING

This statement appears where the information must be followed exactly to avoid serious personal injury or loss of life.

⚠ CAUTION

This statement appears where the information must be followed to avoid minor personal injury or damage to this equipment.

KEEP YOUR HEAD OUT OF THE FUMES.



DON'T get too close to the arc. Use corrective lenses if necessary to stay a reasonable distance away from the arc.

READ and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.

USE ENOUGH VENTILATION or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.

IN A LARGE ROOM OR OUTDOORS, natural ventilation may be adequate if you keep your head out of the fumes (See below).

USE NATURAL DRAFTS or fans to keep the fumes away from your face.

If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.

WEAR CORRECT EYE, EAR & BODY PROTECTION

PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate (See ANSI Z49.1).

PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.

PROTECT others from splatter, flash, and glare with protective screens or barriers.

IN SOME AREAS, protection from noise may be appropriate.

BE SURE protective equipment is in good condition.

Also, wear safety glasses in work area **AT ALL TIMES.**

SPECIAL SITUATIONS

DO NOT WELD OR CUT containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned. This is extremely dangerous.

DO NOT WELD OR CUT painted or plated parts unless special precautions with ventilation have been taken. They can release highly toxic fumes or gases.

Additional precautionary measures

PROTECT compressed gas cylinders from excessive heat, mechanical shocks, and arcs; fasten cylinders so they cannot fall.

BE SURE cylinders are never grounded or part of an electrical circuit.

REMOVE all potential fire hazards from welding area.

ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT.

SECTION A: WARNINGS

CALIFORNIA PROPOSITION 65 WARNINGS

WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects, or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an exposed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65 warnings.ca.gov/diesel

WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code § 25249.5 *et seq.*)

WARNING: Cancer and Reproductive Harm www.P65warnings.ca.gov

ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

FOR ENGINE POWERED EQUIPMENT.

1.a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.

1.b. Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

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

1.d. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

1.e. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

1.f. To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

1.g. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

1.h. Using a generator indoors CAN KILL YOU IN MINUTES.

1.i. Generator exhaust contains carbon monoxide. This is a poison you cannot see or smell.

1.j. NEVER use inside a home or garage, EVEN IF doors and windows are open.

1.k. Only use OUTSIDE and far away from windows, doors and vents.

1.l. Avoid other generator hazards. READ MANUAL BEFORE USE.

ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS

2.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines

2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

2.d.1. Route the electrode and work cables together - Secure them with tape when possible.

2.d.2. Never coil the electrode lead around your body.

2.d.3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

2.d.5. Do not work next to welding power source.

ELECTRIC SHOCK CAN KILL.

3.a. The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- Semiautomatic DC Constant Voltage (Wire) Welder.
- DC Manual (Stick) Welder.
- AC Welder with Reduced Voltage Control.

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e. Ground the work or metal to be welded to a good electrical (earth) ground.

3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically “hot” parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

3.j. Also see Items 6.c. and 8.

ARC RAYS CAN BURN.

4.a. 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 open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.

4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES CAN BE DANGEROUS.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding hardfacing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also be required. Additional precautions are also required when welding on galvanized steel.**

5. b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.j.

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WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.

6.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.

6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).

6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

6.h. Also see item 1.b.

6.i. Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, MA 022690-9101.

6.j. Do not use a welding power source for pipe thawing.

CYLINDER MAY EXPLODE IF DAMAGED.

7.a. 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. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c. Cylinders should be located:

- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.

7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-l, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 14501 George Carter Way Chantilly, VA 20151.

FOR ELECTRICALLY POWERED EQUIPMENT.

8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.

8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.

8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

Refer to http://www.lincolnelectric.com/safety for additional safety information.

ELECTROMAGNETIC COMPATIBILITY (EMC)

CONFORMANCE

Products displaying the CE mark are in conformity with European Community Council Directive of 15 Dec 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility, 2014/30/EU. It was manufactured in conformity with a national standard that implements a harmonized standard: EN 60974-10 Electromagnetic Compatibility (EMC) Product Standard for Arc Welding Equipment. It is for use with other Lincoln Electric equipment. It is designed for industrial and professional use.

INTRODUCTION

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

Warning: This Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There may be potential difficulties in ensuring electro-magnetic compatibility in those locations, due to conducted as well as radiated disturbances.

This machine has been designed to operate in an industrial area. 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. This equipment does not comply with IEC 61000-3-12. If it is connected to a public low-voltage system, it is responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment may be connected.

INSTALLATION AND USE

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

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

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

ASSESSMENT OF AREA

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

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

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

METHODS OF REDUCING EMISSIONS

Public Supply System

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

Maintenance of the Welding Equipment

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

Welding Cables

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

Equipotential Bonding

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

Earthing of the Workpiece

Where the workpiece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, e.g., ship's hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

Screening and Shielding

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

Section 1
PREPARATION AND SETUP

INTRODUCTION TO FANUC CRX COLLABORATIVE ROBOT/CONTROLLER

The Cooper CRX Collaborative Robot (Cobot) Cart (1) is a mobile robotic welding push cart that incorporates a FANUC CRX-10iA/L (or the CRX-25iA) Cobot. The system is designed to meet ANSI/ RIA 15.06-2012 specifications for equipment safety, employing a single operating zone. The Cobot has force sensors that trigger an immediate safety stop at the touch of a human body or any other object.

Figure 1-1

INTENDED OR PROPER USE OF THE EQUIPMENT

This equipment is intended for use exclusively as a robotic system for metal inert gas (MIG) shielded welding of steel or aluminum components. These components are held in welding position by specifically designed tooling fixtures.

This equipment is intended to be used only in indoor environments. Models with casters should only be used in a leveled position, with all casters firmly on the floor in the locked/braked position. Certain models may be configured for transportation by cranes and/or forklifts; however, this system should never be operated while suspended or elevated.

Measures need to be taken to safeguard people who work with the system. The relevant safety measures that are taken must consider all risks and hazards that may arise when working with the robotic welding system. The end user has the responsibility to ensure that a proper risk assessment of the system is performed prior to use. Lincoln Electric's risk assessment covering the foreseeable hazards of this system is attached at the end of this manual. The end user must consider all hazards and risks present in the workplace where the system is operated, and take appropriate safety measures, including those that may arise when working with this system.

End users must observe all safety guideline instructions in the operating manual for this system, and in any component instruction manual. Inspections and maintenance work should only be done by qualified individuals, who are also familiar with the safety and instruction literature.

REASONABLY FORESEEABLE MISUSE OF THE EQUIPMENT

Any procedure, other than what is specified in the "Intended or Proper Use of the Equipment" section, that goes beyond the above-mentioned "Intended or Proper Use of the Equipment" is considered improper use. This includes, but not limited to, loading the robot at a higher weight and volume, providing different than what is specified as incoming voltage, power feeder protection and capacity, attempts to weld with different materials other than steel or aluminum, or welding using different weld processes other than MIG.

MODIFICATION OF THIS SYSTEM

The system shall not be modified in any way. Modifications could affect its performance, safety or durability, increase risks of serious injury and/or death, and possibly violate ANSI/RIA 15.06-2012 safety requirements. In addition, damage or performance problems resulting from modification will not be covered under the Lincoln Electric warranties.

WHEN READING THIS MANUAL

This manual includes information for all options available on this type of equipment. Therefore, you may find some information that does not apply to your system. All information, specifications and illustrations in this manual are those in effect at the time of printing. Lincoln Electric reserves the right to change specifications or design at anytime without notice.

INTRODUCTION TO THE COOPER WELDING COBOT

The Cooper CRX Cobot is designed to safely operate alongside an operator, so only one person should be operating the Cobot at anytime. In each axis, and/or joint, of the Cobot arm there are force sensors that trigger an immediate safety stop when it comes into contact with a human body or any other object.

The Cooper Welding Cobot Cart comes configured on Lincoln Electric's Generation II Universal Cart. The Fanuc CRX-10iA/L (1) and/or CRX-25iA/L (2) as either an air or water-cooled welding system, that comes setup to weld 0.035 in. or 0.045 in. solid wire welding process; these are the most common wire diameter sizes and type used across many industries that weld. Operators are able to change the liners, drive-rolls, and contact tips in order to weld different size wires, along with other processes, like flux-cored wire welding.

Figure 1-2

To register the Cooper Cobot, please visit lincolnelectric.com

or use the QR code below:

COOPER WELDING COBOT POWER REQUIREMENTS

Fanuc R-30iB PLUS Mini Robot Controller:

120V single phase power- plugged into a standard 15 or 20 Amp utility outlet.

Note: Please see the PowerWave R450 Operators Manual for all power configurations.

Power Source-Input Voltage and Current					
Model	**Duty Cycle**	**Input Voltage ±10%**	**Input Amps**	**Idle Power**	**Power Factor at Rated Output**
K3451-1 K3451-2 Code 13386 and Above	100% Rating	208/230/1 50/60 Hz	57/52	500 Watts Max (Fan On)	0.89/0.87
			80/73/41/37/29		
			60/54/31/27/21		
K3451-1	40% Rating	208/230/400*460/575/3 50/60 Hz (includes 380V to 415V)	80/73/41/37/29		0.95
K3451-2					
All Codes	100% Rating		60/54/31/27/21		

Rated Output									
Input Voltage/ Phase/ Frequency	**GMAW**			**SMAW**			**GTAW-DC**		
	40%	**60%**	**100%**	**40%**	**60%**	**100%**	**40%**	**60%**	**100%**
208/1/50/60	-	-	300 Amps 29V	-	-	275 Amps 31V	-	-	300 Amps 22V
230/1/50/60	-	-		-	-		-	-	
200-208-3-50-60	550 Amps 41.5V	500 Amps 39V	450 Amps 36.5V	550 Amps 42V	500 Amps 40V	450 Amps 38V	550 Amps 32V	500 Amps 30V	450 Amps 28V
230/3/50/60									
380/415/3/50/60									
460/3/50/60									
575/3/50/60									

Recommended Input Wire and Fuse Sizes[1]			
Input Voltage/ Phase/ Frequency	**Maximum Input Amp Rating and Duty Cycle**	**Cord Size (AWG Sizes[3] [mm²])**	**Time Delay Fuse or Breaker[2] Amp**
208/1/50/60	57A, 100%	4 (25)	80
230/1/50/60	52A, 100%	6 (16)	80
200-208/3/50/60	80A, 40%	4 (25)	100
230/3/50/60	73A, 40%	4 (25)	90
380-415/3/50/60	41A, 40%	8 (10)	60
460/3/50/60	37A, 40%	8 (10)	45
575/5/50/60	29A, 40%	10 (7)	35

Idle power is less than 50 watts when in Hibernation mode[4].

[1] Based on U.S. National Electrical Code.

[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 the current increases.

[3] Type SO cord or similar in 30° C ambient at effective current rating of unit.

[4] If supported by the robotic controller software version.

Cooper Welding Cobot Universal Cart Layout

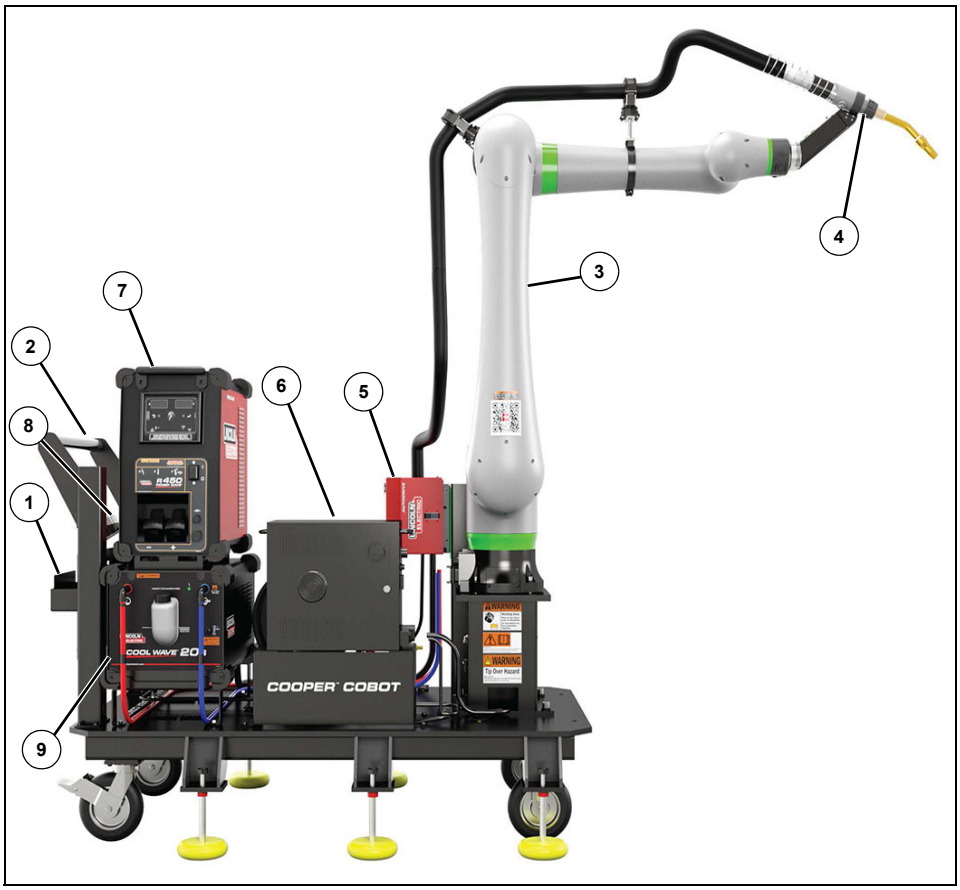

Figure 1-3: Cooper CRX-25iA Water-Cooled Wire Brake Cobot Cart

1. Fanuc CRX Pendant	4. Water-Cooled Welding Torch[1]	7. Power Wave R450
2. Gen II Universal Cooper Cart	5. AutoDrive 4R220 Wire Feeder[2]	8. Palm-Station Buttons
3. Fanuc CRX-25iA Cobot	6. R-30iB Mini Plus Controller	9. Cool Wave 20s

[1] Air-Cooled Welding Torch is for Cooper Air-Cooled Welding Cobots.

[2] Water-Cooled Welding Robots will use an AutoDrive 4R220 Wire Feeder

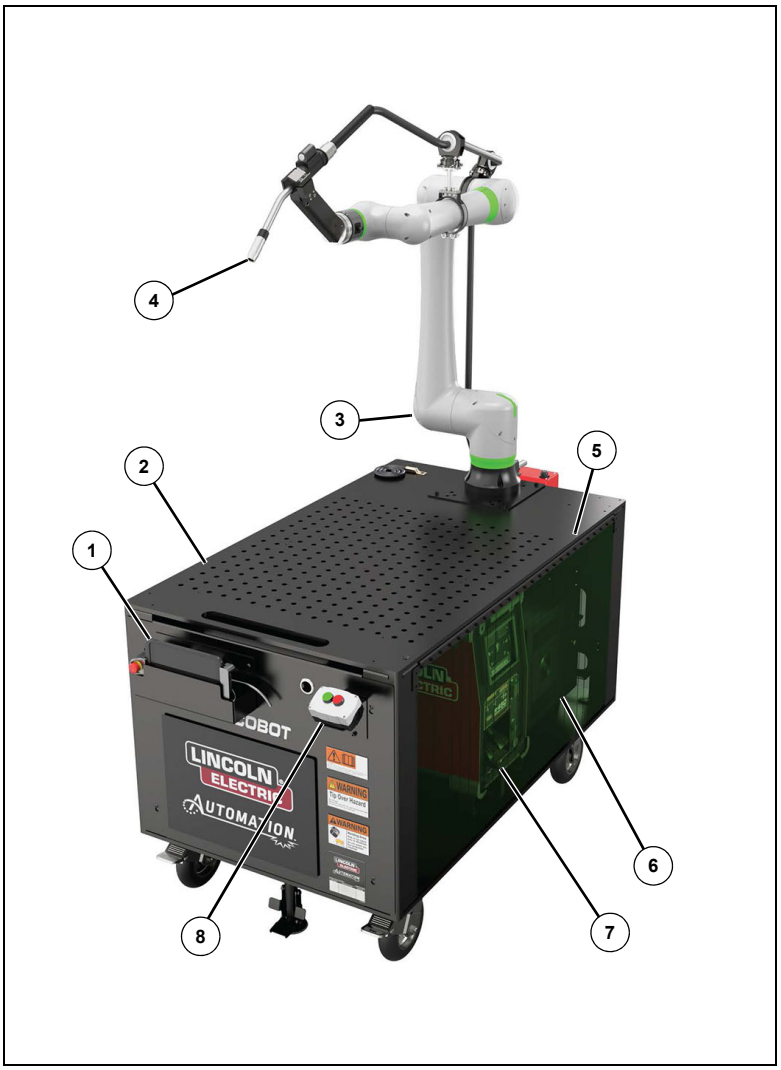

Figure 1-4: Cooper CRX-10iA Air-Cooled Wire Brake Cobot Cart

1. Fanuc CRX Pendant	4. Air-Cooled Welding Torch[1]	7. Power Wave R450
2. Gen II Universal Cooper Cart	5. AutoDrive 4R100 Wire Feeder[2]	8. Palm-Station Buttons
3. Fanuc CRX-10iA/L Cobot	6. R-30iB Mini Plus Controller	

[1] Air-Cooled Welding Torch is for Cooper Air-Cooled Welding Cobots.

[2] Water-Cooled Welding Cobots will use an AutoDrive 4R220 Wire Feeder.

COOPER WELDING COBOT UNIVERSAL CART DIMENSIONS

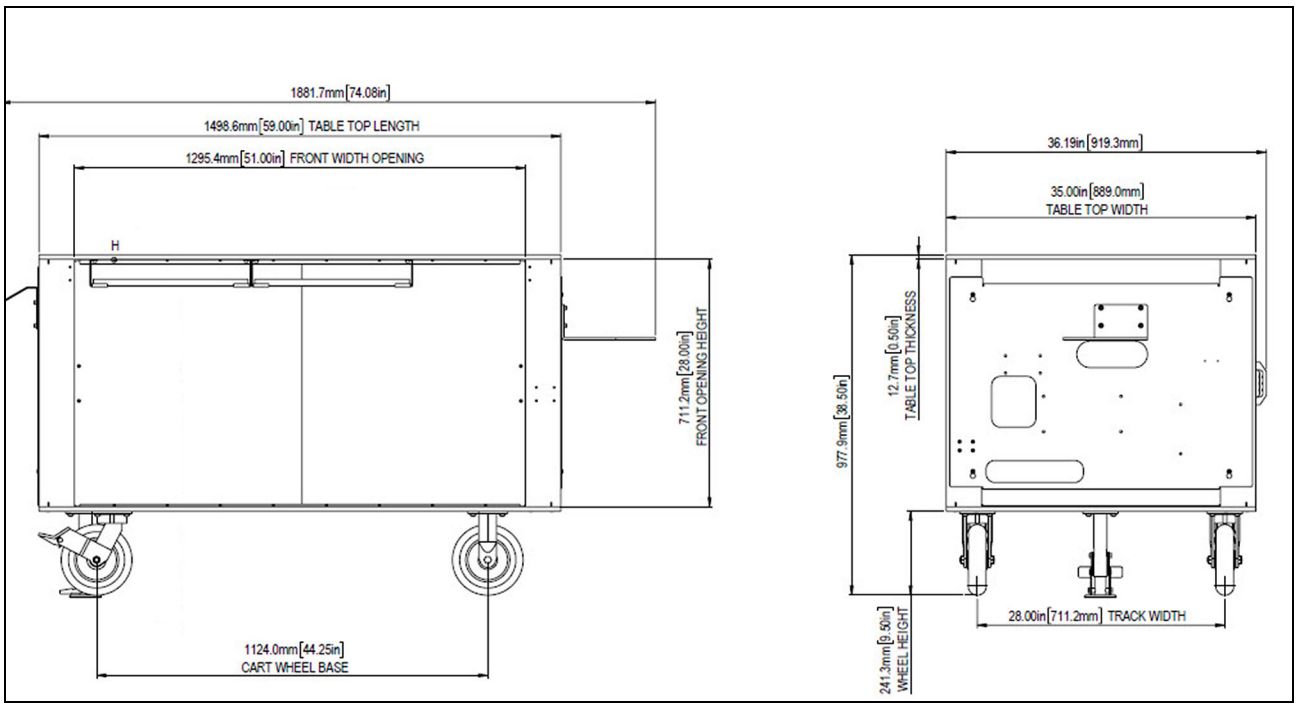

Figure 1-5: Gen. II Universal Cart for CRX-10iA/L

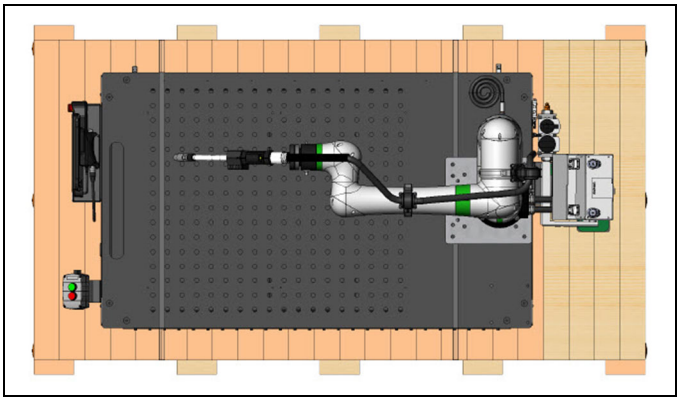

Figure 1-6: PerfectPoint and Power Ream Plus Installed

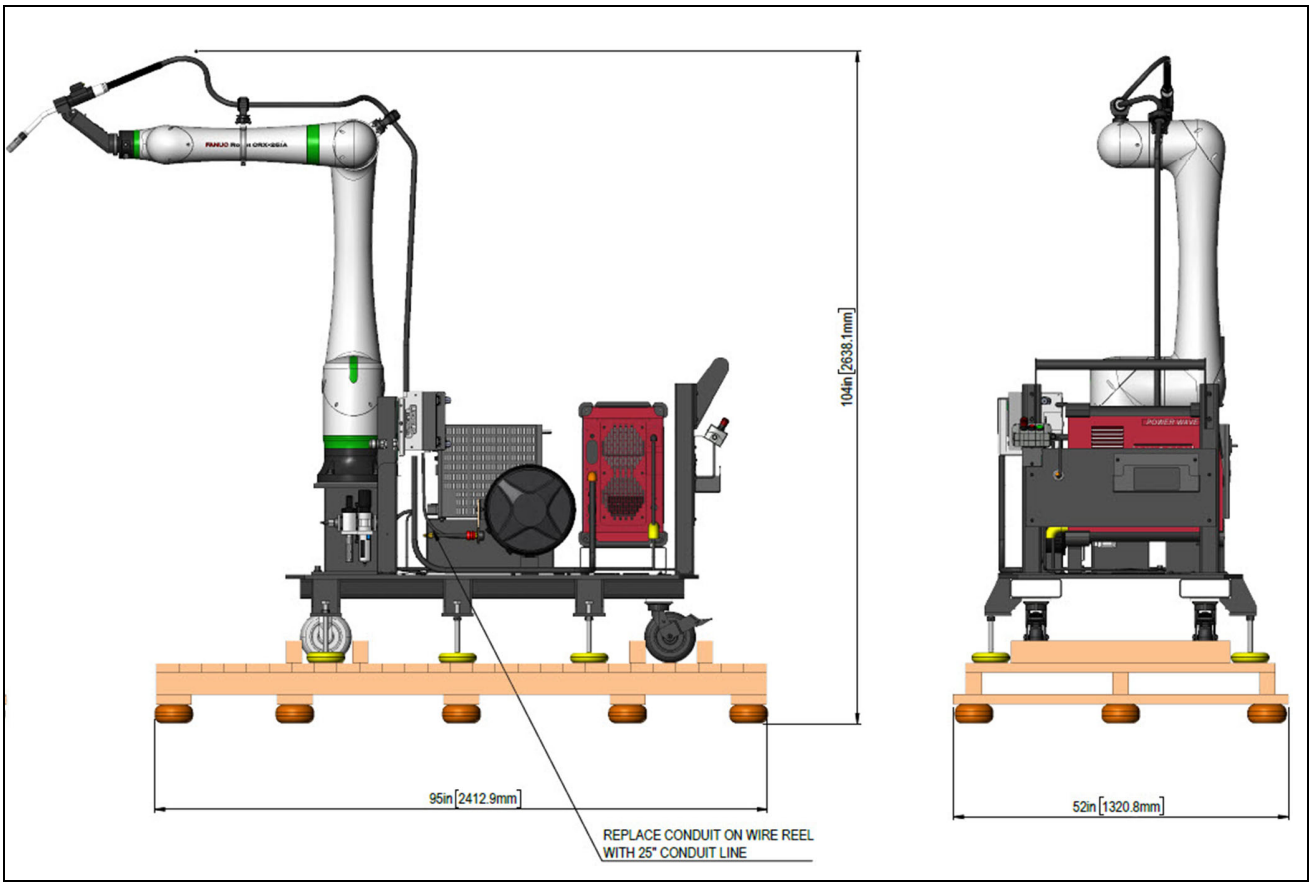

Figure 1-7: CRX-25iA Cobot Cart Dimensions

COOPER WELDING COBOT UNBOXING AND SETUP

⚠ WARNING

Ensure that unboxing area is clean of any obstructions and that all personnel are wearing proper personal protective equipment (PPE). Always use appropriate lifting device(s) when raising or lowering the welding cart. Ensure that the welding cart is always secure when raising or lowering the welding cart. Failure to follow these instructions can cause serious injury or machine damage.

⚠ WARNING

When unboxing the welding cart, some components secured to the side of the welding cart may have shifted during transportation. Remove shrink wrap and banding carefully.

1. The Cooper Welding Cobot will come shrink wrapped and banded to a LTL rated shipping pallet. Cut banding that secures the Cobot cart to the pallet. Using a forklift, lift and move the welding cart to the appropriate location and remove the shrink wrap.
2. Remove any loose items from the top of the welding cart.

⚠ WARNING

Before fully lifting the welding cart, ensure that the welding cart is well-balanced and secured to the lifting device.

3. Using an appropriate lifting device, raise the welding cart up from the bottom of the cart (1) and off of the shipping pallet.

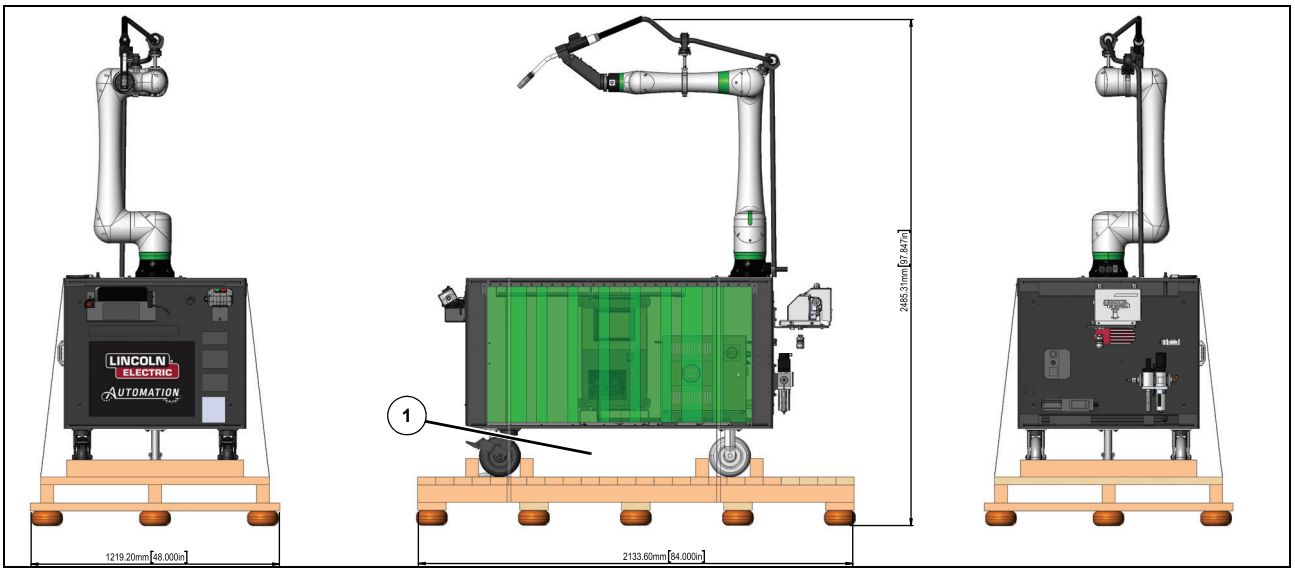

Figure 1-8

4. Wheel the welding cart to the desired location.

NOTE: The PowerWave R450 does not come equipped with a power cord, it must be purchased separately. Please make note of cord length and size before purchasing.

5. Unpack the welding cart. Ensure that all components are present and that there is no visible damage from shipping.
6. Plug in the PowerWave R450 and Cobot into their respective outlets.
7. Turn on all powered equipment and turn on all breakers on the welding cart.
8. Plug in the teach pendant. Turn on the teach pendant by pressing and holding the power button located on the top right side. The teach pendant will load and bring the operator to the main control screen.

For more information on the Cobot components, please see *Cooper Welding Cobot Universal Cart Layout on page 1-5*, *Reference Materials on page 1-11* and *Start-up Process on page 2-1*.

COLLABORATIVE ROBOT WORKING ENVELOPE

The Cobot work zone (1) for the Cobot Welding Arm is 55.8 in. (1418 mm). The safety zone (2) is 31 in. (800 mm). When setting up the Cobot cart, ensure that there are no obstacles within the Cobot work zone or the safety zone.

This entire area, with section 1 & 2 is a collaborative space according to part 5.11 of ANSI RIA R15.06-2012 Robots and Robotic Devices. That means that safe and collaborative operation of the robot and the end effector (torch) reach area. The end user, at this point, is solely responsible for electrical and welding bonding of the external to the cart structures. To ensure a safe and reliable operation, it is the responsibility of the end user to follow all the assembly instructions and to train all operators, maintenance personnel, and all other employees involved with the system. All relevant personnel shall study, based on their respective duties, the risk assessment performed by their facility or facility appointed third party.

Note: It is important to be mindful of collaborative speeds. Teaching speeds can be up around 750 mm/sec; operable speeds (i.e. while running a program) should not exceed 250 mm/sec to ensure safety for operators working collaboratively with the Cobot.

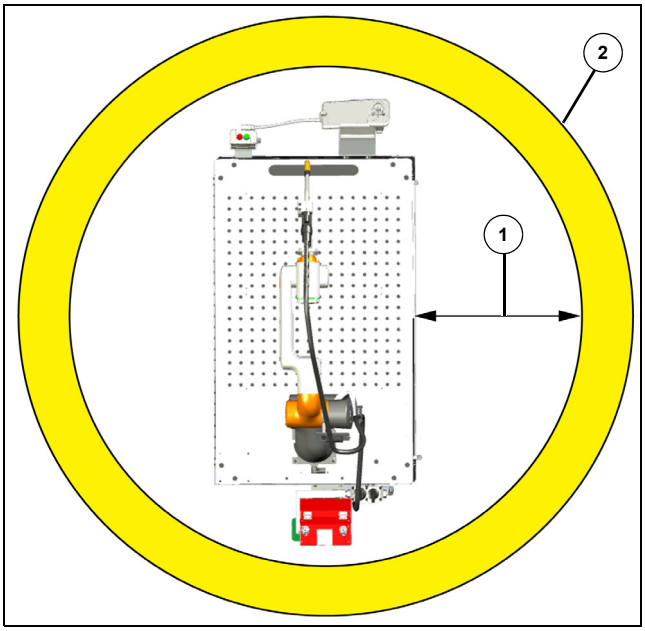

Figure 1-9

REFERENCE MATERIALS

For more information on the following operator manuals, see the link below this list:

- Cooper App
- Lincoln Electric Power Wave R450 Welding Power Supply

Figure 1-10

- Lincoln Electric Auto Drive 4R100 or 4R220 Wire Feeder

Figure 1-11

- MagnumPro Air Cooled Wire Brake Torch

Figure 1-12

• MAGNUM PRO Water Cooled Wire Brake Torch

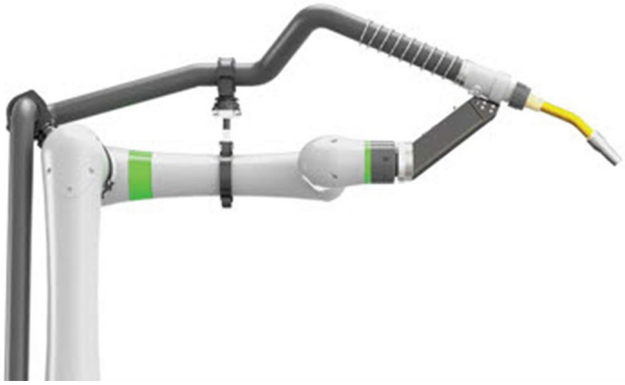

Figure 1-13

For more information, see

https://www.lincolnelectric.com/en/operators-manuals

or use the QR code below:

Section 2
FANUC CRX OPERATION

START-UP PROCESS

For more information on the Cobot welder start-up process, please see *Cooper Welding Cobot Unboxing and Setup on page 1-9*.

TEACH PENDANT OVERVIEW

Figure 2-1

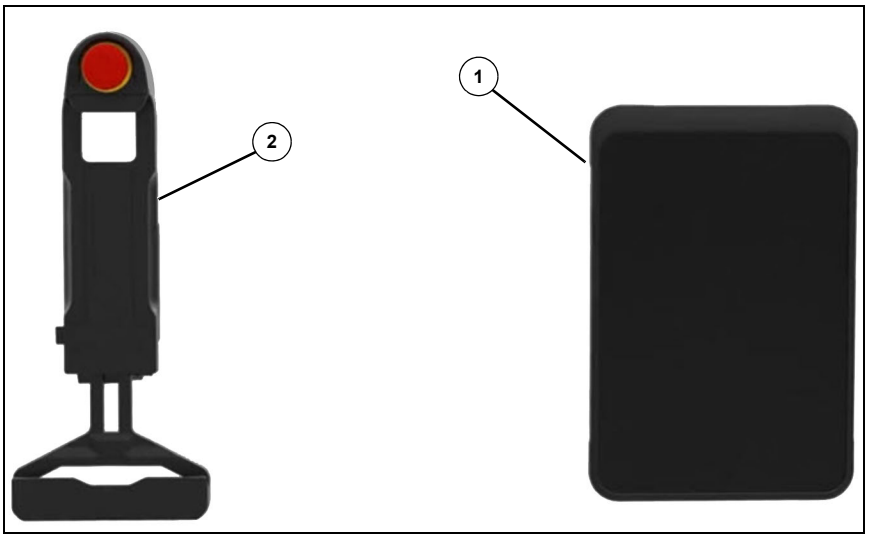

Figure 2-2

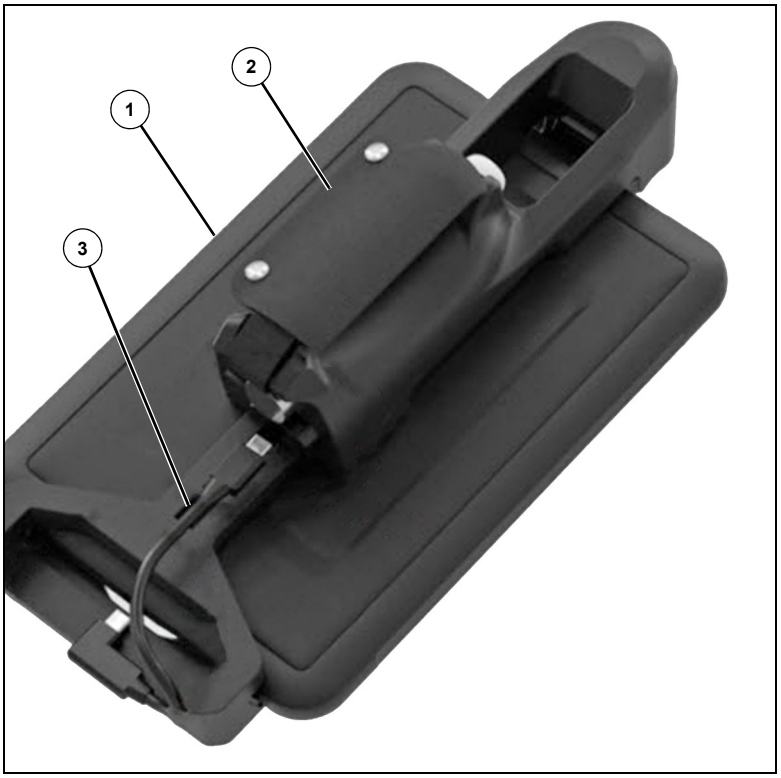

Figure 2-3

1. Connect USB cable (3) to teach pendant base (2) and tablet (1).

Figure 2-4

2. Connect teach pendant connection cable (4).

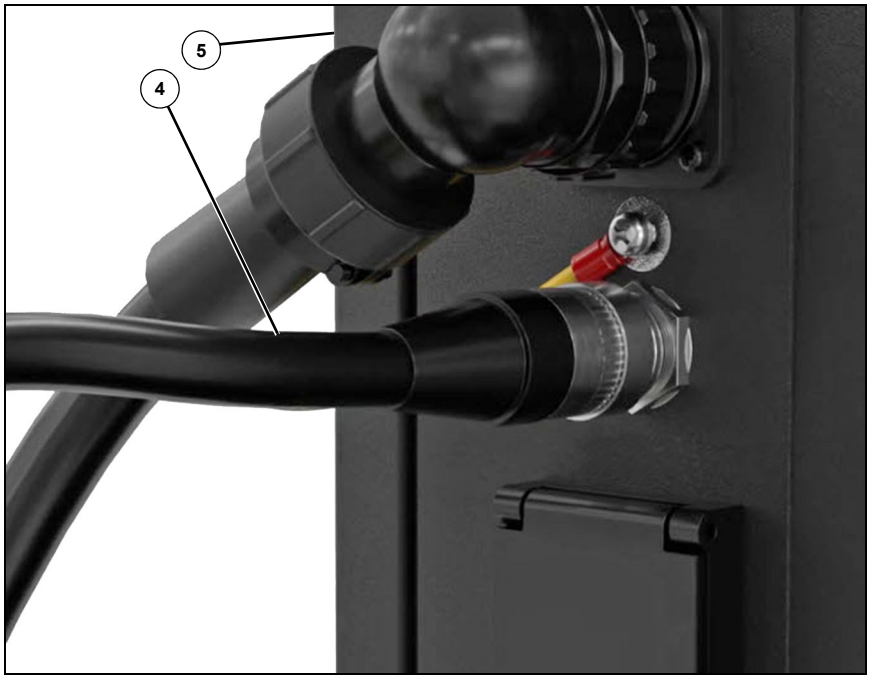

Figure 2-5

3. Attach teach pendant connection cable (4) to the base unit (5).

LIGHTS ON THE ARM AND THEIR MEANINGS

The indicating light on the base of the Cobot arm will either be red or green. Red light can indicate a fault or simply because it is not ready to be moved, and a green light on the Cobot base can indicate that the Cobot is ready to operate and be programmed. The green light will start blinking and then the robot can be freely moved by hand.

If a fault occurs during automatic operation, the system will stop. The indicating light in the base of the robot will turn red and the tablet will indicate fault conditions.

To recover from fault, determine and correct the fault condition(s). The tablet displays an error message, which defines the cause of the fault.

Touch the RESET button on the tablet or press red illuminated RESET button on the remote push button console. If all faults have been cleared, the system will be ready to resume operation. Press the RUN button on the tablet or press green START button on the remote push button console to resume operation.

HOW TO NAVIGATE TO UI TO CREATE A CUSTOM WELD DEFINITION

For more information on the Cooper App and creating a custom weld, please see the links below:

Cooper Welding Cobot Resources

Cooper App – Operators Manual

SHIPPING MODE STEPS

For CRX-10iA/L:

1. Move torch support (1) to the table top and secure using the bolts and nuts.
2. Position the Cobot as shown below using the following angles (+/- 1 degree):

Cobot Joint	Degrees
J1	+0°
J2	+45°
J3	-90°
J4	+0°
J5	+90°
J6	+0°

3. Place Cobot on shipping pallet and secure casters between 2x4 wood boards.

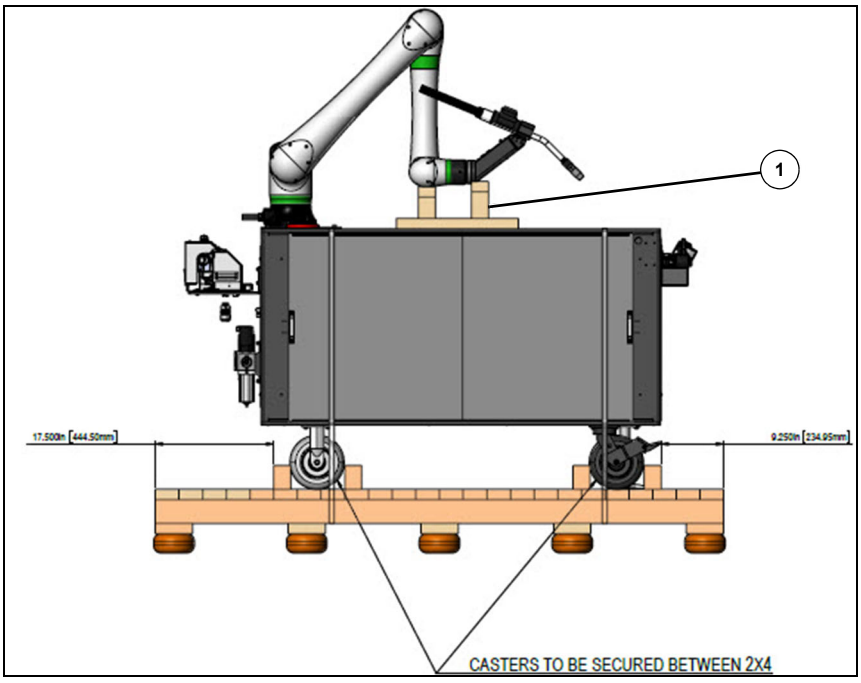

Figure 2-6

For CRX-25iA/L:

1. Move torch support (2) to the cart base plate and position as shown.
2. Position the Cobot as shown below using the following angles (+/- 1 degree):

Cobot Joint	Degrees
J1	+0°
J2	+0°
J3	-90°
J4	+180°
J5	-90°
J6	+0°

3. Wedge torch on cobot support and use foam protector between wood and torch.

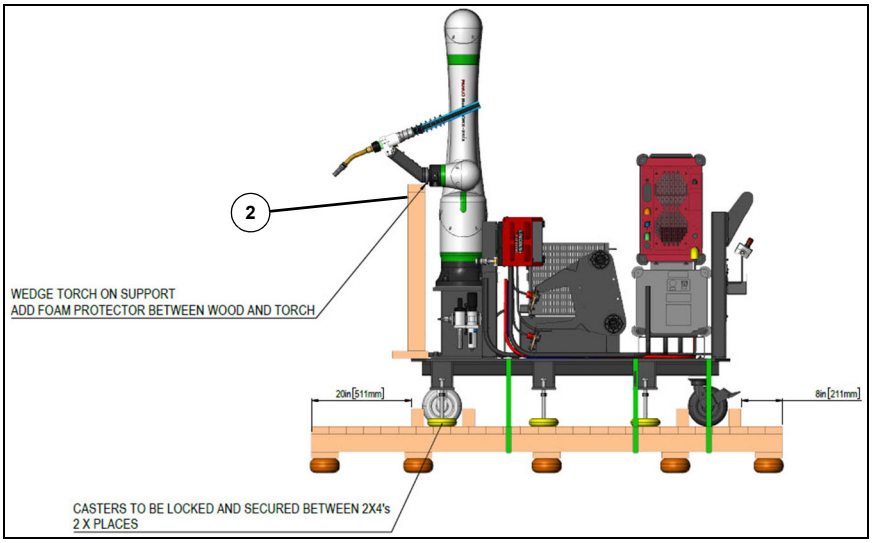

Figure 2-7

Use metal banding to secure cart to the skid, with cardboard protector between banding and cart to prevent marks and scratches to the cart. Banding to be tucked under cables to prevent cable damage.

Note: Use cardboard protectors between banding and cart to prevent damage to the cart.

4. Secure the Cobot using metal and/or robust material banding at two or more places.
5. For shipping dimensions, please see *Cooper Welding Cobot Unboxing and Setup on page 1-9*.

CRX & COOPER APP SOFTWARE UPDATE PROCESS

For more information on GoFa and Cooper App Software updates, please see the following link:

Software Update Process

Section 3
COOPER WELDING COBOT OPTIONAL EQUIPMENT

For more information on the following products:

- Lincoln Electric Power Ream Torch Cleaner
- Lincoln Electric PerfectPoint Automated TCP Solution

Please see,

https://www.lincolnelectric.com/en/operators-manuals

Or use the QR code below:

Section 4
MAINTENANCE

Before Each Use	Complete
• Check the machine and remove all objects that are not necessary for operation.	
• Check that exposed cables are not damaged in any way.	
• Check the connector terminations.	
• Inspect there is no oil leaking from the sealed part of each seal.	
• Check that there are no abnormal noises or vibrations.	

• Inspect the following:
  • Condition of the welding torch
  • Wear of the nozzle contact tip
  • Condition of the gas diffuser and the wire guide sleeve
  • Condition of the torch bundle	

Weekly Checks	Complete
• Check the working of all safety components.	
• Test the working of peripheral devices.	

• Clean the following:
  • Robot
  • Power source
  • Operating equipment
  • All the peripheral devices	

Monthly Checks	Complete
• Inspect the body and components of the welding torch.	
• Inspect the cable of the teaching tablet.	
• Check that the cooling fan is operating silently. • If the fan has collected dust, clean the fan.	
• Clean the wire feeder assembly.	
• Check that all the electrical terminals of the whole unit are tight.	
Yearly Checks	Complete
• Change the lithium cell of the processor or the front panel of the main control PCB.	

Section 5
COOPER WELDING COBOT PARTS CATALOG

Consumable Parts List

Cooper Cobot Fanuc CRX		
Part Number	**Quantity**	**Description**
Fanuc CRX Cobot		
S22320-1034	2	Encoder Battery (CRXiA requires 3 batteries)
S22320-16	1	CPU Battery
A2025507	1	R30IB Mini plus Spare Fuse Kit
AD1253-844	1	Tablet Teach Pendant with Fanuc TP APP Included
S22317-1060	1	Tablet Holder - Base Only
A2034533	1	Cobot Tablet Screen Protector
AD1253-840	1	USB-C Cable (tablet to base connection)
A2025506	1	CRX Teach Pendant Cable (5 m)
A2048837	1	Heat Exchanger Unit
A2054544	1	External Fan Unit for Controller (single fan unit)
A2054545	1	Fuse
A2049159	1	Main Board
A2054547	1	CPU Card
A2054548	1	From 256NM/SRAM 3MB
Lincoln Electric Magnum PRO Air Cooled Weld Torch		
K2647-11	1	A/C Robotic Torch (11 ft. long)
KP45-3545-15	1	Liner - 15 ft. for 0.035 in. and 0.045 in. Steel Wire
KP2747-1	1	Gas Diffuser
KP2743-1-62R	1	Gas Nozzle (thread on, 1/8 in. recessed, t/8 in. ID)
KP2773-1	1	Insulator
KP2745-045	10	Contact Tip 0.045 in.
KP2745-035	10	Contact Tip 0.035 in.
ED034270	1	SuperArc 0.035 in. L-59 Weld Wire (33 lb spool)
ED034271	1	SuperArc 0.045 in. L-59 Weld Wire (33 lb spool)

Cooper Cobot Fanuc CRX		
A2054549	1	EE Connector with Cable (K161)
Lincoln Electric Magnum PRO Water Cooled Weld Torch		
K5415-11	1	W/C Robotic Torch (11 ft. long) GOFA-5
K5415-13	1	W/C Robotic Torch (11 ft. long) GOFA-10
KP44-564-15	1	Liner - 15 ft. for 0.035 in. and 0.045 in. Steel Wire
K5386-2	1	Nose Cone Assembly
KP4403-22	1	Gun Tube
KP4380-1	1	Gas Diffuser
KP2745-045	10	Contact Tip 0.045 in.
KP2745-035	10	Contact Tip 0.035 in.
KP4714-1	1	Gooseneck Nut Wrench
K4214-1	1	Water Fitting Tool
KP4215-1	1	Water Fitting Repair (K4214-1 tool required)
KP4216-1	1	Gooseneck O-Ring Kit
Lincoln Electric Smart Torch Bracket		
A2038074-10M	1	Female Cable Connector, 8 Pin/M8, 10M
A3118126	1	Control Buttons and Harness 8 Pin
A3131205	1	M8 Cable, 8 Pin, Female to Female (Fanuc timeline EE jumper)
Lincoln Electric Wire Feeder 4R100 / 4R220		
S28460	1	Autodrive 4R100 Wire Drive-Motor Brush Kit
KP1505-035S	1	Drive Roll (035 STL)
KP1505-045S	1	Drive Roll (045 STL)

Spare Part Kits

Cooper Cobot CRX Welding Cobot				
Part Number	**Description**	**QTY**	**Part Number**	**Description**
AD2498-23	Spare Parts, CRX-25iA AC WB Torch	1	A2034533	Cobot Tablet Screen Protector
		1	A2025507	R30IB Mini and Spare Fuse Kit
		1	S22642-1	Fuse 7.5 Amp
		1	A2025506	CRX Teach Pendant Cable 5 m
		1	A4000016 (BOM)	Filter/Regulation Assembly (Includes: A2000045, A2000046, A2000047, A2000052, A2000053)
		1	A2000404	Solenoid Valve, 5/2 Module, G 1/8 in. Port
		1	A2010185	Cable, Pico QD 5M, 3 Pin
		1	A2051750	90° Elbow, 3/8 in. NPT Male Thread to 6 mm QD for Tubing
		1	K5481-13	Air Cooled Wire Brake Torch Bundle (wire feeder to contact tip) (25iA) 13 ft.

AD2498-24	CRX 10iA/L WC WB Torch	1	A2034533	Cobot Tablet Screen Protector
		1	A2025507	R30IB Mini and Spare Fuse Kit
		1	S22642-1	Fuse 7.5 Amp
		1	A2025506	CRX Teach Pendant Cable-5M
		1	A4000016 (BOM)	Filter/Regulator Assembly (Includes: A2000045, A2000046, A2000047, A2000052, A2000053)
		1	A2000404	Solenoid Valve, 5/2 Module, G 1/8 in. Ports
		1	A2010185	Cable, Pico QD 5M, 3 Pins
		1	A2051750	90° Elbow, 3/8 in. NPT Male Thread to 6 mm QD for Tubing
		1	KP5385-11	Cable Bundle (feeder to nosecone includes liner) (water-cooled)
		1	KP4403-22	22° Gun Tune (gooseneck) (water-cooled)
		1	K5386-2	Nose Cone with Wire Brake

AD2498-25	CRX25iA WC WB Torch	1	A2034533	Cobot Tablet Screen Protector
		1	A2025507	R30IB Mini and Spare Fuse Kit
		1	S22642-1	Fuse 7.5 Amp
		1	A2025506	CRX Teach Pendant Cable-5M
		1	A4000016 (BOM)	Filter/Regulator Assembly (Includes A2000045, A2000046, A2000047, A2000052, A2000053)
		1	A2000404	Solenoid Valve, 5/2 Module, G 1/8 in. Ports
		1	A2010185	Cable, Pico QD 5M, 3 Pins
		1	A2051750	90° Elbow, 3/8 in. NPT Male Thread to 6 mm QD for Tubing
		1	KP5385-13	Cable Bundle (feeder to nosecone, includes liner) (water-cooled) (25iA)
		1	KP4403-22	22° Gun Tube (gooseneck) (water-cooled)
		1	K5386-2	Nose Cone with Wire Brake

AD2498-26	0.035 in. AC WB Torch	1	KP45-3545-15	Liner-15 ft. for 0.035 in. and 0.045 in. Steel Wire
		1	KP2743-1-62R	Gas Nozzle (thread on, 1/8 in. recessed, 5/8 in. ID)
		1	KP2747-1	Gas Diffuser
		1	KP2773-1	Insulator
		10	KP2745-035	Contact Tip 0.035 in.
		1	KP3364-1	Jumpliner (0.035 in. and 0.045 in. steel wire)
		1	KP1505-035S	Drive Roll Kit (0.035 in., 4 roll)
		1	KP3979-1	Wire Guide
AD2498-27	0.045 in. AC WB Torch	1	KP45-3545-15	Liner-15 ft. for 0.035 in. and 0.045 in. Steel Wire
		1	KP2743-1-62R	Gas Nozzle (thread on, 1/8 in. Recessed, 5/8 in. ID)
		1	KP2747-1	Gas Diffuser
		1	KP2773-1	Insulator
		10	KP2745-045	Contact Tip 0.045 in.
		1	KP3364-1	Jumpliner (0.035 in. and 0.045 in. steel wire)
		1	KP1505-045S	Drive Roll Kit (0.045 in., 4 roll)
		1	KP3979-1	Wire Guide

AD2498-28	0.035 in. WC WB Torch	1	KP44-3545-15	Liner-15 ft. for 0.035 in. and 0.045 in. Steel Wire (water-cooled)
		1	KP4120-1-62R	Gas Nozzle (Thread ON, 1/8 in. Recessed, 5/8 in ID) (water-cooled)
		1	KP4380-1	Gas Diffuser (water-cooled)
		10	KP2735-035	Contact Tip 0.035 in.
		1	KP3364-1	Jumpliner (0.035 in. and 0.045 in. steel wire)
		1	KP1505-035S	Drive Roll Kit (0.035 in., 4 roll)
		1	KP5390-1	Wire Guide (water-cooled)
		1	KP4159-1	Lincoln Low Conductivity Coolant (1 gal.)

AD2498-29	0.045 in. WC WB Torch	1	KP45-3545-15	Liner-15 ft. for 0.035 in. and 0.045 in. Steel Wire
		1	KP4120-1-62R	Gas Nozzle (thread on, 1/8 in. Recessed, 5/8 in. ID) (water-cooled)
		1	KP4380-1	Gas Diffuser (water-cooled)
		10	KP2745-035	Contact Tip 0.045 in.
		1	KP3364-1	Jumpliner (0.035 in. and 0.045 in. steel wire)
		1	KP1505-045S	Drive Roll Kit (0.045 in., 4 roll)
		1	KP5390-1	Wire Guide (water-cooled)
		1	KP4159-1	Lincoln Low Conductivity Coolant (1 gal.)

AD2498-30	CRX 10iA/L AC WB Torch	1	A2034533	Cobot Tablet Screen Protector
		1	A2025507	R30IB Mini and Spare Fuse Kit
		1	S22642-1	Fuse 7.5 Amp
		1	A2025506	CRX Teach Pendant Cable (5m)
		1	A4000016 (BOM)	Filter/Regulation Assembly (Includes: A2000045, A2000046, A2000047, A2000052, A2000053)
		1	A2000404	Solenoid Valve, 5/2 Module, G 1/8 in. Port
		1	A2051750	90° Elbow, 3/8 in. NPT Male Thread to 6 mm QD for Tubing
		1	K5481-13	Air Cooled Wire Brake Torch Bundle (wire feeder to contact tip) 13 ft.

For more information, see

https://www.lincolnelectric.com/en/operators-manuals

or use the QR code below:

CUSTOMER ASSISTANCE POLICY

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WELD FUME CONTROL EQUIPMENT

The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

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