COLLABORATIVE ROBOT

LINC-COBOT CART

SAFETY INSTRUCTIONS FOR OPERATING AND MAINTENANCE

MACHINE No

AS-RM-2461-3 - AS-RM-91506401 - AS-RM-91506402 - AS-RM-91506403
AS-RM-91506096 - AS-RM-91506421 - AS-RM-91506422 - AS-RM-91506423
AS-RM-91506098 - AS-RM-91506441 - AS-RM-91506442 - AS-RM-91506443
AS-RM-91506460 - AS-RM-91506461 - AS-RM-91506462 - AS-RM-91506463

ISSUE : EN
REVISION : D
DATE : 12 - 2023

Instruction manual

REF : 8695 6990

Original instructions

LINCOLN ELECTRIC

Thank you very much for the trust you have shown by choosing this piece of equipment. It will give you trouble-free service if it is used and maintained as recommended.

Its design, component specifications and manufacturing are in accordance with applicable European directives.

Please refer to the CE declaration enclosed to identify the directives applicable to it.

The manufacturer shall not be liable for any combination of parts not recommended by it.

For your safety, please follow the non-limitative list of recommendations and obligations, a large part of which are included in the Labour Code.

Please inform your supplier if you find any error in this instruction manual.

Table of contents

INFORMATION

This manual and the product with which it is associated refer to the applicable standards in force.

Please read this document carefully before you install, use or maintain the machine. Keep this document in a safe place for future reference. This document must follow the machine described if there is a change in ownership of the machine and accompany it up to demolition.

Display and pressure gauge:

Measurement instruments or displays of voltage, intensity, speed, accuracy etc. are to be considered as indicators, whether they are analogue or digital.

For operating instructions, adjustments, troubleshooting and spare parts, please refer to the special instructions for safe operating and maintenance.

PLEASE CHECK THE BOX AND EQUIPMENT IMMEDIATELY FOR DAMAGE
When the equipment is shipped, ownership is transferred to the buyer as soon as it is received by the carrier. As a result, any complaints relating to damage during shipment must be made to the carrier's company when the equipment is received.

This technical literature is intended for the following machines or products:

- **AS-RM-2461-3 ☛ LINC-COBOT CART AIR LE550**
- **AS-RM-91506401 ☛ LINC-COBOT CART AIR LE550 S**
- **AS-RM-91506402 ☛ LINC-COBOT CART AIR LE550 T**
- **AS-RM-91506403 ☛ LINC-COBOT CART AIR LE550 ST**
- **AS-RM-91506096 ☛ LINC-COBOT CART WATER B500**
- **AS-RM-91506421 ☛ LINC-COBOT CART WATER BW500 S**
- **AS-RM-91506422 ☛ LINC-COBOT CART WATER BW500 T**
- **AS-RM-91506423 ☛ LINC-COBOT CART WATER BW500 ST**
- **AS-RM-91506098 ☛ LINC-COBOT CART WATER FX500**
- **AS-RM-91506441 ☛ LINC-COBOT CART WATER FX500 S**
- **AS-RM-91506442 ☛ LINC-COBOT CART WATER FX500 T**
- **AS-RM-91506443 ☛ LINC-COBOT CART WATER FX500 ST**
- **AS-RM-91506460 ☛ LINC-COBOT CART WATER LE550**
- **AS-RM-91506461 ☛ LINC-COBOT CART WATER LE550 S**
- **AS-RM-91506462 ☛ LINC-COBOT CART WATER LE550 T**
- **AS-RM-91506463 ☛ LINC-COBOT CART WATER LE550 ST**

REVISIONS

REVISION : A DATE : 04/22

DESCRIPTION	PAGE
Creation	

REVISION : B DATE : 09/23

DESCRIPTION	PAGE
Update	

REVISION : C DATE : 10/23

DESCRIPTION	PAGE
Update	

REVISION : D DATE : 12/23

DESCRIPTION	PAGE
LE550 Water torch added	

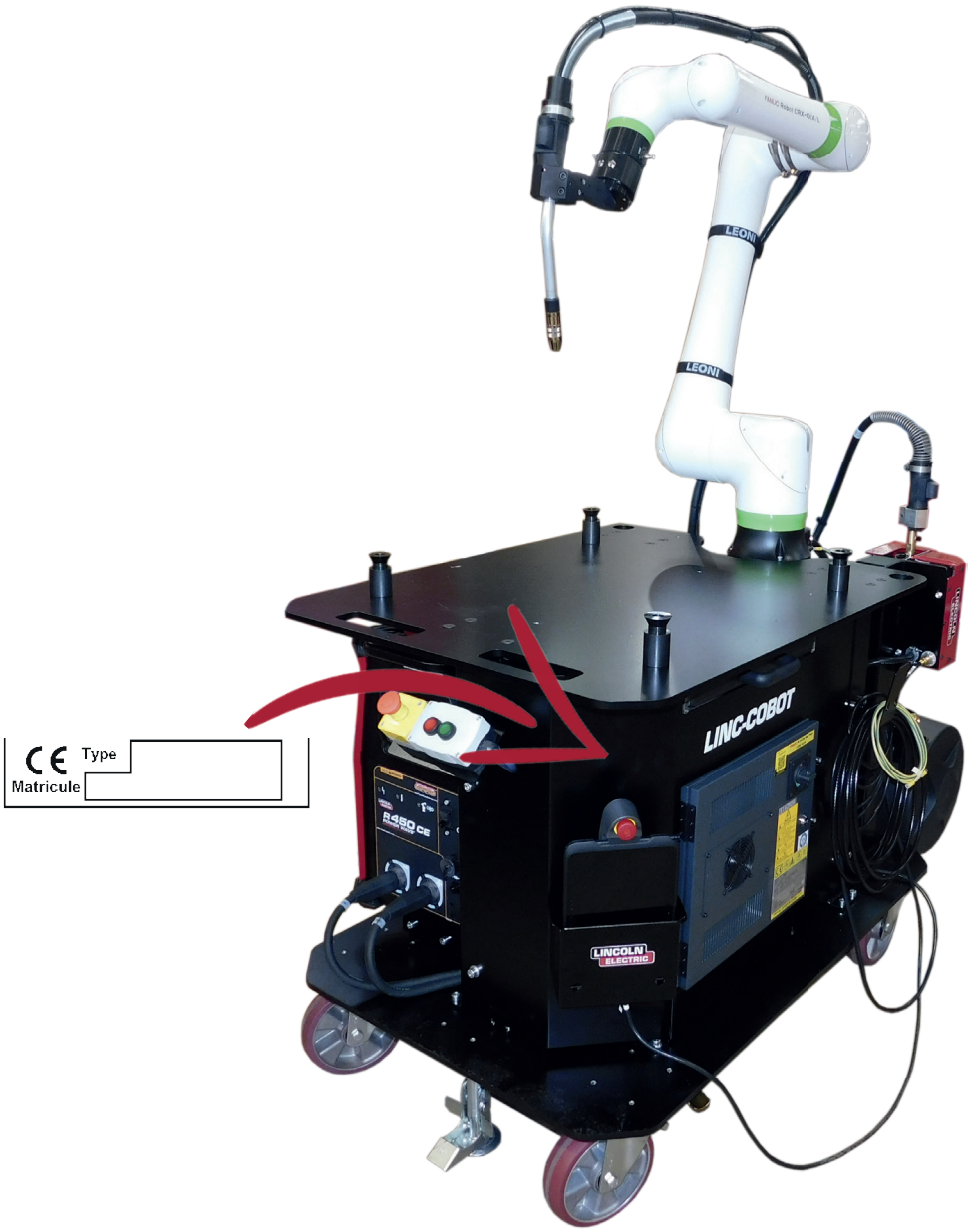
MEANING OF SYMBOLS

	Reading the manual/instructions is mandatory.		Indicates a hazard.
	Mandatory use of safety shoes.		Warning of an electricity risk or hazard.
	Mandatory use of hearing protection.		Warning of a risk or hazard due to an obstacle on the floor.
	Mandatory use of a safety helmet.		Warning of a risk or hazard of falling with a level change.
	Mandatory use of safety gloves.		Warning of a risk or hazard due to suspended loads.
	Mandatory use of safety glasses.		Warning of a risk or hazard due to a hot surface.
	Mandatory use of a safety visor.		Warning of a risk or hazard due to moving mechanical parts.
	Mandatory use of safety clothing.		Warning of a risk or hazard due to a closing movement of mechanical parts of a machine.
	Make sure you clean the working zone.		Warning of a risk or hazard due to laser radiation.
	Mandatory use of breathing protection.		Warning of a risk or hazard due to an obstacle at a height.
	Visual inspection required.		Warning of a risk or hazard due to the presence of a pointed part.
	Indicates a lubrication operation.		Wearers of pacemakers may not be admitted in the designated area.
	Requires maintenance action.		

A - IDENTIFICATION

Please note the registration number of your machine.

The information below should be provided in all correspondence.



B - SAFETY INSTRUCTIONS

For general safety instructions, please refer to the specific manual supplied with the equipment.

The Linc-Cobot Cart collaborative robot of Lincoln Electric is designed and manufactured to ensure safety. However, you can heighten the overall safety of your machine by installing it correctly and using it wisely.
MAKE SURE YOU DO NOT INSTALL, USE OR REPAIR THE EQUIPMENT WITHOUT FIRST READING THE SAFETY INSTRUCTIONS IN THIS MANUAL. Think before you act, and be careful.

All the service and maintenance personnel working with this equipment must necessarily have read and understood all the instructions in this manual.

The Linc Cobot is supplied configured for collaborative mode operation. The software configuration (maximum speed setting, safety subprogram, use of registries R190 to R199 etc.) MAY NOT BE modified . That could lead to a loss of collaborative features and potentially be hazardous for workers.

1 - Limits of use of the machine

The limits of use of the machine are provided in the different documents; please review them carefully before starting to use the machine.

Normal use of the machine:

- The machine may only be operated by a single person above the age of 18 and trained in operating and use-related risks.
- All maintenance must be carried out by specialised personnel who have read and understood this manual.
- Maintenance may only be carried out by experienced personnel who are trained in machine-related risks.
  Electricity technician: Qualified operator with the ability to work in normal conditions on electrical parts for regulation, maintenance and repair.
  Mechanical technician: Specialised technician authorised to carry out complex and exceptional mechanical operations.
- The machine may only be used for welding applications; any other use of the machine is forbidden.
- The use of Personal Protective Equipment (PPE) and work clothing covering the body is mandatory in the work area. Do not wear a tie and keep your hair tied back securely.

Reasonably foreseeable misuse:

- Operating and troubleshooting of the installation by several individuals.
- Operating of the installation by an individual not trained in its use.

Limit in time:

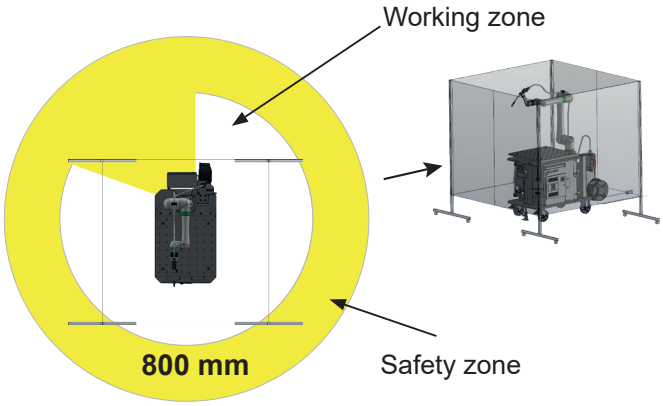
- The machine is designed to be used in one shift lasting 8 hours.
- Loading and unloading may only be carried out outside the welding cycle.
- Visually inspect the overall condition of the machine and the working area, at least:
  - ☛ twice in each shift, or,
  - ☛ with each change of place of the **Linc-Cobot Cart** or,
  - ☛ with each change of production.
- For any extended absence, the operator must shut off the supply of utilities (electricity and fluids).

Limits in space:

- The machine is designed for indoor use. It may not be used outdoors.
- The dimensions and weights of the workpieces must be appropriate for the installation.
- Access to the machine must be left free for maintenance (e.g. no workpiece etc.).

- The workshop must be adequately lit and ventilated.
- Before use, the operator must make sure that there is no risk of collision with personnel.

- For safety reasons, and in the light of our current knowledge of customer processes, the working area may be occupied only by one individual.
  Make sure that no part of the machine can come within less than 500 mm from an obstacle.
  Important: the operator passage way must absolutely be clear over a minimum width of 800 mm.
  The floor should be marked out.
  While accessing the marked area, a worker could be hit by a part of the installation.



- The working and safety area must be clear of all obstacles.

Other limits:

- The energy supply must imperatively comply with recommendations.
  The customer must supply and install a device for isolating each source of energy (electricity, air, gas and water). The devices must be clearly identified. They must be of the locking type.
- The machine is designed for professional use.
- The frequency of such maintenance is indicated for production in one work shift per day (i.e. 8 hours a day).
- Consumables must be changed based on their wear and tear.
- The maintenance schedule must absolutely be followed.
  We recommend putting in place a traced system for tracking all your maintenance operations.
- “No climbing on the structure of the machine other than on platforms or gangways designed for that purpose. To access equipment **at heights, the user must use accessing means in accordance with the regulations, such as a safe mobile walkway, an aerial lift etc.”.**
- Before using the machine, make sure that all the guards are in place. All guard covers must be screwed in.
- Only authorised personnel may access electrical cabinets, which must have locking systems.
- Clean the working area from time to time. The working area must remain clear of all obstacles.
- Never modify the machine.
- The **Linc-Cobot Cart** is not designed for anchoring handling equipment.
- With the exception of movement controls of the **Linc-Cobot Cart** and cell replacement, maintenance must be carried out with all the energy supplies switched off. The disconnection and padlocking of all energy sources is **mandatory**.
- For installation compliance, a system for extracting fumes must be put in place.
- For installation compliance, a system for visual protection from radiation must be put in place.
- Before use, the operator must make sure that there is no risk of collision with personnel.
- **IMPORTANT!** While handling plates, take the necessary precautions to avoid impacts on the machine.
- Follow applicable manual or mechanical handling rules while loading and unloading welded parts.
- It is absolutely necessary to anchor the cart to the ground (lock and stand) for safe use.
- **DO NOT RUN** with the cart.
- The gas cylinder must be handled alone, and may not be carried on the cart when the cart is moved.
- The **Linc-Cobot Cart** may not moved over a slope greater than 0.5°. Beyond that, the **Linc-Cobot Cart** must be moved using mechanical handling means, in accordance with the lifting recommendations stated in this operating manual.

2 - Residual risks

Based on the results of the risk assessment, a few elements have emerged where there was no “technical” solution for eliminating risk or making it negligible.

In spite of all the care that has gone into the designing of our machines, some risk areas remain. To control these risks, the customer must pay particular attention to them, ensure that the instructions are applied and define any additional measures that may be necessary in view of its own internal operating procedures.

Therefore, you will find below a guidance list of residual risks.

Training of operators in safety and in the use of the machine from their operating position will better address these residual risks.

We recommend putting in place workstation instructions that remind users of the presence or otherwise of residual risks in the working area.

2.1 - Residual risks - General

☛ Environment risk - slipping and/or falling

The working and safety area must be clear of all obstacles.

The working area must be kept clean and cleaned regularly.

The machine must undergo periodic maintenance (see maintenance instructions of each piece of equipment).

Waste consumables must be cleaned.

The operator must pay special attention to cables and rolling tracks on the ground.

The operator must use the necessary personal protective equipment (helmet, gloves, safety shoes, mask and work clothing).

Falling from heights:

In order to be protected from falling from heights and for safe access to high parts, the operator must use access means that comply with applicable standards.

For all work at heights, the use of personal protective equipment (helmet, gloves, safety shoes, mask, ear muffs and harness) is indispensable.

For all work at heights, the operator must be trained in the use of means for accessing high locations.

☛ Mechanical risk - Impacts, shearing, crushing

The operator may not wear loose clothing or a tie, must have their hair tied back and use personal protective equipment (helmet, gloves, safety shoes, mask and work clothing).

The operator must make sure that nobody else is close to the machine before starting.

The operator’s working position is before the control console.

The machine safety areas must not be crossed.

The operator must be trained in the use of the machine, and all personnel must be aware of residual risks.

When the machine is being handled with a lift truck or travelling crane, nobody must be located in the handling area.

Catching between an obstacle and the machine - Access to a moving part.

The operator must use personal protective equipment, (helmet, gloves, safety shoes, mask and work clothing).

The operator’s working position is before the control console.

The operator must make sure nobody is present in the machine working area or safety area before using it.

The operator must make sure that all the machine guards are in place before using it.

The operator must be trained in the use of the machine, and all personnel must be aware of residual risks.

Anchoring failure of handling equipment

The machine may not be modified.

The machine is not designed for anchoring lifting equipment.

Any change in the machine location must be made by **Lincoln Electric** or authorised personnel.

Presence of a person under the load

The operator must be trained and approved for the use of handling equipment.

The operator must be trained in the use of the machine, and all personnel must be aware of residual risks.

☛ **Mechanical risk - Puncturing or piercing**

The use of personal protective equipment (helmet, gloves, safety shoes, mask, ear muffs) is indispensable.

The operator must be trained in the use of the machine and all personnel must be aware of residual risks.

2.2 - Residual risks - Process

☛ **Electrical risk - Splattering of molten particles**

Splattering of molten material on flammable materials or personnel:

The working area must be kept clean and cleaned regularly.

Put guards in place around the torches depending on the working environment.

The use of personal protective equipment (helmet, gloves, safety shoes, mask, ear muffs, fire-resistant work clothing) is indispensable.

The operator must be trained in the use of the machine, and all personnel must be aware of residual risks.

The position of the production operator is located before the **Linc-Cobot Cart**.

☛ **Ergonomics risk - Fatigue**

Loading of heavy coils on coil carriers at a height:

The operator must use appropriate handling means.

The operator must be trained in the use of the machine, and all personnel must be aware of residual risks.

☛ **Material and product risks - Poisoning**

Fumes/gas discharged by the process:

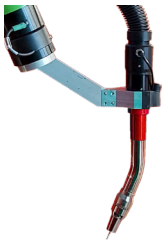
Provide for the use of extraction equipment (to be supplied by the customer).

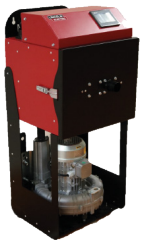
In accordance with the requirements under the applicable standard used by the French occupational safety organisations, **Lincoln Electric** recommends the use of means to extract welding fumes such as:

- **Mobiflex 200 M**:
  - Extraction arm capturing system
  - Flow rate at nozzle: 1200 m^3/hour
  - Minimum induced speed for pollutant emission: 0.5 m/s
  - The nozzle must therefore ideally be placed 300 mm away from the point of emission.

OR

- **Linc Extractor** + Fume extraction torch **Linc-Gun FX 500W**:
  - High-vacuum unit capturing system
  - Minimum induced speed for pollutant emission: 0.35 m/s
  - The flow rate must be 65 m^3/h at the nozzle.





The use of personal protective equipment (helmet, gloves, safety shoes, mask, ear muffs) is indispensable.

The operator must be trained in the use of the machine, and all personnel must be aware of residual risks.

☛ **Mechanical risk - Puncturing or piercing** 

Contact between the end of the filler wire and a part of the body

The use of personal protective equipment (helmet, gloves, safety shoes, mask, ear muffs) is indispensable.

The operator must be trained in the use of the machine and all personnel must be aware of residual risks.

☛ **Radiation risk - Eye and skin injuries** 

Arc flash

Put guards in place around the torches depending on the working environment.

The use of personal protective equipment (helmet, gloves, safety shoes, mask, ear muffs) is indispensable.

The operator must be trained in the use of the machine and all personnel must be aware of residual risks.

☛ **Thermal risk - Burns** 

Part of the body in contact with a hot part (torch/workpiece etc.)

The use of personal protective equipment (helmet, gloves, safety shoes, mask, ear muffs) is indispensable.

The operator must be trained in the use of the machine and all personnel must be aware of residual risks.

Welded parts can remain hot for a certain length of time.

☛ **Noise risk - Fatigue** 

Process noise

The use of personal protective equipment (helmet, gloves, safety shoes, mask, ear muffs) is indispensable.

The operator must be trained in the use of the machine and all personnel must be aware of residual risks.

☛ **Mechanical risk - Crushing** 

Handling of gas cylinders and/or racks

Gas cylinders must be transported securely strapped to a truck.

Racks are to be transported with appropriate handling equipment (e.g. travelling crane, lift truck).

The operator must be trained and approved for the use of handling equipment.

The use of personal protective equipment (helmet, gloves, safety shoes, mask, ear muffs) is indispensable.

☛ **Material and product risk - Explosion**

Storage of gas cylinders and/or racks near the machine

The storage must be sufficiently distant from the welding area and other sources of heat, in a ventilated location.

Cylinders must be secured.

The operator must be trained and personnel must be aware of how gas is used.

☛ **Electrical risk - Electrocution** 

Contact between the end of the feeder and a part of the body

The position of the production operator is located before the **Linc-Cobot Cart**.

3 - Electromagnetic compatibility (EMC)

Conformity

Products with CE marking comply with European Directives and regulations.
It is designed for use with other **Lincoln Electric** equipment. It is designed for industrial and professional use.

Introduction

All electrical equipment generates small quantities of electromagnetic emissions. Electrical emissions may be transmitted by electricity lines or radiated into space, just like a radio emitter. When emissions are received by other machines, electrical interference may occur. Electrical emissions may affect a number of types of equipment, other welding equipment located nearby, radio and TV reception, numerical control machines, telephone systems, computers etc.
Warning: This class A machine is not designed to be used in residential locations where the electricity is supplied by the public low-voltage system. It may be potentially difficult to ensure electromagnetic compatibility in such locations, due to conducted and radiated interference.

Installation and use

The user is responsible for installing and using the welding equipment in accordance with the manufacturer's instructions. If any electromagnetic disturbance is detected, the user of the welding equipment is responsible for solving the problem with the technical assistance of the manufacturer. In some cases, such corrective action may be as simple as connecting the welding circuit to the earth. In other cases, that may require the construction of an electromagnetic screen enclosing the power source and the entire job with the associated input filters. In any case, electromagnetic disturbance must be reduced to a point where it is no longer a problem.
NB: The welding circuit may be connected to the earth or not for safety reasons. Follow your local and national standards for installation and use. Earthing arrangements may only be modified with the permission of a competent individual capable of assessing whether the modifications could increase the risk of injury, for example by permitting parallel welding current return paths that could damage the earth circuits of other equipment.

Area assessment

Before installing the welding equipment, the user must assess the potential electromagnetic problems in the surrounding area. The following must be taken into account:

- Other power supply cables, control, signalling and telephone cables; above, below and near the welding equipment,
- Radio and television emitters and receivers,
- Computers and other control equipment,
- Safety-critical equipment, such as protection for industrial equipment,
- The health of the people in the vicinity, for instance the use of cardiac pacemakers and hearing devices,
- Equipment used for calibration or measurement,
- The immunity of other equipment in the environment. The user must make sure that the other equipment used in the environment is compatible. That may make it necessary to take additional protective measures,
- The time of the day when welding or other activities must be carried out.
  The size of the surrounding area to be taken into account will depend on the structure of the building and the other activities carried out in it.
  The surrounding area may extend beyond the limits of the premises.

Public supply system

The welding equipment must be connected to the public supply system according to the manufacturer's recommendations. In the event of interference, it may be necessary to take additional precautions such as filtering the system. You may need to shield the power cable of the welding equipment installed permanently, in a metal conduit or the like. The shielding must be electrically continuous over its whole length. The shielding must be connected to the welding power source so that good electrical contact is maintained between the conduit and the enclosure of the welding power supply.

Maintenance of welding equipment

The welding equipment must be maintained regularly in accordance with the recommendations of the manufacturer. All casings and access doors must be closed and correctly fastened when the welding equipment is operating. The welding equipment may not be modified in any way, with the exception of changes and adjustments provided in the manufacturer's instructions. In particular, spark gaps of arc striking and stabilisation devices must be adjusted and maintained in accordance with the manufacturer's recommendations.

Welding cables

Welding cables must be kept as short as possible and placed close to each other, on or close to the ground level.

Equipotential bonding

The sticking of all metal components in the welding machine and adjacent to it must be envisaged. However, sticking metal components to the workpiece would increase the risk of the operator being exposed to electric shock by touching those metal components and electrode at the same time. The operator must be insulated from all these stuck metal components.

Connecting the piece to the earth

Connecting the welded piece to the earth may reduce electromagnetic emissions in some cases.
However, precautions must be taken to ensure that such a connection does not increase the risk of injury for users or damage to other electrical equipment.
Whenever possible, the work piece must be connected to the earth by a direct connection, but if direct connection is not permitted in some countries, the connection must be made through an adequately rated capacitor, selected in accordance with national regulations.

Shielding

The shielding of cables and equipment in the surrounding area may mitigate interference issues. The whole welding installation may need to be shielded for special applications.

1 - Introduction

Linc-Cobot Cart is a mobile robotised welding cart that includes the Fanuc CRX-10iA/L collaborative robot. The system is designed to address equipment safety specifications, by using **only one operating area and a single operator**. The robot has force sensors which trigger an immediate safety stop when it comes into contact with a human body or any other object.

The **Linc-Cobot Cart** is equipped with several safety functions to help protect the operator from injuries caused by robot movements. The following components are used in the safety arrangements of the system:

- Robot with power and force limitation in accordance with the standard Robots and robotic devices - Collaborative robots".
- Three-position axes release button on the smart torch.
- Axes release button on the tablet support.
- Tablet holder with integrated e-stop button.
- Operating console with an e-stop button

The welding equipment is made up of the following elements:

- a **Powerwave R450 CE** power source.
- an **Autodrive 4R100** wire feeder fitted with four powered rollers that feed wire with a diameter 0.8 to 1.6 mm.
- A welding torch out of those listed below, as described:
  - a **Magnum Pro Air LE550**welding torch for MAG welding up to 385 Amperes with a 100% duty cycle using an Ar-8% CO2 gas mixture, in the air cooled version.
  - a **BW500** 500 A - 100% welding torch in the water cooled version, with its **Coolarc 26** cooling unit.
  - an **FX500** 500 A - 100% extraction welding torch, in the water cooled version, with its **Coolarc 26** cooling unit.
  - an **LE550** welding torch, in the water cooled version, with its **Coolarc 26** cooling unit.

The **Linc-Cobot Cart** is supplied fitted with a wire feeding system for solid wire with diameter 1.2 mm.

1.1 Intended or appropriate use of the equipment

This equipment is intended exclusively for use as a robotic system for Metal Inert Gas (MIG) welding. These components are held in the welding position using specially designed tools.
The equipment is designed to be used only in indoor environments. Models with wheels may only be used in the horizontal position, with all the wheels firmly on the ground in the locked/braked position. Some models may be configured for transport by cranes and/or lift trucks; however, this system may never be used when it is suspended or raised.
Measures must be taken to protect individuals working with the system. Relevant safety measures must be taken to address all the risks and hazards that may occur while working with the robotised welding system. The end user is responsible for making sure that the risks presented by the system are appropriately assessed before use. The end user must take account of all the hazards and risks present in the workplace in which the system is used, and take appropriate safety measures, including those that may occur while using the system.
End users must follow all the safety instructions in the operating manual of the system and all the instruction manuals of its components. Inspections and maintenance work may only be carried out by qualified individuals who are also familiar with safety documentation and the instructions.

1.2 Reasonably foreseeable improper use of the equipment

Any procedure that is not specified in the section “Intended or appropriate use of the equipment”, which goes beyond such intended or appropriate use of the equipment above, is considered to be inappropriate use.
That includes, without limitation:

- making the robot bear weights or volumes different from those defined by the suppliers,
- power supply with an input voltage that is different from that specified,
- use of a welding process other than MIG/MAG,
- loading the cart table beyond the manufacturer’s recommendations.

No change may be made to any part of the equipment if it enables improper use in relation to what is defined in the section “Intended or appropriate use of the equipment”.

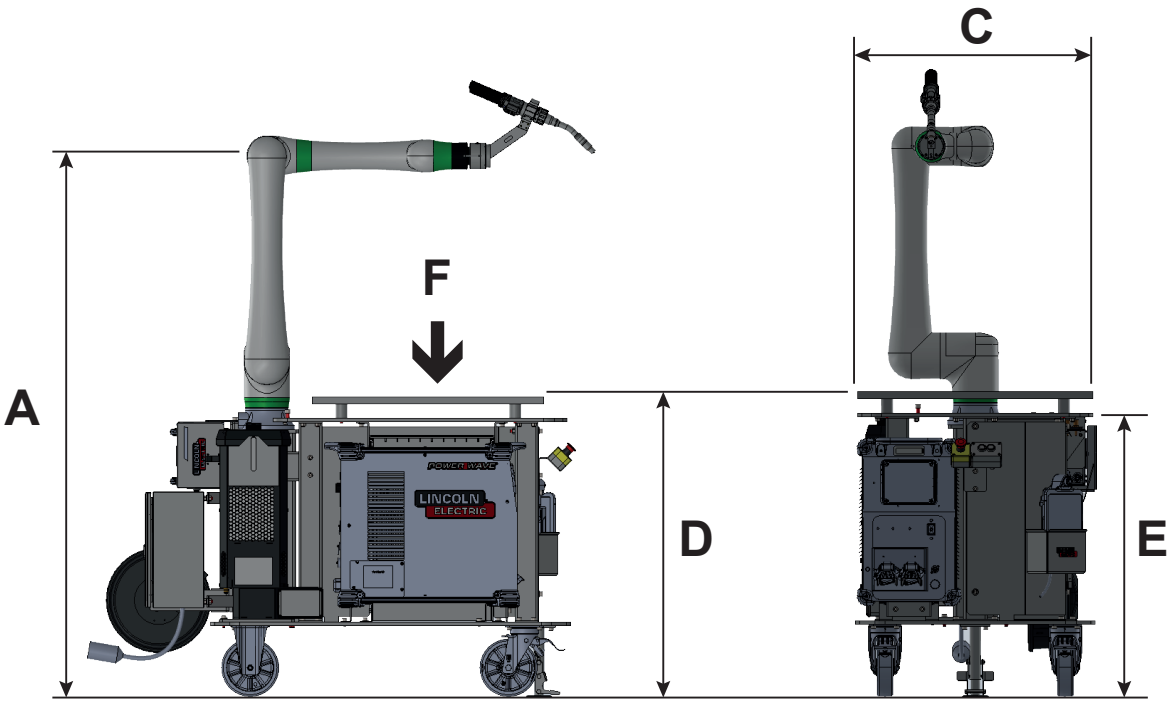
1.3 System modification

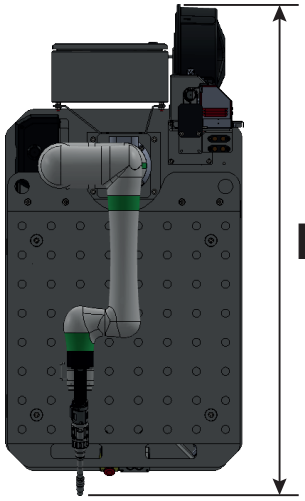
The system may not be modified in any event. Modifications may affect its performance, safety and durability, increase the risk of serious injury and/or death, and possibly go against safety requirements. Further, any damage or performance issues resulting from modifications will not be covered by the guarantees given by **Lincoln Electric**.

1.4 While reading this manual

This manual includes information about all the options available with this type of equipment. As a result, you may find information that does not apply to your system. All the information, specifications and illustrations in this manual are those applicable at the time of printing. **Lincoln Electric** reserves the right to modify the specifications or design at any time without notice.

2.1 Overall dimensions

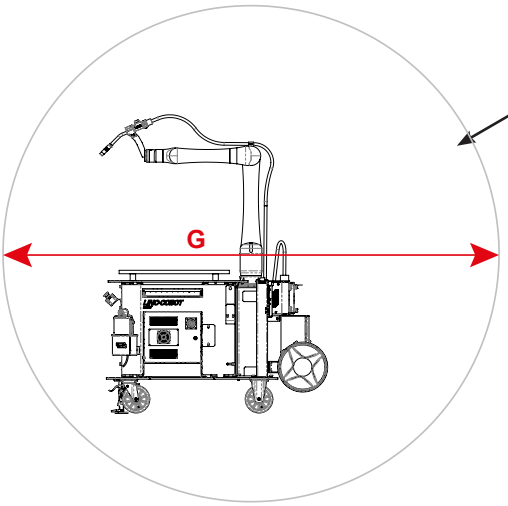




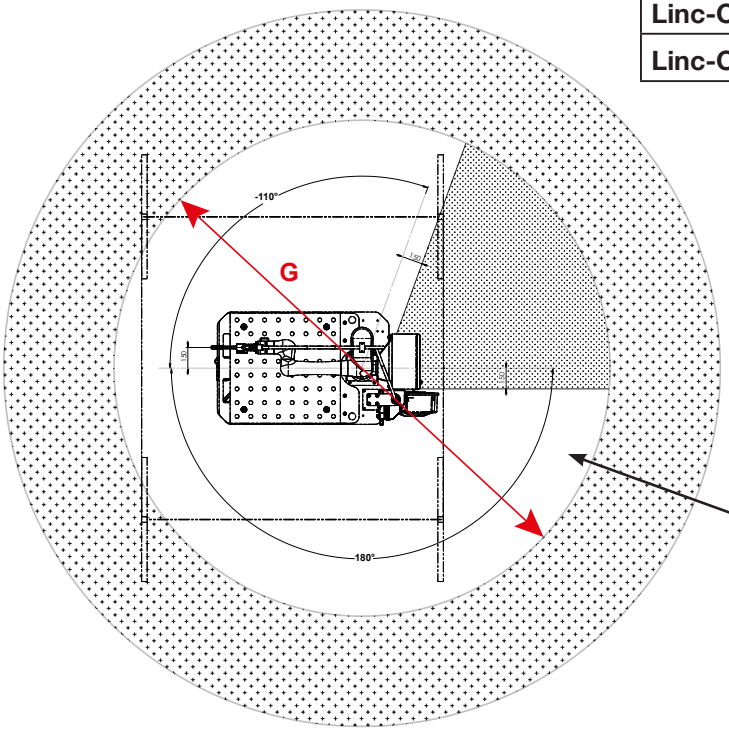
	A	B	C	D	E	F Max load
	mm	mm	mm	mm	mm	daN
Linc-Cobot Cart Air LE550	1869	1672	800	1038	963	226
Linc-Cobot Cart Water BW500		1692				
Linc-Cobot Cart Water FX500		1708				
Linc-Cobot Cart Water LE550		1727				

2.2 Robot operating space

The collaborative area of the working of the **Linc-Cobot Cart** robot is represented below. This area may be truncated depending on the configuration of the passage of the torch bundle and other power bundles. That means that safe collaborative working of the robot is not limited to the cart table, but may be extended to any other part of the robot and the range of action of the final effector (torch). At this point, the end user has sole responsibility for electrical and welding connections of structures outside the cart.
To ensure safe and reliable operation, the end user is responsible for following all the assembly instructions and training all the operators, maintenance personnel and all other workers involved in the system. The risk assessment must take account, and operators must have heightened knowledge of objects and individuals located within the range of the robot when the system is being configured and is operated. All workers, including the operator, must be outside the robot operating space during movements in Auto mode. Welding may only take place in the robot operating space.



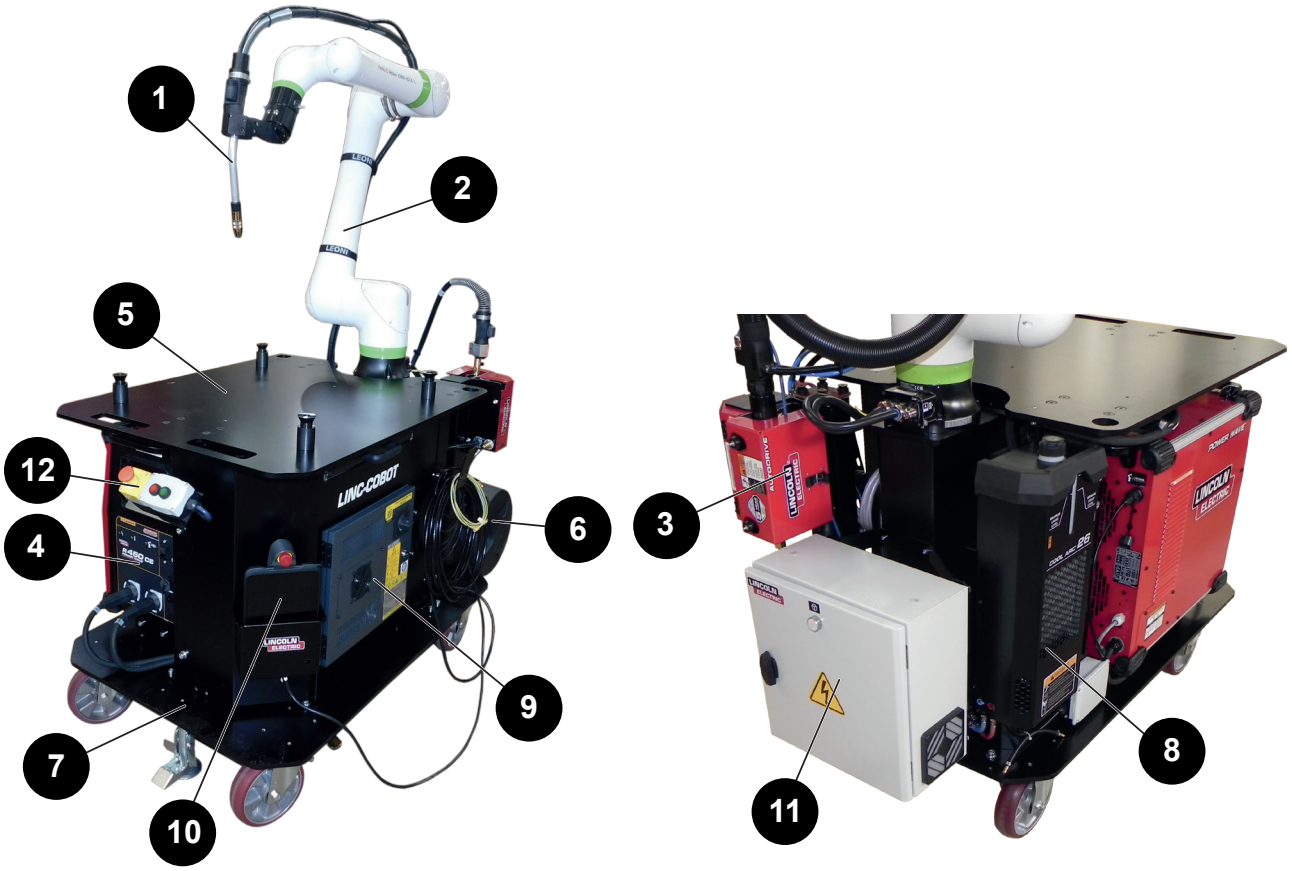
	G
	mm
Linc-Cobot Cart Air LE550	3600
Linc-Cobot Cart Water BW500	3682
Linc-Cobot Cart Water FX500	3770
Linc-Cobot Cart Water LE550	3650



Version of **Linc-Cobot Cart**	Part number	Type of torch				Option	
		Air **LE550**	Water **BW500**	Water **FX500** (1)	Water **LE550**	Soft (2)	Table
Air LE550	AS-RM-2461-3	✔					
Air LE550 S	AS-RM-91506401	✔				✔	
Air LE550 T	AS-RM-91506402	✔					✔
Air LE550 ST	AS-RM-91506403	✔				✔	✔
Water BW500	AS-RM-91506096		✔				
Water BW500 S	AS-RM-91506421		✔			✔	
Water BW500 T	AS-RM-91506422		✔				✔
Water BW500 ST	AS-RM-91506423		✔			✔	✔
Water FX500	AS-RM-91506098			✔			
Water FX500 S	AS-RM-91506441			✔		✔	
Water FX500 T	AS-RM-91506442			✔			✔
Water FX500 ST	AS-RM-91506443			✔		✔	✔
Water LE550	AS-RM-91506460				✔		
Water LE550 S	AS-RM-91506461				✔	✔	
Water LE550 T	AS-RM-91506462				✔		✔
Water LE550 ST	AS-RM-91506463				✔	✔	✔

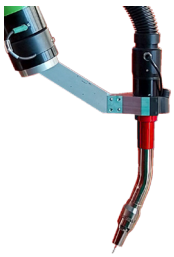
(1): extraction torch
(2) functions: advanced functions (Touch sensor - Arc sensor - Multipass)

3.1 Linc-Cobot Cart *assembly*



Refer-ence	Description
1	**Magnum Pro** welding torch, Air **LE550** or Water **BW500** torch or Water **FX500** extraction torch or Water **LE550** torch
2	**CRX-10i A/L** welding robot
3	**Autodrive 4R100** welding wire feeder
4	**Powerwave R450 CE** welding power source
5	Upper plate
6	Wire reel holder (wire reel not supplied)
7	Cart
8	**Coolarc 26** (for use with water cooled torch)
9	**R30iB Mini Plus** robot controller
10	Touch tablet for controls
11	Electrical cabinet
12	Operator control console

3.2 Welding torches

Magnum Pro Air LE550 torch	BW500 torch	FX500 extraction torch	Magnum Pro Water LE550 torch
			
380 A - 100%	500 A - 100%		650 A - 100%
Air cooled	Water cooled		
Stainless steel	Stainless steel Aluminium	Stainless steel	Stainless steel
0.8 - 1.2 mm	0.8 - 1.6* mm		0.9 - 1.6* mm Single-wire

*: Provide an appropriate wire feeder roller kit:
- steel wire, 1.6mm: kit KP1505-1/16S (optional)
- aluminium wire, 1.2mm: kit KP1507-3/64A (option)
- aluminium wire, 1.6mm: kit KP1507-1/16A (option)

3.3 Welding robot

Refer to the literature:
- **B-84194EN-01 “Mechanical operating manual of CRX-10iA/L robot”**

3.4 Autodrive 4R100 *welding wire feeder*

Refer to the literature:
- **IM10472 “AutoDrive 4R100”**

3.5 Powerwave R450 CE *power source*

Refer to the literature:
- **IM10421 “Power Wave® R450”**

3.6 R30iB Mini Plus robot controller

Refer to the literature:
- **B-83284EN-1 “Operating Manual for Controller R-30iB Mini Plus”**
- **B-84175EN/01 “Maintenance Manual for Controller R-30iB Mini Plus”**

3.7 Touch tablet for controls

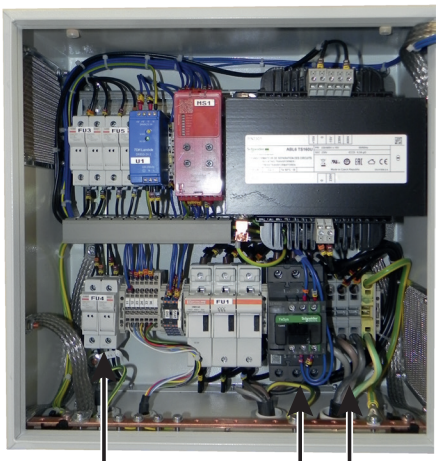
Refer to the literature:
- **B-84274EN/01 “Operating Manual for UI tablet of R-30iB Mini Plus controller”**

3.8 Cool Arc 26 *cooler*

Refer to the literature:
- **IM3101 Cool Arc 26**

4 - Technical specifications

4.1 Electricity supply requirements



FU1: 50A aM - 14x51 aM
FU3: 6A - 10x38 aM
FU4: 8A - 10x38 gG
FU5: 2A - 10x38 aM
FU6: 4A - 5x20 FSF

Three-phase power supply
400V - 4x10mm²
Power: 30 KVa

Single-phase power supply
240V - 3x2.5mm²
Power: 1.5 KVa
Pre-wired in the factory

Three-phase power supply
400V - 4x6mm²
Power: 28.5 KVa
Pre-wired in the factory

1 - Installation conditions

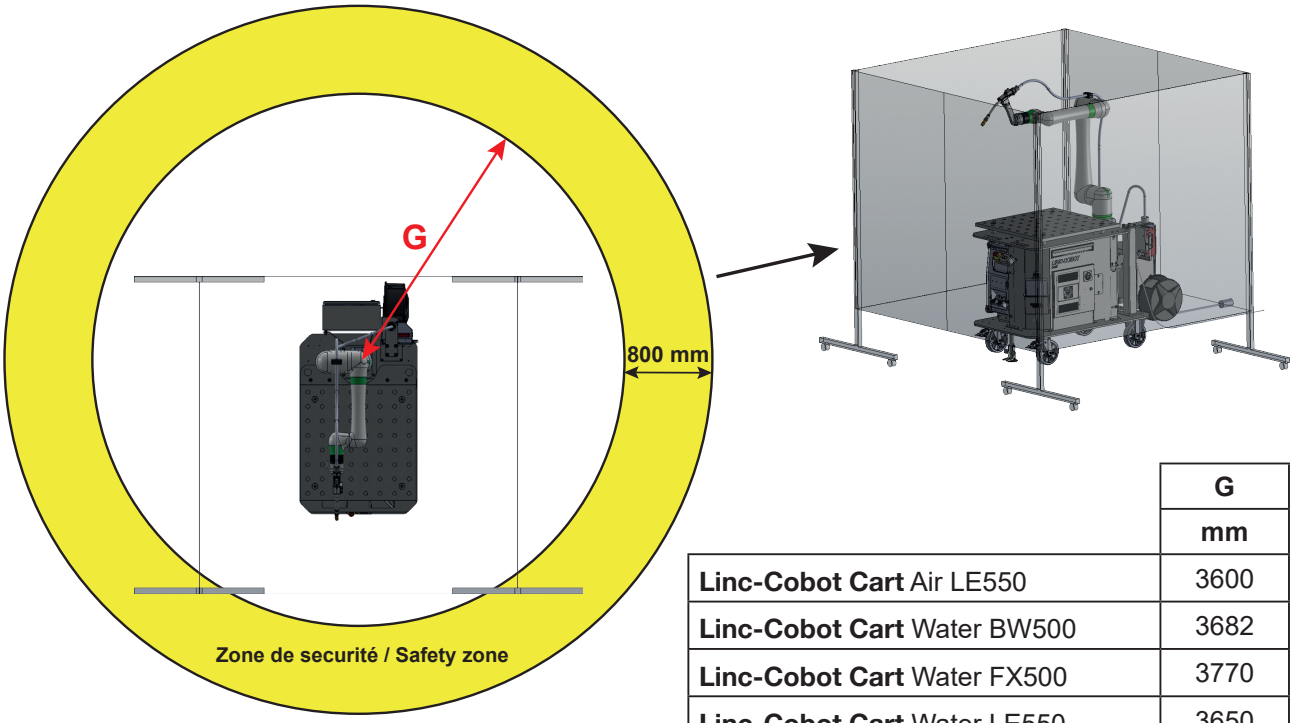
The machine must be located in accordance with applicable safety standards to keep personnel safe.

For the installation to be compliant, put in place a visual radiation protection system and a fume extraction system.

Make sure that no part of the machine can come within less than 500 mm from an obstacle according to safety standards.

Important: the operator passage way must absolutely be clear over a minimum width of 800 mm according to safety standards.

The floor should be marked out as shown in the drawing opposite.



	G
	mm
Linc-Cobot Cart Air LE550	3600
Linc-Cobot Cart Water BW500	3682
Linc-Cobot Cart Water FX500	3770
Linc-Cobot Cart Water LE550	3650

The **Linc-Cobot Cart** is delivered with a set of two three-panel screens which act as a barrier against welding arcs and demarcate the working area of the **Linc-Cobot Cart**.

Welding arc radiation cannot be limited at the torch, and so the three-panel screens must be positioned so as to protect the environment of the **Linc-Cobot Cart**.

The position of the three-panel screens must be adjusted for the working area of the Linc-Cobot Cart.

Within the area protected by the three-panel screens, the operator must be equipped with the Personal Protective Equipment (PPE) listed above.

While handling the machine with a truck or crane, the operation must be carried out by an individual trained in the use of mechanical handling equipment.

Make sure you have enough space while unpacking the Linc-Cobot Cart.

A cluttered area increases the risk of tripping and slipping.

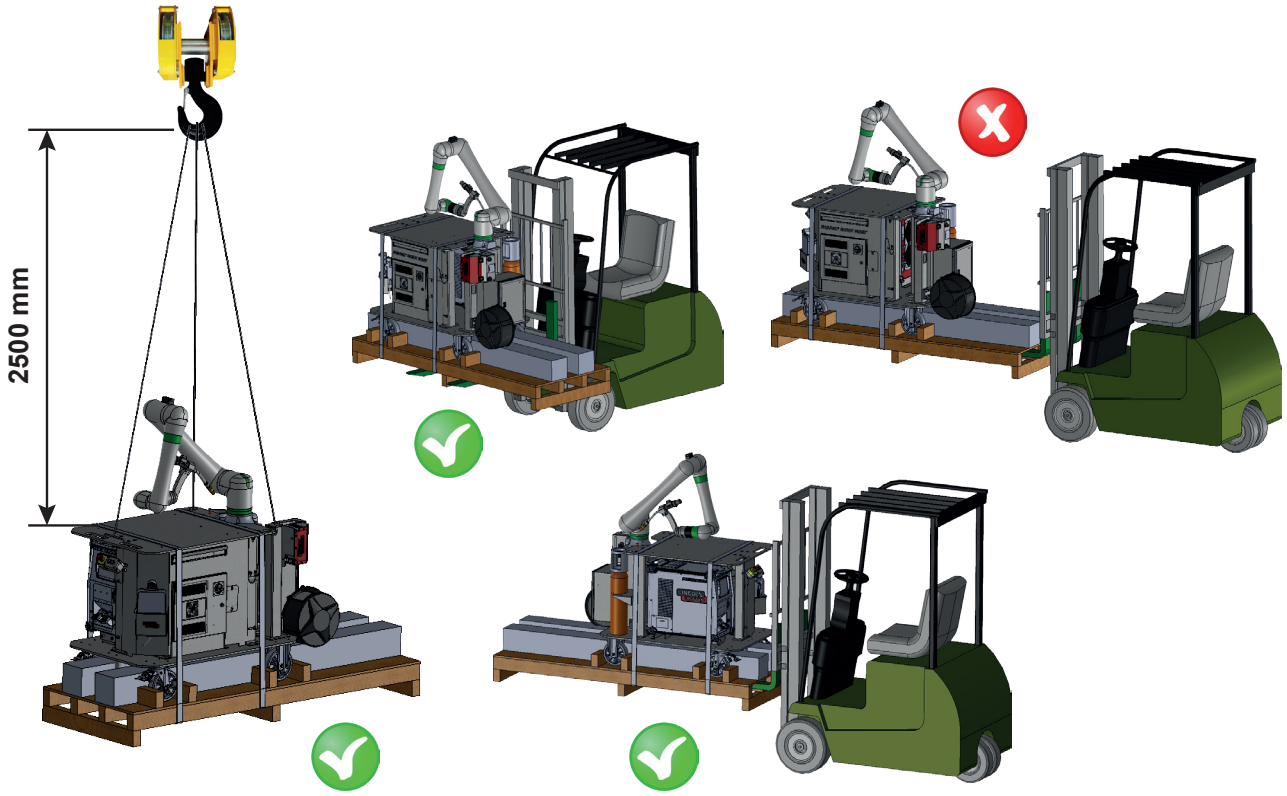
Dispose of packaging waste based on its type.

CAUTION: Protect sensitive parts while slinging.

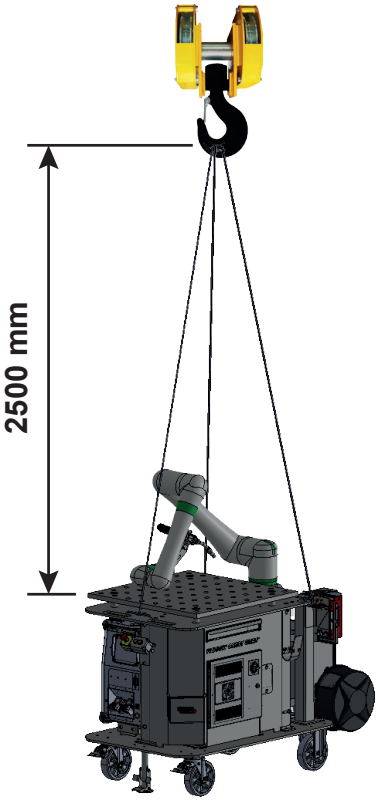
Use webbing

During any lifting operations, the use of appropriate PPE (Personal Protective Equipment) is MANDATORY.

The components of the installation may only be transported using the slinging points provided, with appropriate slinging equipment.



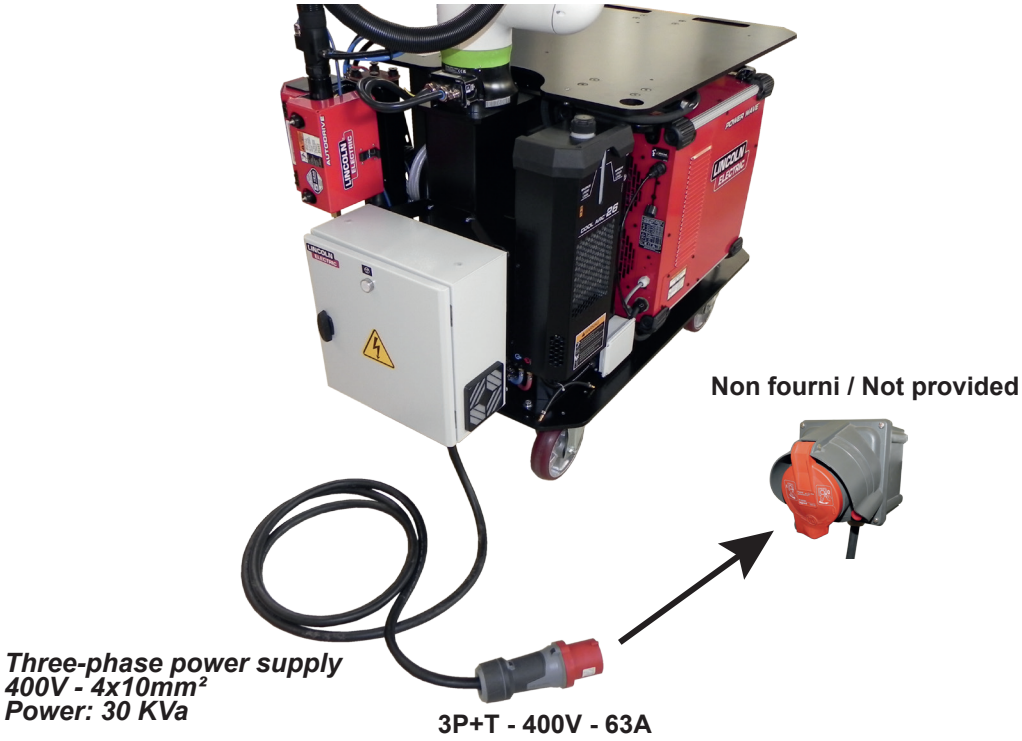
Before you set up the system, make sure you have unpacked and identified all the elements. Make sure that all the ordered items have been delivered. Inspect the system and all its components to detect any damage.



Version of **Linc-Cobot Cart**	Part number	Weight (in Kg)	
		Packaged	Unpacked
Air **LE550**	AS-RM-2461-3	590	470
Air **LE550 S**	AS-RM-91506401	590	470
Air **LE550 T**	AS-RM-91506402	710	590
Air **LE550 ST**	AS-RM-91506403	710	590
Water **BW500**	AS-RM-91506096	620	500
Water **BW500 S**	AS-RM-91506421	620	500
Water **BW500 T**	AS-RM-91506422	740	620
Water **BW500 ST**	AS-RM-91506423	740	620
Water **FX500**	AS-RM-91506098	620	500
Water **FX500 S**	AS-RM-91506441	620	500
Water **FX500 T**	AS-RM-91506442	740	620
Water **FX500 ST**	AS-RM-91506443	740	620
Water **LE550**	AS-RM-91506460	620	500
Water **LE550 S**	AS-RM-91506461	620	500
Water **LE550 T**	AS-RM-91506462	740	620
Water **LE550 ST**	AS-RM-91506463	740	620

3.1 Electrical connections

The **Linc-Cobot Cart** is connected by means of a 5 m long cable fitted with a male four-pole connector (3P+E).



3.2 Gas connections

The Linc-Cobot Cart is supplied with a 7.5 m long pipe for supplying gas. A connection may be made to a cylinder fastened to a support close to the Linc-Cobot Cart but outside the collaborative area.

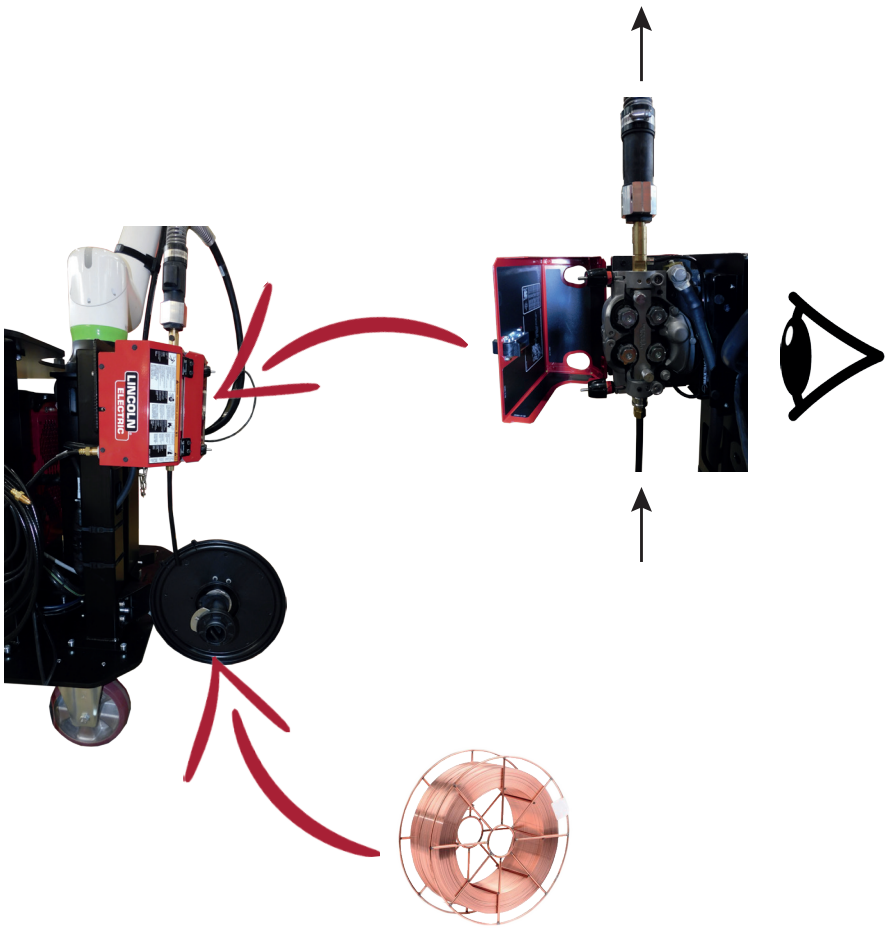
The gas cylinder must be handled alone, and may not be carried on the cart when the cart is moved.

Follow applicable manual or mechanical handling rules while loading and unloading the gas cylinder.

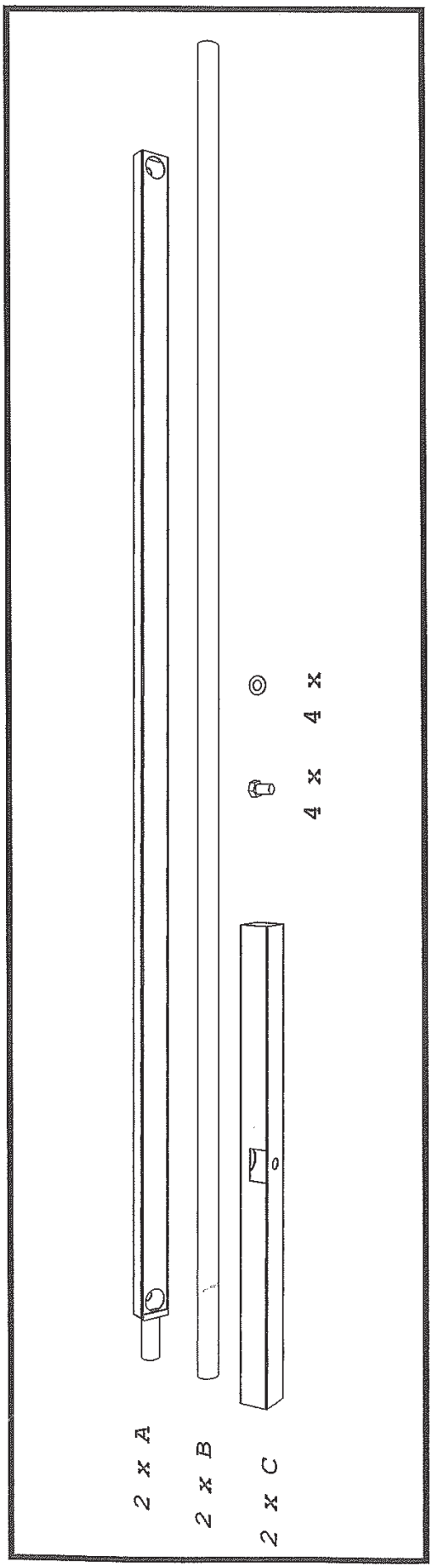
3.3 Position of wire reel

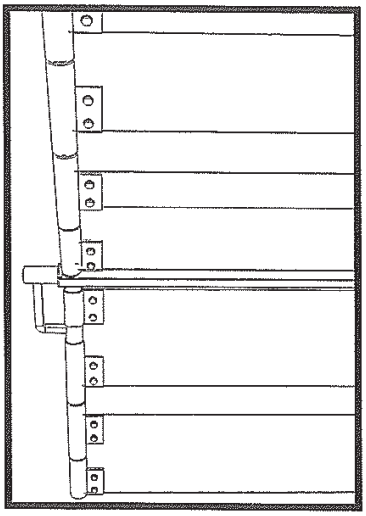
Follow applicable manual or mechanical handling rules while loading the wire reel.

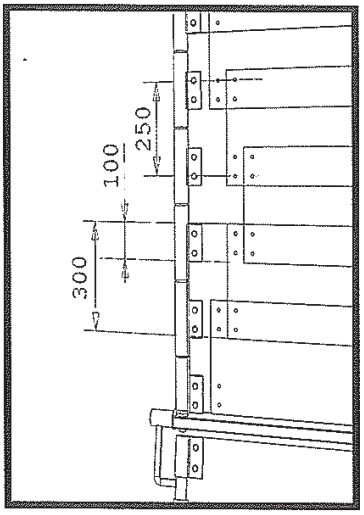
The use of Personal Protective Equipment is mandatory while installing the wire reel.

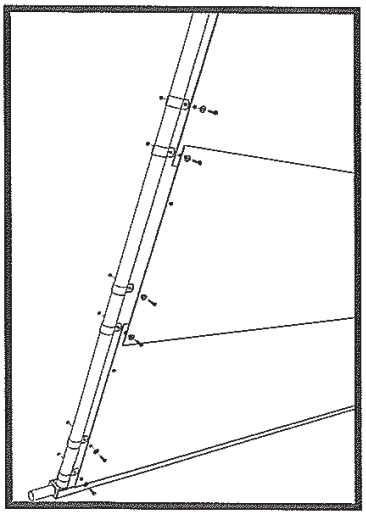


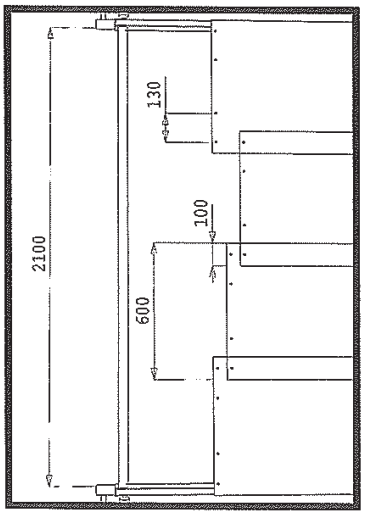
3.4 Assembly of three-panel screens

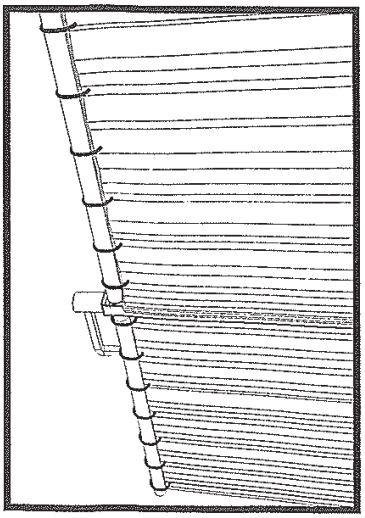


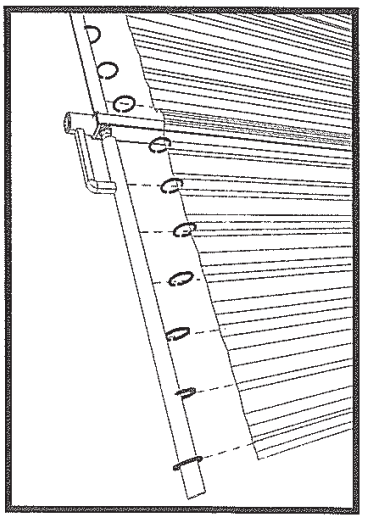


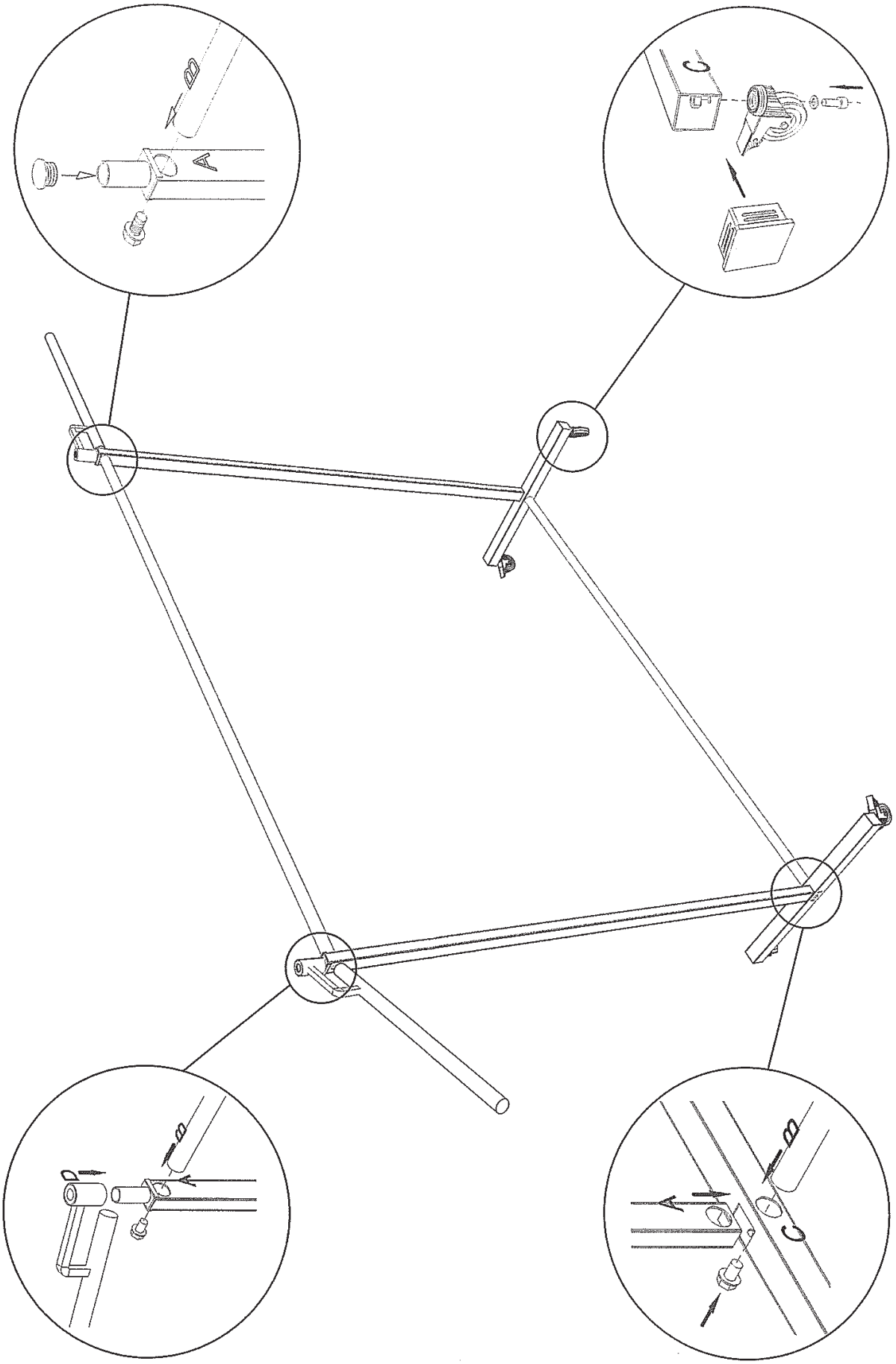






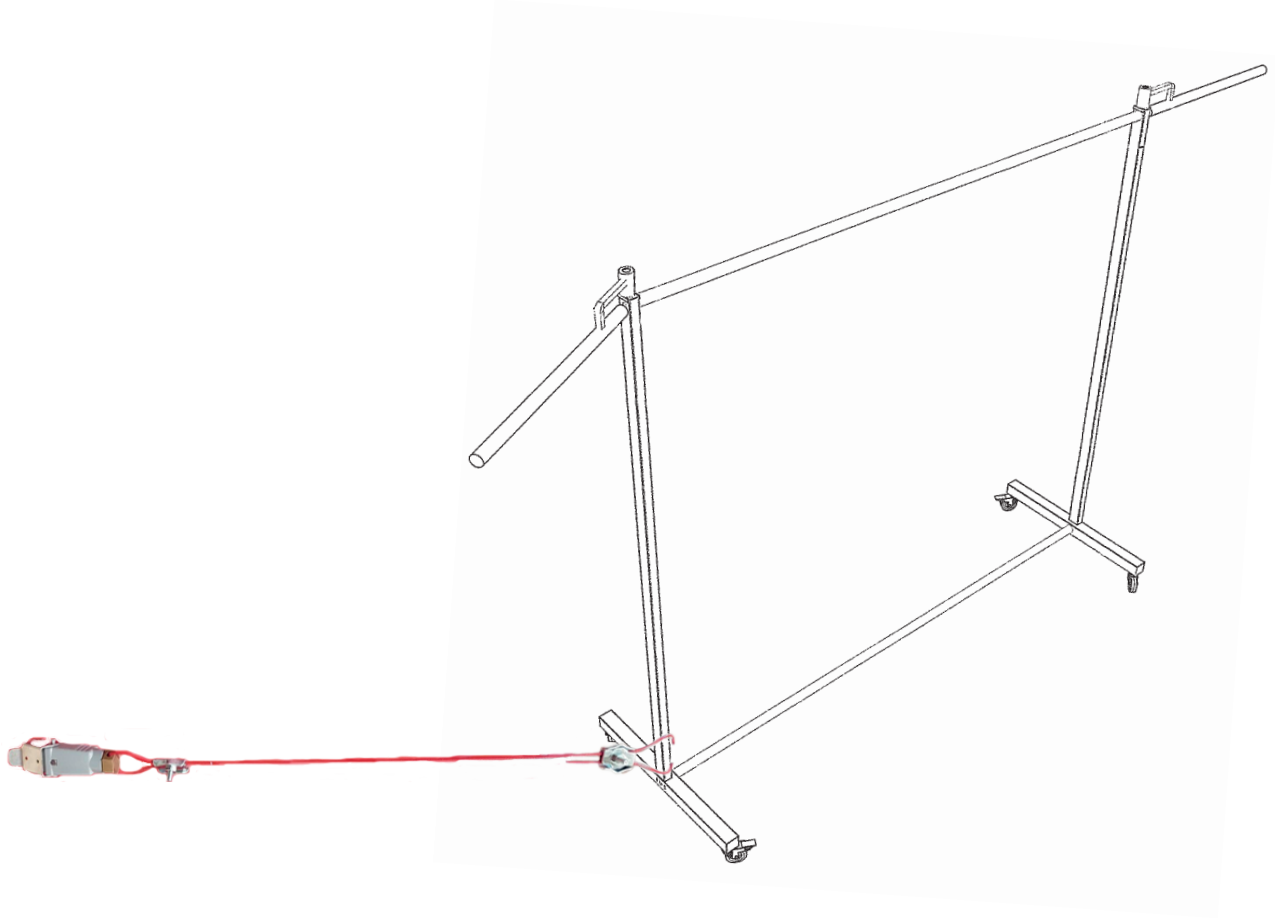





A
C
A
C

Electrical connection of panels:

- After the panels are assembled, an electrical safety shunt must be attached to the base of each panel.



- Each shunt must then be connected electrically to the **Linc-Cobot cart**:

1 - Starting up and shutting down

REMINDER: The operator station is located before the control console.
The machine is designed to work with only one operator in the collaborative area.

The cart must be located on a flat surface (with a slope that does not exceed 0.5%). In a fixed position, it must necessarily be locked to the ground using the wheel locks and the stand.
The cart must not be able to move ☛ wheel locked and stability stand in place.

While loading and unloading the piece or pieces to weld on the table, the operator, who must be trained and authorised to use handling equipment, must necessarily use the personal protective equipment required, namely helmet, gloves, safety shoes and work clothing, and follow the applicable rules for manual or mechanical handling.
Make sure that the robot is in the retracted position to avoid collision risks.

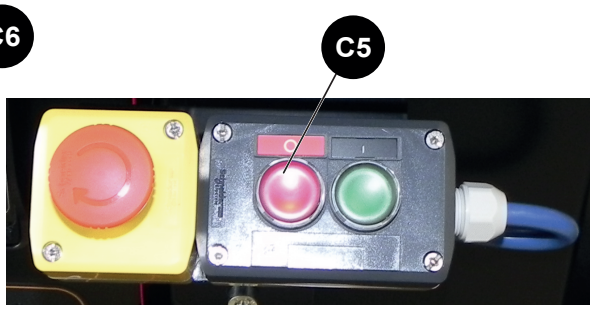
When the Linc-Cobot Cart is operating, the operator must always be mindful of the working area of the robot and continuously keep an eye on the robot when in the working area.

POWERING UP:

- Connect the male four-pole connector.
- Set the disconnector **C1** of the **R30iB Mini Plus robot controller** to the **ON** position.
- Switch on the **Power Wave R450 CE** power source by setting the disconnector **C2** to **I**.
- Start up the tablet by pressing **C3**. Then start the Android application **C4** "**Tablet TP**".
- Switch on the extraction system if needed.

STARTING UP:

- Make sure that the emergency stops **AU** of the touch tablet and console are released.
- Press the starting up button **C6** located on the door of the connection cabinet.
- Press the red button of the operator console **C5** to clear the faults or use the **Reset** touch button of the tablet.



SHUTTING DOWN:

- Use the emergency stop **AU** of the touch tablet or console.

POWERING DOWN:

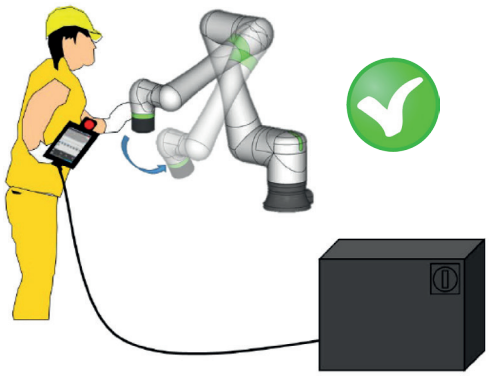
- Set the disconnector **C1** of the **R30iB Mini Plus robot controller** to the **OFF** position.
- Switch off the **Power Wave R450 CE** power source by setting the disconnector **C2** to **0**.
- Shut down or put the tablet on standby by pressing **C3**.
- Shut down the extraction system.
- Disconnect the male four-pole connector.

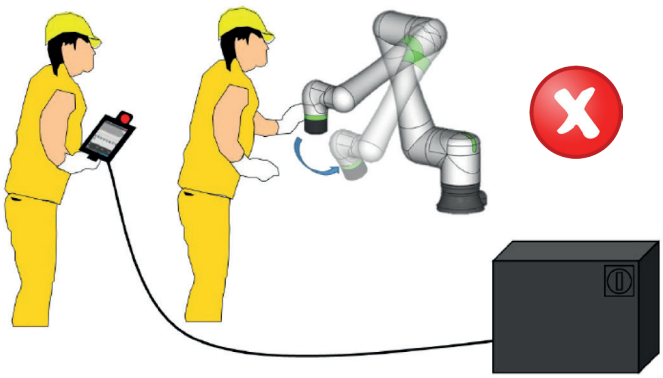
NB: When the installation is out of service or when the robot controller and Power Wave R450 CE are powered down, the transformer located in the disconnecting cabinet consumes power and it is therefore normal for the connecting cabinet to heat. To avoid that phenomenon, users are strongly advised to disconnect the four-pole connector when the machine is not in use.

Robot movement in manual mode

The **Manuel Guide Teaching** mode enables the operator to move the robot by pushing it directly. This movement mode makes it necessary to press the **Axes release button** dead man switch placed on the tablet support or the welding torch.

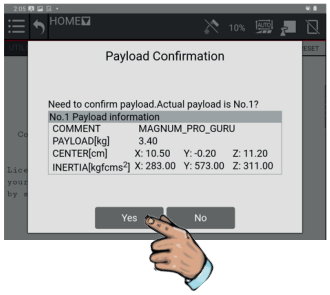
Robot movement operations must be carried out by a single worker.

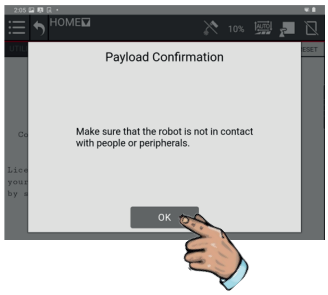


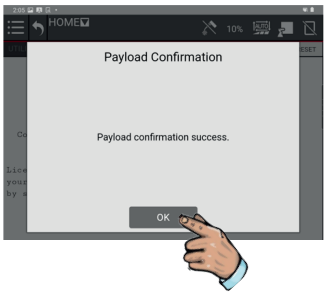


2 - Switching on procedure and status indicator

Upon switching on, the indicator above the robot articulation **J2** is red and the user is asked to confirm the payload by verifying the conditions and answering a few questions on the contextual screens of the tablet:

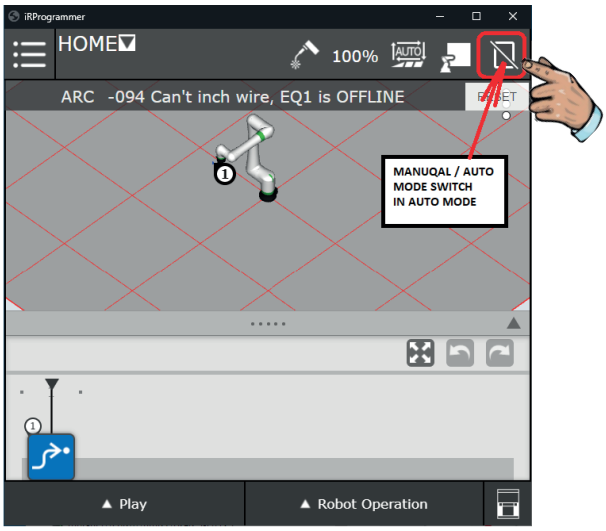


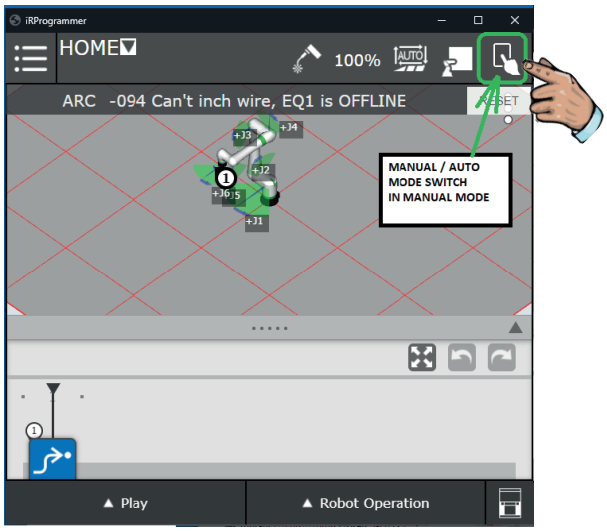




Mind you do not touch the robot arm during this operation.

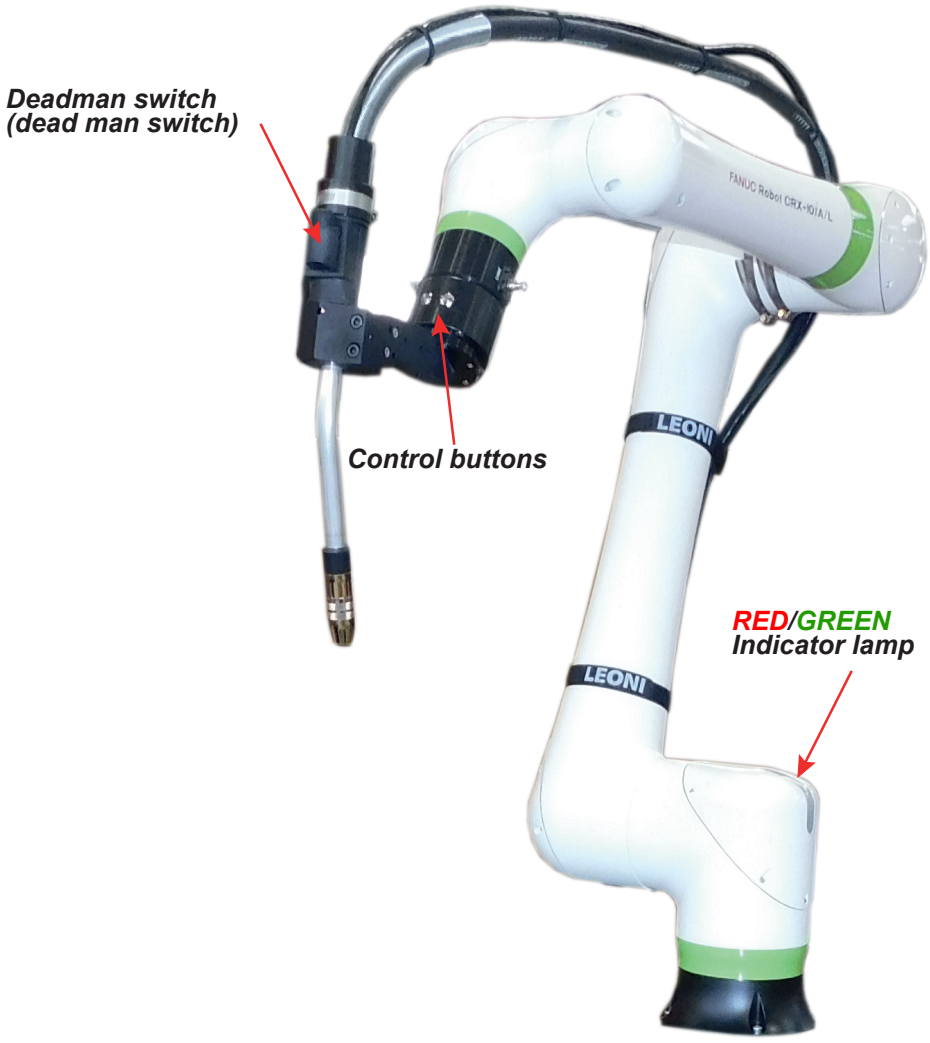
The indicator lamp is still red at this point, but the robot is now ready for operating in manual or automatic mode.
Touch the **Auto/Manual** icon to switch from one mode to another and touch the **Reset** button to clear the faults. The lamp changes from red to green:



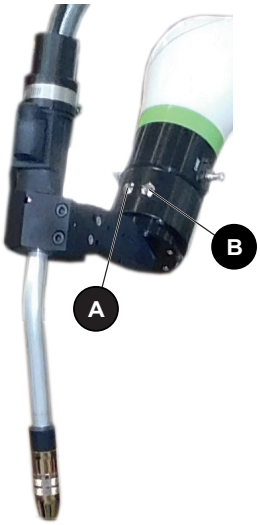


3.1 Smart Torch 1 Function Deadman switch mounted on the torch

1. Press and hold the axes release button midway; the green indicator on the base of the robot starts to flash and the robot can be moved freely by hand.
2. Release the button; the green indicator on the base of the robot becomes steady, the robot stops and no other manual movement is permitted.
3. Pressing the button fully (panic mode) stops the robot and no other manual movement is permitted. The button will now have to be fully released and then pressed again midway to restart the movements.



3.2 Smart Torch 2 Function Program control pushbuttons mounted on the torch



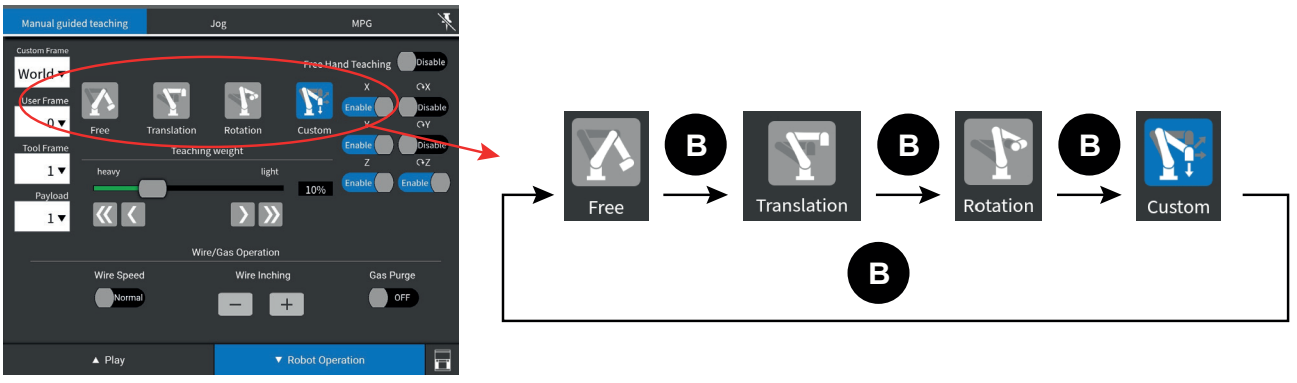
Left-hand smart button A:

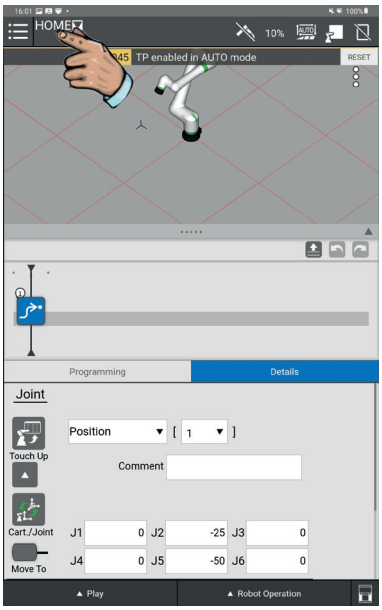
The left-hand smart button (**A**) may be used for simplified programming of linear welds. To do so, the **Arc Handle Teaching** function must first be activated in a program (see “Creating a program”).

1. Move the robot to the starting point and briefly press the button - the robot position point **L** is saved
2. Move the robot up to the weld start position, press and hold the button for three seconds - the instruction **Weld Start (Motion)** is saved and the button goes on in green
3. Move the robot up to the weld end position, keep the button pressed in for three seconds - the instruction **Weld End (motion)** is saved and the green indicator on the button goes off
4. Move the robot to an escape point and briefly press the button - the robot position point **L** is saved

Right-hand smart button B:

1. Not pressed in - the robot is in **Free** mode, and may be moved freely by hand in any direction or way
2. Press once - the robot is in **Displacement** mode - only linear XYZ movements are permitted (all rotation movements are blocked).
3. Press once again - the robot is in **Rotation** mode - no XYZ movement is permitted, only rotation around TCP (tool centre point) (all displacement movements are blocked).
4. Press once again, the robot is in **Custom** mode. Displacement and rotation movements can be personalised.
5. Press once again - the robot is back in free mode, and may be moved freely by hand in any direction or way





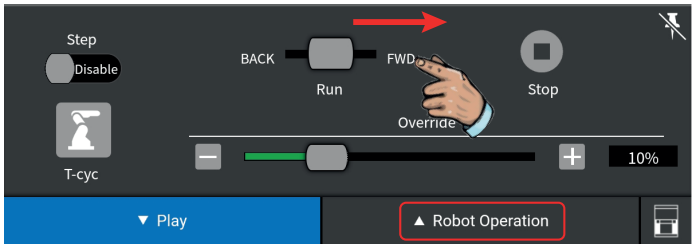
The **Home** program supplied as part of the basic software is a program made up of a single point located in a clear part of the working area and free from any other obstruction inside the collaborative area of the robot. Users are strongly advised that all user-created programs start and end with the program named **Home**.

To move the robot to its **Home** position, make sure that it is away from any obstacle; if needed, move the robot away from any obstructions.

Make sure that the **Home** program is selected (displayed in the upper left-hand corner of the tablet).

Switch to manual mode, press the **Fwd** key of the **Robot operation** field to move the robot to its **Home** position.

Manual mode



5.1 Program creation

This mode is used to program pieces and to “retouch” existing programs and for different maintenance procedures. Review the sample programs of the robot manufacturer as examples of programming and an appropriate sequence of operations.

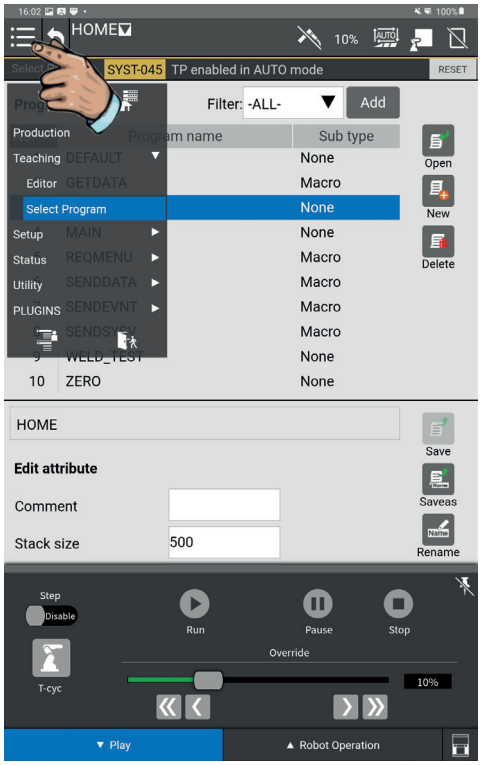
Before programming, make sure the cart is locked to the floor and that the production pieces are securely fastened.

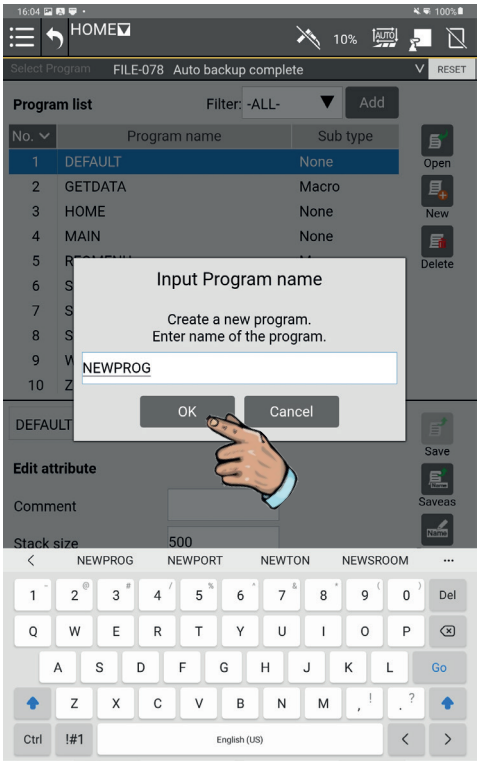
Program sequence

- Go into **Manual** mode 
- Press the **Reset** button 

To create a new program, press the drop-down menu (top left), press **Select program**, then press the icon **New**, enter the name of the program and press the button **OK** (a program name may not contain symbols or spaces). The program has been created and selected automatically as a new program to be used immediately.

Button **New**



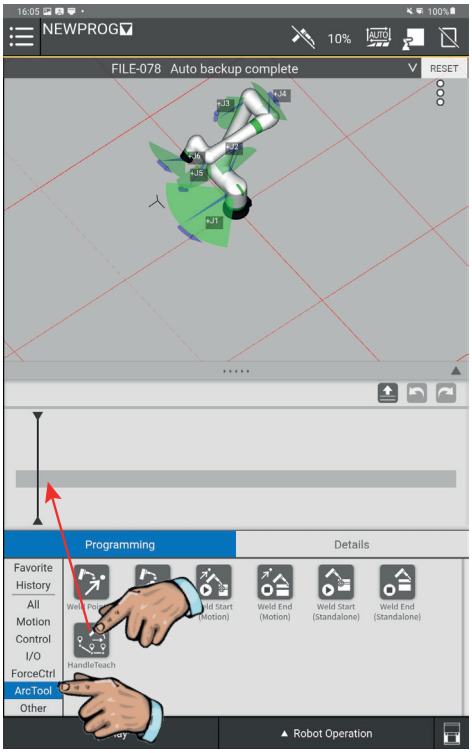


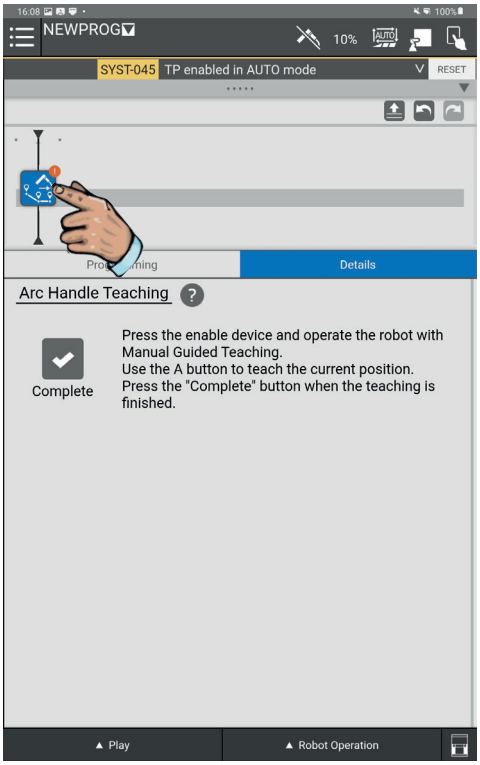
There are two methods for executing a program on the **Linc-Cobot**:

- Teaching method from the icons of the **Programming** menu. This method allows you to access all the programming functions.
- Simplified teaching method using the **Arc Handling Teaching** function. This simplified method is limited to the execution of linear paths.

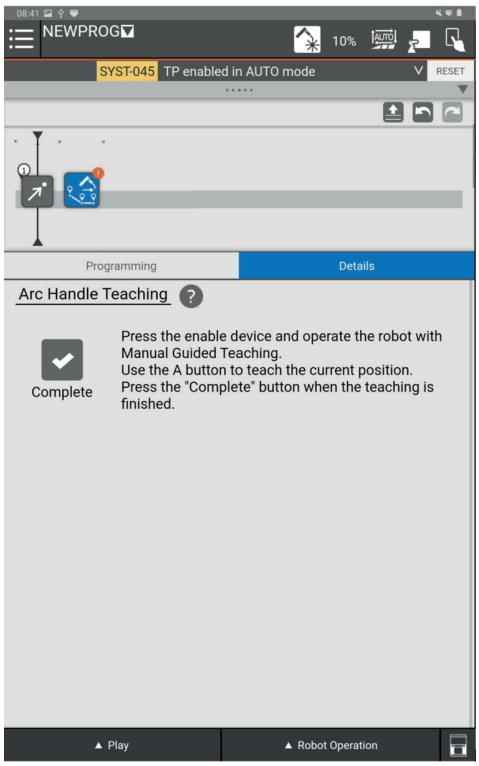
5.2 Simplified Arc Handling Teaching method

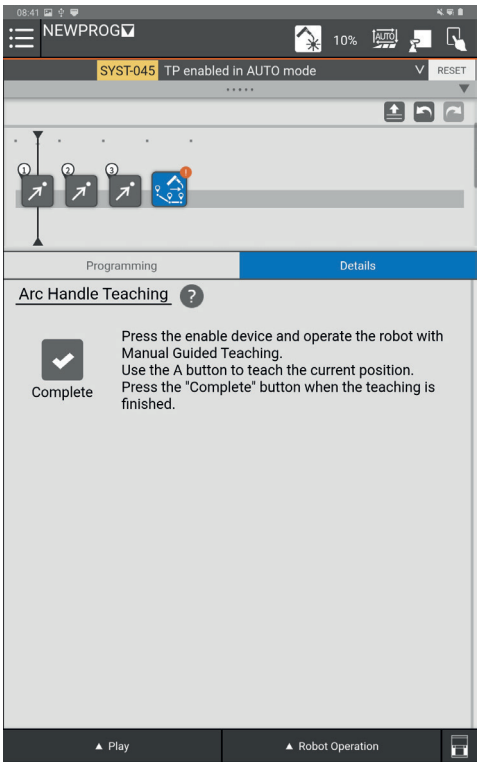
Press the **ArcTool** selection and drag the **Arc Handle Teaching** icon up to the **Time Line**.



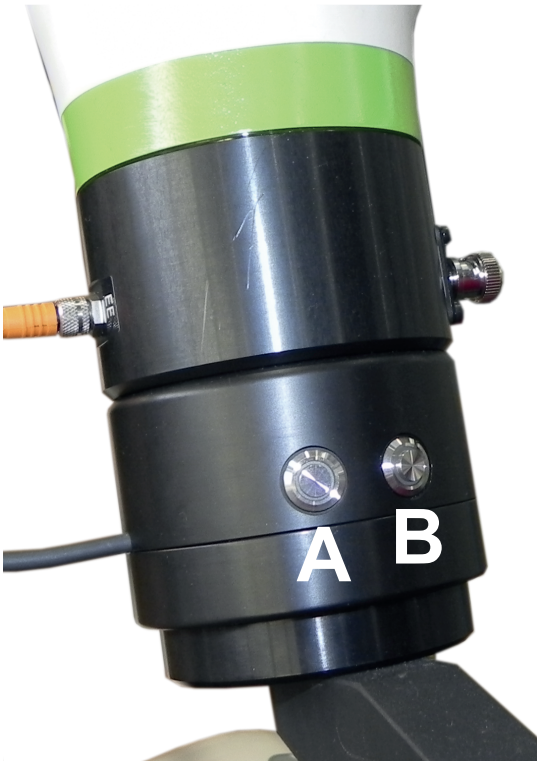


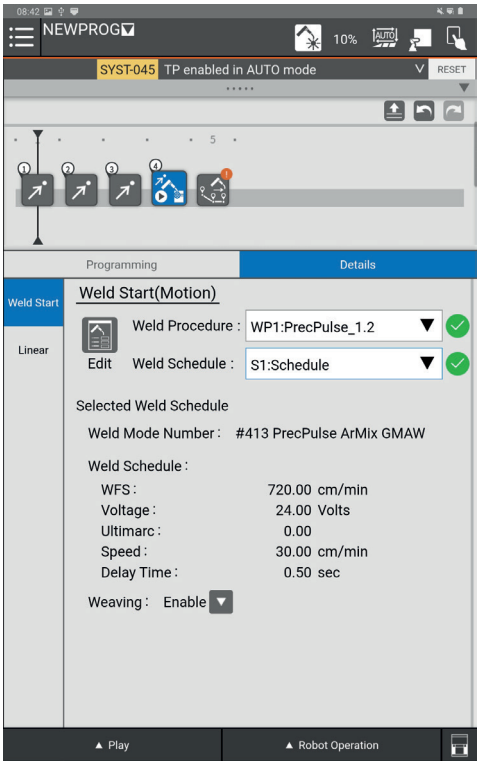
Press the axes release button on the smart torch into its midway position, move the robot manually to its first point and briefly press the left-hand button **A** on the base of the torch. A movement icon will appear on the program timeline. Continue till you are ready to enter your weld start point:



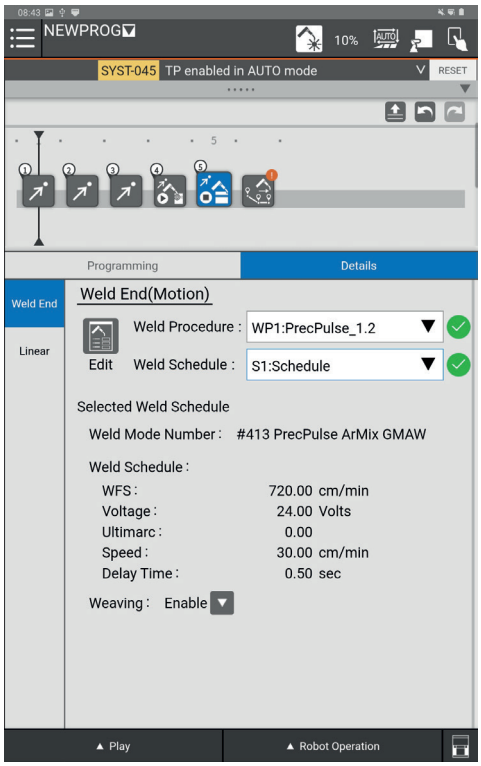


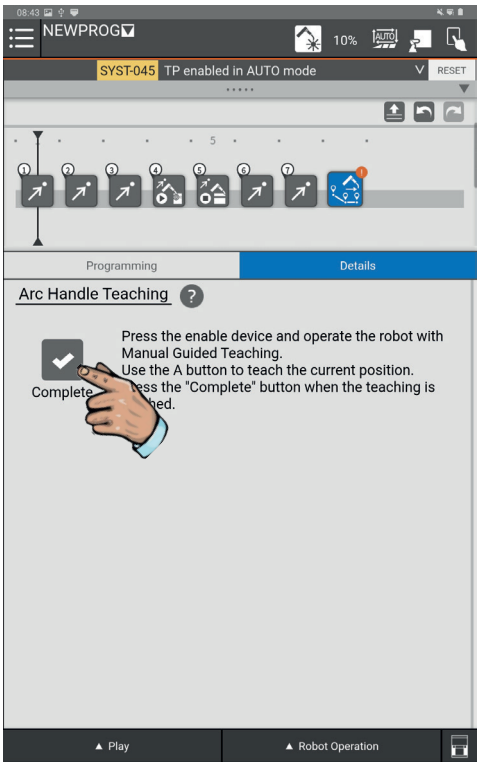
When the robot has moved to the weld start point, keep the button **A** of the smart torch pressed in for 3 seconds. A green light is displayed on button **A** to show that the welding point and the weld start point are being saved. A **Weld Start (Motion)** icon is displayed in the program timeline:



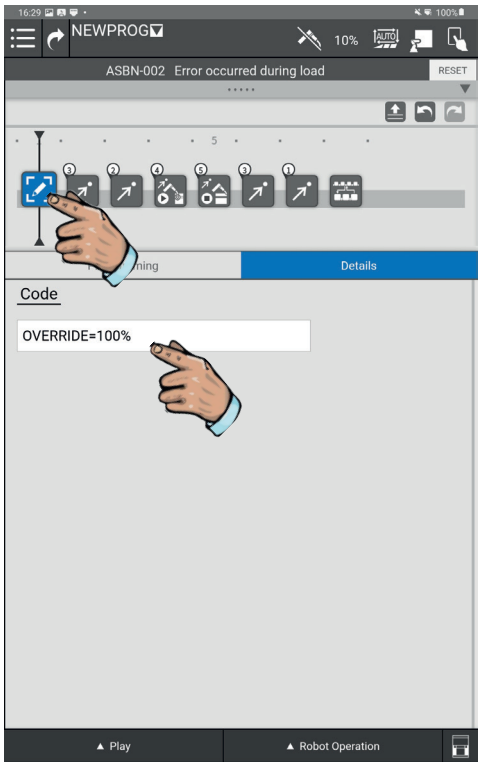


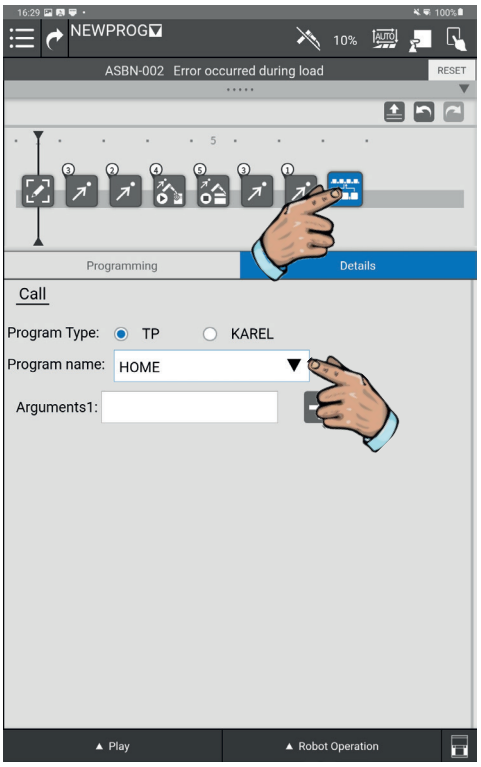
Now move the robot up to the weld end point, keep the button **A** of the smart torch pressed in for 3 seconds. The green indicator on the button **A** goes off, indicating that the weld end point is saved. Move the robot to its removal point and other required points by briefly pressing the button **A** to save those points:



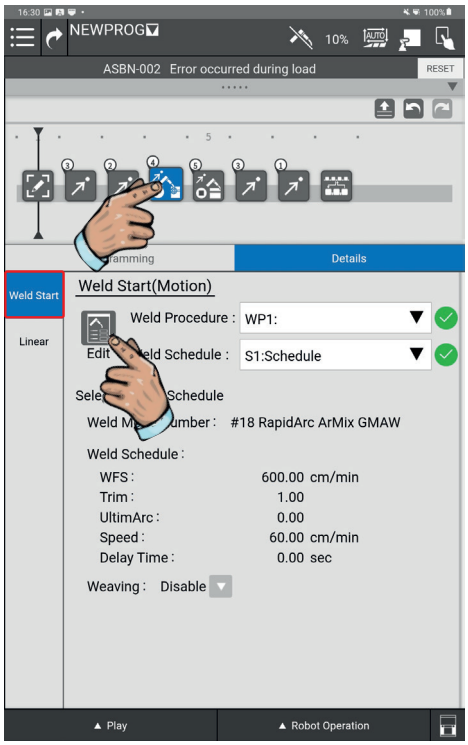


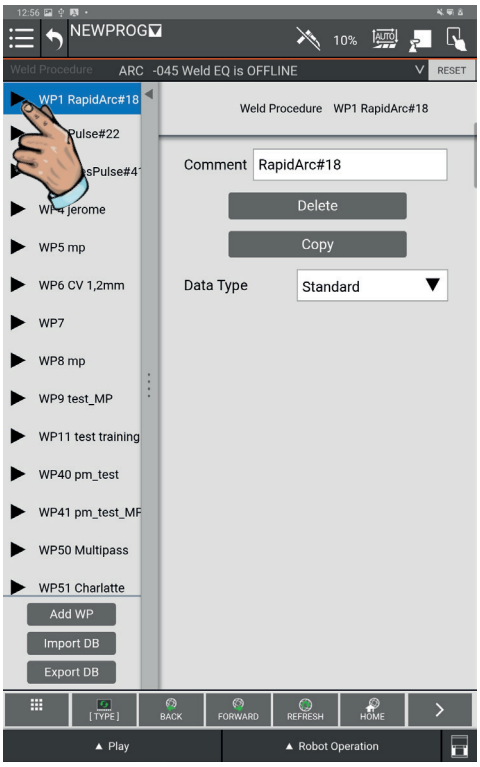
To automatically execute these programs at full speed, use the code “**OVERRIDE = 100%**”
In order to always end the program at a known position, use the **Home** instruction

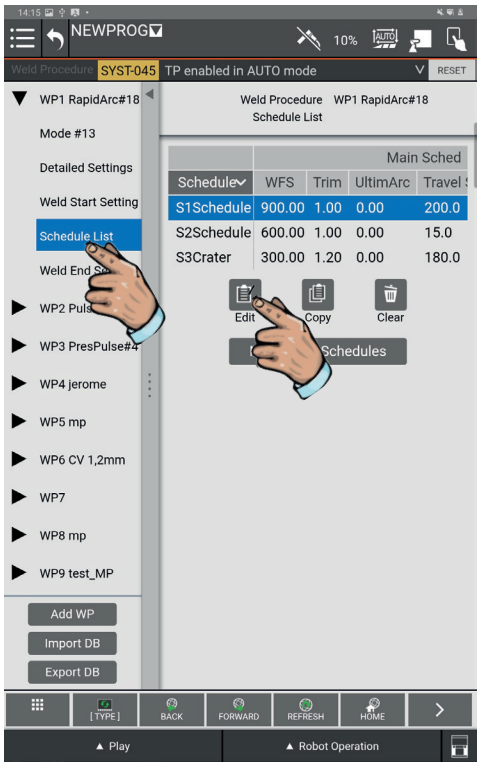


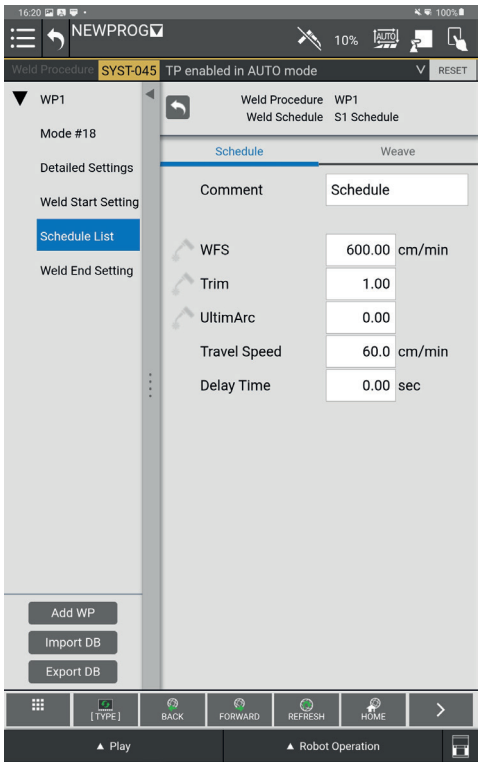


Press the **Weld start (Motion)** icon of your new program and then the **Edit** icon of the **Weld Start** tab to enter the required welding settings. Select the procedure (e.g. WP1) and the **Schedule** required by clicking once again on the **Edit** icon.



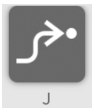




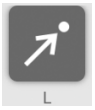


5.3 Teaching method from Programming icons

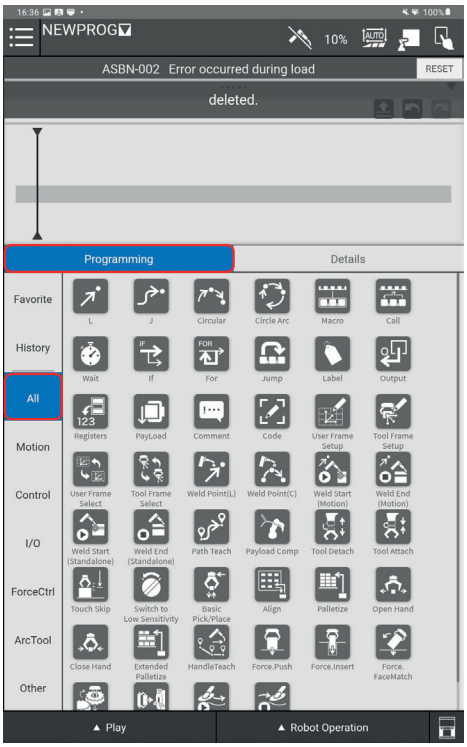
Open the selection **All** to access all the programming icons.
Drag and drop the required function on the time line.
The functions used for moving the robot away from welding are:



Points **J** ➔ Movement in space with no risk of collision.



Points **L** ➔ Linear movement.



The functions used for the welding instructions are:

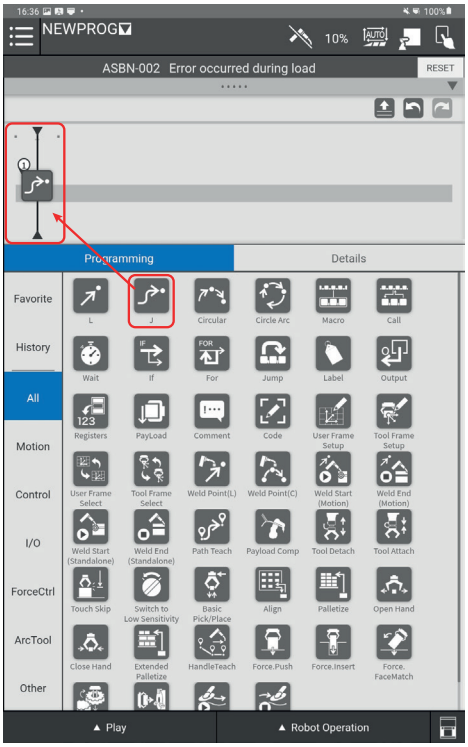
Weld Start (Motion) ➔ Start of welding

Weld point (L) ➔ Linear intermediate weld point.

Weld point (C) ➔ Circular intermediate weld point (includes 2 points).

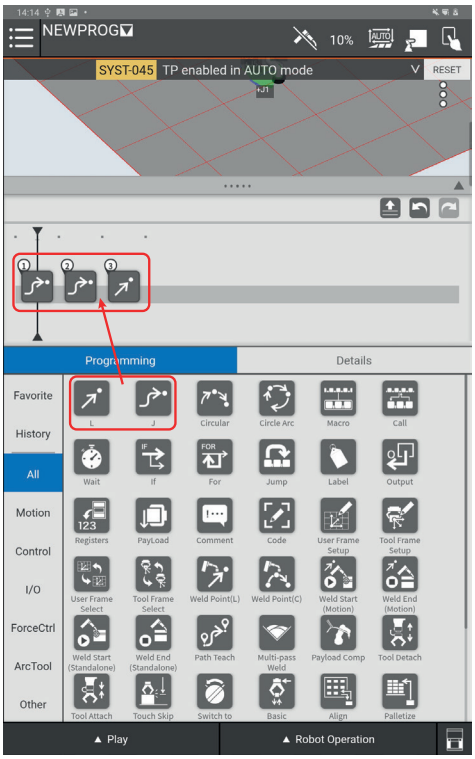
Weld End (Motion) ➔ End of welding

Manually move the robot to the first point of the program (this first point must be placed in an area that is sufficiently far away from the piece to weld to clear the working area during the stages when pieces are put in place and removed.



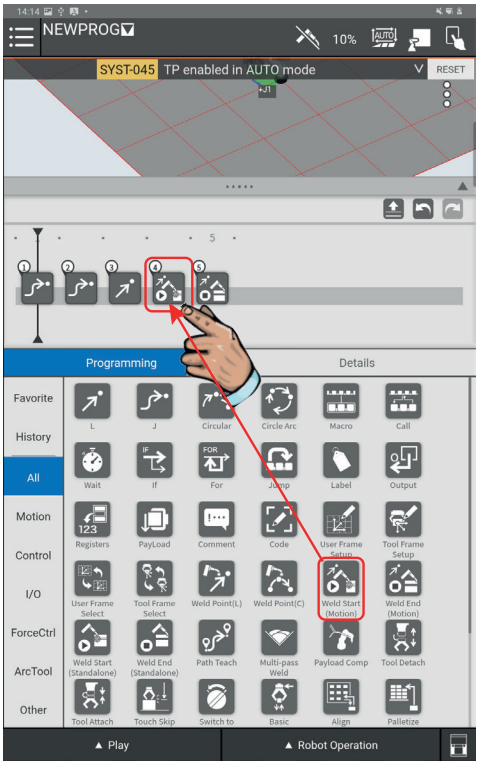
Press the icon **J** and drag the icon to the time line.
The coordinates of the first point are saved automatically.

Move the robot once again to the next approach points and save the positions of each point by dragging the required movement instruction to the time line (points **J** or **L** as needed)



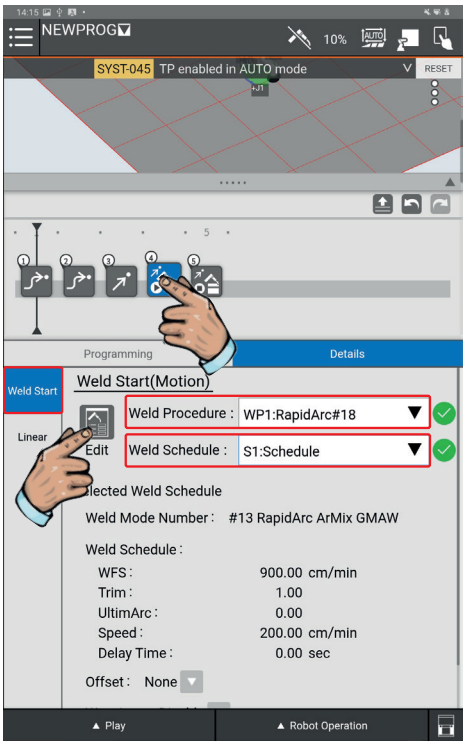
Manually move the robot to the weld start point.

Drag and drop a **Weld Start (Motion)** icon on the time line just after the approach points. The weld start point will be saved automatically.



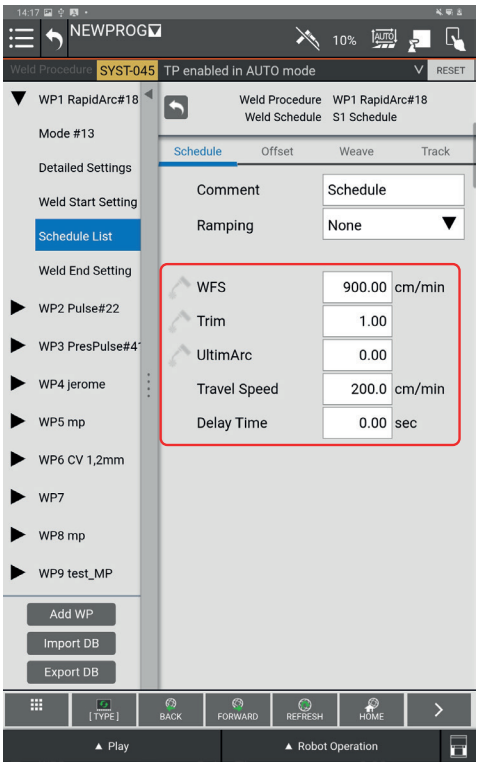
Press the **Weld Start (Motion)** icon and then select the **Weld Start** tab to enter the **Weld Procedure** and the required **Weld Schedule** from the drop-down menus.

Press the **Edit** icon to access and edit the welding parameters. To do so, select the **Weld Procedure** and the schedule number to edit.



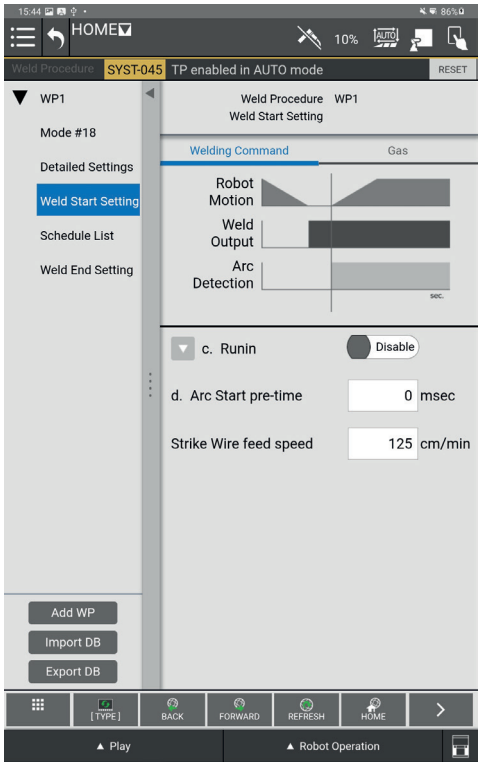
Complete the following fields*:

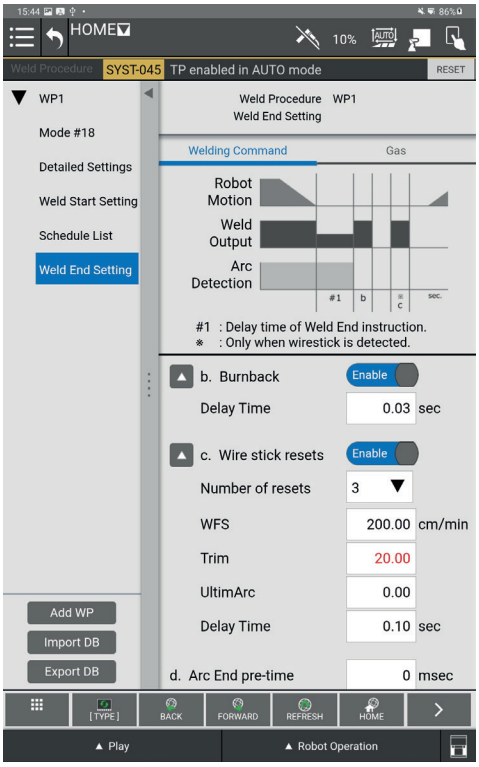
- **Wire feed speed (**WFS)
- **Trim**
- **UltimArc**
- **Travel Speed**
- **Delay Time**



* the fields to complete may vary depending on the welding mode used

The **Weld Start setting** and **Weld End setting** settings may also be adjusted.

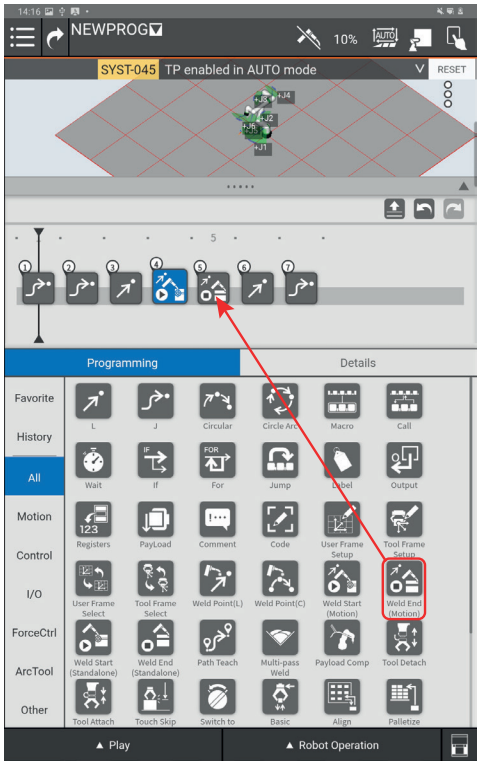


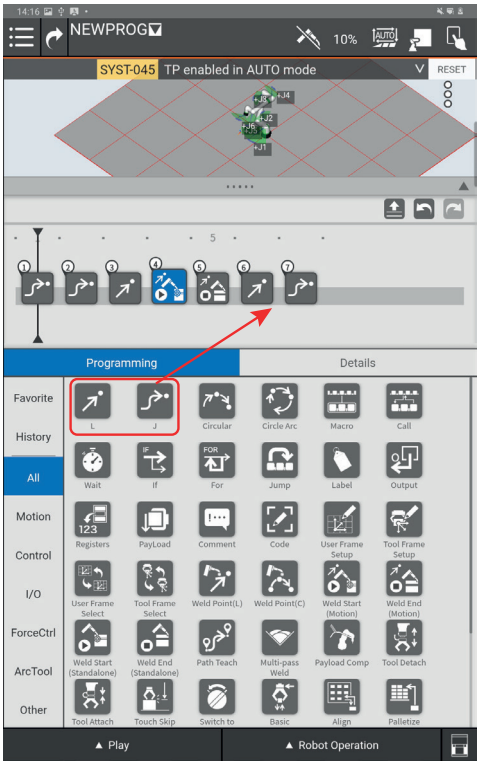


Manually move the robot to the weld end point.

Drag and drop a **Weld End (Motion)** to save the weld end position.
Press the **Weld End (Motion)** icon to enter the **Weld Procedure** and the required **Weld Schedule** from the drop-down menus.

Move the robot to the removal point and other required points to move the torch away from the welded piece and save the positions with the instructions **J** or **L** as needed.





5.4 Verification of a program

A program can be run in manual mode for the purpose of path verification.

WARNING: To run a program containing Weld Start (motion) or Weld End (Motion) instructions without welding, first make sure that the welding mode is disabled.

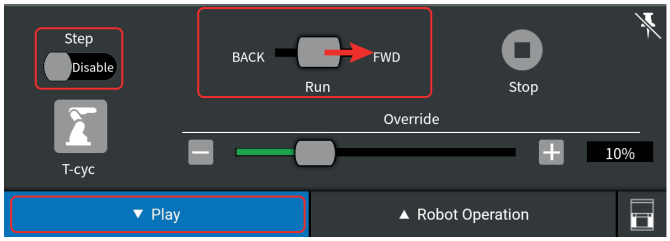
Welding enabled

Welding disabled

WARNING – Before running a program in manual mode, check that:

- **Robot movements are not obstructed and any foreign objects have been removed.**
- **The operator is wearing appropriate PPE and is not placed between the robot's arms and the piece to weld or any other obstacle.**
- **The stabilising stand is in place.**

Click on the **Play** button at the bottom of the screen. The following menu will be displayed:



Hold the **Run** slider in the **FWD** position to run the program in the chronological order. To run a program in the anti-chronological order, hold the **Run** slider in the **BACK** position.
If the **Step** slider is **Enabled**, that means that the robot will stop at every point of the program.
If the **Step** slider is **Disabled**, all the program sequences will be carried out successively till the end of the program or till the **Run** slider is released.
The **Override** slider is used to override the robot speed while playing the program (100% = the robot moves at the speed set in the program/10% = the robot moves at 10% of the set speed).

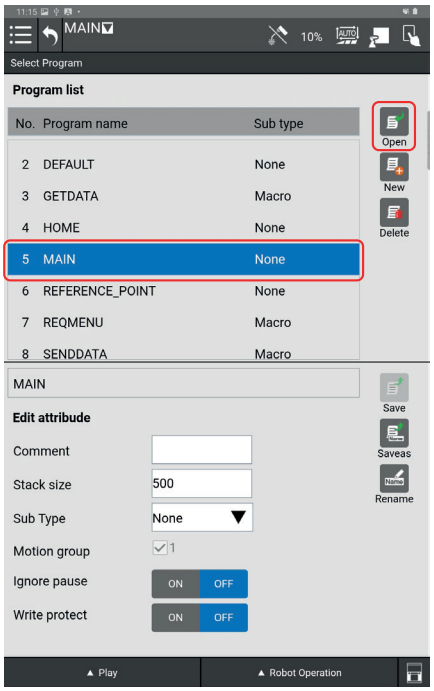
WARNING - BEFORE USING THE AUTO MODE, PLEASE CHECK THE FOLLOWING:

- Robot movements are not obstructed and any foreign objects have been removed.
- The operator is wearing appropriate PPE and is not placed between the welds and the fume extraction system or other ventilation equipment.
- The stabilising stand is in place.
- The tablet is stored on its bracket (while welding).
- The curtains are installed around the machine and effectively protect the environment from welding arcs. The electrical safety of the panels must be connected as recommended.

This mode is used for production and automatic system operation. Once all the pieces have been programmed and the welds have been examined to address specifications, this welding system may be used for continuous operation.

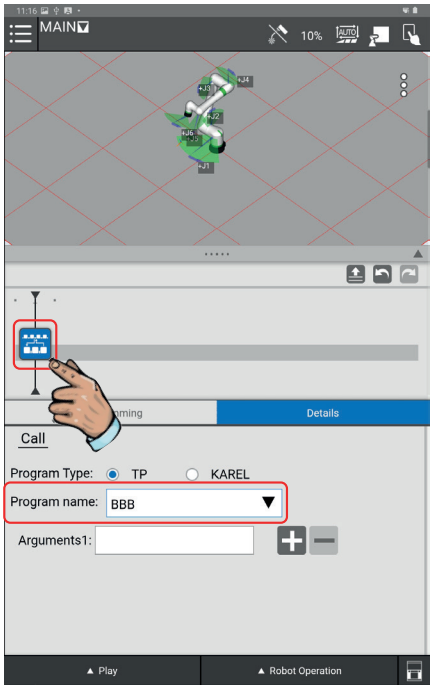
Automatic cycle sequence

The **Main** program is always the program that is executed automatically. This program calls the selected task program via the instruction **Call**.



Open the **Select program** menu and select the **Main** program.

Use **Open**.



Click on **Call**. Select the program you want to execute automatically.

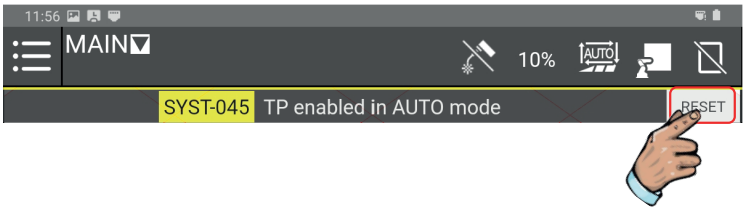
After completing the program to execute automatically in the **Main** program, switch to the automatic mode.

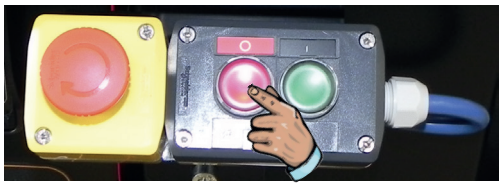
To that end, click on the icon in the upper right-hand corner of the tablet to switch from the manual to the automatic mode.

Manual mode

Automatic mode

If a message appears in the faults banner, press **Reset** or a red button of the operator control console to clear the message.





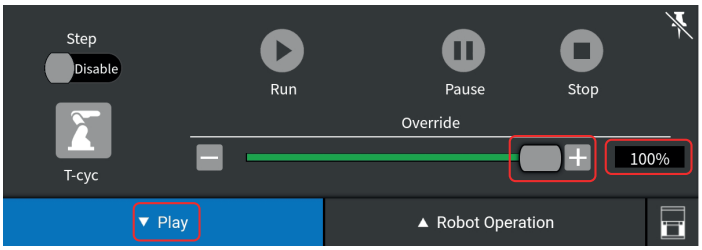
Press the welding icon to start welding.

Welding enabled

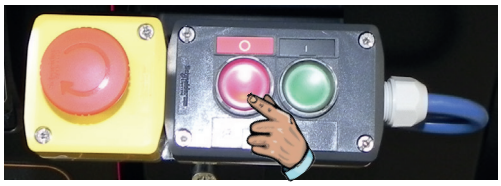
Welding disabled

Press the **Play** menu and move the speed cursor to 100%.

NB: The speed must absolutely be set to 100% for executing welding in automatic mode.

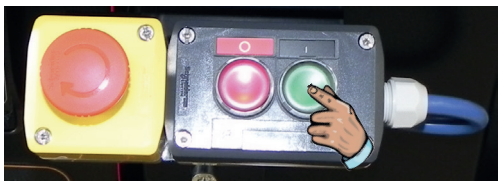


Press the red button on the operator control console to make sure that the program will start from its initial sequence.



Important: Check that the slider of the time line is positioned on the first point of the program before starting the automatic program.

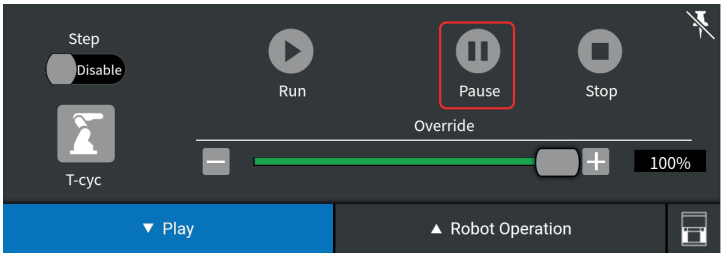
Press the green button on the operator control console to start the program in automatic mode.



The robot will execute the program selected by the user in the **Main** program.

The program may be stopped at any time when the red button on the operator control console is pressed. In that case, the program will be aborted and if the green button on the operator control console is pressed again, the program will start at the initial stage.

To temporarily stop a program being executed, you may press the **Pause** button on the tablet, or just give the robot arm a slight push.



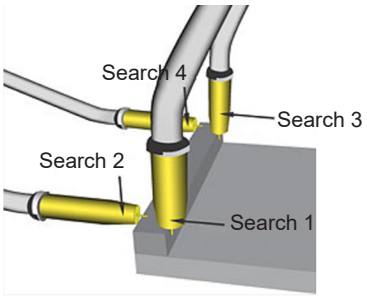
At the end of the production program, the robot stops at the last position saved in the executed program. Ideally, programs should end in the **Home** position.

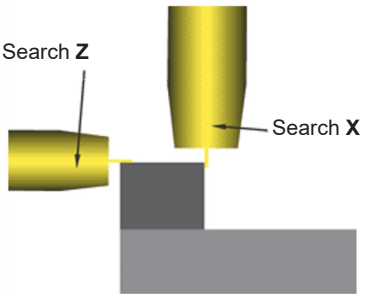
NB: If the program is interrupted for any reason, correct the error condition with the **Reset** key and press the green button to start.

6.1 Touch sensing function

The **Touch Sensing** function is a detection system for relocating program paths.
Touch Sensing operates by using the welding wire to establish electrical contact with the piece. The robot saves position data, then automatically makes adjustments over the whole welding path before the arc starts.
Touch Sensing allows readjustments in one, two or three dimensions.
Touch Sensing will increase the cycle time as a result of the execution of search routines, but will ensure that the wire placement position is correct.
For detection to be as effective as possible, the piece must have definite and precise reference surfaces or edges.

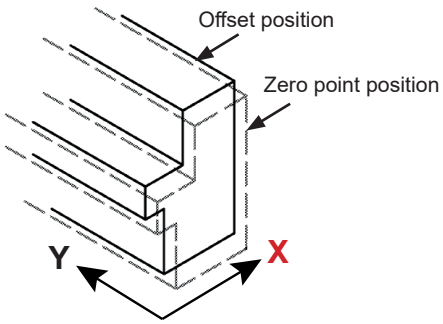
Examples of wire searches:

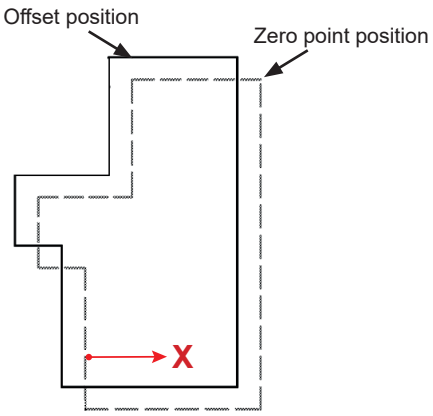




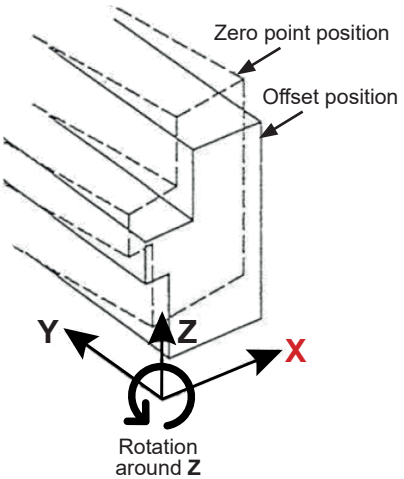
Search models:

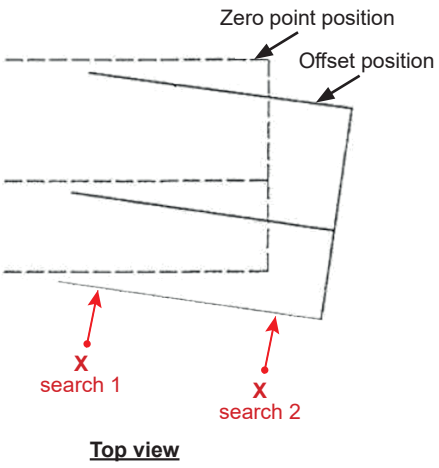
1D search



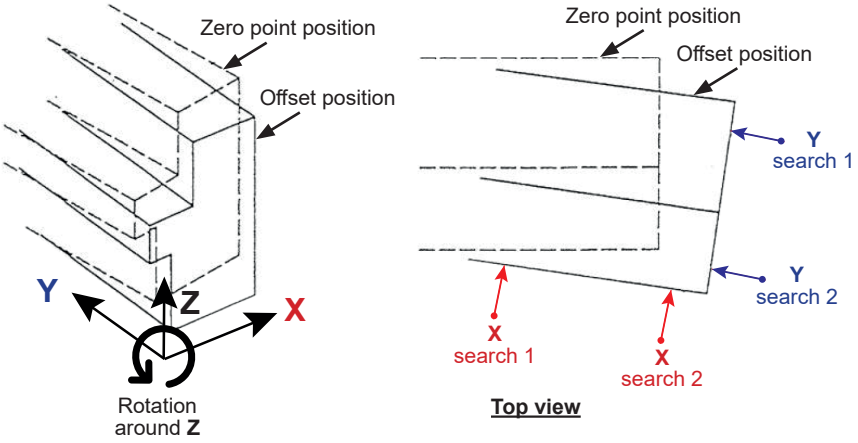


1D search + Z rotation

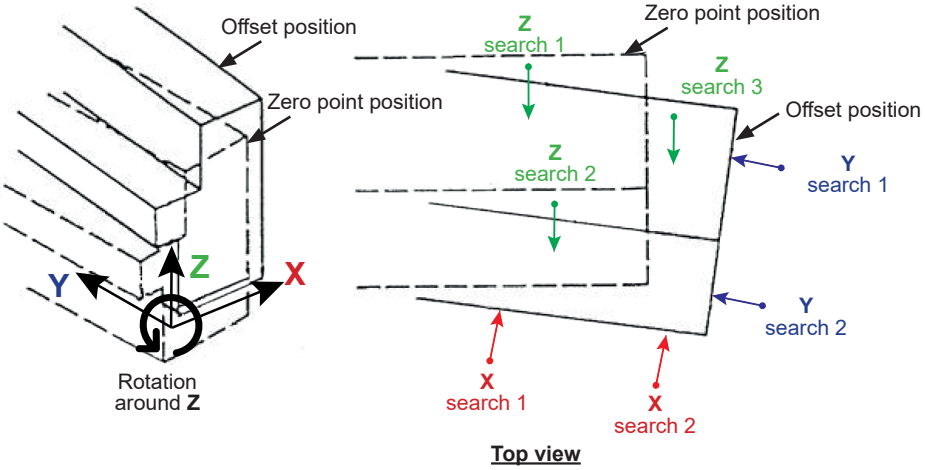




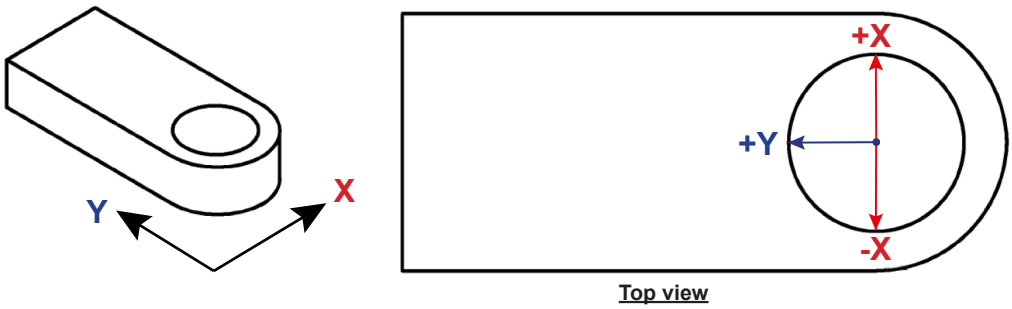
2D search + Z rotation



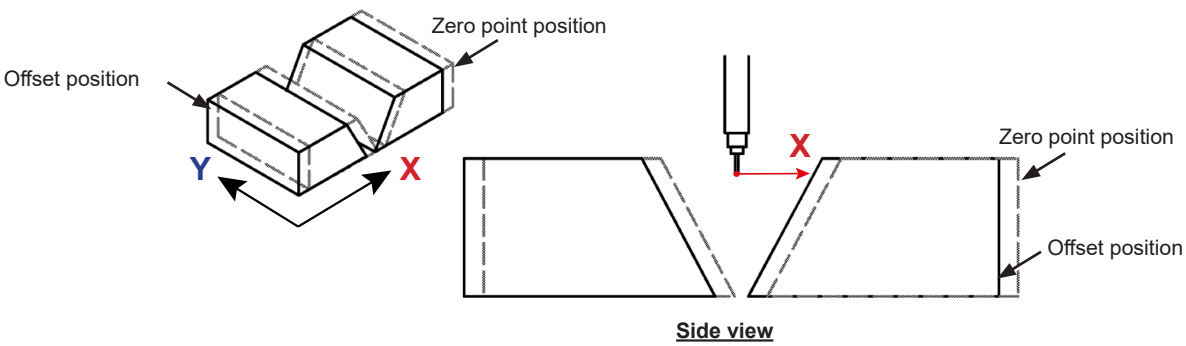
3D search + X, Y, Z rotation



Inner diameter search



V joint search

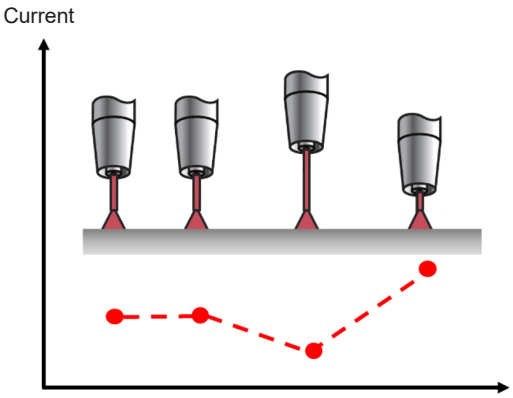


6.2 TAST function

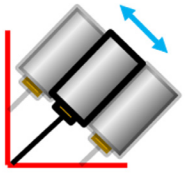
Through Arc Seam Tracking is a software function that tracks the seam through the welding arc.

TAST reads the welding current to determine the vertical position of the torch and the robot's weaving function to determine the lateral position of the torch.

Vertical seam tracking:
As the distance between the contact tip and the welded piece increases, the current decreases, and as the distance between the contact tip and the welded piece decreases, the current increases.
By reading the welding current, **TAST** corrects the vertical position of the torch to maintain constant **stick-out**.

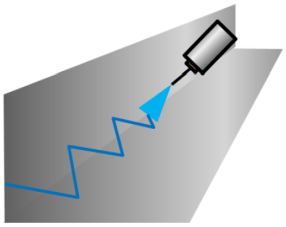


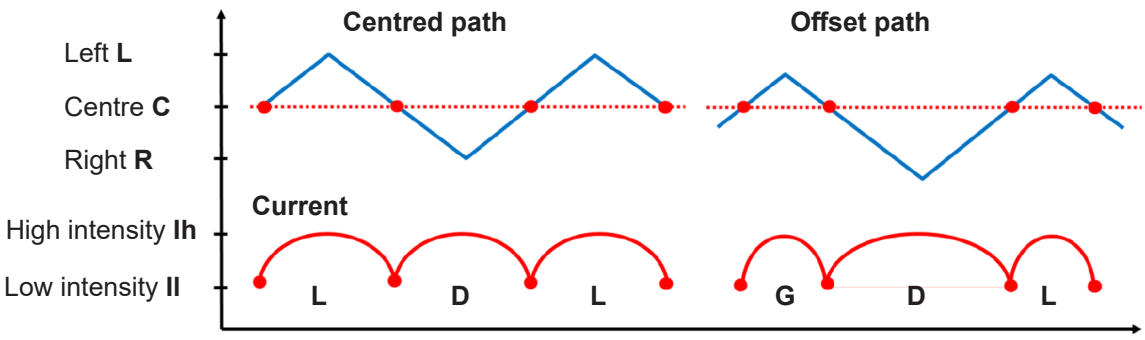
Similarly, **TAST** uses the robot's weaving function to determine the lateral position of the torch in the weld seam.
At the centre of the seam, the welding current is minimum. When the torch reaches the edge of its weaving cycle, the welding current peaks. If the path of the robot is offset in relation to the centre of the seam, the peak current value at the edge of the weaving cycle is no longer symmetrical. **TAST** makes the necessary corrections to the path.



Torch at centre:
- Long stick out => weak current

Torch to the left or right:
- Short stick out => strong current

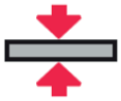




TAST corrects imperfect weld seams, but requires careful configuration of system variables, and an in-depth understanding of the welding process.

Conditions of use:

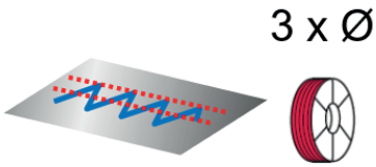
- Carbon steel
- Minimum 3 mm



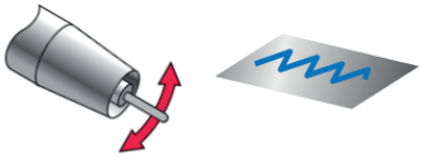
- Recommended min. current:

270A

- Weaving amplitude:
  minimum 3 x Ø wire

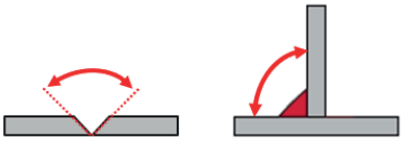


- Sinusoidal weaving necessary for horizontal tracking

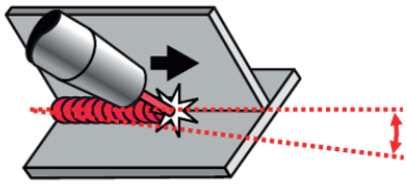


- The starting point must be perfectly within the seam

- Max angle: 90°
- Seams without spaces

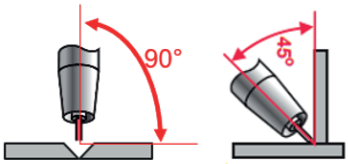


- Path correction:
- -10° maximum

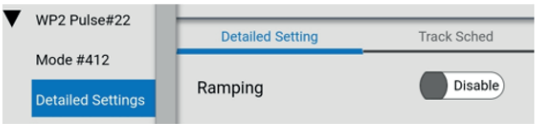


Limits of use:

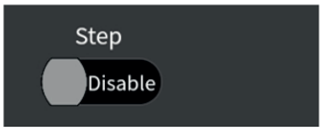
- The working angle of the torch must be perpendicular to the seam.
- Otherwise, the weaving elevation setting must be adjusted in order to obtain a strict 90° weaving plane in relation to the seam.



- The use of the ramping function is not compatible with TAST.



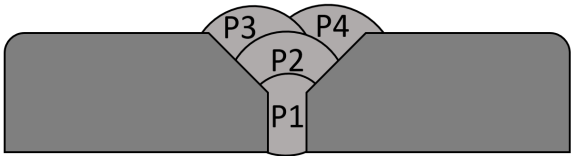
- TAST does not operate in Single Step mode in the Play menu.



- If a weld bead is interrupted, TAST will not operate in restarting mode.

6.3 Multipass function

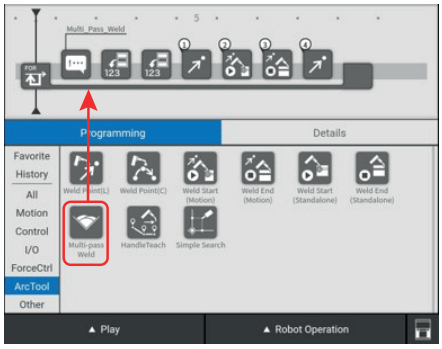
Multipass welding is generally required for assembling very thick pieces or for building up operations.
As indicated by their name, multipass welds are made up of several welding passes in a seam.
The multipass function is used to simplify the programming of welding sequences by saving a path (P1) and indicating the number of passes to apply and the required offset between each pass.



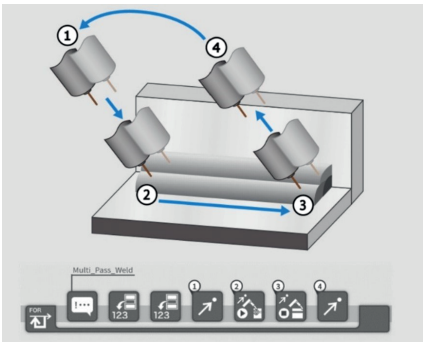
The offsets are adjusted in the welding menu, making it possible to change the torch position, the welding settings and the weaving settings with each pass.

	Main Sched					Weave					Offset						
Pass	WFS	Voltage	Ultimarc	Travel Speed	Delay Time	Weave	Freq	Ampl	R_Dwl	L_Dwl	Offset	StartX	Y	Z	Work	Trvl	EndX
P1Schedule	650.00	23.00	0.00	30.0	0.00	Disable	1.0	4.0	0.100	0.100	None	0.0	0.0	0.0	0	0	0.0
P2Schedule	700.00	23.00	0.00	30.0	0.00	Disable	1.0	4.0	0.100	0.100	Mpass	-5.0	-5.0	5.0	0	0	-5.0
P3Schedule	700.00	23.00	0.00	30.0	0.00	Disable	1.0	4.0	0.100	0.100	Mpass	-10.0	5.0	5.0	0	0	-10.0

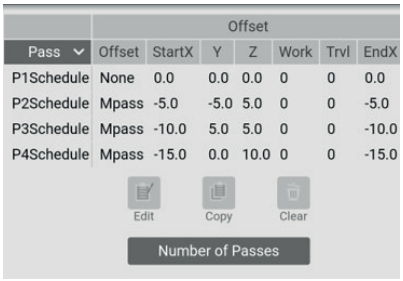
The use of the **multipass** function is simplified by using the **Multipass Weld** icon for saving a set of instructions grouping the torch approach and escape positions (points 1 and 4), the arc start and end positions (points 2 and 3) and the loop for making the number of passes required.



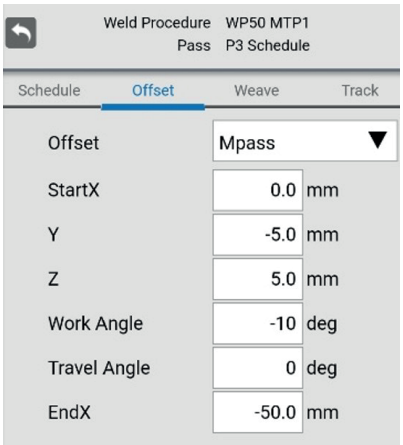
Inserting a **Multipass** sequence



Viewing the **Multipass** sequence



Details of offsets of 4 passes



Details of the offset page for pass 3

The use of personal protective equipment is MANDATORY for all maintenance work.

1 - Troubleshooting

1.1 Fault recovery

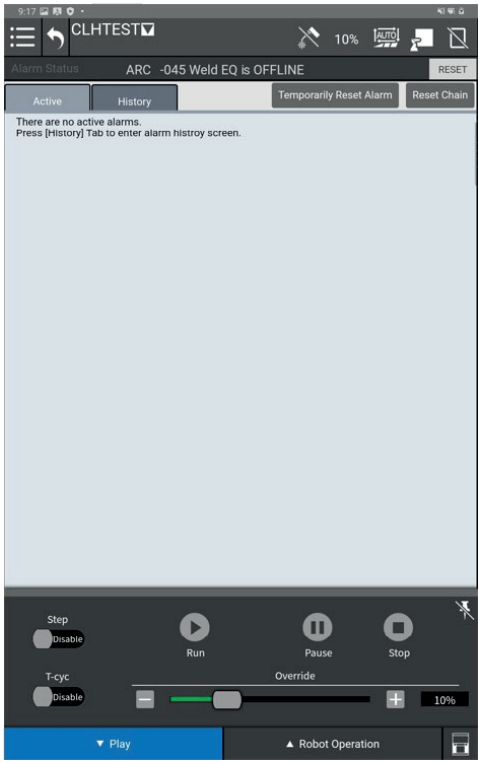
If a fault occurs during manual or automatic operation, the system will stop, the indicator located at the base of the robot will go red and an error message will be displayed in the upper banner of the tablet.
To acknowledge a fault:

- Read and analyse the error message.
- Depending on the message, , correct the error and press the **Reset** of the tablet or press the red button of the operator unit.

When all the faults have been corrected, the system is ready to resume operating.

1.2. Alarm

- To access the alarm screen, touch the drop-down menu and select **Status** – **Alarm status**. The **Active** tab displays the active alarms [if there are any] in the order in which they have occurred; the **History** tab shows the alarms history.
- Press **Rest Chain** to clear all the faults.



Refer to the documentation for detailed definitions of the alarms and solutions:

- **B-83284EN-1 “Operating Manual for Controller R-30iB Mini Plus (Alarm Code List)”**

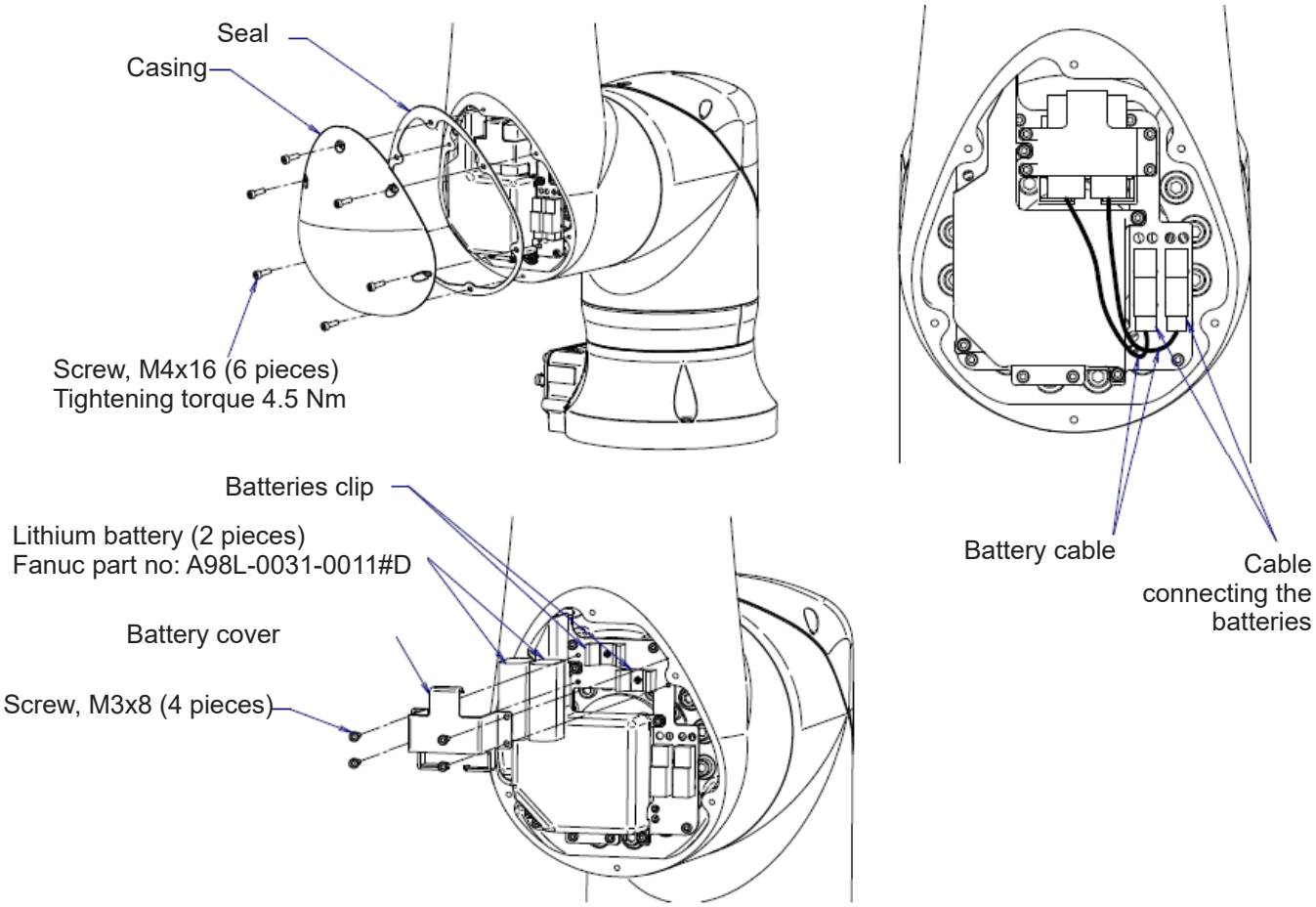
When the BZAL alarm is displayed, replace the encoder batteries using the following procedure:

1. Leave the installation powered,
2. Press an emergency stop button,
3. Remove the 6 M4X16 screws of the lateral housing of axis 2,
4. Remove the 4 M3X8 screws holding the battery cover,
5. Disconnect the 2 battery connectors,
6. Take the 2 batteries out of their slots,
7. Install the 2 new batteries to replace the old ones,
8. Take the 2 batteries out of their slots,

NB: the J2 casing seal is reusable.

Warning - cell replacement with the power switched off will lead to loss of data about the current position of all axes, and as a result, the zero position control procedure will have to be carried out.

Refer to the robot maintenance literature:
- **B-84194FR-01 "Mechanical operating manual of CRX-10iA/L robot"**



While replacing the batteries, always replace both batteries.

1.3 Electrical box diagram

Please refer to electrical diagram 91506045

2 - Care

For a long and trouble-free life, the machine requires a minimum level of care and maintenance.

The frequency of such maintenance is indicated for production in one work shift per day. For higher production rates, increase the maintenance frequencies accordingly.

Your maintenance department could photocopy these pages to track maintenance frequencies and times and the operations completed (tick the appropriate box).

With the exception of movement controls of the **Linc-Cobot Cart** and cell replacement, **maintenance** must be carried out with all the **energy supplies switched off.**
The disconnection and padlocking of all energy sources is **mandatory**.

This section provides general system maintenance guidelines. It does not provide maintenance guidelines for individual system components. Make sure you follow the appropriate maintenance procedures for the different components in the system (robot, welding power source etc.).

Refer to the literature for detailed robot controller maintenance:
- **B-84175EN/01 “Maintenance Manual for Controller R-30iB Mini Plus”**

Refer to the robot maintenance literature:
- **B-84194EN-01 “Mechanical operating manual of CRX-10iA/L robot”**

WARNING: FAILURE TO CORRECTLY CARRY OUT PREVENTIVE MAINTENANCE COULD LEAD TO DAMAGE TO THE MACHINE AND/OR PREMATURE FAILURE OF COMPONENTS AND CREATE HAZARDS THAT MAY LEAD TO DAMAGE TO PROPERTY OR INJURY.

We recommend putting in place a traced system for tracking all your maintenance operations.

Clean the working area from time to time. The working area must remain clear of all obstacles.

Step	Operation	OK	NOK
A	*Daily*	✔	✘
	• 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 tightening of connectors. • Inspect there is no oil seepage from the sealed part of each seal. • Check that there is no abnormal noise or vibrations. • Check: ➔ the condition of the welding torch, ➔ the wear of the nozzle contact tip, ➔ the condition of the gas diffuser and the wire guide sleeve, ➔ the condition of the torch bundle.		

Step	Operation	OK	NOK
B	*Every week*	✔	✘
	• Check the working of all safety components. • Test the working of peripheral devices. • Clean the robot, the power source, the operating equipment and all the peripheral devices.		

Step	Operation	OK	NOK
C	*Every month*	✔	✘
	• 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 installation (electrical cabinet, power source etc.) are tight		

Step	Operation	OK	NOK
D	*Every 1 years*	✔	✘
	• Change the lithium cell of the processor or the front panel of the main control PCB • Replace the encoder batteries using the procedure.		

Ordering procedure:

Almost all the parts of a machine or installation are referenced in the photographs and sketches.

The descriptive tables contain three types of item:

- items normally held in stock: ✔
- items not held in stock: ✘
- articles upon request: no reference

(For such parts, please complete the list of parts page and send us a copy. In the Order column, state the number of parts required and indicate the type and number of your equipment.)

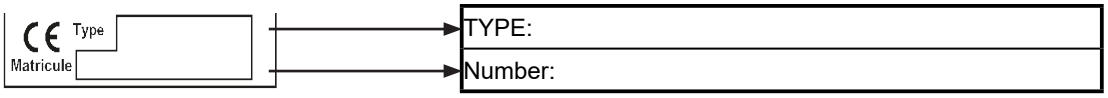
For items referenced in the photographs or sketches but not included in the tables, please send us a copy of the relevant page and highlight the relevant reference.

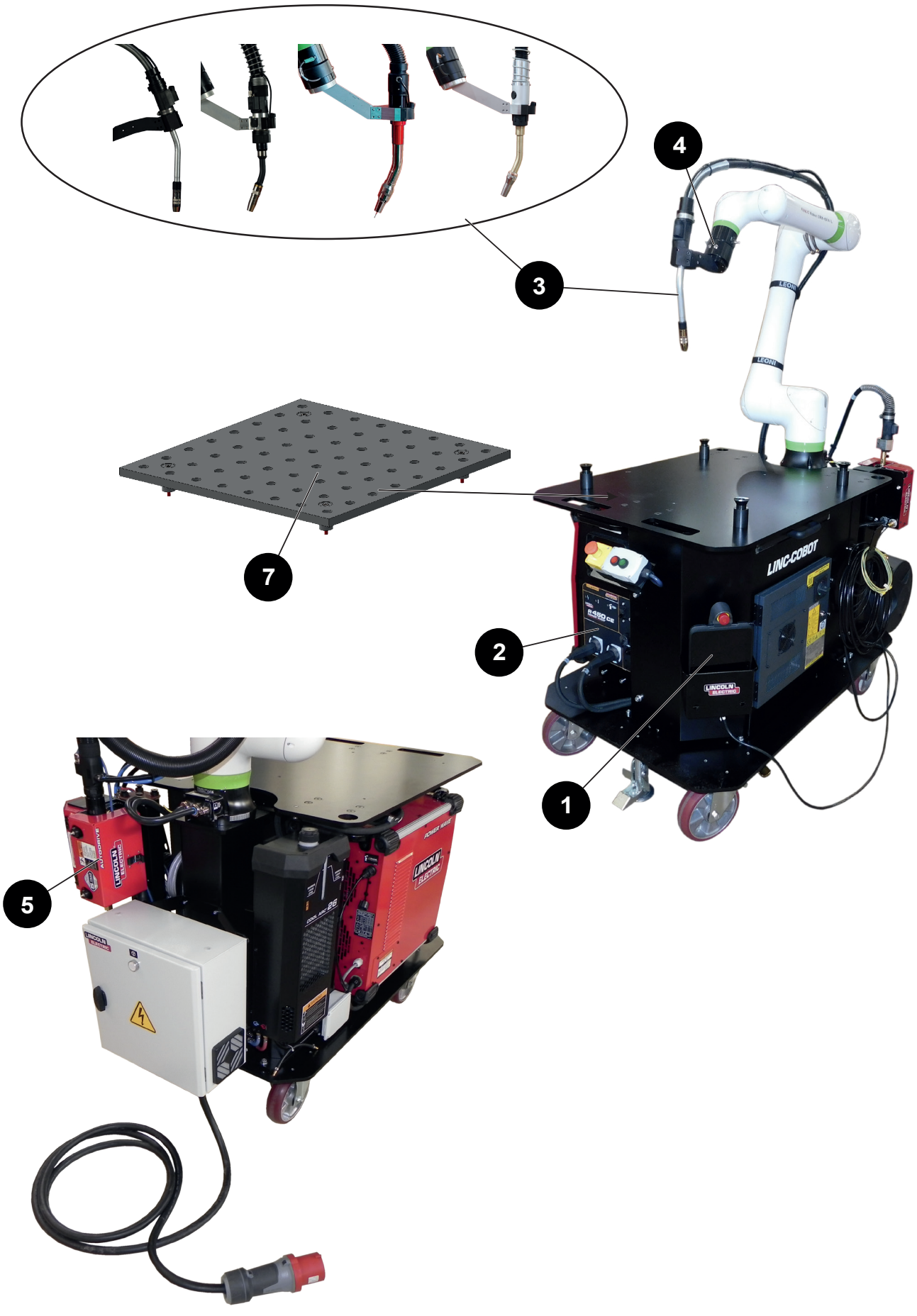
Example:

✔	normally held in stock.
✘	not in stock
	upon request.

Ref.	Part no	Stock	Order	Description
E1	W000XXXXXX	✔		Machine interface board
G2	W000XXXXXX	✘		Flow meter
A3	P9357XXXX			Printed front plates

- While ordering parts, please indicate the quantity and note the number of your machine in the box above.

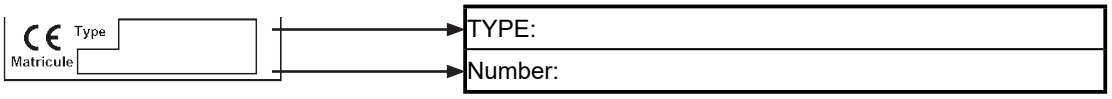



4
3
7
2
1
5
LINC-COBOT

✔	normally held in stock.
✘	not in stock
	upon request.

Ref.	Part no	Stock	Order	Description
1	AS-RS-A2025505			Touch tablet
	AS-RS-A2025593			5-metre tablet cable
	AS-RS-S22317-1034			CRX battery
2	K3455-1			**Power Wave® R450** power source
3	K2647-11			**Magnum Pro Air LE550** torch - 3.3 metres long
				BW500 torch - 3 metres long
	EM61000675			**Linc-Gun FX500** extraction torch - 3.3 metres long
	K5415-11			**Magnum Pro Water LE550** torch - 3.3 metres long
4	AS-RS-A3048271			Robot control button
5	K3560-1			**AutoDrive 4R100** wire feeder
7	AS-RP-TABLE800X800			Work table
	W000010167			Freezcool coolant
	AS-RS-S22320-16			CPU battery
	AS-RS-A2025507			Set of cobot rack fuses

- While ordering parts, please indicate the quantity and note the number of your machine in the box above.



4.2 Magnum Pro Air LE550 torch

✔	normally held in stock.
✘	not in stock
	upon request.

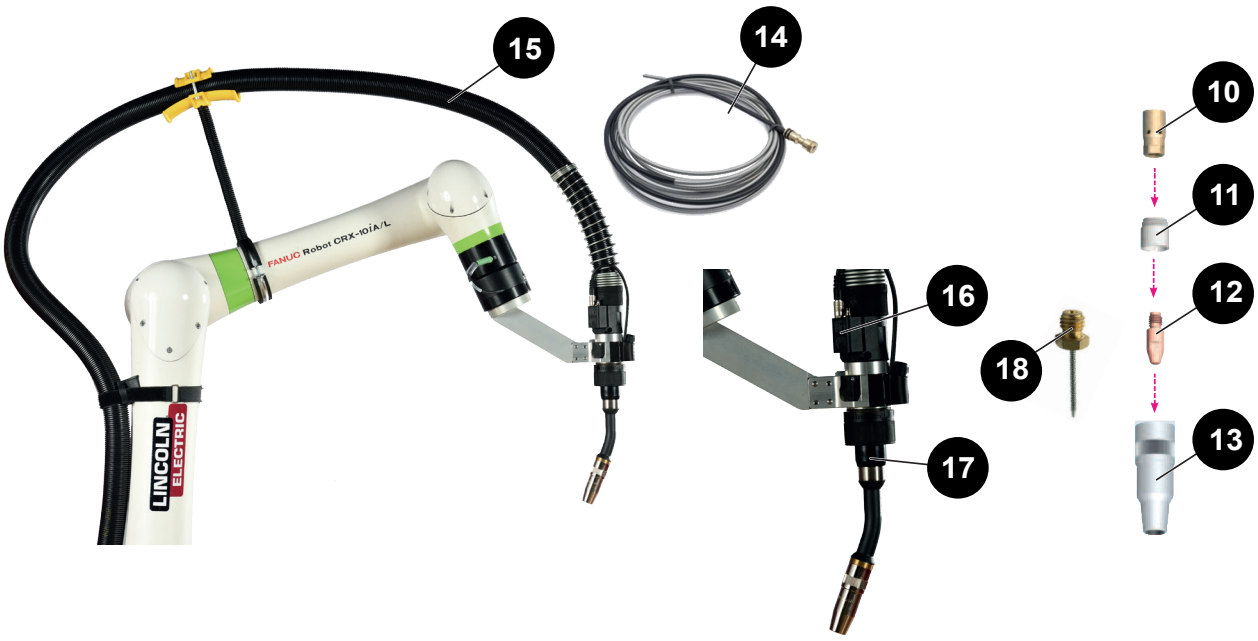
Ref.	Part no	Stock	Order	Description
	K2647-11			**Magnum Pro Air LE550** torch
1	KP45-3545-15			Wire sleeve, length 4.5m for wire, Ø0.9 to Ø1.2mm
2				Red seal
3	KP2747-1			Diffuser
4	KP2745-040			Set of 10 contact tips Ø1 mm - 550A
	KP2745-045			Set of 10 contact tips Ø1.2 mm - 550A
5	KP2743-1-62R			**Magnum Pro Air LE550** nozzle, screw type, TC -3.2mm Inner diameter 15.9mm
6				Torch bundle
7	AS-RS-A4015601			Deadman button
8	AS-RS-A3045996			**Magnum Pro Air LE550** torch holder

- While ordering parts, please indicate the quantity and note the number of your machine in the box above.

CE Type
Matricule

TYPE:
Number:

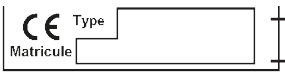
4.3 BW500 torch



✔	normally held in stock.
✘	not in stock
	upon request.

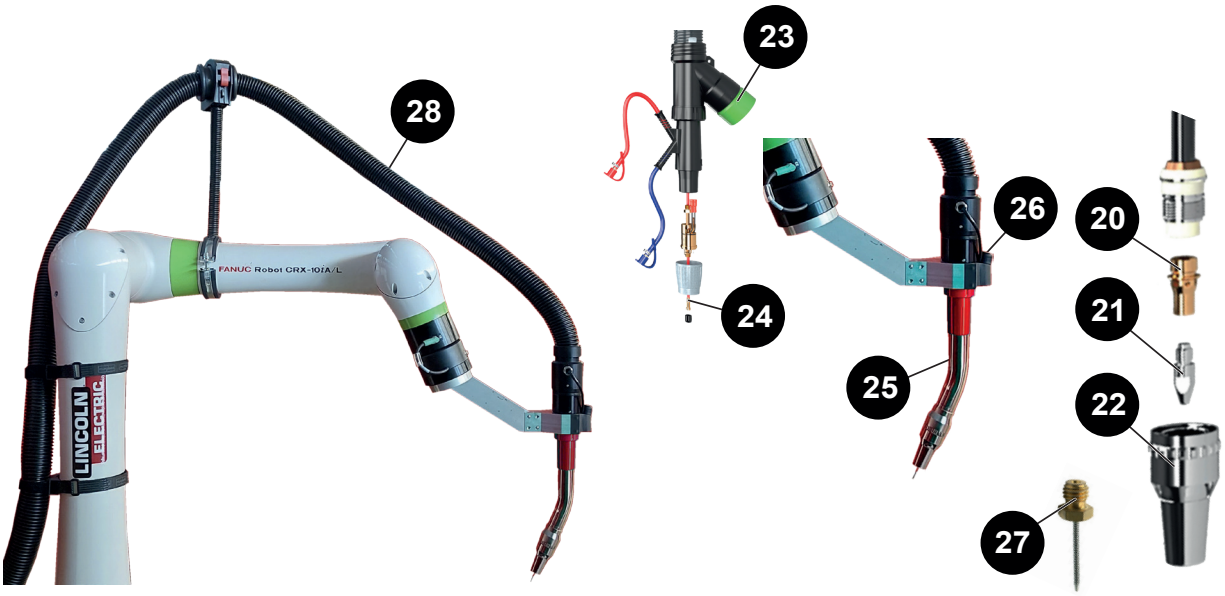
Ref.	Part no	Stock	Order	Description
				BW500 torch
10	AS-RS-W500-TIPADAP			**BW500** adapter for M8 contact tip (P125)
11	AS-RS-W500-INSUL			**BW500** insulator
12	W000010841			Set of 10 steel contact tips, Ø 1.0 mm
	W000010842			Set of 10 steel contact tips, Ø 1.2 mm
	W000010843			Set of 10 steel contact tips, Ø 1.6 mm
	W000010853			Set of 10 aluminium contact tips Ø 1.0 mm
	W000010854			Set of 10 aluminium contact tips Ø 1.2 mm
	W000010855			Set of 10 aluminium contact tips Ø 1.6 mm
13	AS-RS-W500-GN15-75			**BW500** gas nozzle, wire Ø 15.5mm L75.5mm R1.1
	AS-RS-W500-GN15-72			**BW500** gas nozzle, wire Ø 15.5mm L72mm SO2.4
14	AS-RW-S-08-12-3M			**BW500** steel wire sleeve, 0.8-1.2 - Length 3 metres
	AS-RW-S-16-3M			**BW500** steel wire sleeve, 1.6mm - Length 3 metres
	AS-RW-A-08-12-3M			**BW500** aluminium wire sleeve, 0.8-1.2 - Length 3 metres
	AS-RW-A-16-3M			**BW500** aluminium wire sleeve, 1.6mm - Length 3 metres
15	AS-RS-91506168			**Linc-Gun BW500** torch bundle - Length 3 metres
16	AS-RS-91506193			Dead man button for **BW500**
17	AS-RS-W500-T22			Gooseneck for **BW500** 22°
18	AS-RS-PROGTIP-SO15			Programming tip TCP SO15mm

- While ordering parts, please indicate the quantity and note the number of your machine in the box above.



TYPE:
Number:

4.4 FX500 torch



✔	normally held in stock.
✘	not in stock
	upon request.

Ref.	Part no	Stock	Order	Description
28	EM61000675			**Linc-Gun FX500** torch - 3.3 metres long
20	EM61000678			**FX500** adapter for M8 contact tip (P125)
21	W000010841			Set of 10 steel contact tips, Ø 1.0 mm
	W000010842			Set of 10 steel contact tips, Ø 1.2 mm
	W000010843			Set of 10 steel contact tips, Ø 1.6 mm
22	EM61000676			**FX500** gas nozzle, wire Ø 14mm
	EM61000677			**FX500** gas nozzle, wire Ø 17mm
23	EM61000701			Black pipe adapter for **FX500** torch
24	W000010731			**FX500** blue wire sleeve for steel wire, 1.2mm - Length 4 metres
	W000010734			Red wire sleeve for **FX500**, steel wire, 1.0-1,2 - Length 4 metres
	W000010868			**FX500** yellow wire sleeve for steel wire, 1.2mm - Length 4 metres
25				Gooseneck for **FX500** 22°
26	AS-RS-91506194			Dead man button for **FX500**
27	AS-RS-PROGTIP-SO15			Programming tip TCP SO15mm

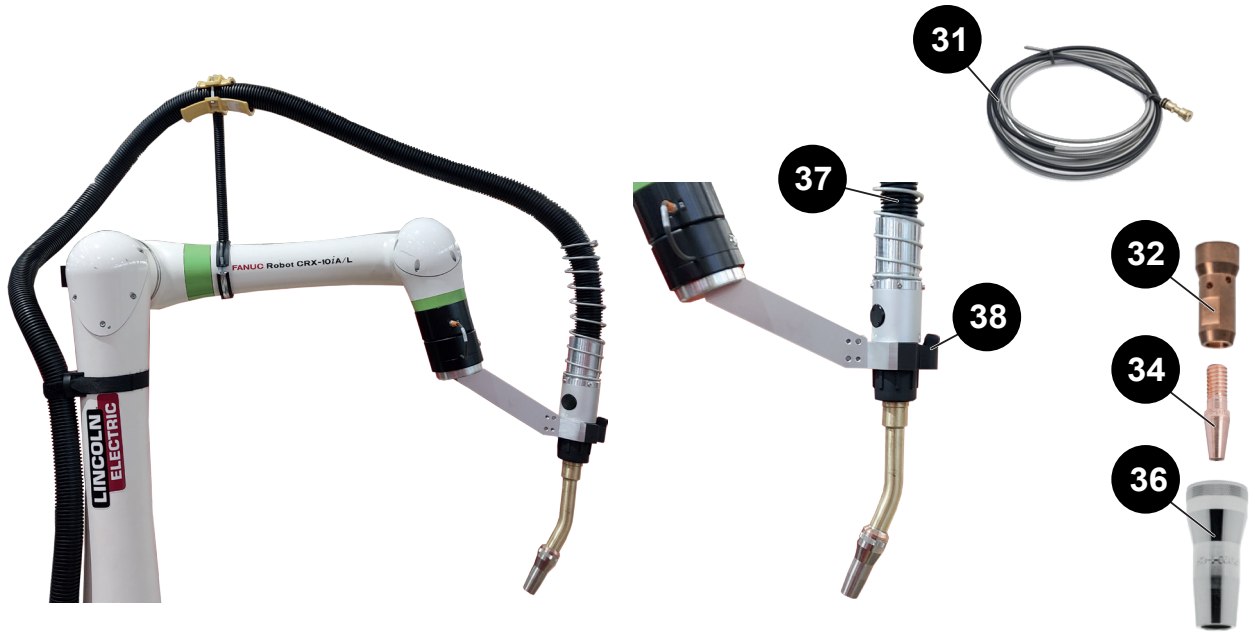
- While ordering parts, please indicate the quantity and note the number of your machine in the box above.

CE Type
Matricule

TYPE:	
Number:	

Wire sleeves must be cut to length. They will also need to be stripped.

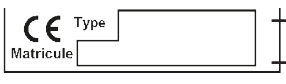
4.5 Magnum Pro Water LE550 torch



✔	normally held in stock.
✘	not in stock
	upon request.

Ref.	Part no	Stock	Order	Description
	K5415-11			**Magnum Pro Water LE550** torch
31	KP44-3545-15			Wire sleeve for wire Ø 0.9 - 1.5 mm - 4.5 metres long
	KP44-116-15			Wire sleeve for wire Ø 1.6 mm - 4.5 metres long
32	KP4380-1			Single-wire diffuser
34	KP2745-040			Set of 10 contact tips Ø1 mm - 550A
	KP2745-045			Set of 10 contact tips Ø1.2 mm - 550A
	KP2745-116			Set of 10 contact tips Ø1.6 mm - 550A
36	KP4120-1-75R			**Magnum Pro Water LE550** nozzle - TC 3.2mm Inner diameter 15.9mm
37	KP5385-11			Torch bundle
38	AS-RS-91506320			Deadman button

- While ordering parts, please indicate the quantity and note the number of your machine in the box above.



TYPE:
Number:

Wire sleeves must be cut to length. They will also need to be stripped.

PERSONAL NOTES

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