ABB Robotics

Operating manual
Introduction and safety - IRC5 M2004

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Introduction and Safety
Arc Welding Products

IRC5 M2004

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1 Introduction

1.1 General

Usage

Safety and the introduction to the manual are intended to provide information on the different manuals which are included in the robot welding system. They also outline the safety risks and how to protect equipment and personnel.

Basic knowledge

The welding robot system may only be used for its intended purpose where all supplied and installed parts are fully functional. All other usage is at the user's own risk.

If the equipment's component parts are used individually or together with other equipment, conversion work must be carried out by authorized and qualified personnel.

Reference document

Document	Document ID
Getting Started	3HAC021564-001
Safety equipment	3HEA 801 229

1.2 Key to symbols

The different types of warnings are set out with symbols according to the table below:

Symbol	Name	Meaning
	Danger	Warning that serious or life-threatening personal injury and/or serious damage to the product will occur if the instructions are not followed.
	Warning!	Warns of the risk of personal injury or serious damage to the product. Always follow the instructions that accompany the use of this symbol.
	Electric shock	Warns that electric shock can cause life-threatening or serious personal injury. Always follow the instructions that accompany the use of this symbol.
	Caution	Draws your attention to the fact that damage to the product can occur if an action is not performed or is performed incorrectly.
	Static electricity ESD	The ESD symbol indicates a risk of static electricity that may cause serious damage to the product.
	Note!	Information about important parts.
	Tip	The Tip symbol refers to an instruction offering further information on a particular step.

2 General information

2.1 Identification

2.1.1 Location of rating and reference plates

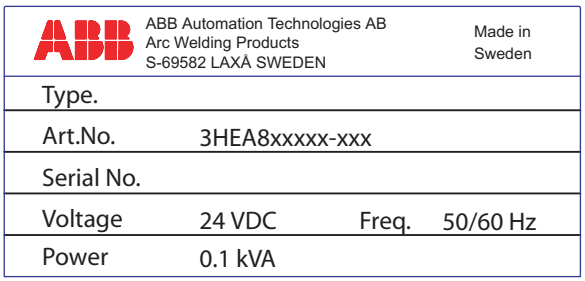
Rating plates and reference plates can be found on component units in the welding robot system.

The location of each rating plate and reference plate is described in the Product Manuals for respective units.

Check that the data on these plates corresponds with the delivery information found under tab 2 in the system manual.

Rating plate, Robot Controller

Rating plates for robot controller interface are located on the left side of the control module respectively the drive module.



Figur 1 Example of a rating plate, robot controller

Rating plates, other electrical and mechanical equipment

Rating plates for other electrical and mechanical equipment are located on the following units:

- positioner
- wire feed
- cell structure

ABB Automation Technologies AB Arc Welding Products SE-695 82 LAXÅ SWEDEN	**Made in Sweden** CE
Type	
Article No.	
Serial No.	
Net weight	

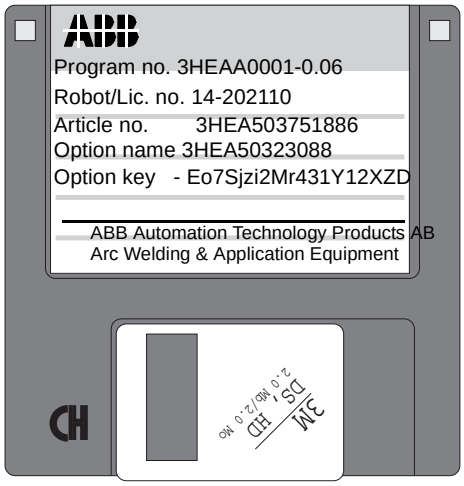
Applies to the cell structure

ABB Automation Technologies AB Arc Welding Products SE-695 82 LAXÅ SWEDEN	**Made in Sweden**
Type	
Article No.	
Serial No.	
Net weight	

Figur 2 Example of a rating plate, other electrical and mechanical equipment

2.1.2 Labeling of diskettes

For more information about the labeling of system diskettes (robot), see IRB Product Manual.



Figur 3 Example of system diskette labeling

2.2 Manufacturer's Declaration

With all deliveries (except the delivery of FlexArc and FlexArc Compact) to EU and EES countries comes a declaration by the manufacturer in accordance with the requirements of directive 98/37/EEC, Appendix IIB.

3 Safety instructions

3.1 General

There are safety instructions in this chapter for all steps that involve a risk of personal injury or material damage. In addition, they are written out in the document together with the instructions for each step.

General warnings where the intention is to avoid difficulties are only set out by the instruction in question.

Before the welding robot system is taken into production, it should be equipped with a safety system to meet the requirements of the Machinery Directive. 98/37/EC.

All personnel working with the welding robot system must be fully conversant with the applicable safety instructions that are available.

3.1.1 Purchaser’s/user’s responsibility

- Users of a welding robot system from ABB Automation Technologies AB have the ultimate responsibility for safety measures concerning personnel working with the system or in its proximity.
- The purchaser/user of ABB's welding robot equipment bears responsibility for ensuring that all equipment is installed and used in the manner stated by the supplier.

  Follow the standards and safety instructions applicable in respective countries.

Preparations

Read through all included manuals carefully, especially the sections about safety before you start to unpack, install and use the station.

Save all manuals. When the equipment is sold ensure all manuals are handed over to the new owner.

User environment

Welding fumes and any gases formed or used when welding can be dangerous to inhale.

It is the responsibility of the purchaser/user to ensure that the working environment complies with each country's regulations. In addition, the following should be done:

Action
• Ensure that satisfactory extraction equipment is installed and used.
• Ensure that there is sufficient lighting above the workplace.
• If possible use environment-friendly shielding gas and environment-friendly vegetable oil for splatter cleaning.

3.1.2 Equipment

This equipment is only intended for gas metal-arc welding, a.k.a. MIG/MAG welding, and may only be used in accordance with the instructions in the documentation. The equipment may only be used for other purposes if specifically stated. With all other use of the equipment ABB disclaims all responsibility and any compensation and warranty claims.

The equipment may not be used in environments where there is a risk of explosion and/or that are easily combustible.

The diskettes that contain control programs must not be modified in any way. This can result in the deactivation of safety functions such as reduced speed.

3.1.3 Limitation of liability

The safety information in the document must not be considered as a guarantee from ABB that the equipment cannot cause accidents or injury, even if all the safety instructions have been observed.

3.2 Safety risks

3.2.1 Fire risk

There is a risk of fire in connection with welding.

Safety measure
• Observe local fire regulations for welding.
• Clean the area around the workplace regularly and ensure that the area is free from combustible material.
• Check all connections in the welding current circuit are tightened correctly. Bad contact can result in an inferior welding result and the risk of fire.
• Check the cables are correctly dimensioned. Cables that are poorly dimensioned can constitute a fire risk due to overheating.

Fire extinguishing

Use carbon dioxide (CO_2) to extinguish fires involving equipment.

3.2.2 Risk of explosion

The risk of the gas cylinders exploding is great in the event of a fire. Observe local safety instructions with regard to handling and storing gas cylinders.

3.2.3 Risk of electric shock

The welding wire is live during the welding process even before the arc is ignited.

Safety measure
• Do not mix up the phase and protective conductors when connecting the equipment to the mains supply.
• The workpiece, fixtures and positioner are usually in direct contact with the welding circuit, and should therefore be regarded as live.
• Do not touch live parts of the equipment with just your hands or with damp gloves.
• Equip the operator station with an insulating mat.
• The welding circuit should not be earthed bearing in mind the risk of the protective conductor being damaged by forbidden welding current paths.
• The welding circuit must not be broken during the welding process.

3.2.4 Risk of slipping

Splatter cleaning

Splatter and oil on the floor bring about a risk of slipping.

Safety measure
• If possible, carry out splatter cleaning using a separate container.
• The container should be connected to extraction equipment.

3.2.5 Risk of static electricity

Components in the control module and drive modules are sensitive to static electricity.

Safety measure
• Use an ESD bracelet.
• Use an ESD protective floor mat.

3.2.6 Other risks

Cuts and scrapes

To avoid cuts and scrapes, fixtures, and if possible also workpieces, should be designed so that sharp corners and edges or sharp components are avoided.

Risk of burns

Do not touch the welding gun's nozzle or the hot workpiece immediately after welding.

Safety measure
• Wear dry and undamaged protective gloves.

Arc eye can cause burns and radiation injuries to the eyes and skin.

Safety measure
• Use a welding helmet with welding glass, gloves and protective clothing
• Protect others by setting up protective screens and curtains

3.3 Safe working methods

Caution must be exercised. All work carried out on the system shall be done professionally and conform to applicable safety regulations.

Safe working methods must be used to prevent injuries. The safety equipment must not be disengaged, bypassed or in any other way modified so that the safety effect ceases.

3.3.1 Normal operations

All normal operations in automatic mode are to be handled from a position outside of the enclosed working area.

3.3.2 Action in the event of disturbances in the operating sequence

Disturbances in the operating sequence bring about other risks than those associated with normal operations, as such disturbances require manual actions.

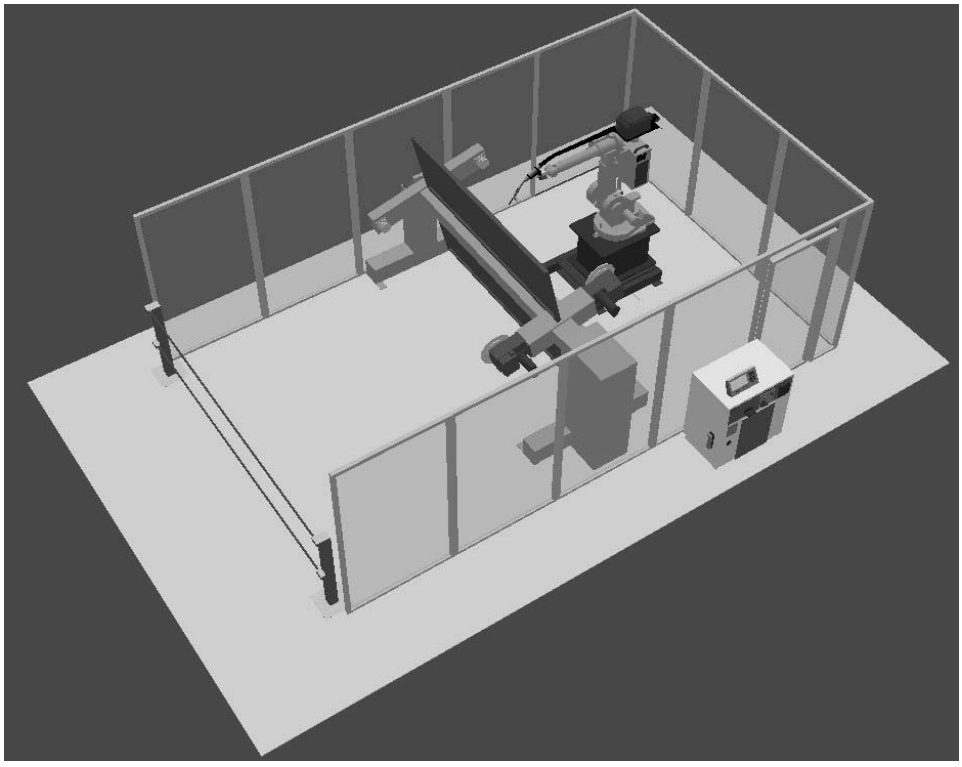
This work may only be carried out by persons trained in the use of the complete system and who are aware of the special risks involved with these different parts.

3.4 Safety equipment

In order for a person to work safely with an arc-welding robot system, the system needs to be equipped with a number of safety components, which are integrated into the control cabinet's safety system, *see "Product manual IRB Safety equipment"*.

3.4.1 Safety components as standard options

Safety components
Working area surveillance using light barriers
Time resetting unit for light barriers
Working area indication for: • Robot or Track motion • Positioner
Gate switch
Time resetting unit for gate device
Adapter unit (safety card SIB) for safety equipment.



Figur 4 Welding robot station with the safety equipment

3.5 Installation

This work may only be carried out by persons trained in the use of the complete system and who are aware of the special risks involved with these different parts.

Caution must be exercised. All work carried out on the system shall be done professionally and conform to applicable safety regulations.

Install the equipment as per the instructions on the Documentation CD. Install the robot and robot controller according to the instructions in the product manual.

3.5.1 Unpacking

Damaged or faulty equipment that can constitute a safety risk should be replaced with faultless equipment before use.

Action
• Make sure the equipment, or parts of it, do not tip or overturn during unpacking or transportation.
• Secure the load before it is removed from the packaging.
• Check that all the equipment has been supplied and that it has not been damaged during transport.
• Remove all packaging after unpacking to prevent a fire.

3.5.2 Lifting instructions

See the chapter on unpacking for each product manual.

3.5.3 Installation of welding cables

If possible lay the cables in cable trenches to prevent the risk of tripping.

The welding cables, power cable, control and signal cables should be placed at a distance from each other (> 200 mm), to prevent the effects of disturbances and voltage transfer.

Action
• Adapt the length of the cables so that the circuit is as short as possible.
• Ensure that the cables do not form coils or loops, or are placed directly against magnetic surfaces.
• Position the cables (supply and return) from each power sources as close together as possible, preferably twisted, to reduce inductance. • This is especially important to maintain a good function with dip transfer welding with long cables and to reduce the electromagnetic field (EMF) from the welding circuit.
• Ensure that the cables do not rest against sharp edges.

3.6 Commissioning

All personnel working with the equipment must have sufficient training for this and be fully conversant with applicable safety instructions. Incorrect usage can cause personal injury and damage the equipment.

Safe working methods must be used. *See "Safe working methods" on page 14.*

3.6.1 Before commissioning

All guards and all safety equipment must be positioned before the station is commissioned. This should be especially observed in connection with maintenance and service.

Before commissioning, the following should be checked:

	Action
1	Check that no tools have been forgotten.
2	Check that the fixture and workpiece are well secured.
3	Check that all parts and guards are in place and that they are well secured.
4	Check that all functions are correct.

3.7 Usage

All personnel working with the equipment must have sufficient training for this and be fully conversant with applicable safety instructions. Incorrect usage can cause personal injury and damage the equipment.

Safe working methods must be used. *See "Safe working methods" on page 14.*

3.7.1 Fault indication

Personnel should pay attention to any fault indication and deal with the cause of these immediately.

Check that no persons are within the risk zone before resetting of the protective equipment takes place and before the station is started.

3.7.2 Protective equipment

Do not wear loose fitting garments such as belts, bracelets, etc. that can become entangled in the robot or positioner. Always use the prescribed personal protective equipment.

Personal protective equipment

Personnel should have the following protective equipment:

Equipment	To ...
Protective glasses	protect the eyes against loose particles, sharp edges and sharp components.
Welding helmets with welding glass	protect the eyes and skin against radiation and burns.
Dry and undamaged gloves	protect against radiation and burns, as well as electric shocks.
Dry and undamaged protective clothing	protects against radiation and burns, as well as electric shocks.
Shoes with insulating soles	protect against radiation and burns, as well as electric shocks.
Ear protection	protects the hearing when using certain welding settings.
Protective screens and curtains	protect other people located in the vicinity of the station.

3.8 Maintenance and service

This work may only be carried out by persons trained in the use of the complete system and who are aware of the special risks involved with these different parts.

Caution must be exercised. All work carried out on the system shall be done professionally and conform to applicable safety regulations.

Only use extra equipment recommended by ABB and original spare parts.

3.8.1 Before maintenance and service is carried out

Turn off the mains voltage and (if possible) lock the circuit breaker before starting work on the equipment.

- Be particularly careful and use safe working methods when work must be completed with the current connected. Even if the mains voltage to the equipment is switched off there is still a risk of injury.

3.8.2 Risk of injury with maintenance and service work

Warning for a collapsing robot or falling load from the positioner if the brakes are released.
Warning for protruding welding wire and splatter from the gun during a service.

Action
• Do not look directly into the gun and wear protective glasses.
• Make sure you stand on a safe surface and use a safe working method.

3.8.3 Commissioning

See “Commissioning” on page 18.

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