

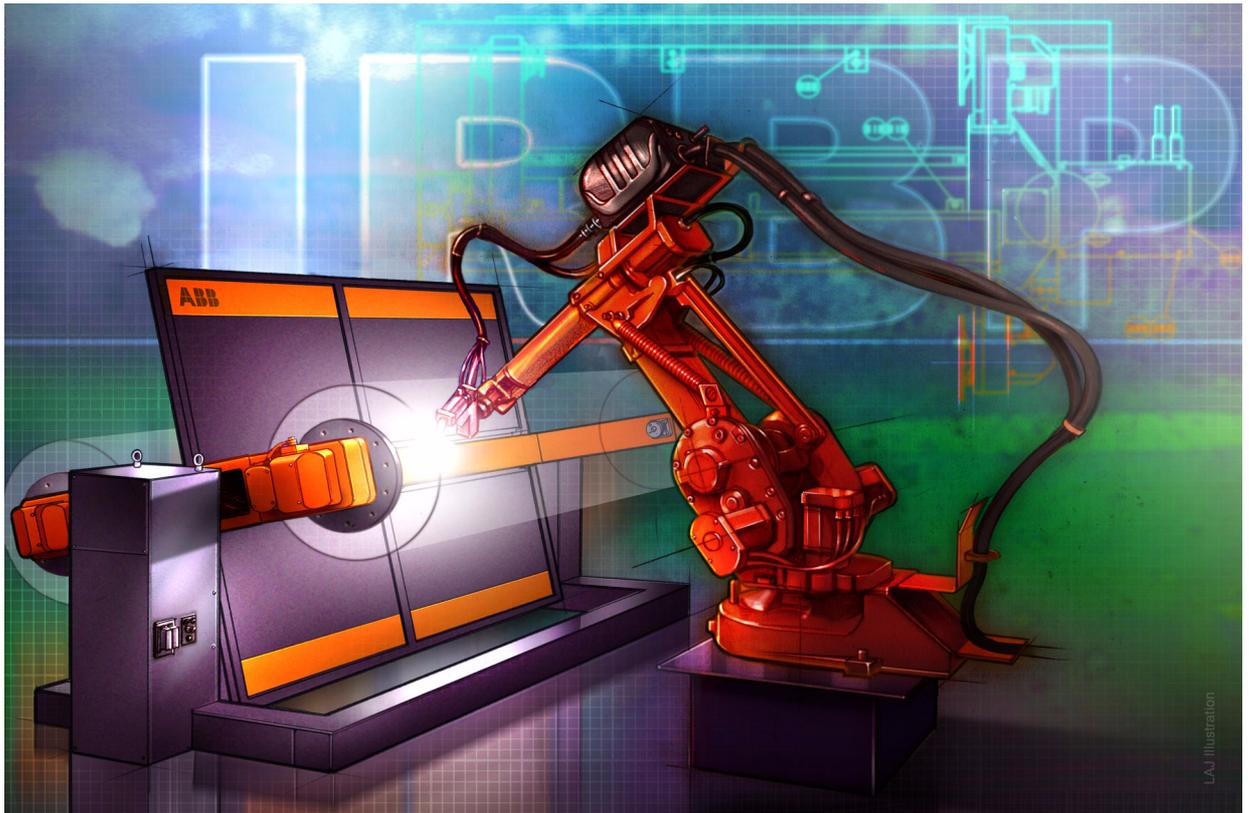


Operator's manual

Arc Welding Products

IRC5 Design 2006

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LAJ Illustration

Operator's Manual Arc Welding Products

IRC5

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1: Introduction

1.1: General

Operation

The operator's manual provides the information needed by the operator of the welding robot system for daily use and maintenance.

Basic knowledge

It is assumed that the operator is a trained welder and has some experience of RAPID programming for the IRC5 welding robot system.



NOTE!

All personnel working with the welding robot system must be fully conversant with the safety instructions provided in this document as well as other safety instructions applicable to this type of activity.



CAUTION

The welding robot system may only be used for its intended purpose, with all supplied and installed parts 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 documents

Documents
Getting Started
System Description
Introduction and Safety
Product Manual: Control Equipment, Positioner
Product Manual: Safety Equipment
Product Manual: Welding Equipment
Product Manual: Welding Power Source RPB
Product Manual: Welding Power Source LRD
Product Manual: Welding Source MigRob 500
Product Manual: IRB
Operators Manual: IRB
Operators Manual: FlexPendant
Troubleshooting Manual

1 Introduction

1.2: Symbol explanations

1.2: Symbol explanations

The various types of warnings are indicated with symbols according to the table below:

Symbol	Designation	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 this symbol.
	Electric shock	Warns of possible electric shock that can cause life-threatening or serious personal injury. Always follow the instructions that accompany this symbol.
	Caution	Draws your attention to the fact that damage to the product may 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	This symbol refers to an instruction providing further information on a particular topic.

1.3: Overview figure

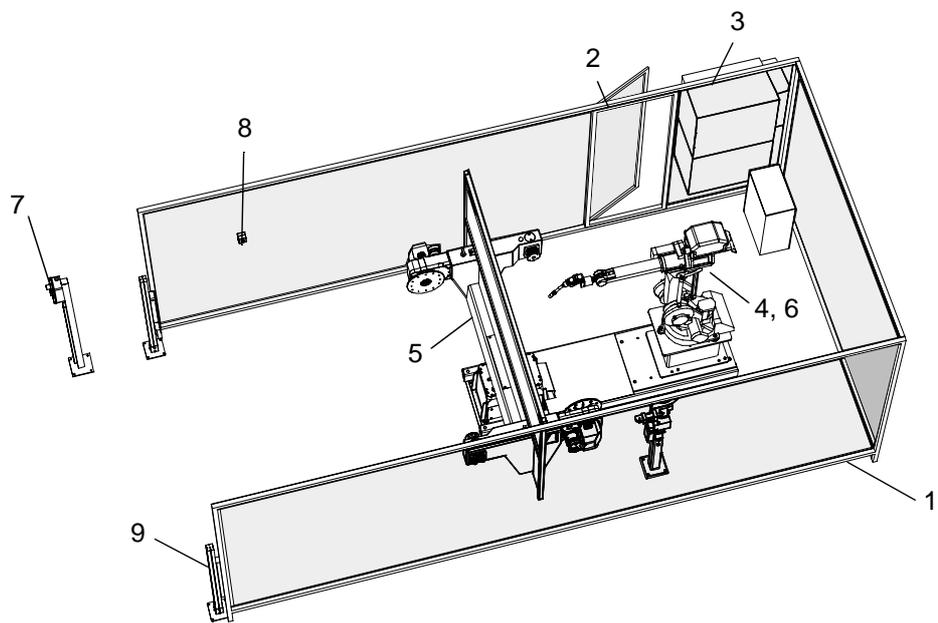


Figure 1: Example of station layout

Item	Description
1	Protective barrier
2	Gate interlock
3	Control equipment
4	Robot
5	Positioner
6	Wire feeder system
7	Operator panel
8	Button for pre-reset
9	Light barrier (entrance to the loading area)

1 Introduction

1.3: Overview figure

2: Safety instructions

2.1: General safety instructions

General

The contents of this recommendation can be considered a supplement to the standard regulations that apply at the workplace.

Users of a welding robot station from ABB have ultimate responsibility for safety measures concerning personnel working with the system or in its vicinity.

The safety measures must conform to the provisions and demands made on this type of equipment, bearing in mind the dangers and risks that can arise while working in a welding robot station.



WARNING

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

2 Safety instructions

2.1.1 DANGER – Ensure that the main power switch is turned off.

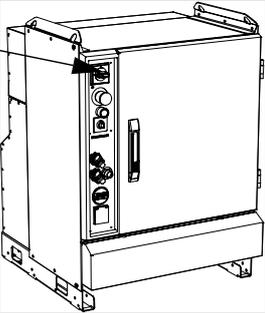
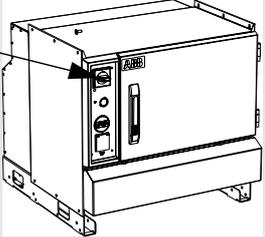
2.1.1 DANGER – Ensure that the main power switch is turned off.

Description

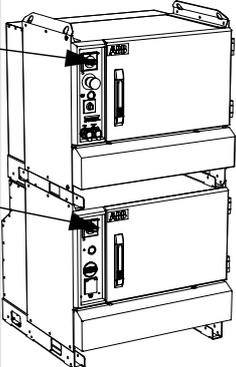
Work with high-voltage installations entails a potential lethal hazard. Persons subjected to high voltages can suffer heart failure, burns or other serious injuries. To avoid such injuries, never begin a job without first eliminating the risks to safety. This is described below.

Elimination

SCC
(single cabinet)

	Action	Info/Illustration
1.	<p>SCC (single cabinet)</p> <p>Turn off the main power switch on the SCC (single cabinet).</p> <p>The main power switch shuts off incoming power to the cabinet and operating power to all included drive modules.</p>	
2.	<p>DM (drive module)</p> <p>Turn off the main power switch (operating switch) on the respective drive modules to shut off incoming power.</p>	

DCC
(dual cabinet)

	Action	Info/Illustration
1.	<p>CM (control module)</p> <p>Turn off the main power switch at the control module.</p> <p>The main power switch on the control module shuts off operating power to all included drive modules.</p>	 <p>All power is disconnected when the main power switch on the drive module (DM1) is turned off.</p>
2.	<p>DM (drive module)</p> <p>Turn off the main power switch (operating switch) on the respective drive modules to shut off incoming power.</p>	

2.1.2 WARNING – The unit is sensitive to ESD.

Description

ESD (electrostatic discharge) is the transfer of electrostatic charges between two objects with varying charges, either through direct contact or through an electrical field.

The discharge contains very little energy and is therefore not hazardous to humans, however, electronics can be damaged by the high voltages.

Elimination

	Action	Info/Illustration
1.	Use an ESD bracelet.	The bracelet must be regularly tested to ensure that it is undamaged and functioning properly.
2.	Use an ESD-protected floor mat.	The mat must be grounded through a voltage regulating resistor.
3.	Use an ESD-protected table mat.	The mat will produce a controlled discharge of static electricity and must be grounded.

Location of attachment point for ESD bracelet

Single cabinet

Location in the SCC (single cabinet) is shown in the figure below.

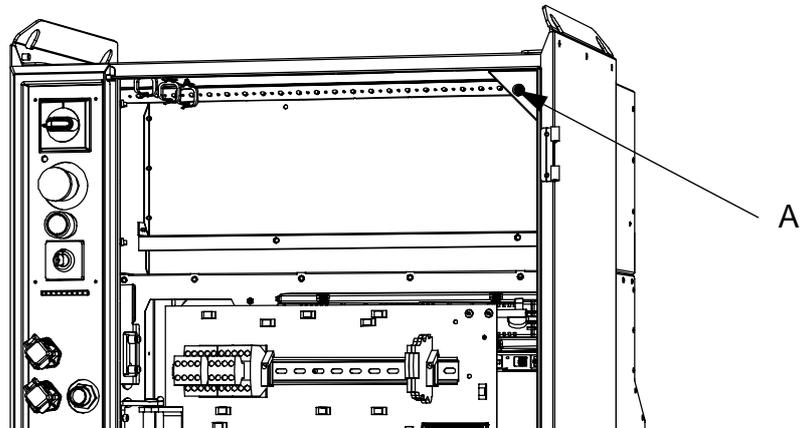


Figure 2: Location of attachment point for ESD bracelet

Item	Designation
A	Attachment point for ESD bracelet in the SCC (single cabinet)

The attachment point (A/B) for the ESD bracelet is located on the computer unit in the SCC (single cabinet)/DCC (dual cabinet).

2 Safety instructions

2.1.2 WARNING – The unit is sensitive to ESD.

Dual cabinet

Location in the DCC (dual cabinet) is shown in the figure below.

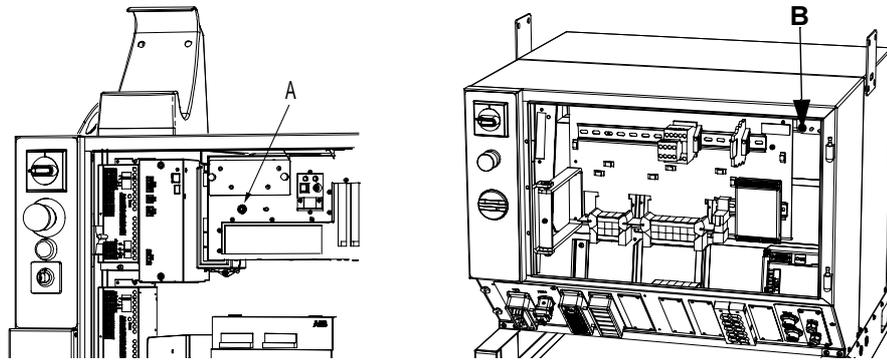


Figure 3: Location of attachment point for ESD bracelet

Item	Designation
A	Attachment point for ESD bracelet in the control module
B	Attachment point for ESD bracelet in the drive module

2.2: Special safety instructions

Welding robot system

The following points should be observed in all work in or around the welding robot system:

- Consider the welding robot equipment as a single unit.
- The welding robot system consists of many different parts, which in addition to the robot, also includes positioners and other peripheral equipment.
- The entire system communicates via electrical signals and can therefore bring about movements in completely different components to those directly affected.

Workplace

The following points should be observed in all work in or around the workplace:

- Make sure that the workplace is in order before the system is put into operation. If faults are discovered on or in the system, these must be rectified before starting.
- Consult trained personnel or the system manager if your own knowledge is insufficient to implement the measures.

Before operation

The following points should be observed before putting the welding robot system into operation:

- All guards and all safety equipment must be fitted before the robot system is started.
- The safety equipment must not be disengaged, bypassed or in any other way modified so that it does not provide the intended protection.
- Test running with the operating mode selector (key switch) in the 100% position should only be carried out by qualified personnel who are aware of the risks this involves.

During operation

The following points should be observed when the welding robot system is in operation:

- Do not remain within the risk zone (the robot and positioner working area) when the system is operational. If it is absolutely essential that you remain within the risk zone in order to carry out the work, the following must be observed.
- Never work alone in the risk zone when the system is in operation. One person should stand outside the risk zone to stop the equipment if a hazard arises while work is being carried out inside the risk zone.
- Exercise extreme care when operating the robot/positioner. Always remember that these can perform unexpected movements when executing a program. Even when the robot system seems to perform the same movement pattern over and over again for an extended period, the pattern can suddenly change.
- Be aware that weld splatter represents a fire and burn risk

2 Safety instructions

2.2: Special safety instructions

During maintenance work

The following points should be observed before beginning maintenance work:

- Take the robot system's FlexPendant with you when entering the risk zone so that no one else can start the robot system. When the continuous pressure switch on the FlexPendant is released, the robot system is put into standby mode with the motors shut off.
- Be sure to release the continuous pressure switch when the robot or positioner does not need to be operated.
- The robot system will be in standby mode with the motors shut off. The operating mode selector (key switch) on the control cabinet's control panel will be in the "Manual reduced speed <250 mm/s" position, and the continuous pressure switch on the FlexPendant must then be used to operate the robot system.
In this mode the robot and positioner movements are limited to a speed of no more than 250 mm/s.

2.3: Protective equipment

General

Do not wear loose-fitting garments or 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...
Safety goggles	Protect the eyes against loose particles, sharp edges and sharp components.
Welding helmet with welding glass	Protect the eyes and skin against radiation and burn injuries.
Dry and undamaged gloves	Protect against radiation and burn injuries, as well as electric shocks.
Dry and undamaged protective clothing	Protect against radiation and burn injuries, as well as electric shocks.
Shoes with insulated soles	Protect against radiation and burn injuries, as well as electric shocks.
Ear protection	Protects hearing when using certain welding settings.
Protective screens and curtains	Protect other persons located in the vicinity of the station.

2 Safety instructions

2.4: Safety risks

2.4: Safety risks

2.4.1 Fire risk



WARNING

There is a risk of fire in connection with welding.

Safety measures

- Observe local fire regulations for welding.
- Clean the area around the workplace regularly and ensure that the area is free of combustible material.
- Check that all connections in the welding current circuit are properly tightened. Poor contact can result in inferior welding results and a risk of fire.
- Check that the cables are correctly dimensioned. Cables that are under-dimensioned can constitute a fire risk due to overheating.

Fire extinguishing

Use carbon dioxide (CO₂) if the equipment catches fire.

2.4.2 Risk of explosion

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

2.4.3 Risk of electric shock

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

Safety measures

- Do not mix up the phase and grounding 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 your bare hands or with damp gloves.
- Equip the operator station with an insulating mat.
- The welding circuit shall not be grounded without necessary measures being taken to ensure proper functioning of the grounding conductor.
- The welding circuit must not be broken during the welding process.

2.5: Safety equipment

2.5.1 Welding robot system

The welding robot system may be complemented with integrated equipment to which the following devices can be connected.

Equipment	Description
Emergency stop buttons	See Emergency stop on page 18 .
Operating mode selector	Key switch on the control system's control panel. See Operating mode selector on page 19 .
Light barriers, e.g. hatches, sliding doors, etc.	See Light barriers on page 20 .
Pre-reset	See Pre-reset on page 20 .
Gate interlock	Service gate with gate switch. See Gate interlock on page 21 .
Positive opening limit switch on the robot and/or positioner	<ul style="list-style-type: none"> The station indication function is used to monitor the system's work stations. See Station indication on page 22. The service position is an area (position) between two work stations where the robot can perform tool cleaning (e.g., the welding torch). See Service position on page 24. The home position is a position where the robot is moved to a safe position out of reach of the operator. See Home position on page 26. The transport position is a position where the robot on a travel track is put in a safe position, out of reach of the operator, when passing a work station with an operator present. See Transport position on page 27.

2 Safety instructions

2.5.1 Welding robot system

Emergency stop

The illustrations below show the emergency stop buttons on the welding robot system:

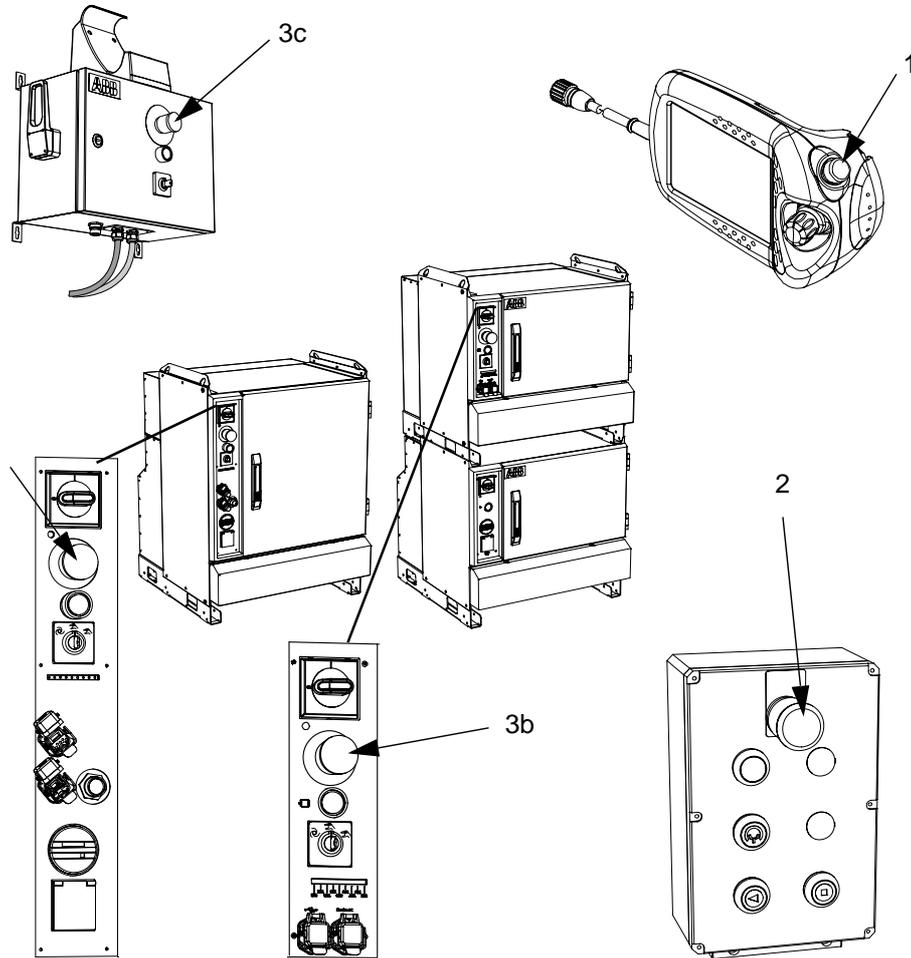


Figure 4: Emergency stop on the control system

Item	Description
1	FlexPendant
2	Operator panel
3a	Control panel on SCC (single cabinet)
3b	Control panel on DCC (dual cabinet), control module



NOTE!

The emergency stop is only activated if any of the buttons or limit switches in the circuit are activated. NOTE: DO NOT reset the emergency stop circuit until the fault has been rectified.

Emergency stop on welding power source See relevant product manual.

Operating mode selector

The operating mode selector has three positions:



NOTE!

“Manual full speed 100%” is not included in certain deliveries, and the operating mode selector then only has two positions.

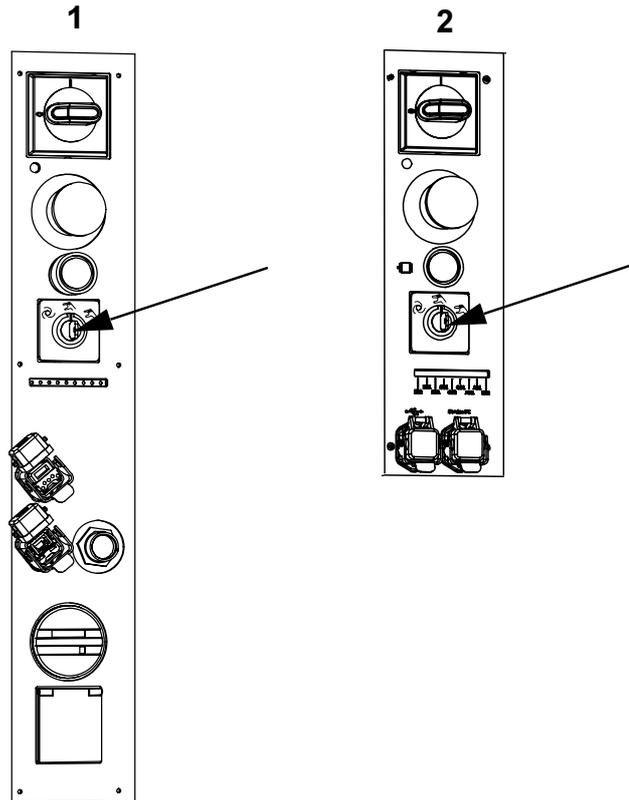


Figure 5: Operating mode selector on the control panel

Item	Designation
1	Control panel, SCC (single cabinet)
2	Control panel on DCC (dual cabinet), control module

Mode	Description
	Auto
	Manual reduced speed (<250 mm/s)
	Manual full speed (100%)

2 Safety instructions

2.5.1 Welding robot system

Light barriers

The light barriers in the robot system are used to stop the robot and positioner if anyone enters the risk zone where moving parts are activated.

The light barriers can, where appropriate, be replaced by hatches, sliding doors or gates.

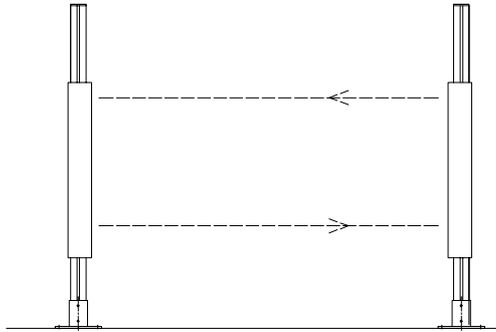


Figure 6: Light barriers

Pre-reset

A pre-reset button is located inside the service area. It is used in connection with resetting the safety circuits for the light barriers. The pre-reset prevents unintentional starting when the operator is inside the service area.

To reset the light barriers:

	Action
1	Press the pre-reset button (this permits a pre-reset of the safety circuits for the light barriers of 10 seconds),
2	Press and hold <i>the start button (operator ready button)</i> on the operator panel within 10 seconds.

Gate interlock

The protective barrier that surrounds the robot system can be complemented with one or more service gates to improve access to the robot and positioner working area. Such a gate can be fitted with a positive opening gate switch (see station layout).

When a service gate is opened during a working cycle, the system is automatically put into standby mode and the motors shut off.

Restarting the system

To restart the system, the gate must:

- Be closed.
- The gate interlock must be reset (only if option included).

This can be done in different ways depending on where the control equipment is located.

Location of control equipment	Action
Near the service gate	Provides a good view of the risk area and resetting can be undertaken using the controller on the control module's control panel.
Far from the service gate	When you cannot see the risk zone, external buttons should be fitted to reset the gate interlock. <ul style="list-style-type: none">• One button is located outside the service gate where it cannot be reached from inside the gate.

2 Safety instructions

2.5.2 Station indication

2.5.2 Station indication

General

The station indication function is used to monitor the system's work stations. Positive opening limit switches are used for this function.

The limit switches are located in different positions depending on the station layout.

Example 1

The illustration below shows a station indication on a positioner with a station interchange unit and two stations.

Station indication on a positioner with a station interchange unit and two stations.

The limit switches are located in the station interchange unit and are used to:

- Monitor prohibited movement on the station interchange unit.
- Indicate which station side is facing the robot.

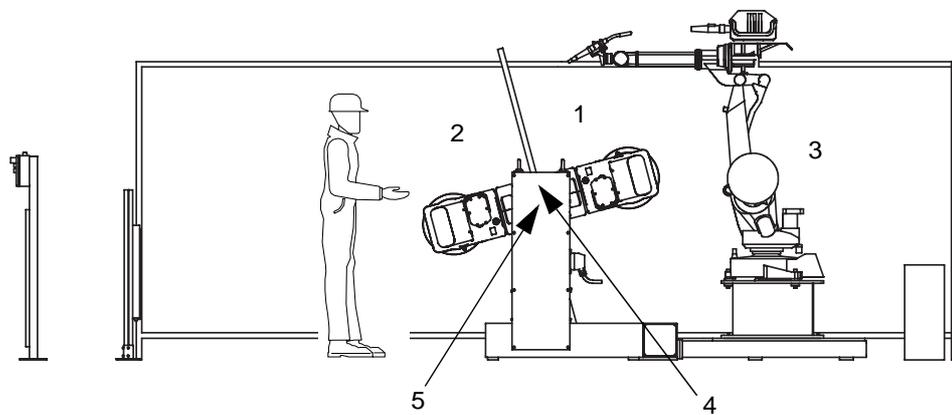


Figure 7: Station indication on a positioner with a station interchange unit and two stations.

Item	Description
1	Station 1
2	Station 2
3	Robot
4	Limit switch
5	Station interchange unit

Example 2

Station indication on a robot with two work stations.

The limit switches, which are located on the base of the robot, indicate which station side the robot is facing.

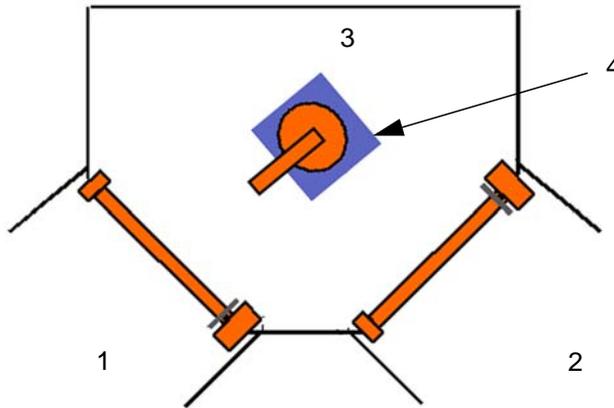


Figure 8: Station indication on a robot with two work stations.

Item	Description
1	Station 1
2	Station 2
3	Robot
4	Limit switch

Example 3

Station indication on a travel track for a robot with two work stations.

The limit switches, which are located on the carriage, indicate which station side the robot is at.

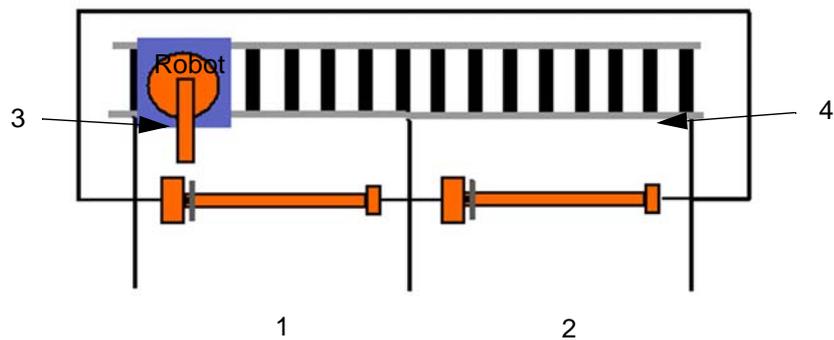


Figure 9: Station indication on a travel track for a robot with two work stations

Item	Description
1	Station 1
2	Station 2
3	Limit switch
4	Travel track

2 Safety instructions

2.5.3 Service position

2.5.3 Service position

General

The service position is a limited area (position) between two work stations where the robot can perform tool cleaning (e.g. the welding torch). When the robot is in this area the operator can enter both work stations without the robot shutting down.



WARNING

If the work stations include positioners, the motors for these must be shut off before the operator enters the working area.

The limit switches are used for the service position function for station indication, see *“Station indication, example 2”*

Example 1

Service position for a robot with two work stations. The limit switches, which are located on the base of the robot, indicate when the robot is in the service position.

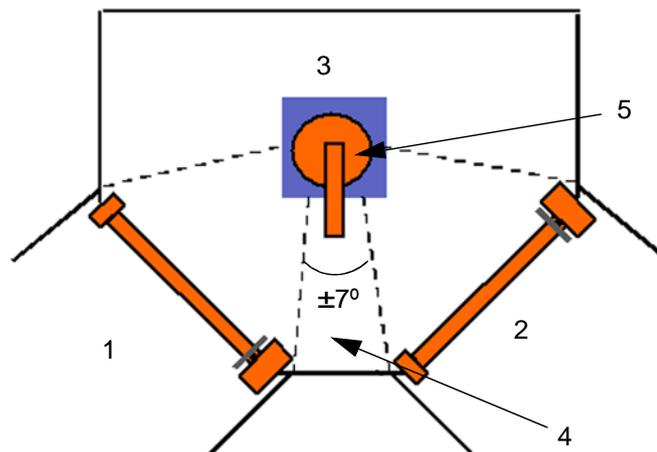


Figure 10: Service position for a robot with two work stations

Item	Description
1	Station 1
2	Station 2
3	Robot
4	Limit switch
5	Service position



NOTE!

Systems that include travel tracks with welding torch service units fitted to carriers can always use the equipment, regardless of robot position.

Example 2

A system that includes a travel track with a welding torch service unit mounted on a floor as shown below cannot provide a service position for the robot between the two work stations.

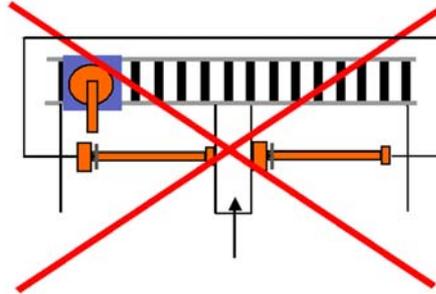


Figure 11: Travel track with a welding torch service unit mounted on a floor

In this case another function, called “Home position”, is used for cleaning tools, *see “Home position”*

2 Safety instructions

2.5.4 Home position

2.5.4 Home position

General

The home position is a safe position the robot is moved to out of reach of the operator. Positive opening limit switches are used for this function and are located on the base of the robot.

- The home position requires an optional circuit board that is connected to the safety unit.
- When the robot is in the safe position the robot is restricted to movements of $\pm 20^\circ$.
- The home position is adjustable at 30° intervals around shaft 1.



NOTE!

When the robot is in the home position the operator is permitted to enter the working area.

Operation

The home position function is used in station solutions that only include one work station, which is common to the robot and operator.

Example

The limit switches, which are located on the base of the robot, indicate the robot's location in the home position.

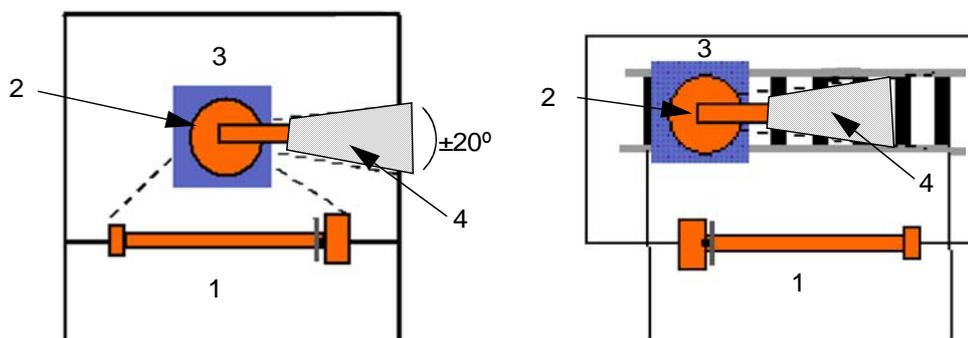


Figure 12: Home position for robot with one work station, alternatively, robot with travel track

Item	Description
1	Station 1
2	Limit switch
3	Robot
4	Home position



NOTE!

When setting the home position, consideration must be given to the robot's working area. To comply with applicable personal safety norms and standards, the robot may need to be equipped with safe work area limitation on one or more shafts.

2.5.5 Transport position

General

The transport position is a safe position, out of reach of the operator, that robots fitted on travel tracks enter when passing a work station where the operator is present.

Positive opening limit switches are used for this function and are located on the base of the robot.

- The transport position requires an optional circuit board that is connected to the safety unit.
- When the robot is in the safe position the robot is restricted to movements of $\pm 20^\circ$.
- The transport position is adjustable at 30° intervals around shaft 1.



NOTE!

The transport position should be located in the direction of travel.

It should be set in one of the directions of travel if the robot's upper shafts are equipped with fixed stops as work area limitation, to prevent movement into the operator area.

Example

The limit switches, which are located on the base of the robot, indicate when the robot is in the transport position. When the robot is in the transport position:

- The operator can enter both work stations.
- The robot can pass the work station where the operator is present.

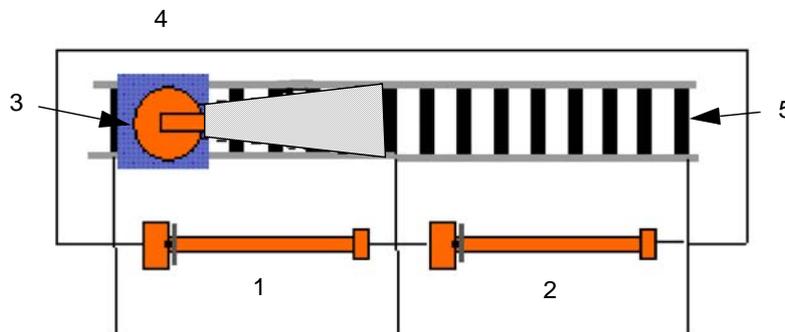


Figure 13: Transport position for the robot

Item	Description
1	Station 1
2	Station 2
3	Limit switch
4	Robot
5	Travel track



NOTE!

When setting the transport position, consideration must be given to the robot's working area. To comply with applicable personal safety norms and standards, the robot may need to be equipped with safe work area limitation on one or more shafts.

2 Safety instructions

2.5.5 Transport position

3: Installation and operation

3.1: Welding robot system

General

In its standard configuration, the welding robot system is delivered unassembled.



NOTE!

The component parts of the system are described under the respective tabs in the system manual.

Welding system

Modes The robot welding system can be in two modes – operating and standby modes:

Mode	Description
Operating mode	Motors and control power on
Standby mode	Motors and control power off

Overview figure The figure below shows an example of a system.

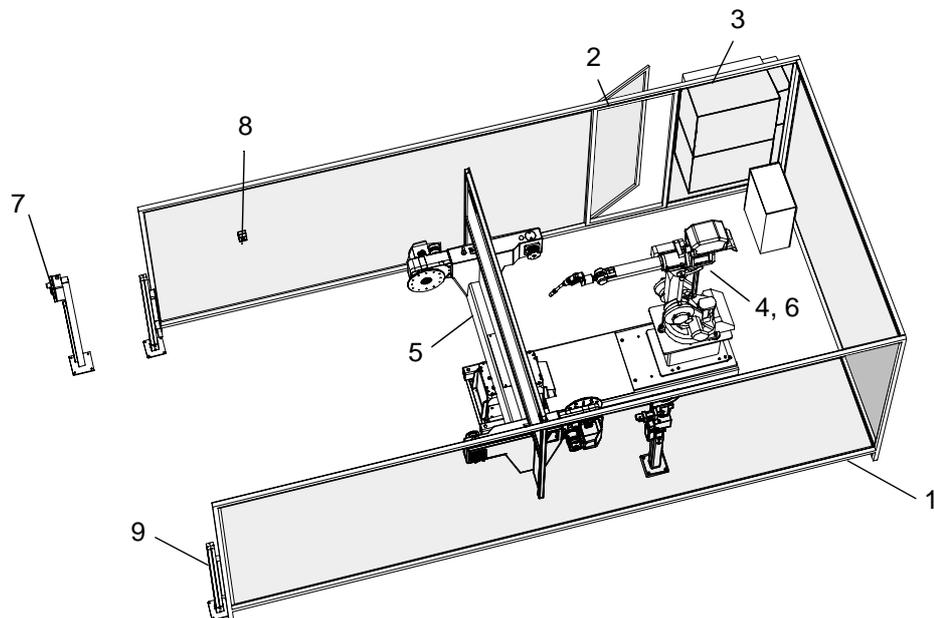


Figure 14: Complete welding robot system.

Item	Description
1	Protective barrier
2	Gate interlock
3	Control equipment
4	Robot

3 Installation and operation

3.1: Welding robot system

Item	Description
6	Wire feeder system
7	Operator panel
8	Button for pre-reset
9	Light barrier (entrance to the loading area)

3.2: Robot



NOTE!

See “Fundamental handling of the robot” in the robot product manual for more information.

Brakes

The robot has brakes on all motors. The brakes are applied automatically in the event of an emergency stop, or a power failure, or when the system is put into standby mode and the motors are shut off.

The brakes can be released by means of one or more buttons located on the robot.



WARNING

The brakes may only be released when the robot is in standby mode or shut down. When the brakes are manually released, the robot collapses and the robot shafts must be supported or held in to prevent personal injury or damage to the equipment.

Wire feeder unit

The figure below shows the operating and indicating devices on the wire feeder unit.

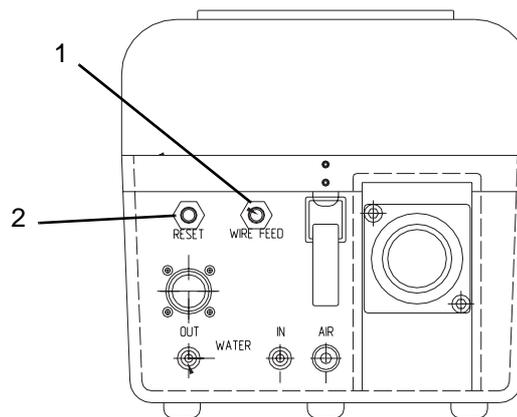


Figure 15: Operating and indicating devices on the wire feeder unit.

Item	Description
1	WIRE FEED switch for manual wire feed.
2	RESET switch for resetting contact unit (optional)

3 Installation and operation

3.3: Control equipment

3.3: Control equipment



NOTE!

For information regarding the control module and drive module, see the control equipment product manuals.

General

Control equipment is available in two configurations:

- SCC (single cabinet)
- DCC (dual cabinet)

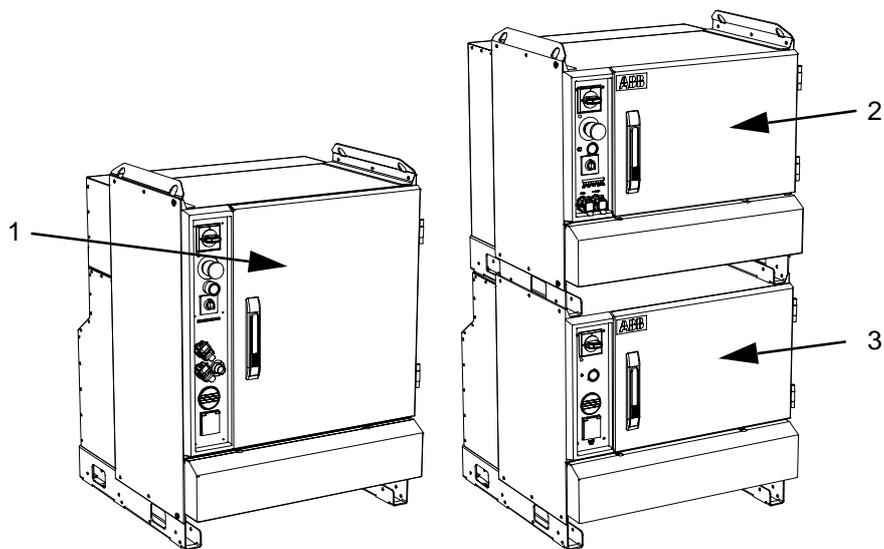


Figure 16: SCC or DCC



NOTE!

There is a drive module for each additional robot that is connected to the system (for one robot, only SCC/DCC).

Item	Description
1	SCC (single cabinet)
2	DCC (dual cabinet), control module
3	DCC (dual cabinet), drive module

Control panel

**NOTE!**

For information regarding the control panel (on SCC/DCC or external), see the control equipment product manuals.

SCC

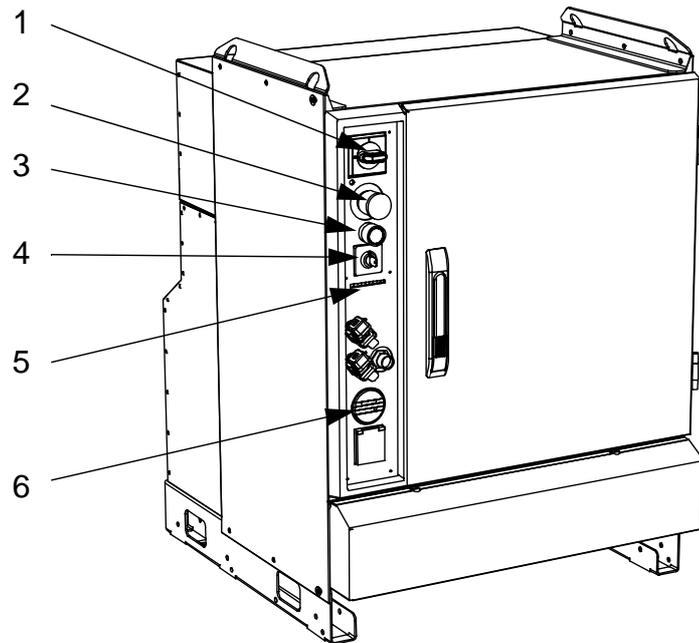


Figure 17: IRC5 control system with control unit for SCC

Item	Description
1	Main power switch
2	Emergency stop
3	Motors On button
4	Operating mode selector
5	Diode panel that shows the status of the safety loops (optional)
6	Running time meter

3 Installation and operation

3.3: Control equipment

DCC

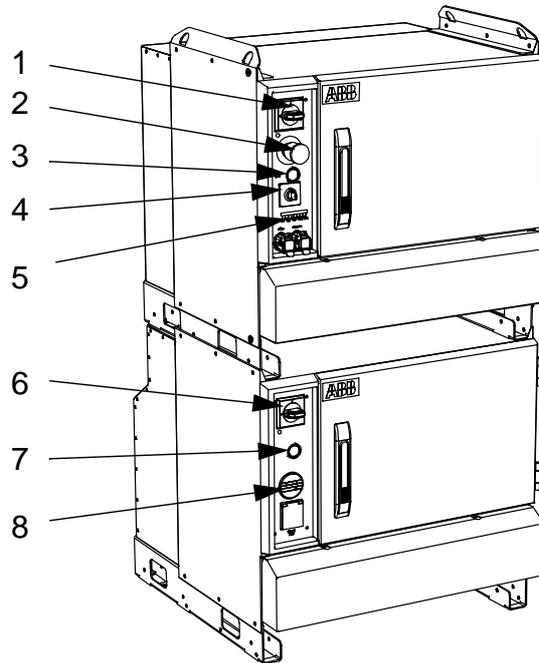


Figure 18: IRC5 control system with control unit for control/drive module

Item	Description
1	Main power switch on control module
2	Emergency stop
3	Motors On button
4	Operating mode selector
5	Diode panel that shows the status of the safety loops (optional)
6	Main power switch (circuit breaker) on drive module
7	Indicator light indicates system status
8	Running time meter

External control panel

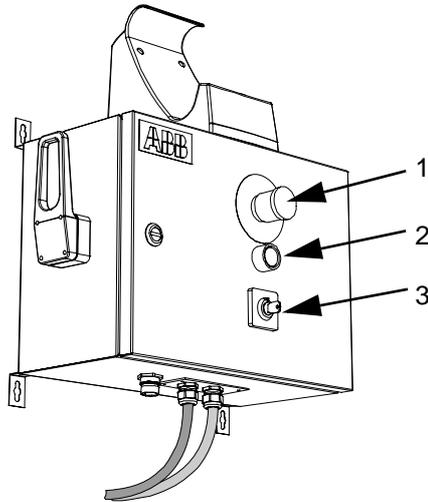


Figure 19: External control panel

Item	Description
1	Emergency stop
2	Motors On button
3	Operating mode selector

Process module

The figure below shows the robot's process module.

One process module is included in a system:

- That has joint tracking system AWC
- When the customer ordered a process module for extra space

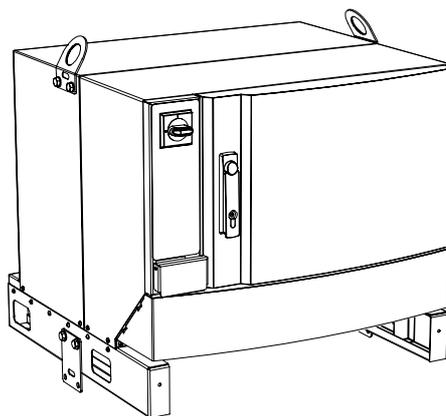


Figure 20: Process module

3 Installation and operation

3.3: Control equipment

FlexPendant



NOTE!

For information on the FlexPendant, see Operating manual - IRC5 with FlexPendant.

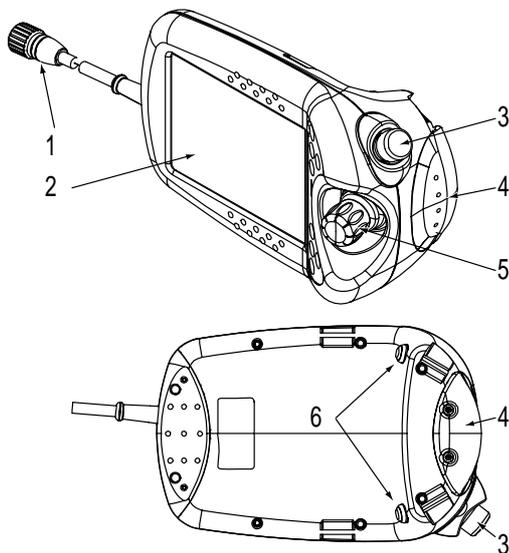


Figure 21: FlexPendant

Item	Description
1	Connector
2	Touch screen
3	Emergency stop button
4	Continuous pressure switch
5	Joystick
6	Hold-to-run buttons



NOTE!

In the event of faults in the welding process, an error message is shown on the FlexPendant's display stating the type and possible cause of the error (see Operating manual - Trouble shooting - IRC5).

3.4: Operator panel

3.4.1 One working area

General

This variant applies to stations with one working area for the operator.

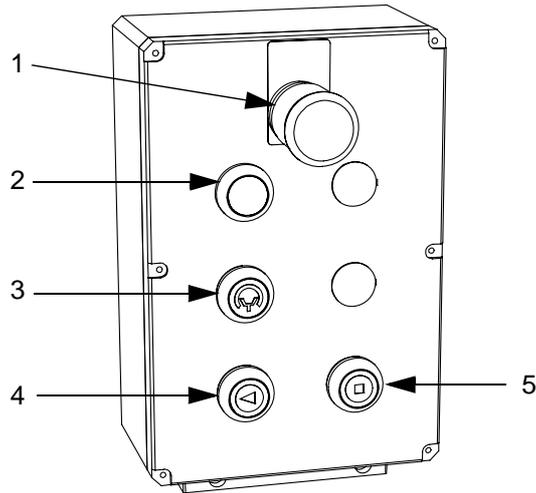


Figure 22: Operator panel, 1 station

Pos.	Symbol	Designation
1		Emergency stop
2		Entry permitted indication
3		Start process, reset (toggle function)
4		Program start
5		Program stop

3 Installation and operation

3.4.1 One working area

Description of buttons

Emergency stop	<p>Pressing the emergency stop button immediately stops the entire welding robot system.</p> <p>The emergency stop button is connected in series with other emergency stop buttons in the system.</p>
Entry permitted indication	<p>When green, the lamp indicates that the station is ready for loading the next workpiece. Entry into the monitored area is permitted.</p>
Start process	<p>Press the button after loading the workpiece in station 1</p> <p>The indication lamp in the button comes on and:</p> <ul style="list-style-type: none">• Gives the ready signal to the robot system that loading of the workpiece in the station is complete.• Resets the personal safety protection around the station's working area.• Starts the process. <p>Press the button once again; the status lamp goes out:</p> <ul style="list-style-type: none">• Cancel button for operator ready. Stops the process.
Program start	<p>Starts execution of the robot program. Enables welding restart.</p>
Program stop	<p>Stops execution of the robot program.</p>

3.4.2 Two working areas

General

This variant applies to stations with two working areas for the operator.

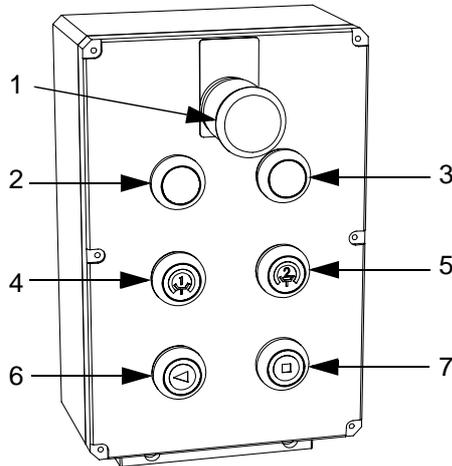


Figure 23: Operator panel, 2 stations

Pos.	Symbol	Designation
1		Emergency stop
2		Entry permitted indication, station 1
3		Entry permitted indication, station 2
4		Start process, reset (toggle function), station 1
5		Start process, reset (toggle function), station 2
6		Program start
7		Program stop

3 Installation and operation

3.4.2 Two working areas

Description of buttons

Emergency stop	Pressing the emergency stop button immediately stops the entire welding robot system. The emergency stop button is connected in series with other emergency stop buttons in the system.
Entry permitted indication, station 1/station 2	When green, the lamp indicates that station 1/station 2 is ready for loading the next workpiece. Entry into the monitored area is permitted.
Start process, station 1/station 2	Press the button after loading the workpiece in station 1/station 2. The indication lamp in the button comes on and: <ul style="list-style-type: none">• Gives the ready signal to the robot system that loading of the workpiece in the station is complete.• Resets the personal safety protection around the station's working area.• Starts the process. Press the button once again; the status lamp goes out: <ul style="list-style-type: none">• Cancel button for operator ready. Stops the process.
Program start	Starts execution of the robot program. Enables welding restart.
Program stop	Stops execution of the robot program.

3.5: Manual job control panel

General

The control panel is available in a configuration that can be used for:

- Positioner IRBP K/R
- Positioner 2 x IRBP L

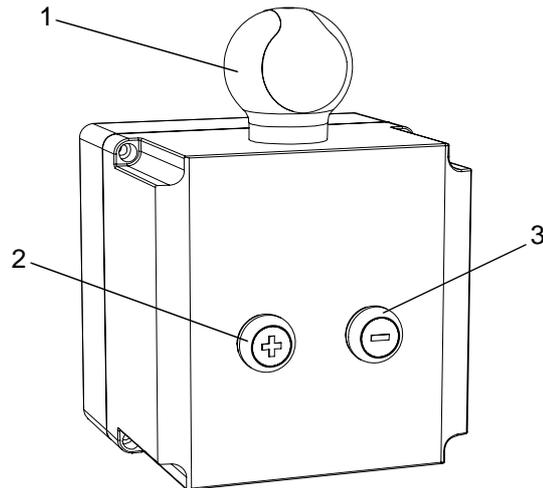


Figure 24: Control panel

Pos.	Symbol	Designation
1		SafeBall, activation
2		Indicates positive direction of travel
3		Indicates negative direction of travel



NOTE!

For more information, see the product manual for manual jog.

3 Installation and operation

3.5: Manual job control panel

4: Starting production

4.1: Preparations

Check that the gas cylinder is connected to the system according to the applicable safety instructions.



WARNING

Make sure that the robot, positioner and travel track working areas are clear and that no one is inside the risk zone when the robot system starts.

4.2: Start-up

4.2.1 Power sources



WARNING

Always switch the power source on and off using the main switch. Do not use the plug to switch the power source on and off.

Welding power source, RPB

Starting power source, RPB:

	Action	Info/Illustration
1	Turn the main power switch (1) to position 1; the status lamp on the front comes on. The lamp indicates that the power source is ready for use.	

Status lamps

There are two status lamps (H11, H12) on the power source.

Lamp	Function	Description
Green lamp (H11)	Operation standby	Always comes on when the power source is connected to the mains supply and the power switch is in position 1.
Yellow lamp (H12)	Thermal cut-out	Comes on when the thermal cut-out has been triggered due to overheating. The fan cools the power source. When the lamp goes out the power source is once again ready for use (resetting takes place automatically).

4 Starting production

4.2.1 Power sources

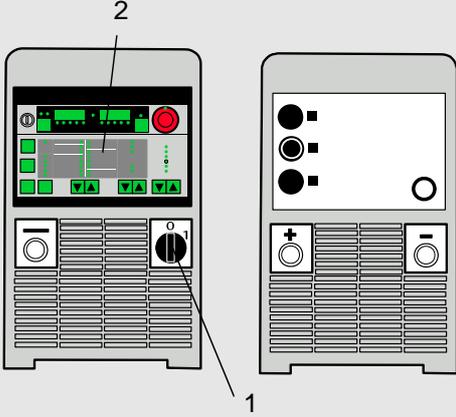
Fans

RPB 320 has one fan and RPB 420/520 has two fans that run at the same time.

- The fan runs for a while when the main power switch is turned to position 1.
- The fan starts when the power source has heated up after a certain period of welding and stops 1–10 minutes after welding concludes.
- When idling, the fan runs for 1 minute approximately every 30 minutes.

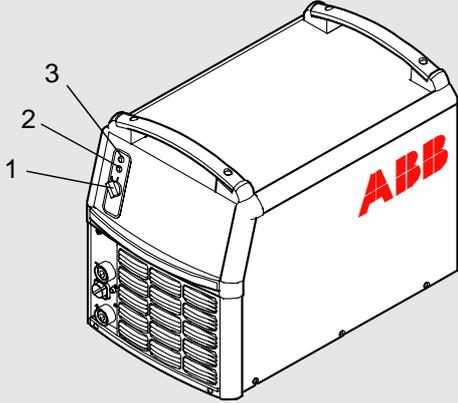
Welding power source, Fronius PS 4000/5000

Start-up of welding power source, Fronius:

	Action	Info/Illustration
1	<p>Set the power switch to (pos 1) position 1. All status lamps on the control panel (2) quickly light.</p> <p><i>For more information, see the operating instructions for the welding power source TPS 4000/5000.</i></p>	

Welding power source, MigRob 500

Start-up of welding power source, MigRob 500.:

	Action	Info/Illustration
1	<p>Turn the power switch (1) to START. The power switch returns to position "1" when released.</p>	
2	<p>The white lamp (2) indicates that mains voltage is on.</p>	
3	<p>The orange lamp (V3) comes on when one of the three overheating cut-outs in the power source trips. When the temperature decreases, the lamp goes out and the power source is again ready for use. (Resetting takes place automatically).</p>	

4.2.2 Robot, positioner and travel track

General

	Action	Illustration
1	Check that none of the emergency stop buttons are actuated.	
2	Set the main power switch on the control module to position 1.	
3	<p>Check that:</p> <ul style="list-style-type: none">• The correct program has been loaded into the system• The cursor is on the instruction where the program is to start. <p>Do this in the programming window; see the operator's manual for the robot.</p>	



CAUTION

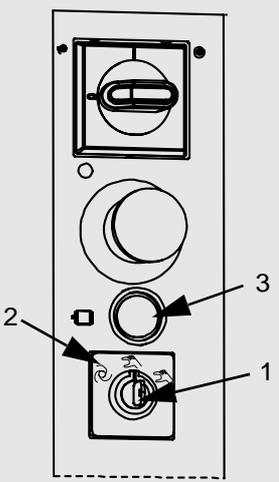
Make sure that the robot, positioner and travel track working areas are clear before the system starts.

4 Starting production

4.2.3 Resetting the light barriers during start-up

4.2.3 Resetting the light barriers during start-up

General

	Action	Info/Illustration
1	Press the pre-reset button (optional); see Pre-reset on page 20 .	
2	Check that the service gate (optional) is closed.	
3	Press the service gate's reset button (optional).	
4	<p>Press the Start Process button for one or two stations (see figure) for the light barriers on the operator panel to:</p> <ul style="list-style-type: none">• Give the ready signal to the robot system that loading of the workpiece in the station is complete.• Reset the personal safety protection around the station's working area.• Start the process. <p>This must be done within 10 seconds of pressing the pre-reset button; otherwise the light barriers will not reset. If the above does not work, start again from step 1.</p>	
5	Turn the operating mode selector (pos. 1) on the control module's control panel to the AUTO position (pos. 2).	
6	Press OK when asked "Is it OK to switch to automatic operation?".	
7	Press the Motors On button on the control module's control panel, (pos. 3).	
8	Press the Start function key on the FlexPendant.	
9	Press Program Start on the operator's panel to start the robot program.	

4.3: Loading the workpiece

Continuous operation

With continuous operation the following process is repeated each time a workpiece is loaded.



NOTE!

Step 3 must be performed within 10 seconds of pressing the pre-reset button; otherwise the light barriers will not reset.

	Action	Info/Illustration
1	Load the positioner or the stationary table.	
2	Make sure that the robot, positioner and travel track working areas are clear before the system starts.	
3	Press the Pre-reset button (optional). See Pre-reset on page 20 .	
4	Press either the Start Process button or the button for the light barriers on the operator panel.	



NOTE!

When Start Process is activated the robot and positioner start.

Two positioners or two work stations

If there are two positioners or if there are two work stations on one positioner with station interchange, loading of one of the positioners or one station side can be performed while the robot works on the other.

If the welding robot system includes two positioners, there is a time pre-reset button and a Start Process button for each positioner.

Once the robot has completed the working cycle it moves to a waiting position and checks if Start Process has been pressed. If this has been done, the robot disengages the positioner or station side on the positioner that it has completed and activates the next positioner/station side.

One positioner with two station sides

There is a station interchange unit on any positioner with two station sides.

When the robot system receives the ready signal from the operator station interchanges takes place, so that the positioner changes station side in relation to the robot.

4 Starting production

4.3.1 Safety stop during loading/unloading

4.3.1 Safety stop during loading/unloading

General

The station is equipped with external protection (light barriers) that monitors the operator area. The outer protection interacts with the station indication function. See [Station indication on page 22](#).

If the outer protection is breached in a prohibited position, the entire station stops (i.e. a safety stop)

The following must be observed in the event of a safety stop during loading/unloading of the work station:



NOTE!

Step 3 must be performed within 10 seconds of pressing the pre-reset button; otherwise the light barriers will not reset.

	Action	Info/Illustration
1	Press the Pre-reset button (optional). See Pre-reset on page 20 .	
2	Reset external personal protection	
3	Leave the operator area of the station	
4	Press the Start Process button on the operator panel.	
5	Putting the system into operation: Turn the operating mode selector (1) on the control module's control panel to the AUTO position (2). If there is a warning about deactivating tasks/disabled tasks, - Respond with "Leave As Is".	
6	Press OK when asked "Is it OK to switch to automatic operation?".	
7	Press the Motors On button on the control module's control panel, (3).	
8	Press the Start function key on the FlexPendant.	
9	Press the Motors On button on the control module's control panel. (3)	
10	Press Program Start on the operator panel to start the robot program. Do not go back to the original station side.	
11	Run the setting procedure to verify the positioner 's station positions; see tab 19 in the system manual, "System settings - Checking limit switch" .	

5: Program stop and restart of program

5.1: Program stop

Programmed operation

Programmed operation can be stopped in various ways:

Stopping method	Button
Manually using the Stop button on the FlexPendant	
Manually using the Stop button on the operator panel.	
Automatically using a programmed stop in the robot program	

Programmed operation in positions

Programmed operation in positions can be stopped in the following ways:

Stopping method	Mode
Should always be done using the Program Stop button before the continuous pressure switch on the FlexPendant is released. The system is otherwise stopped by AUTO stop, which is harder than computer-controlled braking of movement.	Manual reduced speed <250mm/s 
	Manual full speed 100% 

Temporary stop

Temporary stops can be performed as follows:

Stopping method	Button
Press the Program Stop button on the FlexPendant.	
Press the Program Stop button on the operator panel.	
Turn the operating mode selector on the control module's control panel. Result: Motors off.	

Longer stoppages (more than 5 hours)

Longer stoppages can be performed as follows:

Stopping method	Button
Press the Program Stop button on the FlexPendant.	
Press the Program Stop button on the operator panel.	

5 Program stop and restart of program

5.1: Program stop

Stopping method	Button
Turn the Operating mode selector on the control module's control panel. Result: Motors off.	
Switch off the welding power source.	

5.2: Restarting the system

Introduction

In the event of a restart, the program continues at the program instruction where it was interrupted by, for example, a program stop or a welding fault.



NOTE!

If the program was interrupted during welding, the robot will back up along the weld joint and make a new weld start so that the started weld joint is completed.

Resetting programmed operation

The following instructions enable program execution to be restarted.



NOTE!

Step 5 must be performed within 10 seconds of pressing the pre-reset button; otherwise the light barriers will not reset.

	Action	Illustration
1	Rectify any faults that caused the stop.	
2	Check that: <ul style="list-style-type: none"> The service gate is closed The robot, positioner and travel track working areas are clear. 	
3	Press the service gate's Reset button (option). See the station layout and safety section Pre-reset on page 20 .	
4	Press the Pre-reset button. See the station layout.	
5	Press the Start Process button (for one or two stations) for the light barriers on the operator panel.	
6	Press the Motors On button on the control module's control panel.	
7	Press Program Start on the operator panel to start the robot program.	

5 Program stop and restart of program

5.3: Restarting after an emergency stop

5.3: Restarting after an emergency stop

Introduction

With a restart, the program resumes from the program instruction where it was interrupted by, for example, a program stop or a welding fault.



NOTE!

If the program was interrupted during welding, the robot will back up along the weld joint and make a new weld start so that the started weld joint is completed.

Resetting programmed operation

The following instructions enable program execution to be restarted.



NOTE!

Step 5 must be performed within 10 seconds of pressing the pre-reset button; otherwise the light barriers will not reset.

	Action	Illustration
1	Rectify any faults that caused the stop.	
2	Check that: <ul style="list-style-type: none">• The service gate is closed• The robot, positioner and travel track working areas are clear.	
3	Press the service gate's Reset button (option). See the station layout and safety section. Pre-reset on page 20 .	
4	Press the Pre-reset button. See the station layout.	
5	Press the Start Process button (for one or two stations) for the light barriers on the operator panel.	
6	Press the Motors On button on the control module's control panel	
7	Press Program Start on the operator panel to start the robot program.	

5.4: Measures in the event of disturbances in the operating sequence

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



WARNING

This work may only be carried out by persons trained in the use of the complete equipment and who are aware of the special risks that exist or may occur when undertaking such actions.



CAUTION

Caution must be exercised. All work carried out on the system shall be performed in a professional manner and conform to applicable safety regulations.

5 Program stop and restart of program

5.4: Measures in the event of disturbances in the operating sequence

6: Maintenance, welding robot system

6.1: General

6.1.1 Spare parts



CAUTION

Use only original spare parts recommended by ABB.

6.2: Robot

General

The robot is designed for use in demanding working conditions with a minimum of maintenance. However, some routine checks and measures must be undertaken at predetermined intervals (see the robot's product manual).

Cleaning

Clean the exterior of the robot as necessary. For other maintenance, see the robot's product manual.



CAUTION

Do not use solvents or compressed air, which can damage seals, bearings, the finish or cabling.

6 Maintenance, welding robot system

6.3: Control module and drive module

6.3: Control module and drive module

General

The control system is fully enclosed, and the electronics are thereby protected in a normal workshop environment.

The wrist bracelet, located in the cabinet, must be worn when handling circuit boards and other electronics in the control module to prevent ESD damages.

Regular checks

In environments with significant levels of dust and airborne particles, the inside of the cabinet should be regularly inspected. If necessary, use a vacuum cleaner.

- Check that the sealing strips and cable glands are properly sealed so that dirt is not drawn into the control module. If necessary, use a vacuum cleaner.
 - Clean and replace any filters according to the directions in the control equipment product manuals as well as in the power source's product manual.
 - Check that the cables/connectors are not damaged. Damaged components must be replaced immediately.
-

If safety equipment is included

Function checks should preferably be carried out at the start of each shift.

6.4: External equipment

6.4.1 Wire feeder system

For information regarding the maintenance of the wire feeder system, *see the system manual, under the tab "Welding equipment"*.

6.4.2 Options

Welding tools

For a description of the replacement of contact tips, wire guides and welding torches, *see the system manual section "Welding torch"*.

Positioner

Some preventive maintenance, as set out below, is required in order to reduce the amount of downtime and any resulting loss of production. *Consult the system manual, under "Positioner" for more information.*

Interval	Maintenance
Daily	<ul style="list-style-type: none">• Check that there is no oil leakage from the rotary unit on the positioner.
Continuous	<ul style="list-style-type: none">• Check the welding cables' connections on the positioner, power source and other welding equipment. Correct if defective.• Check the cables between the welding robot system's various units (robot, control equipment, positioner, welding power source and other welding equipment). Correct if defective.

Miscellaneous

See the system manual binder, under the respective tabs, for maintenance of products such as:

- Travel tracks
- Torch service units
- Locator system
- Joint tracking system

6 Maintenance, welding robot system

6.4.2 Options



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