

ABB Robotics

# Product manual

## Arc welding equipment for IRB 1520ID



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**Product manual**  
**Arc welding equipment for IRB 1520ID**  
IRC5

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# Overview of this manual

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## About this manual

This manual contains instructions for:

- electrical installation and configuration of the welding equipment
- maintenance of the welding equipment.

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## Usage

This manual should be used during:

- installation
- maintenance work

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## Who should read this manual?

This manual is intended for:

- installation personnel
- maintenance personnel
- repair personnel.

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## Prerequisites

A maintenance/repair/installation craftsman working with an ABB Robot must:

- be trained by ABB and have the required knowledge of mechanical and electrical installation/repair/maintenance work.

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## Organization of chapters

The manual is organized in the following chapters:

Chapter	Contents
Safety, service	Safety information that must be read through before performing any installation or service work on robot. Contains general safety aspects as well as more specific information on how to avoid personal injuries and damage to the product.
Technical description	Overview of the welding equipment.
Installation	Required information about electrical installation of the welding equipment.
Operation	Programming instructions for the power source and the wire feeder unit.
Maintenance	Procedures that describe how to perform maintenance of the welding equipment.

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## References

Documentation referred to in the manual, is listed in the table below.

Document name	Document ID
<i>Product manual - IRB 1520</i>	<i>3HAC043435-001</i>
<i>Circuit diagram - IRB 1520</i>	<i>3HAC039498-007</i>
<i>Product specification - IRB 1520</i>	<i>3HAC043437-001</i>
<i>Application manual - Torch services</i>	<i>3HAC024847-001</i>

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## Overview of this manual

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Document name	Document ID
<i>Product manual - IRC5</i>	<i>3HAC021313-001</i>
<i>Operating manual - IRC5 with FlexPendant</i>	<i>3HAC16590-1</i>
<i>Operating manual - KempArc SYN 300/400/500, DT 400</i>	<i>1920130 -001</i>

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## Revisions

Revision	Description
-	First edition.
A	<p>This revision contains the following updates:</p> <ul style="list-style-type: none"><li>The lower feed rollers in the wire feeder system are redesigned to contain one groove only, see <a href="#">Wire feeder system on page 42</a> and <a href="#">Wire feed unit on page 73</a>.</li></ul>



# 1 Safety

## 1.1 Introduction to safety information

---

### Overview

The safety information in this manual is divided into two categories:

- General safety aspects, important to attend to before performing any service work on the robot. These are applicable for all service work and are found in [General safety information on page 10](#).
- Specific safety information, pointed out in the procedures. How to avoid and eliminate the danger is either described directly in the procedure, or in specific instructions in the section [Safety related instructions on page 25](#).

# 1 Safety

---

## 1.2.1 Introduction to general safety information

## 1.2 General safety information

### 1.2.1 Introduction to general safety information

---

#### Definitions

This section details general safety information for personnel performing installation, repair and maintenance work.

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#### Sections

The general safety information is divided into the following sections.

Contents	Containing
<b>General information</b>	<ul style="list-style-type: none"><li>• safety, service</li><li>• limitation of liability</li><li>• related information</li></ul>
<b>Safety risks</b> lists dangers relevant when working with the product. The dangers are split into different categories.	<ul style="list-style-type: none"><li>• safety risks during installation or service</li><li>• risks associated with live electrical parts</li></ul>
<b>Safety actions</b> describes actions which may be taken to remedy or avoid dangers.	<ul style="list-style-type: none"><li>• fire extinguishing</li><li>• safe use of the FlexPendant</li></ul>
<b>Safety stops</b> describes different types of stops.	<ul style="list-style-type: none"><li>• stopping functions</li><li>• description of emergency stop</li><li>• description of safety stop</li><li>• description of safeguarding</li></ul>

## 1.2.2 Safety in the manipulator system

### Validity and responsibility

The information does not cover how to design, install and operate a complete system, nor does it cover all peripheral equipment that can influence the safety of the entire system. To protect personnel, the complete system must be designed and installed in accordance with the safety requirements set forth in the standards and regulations of the country where the manipulator is installed.

The users of ABB industrial manipulators are responsible for ensuring that the applicable safety laws and regulations in the country concerned are observed and that the safety devices necessary to protect people working with the manipulator system are designed and installed correctly. Personnel working with manipulators must be familiar with the operation and handling of the industrial manipulator as described in the applicable documents, for example:

- *Operating manual - IRC5 with FlexPendant*
- *Product manual*

### Connection of external safety devices

Apart from the built-in safety functions, the manipulator is also supplied with an interface for the connection of external safety devices. An external safety function can interact with other machines and peripheral equipment via this interface. This means that control signals can act on safety signals received from the peripheral equipment as well as from the manipulator.

### Limitation of liability

Any information given in this manual regarding safety must not be construed as a warranty by ABB that the industrial manipulator will not cause injury or damage even if all safety instructions are complied with.

### Related information

Type of information	Detailed in document	Section
Installation of safety devices	<i>Product manual for the manipulator</i>	Installation and commissioning
Changing operating modes	<i>Operating manual - IRC5 with FlexPendant</i>	Operating modes
Restricting the working space	<i>Product manual for the manipulator</i>	Installation and commissioning

# 1 Safety

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## 1.2.3.1 Safety risks during installation and service work on manipulators

### 1.2.3 Safety risks

#### 1.2.3.1 Safety risks during installation and service work on manipulators

---

##### Overview

This section includes information on general safety risks to be considered when performing installation and service work on the manipulator.

These safety instructions have to be read and followed by any person who deals with the installation and maintenance of the manipulator. Only persons who know the manipulator and are trained in the operation and handling of the manipulator are allowed to maintain the manipulator. Persons who are under the influence of alcohol, drugs or any other intoxicating substances are not allowed to maintain, repair, or use the manipulator.

---

##### General risks during installation and service

- The instructions in the product manual in the chapter *Installation and commissioning* must always be followed.
- Emergency stop buttons must be positioned in easily accessible places so that the manipulator can be stopped quickly.
- Those in charge of operations must make sure that safety instructions are available for the installation in question.
- Those who install the manipulator must have the appropriate training for the equipment in question and in any safety matters associated with it.

---

##### Spare parts and special equipment

ABB does not supply spare parts and special equipment which have not been tested and approved by ABB. The installation and/or use of such products could negatively affect the structural properties of the manipulator and as a result of that affect the active or passive safety operation. ABB is not liable for damages caused by the use of non-original spare parts and special equipment. ABB is not liable for damages or injuries caused by unauthorized modifications to the manipulator system.

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##### Nation/region specific regulations

To prevent injuries and damages during the installation of the manipulator, the regulations applicable in the country concerned and the instructions of ABB Robotics must be complied with.

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##### Non-voltage related risks

- Make sure that no one else can turn on the power to the controller and manipulator while you are working with the system. A good method is to always lock the main switch on the controller cabinet with a safety lock.
- Safety zones, which must be crossed before admittance, must be set up in front of the manipulator's working space. Light beams or sensitive mats are suitable devices.

*Continues on next page*

## 1.2.3.1 Safety risks during installation and service work on manipulators




*Continued*

- Turntables or the like should be used to keep the operator out of the manipulator's working space.
- The axes are affected by the force of gravity when the brakes are released. In addition to the risk of being hit by moving manipulator parts, there is a risk of being crushed by the parallel arm (if there is one).
- Energy stored in the manipulator for the purpose of counterbalancing certain axes may be released if the manipulator, or parts thereof, are dismantled.
- When dismantling/assembling mechanical units, watch out for falling objects.
- Be aware of stored heat energy in the controller.
- Never use the manipulator as a ladder, which means, do not climb on the manipulator motors or other parts during service work. There is a serious risk of slipping because of the high temperature of the motors and oil spills that can occur on the manipulator.

**To be observed by the supplier of the complete system**

- The supplier of the complete system must ensure that all circuits used in the safety function are interlocked in accordance with the applicable standards for that function.
- The supplier of the complete system must ensure that all circuits used in the emergency stop function are interlocked in a safe manner, in accordance with the applicable standards for the emergency stop function.

**Complete manipulator**

Safety risk	Description
Hot components!	 <b>CAUTION</b> Motors and gears are HOT after running the manipulator! Touching motors and gears may result in burns! With a higher environment temperature, more surfaces on the manipulator will get HOT and may also result in burns.
Removed parts may result in collapse of manipulator!	 <b>WARNING</b> Take any necessary measures to ensure that the manipulator does not collapse as parts are removed, e.g. secure the lower arm according to repair instruction if removing motor, axis 2.
Removed cables to the measurement system	 <b>WARNING</b> If the internal cables for the measurement system have been disconnected during repair or maintenance, then the revolution counters must be updated.


*Continues on next page*

# 1 Safety



## 1.2.3.1 Safety risks during installation and service work on manipulators

*Continued*

### Cabling

Safety risk	Description
Cable packs are sensitive to mechanical damage!	 <b>CAUTION</b> The cable packs are sensitive to mechanical damage! They must be handled with care, especially the connectors, in order to avoid damaging them!

### Gearboxes and motors

Safety risk	Description
Gears may be damaged if excessive force is used!	 <b>CAUTION</b> Whenever parting/mating motor and gearbox, the gears may be damaged if excessive force is used!
Safety risk	Description
Dangerous balancing device!	 <b>WARNING</b> <i>Do not</i> under any circumstances, deal with the balancing device in any other way than that detailed in the product documentation! For example, attempting to open the balancing device is potentially lethal!

**1.2.3.2 CAUTION - Hot parts may cause burns!**

---

**Description**

During normal operation, many manipulator parts become hot, especially the drive motors and gears. Sometimes areas around these parts also become hot. Touching these may cause burns of various severity.

Because of a higher environment temperature, more surfaces on the manipulator get hot and may result in burns.

---

**Elimination**

The instructions below detail how to avoid the dangers specified above:

	Action	Info
1	Always use your hand, at some distance, to feel if heat is radiating from the potentially hot component before actually touching it.	
2	Wait until the potentially hot component has cooled if it is to be removed or handled in any other way.	

# 1 Safety

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## 1.2.3.3 Safety risks related to tools/work pieces

### 1.2.3.3 Safety risks related to tools/work pieces

---

#### Safe handling

It must be possible to safely turn off tools, such as milling cutters, etc. Make sure that guards remain closed until the cutters stop rotating.

It should be possible to release parts by manual operation (valves).

#### Safe design

Grippers/end effectors must be designed so that they retain work pieces in the event of a power failure or a disturbance to the controller.

Unauthorized modifications of the originally delivered manipulator are prohibited. Without the consent of ABB it is forbidden to attach additional parts through welding, riveting, or drilling of new holes into the castings. The strength could be affected.



#### CAUTION

Ensure that a gripper is prevented from dropping a work piece, if such is used.



---

**1.2.3.4 Safety risks during operational disturbances**

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**General**

- The industrial manipulator is a flexible tool that can be used in many different industrial applications.
- All work must be carried out professionally and in accordance with the applicable safety regulations.
- Care must be taken at all times.

---

**Qualified personnel**

Corrective maintenance must only be carried out by qualified personnel who are familiar with the entire installation as well as the special risks associated with its different parts.

---

**Extraordinary risks**

If the working process is interrupted, extra care must be taken due to risks other than those associated with regular operation. Such an interruption may have to be rectified manually.

# 1 Safety

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## 1.2.3.5 Risks associated with live electric parts

### 1.2.3.5 Risks associated with live electric parts

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#### Voltage related risks, general

Work on the electrical equipment of the manipulator must be performed by a qualified electrician in accordance with electrical regulations.

- Although troubleshooting may, on occasion, need to be carried out while the power supply is turned on, the robot must be turned off (by setting the mains switch to OFF) when repairing faults, disconnecting electric leads and disconnecting or connecting units.
- The mains supply to the robot must be connected in such a way that it can be turned off from outside the robot's working space.
- Make sure that one else can turn on the power to the controller and manipulator while you are working with the system. A good method is to always lock the main switch on the controller cabinet with a safety lock.

The necessary protection for the electrical equipment and manipulator system during construction, commissioning, and maintenance is guaranteed if the valid regulations are followed.

All work must be performed:

- by qualified personnel
- on machine/manipulator system in deadlock
- in an isolated state, disconnected from power supply, and protected against reconnection

---

#### Voltage related risks, IRC5 controller

A danger of high voltage is associated with, for example, the following parts:

- Be aware of stored electrical energy (DC link, Ultracapacitor bank unit) in the controller.
- Units such as I/O modules, can be supplied with power from an external source.
- The mains supply/mains switch
- The transformers
- The power unit
- The control power supply (230 VAC)
- The rectifier unit (262/400-480 VAC and 400/700 VDC. Note: Capacitors!)
- The drive unit (400/700 VDC)
- The drive system power supply (230 VAC)
- The service outlets (115/230 VAC)
- The customer power supply (230 VAC)
- The power supply unit for additional tools, or special power supply units for the machining process.
- The external voltage connected to the controller remains live even when the robot is disconnected from the mains.
- Additional connections.

*Continues on next page*

### **Voltage related risks, manipulator**

A danger of high voltage is associated with the manipulator in:

- The power supply for the motors (up to 800 VDC).
- The user connections for tools or other parts of the installation (max. 230 VAC).

See chapter [Installation on page 49](#).

---

### **Voltage related risks, tools, material handling devices, etc.**

Tools, material handling devices, etc., may be live even if the robot system is in the OFF position. Power supply cables which are in motion during the working process may be damaged.

# 1 Safety

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## 1.2.4.1 Safety fence dimensions

### 1.2.4 Safety actions

#### 1.2.4.1 Safety fence dimensions

---

##### General

Install a safety cell around the manipulator to ensure safe manipulator installation and operation.

---

##### Dimensioning

Dimension the fence or enclosure to enable it to withstand the force created if the load being handled by the manipulator is dropped or released at maximum speed. Determine the maximum speed from the maximum velocities of the manipulator axes and from the position at which the manipulator is working in the work cell (see the section *Robot motion* in the *Product specification*).

Also consider the maximum possible impact caused by a breaking or malfunctioning rotating tool or other device fitted to the manipulator.

#### 1.2.4.2 Fire extinguishing



##### Note

Use a CARBON DIOXIDE (CO<sub>2</sub>) extinguisher in the event of a fire in the manipulator system (manipulator or controller)!

### 1.2.4.3 Safe use of the FlexPendant

---

#### Enabling device

The enabling device is a manually operated, constant pressure push-button which, when continuously activated in one position only, allows potentially hazardous functions but does not initiate them. In any other position, hazardous functions are stopped safely.

The enabling device is of a specific type where you must press the push-button only half-way to activate it. In the fully in and fully out positions, manipulator operation is impossible.



#### Note

The enabling device is a push-button located on the side of the FlexPendant which, when pressed halfway in, switches the system to MOTORS ON. When the enabling device is released or pushed all the way in, the manipulator switches to the MOTORS OFF state.

To ensure safe use of the FlexPendant, the following must be implemented:

- The enabling device must never be rendered inoperational in any way.
- During programming and testing, the enabling device must be released as soon as there is no need for the manipulator to move.
- Anyone entering the manipulator working space must always bring the FlexPendant with him/her. This is to prevent anyone else from taking control of the manipulator without his/her knowledge.

#### Hold-to-run function

The hold-to-run function allows movement when a button connected to the function is actuated manually and immediately stops any movement when released. The hold-to-run function can only be used in manual mode.

How to operate the hold-to-run function for IRC5 is described in *Operating manual - IRC5 with FlexPendant*.

## 1.2.5 Safety stops

### 1.2.5.1 What is an emergency stop?

#### Definition of emergency stop

An emergency stop is a state that overrides any other manipulator control, disconnects drive power from the manipulator motors, stops all moving parts, and disconnects power from any potentially dangerous functions controlled by the manipulator system.

An emergency stop state means that all power is disconnected from the manipulator except for the manual brake release circuits. You must perform a recovery procedure, i.e., resetting the emergency stop button and pressing the Motors On button, in order to return to normal operation.

The manipulator system can be configured so that the emergency stop results in either:

- An uncontrolled stop, immediately stopping the manipulator actions by disconnecting power from the motors.
- A controlled stop, stopping the manipulator actions with power available to the motors so that the manipulator path can be maintained. When completed, power is disconnected from the motors.

The default setting is an uncontrolled stop. However, controlled stops are preferred since they minimize extra, unnecessary wear on the manipulator and the actions needed to return the manipulator system back to production. Please consult your plant or cell documentation to see how your manipulator system is configured.



#### Note

The emergency stop function may only be used for the purpose and under the conditions for which it is intended.



#### Note

The emergency stop function is intended for immediately stopping equipment in the event of an emergency.



#### Note

Emergency stop should not be used for normal program stops as this causes extra, unnecessary wear on the manipulator.

For how to perform normal program stops, see section *Stopping programs* in *Operating manual - IRC5 with FlexPendant*.

*Continues on next page*

# 1 Safety

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## 1.2.5.1 What is an emergency stop?

*Continued*

---

### Classification of stops

The safety standards that regulate automation and manipulator equipment define categories in which each type of stop applies:

If the stop is...	... then it is classified as...
uncontrolled	category 0 (zero)
controlled	category 1

---

### Emergency stop devices

In a manipulator system there are several emergency stop devices that can be operated in order to achieve an emergency stop. There are emergency stop buttons available on the FlexPendant and on the controller cabinet (on the Control Module on a Dual Cabinet Controller). There can also be other types of emergency stops on your manipulator. Consult your plant or cell documentation to see how your manipulator system is configured.



## 1.3 Safety related instructions

### 1.3.1 Safety signals in the manual






#### Introduction to safety signals

This section specifies all dangers that can arise when doing the work described in this manual. Each danger consists of:

- A caption specifying the danger level (DANGER, WARNING, or CAUTION) and the type of danger.
- A brief description of what will happen if the operator/service personnel do not eliminate the danger.
- Instruction about how to eliminate danger to simplify doing the work.

#### Danger levels

The table below defines the captions specifying the danger levels used throughout this manual.

Symbol	Designation	Significance
 xx0200000022	DANGER	Warns that an accident <i>will</i> occur if the instructions are not followed, resulting in a serious or fatal injury and/or severe damage to the product. It applies to warnings that apply to danger with, for example, contact with high voltage electrical units, explosion or fire risk, risk of poisonous gases, risk of crushing, impact, fall from height, and so on.
 xx0100000002	WARNING	Warns that an accident <i>may</i> occur if the instructions are not followed that can lead to serious injury, possibly fatal, and/or great damage to the product. It applies to warnings that apply to danger with, for example, contact with high voltage electrical units, explosion or fire risk, risk of poisonous gases, risk of crushing, impact, fall from height, etc.
 xx0200000024	ELECTRICAL SHOCK	Warns for electrical hazards which could result in severe personal injury or death.
 xx0100000003	CAUTION	Warns that an accident may occur if the instructions are not followed that can result in injury and/or damage to the product. It also applies to warnings of risks that include burns, eye injury, skin injury, hearing damage, crushing or slipping, tripping, impact, fall from height, etc. Furthermore, it applies to warnings that include function requirements when fitting and removing equipment where there is a risk of damaging the product or causing a breakdown.
 xx0200000023	ELECTROSTATIC DISCHARGE (ESD)	Warns for electrostatic hazards which could result in severe damage to the product.



*Continues on next page*

# 1 Safety

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## 1.3.1 Safety signals in the manual

*Continued*

Symbol	Designation	Significance
 xx0100000004	NOTE	Describes important facts and conditions.
 xx0100000098	TIP	Describes where to find additional information or how to do an operation in an easier way.

## 1.3.2 DANGER - First test run may cause injury or damage!

## 1.3.2 DANGER - First test run may cause injury or damage!

---

Description

Since performing a service activity often requires disassembly of the robot, there are several safety risks to take into consideration before the first test run.

---

Elimination

Follow the procedure below when performing the first test run after a service activity, such as repair, installation, or maintenance.

	Action
1	Remove all service tools and foreign objects from the robot and its working area
2	Check that the fixture and workpiece are well secured, if applicable
3	Install all safety equipment properly
4	Make sure all personnel are standing at a safe distance from the robot, that is out of its reach behind safety fences, and so on
5	Pay special attention to the function of the part previously serviced

---

Collision risks**CAUTION**

When programming the movements of the manipulator always check potential collision risks before the first test run.

## 1 Safety

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1.3.3 DANGER - Make sure that the main power has been switched off!

### 1.3.3 DANGER - Make sure that the main power has been switched off!

---

#### Description

Working with high voltage is potentially lethal. Persons subjected to high voltage may suffer cardiac arrest, burn injuries, or other severe injuries. To avoid these dangers, do not proceed working before eliminating the danger as detailed below.

## **1.4 Arc welding related safety**

### **1.4.1 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 malfunctions 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.

*Continues on next page*

# 1 Safety

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## 1.4.1 Special safety instructions

### *Continued*

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

---

### **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 Flex- Pendant 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.

## 1.4.2 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	Description
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.

# 1 Safety

---

## 1.4.3 Light barriers

### 1.4.3 Light barriers

---

#### Light barriers function

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.

---

#### 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.

	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 the <i>start button (operator ready button)</i> on the operator panel within 10 seconds.



**1.4.4 Risk of fire****WARNING**

There is a risk of fire in connection with welding.

---

**Safety measures**

The following points should be observed:

- 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 underdimensioned can constitute a fire risk due to overheating.

---

**Fire extinguishing**

Use carbon dioxide (CO<sub>2</sub>) if the equipment catches fire.

## **1 Safety**

---

### **1.4.5 Risk of explosion**

### **1.4.5 Risk of explosion**

---

#### **Gas cylinders**

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

**1.4.6 Risk of electric shock****WARNING**

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

---

**Safety measures**

The following points should be observed:

- 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.

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## 2 Technical description

### 2.1 Overview of welding equipment

---

#### Content

The welding equipment is adapted to an industrial robot and is controlled by the IRC5 control system and Arc Welding software.

The welding equipment consists of:

- An external power source, installed between the robot and the controller.
- A wire feeder unit, installed on the robot.
- A bobbin, installed on the robot.

---

#### Usage

The welding equipment should only be used for MIG (Metal Inert Gas) and MAG (Metal Active Gas) welding. Only use the equipment according to the instructions in this manual.



#### **WARNING**

The equipment is not intended for use in explosive environments.



#### **Note**

ABB disclaims all responsibility and any claims for damages or warranty undertakings, if equipment is used in other areas than MIG/MAG welding

---

#### Accuracy

Fully digital communication by DeviceNet.

---

#### Safety

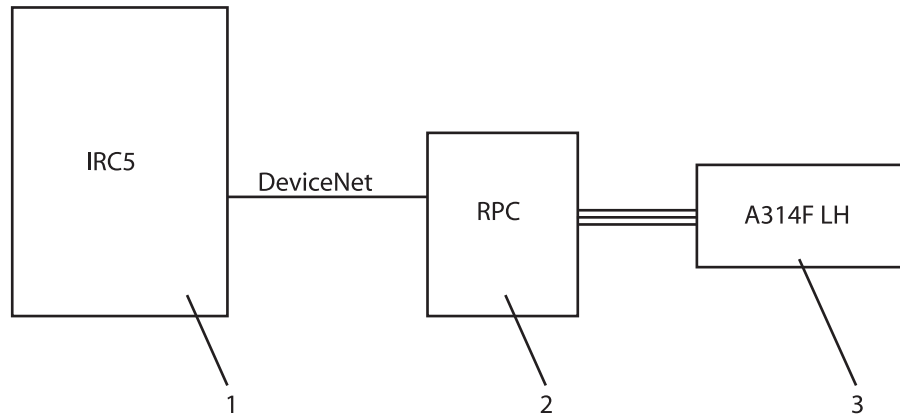
If an error occurs an error code is displayed on the FlexPendant to help the user to solve problems.

## 2 Technical description

### 2.2 Principle design

### 2.2 Principle design

#### Robot welding system



xx1100000396

1	Control module (IRC5)
2	Welding power source
3	Wire feeder unit (A314F LH)

#### Technical data

Together with the AW software in the robot, the welding equipment consists of and has the following characteristics:

Type	Description
Power source, RPC S Series / RPC P Series	400 A synergic and 350 A pulse power sources. Lightweight, compact and modular design. Synergic programs library for the most common materials. 90/100 memory channels for different welding parameters. SmarTac function as a standard feature.
Wire feeder system, A314F LH	Four wheel wire drive mechanism with metallic feed rolls. Gas valve. Speed range: 0 m/min. – 25 m/min.
Options	Weld guide Torch cleaner, TSC Wire cutter Automatic TCP-gauging BullsEye

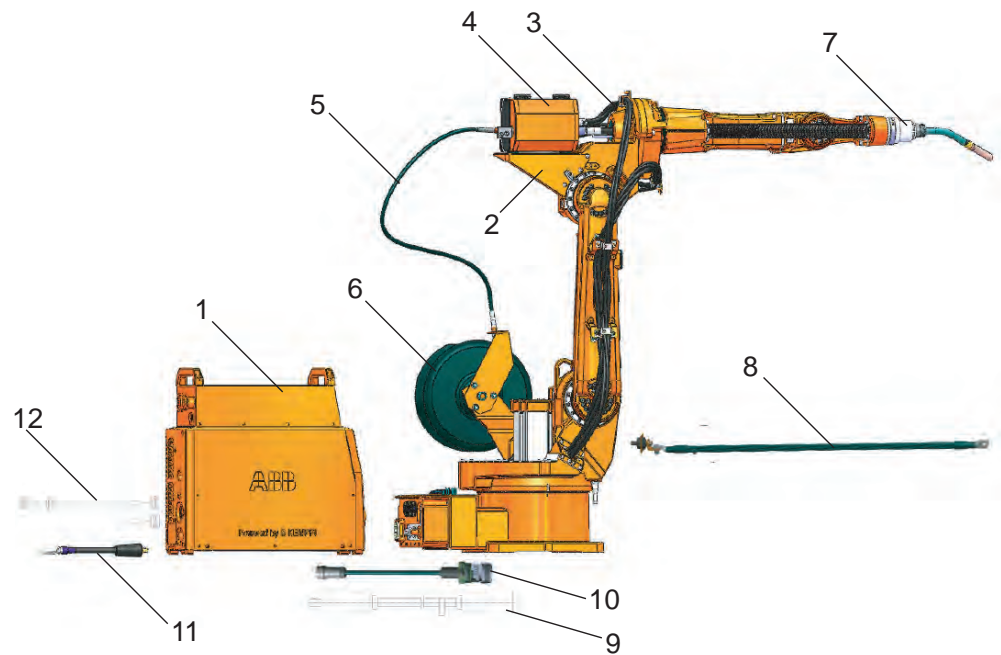
### 2.3 Components

#### Example of welding equipment

The welding equipment can include the following components:

- Welding power source.
- Wire feeder unit mounted on the robot arm and fitted with a Euro-socket for connecting the welding torch.
- Attachment for the wire feeder mechanism and cables.
- Hoses for gas and compressed air, as well as cables for signal and power supplies.
- Cable for the welding current.
- Cable for the power source.

#### Industrial robot with welding equipment



xx1100000485

1	Welding power source (RPC)
2	Attachment
3	Cable and Hose set
4	Wire feeder unit
5	Wire conduit
6	Bobin
7	Welding gun
8	Welding Base Cable Harness
9	Current cable
10	Welding signal Floor Cable

*Continues on next page*

## 2 Technical description

---

### 2.3 Components

*Continued*

11	Returncable 95 mm <sup>2</sup>
12	Cable DeviceNet

*Continues on next page*



### 2.3.1 Power source

---

#### Welding applications

The RPC Series power sources are suitable for synergic MIG/MAG, synergic 1-MIG/MAG and basic MIG/MAG welding. The power sources support the three welding processes:

- Normal MIG welding
- 1-MIG welding (Default)
- Wise-MIG (Optional)

In normal MIG welding the wire-feed speed and the welding voltage are adjusted separately.

Unlike the above, 1-MIG and Wise-MIG processes are synergetic welding processes where the welding voltage and other welding parameters are interconnected so that the welding power and arc length are adjusted to attain optimal welding values.

The Wise-MIG process is an optional feature intended for welding automation. It must be acquired separately and is therefore not available in all configurations.

---

#### More information

The power source is described more in detail in Operating manual - KempArc.

## 2 Technical description

### 2.3.2.1 Overview

## 2.3.2 Wire feeder system

### 2.3.2.1 Overview

#### Usage

The wire feed system A314F LH is intended to be mounted directly on the robot, which results in a short cable bundle and a good wire feed. Furthermore, a smaller floor area is required.



#### Note

A314F LH should be used for gas arc welding

#### Bobbin

If a bobbin is used it may be necessary to adjust the brake hub, see [Adjusting the brake hub of the bobbin on page 60](#).

#### Working area

The wire feeder system A314F LH meets Arc Welding and Application Equipment's recommended layout setup. This means that the robot has a full working area within a section of  $\pm 170^\circ$  for A314F LH around axis 1.

The orientation of the bobbin and the wire conduit bracket should be adjusted according to the working range of axis 2 and axis 3. If not adjusted, the lifetime of the wire conduit will be reduced greatly due to sharp bends. The default orientation of the bobbin and the wire conduit bracket is upward. Adjust the orientation so that there doesn't occur any sharp bends on the wire.



#### CAUTION

Great care should be exercised outside of this sector, for example when programming, otherwise the welding equipment can be damaged

#### Technical specifications

A314F LH	Data
Operating voltage	50 VDC
Rated power	100 W
Load ability 40 °C 80% ED	600 A
Load ability 40 °C 100% ED	500 A
Wire feeder speed	0 - 25 m / min
Diameter of filler wire, Fe, SS, Flux cored wire	0.8 - 1.6 mm
Diameter of filler wire, Al	1.0 - 1.6 mm
Welding gun connector	Binzel ROBO Power Connector (RPC)
Operating temperature range	-20°C to +40°C
EMC class	A

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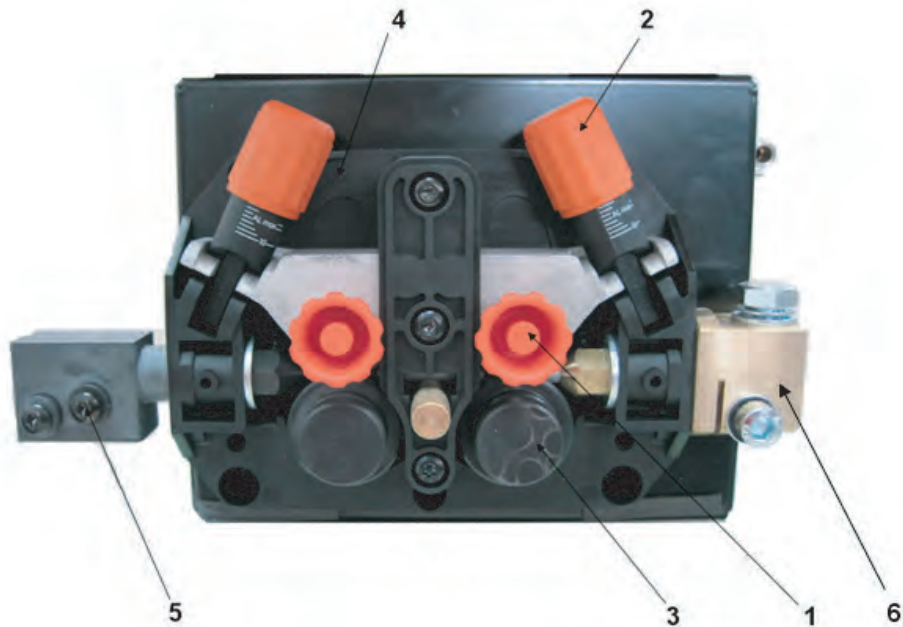
A314F LH	Data
Protection class	IP23S
External dimensions	269 x 175 x 169 mm
Weight	3.6 kg

## 2 Technical description

### 2.3.2.2 Wire feeder unit

#### 2.3.2.2 Wire feeder unit

##### Illustration



xx1100000398

1	Upper feed rollers
2	Adjuster screw
3	Lower feed rollers
4	Motor (On the back)
5	Screws
6	ROBO Torch connector

##### Feed rollers

Wire is fed using two pairs of feed rollers which are linked to each other. The two upper rollers are spring-loaded. The power from the motor is transferred to the rollers via a pinion on the motor shaft.

The pressure between the upper and lower rollers can be adjusted individually using an adjuster screw. All rollers are fitted with sleeve bearings. The lower feed rollers have a groove for one wire diameter. The default wire diameter is 1.2 mm. The whole rollers must be replaced if another wire diameter is used.

##### Motor

The motor is of a permanent magnetized type and is equipped with an optical tachometer meter for accurate speed control.

*Continues on next page*

*Continued*

#### **Bobbin**

When the bobbin is used the wire liner is fitted directly to the feed mechanism and is locked by screws.

#### **Connections and switches on the wire feeder unit (Inlet side)**



xx1100000412

1	Wire feed inlet
---	-----------------

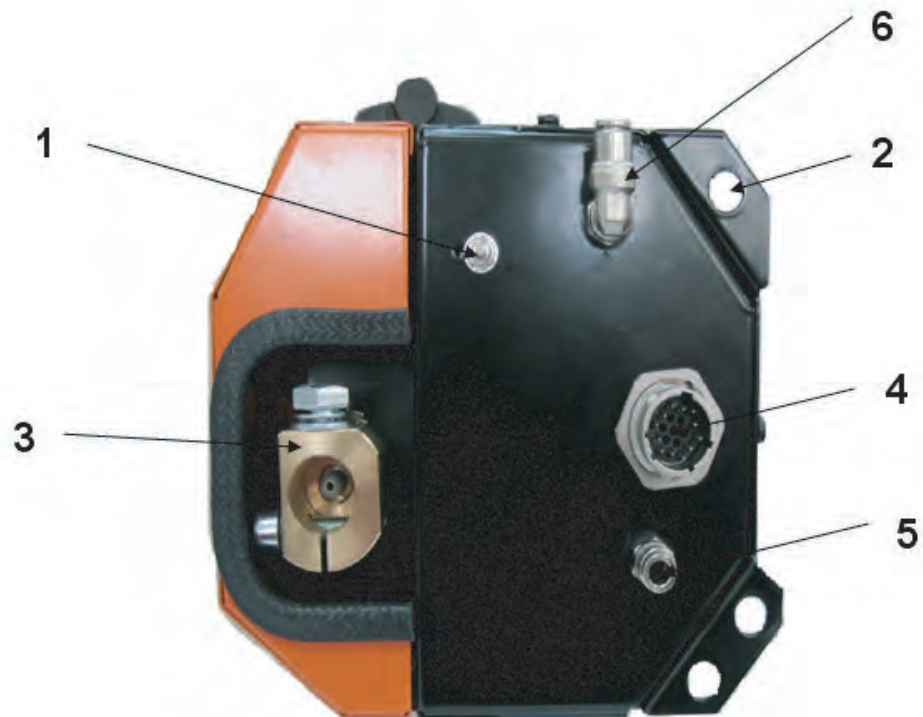
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## 2 Technical description

### 2.3.2.2 Wire feeder unit

*Continued*

#### Connections and switches on the wire feeder unit (Outlet side)



xx1100000399

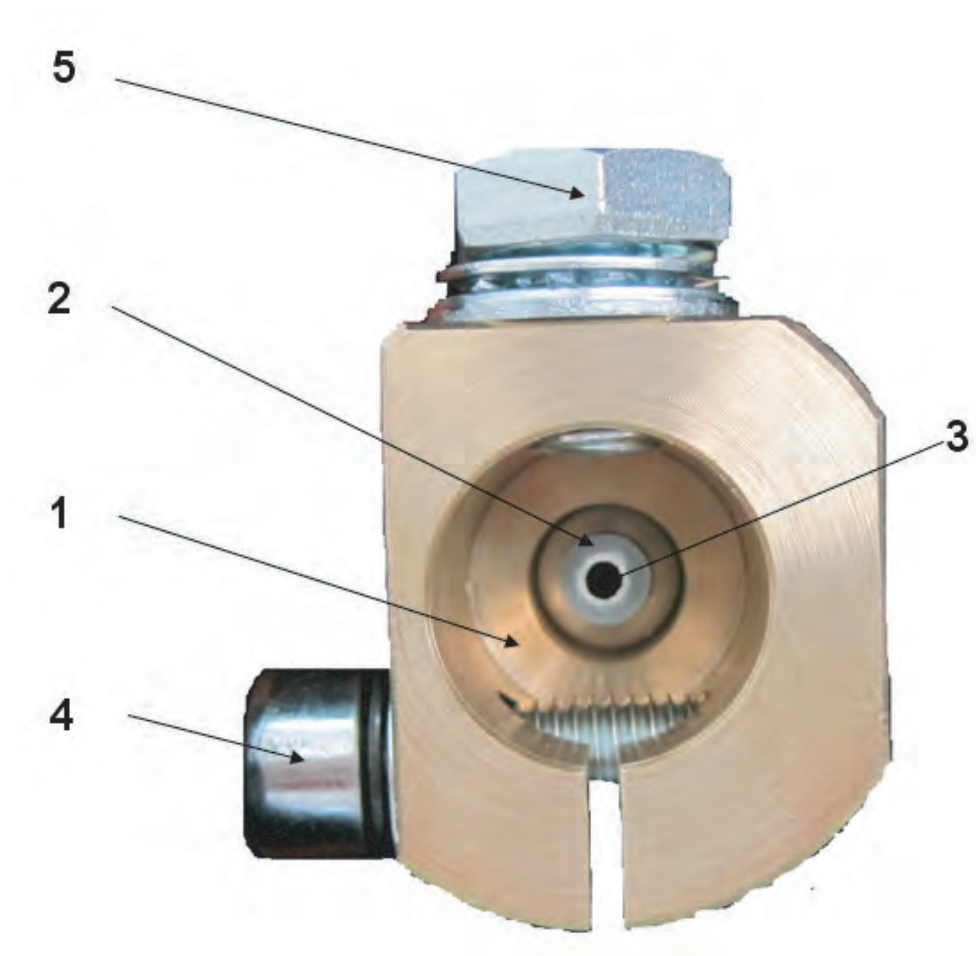
1	Wire in switch (Switch for manual wire feed (inch.))
2	Air connector (Compressed air connection to the welding torch)
3	Torch connector (Binzel ROBO Power Connector) connection for the welding torch.
4	Control connector
5	Shielding gas connector IN (for 8mm hose)
6	Shielding gas connector OUT (for 6mm hose)

#### Wire inch switch

When the switch is pressed the wire feeder motor starts but the gas valve does not open and the power source is not activated. The wire feed pace is 2 m/min for the first two seconds, and then 10 m/min. When the button is released, the wire feeder stops.

*Continues on next page*

#### Torch connector



xx1100000400

1	Hole for torch pin
2	Wire liner
3	Hole for wire
4	Lock screw for torch pin
5	Lock screw for cable lug

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3 Installation

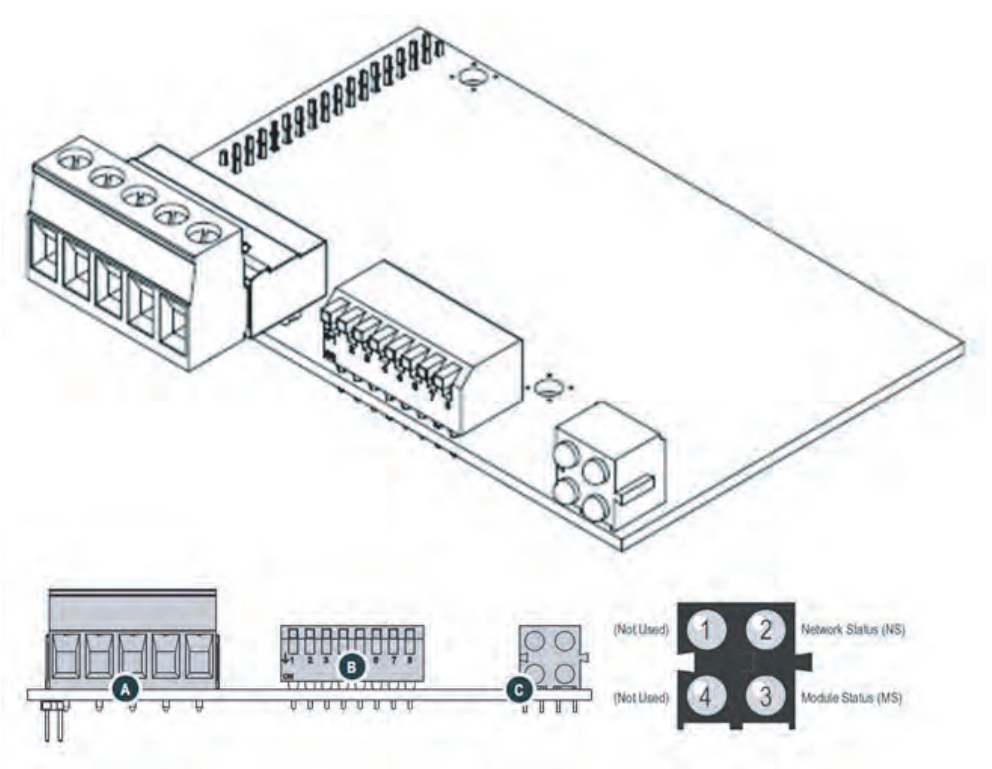
3.1 Connecting the welding equipment

3.1.1 Installing the DeviceNet card and cable

Overview

DeviceNet is used for communication between the robot controller IRC5 and the power source. The card is installed in the power source according to the Operating manual - KempArc. This section contains information about the DeviceNet card.

DeviceNet card design



xx1100000401

A	DeviceNet Connector
B	Configuration Switches
C	Network Status LEDs
1	(Not used)
2	Network Status (NS)
3	Module Status (MS)
4	(Not used)

Continues on next page

### 3 Installation

#### 3.1.1 Installing the DeviceNet card and cable

*Continued*

##### DeviceNet connector

The module supports both 5.08 mm and 3.84 mm pluggable screw connectors to board connector.

##### MAC ID and Baud rate configuration

On a DeviceNet network, each node must be assigned its own unique Mac ID. The Mac ID is a value between 0 and 63 used to identify each node. The Mac ID and Baud rate settings can be set using a physical DIP-switch.

Switches 1 and 2 specify the baud rate, while switches 3 through 8 specify the Mac ID.

S1	S2	Baudrate	S3	S4	S5	S6	S7	S8	Mac ID
OFF	OFF	125k	OFF	OFF	OFF	OFF	OFF	OFF	0
OFF	ON	250K	OFF	OFF	OFF	OFF	OFF	ON	1
ON	OFF	500K	OFF	OFF	OFF	OFF	ON	OFF	2
ON	ON	(reserved)	OFF	OFF	OFF	OFF	ON	ON	3
...			...	...	...	...	...	...	...
ON	ON		ON	ON	ON	ON	OFF	OFF	60
ON	ON		ON	ON	ON	ON	OFF	ON	61
ON	ON		ON	ON	ON	ON	ON	OFF	62
ON	ON		ON	ON	ON	ON	ON	ON	63

xx1100000409

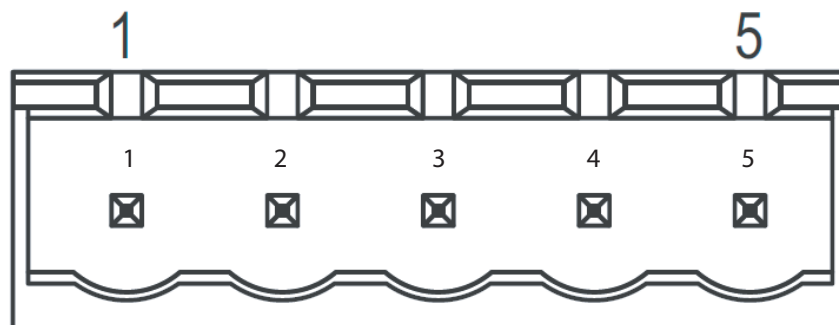
##### ABB Default configuration:

For the first power source: Baud rate: 500K Address: 30.

For the second power source: Baud rate: 500K Address: 31

For the third power source: Baud rate: 500K Address: 32

For the fourth power source: Baud rate: 500K Address: 33



xx1100000402

	Signal	Description
1	V-	Negative supply voltage (DC 0V)
2	CAN_L	CAN_L bus line
3	SHIELD	Cable shield
4	CAN_H	CAN_H bus line
5	V+	Positive supply voltage (DC 24V)

**3.1.2 Installing the power source****Installing the power source**

Refer to the Operating manual for the power source to:

	Action	Note
1	Locate the power source at an appropriate installation location.	
2	Connect the power source to the electric network.	
3	Connect the welding and earthing cables.	
4	Install the field bus card and the field bus cable (DeviceNet card and DeviceNet cable). Additional information is found in xx.	

Requirements and detailed instructions for all of the steps above are found in the Operating manual - KempArc.

### 3 Installation

#### 3.1.3 Connecting the cables and hoses

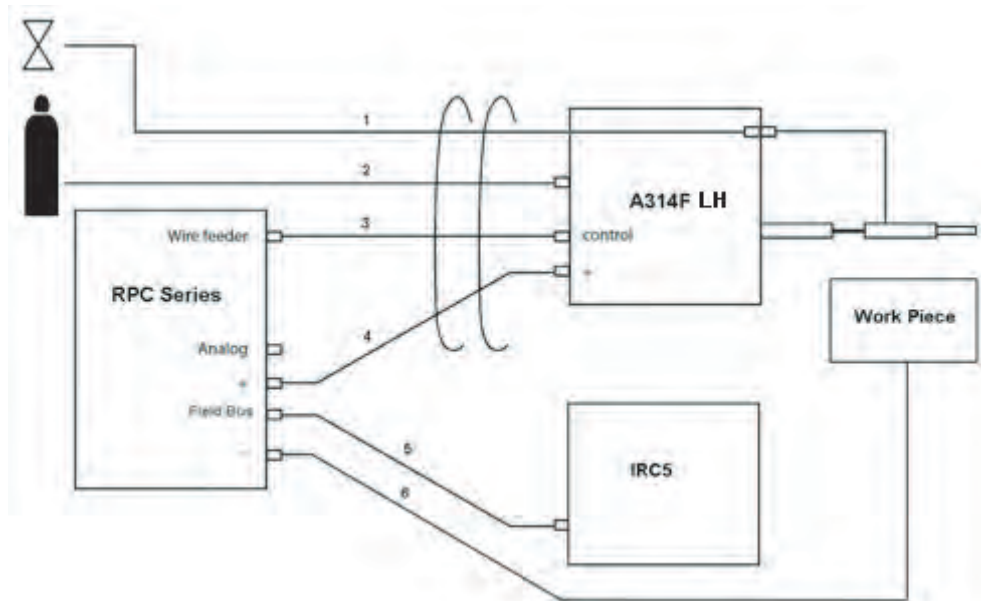
#### 3.1.3 Connecting the cables and hoses



#### WARNING

All personnel working with the welding robot system must have a full understanding of the applicable safety instructions.

#### Connection layout




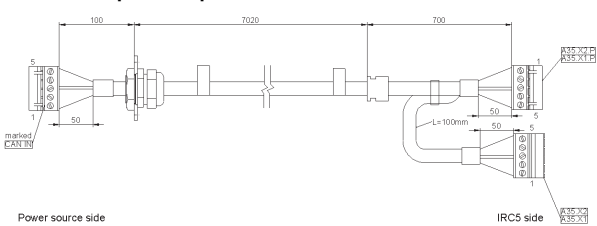
xx1100000403

1	Compressed air hose
2	Shield gas hose
3	Feeder cable
4	Welding cable (positive)
5	DeviceNet cable
6	Welding cable (negative)

*Continues on next page*

### Connection points for cables and hoses

The cables and hoses are connected as follows.

Cable / house	Type	Connection points																		
DeviceNet cable		<p>Connect the cable between the IRC5 controller and the power source.</p> <p>Connect the connector CAN IN to the DeviceNet card through the Robot Control hole on the power sources rear panel.</p> <p>Connect the connectors A35.X1.P/X2.P to terminal A35.X1 or A35.X2 in the IRC5 controller, by entering through the gland plate XS.7.</p> <p> <b>Note</b></p> <p>Each end of the DeviceNet bus must be terminated with a 121 ohm resistor. The two terminating resistors should be as far apart as possible.</p>  <p>xx1100000404</p> <table border="1"> <thead> <tr> <th>Signal description</th><th>Terminal</th><th>Color</th></tr> </thead> <tbody> <tr> <td>V-</td><td>1</td><td>Black</td></tr> <tr> <td>CAN L</td><td>2</td><td>Blue</td></tr> <tr> <td>DRAIN (NC)</td><td>3</td><td>Gray</td></tr> <tr> <td>CAN H</td><td>4</td><td>White</td></tr> <tr> <td>V+</td><td>5</td><td>Red</td></tr> </tbody> </table>	Signal description	Terminal	Color	V-	1	Black	CAN L	2	Blue	DRAIN (NC)	3	Gray	CAN H	4	White	V+	5	Red
Signal description	Terminal	Color																		
V-	1	Black																		
CAN L	2	Blue																		
DRAIN (NC)	3	Gray																		
CAN H	4	White																		
V+	5	Red																		
Feeder cable (signal cable)	A314F LH	Connect the cable between the wire feeder unit and the power source, through the robot base.																		
Shield gas hose	Black house	Connect the hose between the central gas supply or the gas cylinder and the wire feeder unit.																		
Compressed air hose		Connect to the compressed air supply. System pressure: approximately 6 bar.																		
Wire guide input		The welding wire is taken to the wire feeder through a metallic wire guide adapter. Push the wire guide to the end of the adapter and screw in with the top fixing locks. Attach a wire guide input at the end of the adapter to serve as a bend support for the wire guide and to prevent the wire from bending too heavily. Fix the wire guide input with the bottom fixing locks.																		
Current cable		Connect the current cable from the wire feeder unit to the power source.																		

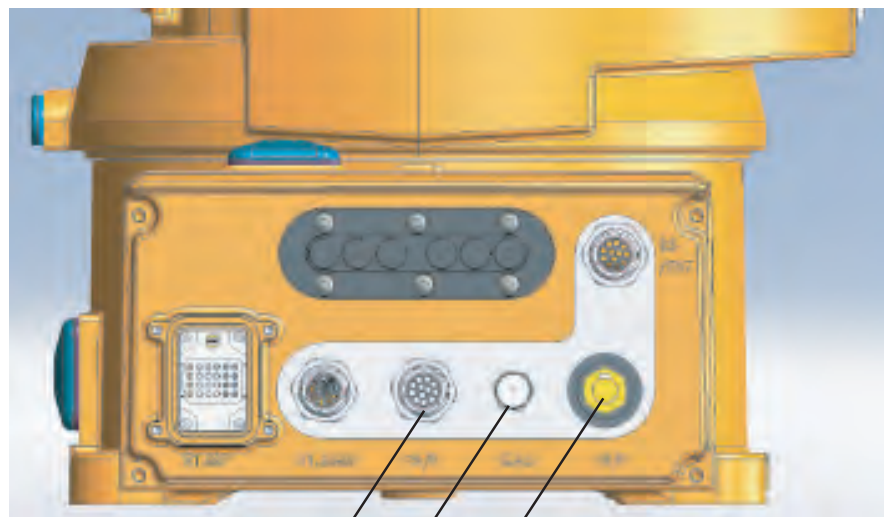
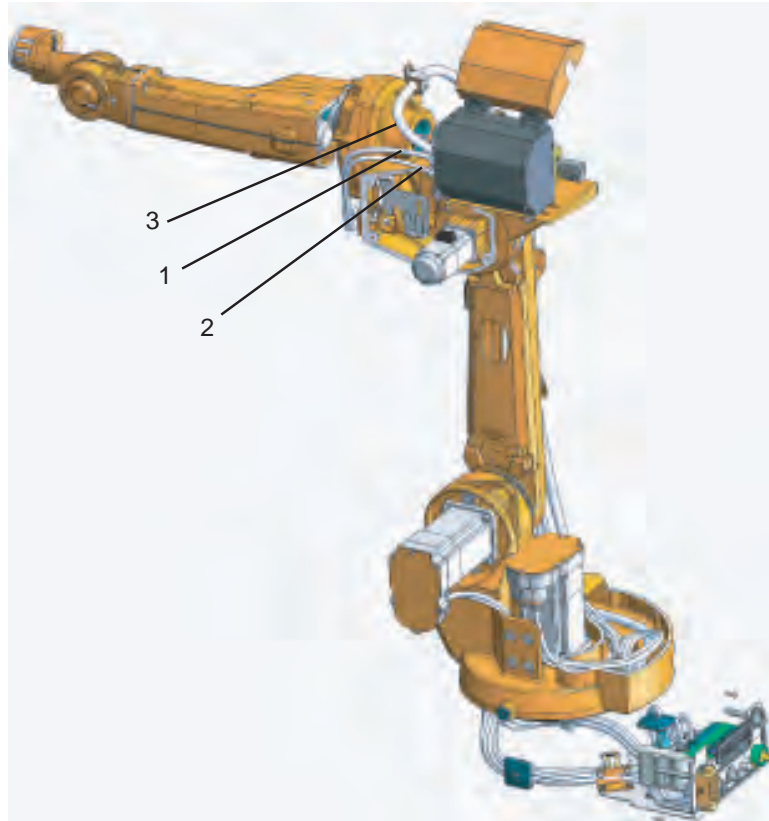
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### 3 Installation

#### 3.1.3.1 Connecting the feeder cable

##### 3.1.3.1 Connecting the feeder cable

Connection on robot base and on wire feeder A314F LH



xx1100000431

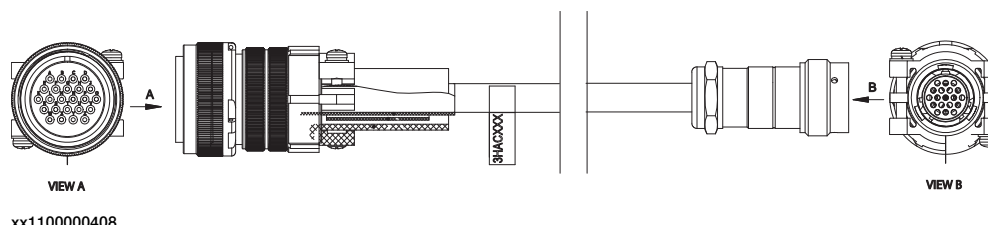
1	Control feeder cable to A314F LH, connection on robot base and on wire feeder
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2	Connection, gas feed on robot base and on wire feeder
3	Connection, current cable on robot base and on wire feeder

Feeder cable (floor cable for welding signal)



A	To the power source (pin)
B	To the robot base (socket)

### Signal description

Signal description for feeder cable for control signal (24 way MIL connector)

Connector to power source (MS4106A24-28P-689)					Signal Cable 3HAA2513-2/1		Conector to robot base 3HAC022151-003
Pin	Signal	Type	Level	Note	Wire color	Wire type	Pin
A	Wire feed motor +	input	0 V to +24 V	Wire feed motor voltage +	BU	AWG24	A
B	Wire feed motor -	input	0 V	Wire feed motor voltage -	Violet	AWG24	B
C	Gas valve +	input	0 V / +24 V	Gas valve control voltage +	Grey	AWG24	C
D	Gas valve -	input	0 V	Gas valve control voltage -	White	AWG24	D
E	nc.	-	-	-	-	-	nc.
F	nc.	-	-	-	-	-	nc.
G	nc.	-	-	-	-	-	nc.
H	nc.	-	-	-	-	-	nc.
J	nc.	-	-	-	-	-	nc.
K	Tacho +5 V	input	+5 V	Tacho supply voltage	White Blue	AWG26	G
L	Tacho GND	input	0 V	Tacho supply GND	White Green	AWG26	H
M	Tacho signal	output	0 V / +5 V	Tacho signal from wire feeder	White Yellow	AWG26	J
N	nc.	-	-	-	-	-	nc.
P	Isolated +24 V	input	+24 V	Analog supply voltage	Black	AWG24	E

*Continues on next page*

### 3 Installation

#### 3.1.3.1 Connecting the feeder cable

*Continued*

Connector to power source (MS4106A24-28P-689)					Signal Cable 3HAA2513-2/1		Conector to robot base 3HAC022151- 003
Pin	Signal	Type	Level	Note	Wire color	Wire type	Pin
Q	Isolated GND	input	0 V	Analog supply GND	Yellow Green	AWG24	F
R	nc.	-	-	-	-	-	nc.
S	nc.	-	-	-	-	-	nc.
T	Wire inch	output	0 V / +24 V	Wire test feed	Or- ange Green	AWG26	K
U	Thruougput4	output	0 V / +24 V	Free for future use	Blue Green	AWG26	M
V	Thruougput5	output	0 V / +24 V	Free for future use	Violet Green	AWG26	N
W	nc.	-	-	-	-	-	nc.
X	nc.	-	-	-	-	-	nc.
Y	nc.	-	-	-	-	-	nc.
Z	Thruougput6	output	0 V / +24 V	Gasnozzle sensing	White Red	AWG26	L



## 3.2 Configuring the welding equipment

### Overview

On delivery the equipment is configured according to the applicable configuration data which is stored on the disk that comes with the delivery.

The data can be read and modified by way of the robot FlexPendant.

### Installation disk

The configuration file on the installation disk contains configuration data for the welding equipment.



#### Note

As the disk is unique for the equipment supplied, it should be stored in a safe place. The program number indicated on the disk corresponds to the configuration in question, and should be referred to in case of service matters regarding the function of the welding equipment.

### Reload configuration data

In case the configuration data must be reloaded, proceed in one of the following ways:

Alternative	Description
Reboot the robot	The original configuration will be restored.
Loading by using the FlexPendant	Use this alternative if individual parameters need to be changed compared to the original configuration.
Loading a new configuration file	(EIO:CFG) Executed by way of the robot instruction: System Parameters\File\Add or Replace Parameters\ "file".cfg.

### Default configuration

In ABB default configuration, the power source is controlled by the robot in the way of schedule/memory channel (sometime called as job) and the power source is recommended to work in 1-MIG mode.

## 3 Installation

### 3.3.1 Torch cleaner (TSC)

## 3.3 Installing accessories

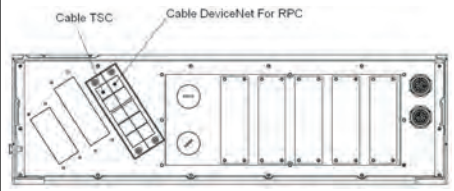
### 3.3.1 Torch cleaner (TSC)



#### Note

The torch cleaner (TSC) communicates with the IRC5 controller by standard I/O communication. Basically it needs three digital outputs and two digital inputs. For detailed information refer to Product Specification - TSC.

#### Connecting the torch cleaner

	Action	Note
1	Install the torch cleaner.	 xx1100000413 Cable entry can easily be made through the gland plate (DeviceNet cable used) at the bottom of the control cabinet.
2	Configure the I/O ports.	The I/O ports belong to the ABB standard I/O board, which is the one installed in the controller. Refer to the I/O configuration file.
3	Connect the line to the port of standard I/O board.	Connection needs to be done according to the I/O configuration file.

#### Example of configuration file

Here is an example of the configuration file for torch cleaner, as for reference:

EIO.CFG\_1.0:5:0:

#

# using the spare DOI ports of ABB standard IO unit (d651)

# which is installed in the PIB Box. If using another IO unit,

# this definition can be used as the reference.

EIO\_UNIT:

-Name "B\_PROC\_10" -UnitType "d651" -Bus "DeviceNet1" -DN\_Address 10

EIO\_SIGNAL:

-Name "doTS1\_SpOn" -SignalType "DO" -Unit "B\_PROC\_10" -UnitMap "35"

-Name "doTS1\_St" -SignalType "DO" -Unit "B\_PROC\_10" -UnitMap "38"

-Name "doTS1\_AiBI" -SignalType "DO" -Unit "B\_PROC\_10" -UnitMap "39"

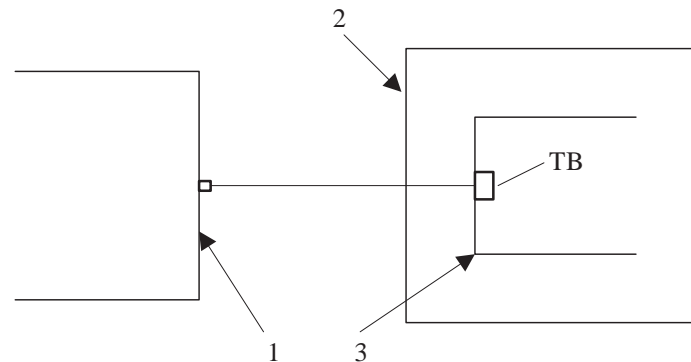
-Name "diTS1\_CIOp" -SignalType "DI" -Unit "B\_PROC\_11" -UnitMap "7"

-Name "diBE\_SENSE" -SignalType "DI" -Unit "B\_PROC\_10" -UnitMap "8"

#

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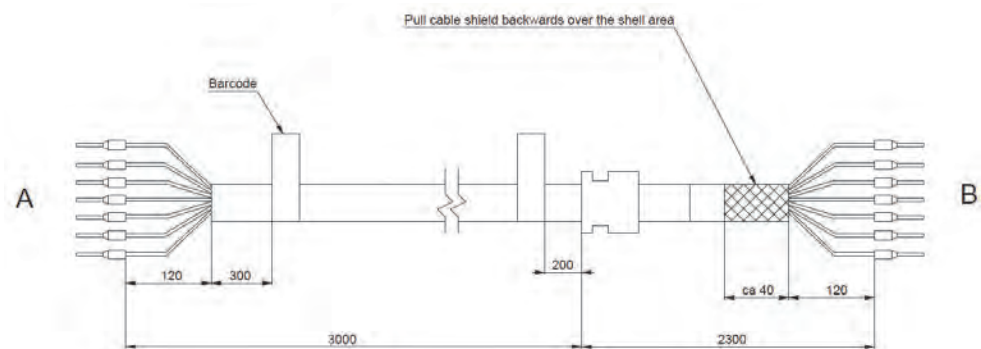
### Block diagram



xx1100000414

1	TSC
2	Control module
3	Terminal block of IO board

### Cable for torch cleaner



xx1100000415

### Signal description

Signal description	Color	A (TSC)	A (BINZEL)	B (I/O Unit)
24V DC	White	4	6	
0V DC	Brown	2 and 8	3,4 and 5	
Lubrication	Green	11	8	
Cleaning	Yellow	10	7	
Wire cutter	Gray	1	NC	
Cleaning finished	Pink	7	9	
BullsEye	Blue	16	10	
Shield	SC	NC	NC	PE

## 3 Installation

### 3.3.2 Adjusting the brake hub of the bobbin

### 3.3.2 Adjusting the brake hub of the bobbin

#### Introduction


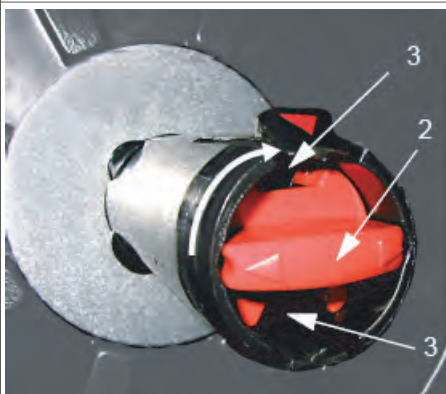
If a bobbin is used it may be necessary to adjust the brake hub.



#### WARNING

At high wire speed and when the bobbin is new, the wire can roll off when the wire feeder unit stops. To avoid this, change the brake hub's preset value of 5 kpcm (= 0.5 Nm).

#### Adjusting the brake hub of the bobbin

	Action	Note
1	Localize the brake hub (1).	 xx1100000416
2	Turn the knob (2) on the brake hub until the arrows are in line with each other (locked bobbin position).	 xx1100000417
3	The springs (3) on each side of the knob are screwed in at the same time to increase the braking force.	



#### Tip

If the wire feed speed is so high that this adjustment does not have any effect, Marathon Pac should be used

### 3.4 Before commissioning

#### Actions before commissioning



#### **DANGER**

Make sure all safety requirements are met when performing the first test run. These are further detailed in the section ***DANGER - First test run may cause injury or damage!** on page 27.*

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## **4 Operation**

### **4.1 Power source**

---

#### **Operating the power source**

RPC S series power source is designed to be used only with A314F LH wire feeder unit and RF 59 control panel. Normally ABB will offer RPC S-400.

Refer to the Operating manual - KempArc for instructions of how to operate the power source and to learn more about its control panel and functions.

RPC P series power source is designed to be used only with A314F LH wire feeder unit and KF 62 control panel. Normally ABB will offer RPC P-350. Welding applications vary, so the equipment must adapt. RPC P-350 features K60 interface, a clear and logical LCD menu display. Arc Wizard menu allows the operator to refine, adapt and manage the arc process and system function before, during and after welding.

Refer to the Operating manual - KempArc for instructions of how to operate the power source and to learn more about its control panel and functions.

*Continues on next page*

## 4 Operation

### 4.1.1 Programming the power source

#### 4.1.1 Programming the power source

##### Default configuration

In the default configuration from ABB, the power source is controlled by the robot in the way of schedule/memory channel and the power source is recommended to work in 1-MIG mode.

##### Before programming

Before programming in IRC5, a set of welding parameters for the seam to be welded needs to be stored in a selected memory channel. See Operating manual - KempArc for details.

##### Programming - setting the welding speed and the schedule number

When programming in IRC5, usually in the component welddata, it is only necessary to set welding speed and schedule number. Welding voltage and wire feed speed is saved in the selected schedule/memory channel.

Name	Value	Data Type	Unit
weld_speed :=	8	num	mm/s
main_arc:	[1,0,0,0]	arcdata	
sched :=	1	num	
voltage :=	0	num	
wirefeed :=	0	num	m/min
current :=	0	num	

xx1100000418

*Continues on next page*



*Continued***Optional programming - setting the welding voltage and wire feed speed**

It is possible to also specify the welding voltage and wire feed speed directly, which will override the value in the selected memory channel, but these two values only take effect when the signal doRpcOnline is set to 1.

**Step 1 - set signal doRpcOnline to 1**

Choose one of the two methods.

Method	Description
1	<p>On the FlexPendant, in manual mode.</p> <ol style="list-style-type: none"> <li>1 On the <b>ABB</b> menu, tap I/O units.</li> <li>2 Tap <b>RpcArcDN1</b>.</li> <li>3 Select <b>doRpcOnline</b> from the list of I/O signals and set it to 1.</li> </ol>

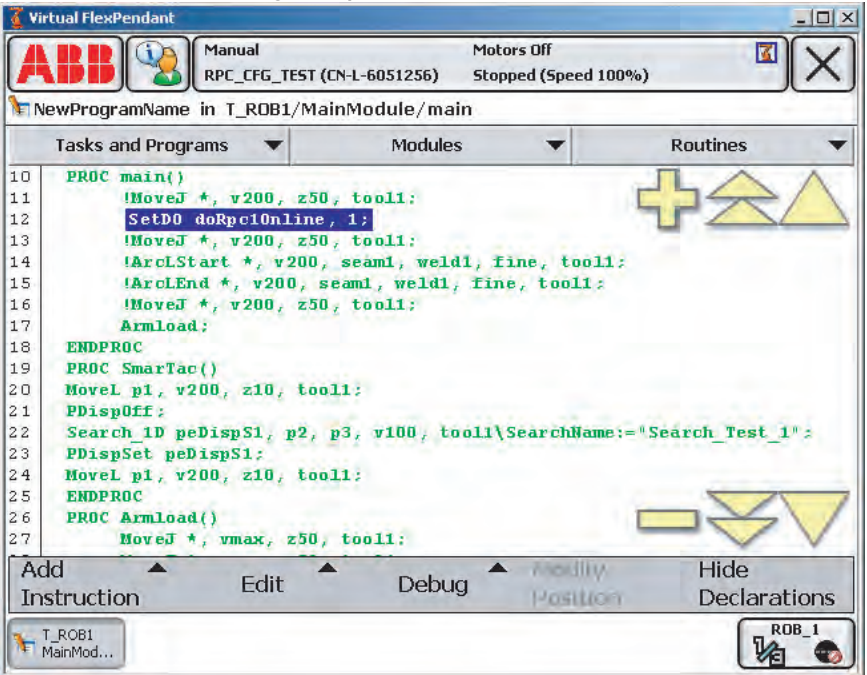
The screenshot shows the ABB FlexPendant interface. At the top, there is a status bar with the ABB logo, a 'Manual' mode indicator, and a 'Guard Stop' button. Below this, the 'I/O Units' screen is displayed for 'RpcArcDN1'. It shows a list of I/O signals with their current values and types. The signal 'doRpcOnline' is highlighted, and its value is set to 1. Other signals include 'diRpc1TouchSensed', 'doRpc1GasPurge', 'doRpc1Start', 'doRpc1TouchSensing', 'doRpc1WireInch', 'doRpc1WireRetract', 'giRpc1ErrorNum', 'giRpc1Throughput', and 'goRpc1MemoryChannel'. At the bottom, there are buttons for 'Control Panel', 'I/O', 'RobotWare Arc', 'T\_ROB1 MainModule', and a 'Close' button.

*Continues on next page*

## 4 Operation

### 4.1.1 Programming the power source

Continued



Method	Description
2	<p>In a RAPID program: Add instruction for setting "doRpcOnline" to 1.</p>  <p>The screenshot shows the Virtual FlexPendant interface. At the top, there's a status bar with 'ABB' logo, 'Manual', 'RPC_CFG_TEST (CN-L-6051256)', 'Motors Off', and 'Stopped (Speed 100%)'. Below this is a tab labeled 'NewProgramName in T_ROB1/MainModule/main'. The main area displays a RAPID program with line numbers 10 to 27. Line 12 contains the instruction 'SetDO doRpcOnline, 1;', which is highlighted. Other instructions include 'MoveJ', 'ArcLStart', 'ArcLEnd', 'MoveJ', 'ArmLoad', 'ENDPROC', 'PROC Smartac()', 'MoveL', 'PDispOff', 'Search 1D', 'PDispSet', and 'PROC ArmLoad()'. At the bottom, there are buttons for 'Add Instruction', 'Edit', 'Debug', 'Modify Position', and 'Hide Declarations'. A small icon for 'T_ROB1 MainMod...' is also visible.</p> <p>xx1100000423</p>

Step 2 - set the voltage and wire feed speed

## Action



3


Set welding voltage and wire feed speed in the welddata, as shown in the figure:

**Manual**  
 RPC\_CFG\_TEST (192.168.0.1)

**Guard Stop**  
 Stopped (Speed 100%)







 Edit

Name: weld1

Tap a field to edit the value.

Name	Value	Data Type	Unit
weld_speed :=	8	num	mm/s
main_arc:	[1,19.6,6.5,0]	arcdata	
sched :=	1	num	
voltage :=	19.6	num	
wirefeed :=	6.5	num	m/min
current :=	0	num	

Undo
 OK
 Cancel

 Control Panel
  I/O
  RobotWare Arc
  T\_ROB1 MainModule
  Program Data
 

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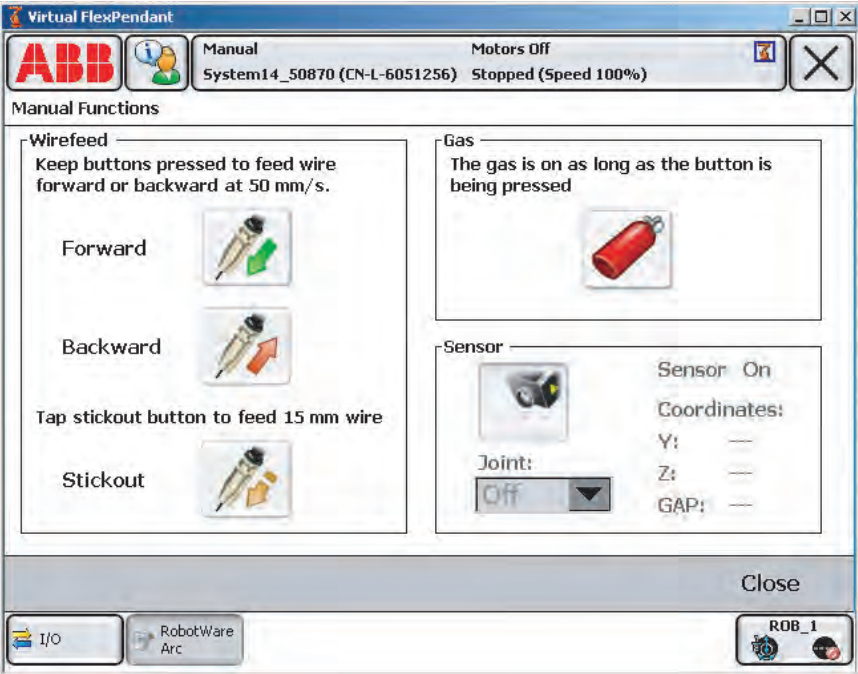
During welding, the specified welding voltage and wire feed speed override the value in the selected memory channel.

## 4.2 Wire feeder unit

### Threading the wire and adjusting tightness

Refer to Operating manual - KempArc for instructions of how to thread the wire and adjust the tightness.

### Manual wire feed - different methods

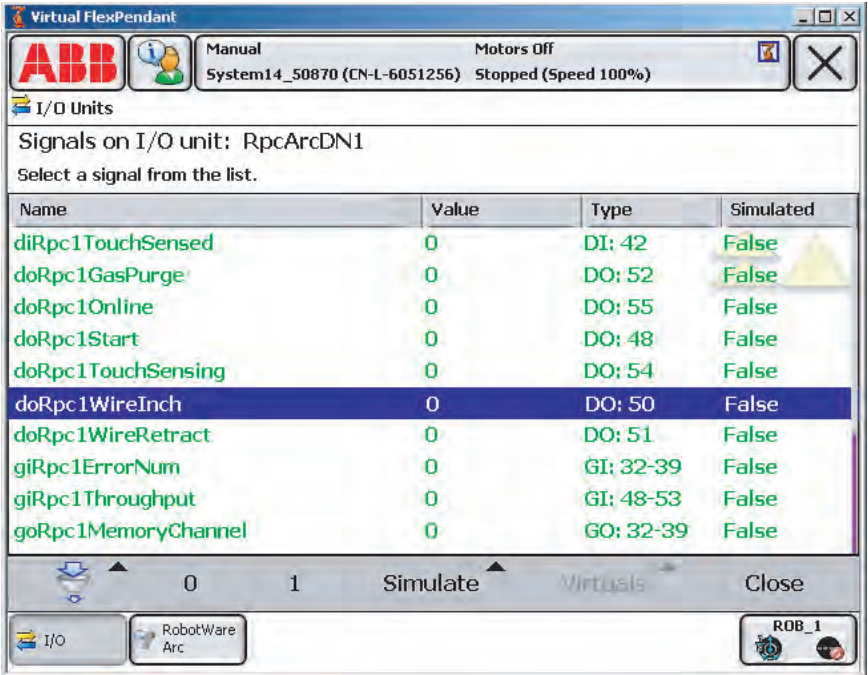
Method	Description
1	Push the button for manual wire feed on the front of the wire feeder unit.
2	<p>Activate the function Manual wire feed (Forward or Backward) from the robot's FlexPendant in test mode under the following window: ABB Menu\RobotWare Arc\Manual functions.</p>  <p>xx1100000425</p> <p><b>Note</b></p> <p>If tapping the "Stickout" button from the robot's FlexPendant in test mode, the wire feeder will feed 15 mm wire every time.</p>

*Continues on next page*

## 4 Operation

### 4.2 Wire feeder unit

Continued

Method	Description																																												
3	<p>Activate the robot output (doRpc1WireInch or doRpc1WireRetract) from the robot's FlexPendant in test mode under the following window: ABB Menu\I/O Units\RpcArcDN1.</p>  <p>The screenshot shows the 'Virtual FlexPendant' window. At the top, it says 'Manual' and 'Motors Off'. Below that, it says 'System14_50870 (CN-L-6051256) Stopped (Speed 100%)'. The main section is titled 'I/O Units' and 'Signals on I/O unit: RpcArcDN1'. It says 'Select a signal from the list.' and shows a table of signals. The 'doRpc1WireInch' signal is highlighted in blue.</p> <table border="1"><thead><tr><th>Name</th><th>Value</th><th>Type</th><th>Simulated</th></tr></thead><tbody><tr><td>diRpc1TouchSensed</td><td>0</td><td>DI: 42</td><td>False</td></tr><tr><td>doRpc1GasPurge</td><td>0</td><td>DO: 52</td><td>False</td></tr><tr><td>doRpc1Online</td><td>0</td><td>DO: 55</td><td>False</td></tr><tr><td>doRpc1Start</td><td>0</td><td>DO: 48</td><td>False</td></tr><tr><td>doRpc1TouchSensing</td><td>0</td><td>DO: 54</td><td>False</td></tr><tr><td>doRpc1WireInch</td><td>0</td><td>DO: 50</td><td>False</td></tr><tr><td>doRpc1WireRetract</td><td>0</td><td>DO: 51</td><td>False</td></tr><tr><td>giRpc1ErrorNum</td><td>0</td><td>GI: 32-39</td><td>False</td></tr><tr><td>giRpc1Throughput</td><td>0</td><td>GI: 48-53</td><td>False</td></tr><tr><td>goRpc1MemoryChannel</td><td>0</td><td>GO: 32-39</td><td>False</td></tr></tbody></table> <p>At the bottom of the window, there are buttons for 'I/O', 'RobotWare Arc', and 'ROB_1'. There is also a 'Simulate' button and a 'Close' button.</p>	Name	Value	Type	Simulated	diRpc1TouchSensed	0	DI: 42	False	doRpc1GasPurge	0	DO: 52	False	doRpc1Online	0	DO: 55	False	doRpc1Start	0	DO: 48	False	doRpc1TouchSensing	0	DO: 54	False	doRpc1WireInch	0	DO: 50	False	doRpc1WireRetract	0	DO: 51	False	giRpc1ErrorNum	0	GI: 32-39	False	giRpc1Throughput	0	GI: 48-53	False	goRpc1MemoryChannel	0	GO: 32-39	False
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diRpc1TouchSensed	0	DI: 42	False																																										
doRpc1GasPurge	0	DO: 52	False																																										
doRpc1Online	0	DO: 55	False																																										
doRpc1Start	0	DO: 48	False																																										
doRpc1TouchSensing	0	DO: 54	False																																										
doRpc1WireInch	0	DO: 50	False																																										
doRpc1WireRetract	0	DO: 51	False																																										
giRpc1ErrorNum	0	GI: 32-39	False																																										
giRpc1Throughput	0	GI: 48-53	False																																										
goRpc1MemoryChannel	0	GO: 32-39	False																																										

xx1100000426

#### Explanations for the different methods of manual wire feed

The table shows the differences between the methods.

Method	Explanation
1	When the Wire inch button is pressed, the wire feeder motor starts but the gas valve does not open and the power source is not activated. The wire feed pace is 2 m/min for the first two seconds, and then 10 m/min. When the button is released, the wire feeder stops.
2	The arc weld function "Manual Wire feed" is called from the robot's programming unit. The robot activates the output (doRpc1WireInch or doRpc1WireRetract) and the function is the same as when the Manual feed button on the wire feeder unit is pressed in. The function is active as long as the button is hold.
3	The function is active as long as the output signal (doRpc1WireInch or doRpc1WireRetract) is set to 1.

## 5 Maintenance

### 5.1 Introduction

---

#### Planning maintenance

Please consider the utilisation level and working environment of the equipment when planning routine maintenance.

Unnecessary downtime and equipment failure are avoided with correct operation of the equipment and with regular maintenance.

---

#### Safety

**WARNING**

This work must only be carried out by persons trained in the complete installation, who are aware of the particular risks associated with its different parts.

**DANGER**

Disconnect the mains supply and (if possible) secure the switch before starting work on the equipment.

In some cases however, it is necessary to work with the mains supply switched on, special care and safe working methods must be used.

**CAUTION**

Only use genuine spare parts and extra accessories that are recommended by ABB.

## 5 Maintenance

---

### 5.2 Daily maintenance

### 5.2 Daily maintenance

---

#### Daily maintenance procedures

- Check the overall condition of the welding gun. Remove welding spatter from the contact tip and clean the gas nozzle. Replace worn or damaged parts. Only use original ABB spare parts.
- Check the condition and connection of the welding circuit components: welding gun, earth return cable and clamp, sockets and connectors.
- Check the condition of the feed rolls, needle bearings and shafts. Clean and lubricate bearings and shafts with a small quantity of light machine oil if necessary. Assemble, adjust and test function.

### 5.3 Service shop maintenance

---

#### General

ABB Service Workshops complete maintenance according to their ABB service agreement.

The major points in the maintenance procedure are listed as follows:

- Cleaning of the machine
- Checking and maintenance of the welding tools
- Checking of connectors, switches and potentiometers
- Checking of electric connections
- Checking of mains cable and plug
- Damaged parts or parts in bad condition are replaced by new ones
- Maintenance testing.
- Operation and performance values of the machine are checked, and when necessary adjusted by means of software and test equipment.
- ABB Service Workshops can also test and load firm ware and welding software.

## 5 Maintenance

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### 5.4 Power source

### 5.4 Power source

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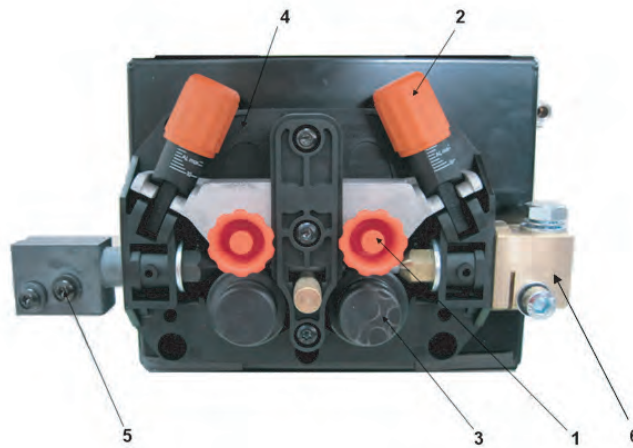
#### Maintenance information

See Operating manual - KempArc for both periodical and regular maintenance and for information about disposal of the machine.



## 5.5 Wire feed unit

### Illustration of the wire feed unit



xx1100000398

1	Upper feed rollers
2	Adjuster screws
3	Lower feed rollers
4	Motor (On the back)
5	Inlet guide and screws

### Regular maintenance

	Action	Note
1	Make a visual inspection of the equipment. Correct errors, if any, for reliable operation.	
2	Purge the inside of the feed unit as necessary by compressed air at reduced pressure.	
3	Clean the grooves in the feed rollers and the bore of the outlet nozzle.	To ensure satisfactory feed of the wire, the grooves in the feed rollers should be cleaned at regular intervals.
4	Purge the wire conduit by compressed air when changing the wire and as necessary. When the wire conduit is worn out, replace it.	
5	Use filler wire that is free of impurities.	Dirt can cause slipping.

### Changing the wire

There is a groove in the feed rollers, for a specified wire diameter.

Replace the feed rollers to change the groove if changing the wire diameter.

*Continues on next page*

## 5 Maintenance

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### 5.5 Wire feed unit

*Continued*



#### **Note**

The bearings of the motor and the gearbox are permanently lubricated and maintenance-free.

### 5.6 Before commissioning



#### **DANGER**

Make sure all safety requirements are met when performing the first test run. These are further detailed in the section ***DANGER - First test run may cause injury or damage! on page 27.***

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