

# Product manual (part 1 of 2), procedure

## Robot Controller

IRC5  
M2004



Product manual, (part 1 of 2), procedures

Robot Controller

IRC5

M2004

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## Overview

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### About this manual

This manual contains instructions for

- installing the controller cabinet, mechanically as well as electrically
- maintenance of the controller cabinet
- mechanical and electrical repair of the controller cabinet.

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### Usage

This manual should be used during

- installation, from lifting the controller cabinet to its work site and securing it to the foundation to making it ready for operation
- maintenance work
- repair work.

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### Who should read this manual?

This manual is intended for:

- installation personnel
- maintenance personnel
- repair personnel.

---

### Prerequisites

The reader should...

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

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### References

Reference	Document ID
Product manual, procedures - IRC5	3HAC021313-001
Product manual, reference information - IRC5	3HAC021313-001
Operator's manual - IRC5 with FlexPendant	3HAC16590-1
Operator's manual - RobotStudio <sup>Online</sup>	3HAC18236-1
Getting started - IRC5 and RobotStudio <sup>Online</sup>	3HAC021564-001
Trouble shooting manual - IRC5	3HAC020738-001
Technical reference manual - System parameters	3HAC17076-1

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Overview

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**Revisions**

Revision	Description
-	First edition
A	Updated information

## Product documentation, M2004

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### General

The robot documentation may be divided into a number of categories. This listing is based on the type of information contained within the documents, regardless of whether the products are standard or optional. This means that any given delivery of robot products *will not contain all* documents listed, only the ones pertaining to the equipment delivered.

However, all documents listed may be ordered from ABB. The documents listed are valid for M2004 robot systems.

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### Hardware manuals

All hardware, robots and controller cabinets, will be delivered with a **Product manual** which is divided into two parts:

#### **Product manual, procedures**

- Safety information
- Installation and commissioning (descriptions of mechanical installation, electrical connections and loading system software)
- Maintenance (descriptions of all required preventive maintenance procedures including intervals)
- Repair (descriptions of all recommended repair procedures including spare parts)
- Additional procedures, if any (calibration, decommissioning)

#### **Product manual, reference information**

- Reference information (article numbers for documentation referred to in Product manual, procedures, lists of tools, safety standards)
- Part list
- Foldouts or exploded views
- Circuit diagrams

---

### RobotWare manuals

The following manuals describe the robot software in general and contain relevant reference information:

- **RAPID Overview:** An overview of the RAPID programming language.
- **RAPID reference manual part 1:** Description of all RAPID instructions.
- **RAPID reference manual part 2:** Description of all RAPID functions and data types.
- **Technical reference manual - System parameters:** Description of system parameters and configuration workflows.

---

### Application manuals

Specific applications (e.g. software or hardware options) are described in **Application manuals**. An application manual can describe one or several applications.

An application manual generally contains information about:

- The purpose of the application (what it does and when it is useful)
- What is included (e.g. cables, I/O boards, RAPID instructions, system parameters)



- How to use the application
- Examples of how to use the application

---

### Operator's manuals

This group of manuals is aimed at those having first hand operational contact with the robot, i.e. production cell operators, programmers and trouble shooters. The group of manuals include:

- **Operator's manual - IRC5 with FlexPendant**
- **Operator's manual - RobotStudioOnline**
- **Trouble shooting Manual** for the controller and robot

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### Miscellaneous

A number of manuals provide generic descriptions of the robot and robot system. These include:

- **Robot fundamentals** (describing the fundamental aspects, functions, concept and similar, of a robot system to provide a basic understanding of the robot system)

# 1 Safety

## 1.1. Introduction

---

### Overview

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

- general safety aspects, important to attend to before performing any service work on the controller. These are applicable for all service work and are found in section *General safety information*.
- specific safety information, pointed out in the procedure at the moment of the danger. How to avoid and eliminate the danger is either detailed directly in the procedure, or further detailed in separate instructions, found in section *Safety related instructions* on page 17.

# 1 Safety

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## 1.2.1. Introduction

## 1.2 General safety information

### 1.2.1. Introduction

---

#### Definitions

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

---

#### Sections

The general safety information is divide into the following sections.

Contents	Containing
1. <b>General information</b>	<ul style="list-style-type: none"><li>• safety, service</li><li>• limitation of liability</li><li>• related information</li></ul>
2. <b>Safety risks</b> (lists dangers relevant when servicing the controller. The dangers are split into differnt categories).	<ul style="list-style-type: none"><li>• safety risks during installation or service</li><li>• risks associated with live electrcal parts</li></ul>
3. <b>Safety acitions</b> (details 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>

## **1.2.2. General Information**

### **1.2.2.1. Safety, service**

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#### **Validity and responsibility**

The information does not cover how to design, install and operate a complete system, nor does it cover all peripheral equipment, which can influence the safety of the total 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 robot is installed.

The users of ABB industrial robots 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 robot system have been designed and installed correctly. Personnel working with robots must be familiar with the operation and handling of the industrial robot, described in the applicable documents, e.g. User's Guide and Product Manual.

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#### **Connection of external safety devices**

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

In the Product Manual - Installation and Commissioning, instructions are provided for connecting safety devices between the robot and the peripheral equipment.

# 1 Safety

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## 1.2.2.2. Limitation of Liability

### 1.2.2.2. Limitation of Liability

---

#### General

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

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**1.2.2.3. Related information**

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**General**

The list below specifies documents which contain useful information:

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**Documents**

<b>Type of information</b>	<b>Detailed in document</b>	<b>Section</b>
Installation of safety devices	Product manual for the manipulator	Installation and commissioning
Changing robot modes	User's Guide	Start-up
Restricting the working space	Product manual for the manipulator	Installation and commissioning

# 1 Safety

---

## 1.2.3.1. Safety risks during installation and service

### 1.2.3. Safety risks

#### 1.2.3.1. Safety risks during installation and service

---

##### General risks during installation and service

- The instructions in the Product Manual - Installation and Commissioning must always be followed.
- Emergency stop buttons must be positioned in easily accessible places so that the robot 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 robot must have the appropriate training for the robot system in question and in any safety matters associated with it.

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##### Nation/region specific regulations

To prevent injuries and damage during the installation of the robot system, 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

- Safety zones, which have to be crossed before admittance, must be set up in front of the robot's working space. Light beams or sensitive mats are suitable devices.
- Turntables or the like should be used to keep the operator out of the robot'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 robot parts, you run the risk of being crushed by the parallel arm.
- Energy, stored in the robot for the purpose of counterbalancing certain axes, may be released if the robot, or parts thereof, is dismantled.
- When dismantling/assembling mechanical units, watch out for falling objects.
- Be aware of stored heat energy in the controller.
- Never use the robot as a ladder, i.e. do not climb on the robot motors or other part during service work. There is a serious risk of slipping because of the high temperature of the motors or oil spills that can occur on the robot.

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##### 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.

### 1.2.3.2. Risks associated with live electric parts

---

#### Voltage related risks, general

- Although troubleshooting may, on occasion, have 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 outside the robot's working space.

---

#### Voltage related risks, controller

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

- Be aware of stored electrical energy (DC link, Ultra Cap unit) in the controller.
- Units inside the controller, e.g. 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 (400-480 VAC and 700 VDC. Note: Capacitors!)
- The drive unit (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 tools, or special power supply units for the machining process
- The external voltage connected to the control cabinet remains live even when the robot is disconnected from the mains.
- Additional connections

---

#### 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

---

## 1.2.4.1. Fire extinguishing

### 1.2.4. Safety actions

#### 1.2.4.1. Fire extinguishing



**NOTE!**

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

## 1.3 Safety related instructions

### 1.3.1. Safety signals, general





#### General

This section specifies all dangers that may arise from performing the work detailed in the manual. Each danger is detailed in its own section consisting 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 **does not** eliminate the danger.
- An instruction of how to eliminate the danger to facilitate performing the activity at hand.




#### Danger levels

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

Symbol	Designation	Signification
 danger	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 etc.
 warning	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.
 Electrical shock	ELECTRICAL SHOCK	The electrocution or electrical shock symbol indicates electrical hazards which could result in severe personal injury or death.
 caution	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.

# 1 Safety

## 1.3.1. Safety signals, general

Symbol	Designation	Signification
 Electrostatic discharge (ESD)	ELECTROSTATIC DISCHARGE (ESD)	The electrostatic discharge (ESD) symbol indicates electrostatic hazards which could result in severe damage to the product.
 Note	NOTE	Note symbols alert you to important facts and conditions.
 Tip	TIP	Tip symbols direct you to specific instructions, where to find additional information or how to perform a certain operation in an easier way.

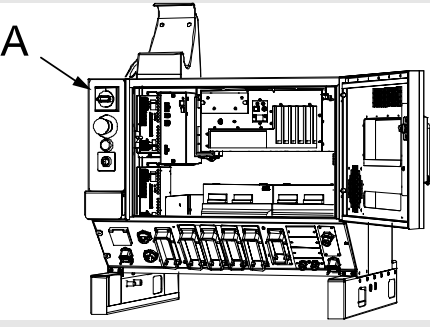
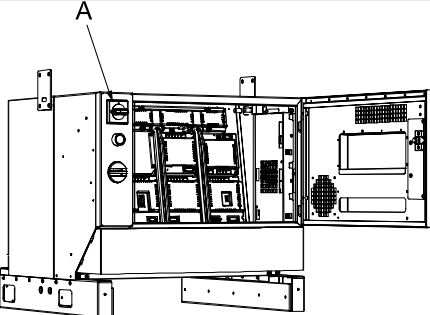
1.3.2. DANGER - Make sure that the main power has been switched off!

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

General

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.

Elimination

Step	Action	Info/Illustration
1.	Switch off the main switch on the Control Module.	 <p>xx0400000978</p> <ul style="list-style-type: none"> <li>• A: main switch, control module</li> </ul>
2.	Switch off the main switch on the Drive Module.	 <p>en0400001017</p> <ul style="list-style-type: none"> <li>• A: main switch, drive module</li> </ul>

# 1 Safety

## 1.3.3. WARNING - The unit is sensitive to ESD!

### 1.3.3. WARNING - The unit is sensitive to ESD!

#### Description

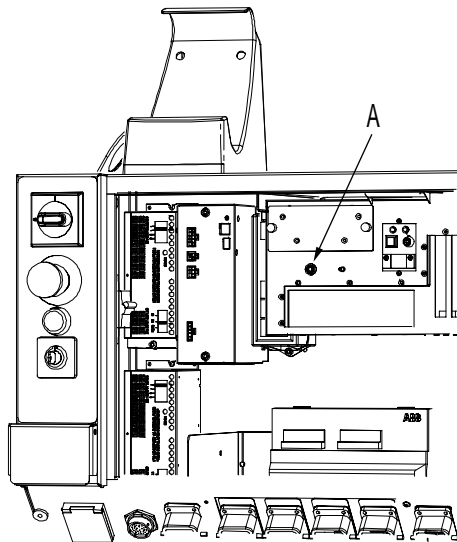
ESD (electro static discharge) is the transfer of electrical static charge between two bodies at different potentials, either through direct contact or through an induced electrical field. When handling parts or their containers, personnel not connected to ground potential may transfer high static charges. This discharge may destroy sensitive electronics.

#### Elimination

Step	Action	Note/Illustration
1.	Use a wrist strap	Wrist straps must be tested frequently to ensure that they are not damaged and are operating correctly.
2.	Use an ESD protective floor mat.	The mat must be grounded through a current-limiting resistor.
3.	Use a dissipative table mat.	The mat should provide a controlled discharge of static voltages and must be grounded.

#### Location of wrist strap button

The wrist strap button is located on the computer unit in the control module as show in the illustration below.



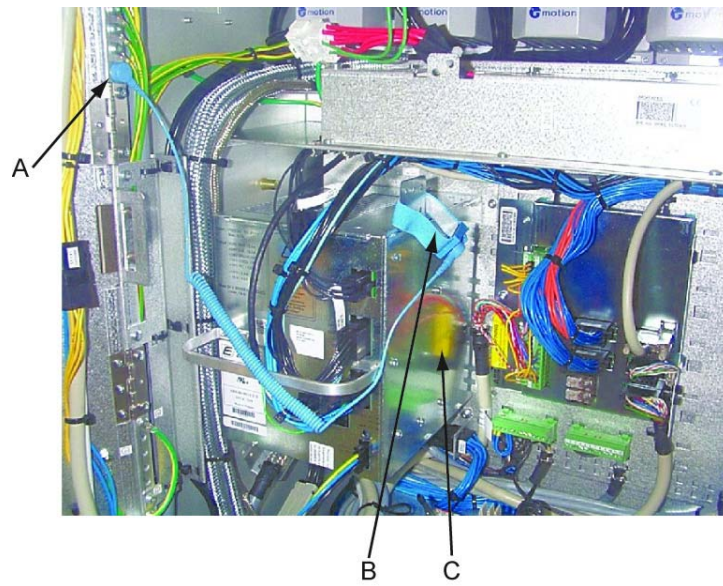
xx0400001061

A wrist strap button

#### Assemble the wrist strap

The picture illustrates how the ESD wrist strap is assembled in the controller cabinet.

## 1.3.3. WARNING - The unit is sensitive to ESD!



xx0400001055

A	The strap is fastened to a button on the side of the control cabinet.
B	When not used, the wrist strap is placed on the power supply unit.
C	Power supply unit

## 1 Safety

---

1.3.3. WARNING - The unit is sensitive to ESD!

## **2 Installation and Commissioning, IRC5**



## 2 Installation and Commissioning, IRC5

### 2.1. Installation Activities

### 2.1. Installation Activities

#### Preconditions

The following section details the main steps on how to unload, transport, install and connect the IRC5 controller modules.

#### Procedure

Step	Action	Info/Illustration
1.	Unpack the delivered IRC5 controller.	How to lift, unpack and transport the IRC5 controller is detailed in section <a href="#">Lifting the controller modules</a> on page 25 and <a href="#">Unpacking, IRC5</a> on page 26
2.	Install the IRC5 controller modules.	How to bolt down the IRC5 controller is detailed in section <a href="#">Bolting down the controller</a> on page 29.
3.	Connect the FlexPendant to the IRC5 control module.	How to connect the FlexPendant is detailed in section <a href="#">Connecting a FlexPendant</a> on page 32.
4.	Connect power supply to the IRC5 controller modules.	How to connect power supply is detailed in section <a href="#">Connecting power supply to IRC5 controller module</a> on page 36.
5.	Connect the manipulator to IRC5 controller.	How to connect the manipulator to IRC5 controller is detailed in section <a href="#">Connecting the manipulator to the control cabinet, IRC5</a> on page 40.
6.	Miscellaneous connections.	How to connect MOTORS ON/MOTORS OFF circuits is detailed in section <a href="#">The MOTORS ON/MOTORS OFF circuit</a> on page 46. How to connect to an external safety relay is detailed in <a href="#">Connection of external safety relay</a> on page 53. How to connect buses e.g. Device Net, is detailed in the <a href="#">Application manual</a> for the bus respectively. How to connect I/O units to the IRC5 controller is detailed in the <a href="#">Application manual</a> for the I/O unit respectively. How to connect to a network is detailed in section <a href="#">Connecting a PC to the service port</a> on page 33.
7.	If used, Install add-ons.	How to install add-ons is detailed in section <a href="#">Installation of add-ons</a> on page 74

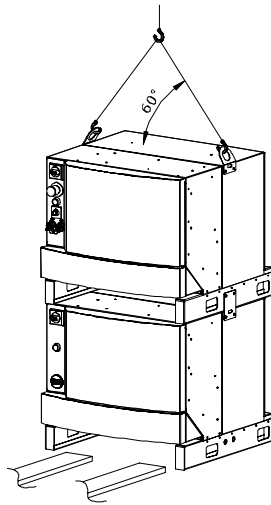
## 2.2 Transporting and handling

### 2.2.1. Lifting the controller modules

#### Lifting device

Use the two lifting devices or a fork lift when lifting the IRC5 controller, as shown below.

The figure below shows the maximum angle between the lifting straps when lifting the controller. The weight of the controller modules are detailed in section [Weight controller cabinet](#) on page 26 [Weight controller cabinet](#) on page 26



xx020000076

## 2 Installation and Commissioning, IRC5

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### 2.2.2. Unpacking, IRC5

### 2.2.2. Unpacking, IRC5

---

#### General

Before unpacking and installing the robot system, read the safety regulations and other instructions very carefully. These are found in Chapter *Safety*.

The installation must be done by qualified installation personnel and should conform to all national and local codes.

When unpacking the controller, check that it was not damaged during transport.



#### NOTE!

If the IRC5 controller is going to be stored before unpacking and installation, read the following information regarding storage conditions.

---

#### Storage conditions

The table below shows the recommended storage conditions for the IRC5 controller:

Parameter	Value
Min. ambient temperature	-25 C
Max. ambient temperature	+55 C
Max. ambient temperature	+70 C
Max. ambient temperature	Max. 95% at constant temperature

---

#### Weight controller cabinet

The table below shows the weight for the IRC5 controller:

Controller	Weight
Control module	105 kg
Drive module	145 kg

---

#### Operating conditions

The table below shows the allowed operating conditions for the IRC5 controller:

Parameter	Value
Min. ambient temperature	+5 C
Max. ambient temperature	+45 C
Max. ambient temperature (option)	+52 C
Max. ambient humidity	Max. 95%

---

#### Protection class

The table below shows the protection classes for the IRC5 controller and FlexPendant:

Equipment	Protection class
IRC5 controller	IP54
FlexPendant	IP54

## 2 Installation and Commissioning, IRC5

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### 2.3.1. Required installation space, IRC5 controller

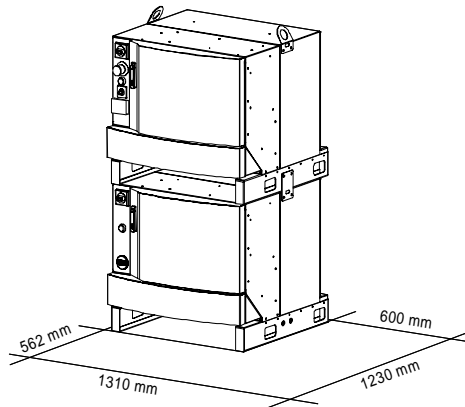
## 2.3 On-site Installation

### 2.3.1. Required installation space, IRC5 controller

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#### Dimensions

The figure below shows the required installation space for the IRC5 controller:



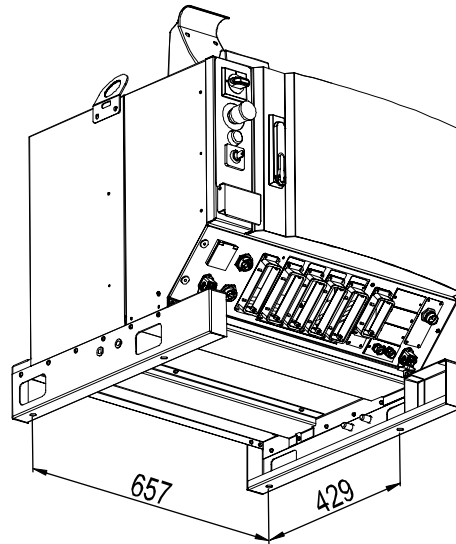
xx020000077

**NOTE!** that the free space on the right hand side of the controller is required to allow opening the door a full 90°.

### 2.3.2. Bolting down the controller

#### Bolt pattern

The figure below shows the bolt pattern for the IRC5 controller:



xx0200000075

## 2 Installation and Commissioning, IRC5

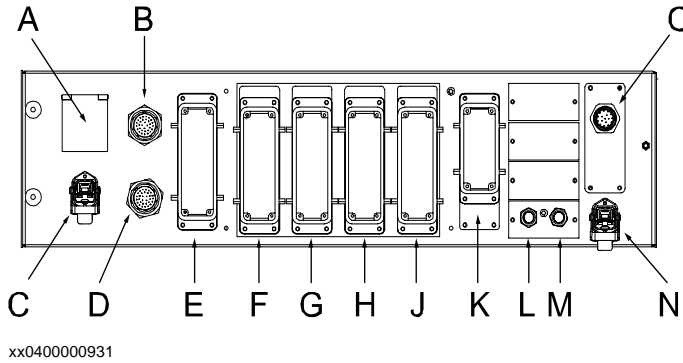
### 2.4.1. Connectors on controller, IRC5

## 2.4 Connections

### 2.4.1. Connectors on controller, IRC5

#### General

The IRC5 controller modules have a number of connectors on their respective front panels. These are described below:



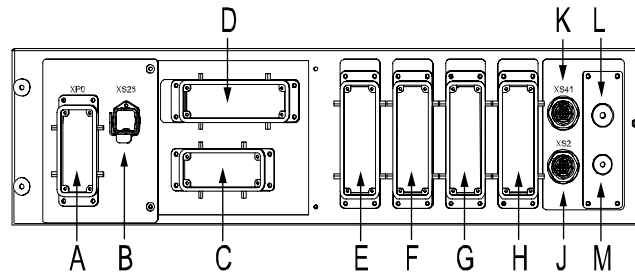
#### Control module

The following details the connectors on the frontpanel of the control module.

Pos	Description
A	A5.X22: Service outlet
B	A5.X8: Position switches
C	A5.X20: Power connection
D	A5.X58: Position switches
E	A5.X5: Customer power/signals external connection
F	A5.X11: Customer options
G	A5.X12: Customer options
H	A5.X13: Customer options
J	A5.X13: Customer options
K	A5.X3: Customer safety signals
L	Communication cabling between Control/Drive Module
M	Communication cabling between Control/Drive Module
N	A5.X28 Network connection
O	A22.X1: FlexPendant connection

#### Drive module

The following details the connectors on the frontpanel of the drive module.



xx0400001016

Pos	Description
A	A4.X0: Mains connection to transformer
B	A4.XS25: Power to control module
C	A4.X1: Robot power connection
D	A4.X7: External axes power connection
E	A4.XX: Customer options
F	A4.XX: Customer options
G	A4.XX: Customer options
H	A4.XX: Customer options
J	A4.XS2: Robot SMB connection
K	A4.XS41: External axes SMB connection
L	Communication cabling between Control/Drive Module
M	Communication cabling between Control/Drive Module



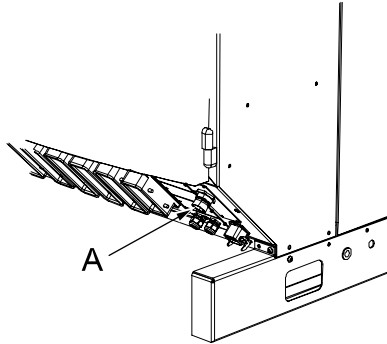
## 2 Installation and Commissioning, IRC5

### 2.4.2. Connecting a FlexPendant

#### 2.4.2. Connecting a FlexPendant

##### Location

The FlexPendant connector is located as shown below.



xx0400000729

A	FlexPendant socket connector
---	------------------------------

##### Procedure

Step	Action	Illustration
1.	Locate the FlexPendant socket connector on the control module.	<p>xx0400000931</p> <ul style="list-style-type: none"> <li>O: FlexPendant connector (A22.X1)</li> </ul>
2.	Plug in the FlexPendant cable connector.	
3.	Screw the connector lock ring firmly by turning it clockwise.	

### 2.4.3. Connecting a PC to the service port



#### NOTE!

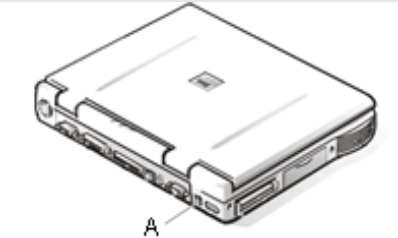
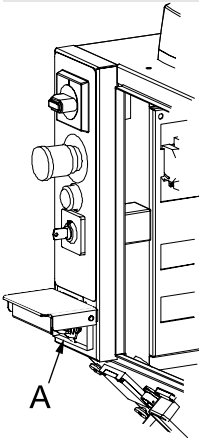
The service port shall only be used for direct connection to a PC as described in this procedure. It must not be connected to a LAN (local area network), since it has a DHCP server that automatically distributes IP addresses to all units connected to the LAN. Contact your network administrator if you need more information.



#### CAUTION!

When a boot cable is connected to the service port and the service hatch is opened, the controller will not comply with the requirements of protection class IP54.

#### Procedure

Step	Action	Illustration
1.	Make sure the PC's network settings are configured correctly.	Proceed as detailed in section <a href="#">Network settings for a PC connected to the service port</a> or the Getting Started Manual
2.	Use the delivered category 5 Ethernet crossover boot cable with RJ45 connectors.	The cable is delivered in the RobotWare product box.
3.	Connect the network cable to the network port of your PC	 <p>xx0400000844</p> <ul style="list-style-type: none"> <li>A: network port</li> </ul> <p>The placement of the network port may vary depending on the pc model.</p>
4.	Connect the boot cable to the service port, placed on the control module front.	 <p>Placeholder</p> <ul style="list-style-type: none"> <li>A: service port.</li> </ul>

## 2 Installation and Commissioning, IRC5

### 2.4.4. Connection to serial channel connector

#### 2.4.4. Connection to serial channel connector

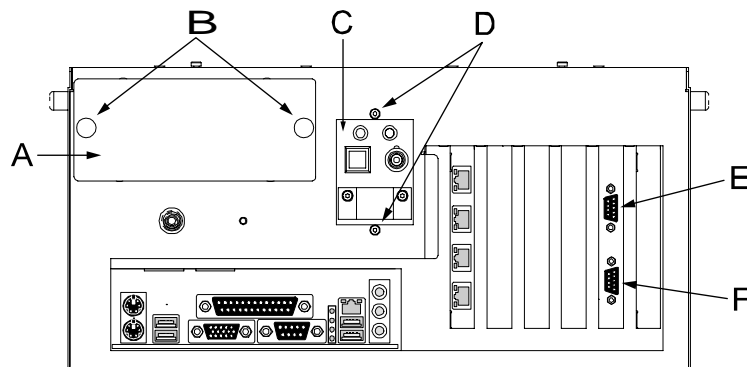
##### Overview

The controller has one serial channel RS232 for permanent use which can be used for communication point to point with printers, terminals, computers or other equipment.

The following sections details connection to the serial channel connector (COM 1) on the computer unit.

##### Location

The serial channel connector is placed on a PCI board mounted in the computer unit, as shown below.



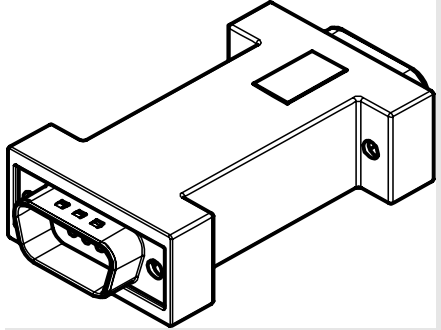
xx0400000883

A	Bay for hard disk and solid state drive
B	Cage attachment screws, hard disk and solid state drive cages
C	Switches and LEDs
D	Attachment screws, switch and LED assembly
E	Serial channel connector, Console
F	<b>Serial channel connector, COM 1</b>

##### Conversion of the RS 232 channel

The RS232 channel can be converted to RS422 full duplex with an optional adapter (Option 714-1).

The RS422 enables a more reliable point to point communication (differential) over longer distances, from RS232 = 15 m to RS422 = 120 m.

Step	Action	Info/Illustration
1.	Connect the adapter to the serial channel connector, see <a href="#">Location</a> on page 34	 <p>xx0300000376</p> <ul style="list-style-type: none"> <li>• A:</li> <li>• B:</li> </ul>

#### Required equipment

Equipment	Spare part no.	Art. no.	Note
RS-232/422 converter	3HAC14944-1		DSQC 615
Circuit Diagram		3HAC020538-002	

## 2 Installation and Commissioning, IRC5

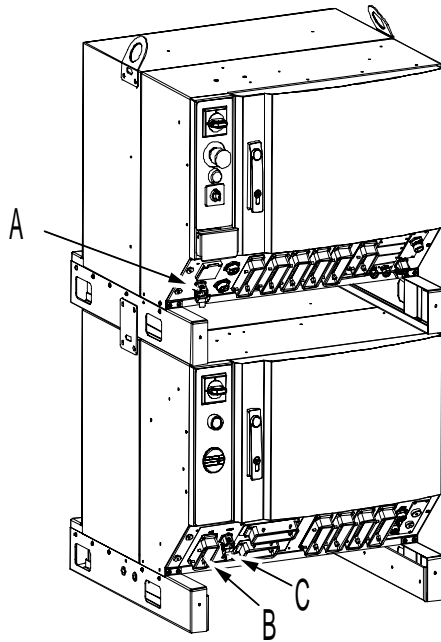
### 2.4.5. Connecting power supply to IRC5 controller module

### 2.4.5. Connecting power supply to IRC5 controller module

#### General

The following sections details how to connect both the control module and the drive module.

#### Location



xx040000758

A	Power connection A.5X20 (from drive module)
B	Power connection A.4X0 (mains connection from shop supply to drive module)
C	Power connection A.4X25 (to control module)

#### Prerequisites

Equipment	Spare part no.	Art. no.	Note
Harness-230V, Between control-Drive cabinet	3HAC021570-001		Length = 2m
Harness-230V, Between control-Drive cabinet	3HAC021570-005		Length = 4m
Harness-230V, Between control-Drive cabinet	3HAC021570-006		Length = 30m
External earth fault protection			min. 300mA
Standard toolkit			The contents are defined in section Standard toolkit!

Equipment	Spare part no.	Art. no.	Note
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC 123459-2	Complete control system

#### To Control module

The following procedures detail how to connect the mains power to the control module..

Step	Action	Note/Illustrator
1.	Connect the cable Harness 230V from the connector A.5X20 on the control module to connector A.4X25 on the drive module.	Connectors on the control module are described in section, <a href="#">Connectors on controller, IRC5</a> on page 30.

#### To Drive module

This section details how to connect the transformer if there is a pre-fabricated cable. If there is not, how to do this is detailed in section, [Fitting the connector](#) on page 38.

Step	Action	Note/Illustration
1.	Connect the power cable from the shop supply to connector A4.4X0 on the drive module.	The connectors on the drive module are described in section, <a href="#">Connectors on controller, IRC5</a> on page 30.

## 2 Installation and Commissioning, IRC5

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### 2.4.6. Fitting the connector

### 2.4.6. Fitting the connector

---

#### General

This section details how to fabricate a cable for connecting the mains power to the drive module.

#### Specifications

The following details the cable and fuse requirements for the mains power connection to the drive module.

Component	Description
Cable typ	Flexible oil resistant rubber
Cable area	4 x 6mm <sup>2</sup>
Fuse	Delay action fuse 25A

#### Included parts

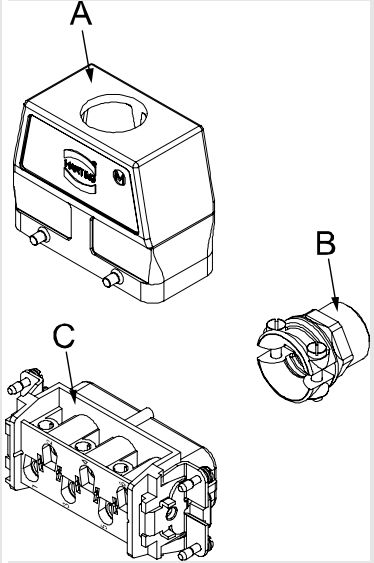
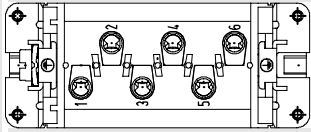
The following parts are included in the delivery.

Part	Qty	Art. no.
Female contact, Harting	1	
Contact housing, Harting	1	
Brass cable clamp with gasket	1	

#### Procedure

The following details how to fit the connectors

Step	Action	Note/Illustration
1.	Select a suitable three phase + earth cable and cut it to desired length.	See specifications above.
2.	Make sure all parts required are available.	Specified in Included parts above.

Step	Action	Note/Illustration
3.	Fit the cable through the hosing and the brass cable clamp, and connect the wires to the female connector.	 <p>xx0400001044</p> <ul style="list-style-type: none"> <li>• A: housing</li> <li>• B: Brass cable clamp</li> <li>• C: female connector</li> </ul>
4.	Connect the wires according to the illustration.	 <p>xx0400001045</p> <ul style="list-style-type: none"> <li>• X0.1 - phase 1</li> <li>• X0.2 - phase 2</li> <li>• X0.3 - phase 3</li> <li>• X0.PE - earth wire</li> </ul>
5.	Assemble the connector by fitting the housing and the brass cable clamp.	



## 2 Installation and Commissioning, IRC5

### 2.4.7. Connecting the manipulator to the control cabinet, IRC5

### 2.4.7. Connecting the manipulator to the control cabinet, IRC5

#### General

Connect the manipulator and control cabinet to each other after securing them to the foundation. The lists below specify which cables to be used in each application.

All connectors on the control cabinet are shown in section *Connectors on controller, IRC5* on page 30.

#### Main cable categories

All cables between manipulator and control cabinet are divided into the following categories:

Cable category	Description
Manipulator cables	Handles power supply to and control of the manipulator's motors as well as feedback from the serial measurement board.
Position switch cables (option)	Handles supply to and feedback from any position switches.
Customer cables (option)	Handles communication with equipment fitted on the manipulator by the customer.
External axes cables (option)	Handles power supply to and control of the external axes' motors as well as feedback from the servo system.

These categories are divided into sub-categories which are specified below:

#### Manipulator cables

These cables are included in the standard delivery. They are completely pre-manufactured and ready to plug in.

Cable sub-category	Description	Connector, cabinet	Connector, manipulator
Manipulator cable, power	Transfers drive power from the drive units in the control cabinet to the manipulator motors.	XP1	R1.MP
Manipulator cable, signals	Transfers resolver data from the serial measurement board and power supply to the SMB.	XP2	R1.SMB
Manipulator cable, control cable	A combination of the two sub-categories specified above. <i>Used on some robot models only!</i>	XP1 XP2 XP5	R1.MP1-3 R1.MP4-6 R1.H1 R1.CS R2.SMB Ground

#### Manipulator cable, power

Manipulator model	Cable	Art. no.
IRB 6600 IRB 7600	Manipulator cable, power, 7 m	3HAC 11818-1
IRB 6600 IRB 7600	Manipulator cable, power, 15 m	3HAC 11818-2
IRB 6600 IRB 7600	Manipulator cable, power, 30 m	3HAC 11818-4
IRB 1400	Manipulator cable, power, 7 m	3HAC 2492-1
IRB 1400	Manipulator cable, power, 15 m	3HAC 2529-2
IRB 1400	Manipulator cable, power, 22 m	3HAC 2539-1
IRB 1400	Manipulator cable, power, 30 m	3HAC 2564-1
IRB 2400	Manipulator cable, power, foundry version protection, 7 m	3HAC 9038-1
IRB 2400	Manipulator cable, power, foundry version protection, 15 m	3HAC 9038-2
IRB 2400	Manipulator cable, power, foundry version protection, 22 m	3HAC 9038-3
IRB 2400	Manipulator cable, power, foundry version protection, 30 m	3HAC 9038-4
IRB 4400	Manipulator cable, power, metal braid protection, 7 m	3HAC 3382-1
IRB 4400	Manipulator cable, power, metal braid protection, 15 m	3HAC 3383-1
IRB 340r	Manipulator cable, power, 7 m	3HAC 8158-1
IRB 340rsa	Manipulator cable, power, 15 m	3HAC 8159-1
IRB 340r IRB 340rsa	Manipulator cable, power, 22 m	3HAC 8160-1
IRB 340r IRB 340rsa	Manipulator cable, power, 30 m	3HAC 8162-1
IRB 340r	Manipulator cable, power, 7 m	3HAC 2492-1
IRB 340r	Manipulator cable, power, 15 m	3HAC 2529-1
IRB 340r	Manipulator cable, power, 22 m	3HAC 2539-1
IRB 340r	Manipulator cable, power, 30 m	3HAC 2564-1

#### Manipulator cable, signals

Manipulator model	Cable	Art. no.
IRB 2400 IRB 4400 IRB 6600 IRB 7600	Manipulator cable, signal, shielded, 7 m	3HAC 7998-1
IRB 2400 IRB 4400 IRB 6600 IRB 7600	Manipulator cable, signal, shielded, 15 m	3HAC 7998-2

## 2 Installation and Commissioning, IRC5

### 2.4.7. Connecting the manipulator to the control cabinet, IRC5

Manipulator model	Cable	Art. no.
IRB 6600 IRB 7600	Manipulator cable, signal, shielded, 30 m	3HAC 7998-4
IRB 1400 IRB 340	Manipulator cable, signal, shielded, 7 m	3HAC 2493-1
IRB 1400 IRB 340	Manipulator cable, signal, shielded, 15 m	3HAC 2530-1
IRB 1400 IRB 340	Manipulator cable, signal, shielded, 22 m	3HAC 2540-1
IRB 1400 IRB 340	Manipulator cable, signal, shielded, 30 m	3HAC 2566-1

Manipulator cable, control cables

Manipulator model	Cable	Art. no.
IRB 140	Manipulator cable, control cable, shielded, 3 m	3HAC 7996-1
IRB 140	Manipulator cable, control cable, shielded, 7 m	3HAC 7996-5
IRB 140	Manipulator cable, control cable, shielded, 15 m	3HAC 7996-6
IRB 140	Manipulator cable, control cable, shielded, 22 m	3HAC 7996-7
IRB 140	Manipulator cable, control cable, shielded, 30 m	3HAC 7996-8

#### Position switch cables

These cables are *not* included in the standard delivery, but included in the delivery if the Position switch option is ordered. The cables are completely pre-manufactured and ready to plug in.

Note that position switches may be used on robots fitted with all required equipment only.

Manipulator model	Cable	Art. no.	Connector, cabinet	Connector, manipulator
IRB 7600 IRB 6600	Position switch cable, axis 1, 7 m	3HAC 13175-1	XP8	R1.SW
IRB 7600 IRB 6600	Position switch cable, axis 1, 15 m	3HAC 13175-2	XP8	R1.SW
IRB 7600 IRB 6600	Position switch cable, axis 1, 30 m	3HAC 13175-4	XP8	R1.SW
IRB 7600 IRB 6600	Position switch cable, axes 2 and 3, 7 m	3HAC 13176-1	XP58	R1.SW2/3

Manipulator model	Cable	Art. no.	Connector, cabinet	Connector, manipulator
IRB 7600 IRB 6600	Position switch cable, axes 2 and 3, 15 m	3HAC 13176-2	XP58	R1.SW2/3
IRB 7600 IRB 6600	Position switch cable, axes 2 and 3, 30 m	3HAC 13176-4	XP58	R1.SW2/3
IRB 1400	Position switch cable, 7 m	3HAC 3363-1	XP8	R1.SW
IRB 1400	Position switch cable, 15 m	3HAC 3364-1	XP8	R1.SW
IRB 1400	Position switch cable, 22 m	3HAC 3365-1	XP8	R1.SW
IRB 1400	Position switch cable, 30 m	3HAC 3366-1	XP8	R1.SW
IRB 2400 IRB 4400	Position switch cable, 7 m	3HAC 7997-1	XP8	R1.SW
IRB 2400 IRB 4400	Position switch cable, 15 m	3HAC 7997-2	XP8	R1.SW
IRB 2400 IRB 4400	Position switch cable, 22 m	3HAC 7997-3	XP8	R1.SW
IRB 2400 IRB 4400	Position switch cable, 30 m	3HAC 7997-4	XP8	R1.SW

#### Customer cables

These cables are *not* included in the standard delivery, but included in the delivery of each specific option.

Manipulator model	Cable	Art. no.	Connector, cabinet	Connector, manipulator
IRB 6600 IRB 7600	Fieldbus cable, CANBUS, 7 m	3HAC 13173-1	XT/XP5.1 XT/XP6 XS6	R1.CP/CS
IRB 6600 IRB 7600	Fieldbus cable, CANBUS, 15 m	3HAC 13173-2	XT/XP5.1 XT/XP6 XS6	R1.CP/CS
IRB 6600 IRB 7600	Fieldbus cable, CANBUS, 30 m	3HAC 13173-4	XT/XP5.1 XT/XP6 XS6	R1.CP/CS
IRB 6600 IRB 7600	Fieldbus cable, Profibus, 7 m	3HAC 13174-1	XT/XP5.1 XT/XP6 DP/M	R1.CP/CS
IRB 6600 IRB 7600	Fieldbus cable, Profibus, 15 m	3HAC 13174-2	XT/XP5.1 XT/XP6 DP/M	R1.CP/CS

## 2 Installation and Commissioning, IRC5

### 2.4.7. Connecting the manipulator to the control cabinet, IRC5

Manipulator model	Cable	Art. no.	Connector, cabinet	Connector, manipulator
IRB 6600 IRB 7600	Fieldbus cable, Profibus, 30 m	3HAC 13174-4	XT/XP5.1 XT/XP6 DP/M	R1.CP/CS
IRB 2400 IRB 4400	Customer cable, power/signal, 7 m	3HAC 3353-1	XP5	R1.CP/CS
IRB 2400 IRB 4400	Customer cable, power/signal, 15 m	3HAC 3354-1	XP5	R1.CP/CS
IRB 2400 IRB 4400	Customer cable, power/signal, 22 m	3HAC 3355-1	XP5	R1.CP/CS
IRB 2400 IRB 4400	Customer cable, power/signal, 30 m	3HAC 3356-1	XP5	R1.CP/CS
IRB 1400	Customer cable, signal, 7 m	3HAC 3346-1	XP5	R1.CS
IRB 1400	Customer cable, signal, 15 m	3HAC 3347-1	XP5	R1.CS
IRB 1400	Customer cable, signal, 22 m	3HAC 3348-1	XP5	R1.CS
IRB 1400	Customer cable, signal, 30 m	3HAC 3349-1	XP5	R1.CS
IRB 2400 (foundry version only) IRB 4400 (foundry version only)	Customer cable, power/signal, 7 m	3HAC 8183-1	XP5	R1.CP/CS
IRB 2400 (foundry version only) IRB 4400 (foundry version only)	Customer cable, power/signal, 15 m	3HAC 8183-2	XP5	R1.CP/CS
IRB 2400 (foundry version only) IRB 4400 (foundry version only)	Customer cable, power/signal, 22 m	3HAC 8183-3	XP5	R1.CP/CS
IRB 2400 (foundry version only) IRB 4400 (foundry version only)	Customer cable, power/signal, 30 m	3HAC 8183-4	XP5	R1.CP/CS
Standard	CP/CS Profibus cable, 7 m	3HAC 7068-1	(XP5.1, XT5.1, XP6 or XT6) DP-M	R1.CP/CS

Manipulator model	Cable	Art. no.	Connector, cabinet	Connector, manipulator
Standard	CP/CS Profibus cable , 15 m	3HAC 7068-2	(XP5.1, XT5.1, XP6 or XT6) DP-M	R1.CP/CS
Standard	CP/CS Profibus cable , 22 m	3HAC 7068-3	(XP5.1, XT5.1, XP6 or XT6) DP-M	R1.CP/CS
Standard	CP/CS Profibus cable , 30 m	3HAC 7068-4	(XP5.1, XT5.1, XP6 or XT6) DP-M	R1.CP/CS
Foundry version	CP/CS Profibus cable , 7 m	3HAC 9613-1	(XP5.1, XT5.1, XP6 or XT6) DP-M	R1.CP/CS
Foundry version	CP/CS Profibus cable , 15 m	3HAC 9613-2	(XP5.1, XT5.1, XP6 or XT6) DP-M	R1.CP/CS
Foundry version	CP/CS Profibus cable , 22 m	3HAC 9613-3	(XP5.1, XT5.1, XP6 or XT6) DP-M	R1.CP/CS
Foundry version	CP/CS Profibus cable , 30 m	3HAC 9613-4	(XP5.1, XT5.1, XP6 or XT6) DP-M	R1.CP/CS

#### External axes cables

These cables are *not* included in the standard delivery, but may be fabricated by the user.

Listed below are the details required to manufacture a complete connector assembly. Wires are to be connected the the connector assembly as specified in the robot Circuit Diagram.

Item	Qty	Article no.
CCMA 4.0 Connector pin	18	310361-33
CMO 24x Top	1	310447-33
CDMA 1.0 Connector pin	5	310569-33
CDMA 1.5 Connector pin	10	310570-33
CX06 TM Frame	1	315013-00
CX06 CM Insats, male 6 pole xx	3	315037-33
CX12 DM Insats, male 12 pole xx	2	315043-33
CX FM Insats, blind xx	1	315056-33

## 2 Installation and Commissioning, IRC5

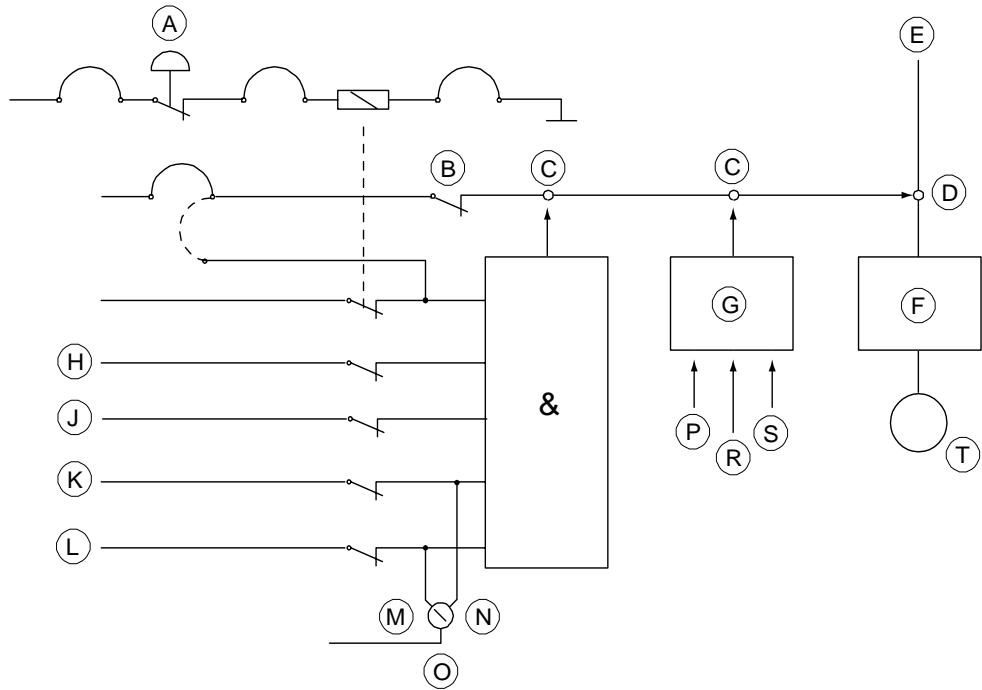
### 2.4.8. The MOTORS ON/MOTORS OFF circuit

#### 2.4.8. The MOTORS ON/MOTORS OFF circuit

##### Outline diagram

The MOTORS ON/MOTORS OFF circuit is made up of two identical chains of switches.

The diagram shows the available customer connections, AS, GS, SS and ES.



xx010000174

A	ES (emergency stop)
B	LS (Limit switch)
C	Solid state switches
D	Contactor
E	Mains
F	Drive unit
G	Second chain interlock
H	GS (general mode safeguarded space stop)
J	SS (superior stop)
K	AS (Automatic mode safeguarded space stop)
L	ED (TPU enabling device)
M	Manual mode
N	Automatic mode
O	Operating mode selector
P	RUN
R	EN1
S	EN2
T	Motor

#### Function of the MOTORS ON/MOTORS OFF circuit

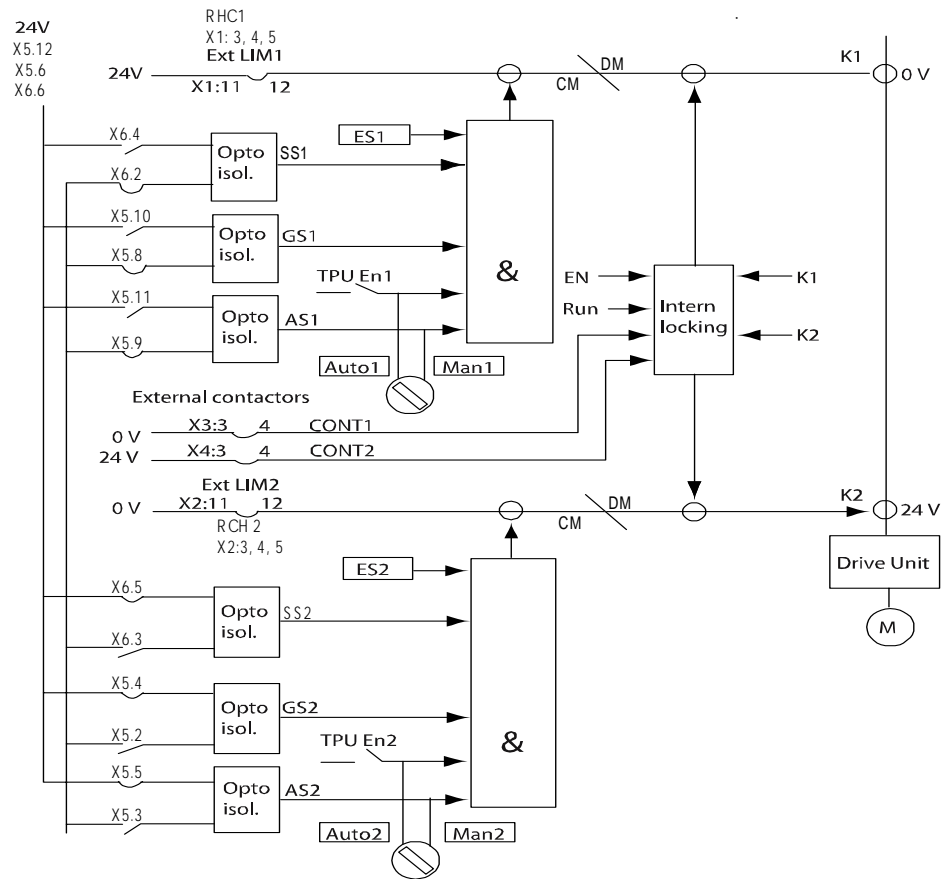
The circuit monitors all safety related equipment and switches. If any of the switches are opened, the MOTORS ON/MOTORS OFF circuit switches the power to the motors off.

As long as the two chains are not identical, the robot will remain in MOTORS OFF mode.

#### Connection of safety chains

The diagram below shows the two-channel safety chain.

The supply from internal 24V (X3/X4:12) and 0 V (X3/X4:7) is displayed. For an external supply of GS and AS, X3/X4:10,11 is connected to 24V and X3/X4:8,9 is connected to external 0V. Connection tables for X1-X4 are given in "External customer connections on panel X1 - X4".



xx0100000166

Technical data per chain	
Limit switch	Load: 300 mV Max. voltage drop: 1 V
External connectors	Load: 10 mA Max. voltage drop: 4 V
GS/AS load at 24 V	25 mA
GS/AS closed "1"	>18 V



## 2 Installation and Commissioning, IRC5

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### 2.4.8. The MOTORS ON/MOTORS OFF circuit

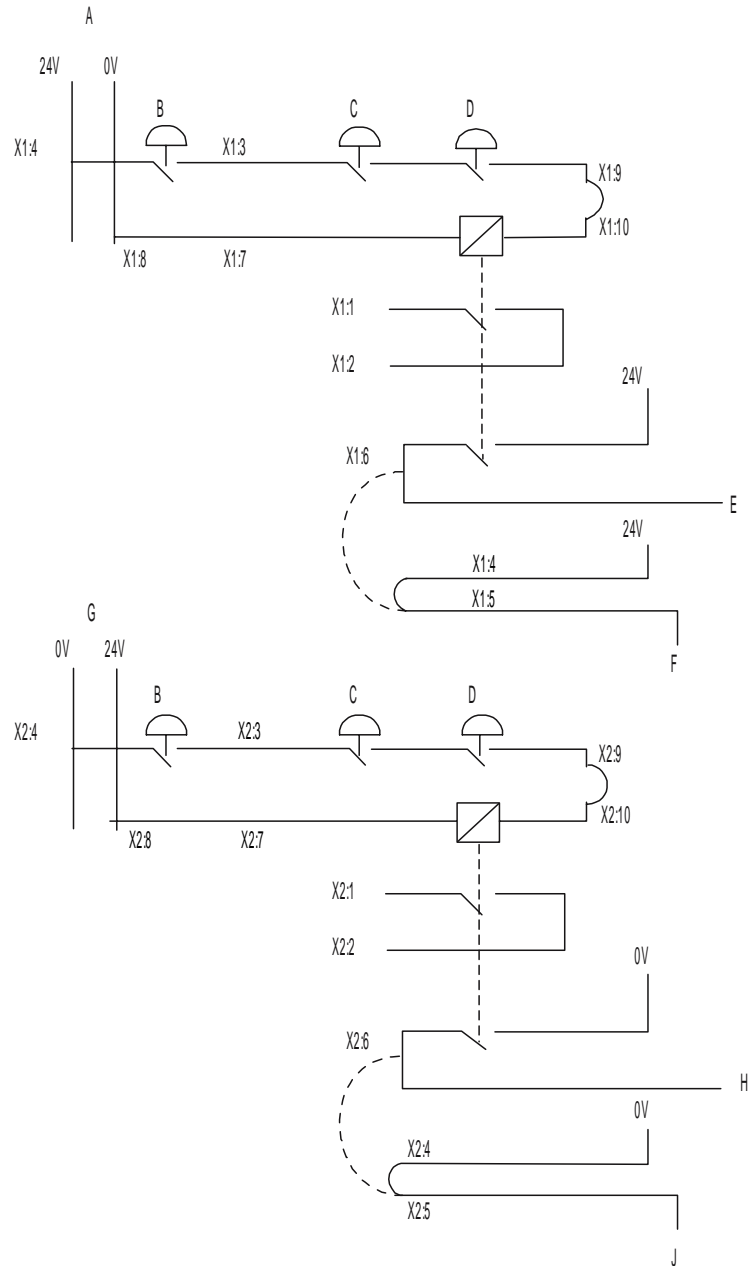
Technical data per chain	
GS/AS open "0"	< 5 V
External supply of GS/AS	Max. + 35 VDC Min. - 35 VDC
Max. potential in relation to the cabinet earthing and other signal groups.	300 V
Signal class	Control signals

---

#### Connection of ES1/ES2 on panel unit

The diagram below shows the terminals for the emergency circuits.

The supply from internal 24V (X1/X2:10) and 0V (X1/X2:10) is displayed. For an ext. supply, X1:3 / X2:9 is connected to ext. 24V, and X1:9 / X2:3 is connected to ext. 0V (dotted lines).



xx0100000191

A	Internal
B	Ext stop
C	TPU
D	Cabinet
E	ES1 internal
F	Run chain 1 top
G	Internal
H	ES2 internal
J	Run chain 2 top

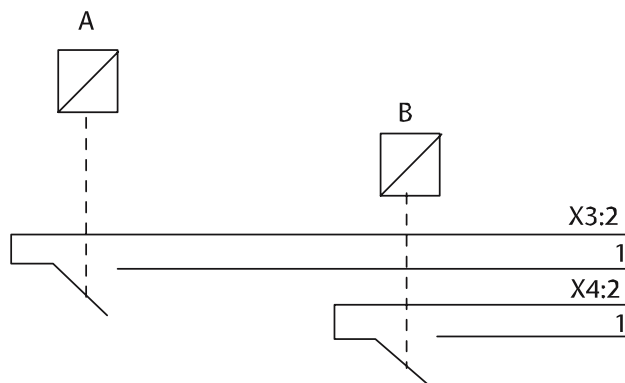
## 2 Installation and Commissioning, IRC5

### 2.4.8. The MOTORS ON/MOTORS OFF circuit

Technical data	
ES1 and ES2 max output voltage	120 VAC or 48 VDC
ES1 and ES2 max output current	120 VAC: 4 A 48 VDC L/R: 50 mA 24 VDC L/R: 2 A 24 VDC R load: 8 A
External supply of ES relay	24 VDC $\pm$ 10% between terminals X1:9, 8 and X2:9, 8 respectively. <b>Note!</b> In case of interference, the external supply must be properly filtered.
Rated current per chain	40 mA
Max. potential in relation to the cabinet earthing and other signal groups.	300 V
Signal class	Control signals

#### Connection to MOTORS ON/MOTORS OFF contactor

The diagram below shows the connection of terminals for customer use.



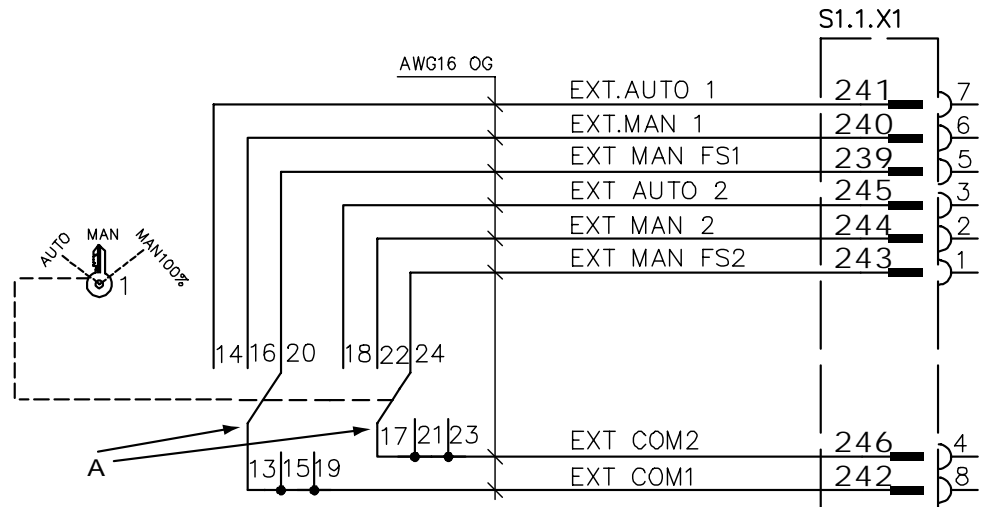
xx010000193

A	K1 (Motor on/off 1)
B	K1 (Motor on/off 2)

Technical data	
Max. voltage	48 VDC
Max. current	4 A
Max. potential in relation to the cabinet earthing and other signal groups.	300 V
Signal class	Control signals

#### Connection to operating mode selector (Option)

The illustration below shows the connection of terminals for customer use.



xx0100000197

A	Mode selector
---	---------------

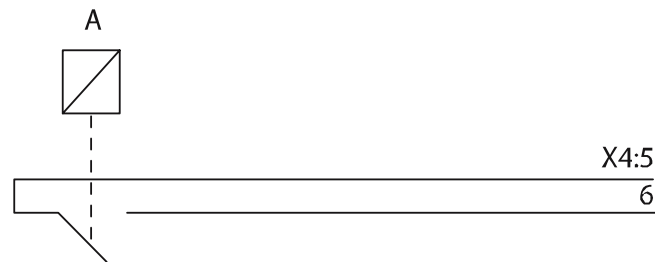
External manual FS (Full Speed) 100% is an option.

For information on where the connector S1.1.X1 is placed in the control cabinet. The connector is found in the cable duct.

Technical data	
Max. voltage	48 VDC
Max. current	4 A
Max. potential in relation to the cabinet earthing and other signal groups.	300 V
Signal class	Control signals

#### Connection to brake contactor

The diagram below shows the connection of terminals for customer use.



xx0100000199

A	K3 (Brake)
---	------------

## 2 Installation and Commissioning, IRC5

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### 2.4.8. The MOTORS ON/MOTORS OFF circuit

<b>Technical data</b>	
Max. voltage	48 VDC
Max. current	4 A
Max. potential in relation to the cabinet earthing and other signal groups.	300 V
Signal class	Control signals

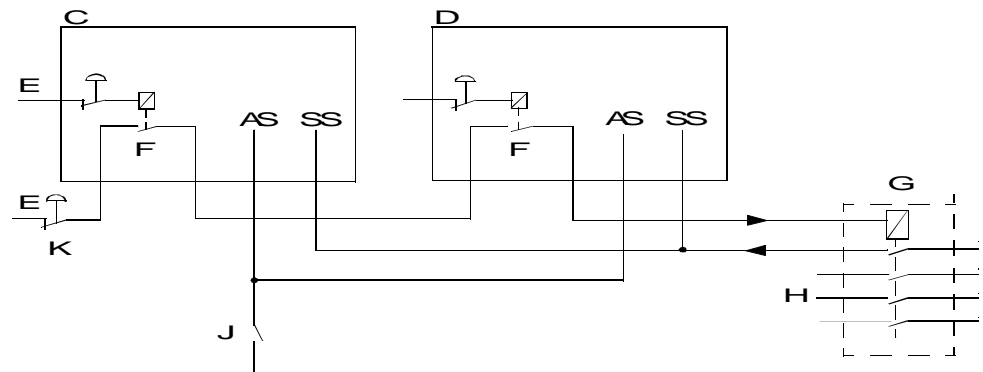
### 2.4.9. Connection of external safety relay

#### Description

The motor contactors K1K42 and K2K43 in the controllerdrive module can operate with external equipment if external relays are used.

The figure below shows two examples of how to connect the external safety relays:

#### Connection examples



xx0100000246

A	Panel unit
B	Relays with positive action
C	Robot 1
D	Robot 2
E	External supply
F	ES (emergency stop) out
G	Safety relay
H	To other equipment
J	Safety gate
K	Cell ES (emergency stop)

## 2 Installation and Commissioning, IRC5

### 2.4.10. Connection to MOTORS ON/MOTORS OFF contactor

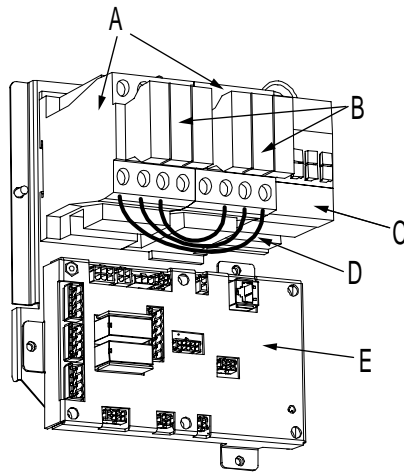
#### 2.4.10. Connection to MOTORS ON/MOTORS OFF contactor

##### General

This section details connection to the MOTORS ON/MOTORS OFF contactor. To be used when the customer wants external equipment to follow the robot control.

##### Location

The MOTORS ON/MOTORS OFF contactor is located on the left hand side in the drive module as shown below.



xx0400001058

A	MOTOR ON contactor K42 / K43
B	<b>contactor auxiliary block 33-34</b>
C	brake contactor
D	jumper (3 pcs)
E	contactor interface board

##### Required equipment

The table below details the required equipment.

Equipment	Spare part no.	Art. no.	Note
Standard toolkit			
Circuit Diagram		3HAC020538-002	Complete control system

##### Technical data


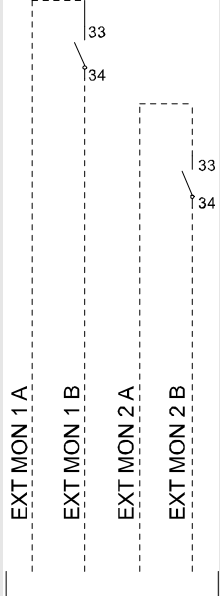
The table below shows technical data.

Technical data	
Max. voltage	48 VDC
Max. current	4 A

<b>Technical data</b>	
Max. potential in relation to the cabinet earthing and other signal groups.	300 V
Signal class	Control signals

### Procedure

Following procedure details connection to the MOTORS ON/MOTORS OFF contactor.

Step	Action	Info/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	<p>Connect the wires to the contactor auxiliary blocks 33-34, according to the diagram to the right.</p>	 <p style="text-align: center; font-size: small;">xx0400001231</p>



## 2 Installation and Commissioning, IRC5

### 2.4.11. Connection of servo disconnect

#### 2.4.11. Connection of servo disconnect

##### General

The IRC5 Drive Module is pre-wired to accept a servo disconnect.

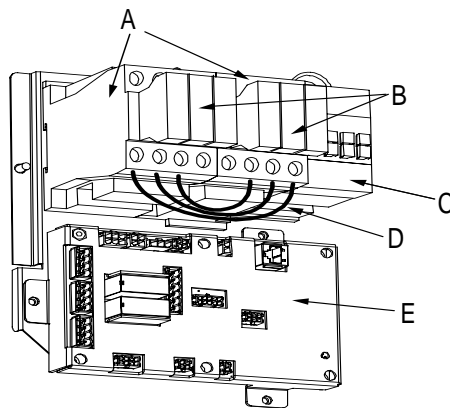


##### NOTE!

Due to risk of voltage drop, the switch to the servo disconnect circuit should not be mounted more than 50 meters from the drive module.

##### Location

The contactor is found on the left hand side inside the drive module as shown below.



xx0400001058

A	MOTOR ON contactor K42 / K43
B	Contactor block3
C	brake contactor
D	jumper (3 pcs)
E	contactor interface board


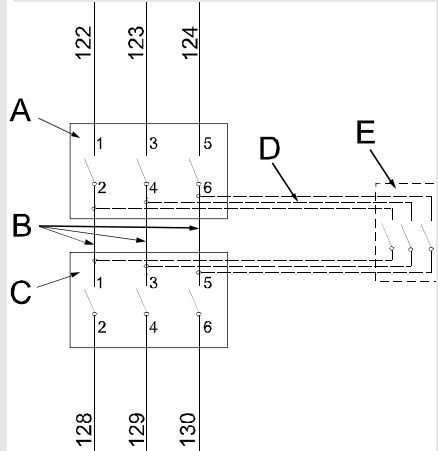
##### Required equipment

The table below details the required equipment.

Equipment	Spare part no.	Art. no.	Note
Wire			AWG 10
Switch			40 A
Standard toolkit			
Circuit Diagram		3HAC020538-002	Complete control system

##### Procedure

Following procedure details how to connect a servo disconnect.

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	Remove the three jumpers between contactors R2 and R3	The jumpers are shown in <i>Location</i> .
3.	Connect the wires according to the diagram on the right.	 <p>xx0400001057</p> <ul style="list-style-type: none"> <li>• A: MOTOR ON contactor K43</li> <li>• B: jumper (3 pcs)</li> <li>• C: MOTOR ON contactor K42</li> <li>• D: wires to external main switch</li> <li>• E: external switch</li> </ul>

## 2 Installation and Commissioning, IRC5

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### 2.5.1. Drive functions, general

## 2.5 Drive system

### 2.5.1. Drive functions, general

---

#### General

The manipulator is powered by power electronics found in the Drive Module. This also include power electronics for driving external axes.

---

#### Standard configurations

The drive system (drive units, rectifier and capacitor unit) is available in two sizes depending on which robot to drive and other power requirements.

How to configure the drive system is detailed in, *Configuration of the drive system, IRC5* on page 59 *Configuration of the drive system, IRC5* on page 59

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#### Install drive system parts

How to install the drive system parts is detailed in section, *Installation of Drive system parts in Drive Module, IRC5* on page 79

### 2.5.2. Configuration of the drive system, IRC5

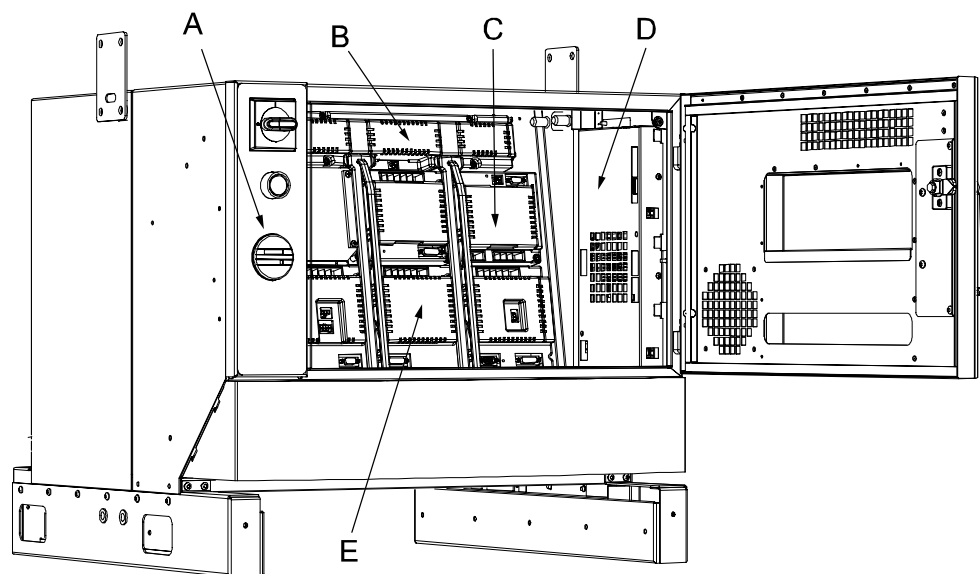
#### General

The IRC5 drive module contains a number of drive units, rectifiers and filters. Any allowed combination of these, depending on the robot type, is specified below.

The robot system may also be equipped with up to three additional drive modules, which are described in section *Installation of additional drive module, IRC5* on page 74.

#### Location

The servo drive units, rectifiers and capacitor units are located in the drive module as shown below.



xx040000997

A	Control panel
B	Capacitor
C	Rectifier
D	Axis computer
E	Drive units

#### DC busbars

Between the units are fitted DC-busbars, which are specified below:

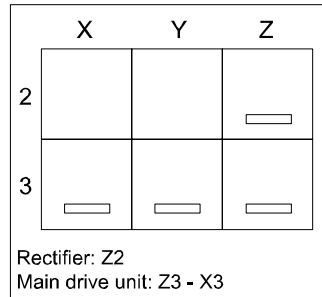
Description	Art. no.	Note
DC-bus bar	3HAC17281-1	DC_L6: long busbar with six connector groups
DC-bus bar	3HAC17281-3	DC_S2: short busbar with two connector groups
Servo drive dummy	3HAC 17282-1	-

## 2 Installation and Commissioning, IRC5

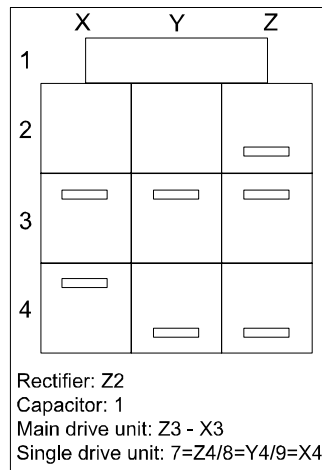
### 2.5.2. Configuration of the drive system, IRC5

#### IRB 140

The figures show the drive unit *with and without additional axes* respectively. The table specifies which units may be fitted in which positions.



xx0200000121

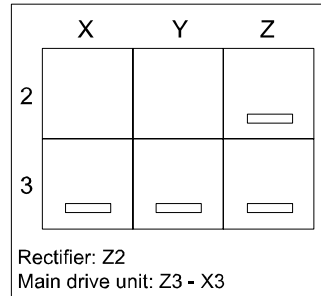


xx0200000120

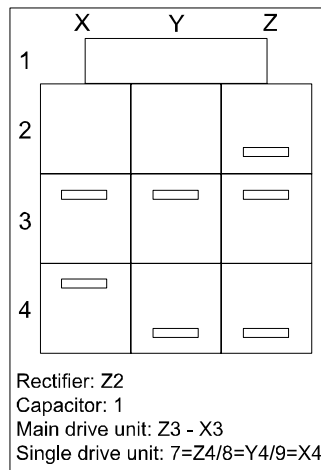
Pos in figure	Identification	Description	Art. no.	Note
1	DSQC 620_C2	Capacitor unit	3HAC 14551-1	Only in system with two external axes, size U
1	DSQC 620_C2	Capacitor unit	3HAC 14551-1	Only in system with two external axes, size U
Z2	DSQC 618_RC1	Rectifier	3HAC 14549-1	In systems <i>without</i> external axes only!
Z2	DSQC 618_R2	Rectifier	3HAC 14549-2	In systems <i>with</i> external axes only!
Z3, Y3, X3	DSQC 617_3B3A	Main Drive unit	3HAC 14546-1	Z3 - X3 is ONE unit!
Z4, Y4, X4	DSQC 619	Optional drive units for additional axes	3HAC 14550-1 3HAC 14550-2 3HAC 14550-3	Size: 1C Size: 1T Size: 1U

#### IRB 340

The figures show the drive unit *with and without additional axes* respectively. The table specifies which units may be fitted in which positions.



xx0200000121



xx0200000120

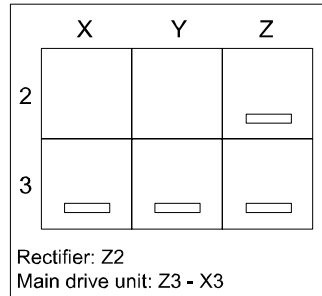
Pos in figure	Identification	Description	Art. no.	Note
1	DSQC 620_C2	Capacitor unit	3HAC 14551-1	In systems <i>with</i> external axes only!
1	DSQC 620_C4	Capacitor unit	3HAC 14551-3	Only in system with two external axes, size U
Z2	DSQC 618_RC1	Rectifier	3HAC 14549-1	In systems <i>without</i> external axes only!
Z2	DSQC 618_R2	Rectifier	3HAC 14549-2	In systems <i>with</i> external axes only!
Z3, Y3, X3	DSQC 617_3B3A	Main Drive unit	3HAC 14546-1	Z3 - X3 is ONE unit!
Z4, Y4, X4	DSQC 619	Optional drive units for additional axes	3HAC 14550-1 3HAC 14550-2 3HAC 14550-3	Size: 1C Size: 1T Size: 1U

## 2 Installation and Commissioning, IRC5

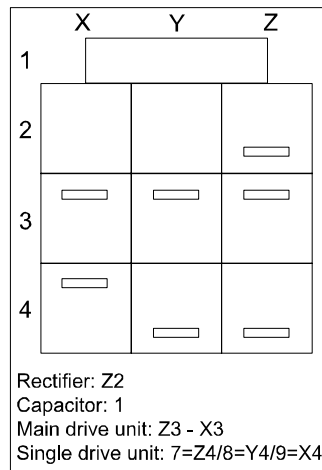
### 2.5.2. Configuration of the drive system, IRC5

#### IRB 1400

The figures show the drive unit *with and without additional axes* respectively. The table specifies which units may be fitted in which positions.



xx0200000121

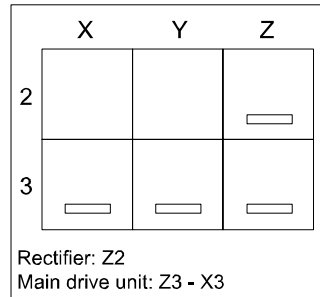


xx0200000120

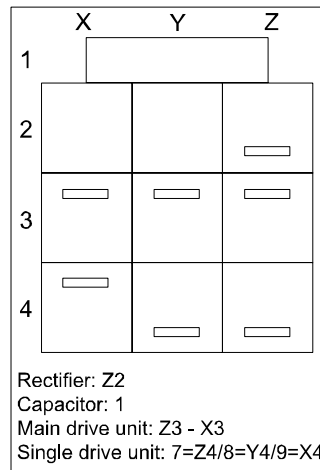
Pos in figure	Identification	Description	Art. no.	Note
1	DSQC 620_C4	Capacitor unit	3HAC 14551-3	Only in system with two external axes, size U
1	DSQC 620_C4	Capacitor unit	3HAC 14551-3	Only in system with two external axes, size U
Z2	DSQC 618_RC1	Rectifier	3HAC 14549-1	In systems <i>without</i> external axes only!
Z2	DSQC 618_R2	Rectifier	3HAC 14549-2	In systems <i>with</i> external axes only!
Z3, Y3, X3	DSQC 617_3B3A	Main Drive unit	3HAC 14546-1	Z3 - X3 is ONE unit!
Z4, Y4, X4	DSQC 619	Optional drive units for additional axes	3HAC 14550-1 3HAC 14550-2 3HAC 14550-3	Size: 1C Size: 1T Size: 1U

#### IRB 2400

The figures show the drive unit *with and without additional axes* respectively. The table specifies which units may be fitted in which positions.



xx0200000121



xx0200000120

Pos in figure	Identification	Description	Art. no.	Note
1	DSQC 620_C4	Capacitor unit	3HAC 14551-3	Only in system with two external axes, size U
1	DSQC 620_C4	Capacitor unit	3HAC 14551-3	Only in system with two external axes, size U
Z2	DSQC 618_RC1	Rectifier	3HAC 14549-1	In systems <i>without</i> external axes only!
Z2	DSQC 618_R2	Rectifier	3HAC 14549-2	In systems <i>with</i> external axes only!
Z3, Y3, X3	DSQC 617_2E2C2B	Main Drive unit	3HAC 14546-2	Z3 - X3 is ONE unit!
Z4, Y4, X4	DSQC 619	Optional drive units for additional axes	3HAC 14550-1 3HAC 14550-2 3HAC 14550-3	Size: 1C Size: 1T Size: 1U

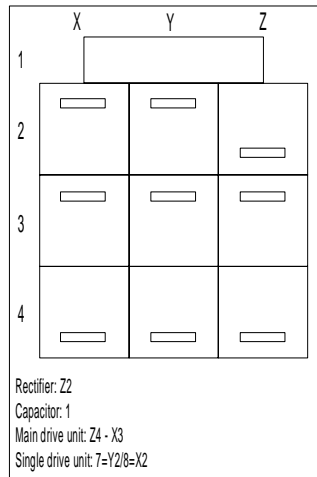


## 2 Installation and Commissioning, IRC5

### 2.5.2. Configuration of the drive system, IRC5

#### IRB 4400

The figures show the drive unit *with and without additional axes* respectively. The table specifies which units may be fitted in which positions.

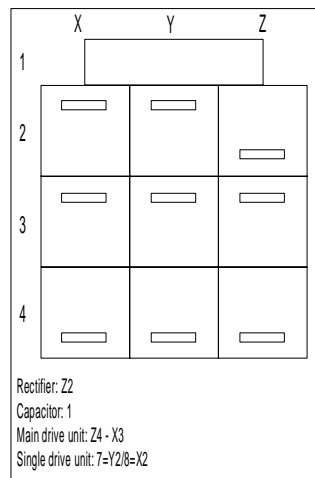


xx0300000184

Pos in figure	Identification	Description	Art. no.	Note
1	DSQC 620_ C4	Capacitor unit	3HAC 14551-3	
1	DSQC 620_ C4	Capacitor unit	3HAC 14551-3	
Z2	DSQC 618_R2	Rectifier	3HAC 14549-2	
Y2, X2	DSQC 619	Optional drive units for additional axes	3HAC 14550-1 3HAC 14550-2 3HAC 14550-3	Size: 1C Size: 1T Size: 1U
Z4, Y4, X4, Z3, Y3, X3	DSQC 617_3G3T	Main Drive unit	3HAC 14546-4	Z4 - X3 is ONE unit!

#### IRB 6600, 7600

The figures show the drive unit *with and without additional axes* respectively. The table specifies which units may be fitted in which positions.



xx0300000184

Pos in figure	Identification	Description	Art. no.	Note
1	DSQC 620_C3	Capacitor unit	3HAC 14551-2	
Z2	DSQC 618_R3	Rectifier	3HAC 14549-3	
Y2, X2	DSQC 619	Optional drive units for external axes	3HAC 14550-4	Size: 1W
Z4, Y4, X4, Z3, Y3, X3	DSQC 617_3V3W	Main Drive unit	3HAC 14546-6	Z4 - X3 is ONE unit!

#### Drive unit Node

The placement of main drive units in a drive system is specified in column Drive Unit Node

Main drive unit	Drive Unit Node
DSQC 617_3B3A	<ul style="list-style-type: none"> <li>Node 1 - Unit Type B</li> <li>Node 2 - Unit Type B</li> <li>Node 3 - Unit Type A</li> <li>Node 4 - Unit Type A</li> <li>Node 5 - Unit Type B</li> <li>Node 6 - Unit Type A</li> </ul>
DSQC 617_2E2C2B	<ul style="list-style-type: none"> <li>Node 1 - Unit Type E</li> <li>Node 2 - Unit Type E</li> <li>Node 3 - Unit Type B</li> <li>Node 4 - Unit Type B</li> <li>Node 5 - Unit Type C</li> <li>Node 6 - Unit Type C</li> </ul>
DSQC 617_3E1C	<ul style="list-style-type: none"> <li>Node 1 - Unit Type E</li> <li>Node 2 - Unit Type E</li> <li>Node 3 - Unit Type -</li> <li>Node 4 - Unit Type -</li> <li>Node 5 - Unit Type E</li> <li>Node 6 - Unit Type C</li> </ul>

## 2 Installation and Commissioning, IRC5

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### 2.5.2. Configuration of the drive system, IRC5

Main drive unit	Drive Unit Node
DSQC 617_3G3T	<ul style="list-style-type: none"><li>• Node 1 - Unit Type T</li><li>• Node 2 - Unit TypeG</li><li>• Node 3 - Unit Type T</li><li>• Node 4 - Unit Type G</li><li>• Node 5 - Unit Type T</li><li>• Node 6 - Unit Type G</li></ul>
DSQC 617_3V3W	<ul style="list-style-type: none"><li>• Node 1 - Unit Type W</li><li>• Node 2 - Unit Type V</li><li>• Node 3 - Unit Type W</li><li>• Node 4 - Unit Type V</li><li>• Node 5 - Unit Type W</li><li>• Node 6 - Unit Type V</li></ul>

## 2.6 Memory functions

### 2.6.1. Memory functions, IRC5

#### General

The controller may be fitted with memory functions found inside the Computer Module.

The memory functions are divided into two main categories:

- Mass memory (hard disk drive, solid state disk drive, etc)
- RAM memory (memory modules fitted on the main computer motherboard)

#### Computer units

The Computer units feature:

- Computer Module A features a hard disk drive containing ABB VxWorks boot image software.
- Computer Module B features a solid state disk drive containing ABB VxWorks boot image software.
- 64 MB SDRAM memory (Synchronous Dynamic Random Access Memory).

#### Further information

The table gives references to additional information.

Information:	Found in:
What types on memory functions are available and what configurations are allowed:	Section <a href="#">Configuration of memory functions, IRC5</a>
How to install the memory units mechanically, electrically as well as software related in a new system:	Section <a href="#">Installation of memory functions, IRC5</a>
How to replace malfunctioning memory units and restore the drive system to full operation:	Section <a href="#">Replacement of hard disk drive, solid state drive and cable, IRC5</a> , Section <a href="#">Replacement of motherboard, IRC5</a> . Note that the DRAM modules on the Computer Module motherboard cannot be replaced separately! Replacing the DRAM modules entails replacing the complete motherboard!

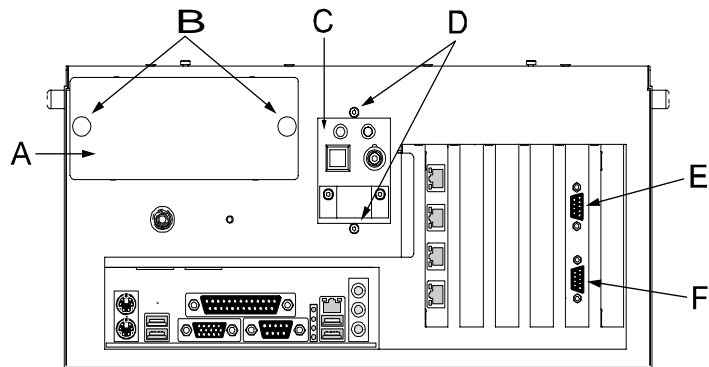
## 2 Installation and Commissioning, IRC5

### 2.6.2. Definition of memory functions, IRC5

#### 2.6.2. Definition of memory functions, IRC5

##### General

The IRC5 Computer Unit may include a number of memory functions. Any allowed combination of these are specified below.



xx040000883

A	Bay for hard disk and solid state drive
B	Cage attachment screws, hard disk and solid state drive cages
C	Switches and LEDs
D	Attachment screws, switch and LED assembly

##### Computer unit model

The figure and table below specify which combinations are allowed:

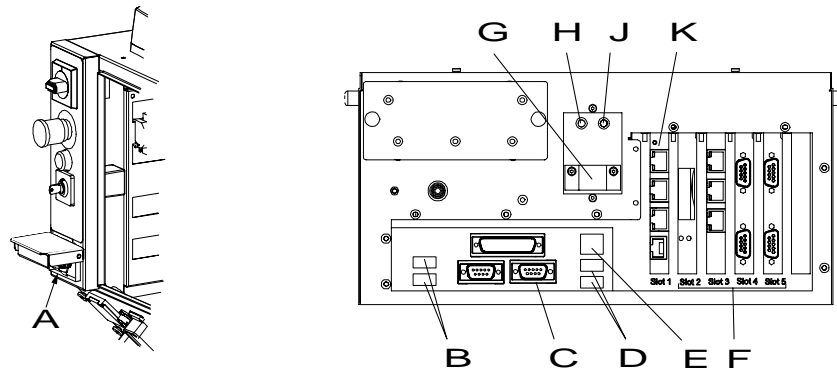
Pos in figure above	Description	Art. no.	Note
A	1 x Solid state drive	3HAC020988-003	Computer unit model A
A	1 x Hard disk drive	3HAC020988-001	Computer unit model B
A	2 x Hard disk drive	3HAC020988-002	Computer unit model IPC

### 2.6.3. Connecting a USB memory to the computer unit

#### General

A USB memory may be connected to one of the USB ports of the IRC5 controller unit.

This is shown in the figures below:



xx040000939

A	USB port, service hatch on control module
B	USB 1, 2 computer unit
C	Serial port A
D	USB 3, 4 computer unit ( USB 3 is normally connected to power supply supervision)
E	LAN
F	A33 Profibus DP M/S, A37 Interbus M/S (optical fiber), A38 Interbus M/S (copper wire), A35 Devicenet
G	X1
H	PWR (green)
J	HDD (yellow)
K	A32 RCC


#### Connection

Step	Action	Info/illustration
1.	Open the service hatch on the controller or open the door on the control module.	Shown in illustration above.

## 2 Installation and Commissioning, IRC5

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### 2.6.3. Connecting a USB memory to the computer unit

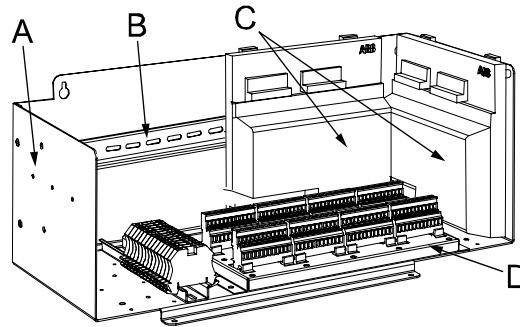
Step	Action	Info/illustration
2.	Remove the end cover on the USB memory and connect it to the connector. Do not disconnect the USB memory within xx seconds after connecting it, or reconnect it within xx seconds after disconnecting it!	The USB memory and its contents may now be accessed from the computer unit just as any other hard drive unit.
3.	 CAUTION! <b>CAUTION!</b> Handling of USB memory is described in Operator's Manual, section File Managing.	

## 2.7 I/O system

### 2.7.1. Definition of I/O units, IRC5

#### General

The IRC5 controller may be fitted with I/O, Gateway or encoder units, mounted in the Control Module. These are configured in an identical way.



xx040000917

A	Customer plate
B	Mounting rail
C	I/O, Gateway or encoder units
D	Phoenix Combicon connects

#### Standard configuration

In the standard form, no Customer Module and no fieldbus are connected to the cabinet. However, digital inputs and outputs are available on the Panel board in the control module. How to configure and use these, are described in the Application manual for the different buses respectively.

It is possible to connect any type of DeviceNet compliant I/O unit on the DeviceNet - DSQC 603 - master bus. All I/O units should comply with the DeviceNet standard and be conformance tested by ODVA.

#### Further information

The table below gives references to additional information:

Information:	Found in:
Allowed types of I/O units and gateways available and all configurations allowed:	Section <a href="#">Installation of I/O, Gateways and encoder interface boards</a> on page 73.
How to install the I/O units and gateways mechanically and electrically:	Section <a href="#">Installation of I/O, Gateways and encoder units, IRC5</a> on page 81



## 2 Installation and Commissioning, IRC5

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### 2.7.1. Definition of I/O units, IRC5

<b>Information:</b>	<b>Found in:</b>
How to install the I/O unit and gateways software related in a new system.	The Application Manual for the different I/O buses respectively.
Detailed descriptions of all available I/O unit and gateways.	The Application Manual for the different I/O buses respectively.

### 2.7.2. Configuration of I/O units, IRC5

#### General

The IRC5 controller is prepared for up to four I/O units, gateways or encoder interface units. This means that the harness inside the IRC5 controller is equipped with the necessary connectors.

#### I/O units

The table below specifies the I/O units:

Description	Art. no.	Note
Digital 24 VDC I/O	3HAB 7229-1	DSQC 328
Analog $\pm 10$ V I/O	3HNE 00554-1	DSQC 355
AD Combi I/O	3HAB 7230-1	DSQC 327
Digital 120 VAC I/O	3HAB 7231-1	DSQC 320
Digital I/O with relay outputs	3HAB 9669-1	DSQC 332

#### Gateways

The table below specifies the gateways:

Description	Art. no.	Note
DeviceNet/Allen Bradley Remote I/O Gateway	3HNE 00025-1	DSQC 350
DeviceNet/Interbus Gateway	3HNE 00006-1	DSQC 351
DeviceNet/Profibus DP Gateway	3HNE 00009-1	DSQC 352

#### Encoder interface units

The table below specifies the encoder interface units:

Description	Art. no.	Note
Encoder interface unit for conveyor tracking	3HNE 00065-1	DSQC 354 For all robots except IRB 340
Encoder interface unit for conveyor tracking	3HNE 01586-1	DSQC 377 For IRB 340 only

#### Installation of I/O, Gateways and encoder interface boards

Physical fitting of the boards is detailed in section [Installation of I/O, Gateways and encoder units, IRC5](#) on page 81.

## 2 Installation and Commissioning, IRC5

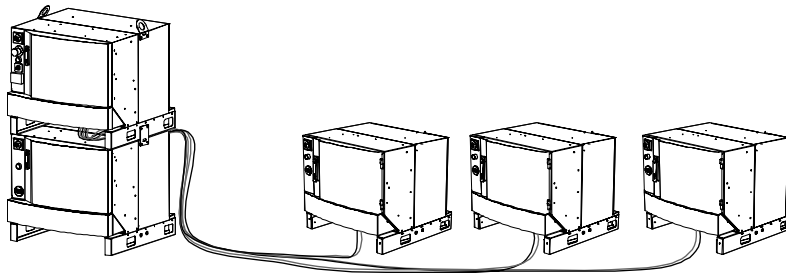
### 2.8.1. Installation of additional drive module, IRC5

## 2.8 Installation of add-ons

### 2.8.1. Installation of additional drive module, IRC5

#### General

To be able to use a Multi Move system or to control more than 3 additional axes, an additional drive module must be installed. The IRC5 control module is prepared for up to three additional drive modules.



xx0400001042

#### Prerequisites



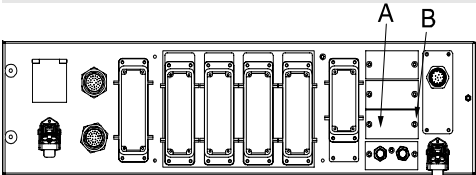
Equipment	Spare part no.	Art. no.	Note
Additional drive module (Includes all cabling and required mounting hardware)			Specified in Specification Form
Ethernet board	3HAC15639-1		DSQC 612
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC 123459-2	Complete control system

#### Procedure

The procedure below details how to install the additional drive module.

## 2 Installation and Commissioning, IRC5

### 2.8.1. Installation of additional drive module, IRC5

Step	Action	Info/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	 <p>Warning!</p> <p><b>WARNING!</b></p> <p>The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20</p>	
3.	Fit the DSQC 612 ethernet board into the computer unit.	How to fit the ethernet card is detailed in section, <i>Replacement of PCI cards in the Computer unit slots, IRC5</i>
4.	Place the additional drive cabinet in position and secure it with the included screws and washers.	
5.	Loosen the attachment screws, and remove the cover to a empty slot on the front panel of the control module.	 <p>xx0400000969</p> <ul style="list-style-type: none"> <li>• A: cover</li> <li>• B: attachment screw (2 pcs)</li> </ul>
6.	Fit the communication cabling with shield plate with the attachment screws.	
7.	Connect the ethernet cable (A32.X9) to the DSQC 612 ethernet board.	Connector: <ul style="list-style-type: none"> <li>• A32.X9 to ethernet board connector, AXC1</li> </ul>
8.	Connect the safety signal cable (A21.X7) to the Panel unit.	Connector: <ul style="list-style-type: none"> <li>• A21.X7 to Panel board, X7</li> </ul>
9.	Strap the cabling to existing straps inside the module.	

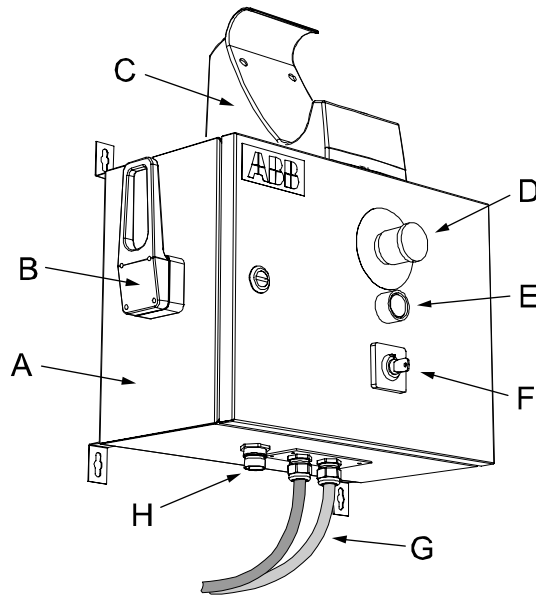
## 2 Installation and Commissioning, IRC5

### 2.8.2. Installation of external operator's panel, IRC5

#### 2.8.2. Installation of external operator's panel, IRC5

##### Location

An external operator's panel may be fitted in a separate wall cabinet as shown in the illustration below.



xx040000956

A	Wall cabinet IRC5
B	Bracket
C	FlexPendant holder
D	Emergency stop button
E	Motor ON button
F	Position mode switch
G	External Operator's panel harness
H	FlexPendant connector


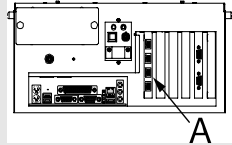
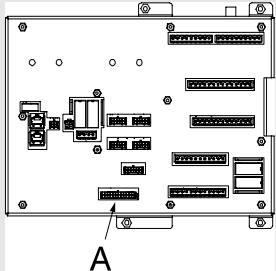
##### Required equipment

Equipment	Spare part no.	Art. no.	Note
Wall cabinet IRC5		3HAC022035-001	
External Operator's panel cable		3HAC021273-005	30 m
		3HAC021273-001	22 m
		3HAC021273-006	15 m
Standard toolkit			The contents are defined in section Standard toolkit!

Equipment	Spare part no.	Art. no.	Note
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC020538-002	Complete control system

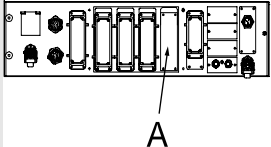
### Procedure

The procedure below details how to install the external control panel.

Step	Action	Info/Illustration
1.	 <p>Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <a href="#">DANGER - Make sure that the main power has been switched off!</a> on page 19.</p>	
2.	Disconnect the cable from the ethernet connector for FlexPendant on the Robot Communication Card on the computer unit.	 <p>xx0400000960</p> <ul style="list-style-type: none"> <li>A: Connector X8</li> </ul>
3.	Disconnect signal cabling from the panel Unit.	 <p>xx0400000961</p> <ul style="list-style-type: none"> <li>A: Connector X9</li> <li>B: Connector X10</li> </ul>

## 2 Installation and Commissioning, IRC5

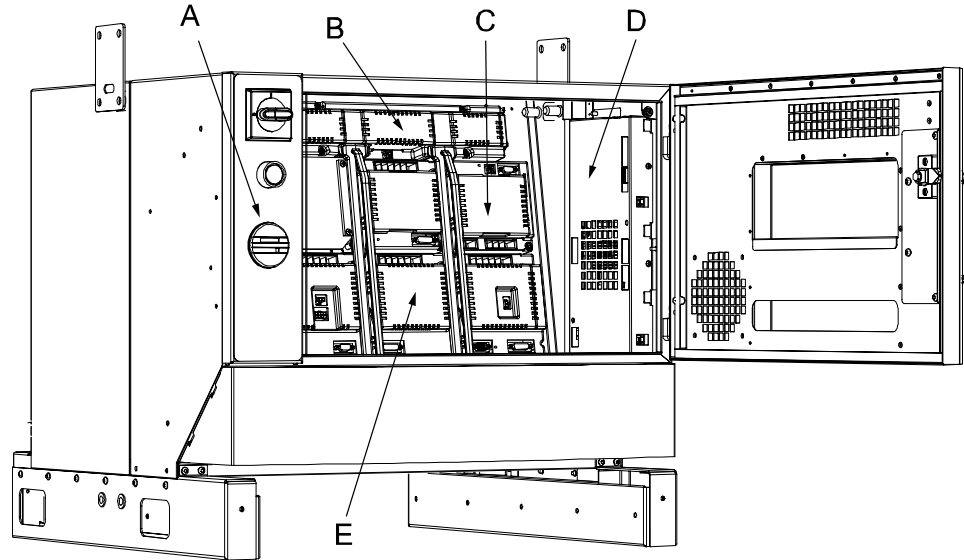
### 2.8.2. Installation of external operator's panel, IRC5

Step	Action	Info/Illustration
4.	Remove the cover to a free customer connector slot on the connection panel.	 xx0400000966 <ul style="list-style-type: none"><li>• A: Cover</li></ul>
5.	Fit the Harness from the external control panel with the four attachment screws.	
6.	Connect the ethernet connector A32.A8 to the Robot Communication Card on the computer unit, <i>connector A8</i> .	
7.	Connect the signal connectors A21.X9 and A21.X10 to the <i>connector X9 and X10</i> on the panel unit.	
8.	Strap the cabling to the existing cable straping inside the module.	
9.	Fit the cabling to the wall cabinet with the two attachment screws.	
10.	Connect the connectors inside the wall cabinet.	Connectors inside wall cubicle. <ul style="list-style-type: none"><li>• A21.X9 to X9</li><li>• A22.X2 to X2</li><li>• A22.X3 to X3</li></ul>

### 2.8.3. Installation of Drive system parts in Drive Module, IRC5

#### Location

The drive system components are located in the Drive Module as shown in the figure below.



xx040000997

A	Control panel
B	Capacitor
C	Rectifier
D	Axis computer
E	Drive units

#### Prerequisites

Equipment	Spare part no.	Art. no.	Note
A number of choices are available!			Specified in section <a href="#">Configuration of Drive Module Units, IRC5</a> .
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Application Manual Additional Axes		3HAC 021395-001	Contains information on how to configure the system for external axes.
Circuit Diagram		3HAC 123459-2	Complete control system




## 2 Installation and Commissioning, IRC5

### 2.8.3. Installation of Drive system parts in Drive Module, IRC5

#### Procedure

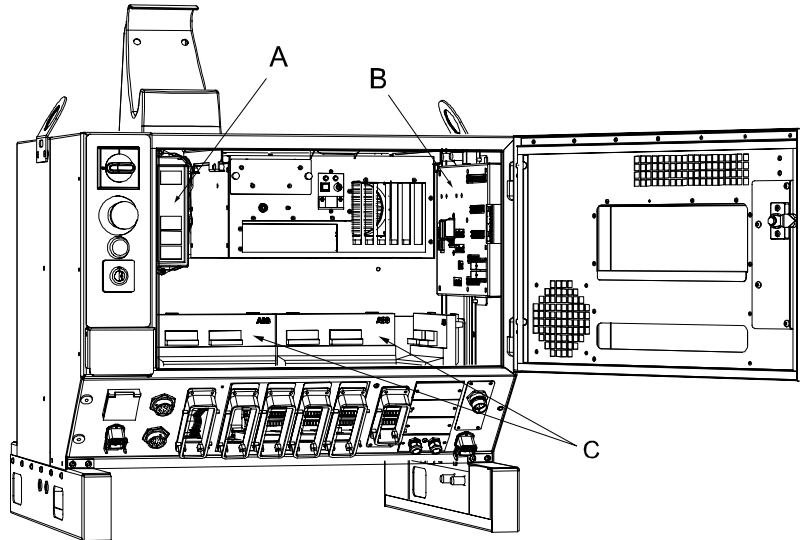
The procedure below details how to install a drive unit.

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <a href="#">DANGER - Make sure that the main power has been switched off!</a> on page 19.	
2.	Remove the dummy by unscrewing its attachment screws.	
3.	Fit the drive unit in position. Secure it with its attachment screws.	Allowed positions are specified in section <a href="#">Configuration of Drive Module Units, IRC5</a>
4.	Connect any additional connectors to the unit.	
5.	Make sure the robot system is configured to reflect the drive functions installed.	Basic robot drive functionality is determined when defining the robot as in "Robot Studio Installer", "System Builder". External axes detailed in documents specified above!

#### 2.8.4. Installation of I/O, Gateways and encoder units, IRC5

##### Location

The location for the I/O, Gateway or encoder units to be installed are shown in the illustration below.



xx040000818

A	Backup energy bank
B	Panel board
C	I/O, Gateways or encoder units

##### Required equipment


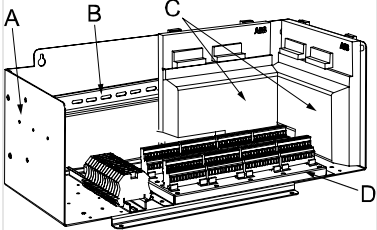
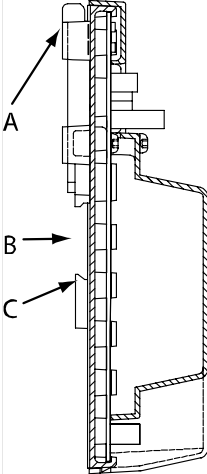
Equipment	Spare part no.	Art. no.	Note
I/O units, gateways or encoder interface units			Specified in <a href="#">Configuration of I/O units, IRC5</a> on page 73
DeviceNet User's Guide		3HAC020676-001	
Circuit Diagram		3HAC020538-002	

##### Fitting

The procedure below details how to fit the units.

## 2 Installation and Commissioning, IRC5

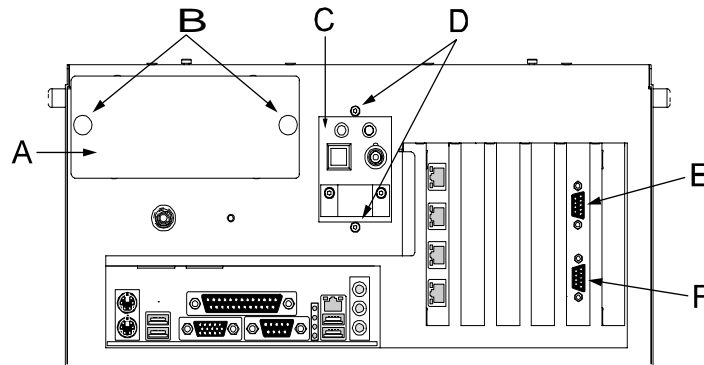
### 2.8.4. Installation of I/O, Gateways and encoder units, IRC5

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	Find a free slot in the customer plate.	 <p>xx0400000917</p> <ul style="list-style-type: none"> <li>• A: customer plate</li> <li>• B: mounting rail</li> <li>• C: I/O, gateway or encoder units</li> <li>• D: phoenix Combicon connects</li> </ul>
3.	<p>Fit the I/O unit by snapping it onto to the bar.</p> <p>If required, pull the <i>release lever</i> to facilitate fitting.</p>	 <p>xx0300000363</p> <ul style="list-style-type: none"> <li>• A: Release lever</li> <li>• B: Fit the bar here!</li> <li>• C: Hook</li> </ul>
4.	Connect the DC supply to the board.	
5.	Connect wires to the inputs and output connectors as required.	Detailed in the Application manual for the differen tbusse s respectively.

### 2.8.5. Installation of extra mass memory in the computer unit, IRC5

#### Location

The mass memory are located in the Computer Modules as shown in the figure below.



xx040000883

A	Bay for hard disk and solid state drive
B	Cage attachment screws, hard disk and solid state drive cages
C	Switches and LEDs
D	Attachment screws, switch and LED assembly

#### Prerequisites



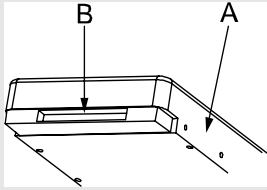
Equipment	Spare part no.	Art no.	Note
A number of versions are available!		-	Available components for each robot version is specified in section <a href="#">Definition of memory functions, IRC5</a> on page 68.
Standard toolkit			The contents are defined in section <a href="#">Standard toolkit</a> !
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.

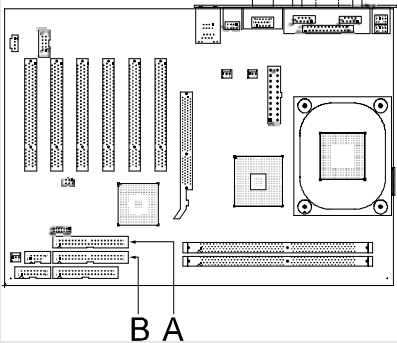
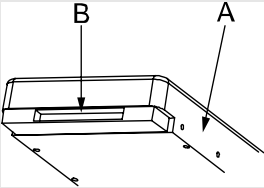
#### Procedure

The procedure below details how to install the extra mass memory.

## 2 Installation and Commissioning, IRC5

### 2.8.5. Installation of extra mass memory in the computer unit, IRC5

Step	Action	Info/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	 <p>Warning!</p> <p><b>WARNING!</b></p> <p>The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20</p>	
3.	Remove the computer unit.	Detailed in section <i>Replacement of computer unit, IRC5</i> on page 128.
4.	Open the computer unit	Detailed in section <i>Replacement of main computer motherboard and related components, IRC5</i> on page 132.
5.	Unscrew the cage attachment screws for the drive cages, and pull the cage out.	Detailed in section <i>Replacement of main computer motherboard and related components, IRC5</i> on page 132.
6.	Disconnect the flat ribbon cable from the mass memory.	 <p>xx0400000941</p> <ul style="list-style-type: none"> <li>• A: Hard disk, solid state drive</li> <li>• B: Flat ribbon cable connection, 40 pin</li> </ul>

Step	Action	Info/Illustration
7.	Disconnect the flat ribbon cable to the primary IDE connector on the motherboard.	 <p>xx0400000895</p> <ul style="list-style-type: none"> <li>• A: Primary IDE connector</li> <li>• B: Secondary IDE connector</li> </ul>
8.	Connect the included flat ribbon cable to the <i>primary IDE connector</i> on the motherboard.	
9.	Reconnect the flat ribbon cable to the mass memory units.	 <p>xx0400000941</p> <ul style="list-style-type: none"> <li>• A: Hard disk, solid state drive</li> <li>• B: Flat ribbon cable connection, 40 pin</li> </ul>
10.	Make sure if the drives are to be defined as "Master" or "Slave".	How to define the unit is shown on a sticker on the unit.
11.	Push the cage back in to the computer unit, and secure it with the attachment screws.	
12.	Make sure no cable is damaged, and close the computer unit.	Detailed in section <a href="#">Replacement of main computer motherboard and related components, IRC5</a> on page 132.

## 2 Installation and Commissioning, IRC5

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### 2.8.5. Installation of extra mass memory in the computer unit, IRC5

## 3 Maintenance activities, controller IRC5

### 3.1. Maintenance schedule, controller IRC5

#### General

The IRC5 robot controller must be maintained at regular intervals to ensure its function. The maintenance activities and their respective intervals are specified below:

#### Intervals

Equipment	Maintenance activity	Interval	Note!	Detailed in section:
Complete controller modules	Inspection	12 months *		<a href="#">Inspection of controller modules, IRC5</a> on page 88.
Heat exchanger fan, control module.	Inspection	12 months *		<a href="#">Inspection of controller modules, IRC5</a> on page 88.
Heat exchanger fan, control module.	Cleaning	12 months *		<a href="#">Cleaning of control cabinet the IRC5 controller</a> on page 91.
Drive module air channels.	Cleaning	12 months		<a href="#">Cleaning of control cabinet the IRC5 controller</a> on page 91.
Drive module fans	Cleaning	12 months *		<a href="#">Cleaning of control cabinet the IRC5 controller</a> on page 91.
FlexPendant	Cleaning	When needed		<a href="#">Cleaning the FlexPendant</a> on page 93.

\*) The time interval depends on the working environment of the equipment: a cleaner environment may extend the maintenance interval and vice versa.



## 3 Maintenance activities, controller IRC5

### 3.2.1. Inspection of controller modules, IRC5

## 3.2 Inspection activities

### 3.2.1. Inspection of controller modules, IRC5

#### Inspection

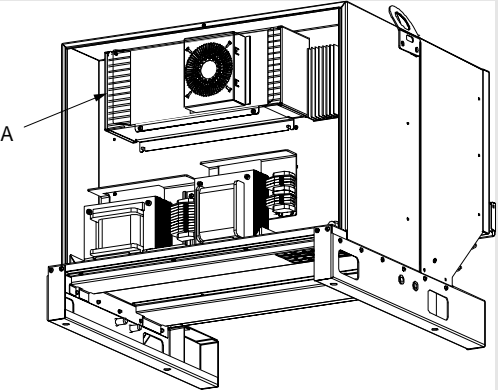
The procedure below details how to inspect the control and drive module.

#### WARNING!

Please observe the following before commencing any repair work on the controller Modules or units connected to the controller:



- Switch off all electric power supplies with the power switches on the Control and Drive Modules!
- Many components inside the module or inside any external units are sensitive to ESD (ElectroStatic Discharge) and will be destroyed if subjected to it!
- Before handling, make sure you are grounded through a special ESD wrist bracelet or similar. Many module and unit fronts are fitted with a special ESD protection button for connection of the bracelet. Use it!

Step	Action	Note/Illustration
1.	Inspect all sealing joints and cable glands to make sure they are airtight in order to prevent dust and dirt from being sucked into the module.	
2.	Inspect connectors and cabling to make sure they are securely fastened and cabling not damaged.	
3.	Inspect the heat exchanger on the control module to make sure it is clean.	 <p>xx0400000802</p> <p>Parts:</p> <ul style="list-style-type: none"> <li>• A: Heat exchanger, heat sink cooling fins in the back of the Control Module</li> </ul>
4.	Inspect the air channels in the drive module to make sure they are clean.	How to clean the air channels is detailed in section, <a href="#">Cleaning of control cabinetthe IRC5 controller</a> on page 91
5.	Clean any contaminated heat exchanger.	How to clean the heat exchanger is detailed in section, <a href="#">Cleaning of control cabinetthe IRC5 controller</a> on page 91

## 3 Maintenance activities, controller IRC5

### 3.2.1. Inspection of controller modules, IRC5

Step	Action	Note/Illustration
6.	Temporarily turn the power supply to the modules on. Inspect all fans to make sure they function correctly. Turn the power supply back off.	Replace any malfunctioning fans as detailed in the <i>Repair Manual</i> . The status of all fans, except the Computer unit heat changer fan, may be checked on the teach pendant unit. This is detailed in the <i>Operator's Manual, IRC5</i> .
7.	Inspect the fan blades of all fans. Check for sticking dust or other contaminations.	Clean as detailed in section <i>Cleaning, drive module fans</i> if required.
8.	Make sure the module door is completely closed.	An open module door allows dirt to enter the cabinet.

## **3 Maintenance activities, controller IRC5**

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### 3.3.1. Activities

## **3.3 Changing/replacing activities**

### **3.3.1. Activities**

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#### **References**

Certain activities to be performed as specified in the Maintenance Schedule are not detailed in this chapter, but in the Repairs chapter.

Please refer to the Repair chapter of the equipment in question.

## 3.4 Cleaning activities

### 3.4.1. Cleaning of control cabinetthe IRC5 controller

#### Required equipment

Equipment, etc.	Spare part no.	Art. no.	Note
Vacuum cleaner			ESD Protected
Cleaning agent, exterior cleaning			If necessary, use rag with e.g. alcohol <b>Use ESD Protection</b>

#### Internal cleaning

The procedure below details how to clean the interior of the control and drive module control cabinet.

Step	Action	Note/Illustration
1.	Clean the cabinet interior with a vacuum cleaner if necessary. Clean the modules interior with a vacuum cleaner if necessary.	
2.	The control module is equipped with a heat exchanger, it is of the utmost importance that it is cleaned. The heat exchanger is found: <ul style="list-style-type: none"> <li>on the rear of the control module.</li> </ul>	If required, remove any heat exchangers before cleaning as detailed in the section, <a href="#">Replacement of heat exchanger unit, IRC5</a> on page 119.
3.	The drive module is equipped with air channels. To clean the channels: <ul style="list-style-type: none"> <li>Remove the drive module fans and use compressed air to clean the channels.</li> </ul>	How to remove the fans is detailed in section, <a href="#">Replacement of drive module fan holder with fans, IRC5</a> on page 169
4.	If the IRC5 controller is installed in a very harsh environment, the drive units cooling fins must be cleaned at regular intervals.	How to remove the drive units is detailed in section, <a href="#">Replacement of servo drive units, rectifiers and capacitor units, IRC5</a> on page 154

#### Do's and don'ts!

The section below specifies some special considerations when cleaning the control cabinet.

Always:

- use ESD Protection
- use cleaning equipment as specified above! Any other cleaning equipment may shorten the life of paintwork, rust inhibitors, signs, or labels!
- check that all protective covers are fitted to the controller before cleaning!

### 3 Maintenance activities, controller IRC5

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#### 3.4.1. Cleaning of control cabinetthe IRC5 controller

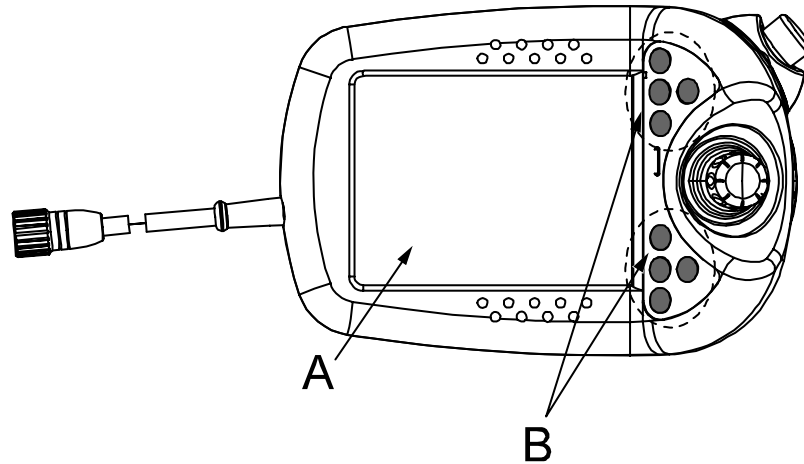
Never:

- remove any covers or other protective devices before cleaning the controller!
- use any cleaning agents, e.g. compressed air or solvents, other than those specified above!
- spray with a high pressure cleaner!

3.4.2. Cleaning the FlexPendant

Location

The surfaces to clean is shown in the illustration below.



xx0400000973

A	Touch screen
B	HardWare buttons

Required equipment

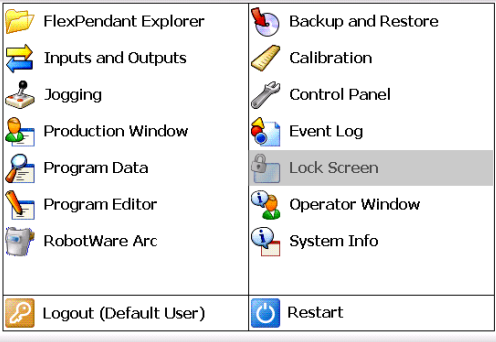
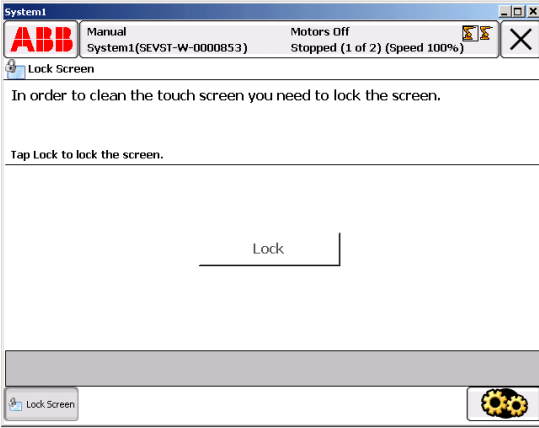
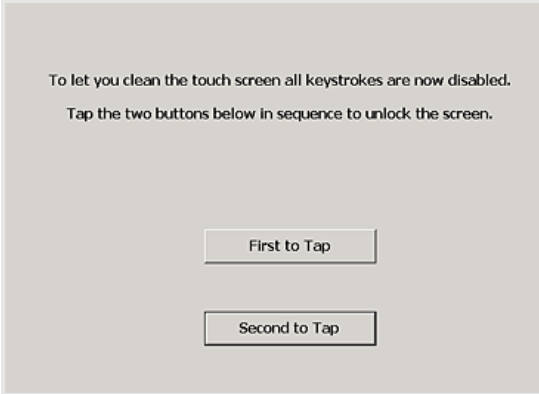
Equipment, etc.	Spare part no.	Art. no.	Note
Soft cloth			ESD Protected
Warm water/Mild cleaning agent			

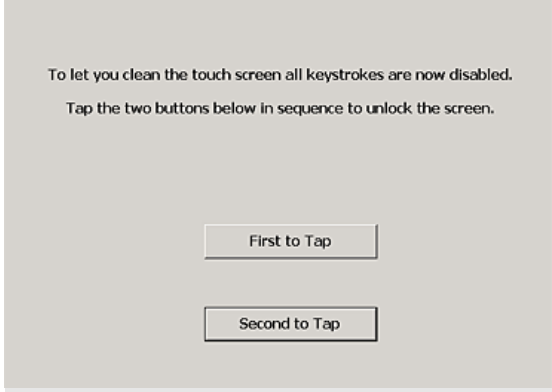
### 3 Maintenance activities, controller IRC5

#### 3.4.2. Cleaning the FlexPendant

#### Clean the touch screen

This section details how to clean the touch screen.

Step	Action	Info/Illustration
1.	Before cleaning the screen, tap the <b>Lock Screen</b> on the ABB menu.	 <p>en0400001221</p>
2.	Tap the <b>Lock</b> button in the following window.	 <p>en0400000657</p>
3.	When the next window appers, it is safe to clean the screen.	 <p>en0400000658</p>

Step	Action	Info/Illustration
4.	Clean the touch screen and hardware buttons using a soft cloth and a bit of water or a mild cleaning agent.	
5.	To unlock the screen, follow the instructions on the screen.	 <p>To let you clean the touch screen all keystrokes are now disabled. Tap the two buttons below in sequence to unlock the screen.</p> <p>First to Tap</p> <p>Second to Tap</p> <p>en0400000658</p>

#### Do's and don'ts!

The section below specifies some special considerations when cleaning the FlexPendant.

#### Always:

- use ESD Protection
- use cleaning equipment as specified above! Any other cleaning equipment may shorten the life time of the touch screen.
- check that all protective covers are fitted to the device before cleaning!
- make sure that no foreign objects or liquids can penetrate into the device.

#### Never:

- remove any covers or other protective devices before cleaning the FlexPendant!
- spray with a high pressure cleaner!
- clean the device, operating panel and operating elements with compressed air, solvents, scouring agent or scrubbing sponges.



### 3 Maintenance activities, controller IRC5

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#### 3.4.2. Cleaning the FlexPendant

## **4 Repair activities, controller IRC5**

## 4 Repair activities, controller IRC5

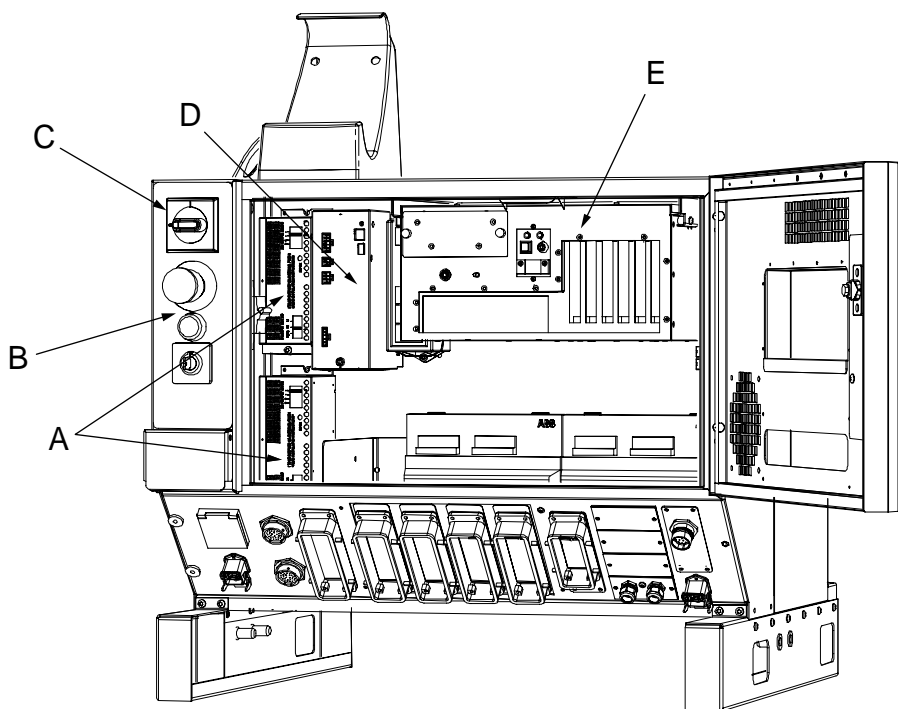
### 4.1.1. Replacement of control panel, IRC5

## 4.1 Control Module

### 4.1.1. Replacement of control panel, IRC5

#### Location

The control panel is located on the front of the Control module as shown below.



dummy

A	Customer I/O power supply
B	<b>Control panel</b>
C	Main switch
D	Control power supply
E	Computer unit

#### Required equipment

Equipment	Spare part no.	Art. no.	Note
Control Panel 2 mode	3HAC020901-001	3HAC 15355-1	No switch position provided for "100% speed manual drive"
Control Panel 3 mode	3HAC020901-002	3HAC 15394-1	Switch position provided for "100% speed manual drive"
Cable ties, 4 pcs			For securing panel unit cable
Standard toolkit			The contents are defined in section Standard toolkit!


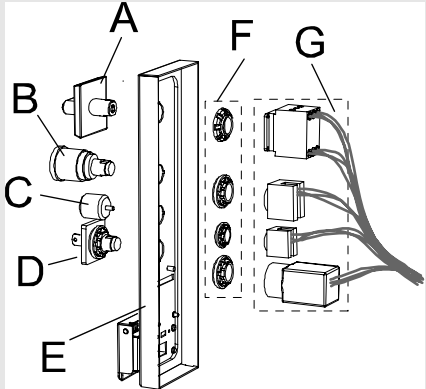
## 4 Repair activities, controller IRC5

### 4.1.1. Replacement of control panel, IRC5

Equipment	Spare part no.	Art. no.	Note
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC XX	Complete control system

### Removal

The procedure below details how to remove the different buttons on the control panel.


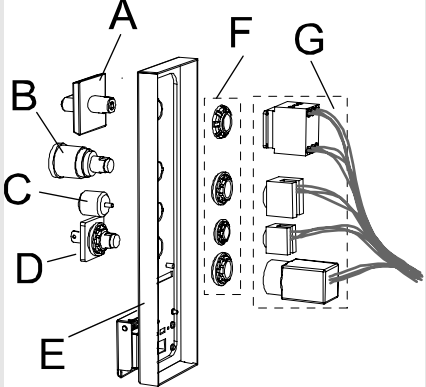
Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	Disconnect the contact block and harness.	 <p>xx0400000911</p> <ul style="list-style-type: none"> <li>• A: Main switch</li> <li>• B: Emergency stop button</li> <li>• C: Motor ON button</li> <li>• D: Position mode switch</li> <li>• E: Control panel</li> <li>• F: Back nut</li> <li>• G: Contact block with harness</li> </ul>
3.	Remove the <i>back nuts</i> .	
4.	Replace the desired button.	

## 4 Repair activities, controller IRC5

### 4.1.1. Replacement of control panel, IRC5

#### Refitting

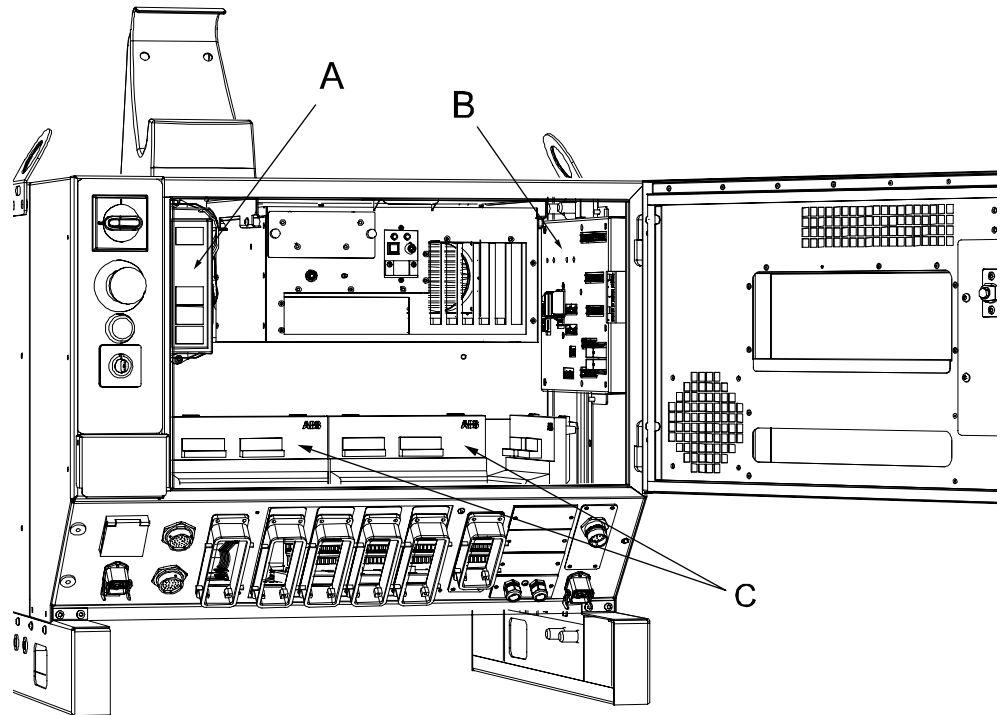
The procedure below details how to refit the control panel.

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	Refit the back nut	 xx0400000911 <ul style="list-style-type: none"><li>• A: Main switch</li><li>• B: Emergency stop button</li><li>• C: Motor ON button</li><li>• D: Position mode switch</li><li>• E: Control panel</li><li>• F: Back nut</li><li>• G: Contact block with harness</li></ul>
3.	Reconnect the <i>harness</i> by snapping the <i>contact block</i> .	

#### 4.1.2. Replacement of panel board unit, IRC5

##### Location

The panel unit is located in the Control Cabinet as shown below.



xx040000811

<b>A</b>	Backup energy bank DSQC 624
<b>B</b>	<b>Panel Board Unit</b>
<b>C</b>	I/O, Gateway or encoder units

##### Required equipment



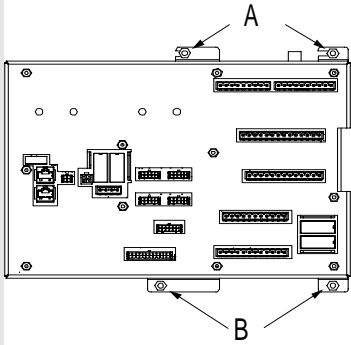
Equipment	Spare part no.	Art. no.	Note
Panel unit	3HAC020665-001		
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC xx	Complete control system

## 4 Repair activities, controller IRC5

### 4.1.2. Replacement of panel board unit, IRC5

#### Removal

The procedure below details how to remove the panel unit.



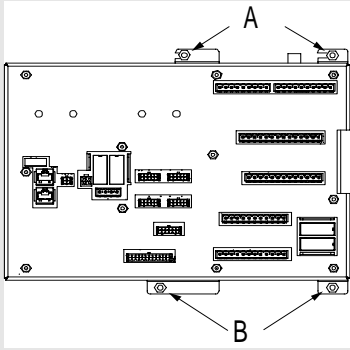
Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	 Warning! <b>WARNING!</b> The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20	
3.	Remove the lower attachment nuts, and remove the Panel Unit.	 xx0400000812 <ul style="list-style-type: none"><li>• A: lock nut (2 pcs)</li><li>• B: attachment nut (2 pcs)</li></ul>

#### Refitting

The procedure below details how to refit the panel unit.

## 4 Repair activities, controller IRC5

### 4.1.2. Replacement of panel board unit, IRC5

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	 Warning! <b>WARNING!</b> The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20	
3.	Refit the panel board unit in the control cabinet.	
4.	Refit the lower attachment nuts.	 xx0400000812 <ul style="list-style-type: none"><li>• A: lock nut (2 pcs)</li><li>• B: attachment nut (4 pcs)</li></ul>



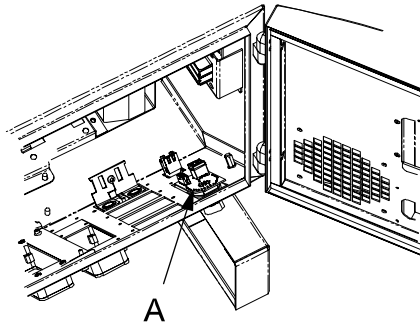
## 4 Repair activities, controller IRC5

### 4.1.3. Replacement of junction board, IRC5

#### 4.1.3. Replacement of junction board, IRC5

##### Location

The junction board is located on the inside of the connection panel in the front of the Control Module as shown below.



xx0400000809



A	Junction board
---	----------------

##### Required equipment

Equipment	Spare part no.	Art. no.	Note
Junction board	3HAC14605-1		
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC xx	Complete control system

#### Removal

The procedure below details how to remove the junction board.



Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <a href="#">DANGER - Make sure that the main power has been switched off!</a> on page 19.</p>	
2.	 <p>Warning!</p> <p><b>WARNING!</b></p> <p>The unit is sensitive to ESD, before handling the unit please observe the safety information in section <a href="#">WARNING - The unit is sensitive to ESD!</a> on page 20</p>	
3.	Open the control module.	
4.	Disconnect both connectors connected to the junction board.	
5.	Remove the junction board by unscrewing the nut securing the cable gland on the front of the cabinet.	

#### Refitting

The procedure below details how to refit the junction board.

## 4 Repair activities, controller IRC5

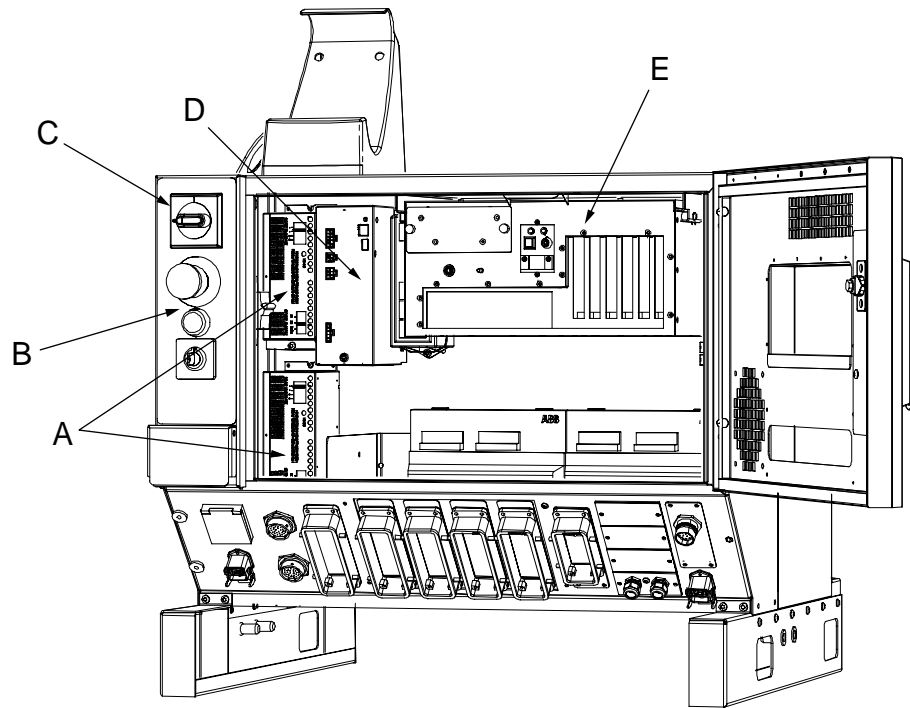
### 4.1.3. Replacement of junction board, IRC5

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	 Warning! <b>WARNING!</b> The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20	
3.	Fit the junction board and secure it with the cable gland locknut.	NOTE! Put the plastic washer inside the nut!
4.	Reconnect both connectors connected to the junction board.	
5.	Close the control cabinet.	

#### 4.1.4. Replacement of control module power supply, IRC5

##### Location

The control module power supply is located on the left hand side in the control module as shown below.



xx0400000815

A	Customer power supply
B	Control panel
C	Main switch
D	<b>Control module power supply</b>
E	Computer unit

##### Required equipment

Equipment	Spare part no.	Art. no.	Note
Control Power Supply	3HAC12928-1		DSQC 604
Standard toolkit			The contents are defined in section Standard toolkit!


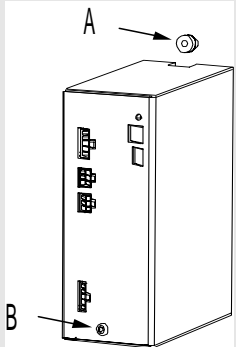
## 4 Repair activities, controller IRC5

### 4.1.4. Replacement of control module power supply, IRC5

Equipment	Spare part no.	Art. no.	Note
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC XX	Complete control system

### Removal

The procedures below details how to remove the control power supply.


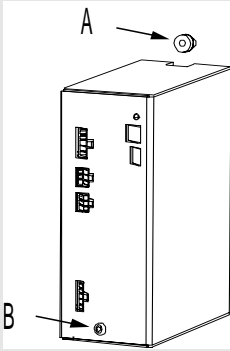
Step	Action	Note/Illustration
1.	 <p>Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <a href="#">DANGER - Make sure that the main power has been switched off!</a> on page 19.</p>	
2.	Disconnect all connectors.	
3.	Loosen the attachment screw and pull the power supply down to release it from the cap nut.	 <p>xx0400000976</p> <ul style="list-style-type: none"> <li>• A: cap nut</li> <li>• B: attachment screw</li> </ul>
4.	Remove the power supply unit.	

### Refitting

The procedures below details how to refit the control power supply.

## 4 Repair activities, controller IRC5

### 4.1.4. Replacement of control module power supply, IRC5

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	Refit the new power supply unit by pushing it upward to fit the cap nut.	 xx0400000976 <ul style="list-style-type: none"><li>• A: cap nut</li><li>• B: attachment screw</li></ul>
3.	Lock the unit in place by tighten the attachment screw.	
4.	Reconnect all the connectors.	

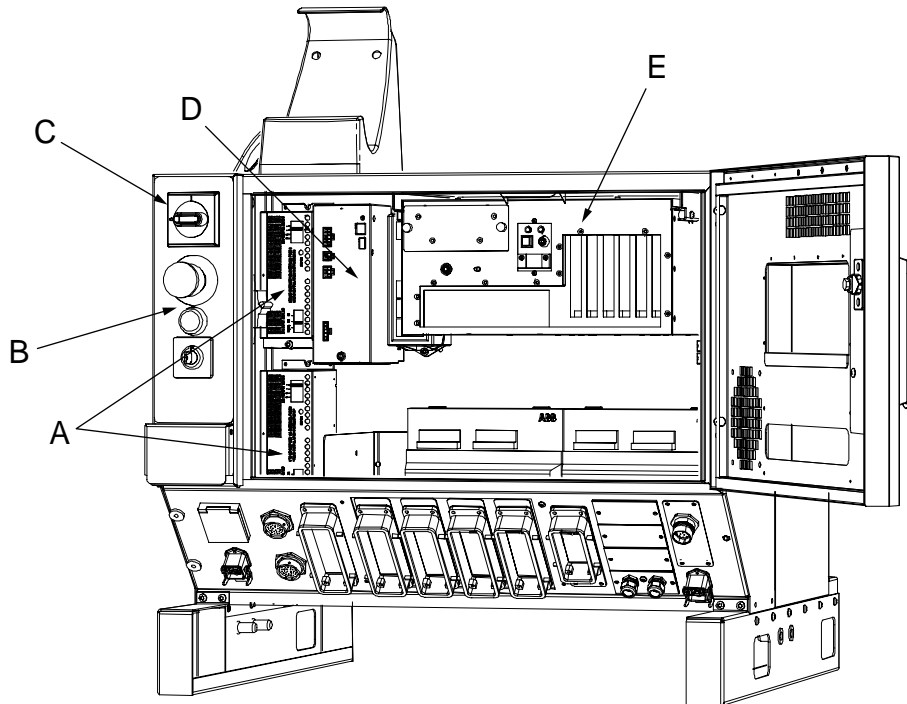
## 4 Repair activities, controller IRC5

### 4.1.5. Replacement of customer I/O power supply, IRC5

### 4.1.5. Replacement of customer I/O power supply, IRC5

#### Location

The customer I/O power supply is located on the left hand side of the module as shown below.



xx0400000815

A	Customer I/O power supply
B	Control panel
C	Main switch
D	Control power supply
E	Computer unit

#### Required equipment

Equipment	Spare part no.	Art. no.	Note
Customer I/O Power Supply	3HAC12934-1		DSQC 608
Standard toolkit			The contents are defined in section Standard toolkit!


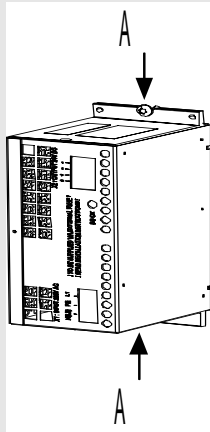
## 4 Repair activities, controller IRC5

### 4.1.5. Replacement of customer I/O power supply, IRC5

Equipment	Spare part no.	Art. no.	Note
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC XX	Complete control system

### Removal

The procedure below details how to remove the customer I/O power supply.

Step	Action	Note/Illustration
1.	 <p>Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <a href="#">DANGER - Make sure that the main power has been switched off!</a> on page 19.</p>	
2.	Remove the upper and lower attachment screws.	 <p>xx0400000908</p> <ul style="list-style-type: none"> <li>A: attachment screw (2 pcs)</li> </ul>
3.	Remove the power supply unit.	


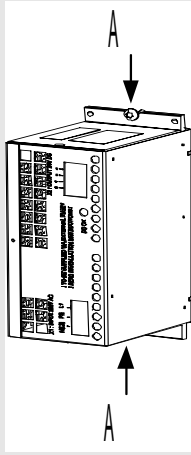
### Refitting

The procedure below details how to refit the customer I/O power supply.



## 4 Repair activities, controller IRC5

### 4.1.5. Replacement of customer I/O power supply, IRC5

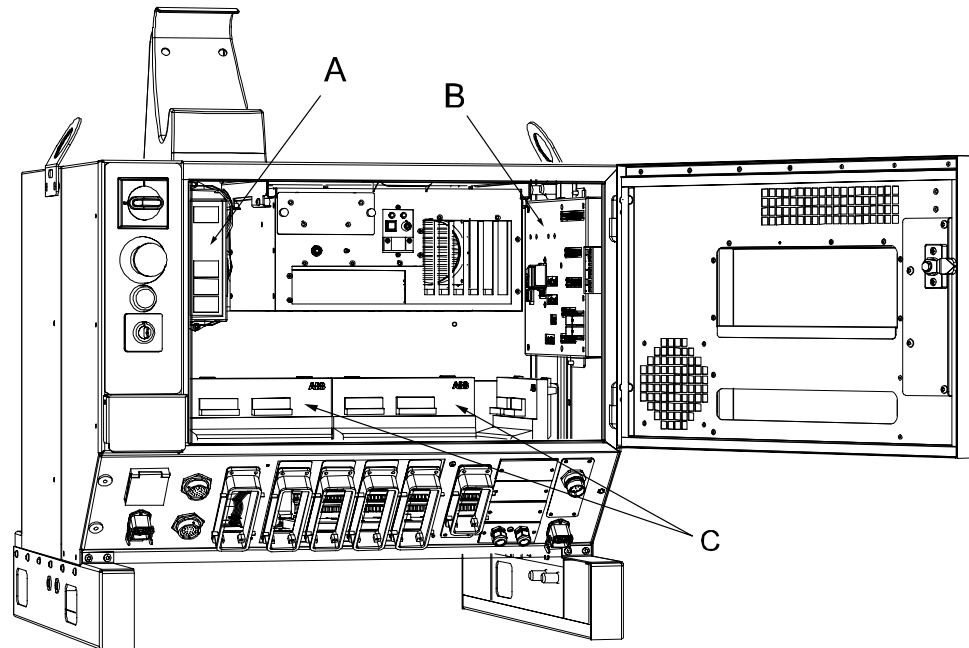
Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	Refit the new power supply unit.	
3.	Refit the attachment screws.	 <p>xx0400000908</p> <ul style="list-style-type: none"><li>• A: attachment screw (2pcs)</li></ul>

#### 4.1.6. Replacement of I/O units and gateways, IRC5

##### Location

A number of I/O units and gateways may be fitted in the Control module. These are specified in the Application manual respectively .

How to configure the I/O unit is detailed in Operating Manual, RobotStudio<sup>Online</sup> .



xx040000818

A	Backup Energy Bank
B	Panel Board
C	Gateway or I/O Units

##### Required equipment



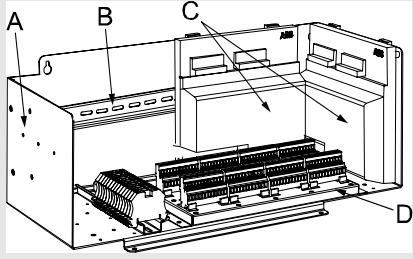
Equipment	Spare part no.	Art no.	Note
A number of choices are available!		-	Specified in section <a href="#">Configuration of I/O units, IRC5</a> .
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC 13459-2	Complete control system

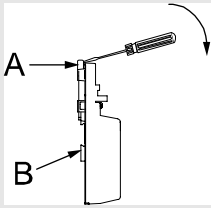
## 4 Repair activities, controller IRC5

### 4.1.6. Replacement of I/O units and gateways, IRC5

#### Removal



The procedure below details how to remove the I/O units or gateways.

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	 Warning! <b>WARNING!</b> The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20	
3.	Identify the I/O unit to be replaced.	 xx0400000917 <ul style="list-style-type: none"><li>• A: Customer plate</li><li>• B: Mounting rail</li><li>• C: I/O/Gateway/encoder units</li><li>• D: Phoenix Combicon connects</li></ul>
4.	Disconnect any connectors from the unit.	Note which connector goes where, to facilitate reassembly.

Step	Action	Note/Illustration
5.	Lift the spring loaded locking device with a screw driver until the upper claw, that holds the unit to the rail, is released.	 <p>xx0400000921</p>
6.	With the upper claw released, tip the unit away from the mounting rail and remove it.	

### Refitting

The procedure below details how to refit an I/O or gateway board.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <a href="#">DANGER - Make sure that the main power has been switched off!</a> on page 19.</p>	
2.	 <p>Warning!</p> <p><b>WARNING!</b></p> <p>The unit is sensitive to ESD, before handling the unit please observe the safety information in section <a href="#">WARNING - The unit is sensitive to ESD!</a> on page 20</p>	
3.	Hook the unit back onto the mounting rail and snap it gently in position.	
4.	Reconnect all connectors disconnected during removal.	

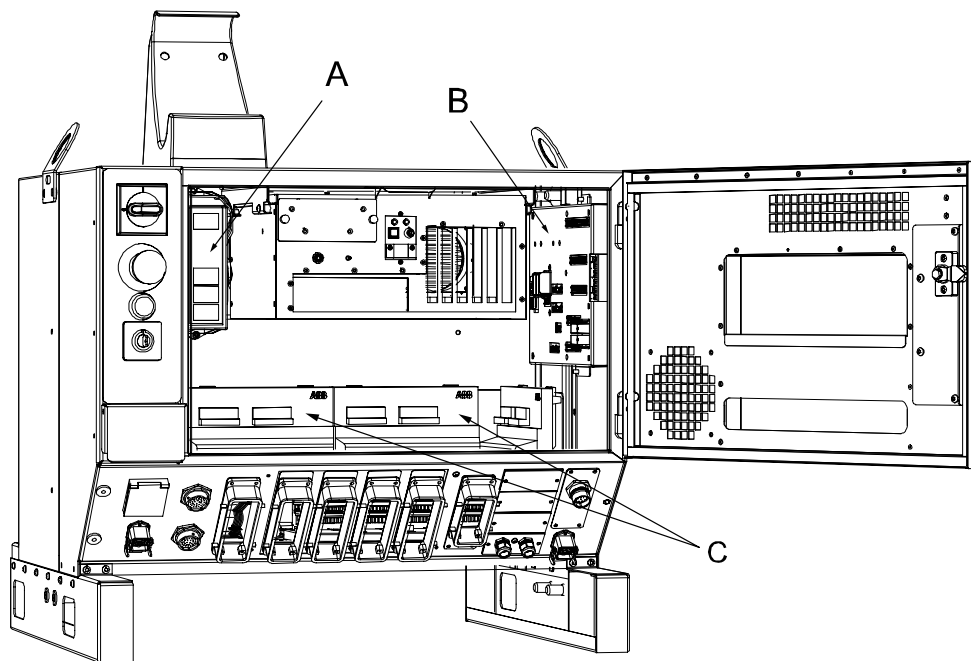
## 4 Repair activities, controller IRC5

### 4.1.7. Replacement of backup energy bank, IRC5

#### 4.1.7. Replacement of backup energy bank, IRC5

##### Location

The backup energy bank is located on the back wall in the control Module as shown below.



xx0400000818


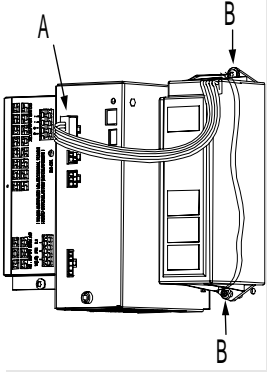
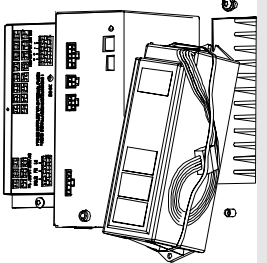
<b>A</b>	<b>Backup energy bank</b>
<b>B</b>	Panel unit
<b>C</b>	I/O units

##### Required equipment

Equipment	Spare part no.	Art. no.	Note
Backup energy bank	3HAC020150-001		Backup energy bank
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC XX	Complete control system

#### Removal

The procedure below details how to remove the backup energy bank.


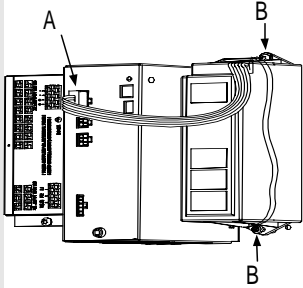
Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	Disconnect the connector X4 from the control power supply.	 <p>xx0400000830</p> <ul style="list-style-type: none"> <li>• A: connector X4</li> <li>• B: attachment screw (2 pcs)</li> </ul>
3.	Loosen the upper <i>attachment screw</i> .	
4.	Remove the lower <i>attachment screw</i> .	
5.	Pull the backup energy bank out.	 <p>xx0400000829</p>

#### Refitting

The procedure below details how to refit the backup energy bank.

## 4 Repair activities, controller IRC5

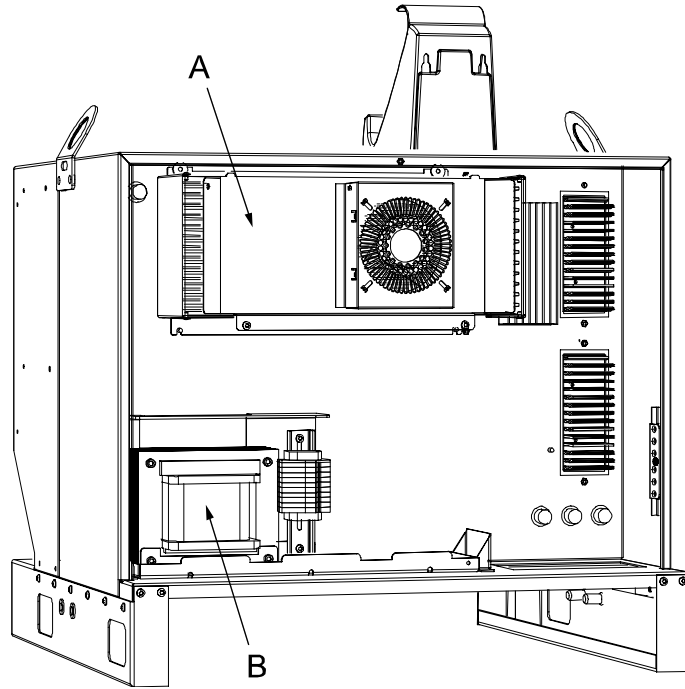
### 4.1.7. Replacement of backup energy bank, IRC5

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	Refit the new backup energy bank.	 xx0400000829 <ul style="list-style-type: none"><li>• A: connector X4</li><li>• B: attachment screw (2 pcs)</li></ul>
3.	Refit the upper <i>attachment screw</i> .	
4.	Tighten the upper <i>attachment screw</i> .	
5.	Reconnect the X4 connector to the control power supply.	

4.1.8. Replacement of heat exchanger unit, IRC5

Location

The heat exchanger unit is located in the back of the control module as shown below.



xx0400000850.wmf

<b>A</b>	<b>Heat exchanger unit</b>
<b>B</b>	Transformer unit (optional)

Required equipment

Equipment	Spare part no.	Art. no.	Note
Heat exchanger unit	3HAC020892-001		
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC XX	Complete control system


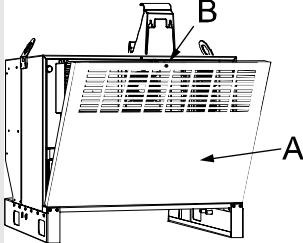
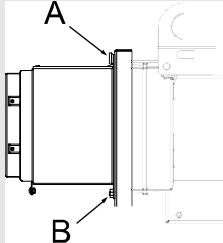
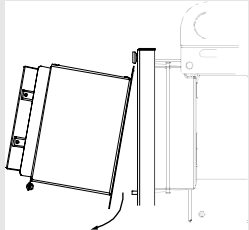


## 4 Repair activities, controller IRC5

### 4.1.8. Replacement of heat exchanger unit, IRC5


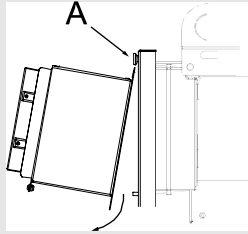
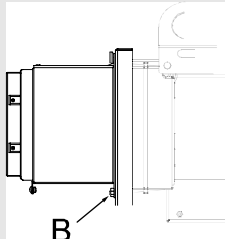
#### Removal

The procedure below details how to remove the heat exchanger unit.

step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	Remove the attachment screw on the rear cover.	 xx0400000854 <ul style="list-style-type: none"><li>• A: rear cover</li><li>• B: attachment screw</li></ul>
3.	Remove the <i>rear cover</i> .	Shown in the figure above.
4.	Remove the lower attachment nuts.	 xx0400000855 <ul style="list-style-type: none"><li>• A: cap nut</li><li>• B: attachment nut (2 pcs)</li></ul>
5.	Pull the heat exchanger down to release it from the cap nuts.	 xx0400000856

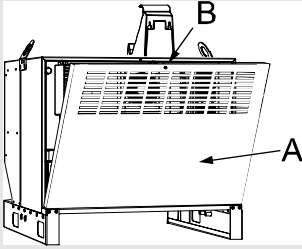
#### Refitting

The procedure below details how to refit the heat exchanger unit.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	Make sure that the sealings in the back of the heat exchanger are in place and undamaged before refitting.	
3.	Slide the heat exchanger recess in beneath the cap nut, and push up.	 <p>xx0400000864</p> <ul style="list-style-type: none"> <li>A: cap nut</li> </ul>
4.	Refit the attachment nuts.	 <p>xx0400000865</p> <ul style="list-style-type: none"> <li>B: attachment nut (2 pcs)</li> </ul>

## 4 Repair activities, controller IRC5

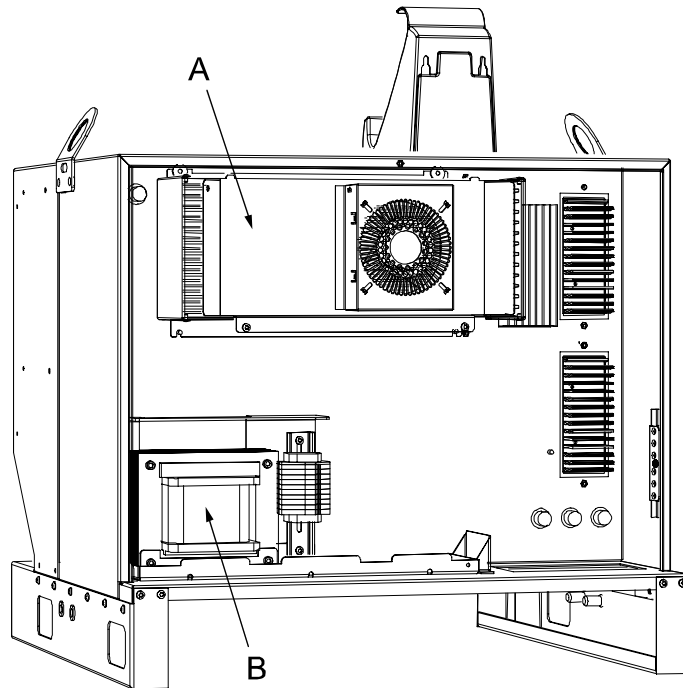
### 4.1.8. Replacement of heat exchanger unit, IRC5

Step	Action	Note/Illustration
5.	Refit the rear cover.	 <p>xx0400000854.wmf</p> <ul style="list-style-type: none"><li>• A: rear cover</li><li>• B: attachment screw</li></ul>
6.	Refit the <i>attachment screw</i>	Shown in the figure above.

#### 4.1.9. Replacement of Transformer unit in control module, IRC5

##### Location

The transformer unit is located in the back of the control module as shown below.



xx040000850

A	Heat exchanger unit
B	<b>Transformer unit (optional)</b>
C	I/O, Gateway or encoder units

##### Required equipment


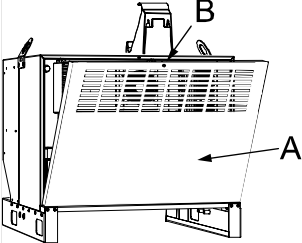
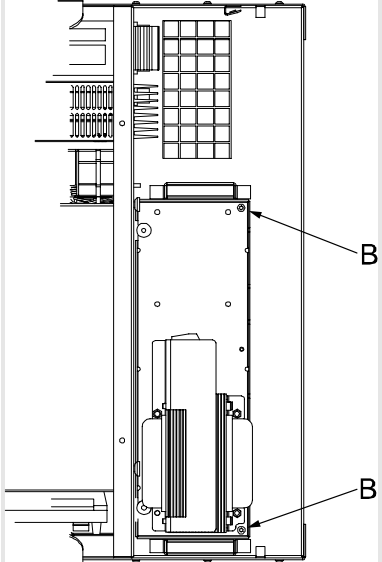
Equipment	Spare part no.	Art. no.	Note
Transformer module	3HAC020953-002		1,8 kVA
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC XX	Complete control system

## 4 Repair activities, controller IRC5

### 4.1.9. Replacement of Transformer unit in control module, IRC5

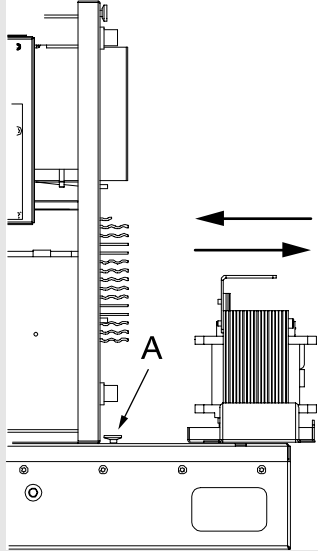
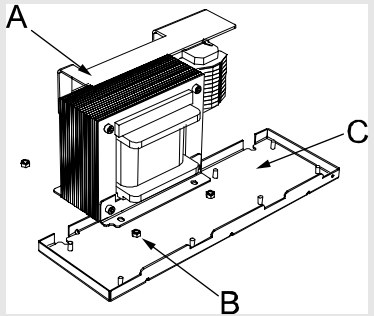
#### Removal

The procedure below details how to remove the transformer unit.

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	Loosen the attachment screw and remove the rear cover to the control module.	 xx0400000854 <ul style="list-style-type: none"><li>• A: rear cover</li><li>• B: attachment screw</li></ul>
3.	Remove the attachment screws.	 xx0400000866 Cabinet view from above <ul style="list-style-type: none"><li>• B: attachment screw (2 pcs)</li></ul>

## 4 Repair activities, controller IRC5

### 4.1.9. Replacement of Transformer unit in control module, IRC5


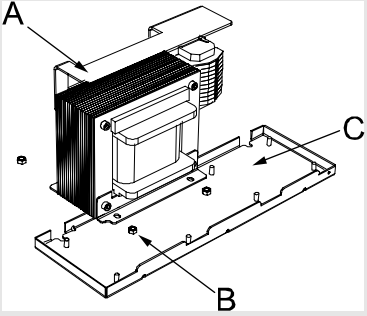
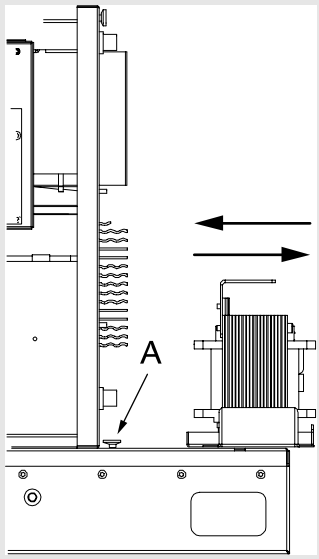
Step	Action	Note/Illustration
4.	Pull out the transformer bracket to release it from the cap nuts.	 <p>xx0400000867</p> <p>Cabinet view from left side</p> <ul style="list-style-type: none"><li>• A: cap nut</li></ul>
5.	Remove the attachment nuts.	 <p>xx0400000869</p> <ul style="list-style-type: none"><li>• A: transformer unit</li><li>• B: attachment nut (4 pcs)</li><li>• C: transformer bracket</li></ul>
6.	Remove the transformer from the transformer bracket.	Shown in the figure above.

### Refitting

This procedure below details how to refit the transformer unit.

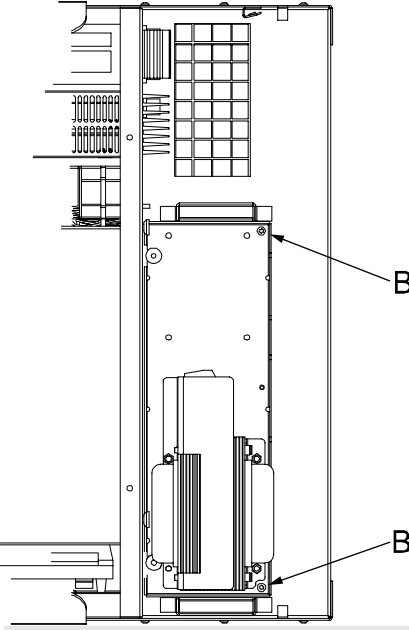
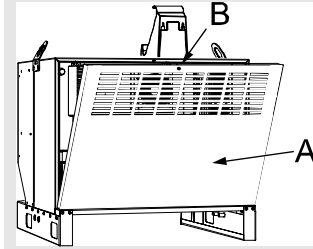
## 4 Repair activities, controller IRC5

### 4.1.9. Replacement of Transformer unit in control module, IRC5

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	Refit the transformer to the transformer bracket.	 <p>xx0400000869</p> <ul style="list-style-type: none"> <li>• A: transformer unit</li> <li>• B: attachment nut (4 pcs)</li> <li>• C: transformer bracket</li> </ul>
3.	Refit the <i>attachment nuts</i> .	Shown in the figure above.
4.	Refit the transformer bracket to fit the cap nuts.	 <p>xx0400000867</p> <p>Cabinet view from left side</p> <ul style="list-style-type: none"> <li>• A: cap nut</li> </ul>

## 4 Repair activities, controller IRC5

### 4.1.9. Replacement of Transformer unit in control module, IRC5

Step	Action	Note/Illustration
5.	Refit the attachment screw.	 <p>xx0400000866</p> <p>Cabinet view from above</p> <ul style="list-style-type: none"><li>• B: attachment screw (2 pcs)</li></ul>
6.	Refit the rear cover.	 <p>xx0400000854</p> <ul style="list-style-type: none"><li>• A: rear cover</li><li>• B: attachment screw</li></ul>
7.	Tighten the <i>attachment screw</i> .	



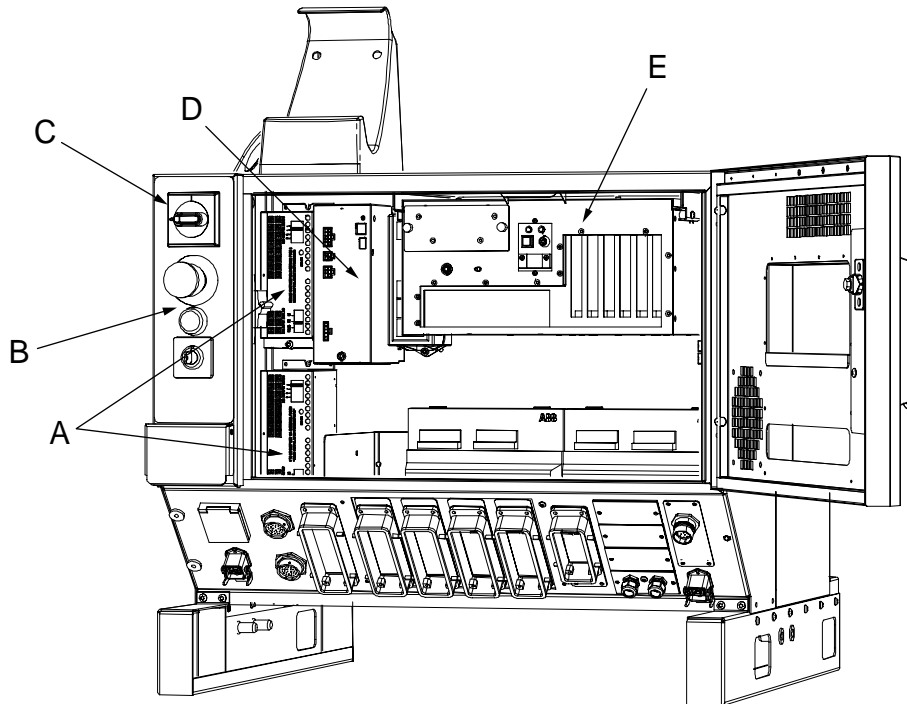
## 4 Repair activities, controller IRC5

### 4.1.10. Replacement of computer unit, IRC5

#### 4.1.10. Replacement of computer unit, IRC5

##### Location

The computer unit is located in the top of the module as shown below.



xx0400000815

A	Customer I/O power supply
B	Control panel
C	Main switch
D	Control module power supply
E	<b>Computer unit</b>



##### Required equipment

Equipment	Spare part no.	Art. no.	Note
Computer unit A, SSD	3HAC020929-001		Solid state drive
Computer unit B, HDD	3HAC020929-002		Hard disk drive
Standard toolkit			The contents are defined in section Standard toolkit!

Equipment	Spare part no.	Art. no.	Note
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC XX	Complete control system

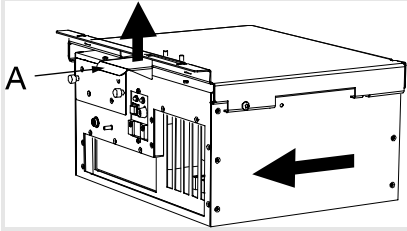
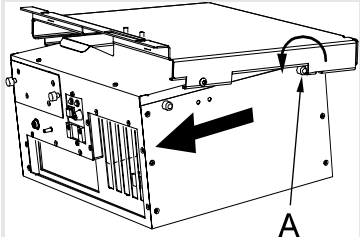
### Removal

The procedure below details how to remove the computer unit.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	 <p>Warning!</p> <p><b>WARNING!</b></p> <p>The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20</p>	
3.	Disconnect all connectors from the computer unit.	



## 4 Repair activities, controller IRC5

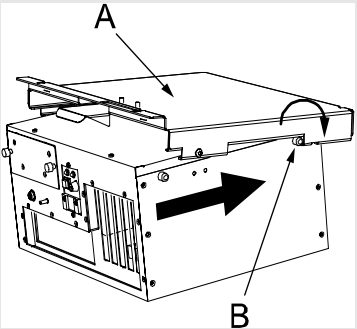
### 4.1.10. Replacement of computer unit, IRC5

Step	Action	Note/Illustration
4.	Lift the spring lock, and pull the computer unit out until it reaches the end stop.	 <p>xx0400000820</p> <ul style="list-style-type: none"> <li>A: spring lock</li> </ul>
5.	Lift the guide pins in the back end of the computer unit over the stop, and pull the unit out.	 <p>xx0400000821</p> <ul style="list-style-type: none"> <li>A: Guide pin (4 pcs)</li> </ul>

### Refitting

The procedure below details how to refit the computer unit.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	 <p>Warning!</p> <p><b>WARNING!</b></p> <p>The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20</p>	

Step	Action	Note/Illustration
3.	Lift the guide pins in the back of the computer unit over the stop.	 <p data-bbox="1059 689 1166 712">xx040000822</p> <ul data-bbox="1094 721 1437 786" style="list-style-type: none"><li>• A: Computer mounting plate</li><li>• B: Guide pin (4 pcs)</li></ul>
4.	Lift the front of the computer to fit the guide pins in front to the rails on the computer mounting plate, and push the computer unit until the spring lock snaps into position.	
5.	Reconnect the connectors to the computer unit.	

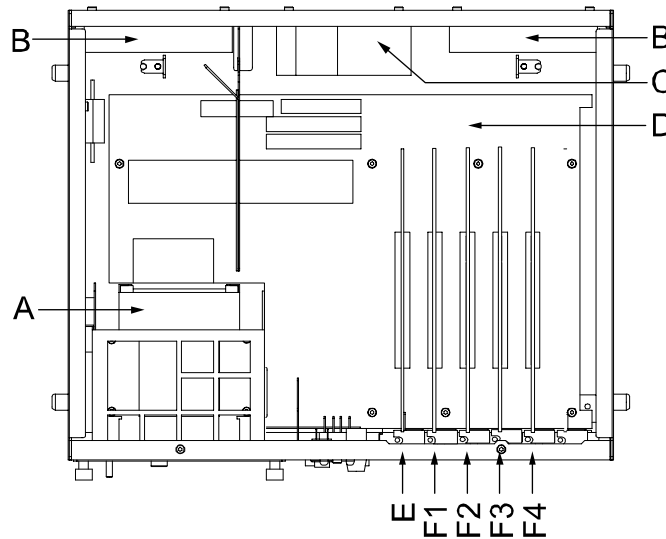
## 4 Repair activities, controller IRC5

### 4.1.11. Replacement of main computer motherboard and related components, IRC5

#### 4.1.11. Replacement of main computer motherboard and related components, IRC5

##### Location

The main computer motherboard is located as shown in the figure below.



xx0400000870

A	Solid state and hard disk drive
B	Computer fans
C	Power supply
D	<b>Main computer motherboard</b>
E	Slot for Robot Communication Card (RCC)
F1-F4	Slots for PCI cards

##### Required equipment



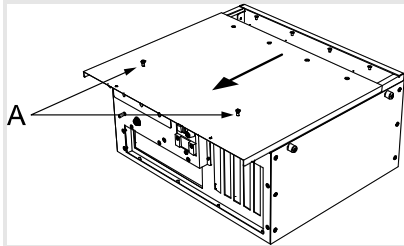
Equipment	Spare part no.	Art. no.	Note
Computer A, SSD	3HAC020929-001		DSQC 600 Includes the memory modules.
Computer B, HDD	3HAC020929-002		DSQC 600 Includes the memory modules.
Standard toolkit			The contents are defined in section Standard toolkit!

### 4.1.11. Replacement of main computer motherboard and related components, IRC5

Equipment	Spare part no.	Art. no.	Note
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC 13459-2	Complete control system

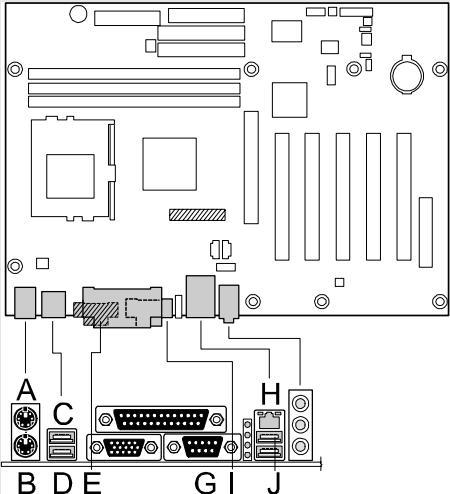
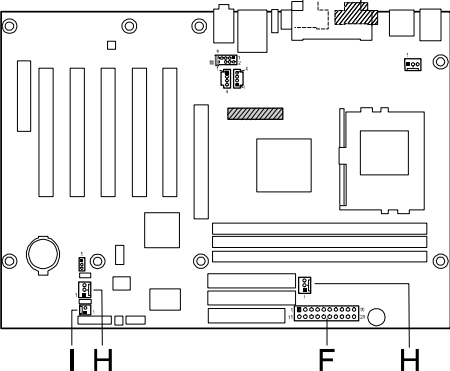
### Removal

The procedure below details how to remove the motherboard and related components.

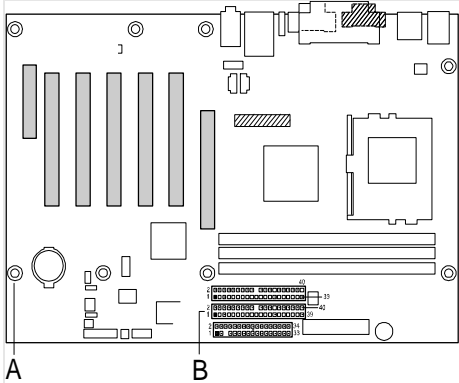
Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	 <p>Warning!</p> <p><b>WARNING!</b></p> <p>The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20</p>	
3.	Remove the Computer Module.	Detailed in section <i>Replacement of computer unit.</i>
4.	Remove the two attachment screws, and open the Computer Module by pulling the cover in the arrow direction.	 <p>XX0400000873</p> <ul style="list-style-type: none"> <li>A: attachment screw (2 pcs)</li> </ul>

## 4 Repair activities, controller IRC5

### 4.1.11. Replacement of main computer motherboard and related components, IRC5



Step	Action	Note/Illustration
5.	Remove the hard disk, flash disk drive bay.	Detailed in section <a href="#">Replacement of hard disk drive, flash disk drive and cable</a>
6.	Remove any PCI cards fitted to the motherboard.	Detailed in section <a href="#">Replacement of boards in the Computer Module slots.</a>
7.	Disconnect all connectors from the computer unit.	 <p>xx0300000340</p> <p>Connectors:</p> <ul style="list-style-type: none"> <li>• A: mouse cableNot used!</li> <li>• B: keyboard cableNot used!</li> <li>• C: USB 1</li> <li>• D: USB 3</li> <li>• E: VGANot used</li> <li>• G: serial port ANot used</li> <li>• H: LAN</li> <li>• I: USB 2Not used</li> <li>• J: USB 0Not used</li> </ul>
8.	Disconnect the connectors from the motherboard.	 <p>xx0300000341</p> <p>Connectors:</p> <ul style="list-style-type: none"> <li>• F: power</li> <li>• H: system fan</li> <li>• I: front panel</li> </ul>

### 4.1.11. Replacement of main computer motherboard and related components, IRC5

Step	Action	Note/Illustration
9.	Disconnect the connectors from the motherboard.	 <p style="text-align: center;">A                      B</p> <p>xx0300000342</p> <p>Connectors:</p> <ul style="list-style-type: none"> <li>• A: attachment screw (8 pcs)</li> <li>• B: primary IDE</li> </ul>
10.	Remove the eight motherboard attachment screws.	NOTE! Always grip the board around the edges to avoid damage to the board or its components!
11.	Gently lift the motherboard out.	NOTE! Immediately put the board in an ESD safe bag or similar!

### Refitting

The procedure below details how to refit the motherboard and related components.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <a href="#">DANGER - Make sure that the main power has been switched off!</a> on page 19.</p>	
2.	 <p>Warning!</p> <p><b>WARNING!</b></p> <p>The unit is sensitive to ESD, before handling the unit please observe the safety information in section <a href="#">WARNING - The unit is sensitive to ESD!</a> on page 20</p>	



## 4 Repair activities, controller IRC5

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### 4.1.11. Replacement of main computer motherboard and related components, IRC5

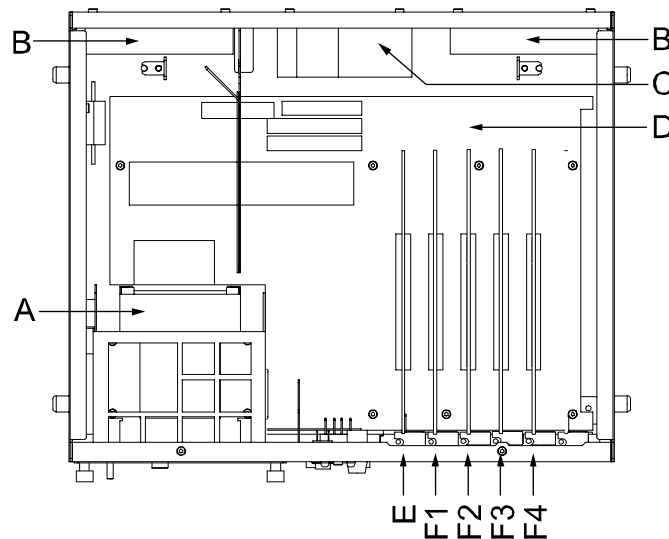
Step	Action	Note/Illustration
3.	Gently lift the motherboard out of the ESD safe bag and fit it into position in the computer module.	NOTE! Always grip the board around the edges to avoid damage to the board or its components!
4.	Secure the board with its eight attachment screws.	
5.	Reconnect all connectors to the motherboard.	As specified in the illustrations in section <a href="#">Removal</a> .
6.	Refit any PCI boards to the motherboard.	Detailed in section <a href="#">Replacement of boards in the Computer Module slots</a> .
7.	Refit the hard disk, flash disk drive bay.	Detailed in section <a href="#">Replacement of hard disk drive, flash disk drive and cable</a> .
8.	Close the computer unit, and refit the attachment screws.	
9.	Refit the computer unit.	Detailed in section <a href="#">Replacement of computer unit</a> .

#### 4.1.12. Replacement of PCI cards in the Computer unit slots, IRC5

##### Location

A number of cards may be fitted in the slots in the Computer Module as shown in the figure below:

- Interbus Master/Slave with copper interface
- Interbus Master/Slave with fiber-optic interface
- Robot communication card
- Ethernet card
- DeviceNet master/slave
- Profibus DP master/slave
- Dual RS-232 card



xx0400000870

A	Solid state drive / hard disk drive
B	Computer unit fan
C	Power Supply
D	Main computer motherboard
E	Slot for Robot Communication Card (RCC)
F1-F4	Slots for PCI cards

## 4 Repair activities, controller IRC5

### 4.1.12. Replacement of PCI cards in the Computer unit slots, IRC5



#### Required equipment

Equipment	Spare part no.	Art no.	Note
Interbus master/slave, copper wire		3HAC11819-1	DSQC 529 Interbus communication is also described in <a href="#">Interbus User's Guide</a> .
Interbus master/slave, optical fibre		3HAC12092-1	DSQC 512 Interbus communication is also described in <a href="#">Interbus User's Guide</a> .
Robot Com. Card		3HAC12816-1	DSQC 602 Always to be fitted in slot 1 as shown in the figure in section <a href="#">Location</a> . Only used in CM.
Ethernet card		3HAC 15639-1	DSQC 612 Only used in multirobot control applications!
DeviceNet master/slave		3HAC 12817-1	DSQC 603 DeviceNet communication is also described in "DeviceNet User's Guide"
Profibus DP master/slave		3HAC 5577-1	DSQC 510 Profibus communication is also described in "Profibus User's Guide"
Dual RS-232 card		3HAC 14864-1	DSQC 614 Always to be fitted in slot 5 as shown in the figure in section <a href="#">Location</a> .
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.

Equipment	Spare part no.	Art no.	Note
Profibus User's Guide		3HAC 10610-1	Contains information on how to configure the system for Profibus cards.
Interbus User's Guide		3HAC 12979-1	Contains information on how to configure the system for Interbus cards.
DeviceNet User's Guide		3HAC xx	Contains information on how to configure the system for DeviceNet cards.
Circuit Diagram		3HAC 13459-2	Complete control system

## Removal

The procedure below details how to remove the cards.

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <a href="#">DANGER - Make sure that the main power has been switched off!</a> on page 19.	
2.	 Warning! <b>WARNING!</b> The unit is sensitive to ESD, before handling the unit please observe the safety information in section <a href="#">WARNING - The unit is sensitive to ESD!</a> on page 20	
3.	Remove the computer unit.	Detailed in section <a href="#">Replacement of computer unit, IRC5</a> on page 128.
4.	Open the Computer Module.	Detailed in section <a href="#">Replacement of main computer motherboard and related components, IRC5</a> on page 132.
5.	Identify the card to be replaced.	The barcode sticker contains information on type designation.



## 4 Repair activities, controller IRC5

### 4.1.12. Replacement of PCI cards in the Computer unit slots, IRC5

Step	Action	Note/Illustration
6.	Disconnect any cables to/from the card.	Make a note of which cables are disconnected.
7.	Remove the Torx attachment screw on top of the card bracket.	NOTE! Always grip the card around the edges to avoid damage to the card or its components!
8.	Gently lift the card straight up.	NOTE! Immediately put the card in an ESD safe bag or similar!

### Refitting

The procedure below details how to refit the cards.

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <a href="#">DANGER - Make sure that the main power has been switched off!</a> on page 19.	
2.	 Warning! <b>WARNING!</b> The unit is sensitive to ESD, before handling the unit please observe the safety information in section <a href="#">WARNING - The unit is sensitive to ESD!</a> on page 20	
3.	Fit the card in position by pushing the card into the socket on the motherboard. Secure it with its attachment screw.	NOTE! Always grip the card around the edges to avoid damage to the card or its components!
4.	Connect any additional cables to the card.	Reconnect as noted on disassembly.
5.	Close the Computer Module and put it in its operational position.	Detailed in section <a href="#">Replacement of modules in the control cabinet.</a>
6.	Make sure the robot system is configured to reflect the communication units installed.	Detailed in documents specified in section <a href="#">Required equipment.</a>

### 4.1.12. Replacement of PCI cards in the Computer unit slots, IRC5

Step	Action	Note/Illustration
7.	Close the computer unit.	Detailed in section <a href="#">Replacement of main computer motherboard and related components, IRC5</a> on page 132.
8.	Refit the computer unit.	Detailed in section <a href="#">Replacement of computer unit, IRC5</a> on page 128.

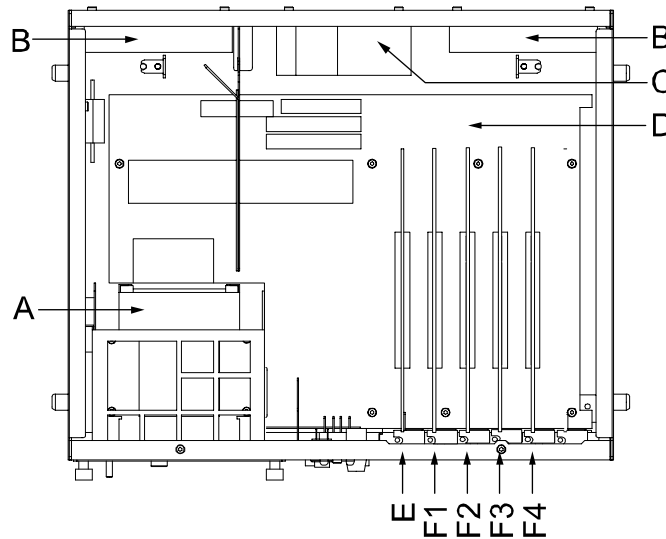
## 4 Repair activities, controller IRC5

### 4.1.13. Replacement of computer unit fan, IRC5

### 4.1.13. Replacement of computer unit fan, IRC5

#### Location

The computer fan is located in the back of the computer unit as shown below.



xx0400000870



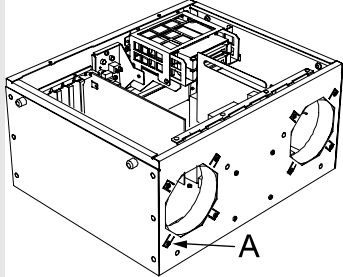
A	Solid state drive / hard disk drive
<b>B</b>	<b>Computer unit fan</b>
C	Power Supply
D	Main computer motherboard
E	Slot for Robot Communication Card (RCC)
F1-F4	Slots for PCI cards

#### Required equipment

Equipment	Spare part no.	Art. no.	Note
Computer unit fan	?????????		
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC 13459-2	Complete control system

#### Removal

The procedure below details how to remove the computer unit fan.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	 <p>Warning!</p> <p><b>WARNING!</b></p> <p>The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20</p>	
3.	Remove the computer unit.	Detailed in section <i>Replacement of computer unit, IRC5</i> on page 128.
4.	Open the computer unit.	Detailed in section <i>Replacement of main computer motherboard and related components, IRC5</i> on page 132.
5.	Disconnect the connectors.	Detailed in section <i>Replacement of main computer motherboard and related components, IRC5</i> on page 132.
6.	Remove the attachment screws.	 <p>xx0400000875</p> <ul style="list-style-type: none"> <li>A: Attachment screw (4 pcs/fan)</li> </ul>



#### Refitting

The procedure below details how to refit the computer unit fan.



## 4 Repair activities, controller IRC5

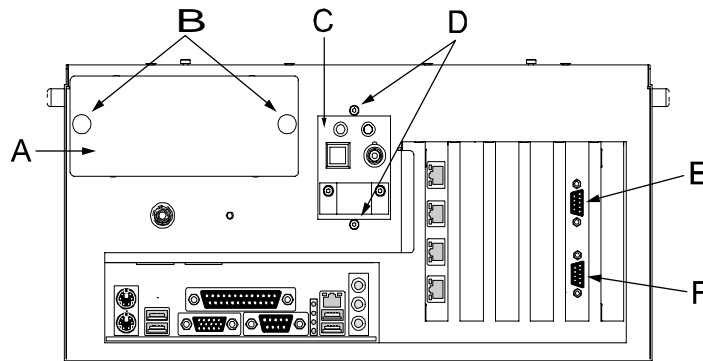
### 4.1.13. Replacement of computer unit fan, IRC5

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	 Warning! <b>WARNING!</b> The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20	
3.	Refit the attachment screws.	
4.	Reconnect the connectors.	Detailed in section <i>Replacement of main computer motherboard and related components, IRC5</i> on page 132.
5.	Close the computer unit, and refit the attachment screws.	
6.	Refit the computer unit.	Detailed in section <i>Replacement of computer unit, IRC5</i> on page 128.

#### 4.1.14. Replacement of hard disk and solid state drive and cable, IRC5

##### Location

Either the hard disk drive or the solid state drive and cable are located in a bay in the computer module as shown in the figure below.



xx040000870

<b>A</b>	<b>Bay for hard disk and solid state drive</b>
<b>B</b>	Cage attachment screws, hard disk and solid state drive cages
<b>C</b>	Switches and LEDs
<b>D</b>	Attachment screws, switch and LED assembly

##### Required equipment

Equipment	Spare part no.	Art. no.	Note
HDD MC with carrier		3HAC 14441-1	Includes all required mounting hardware. To be used with <i>Computer Module</i> only Includes <i>ABB VxWorks boot image</i> software to correctly reboot the robot controller.
SSD MC with carrier		3HAC 14441-2	Includes all required mounting hardware. To be used with <i>Computer Module</i> only Includes <i>ABB VxWorks boot image</i> software to correctly reboot the robot controller.
ATA-100 cable		3HAC 14441-14	Max. 100MB/s
Standard toolkit			The contents are defined in section Standard toolkit!



## 4 Repair activities, controller IRC5

### 4.1.14. Replacement of hard disk and solid state drive and cable, IRC5

Equipment	Spare part no.	Art. no.	Note
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC 13459-2	Complete control system

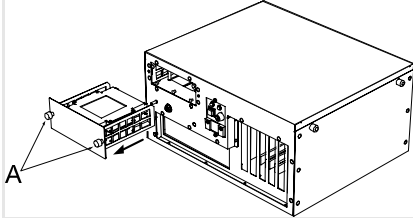
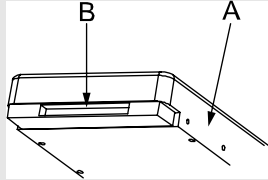
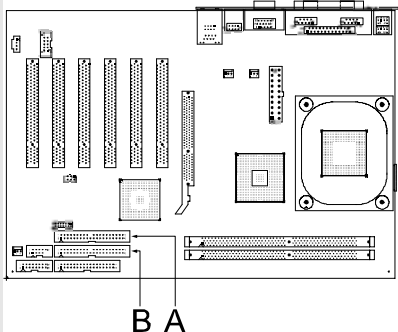
### Removal

The procedure below details how to remove the hard disk drive or the solid state drive and cable.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	 <p>Warning!</p> <p><b>WARNING!</b></p> <p>The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20</p>	
3.	Remove the computer unit.	Detailed in section <i>Replacement of computer unit, IRC5</i> on page 128.
4.	Open the computer unit.	Detailed in section <i>Replacement of main computer motherboard and related components, IRC5</i> on page 132.

## 4 Repair activities, controller IRC5

### 4.1.14. Replacement of hard disk and solid state drive and cable, IRC5



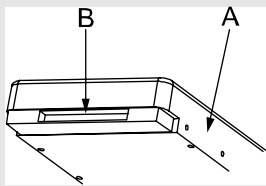
Step	Action	Note/Illustration
5.	Unscrew the cage attachment screws for the drive cages, and pull the cage out in arrow direction.	 <p>xx040000879</p> <ul style="list-style-type: none"><li>• A: a Cage attachment screw (2 pcs)</li></ul>
6.	Disconnect the ribbon cable from the unit.	 <p>xx040000941</p> <ul style="list-style-type: none"><li>• A: Hard disk, solid state drive</li><li>• B: Flat ribbon cable connection, 40 pin</li></ul>
7.	Disconnect the 40 pin interface cable from the motherboard.	 <p>xx040000895</p> <ul style="list-style-type: none"><li>• A: Primary IDE connector</li><li>• B: Secondary IDE connector</li></ul>
8.	Remove and replace the complete cage and drive assembly.	

### Refitting

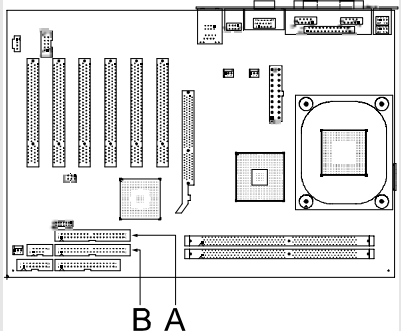
The procedure below details how to refit the hard disk drive or the solid state drive and cable.

## 4 Repair activities, controller IRC5

### 4.1.14. Replacement of hard disk and solid state drive and cable, IRC5

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	 Warning! <b>WARNING!</b> The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20	
3.	Fit the complete cage and drive assembly and secure it with its attachment screws.	
4.	Make sure the drive to be used is defined as "Master" by fitting a jumper.	How to define the unit as "Master" is shown on a sticker on the unit. This has usually been done before delivery.
5.	Reconnect the flat ribbon cable to the unit.	 xx0300000407 <ul style="list-style-type: none"><li>• A: Hard disk, solid state drive</li><li>• B: Flat ribbon cable connection, 40 pin</li></ul>

### 4.1.14. Replacement of hard disk and solid state drive and cable, IRC5

Step	Action	Note/Illustration
6.	Reconnect the flat ribbon cable to the primary IDE connector on the motherboard.	 <p>xx0400000895</p> <ul style="list-style-type: none"> <li>• A: Primary IDE connector</li> <li>• B: Secondary IDE connector</li> </ul>
7.	Make sure the drive to be used is defined as "Master" by fitting a jumper.	How to define the unit as "Master" is shown on a sticker on the unit. This has usually been done before delivery.
8.	Push the cage back in to the computer unit, and secure it with the attachment screws.	Shown in the figure in section <a href="#">Location</a> .
9.	Make sure no cable is damaged, and close the computer unit	Detailed in section <a href="#">Replacement of main computer motherboard and related components, IRC5</a> on page 132.

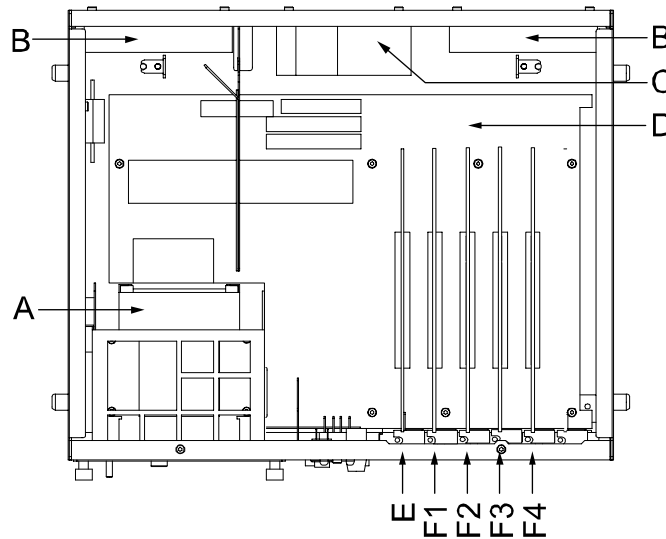
## 4 Repair activities, controller IRC5

### 4.1.15. Replacement of computer power supply, IRC5

#### 4.1.15. Replacement of computer power supply, IRC5

##### Location

The computer power supply is located in the computer unit as shown below.



xx0400000870



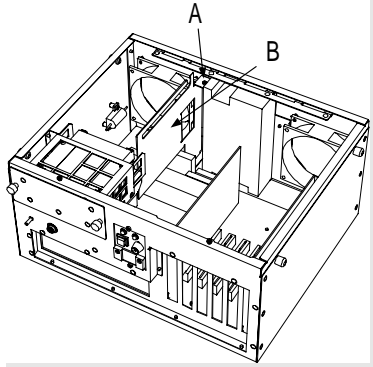
A	Solid State drive / hard disk drive
B	Computer unit fan
C	<b>Power supply</b>
D	Main computer motherboard
E	Slot for Robot Communication Card (RCC)
F1-F4	Slots for PCI cards

##### Required equipment

Equipment	Spare part no.	Art. no.	Note
Power supply	3HAC020464-001		DSQC 625
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC 13459-2	Complete control system

#### Removal

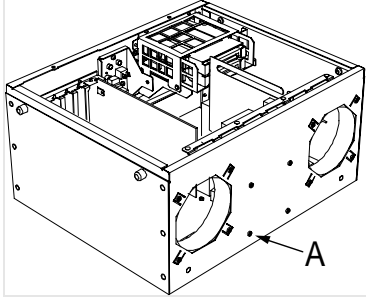
The procedure below details how to remove the computer power supply.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	 <p>Warning!</p> <p><b>WARNING!</b></p> <p>The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20</p>	
3.	Remove the computer unit.	Detailed in section <i>Replacement of computer unit, IRC5</i> on page 128.
4.	Open the computer unit.	Detailed in section <i>Replacement of main computer motherboard and related components, IRC5</i> on page 132.
5.	Loosen the attachment screw and remove the air deflector plate.	 <p>xx0400001135</p> <ul style="list-style-type: none"> <li>• A: attachment screw</li> <li>• B: air deflector plate</li> </ul>
6.	Disconnect the 24V and 0V power cables.	
7.	Disconnect the connector connected to the mother board.	
8.	Disconnect the power cables to the computer fan units.	





## 4 Repair activities, controller IRC5

### 4.1.15. Replacement of computer power supply, IRC5

Step	Action	Note/Illustration
9.	Remove the attachment screws.	 <p>xx0400000909</p> <ul style="list-style-type: none"> <li>A: attachment screw (4 pcs)</li> </ul>
10.	Remove the computer power supply.	

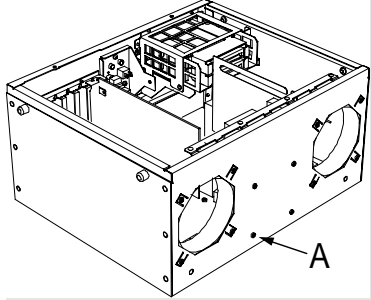
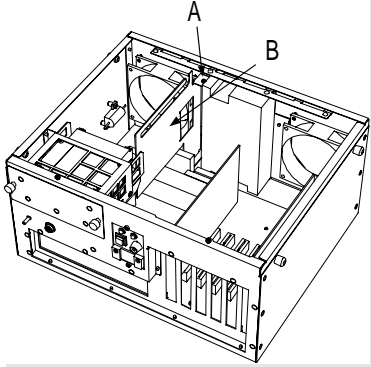
### Refitting

The procedure below details how to refit the computer power supply.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i><a href="#">DANGER - Make sure that the main power has been switched off!</a></i> on page 19.</p>	
2.	 <p>Warning!</p> <p><b>WARNING!</b></p> <p>The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i><a href="#">WARNING - The unit is sensitive to ESD!</a></i> on page 20</p>	
3.	Refit the computer power supply.	

## 4 Repair activities, controller IRC5

### 4.1.15. Replacement of computer power supply, IRC5

Step	Action	Note/Illustration
4.	Refit the Attachment screws.	 xx040000909
5.	Reconnect all connectors.	
6.	Refit the air deflector plate, and tighten the attachment screw.	 xx0400001135 <ul style="list-style-type: none"><li>• A: attachment screw</li><li>• B: air deflector plate</li></ul>
7.	Refit the computer unit cover.	Detailed in section <a href="#">Replacement of main computer motherboard and related components, IRC5</a> on page 132.
8.	Refit the computer unit.	Detailed in section <a href="#">Replacement of computer unit, IRC5</a> on page 128.

## 4 Repair activities, controller IRC5

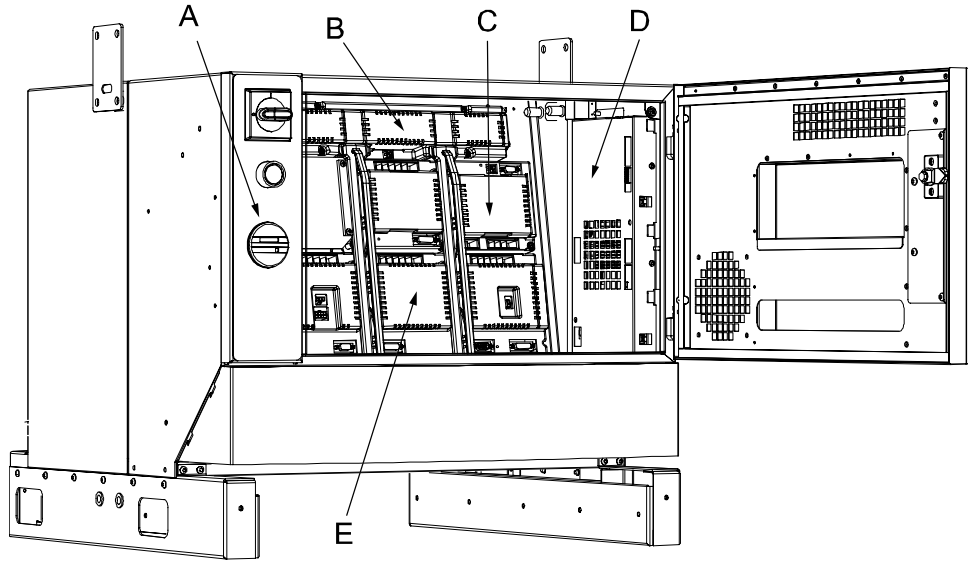
### 4.2.1. Replacement of servo drive units, rectifiers and capacitor units, IRC5

## 4.2 Drive Module

### 4.2.1. Replacement of servo drive units, rectifiers and capacitor units, IRC5

#### Location

The servo drive units, rectifiers and capacitor units are located in the drive module as shown below.



xx040000997

A	Control panel
B	Capacitor
C	Rectifier
D	Axis computer
E	Drive units

#### Configuration

The drive module exists in a number of versions, these are described in section [Configuration of Drive Module Units](#)

#### Required equipment


Equipment	Spare part no.	Art. no.	Note
Drive modules, rectifiers and capacitor units			Specified in section <a href="#">Configuration of Drive Module Units</a>
Standard toolkit			The contents are defined in section Standard toolkit!

### 4.2.1. Replacement of servo drive units, rectifiers and capacitor units, IRC5

Equipment	Spare part no.	Art. no.	Note
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC 13459-2	Complete control system

### Removal

The procedure below details how to remove the servo drive units, rectifiers and capacitor units.

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <a href="#">DANGER - Make sure that the main power has been switched off!</a> on page 19.	
2.	Disconnect all connectors from the unit to be replaced.	
3.	Remove all bus bars between units.	Specified in section <a href="#">Configuration of Drive Module Units</a>
4.	Remove the drive unit after unscrewing its <i>attachment screws</i> .	Shown in the figure in section <a href="#">Location</a> .


### Refitting

The procedure below details how to refit the servo drive units, rectifiers and capacitor units.

## 4 Repair activities, controller IRC5

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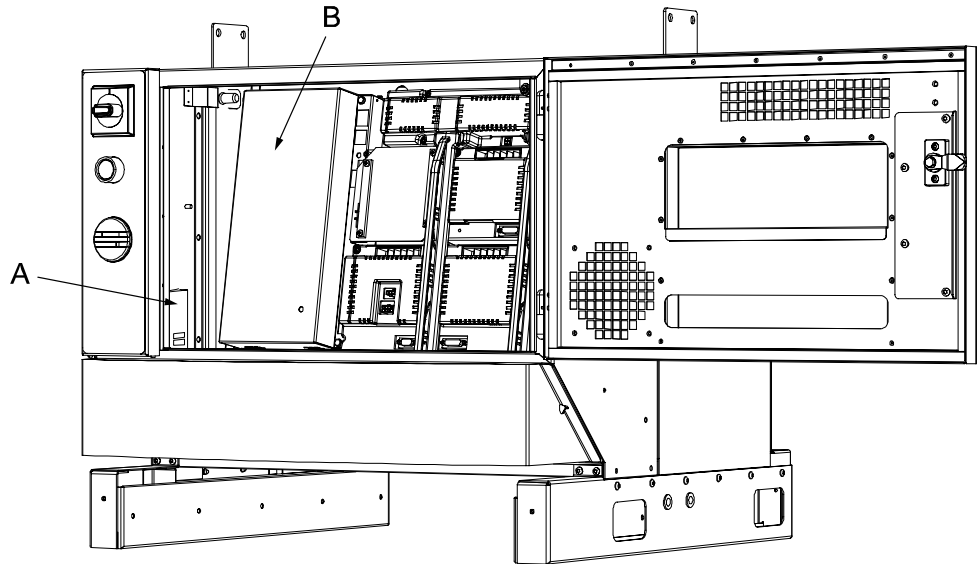
### 4.2.1. Replacement of servo drive units, rectifiers and capacitor units, IRC5

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	Fit the unit in its intended position and orientation. Secure it with its attachment screws.	
3.	Reconnect all <i>busbars</i> between units.	
4.	Reconnect any connectors disconnected at removal.	

4.2.2. Replacement of drive system power supply, IRC5

Location

The drive system power supply is located in the drive module as shown in the illustration below.



xx0400000998

A	Contactor board
B	Drive system power supply

Required equipment


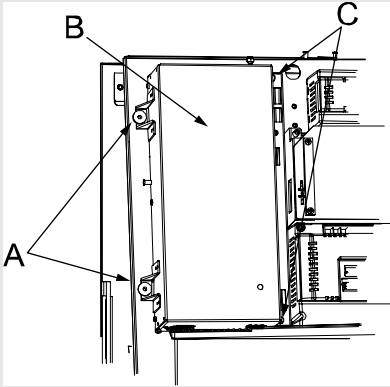
Equipment	Spare part no.	Art. no.	Note
Drive system power supply	3HAC020465-001		DSQC 626
Drive system power supply	3HAC020466-001		DSQC 627
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC 13459-2	Complete control system

## 4 Repair activities, controller IRC5

### 4.2.2. Replacement of drive system power supply, IRC5

#### Removal

The procedure below details how to remove the drive system power supply.


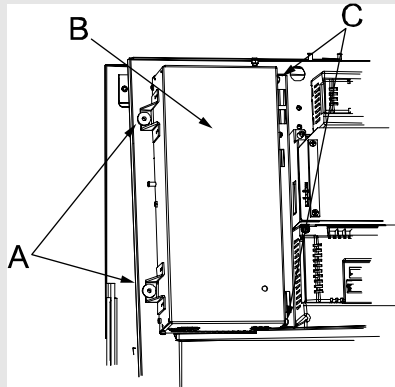
Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	Disconnect all connectors from the unit.	
3.	Loosen the attachment screws.	 xx0400000999 <ul style="list-style-type: none"><li>• A: cup nut (2 pcs)</li><li>• B: power supply</li><li>• C: attachment screw (2 pcs)</li></ul>
4.	Pull the power supply unit to the right to release it from the <i>cap nuts</i> , and remove it.	

#### Refitting

The procedure below details how to refit the drive system power supply.

## 4 Repair activities, controller IRC5

### 4.2.2. Replacement of drive system power supply, IRC5

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any repair work, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i>	
2.	Refit the power supply by sliding the recess in beneath the cap nuts, and push it to the left.	
3.	Tighten the <i>attachment screws</i> .	 xx040000999 <ul style="list-style-type: none"><li>• A: cup nut (2 pcs)</li><li>• B: power supply</li><li>• C: attachment screw (2 pcs)</li></ul>
4.	Reconnect all connectors to the unit .	



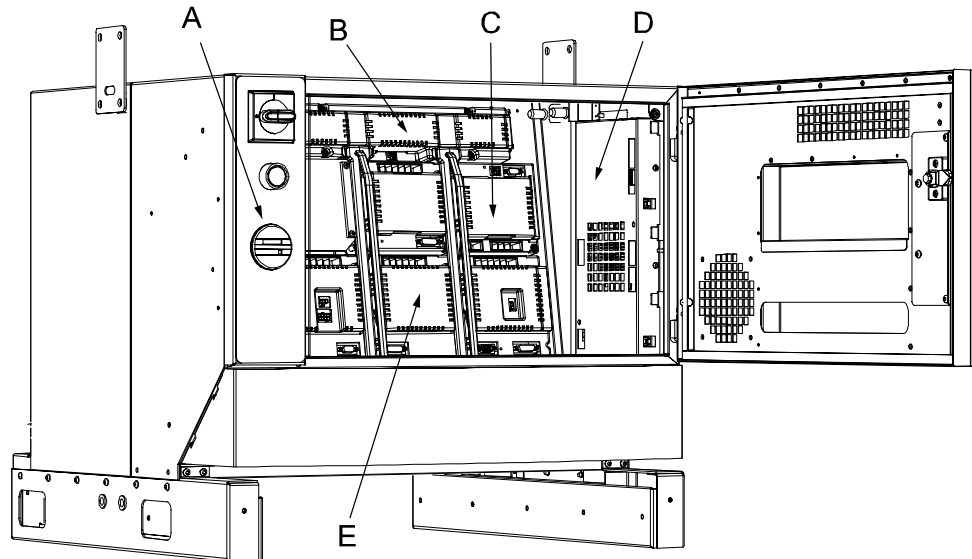
## 4 Repair activities, controller IRC5

### 4.2.3. Replacement of axis computer, IRC5

### 4.2.3. Replacement of axis computer, IRC5

#### Location

The axis computer is located in the drive module as shown below.



dummy


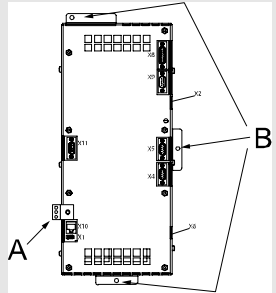
A	Control panel
B	Capacitor
C	Rectifier
D	Axis computer
E	Drive units

#### Required equipment

Equipment	Spare part no.	Art. no.	Note
Axis computer	3HAC020919-001		DSQC 601
Standard toolkit			The contents are defined in the Reference manual, section Standard toolkit
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC 13459-2	Complete control system


#### Removal

The procedure below details how to remove the axis computer.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <a href="#">DANGER - Make sure that the main power has been switched off!</a> on page 19.</p>	
2.	Disconnect all connectors from the axis computer.	
3.	Remove the attachment nuts.	 <p>dummy</p> <ul style="list-style-type: none"> <li>• A: ground connection plate</li> <li>• B: attachment nuts (3 pcs)</li> </ul>
4.	Remove the <i>ground connection plate</i> .	
5.	Remove the axis computer.	

#### Refitting

The procedure below details how to refit the axis computer.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <a href="#">DANGER - Make sure that the main power has been switched off!</a> on page 19.</p>	
2.	Reconnect all the connectors.	

## 4 Repair activities, controller IRC5

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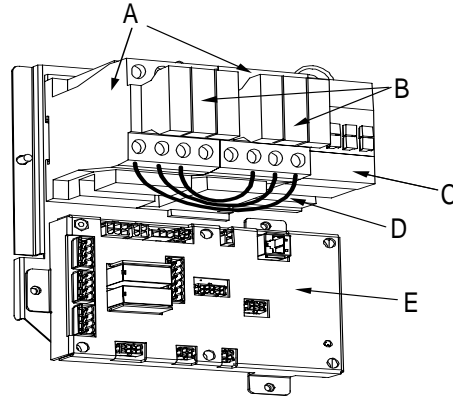
### 4.2.3. Replacement of axis computer, IRC5

Step	Action	Note/Illustration
3.	Refit the <i>attachment nuts</i> .	
4.	Refit the <i>ground connection plate</i>	

4.2.4. Replacement of Contactor Interface Board, IRC5

Location

The contactor board is located in the drive module as shown below.



xx0400001058

A	MOTOR ON contactor R2
B	MOTOR ON contactor R3
C	brake contactor
D	jumpers (3pcs)
E	contactor interface board

Required equipment



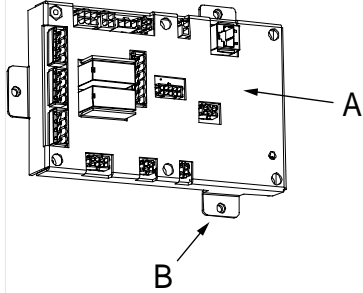
Equipment	Spare part no.	Art. no.	Note
Contactor Interface board	3HAC13389-2		DSQC 611
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Board		3HAC 13459-2	Complete control system

## 4 Repair activities, controller IRC5

### 4.2.4. Replacement of Contactor Interface Board, IRC5



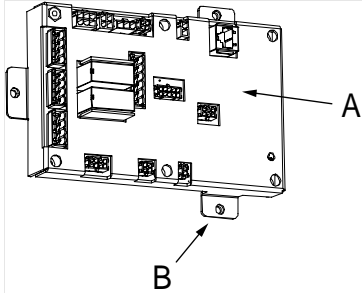
#### Removal

The procedure below details how to remove the contactor board.

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	 Warning! <b>WARNING!</b> The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20	
3.	Disconnect all connectors.	
4.	Refit the attachment screws.	 xx0400001062 <ul style="list-style-type: none"><li>• A: contactor interface board</li><li>• B: attachment screws, (3 pcs)</li></ul>
5.	Remove the contactor interface board.	

#### Refitting

The procedure below details how to refit the contactor board.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	 <p>Warning!</p> <p><b>WARNING!</b> The unit is sensitive to ESD, before handling the unit please observe the safety information in section <i>WARNING - The unit is sensitive to ESD!</i> on page 20</p>	
3.	Refit the contactor interface board.	
4.	Refit the attachment screws.	 <p>xx0400001062</p> <ul style="list-style-type: none"> <li>• A: contactor interface board</li> <li>• B: attachment screws, (3 pcs)</li> </ul>
5.	Reconnect all connectors.	

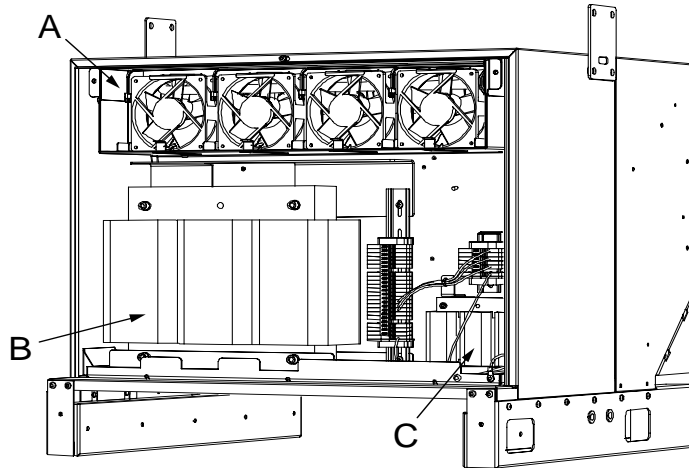
## 4 Repair activities, controller IRC5

### 4.2.5. Replacement of drive module fans, IRC5

### 4.2.5. Replacement of drive module fans, IRC5

#### Location

The fans is located in the drive module as shown below.



dummy


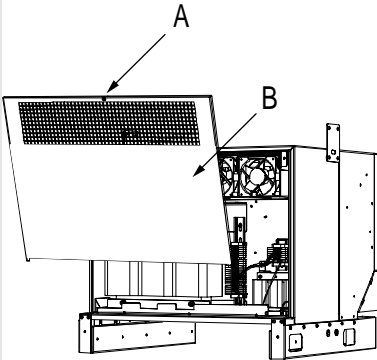
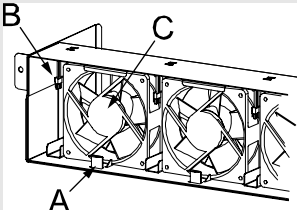
A	Fan holder with fans
B	Transformer module
C	Transformer module

#### Required equipment

Equipment	Spare part no.	Art. no.	Note
Fan	3HAC12924-3		
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC 13459-2	Complete control system

#### Removal

The procedure below details how to remove a drive unit fan.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	Loosen the attachment screw and remove the rear cover.	 <p>xx0400000854</p> <ul style="list-style-type: none"> <li>• A: attachment screw (Torx Tx25)</li> <li>• B: rear cover</li> </ul>
3.	Disconnect the <i>connector</i> .	
4.	Push the <i>spring lock</i> down.	 <p>dummy</p> <ul style="list-style-type: none"> <li>• A: spring lock</li> <li>• B: connector</li> <li>• C: fan</li> </ul>
5.	Pull out the fan.	

#### Refitting


The procedure below details how to refit a drive unit fan.



## 4 Repair activities, controller IRC5

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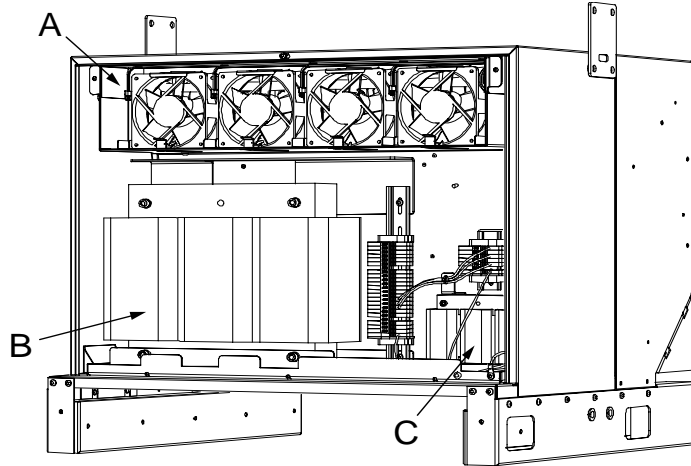
### 4.2.5. Replacement of drive module fans, IRC5

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	Refit the new fan and push it in position.	Make sure that fan is mounted in the right direction.
3.	Reconnect the <i>connector</i> .	
4.	Refit the <i>rear cover</i> .	

4.2.6. Replacement of drive module fan holder with fans, IRC5

Location

The fan holder with fans is located in the drive module as shown below.



xx0400000996

A	Fan holder with fans
B	Transformer unit
C	Transformer unit

Required equipment


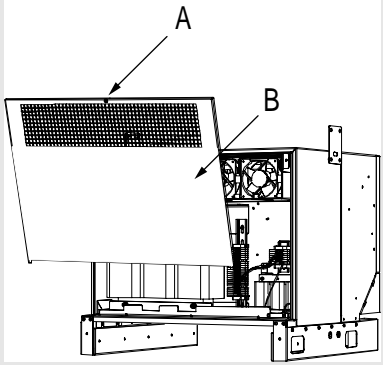
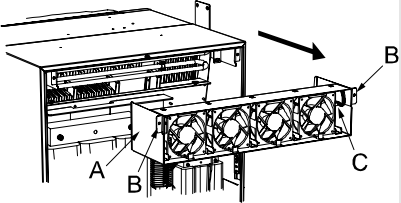
Equipment	Spare part no.	Art. no.	Note
Fan holder with fans	3HAC020953-001		
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC 13459-2	Complete control system

## 4 Repair activities, controller IRC5

### 4.2.6. Replacement of drive module fan holder with fans, IRC5


#### Removal

The procedure below details how to remove the fan holder with fans.

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	Loosen the attachment screw, and remove the rear cover of the drive module.	 xx0400001009 <ul style="list-style-type: none"><li>• A: attachment screw (Torx Tx25)</li><li>• B: rear cover</li></ul>
3.	Disconnect the <i>connector</i> , placed on the right hand side.	
4.	Remove the attachment screws.	 xx0400001011 <ul style="list-style-type: none"><li>• A: fan holder with fans</li><li>• B: attachment screw</li><li>• C: connector</li></ul>
5.	Remove the <i>fan holder with fans</i> .	

#### Refitting

The procedure below details how to refit the fan holder with fans.

Step	Action	Note/Illustration
1.	 Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.	
2.	Refit the <i>fan holder with fans</i>	<b>Note!</b> Make sure that the cabling not get pinched.
3.	Refit the <i>attachment screws</i> .	
4.	Reconnect the <i>connector</i> , placed on the right hand side.	
5.	Refit the <i>rear cover</i> , lock it with the <i>attachment screw</i> .	

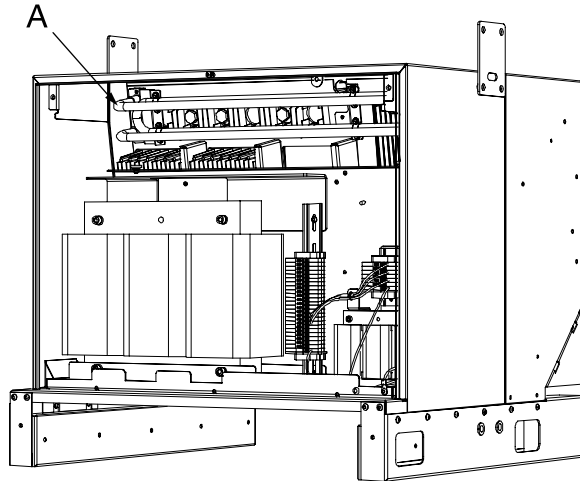
## 4 Repair activities, controller IRC5

### 4.2.7. Replacement of brake resistor bleeder, IRC5

### 4.2.7. Replacement of brake resistor bleeder, IRC5

#### Location

The brake resistor bleeder is located in the drive module as shown below.



xx0400001012


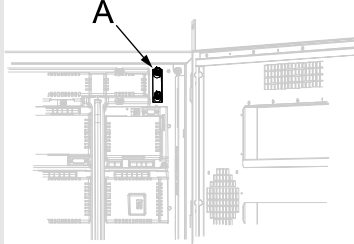
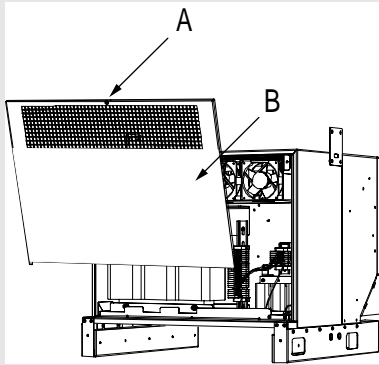
A	Brake resistor bleeder
---	------------------------

#### Required equipment

Equipment	Spare part no.	Art. no.	Note
Brake resistor bleeder	3HAC020900-001		
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit diagram		3HAC 13459-2	Complete control system

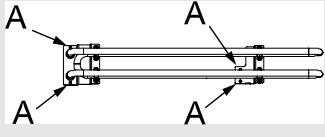
#### Removal

The procedure below details how to remove the brake resistor bleeder.

Step	Action	Note/Illustration
1.	 <p>Danger <b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	Disconnect the two flat pin connectors, placed on the right hand side inside the drive module.	 <p>dummy</p> <ul style="list-style-type: none"> <li>A: Flat pin connectors</li> </ul>
3.	Remove the rear cover of the drive module.	 <p>xx0400001009</p> <ul style="list-style-type: none"> <li>A: attachment screw</li> <li>B: rear cover</li> </ul>
4.	Remove the fan holder with fans.	Detailed in section, <i>Replacement of drive module fan holder with fans, IRC5</i> on page 169.


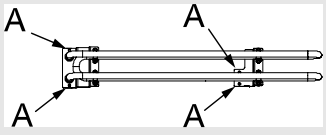
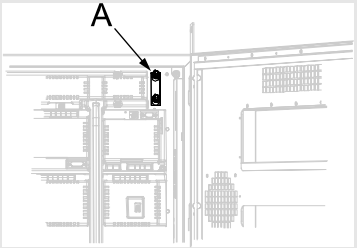
## 4 Repair activities, controller IRC5

### 4.2.7. Replacement of brake resistor bleeder, IRC5

Step	Action	Note/Illustration
5.	Remove the attachment screws to the brake resistor.	 <p>dummy</p> <ul style="list-style-type: none"> <li>A: attachment screw (4 pcs Torx TX25)</li> </ul>
6.	Remove the brake resistor bleeder.	

### Refitting

The procedure below details how to refit the brake resistor bleeder.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	Refit the brake resistor bleeder.	 <p>dummy</p> <ul style="list-style-type: none"> <li>A: attachment screw (4 pcs Torx TX25)</li> </ul>
3.	Refit the <i>attachment screws</i> .	
4.	Reconnect the two flat pin connectors, placed on the right hand side inside the drive module.	 <p>dummy</p> <ul style="list-style-type: none"> <li>A: Flat pin connectors</li> </ul>

## 4 Repair activities, controller IRC5

---

### 4.2.7. Replacement of brake resistor bleeder, IRC5

Step	Action	Note/Illustration
5.	Refit the fan holder with fans.	Detailed in section, <i>Replacement of drive module fan holder with fans, IRC5</i> on page 169.
6.	Refit the <i>rear cover</i> with <i>attachment screw</i> .	



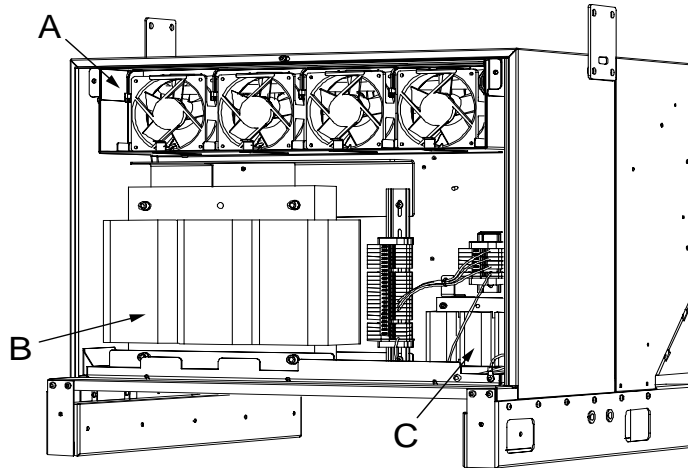
## 4 Repair activities, controller IRC5

### 4.2.8. Replacement of Transformer in drive module, IRC5

### 4.2.8. Replacement of Transformer in drive module, IRC5

#### Location

The heat transformer unit is located in the back of the drive module as shown below.



xx0400000996


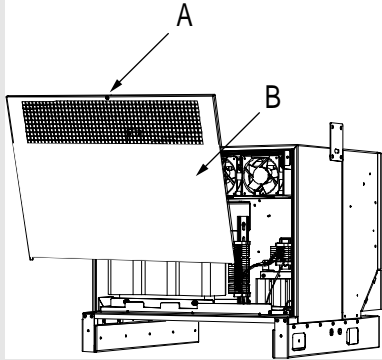
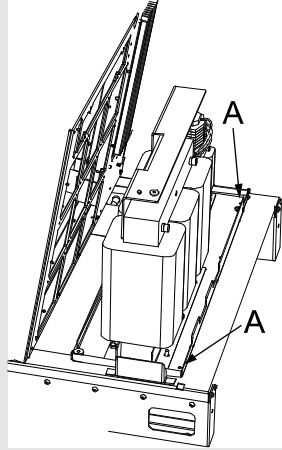
A	Fan holder with fans
B	Transformer 13kVA/8.5kVA
C	Transformer 1.8kVA

#### Required equipment

Equipment	Spare part no.	Art. no.	Note
Transformer module	3HAC020953-004		13kVA
Transformer module	3HAC020953-003		8,5kVA
Transformer module	3HAC020953-006		1,8kVA
Standard toolkit			The contents are defined in section Standard toolkit!
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.			These procedures include references to the tools required.
Circuit Diagram		3HAC XX	Complete control system

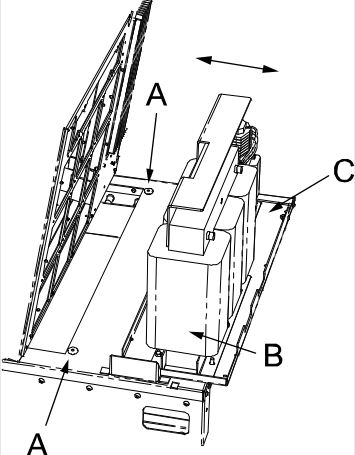
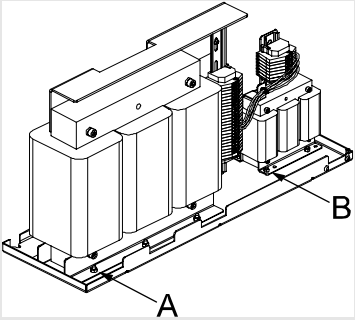
#### Removal

The procedure below details how to remove the transformer unit.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b></p> <p>Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	Loosen the attachment screw and remove the rear cover.	 <p>xx0400001009</p> <ul style="list-style-type: none"> <li>• A: attachment screw</li> <li>• B: rear cover</li> </ul>
3.	Remove the attachment screws.	 <p>xx0400001031</p> <ul style="list-style-type: none"> <li>• A: attachment screw (2pcs).</li> </ul>


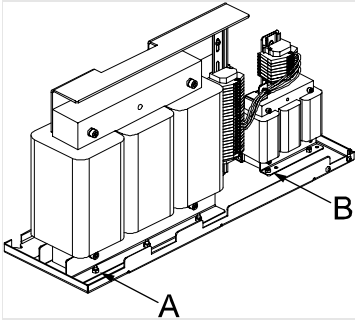
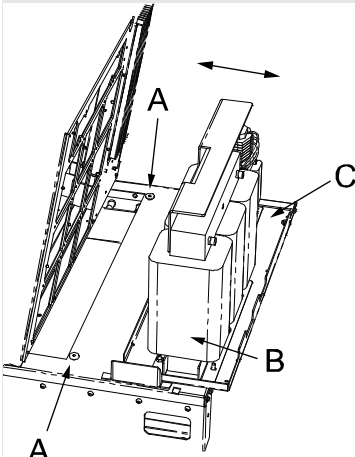
## 4 Repair activities, controller IRC5

### 4.2.8. Replacement of Transformer in drive module, IRC5

Step	Action	Note/Illustration
4.	Pull out the transformer bracket to release it from the cap nuts.	 <p>xx0400001032</p> <ul style="list-style-type: none"><li>• A: cap nut (2 pcs)</li><li>• B: transformer unit</li><li>• C: transformer bracket</li></ul>
5.	Remove the attachment nuts to the transformer to be replaced.	 <p>xx0400001033</p> <ul style="list-style-type: none"><li>• A: attachment nut (6 pcs)</li><li>• B: attachment nut (4 pcs)</li></ul>
6.	Remove the transformer from the <i>transformer bracket</i> .	

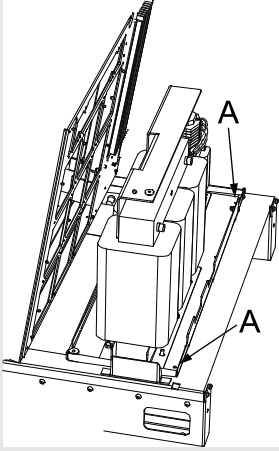
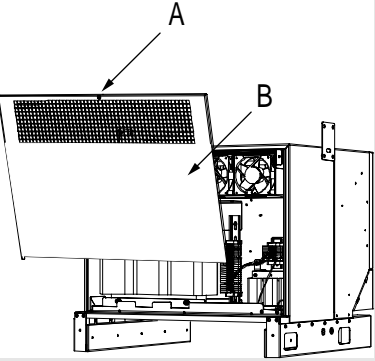
### Refitting

The procedure below details how to refit the transformer unit.

Step	Action	Note/Illustration
1.	 <p>Danger</p> <p><b>DANGER!</b> Before any work inside the IRC5 controller modules, please observe the safety information in section <i>DANGER - Make sure that the main power has been switched off!</i> on page 19.</p>	
2.	Refit the transformer to the <i>transformer bracket</i> .	
3.	Refit the <i>attachment nuts</i> .	 <p>xx0400001033</p> <ul style="list-style-type: none"> <li>• A: attachment nut (6 pcs)</li> <li>• B: attachment nut (4 pcs)</li> </ul>
4.	Refit the <i>transformer bracket</i> to fit the cap nuts.	 <p>xx0400001032</p> <ul style="list-style-type: none"> <li>• A: cap nut (2pcs)</li> <li>• B: transformer unit</li> <li>• C: transformer bracket</li> </ul>

## 4 Repair activities, controller IRC5

### 4.2.8. Replacement of Transformer in drive module, IRC5

Step	Action	Note/Illustration
5.	Refit the attachment screw.	 <p data-bbox="1026 815 1134 835">xx0400001031</p> <ul data-bbox="1062 844 1402 875" style="list-style-type: none"><li>• A: attachment screw (2pcs).</li></ul>
6.	Refit the rear cover.	 <p data-bbox="1026 1285 1134 1305">xx0400001009</p>
7.	Tighten the <i>attachment screw</i> .	

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