The information in this manual is subject to change without notice and should not be construed as a commitment by ABB. ABB assumes no responsibility for any errors that may appear in this manual.

Except as may be expressly stated anywhere in this manual, nothing herein shall be construed as any kind of guarantee or warranty by ABB for losses, damages to persons or property, fitness for a specific purpose or the like.

In no event shall ABB be liable for incidental or consequential damages arising from use of this manual and products described herein.

This manual and parts thereof must not be reproduced or copied without ABB’s written permission, and contents thereof must not be imparted to a third party nor be used for any unauthorized purpose. Contravention will be prosecuted.

Additional copies of this manual may be obtained from ABB at its then current charge.

© Copyright 2007-2010 ABB All rights reserved.

ABB AB
Robotics Products
SE-721 68 Västerås
Sweden
# Table of Contents

Overview ................................................................. 5
Safety note ............................................................. 7

## 1 Procedures ......................................................... 9
  1.1 Procedure for single robot systems ......................... 9
  1.2 Procedure for MultiMove systems ......................... 10
  1.3 Common procedures for all systems ..................... 13

## 2 General ............................................................ 21
  2.1 What you need to get the system started ............... 21
  2.2 What is a FlexPendant? ...................................... 24
  2.3 What is RobotStudio? ........................................ 32
  2.4 What is RobotWare? .......................................... 33
  2.5 About the media pool ...................................... 34
  2.6 When to use the FlexPendant and RobotStudio .......... 35
  2.7 Product documentation, M2004 ............................ 38

# Index ................................................................. 41

© Copyright 2007-2010 ABB. All rights reserved.
Overview

About this manual
This manual is to be used when starting up the system for the very first time. It contains excerpts from other documents included in the robot system delivery.

Usage
This manual contains instructions for starting up the IRC5 robot controller for the very first time after the physical installation has been completed.

Who should read this manual?
This manual is intended for:
• Commissioning personnel

Prerequisites
The reader should be familiar with:
• Mechanically installing the robot hardware.
• Be trained in robot operation.

The contents of the manual assumes all hardware (manipulator, controller and such) has been installed correctly and connected to each other.

Organization of chapters
The manual is organized in the following chapters:

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Procedures</td>
<td>Procedures for setup and startup of the IRC5 robot system.</td>
</tr>
<tr>
<td>2. General</td>
<td>Descriptions of the parts in IRC5 robot system.</td>
</tr>
</tbody>
</table>

References

<table>
<thead>
<tr>
<th>Reference</th>
<th>Document Id</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product manual - IRC5</td>
<td>3HAC021313-001</td>
</tr>
<tr>
<td>Operating manual - IRC5 with FlexPendant</td>
<td>3HAC16590-1</td>
</tr>
<tr>
<td>Operating manual - RobotStudio</td>
<td>3HAC032104-001</td>
</tr>
<tr>
<td>Operating manual - Trouble shooting</td>
<td>3HAC020738-001</td>
</tr>
<tr>
<td>Technical reference manual - System parameters</td>
<td>3HAC17076-1</td>
</tr>
<tr>
<td>Application manual - MultiMove</td>
<td>3HAC021272-001</td>
</tr>
</tbody>
</table>

Continues on next page
## Overview

*Continued*

### Revisions

<table>
<thead>
<tr>
<th>Revision</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Replaces manual with document id 3HAC 021564-001. Released with RobotWare 5.08.</td>
</tr>
<tr>
<td>A</td>
<td>Polish translation added.</td>
</tr>
<tr>
<td>B</td>
<td>RobotStudio Online is integrated in RobotStudio. Title adjusted.</td>
</tr>
<tr>
<td>C</td>
<td>Updated information on installing and licensing RobotStudio.</td>
</tr>
<tr>
<td>D</td>
<td>Updated the section <em>Common procedures for all systems on page 13</em> with the information on Installing RobotStudio.</td>
</tr>
</tbody>
</table>
| E        | Released with RobotWare 5.13. Updated information in the section *Common procedures for all systems on page 13*  
  - Added steps on installing RobotWare. See *How to install RobotStudio on a PC on page 13*.  
  - Updated information on Premium feature. See *Installing RobotStudio on page 13*.  
  - Updated the web link for manual activation. See *Manual activation on page 15*.  
  - Added steps on downloading a system to a controller. See *How to create a system using RobotStudio on page 17*. |
Safety note

Overview

Please note that there is no information regarding safety aspects in this manual!

In an effort to keep this manual short, there is no information regarding:

- safe handling and operation of the equipment
- generic reference information
- detailed procedures

This information can be found in the Product manuals or the Operating manuals delivered with the robot system.
# 1 Procedures

## 1.1. Procedure for single robot systems

### Overview

This instruction is valid for IRC5 single robot systems.

A single robot system contains either a Single Cabinet Controller (controller with integrated Control Module and Drive Module) or a Dual Controller (Control Module to which one Drive Module is connected).

### How to get started

This procedure details how to get started with a single robot system.

<table>
<thead>
<tr>
<th>Action</th>
<th>Info/illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mechanically install the robot and controller, and connect the electrical power and signal cables between them. Also connect the electrical power supply. These procedures are detailed in the Product Manuals of robot and controller respectively.</td>
</tr>
<tr>
<td>2.</td>
<td>Make sure all safety related connections are made correctly. Refer to the work station wiring diagram.</td>
</tr>
<tr>
<td>3.</td>
<td>Connect the FlexPendant to the controller.</td>
</tr>
<tr>
<td>4.</td>
<td>If the robot system is delivered with fully functional system software installed, you can proceed as detailed in section <em>How to switch on power</em> in <em>Common procedures for all systems on page 13</em>. If no functional system software has been installed, please proceed as detailed in section <em>Common procedures for all systems on page 13</em>.</td>
</tr>
</tbody>
</table>

![Diagram](xx0500001854)

A: FlexPendant connector, Single Cabinet Controller
1.2. Procedure for MultiMove systems

Overview

This instruction is valid for IRC5 multi robot systems, that is, systems using the MultiMove option.

A MultiMove robot system contains either a Single Cabinet Controller (an integrated Control Module and Drive Module as shown in the illustration above) or a separate Control Module to which a number of Drive Modules (one for each robot being run by the system) have been connected. Up to four robots may be operated by a MultiMove system.

NOTE!

All multi robot systems are configured as single robot systems on delivery. In order to be fully functional as multi robot systems, these systems must be re-configured.

How to perform this is detailed in Operating manual - RobotStudio.
# How to get started

This procedure details how to get started with a multi robot system.

<table>
<thead>
<tr>
<th>Action</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mechanically install the robot and controller, and connect the electrical power and signal cables between them. Also connect the electrical power supply.</td>
<td>These procedures are detailed in the Product Manuals of robot and controller respectively.</td>
</tr>
</tbody>
</table>

2. Connect the Ethernet cables from each Drive Module to the Control Module Ethernet card. Make sure the Drive Modules are connected in the correct order! The order must correspond to the order in which the key strings are entered when creating the system.

Connections:
- A: Robot communication card
- B: Ethernet card
- C: Ethernet connection to Drive Module #1 (connected on delivery)
- D: Ethernet connection to Drive Module #2
- E: Ethernet connection to Drive Module #3
- F: Ethernet connection to Drive Module #4

Continues on next page
1 Procedures

1.2. Procedure for MultiMove systems

Continued

<table>
<thead>
<tr>
<th>Action</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Before connecting the safety signal cables, remove jumpers from connectors X7, X8, X14 and X17 as required by the number of Drive Modules to connect. Connect the safety signal cables from each Drive Module to the Control Module panel board as shown in the figure.</td>
<td>[Diagram of connections]</td>
</tr>
<tr>
<td>Connections:</td>
<td></td>
</tr>
<tr>
<td>• X7: safety signal cable to Drive Module #1 (connected on delivery)</td>
<td></td>
</tr>
<tr>
<td>• X8: safety signal cable to Drive Module #2</td>
<td></td>
</tr>
<tr>
<td>• X14: safety signal cable to Drive Module #3</td>
<td></td>
</tr>
<tr>
<td>• X17: safety signal cable to Drive Module #4</td>
<td></td>
</tr>
<tr>
<td>4. Make sure all safety related connections are made correctly.</td>
<td>Refer to the work station wiring diagram.</td>
</tr>
<tr>
<td>5. Connect the FlexPendant to the controller.</td>
<td>[Image of FlexPendant connector]</td>
</tr>
<tr>
<td>A: FlexPendant connector, Single Cabinet Controller</td>
<td></td>
</tr>
</tbody>
</table>
1.3. Common procedures for all systems

Overview

These procedures are common for installing all robot systems.

Installing RobotStudio

NOTE! You should have administrator privileges on the PC before installing RobotStudio.

RobotStudio is categorized into the following two feature levels:

- **Basic** - Offers selected RobotStudio functionality to configure, program, and run a virtual controller. It also includes online features for programming, configuring, and monitoring a real controller connected over Ethernet.
- **Premium** - Offers full RobotStudio functionality for offline programming and simulation of multiple robots. The Premium level includes the features of the Basic level and requires activation.

In addition to the Premium functionality, there are add-ins like PowerPacs and options for CAD converters available:

- PowerPacs provides enhanced features for selected applications.
- Options for CAD converters allows import of different CAD formats.

RobotStudio offers the following installation options:

- **Minimal** - Installs only the features required to program, configure, and monitor a real controller connected over Ethernet. If installed with this option, only the Online tab is available.
- **Complete** - Installs all the features required to run the complete RobotStudio. If installed with this option, additional features of Basic and Premium functionality are available.
- **Custom** - Installs user-customized features. This option allows excluding unwanted robot libraries and CAD converters.

How to install RobotStudio on a PC

<table>
<thead>
<tr>
<th>Action</th>
<th></th>
</tr>
</thead>
</table>
| 1. Insert the robot software DVD in the PC.  
   - If a menu for the DVD is opened automatically, continue with step 5.  
   - If no menu for the DVD is opened, continue with step 2.  |
| 2. On the Start menu, click Run.  |
| 3. In the Open box, type the drive letter for your DVD drive followed by:  
  - \launch.exe  
  If your DVD drive has the letter D, then type: D:\launch.exe  |
| 4. Click OK.  |
| 5. Select language for the DVD menu.  |
| 6. On the DVD menu, click Install.  |
| 7. On the installation menu, click RobotStudio. This opens the installation wizard, which guides you through the rest of the software installation.  |
| 8. Select the options Minimal, Complete, or Custom and follow the instructions in the installation wizard.  |

Continues on next page
Activate RobotStudio

To continue using your product with all of its features, you must activate it. RobotStudio Product Activation is based on Microsoft anti-piracy technology and designed to verify that software products are legitimately licensed.

Activation works by verifying that the Activation Key is not in use on more personal computers than are permitted by the software license.

How do I activate RobotStudio?

When you start RobotStudio for the first time after installation, you are prompted to enter your 25-digit Activation Key (xxxxx-xxxxx-xxxxx-xxxxx-xxxxx).

Trial period

Before entering a valid Activation Key, you can run the software, in Premium functionality mode, with all the features enabled, for a trial period of up to 30 days.

NOTE! Trial period starts immediately after installation.

After entering a valid Activation Key, you will see only the features you have purchased.

NOTE! If installed during the trial period, you will lose the trial period.

Basic Functionality mode

After the trial period, the software reverts to Basic mode unless you have entered a valid Activation Key. In Basic functionality mode, RobotStudio allows only the use of the Online and basic Virtual Controller features. No existing files or stations are harmed in Basic mode.

After activating your software, you will have full functionality for the features you have purchased.

NOTE!

Activation is not required during Minimal installation for the Online features for programming, configuring and monitoring a real controller connected over Ethernet.
Activate automatically over the Internet or manually

The Activation Wizard gives you two choices on how to proceed.

Automatic activation by using the Internet (recommended)

Once you have selected the option Activate RobotStudio over the Internet, the Activation Wizard automatically contacts the ABB licensing servers over your Internet connection. If you are using a valid Activation Key that has not exceeded the number of installations allowed, your product is activated immediately.

When you activate over the Internet, your activation request is sent to ABB. Your license will then be automatically installed and your product ready for use. If you choose to activate over the Internet but are not currently connected, the wizard alerts you that there is no connection.

Manual activation

If the computer does not have an Internet connection, you must create a license file by selecting the option Create a license request file. Proceed through the wizard, enter your Activation Key and save the License Request File to your computer. Use a removable medium, such as a USB stick or floppy disk, to transfer the file to a computer with an Internet connection. Open a web browser, go to http://www101.abb.com/manualactivation/ and follow the instructions. The result will be a License File that should be saved and transferred back to the computer holding your product. Relaunch the Activation Wizard and select the option Install a license file. Proceed through the wizard, selecting the License File when requested. Upon completion, RobotStudio is activated and ready for use.

How do I activate later?

If you do not want to activate your copy of the software at installation, you can do so later. The following steps will launch the Activation Wizard.

If you have a problem with your activation, contact your local ABB customer support representative at the e-mail address or telephone number provided at www.abb.com/robotics.

<table>
<thead>
<tr>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Click RobotStudio Button, then click RobotStudio Options and select Licensing.</td>
</tr>
<tr>
<td>2. Click Activation Wizard to launch the activation wizard.</td>
</tr>
<tr>
<td>3. Proceed through the wizard to complete the activation.</td>
</tr>
</tbody>
</table>

**NOTE!** If the RobotStudio installation is activated, you will have valid licenses for the features covered by your subscription.

Which RobotStudio version is installed?

The version number of RobotStudio is displayed on the start page that appears when RobotStudio is started.
1 Procedures

1.3. Common procedures for all systems

Continued

How can I tell if my RobotStudio installation is activated?

<table>
<thead>
<tr>
<th>Action</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Click <strong>RobotStudio Button</strong>, then click <strong>RobotStudio Options</strong> and select <strong>Licensing</strong>.</td>
<td></td>
</tr>
<tr>
<td>2. Click <strong>View Installed License Keys</strong> to see the status of your current license.</td>
<td></td>
</tr>
<tr>
<td>3. If the RobotStudio installation is activated, you will have valid licenses for the features covered by your subscription.</td>
<td></td>
</tr>
</tbody>
</table>

How to configure and connect a PC or network to the controller

The illustration below shows the two main ports on the controller Computer Unit: the Service Port and the LAN port. Make sure the LAN (factory network) is not connected to any of the service ports!

A Service port
B LAN port (connects to factory LAN)

<table>
<thead>
<tr>
<th>Action</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Make sure the network setting on the PC to be connected is correct.</td>
<td>Refer to the system documentation for your PC, depending on the operative system you are running. The PC must be set to &quot;Obtain an IP address automatically&quot; or set as described in <strong>Service PC Information</strong> in the Boot Application.</td>
</tr>
<tr>
<td>2. Use the delivered category 5 Ethernet crossover boot cable with RJ45 connectors.</td>
<td>The cable is delivered in the RobotWare product box.</td>
</tr>
</tbody>
</table>
1 Procedures

1.3. Common procedures for all systems

Continued

<table>
<thead>
<tr>
<th>Action</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Connect the boot cable to the network port of your PC.</td>
<td>![Image of network port]</td>
</tr>
</tbody>
</table>

- A: network port
  The placement of the network port may vary depending on the PC model.

<table>
<thead>
<tr>
<th>Action</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Connect the boot cable to the service port.</td>
<td></td>
</tr>
</tbody>
</table>

How to create a system using RobotStudio

Normally, no system will have to be created for single robot systems since one is already installed on delivery. However, if your system uses the option MultiMove, you must create a new system defining all robots in the system.

If for some reason the delivered system does not work, a new system must be created and loaded as outlined below.

A detailed procedure is given in *Operating manual - RobotStudio*. For MultiMove systems, more information is also described in *Application manual - MultiMove*.

<table>
<thead>
<tr>
<th>Action</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Start RobotStudio and click <strong>System Builder</strong>.</td>
<td>The RobotWare key is a license key that determines which robot model(s) to use and which RobotWare options to run on the controller. It is delivered on the software DVD (delivered with the robot).</td>
</tr>
<tr>
<td>2. Before creating a new system, make sure the following criteria are met:</td>
<td></td>
</tr>
<tr>
<td>• The RobotWare media pool must be installed on your PC.</td>
<td></td>
</tr>
<tr>
<td>• You must have a RobotWare key for the system, if the system is to run on a controller.</td>
<td></td>
</tr>
<tr>
<td>3. Click <strong>Create New</strong>. A wizard for creating new systems is started.</td>
<td>Some of the steps are optional and can be skipped.</td>
</tr>
<tr>
<td>4. Follow the steps in the wizard:</td>
<td></td>
</tr>
<tr>
<td>• Enter name and location</td>
<td></td>
</tr>
<tr>
<td>• Enter RobotWare key(s)</td>
<td></td>
</tr>
<tr>
<td>• Add additional options</td>
<td></td>
</tr>
<tr>
<td>• Modify options</td>
<td></td>
</tr>
<tr>
<td>• Add configuration files</td>
<td></td>
</tr>
<tr>
<td>• Add files to home directory</td>
<td></td>
</tr>
<tr>
<td>• View summary</td>
<td></td>
</tr>
<tr>
<td>• Finish</td>
<td></td>
</tr>
<tr>
<td>5. In the <strong>System Builder</strong> dialog box, select the system from the list and then click <strong>Download to Controller</strong> to bring up a dialog box.</td>
<td></td>
</tr>
<tr>
<td>6. In the dialog box, connect to the controller.</td>
<td></td>
</tr>
<tr>
<td>7. Click <strong>Load</strong> to load the new system to the controller.</td>
<td></td>
</tr>
</tbody>
</table>

Continues on next page
1 Procedures

1.3. Common procedures for all systems

Continued

<table>
<thead>
<tr>
<th>Action</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Answer <strong>Yes</strong> to the question <strong>Do you want to load the system.</strong></td>
<td></td>
</tr>
</tbody>
</table>

**How to switch on power**

The mains power switch(es) is located on the front of the controller/modules. See illustration of the switch below.

<table>
<thead>
<tr>
<th>Action</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Switch on the power to the Drive Module(s).</td>
<td>If you have a single robot system with a Single Cabinet Controller, proceed to step 2.</td>
</tr>
<tr>
<td>2. Switch on the power to the Control Module.</td>
<td>The system will now start up, which will take a couple of minutes. The system will be ready to operate when the FlexPendant displays the start window. If the system does not start up, or if the start window is not displayed, please proceed as detailed in <em>Operating manual - Trouble shooting</em>.</td>
</tr>
<tr>
<td>3. After switching the power on, proceed with loading calibration data.</td>
<td></td>
</tr>
</tbody>
</table>
How to load calibration data

The calibration data is normally stored on the serial measurement board of each robot, regardless of whether the robot runs an absolute measurement system (Absolute Accuracy option is installed, Abs.Acc) or not. This data is normally transferred automatically to the controller when the system is powered up, and in such cases no action is required by the operator.

Verify that the correct SMB data has been loaded into the system as detailed below. In a MultiMove system, this procedure must be repeated for each robot.

<table>
<thead>
<tr>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. On the FlexPendant, tap the ABB menu, then tap <strong>Calibration</strong> and select a mechanical unit.</td>
</tr>
<tr>
<td>2. Tap <strong>SMB memory</strong> and then tap <strong>Show status</strong>. The data is displayed with status on the SMB and on the controller.</td>
</tr>
<tr>
<td>3. If <strong>Valid</strong> is displayed under the headings <strong>Cabinet Memory</strong> and <strong>SMB memory</strong>, calibration data is correct. If not, the data (on the SMB board or in the controller) must be replaced with the correct one as detailed below:</td>
</tr>
<tr>
<td>• If, for instance, the SMB board has been replaced, transfer data from controller to SMB board. If the controller has been replaced, transfer data from the SMB board to the controller.</td>
</tr>
<tr>
<td>• Transfer data by tapping <strong>SMB Memory, Update</strong>, and then selecting which data to update.</td>
</tr>
<tr>
<td>4. After loading calibration data, proceed with updating the revolution counters.</td>
</tr>
</tbody>
</table>

How to update revolution counters

In a MultiMove system, this procedure must be repeated for each robot.

<table>
<thead>
<tr>
<th>Action</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Manually run the robot, using the joystick on the FlexPendant, to a position close to the calibration position.</td>
<td>The calibration position of each axis is indicated by the calibration marks.</td>
</tr>
<tr>
<td>2. After positioning all axes within the scale indicated by the calibration marks, store the revolution counter settings. On the FlexPendant, tap the ABB menu, then tap <strong>Calibration</strong>. Select the mechanical unit to be calibrated. Tap <strong>Update revolution counters</strong> and follow the instructions provided.</td>
<td><strong>Caution!</strong> If a revolution counter is incorrectly updated, it will cause incorrect robot positioning, which in turn may cause damage or injury! Check the calibration position very carefully after each update.</td>
</tr>
</tbody>
</table>
1 Procedures

1.3. Common procedures for all systems
2 General

2.1. What you need to get the system started

Illustration

The illustration depicts, in a schematic way, the delivered parts, the software tools to install them and the basic work flow.

<table>
<thead>
<tr>
<th>Parts</th>
<th>Description</th>
<th>Described in</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Manipulator (a generic model shown)</td>
<td>Documents specified in section <em>Product documentation, M2004 on page 38.</em></td>
</tr>
<tr>
<td>B1</td>
<td>Control Module, IRC5, containing the control electronics of the robot system.</td>
<td>Documents specified in section <em>Product documentation, M2004 on page 38.</em></td>
</tr>
<tr>
<td>B2</td>
<td>Drive Module, IRC5, containing the power electronics of the robot system. In a Single Cabinet Controller the Drive Module is included in the single cabinet. In a MultiMove system, there is more than one Drive Module.</td>
<td>Documents specified in section <em>Product documentation, M2004 on page 38.</em></td>
</tr>
</tbody>
</table>

Continues on next page
2 General

2.1. What you need to get the system started

Continued

<table>
<thead>
<tr>
<th>Description</th>
<th>Described in</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C</strong> RobotWare DVD containing all robot software specified in section <em>What is RobotWare? on page 33</em>, and RobotStudio installation package.</td>
<td>Containing documentation files as specified in section <em>Product documentation, M2004 on page 38</em>.</td>
</tr>
<tr>
<td><strong>D</strong> Documentation DVD.</td>
<td><strong>E</strong> Robot system software being run by the robot controller. The system has been loaded into the controller from the server on the local area network.</td>
</tr>
<tr>
<td><strong>F</strong> RobotStudio PC software installed on PC x. RobotStudio is used for loading the RobotWare software to the server as well as configuring the robot system and then loading the complete robot system into the robot controller. RobotStudio is used to perform tasks as defined in section <em>When to use the FlexPendant and RobotStudio on page 35</em>.</td>
<td>Documents specified in section <em>Product documentation, M2004 on page 38</em>. and in section <em>What is RobotStudio? on page 32</em>.</td>
</tr>
<tr>
<td><strong>G</strong> Calibration data diskette for systems running the Absolute Accuracy option only. Calibration data for systems without this option is normally delivered on the Serial Measurement Board (SMB).</td>
<td><strong>H</strong> FlexPendant, which is connected to the controller, is used to perform tasks as defined in section <em>When to use the FlexPendant and RobotStudio on page 35</em>.</td>
</tr>
<tr>
<td><strong>J</strong> Server on network (not included in the delivery). This may be used for manually storing:  • RobotWare  • Complete robot systems  • Documentation files  In this context, the server may be considered as a storage unit used by the PC x, and may even be the same unit!  The server may be disconnected when not transferring data between the server and controller!</td>
<td><strong>PC K</strong> The server may be used for:  • All RobotWare software may be manually stored using the PC and RobotStudio.  • Complete configured system files may be manually stored after being created using the portable PC.  • All robot documentation files may be manually stored after being installed using the portable PC and RobotStudio.  In this context, the server may be considered as a storage unit used by the portable PC.</td>
</tr>
</tbody>
</table>

Continues on next page
### 2.1. What you need to get the system started

<table>
<thead>
<tr>
<th>Description</th>
<th>Described in</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M</strong> RobotWare license key. The original key string is printed on a paper (for the Dual Controller there is one key for the Control Module and one for the Drive Module, and in a MultiMove system there is one key for each module) delivered inside the Drive Module. If ordered, the RobotWare license key is installed on delivery, so no further actions are required to get the system running.</td>
<td></td>
</tr>
<tr>
<td><strong>N</strong> Serial Measurement Board (SMB) handling resolver data and storing calibration data. For systems <em>not running the Absolute Accuracy option</em>, the calibration data is stored on the SMB on delivery.</td>
<td></td>
</tr>
<tr>
<td><strong>PC x</strong> PC (not included in the delivery), may even be the same unit as the server J, shown above! The PC may be disconnected when <em>not</em> transferring data between the server and controller!</td>
<td></td>
</tr>
</tbody>
</table>
2.2. What is a FlexPendant?

Introduction to the FlexPendant

The FlexPendant (occasionally called TPU or teach pendant unit) is a hand held operator unit used to perform many of the tasks involved when operating a robot system: running programs, jogging the manipulator, modifying robot programs etcetera.

The FlexPendant is designed for continuous operation in harsh industrial environment. Its touch screen is easy to clean and resistant to water, oil and accidental welding splashes.

Complete computer and integral part of IRC5

The FlexPendant consists of both hardware and software and is a complete computer in itself. It is an integral part of IRC5, connected to the controller by an integrated cable and connector. The hot plug button option, however, makes it possible to disconnect the FlexPendant in automatic mode and continue running without it.

Main parts

These are the main parts of the FlexPendant (variants with or without USB port).

FlexPendant without USB port

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Connector</td>
</tr>
<tr>
<td>B</td>
<td>Touch screen</td>
</tr>
<tr>
<td>C</td>
<td>Emergency stop button</td>
</tr>
<tr>
<td>D</td>
<td>Enabling device</td>
</tr>
<tr>
<td>E</td>
<td>Joystick</td>
</tr>
</tbody>
</table>
2.2. What is a FlexPendant?

Use the joystick to move the manipulator. This is called jogging the robot. There are several settings for how the joystick will move the manipulator.

Connect a USB memory to the USB port to read or save files. The USB memory is displayed as drive /USB: Removable in dialogs and FlexPendant Explorer.

**Note!** Close the protective cap on the USB port when not used.
2 General

2.2. What is a FlexPendant?

Continued

Stylus pen

The stylus pen included with the FlexPendant is located on the back. Pull the small handle to release the pen.

Use the stylus pen to tap on the touch screen when using the FlexPendant. Do not use screwdrivers or other sharp objects.

Reset button

The reset button resets the FlexPendant, not the system on the controller.

NOTE!

The USB port and the reset button work on systems using RobotWare 5.12 or later. On older systems, these will not work.

Hard buttons

There are dedicated hardware buttons on the FlexPendant. You can assign your own functions to four of the buttons.

FlexPendant without USB port

<table>
<thead>
<tr>
<th>A-D</th>
<th>Programmable keys, 1 - 4. How to define their respective function is detailed in section Programmable keys, in Operating manual - IRC5 with FlexPendant.</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>START button. Starts program execution.</td>
</tr>
<tr>
<td>F</td>
<td>Step BACKWARD button. Executes one instruction backward as button is pressed.</td>
</tr>
<tr>
<td>G</td>
<td>Step FORWARD button. Executes one instruction forward as button is pressed.</td>
</tr>
<tr>
<td>H</td>
<td>STOP button. Stops program execution.</td>
</tr>
</tbody>
</table>
2 General

2.2. What is a FlexPendant?

NOTE!
The select and toggle buttons work on systems using RobotWare 5.12 or later. On older systems, these will not work.
2 General

2.2. What is a FlexPendant?

Continued

How to hold the FlexPendant

The FlexPendant is typically operated while being held in the hand. A right-handed person uses his left hand to support the device while the other hand performs operations on the touch screen. A left-hander, however, can easily rotate the display through 180 degrees and use his right hand to support the device. For more information about adapting the FlexPendant to left-handness, see Operating manual - IRC5 with FlexPendant.
2 General

2.2. What is a FlexPendant?

Continued

Touch screen elements

The illustration shows important elements of the FlexPendant touch screen.

A  ABB menu
B  Operator window
C  Status bar
D  Close button
E  Task bar
F  Quickset menu

Welcome to ABB

© Copyright 2003 ABB. All rights reserved.

Continues on next page
2 General

2.2. What is a FlexPendant?

Continued

ABB menu

From the ABB menu the following items can be selected

- HotEdit
- Inputs and Outputs
- Jogging
- Production Window
- Program Editor
- Program Data
- Backup and Restore
- Calibration
- Control Panel
- Event Log
- FlexPendant Explorer
- System Info
- etc.

This is further detailed in section *The ABB Menu in Operating manual - IRC5 with FlexPendant.*

Operator window

The operator window displays messages from robot programs. This usually happens when the program needs some kind of operator response in order to continue. This is described in section *Operator window in Operating manual - IRC5 with FlexPendant.*

Status bar

The status bar displays important information about system status, such as operating mode, motors on/off, program state and so on. This is described in section *Status bar in Operating manual - IRC5 with FlexPendant.*

Close button

Tapping the close button closes the presently active view or application.

Task bar

You can open several views from the ABB menu, but only work with one at a time. The task bar displays all open views and is used to switch between these.

Quickset menu

The quickset menu provides settings for jogging and program execution. This is described in section *The Quickset menu in Operating manual - IRC5 with FlexPendant.*
Handling and cleaning

• Handle with care. Do not drop, throw, or give the FlexPendant strong shock. It can cause breakage or failure.

• When not using the device, hang it on the wall bracket provided for storage so that it cannot fall to the ground by accident.

• Always use and store the FlexPendant so that nobody can trip over the cable.

• Never use sharp objects (such as screwdriver or pen) for operating the touch screen. This could damage the touch screen. Instead use your finger or a stylus (located on the back on FlexPendant with USB port).

• Clean the touch screen regularly. Dust and small particles can clog the touch screen and cause it to malfunction.

• Never clean the FlexPendant with solvents, scouring agent, or scrubbing sponges. Use a soft cloth and a bit of water or mild cleaning agent. See Product manual - IRC5, section Cleaning the FlexPendant.

• Always close the protective cap on the USB port when no USB device is connected. If the port is exposed to dirt or dust, then it can break or malfunction.

CAUTION!

A disconnected FlexPendant should be stored in such a way that it cannot be mistaken for being connected to the controller.

Operated in fifteen languages

As suggested by its name, the FlexPendant is designed with flexibility and adaptation to end-users’ specific needs in mind. Currently, it can be operated in 15 different languages, including Asian character-based languages such as Chinese and Japanese.

The individual FlexPendant supports up to three languages, selected before the installation of the system to the robot controller. Switching from one of the installed languages to another is easy. For more information about changing language, see Operating manual - IRC5 with FlexPendant.
2 General

2.3. What is RobotStudio?

2.3. What is RobotStudio?

Overview

RobotStudio is a computer application for the offline creation, programming, and simulation of robot cells.

RobotStudio is available in complete, customized, and minimal installation. The minimal installation is used for working in online mode on the controller, as a complement to the FlexPendant. The Complete (and customized) installation offers advanced programming and simulation tools.

RobotStudio online mode functionality

RobotStudio online mode is optimized for:

1. Creating, installing, and maintaining systems, using the System Builder. Text-based programming and editing, using the Program Editor.
2. File manager for the controller.
3. Administrating the User Authorization System.
2.4. What is RobotWare?

Concept

RobotWare is a generic term for all software to be installed in the robot system designed to operate the robot.

RobotWare is installed and stored in the media pool (Mediapool) folder on a PC/server. The media pool is described in section About the media pool on page 34.

RobotWare is delivered on a DVD and this contains software for all available models, options and such.

However, the RobotWare license keys, required to access the software, are delivered as character strings printed on a piece of paper delivered with the controller cabinet. There is one key for the Control Module, and one key for each Drive Module.

When adding functionality at a later date, a new controller license key is required to access the functions. The key is available from your local ABB representative.
2 General

2.5. About the media pool

2.5. About the media pool

Overview

The media pool is a folder on your PC that contains the RobotWare software. It is from the media pool that you select programs and options when building systems.

The default media pool

If RobotWare is installed with default settings on the PC, the default media pool is located in the folder \Program Files\ABB Industrial IT\Robotics IT\Mediapool

Customized media pools

You can create customized media pools by creating new folders to which you copy RobotWare files from existing media pools. You can also update or modify a media pool by importing new parts of RobotWare using the Import Option tool in RobotStudio.

In RobotStudio, you then choose which media pool to use when creating new systems.
2.6. When to use the FlexPendant and RobotStudio

Overview

For operating and managing the robot, you either use the FlexPendant or RobotStudio. The FlexPendant is optimized for handling robot motions and ordinary operation, and RobotStudio is optimized for configuration, programming and other tasks not related to the daily operation.

Start, restart and shut down the controller

<table>
<thead>
<tr>
<th>To...</th>
<th>Use...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start the controller.</td>
<td>The power switch on the controller's front panel.</td>
</tr>
<tr>
<td>Restart the controller.</td>
<td>The <strong>FlexPendant</strong>, <strong>RobotStudio</strong> or the power switch on the controller's front panel.</td>
</tr>
<tr>
<td>Shut down the controller.</td>
<td>The power switch on the controller's front panel or the <strong>FlexPendant</strong>, tap <strong>Restart</strong>, then <strong>Advanced</strong>.</td>
</tr>
</tbody>
</table>

Run and control robot programs

<table>
<thead>
<tr>
<th>To...</th>
<th>Use...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jog a robot.</td>
<td>The <strong>FlexPendant</strong></td>
</tr>
<tr>
<td>Start or stop a robot program.</td>
<td>The <strong>FlexPendant</strong> or <strong>RobotStudio</strong></td>
</tr>
<tr>
<td>Start and stop background tasks</td>
<td><strong>RobotStudio</strong></td>
</tr>
</tbody>
</table>

Communicate with the controller

<table>
<thead>
<tr>
<th>To...</th>
<th>Use...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledge events.</td>
<td>The <strong>FlexPendant</strong></td>
</tr>
<tr>
<td>View and save the controller's event logs.</td>
<td><strong>RobotStudio</strong> or the <strong>FlexPendant</strong>.</td>
</tr>
<tr>
<td>Back up the controller's software to files on the PC or a server.</td>
<td><strong>RobotStudio</strong> or the <strong>FlexPendant</strong>.</td>
</tr>
<tr>
<td>Back up the controller's software to files on the controller.</td>
<td>The <strong>FlexPendant</strong>.</td>
</tr>
<tr>
<td>Transfer files between the controller and network drives.</td>
<td><strong>RobotStudio</strong> or the <strong>FlexPendant</strong>.</td>
</tr>
</tbody>
</table>
2 General

2.6. When to use the FlexPendant and RobotStudio

Continued

### Program a robot

<table>
<thead>
<tr>
<th>To...</th>
<th>Use...</th>
</tr>
</thead>
</table>
| Create or edit robot programs in a flexible way. This is suitable for complex programs with a lot of logic, I/O signals or action instructions. | **RobotStudio** to create the program's structure and most of the source code and the **FlexPendant** to store robot positions and make final adjustments to the program. When programming, RobotStudio provides the following advantages:  
- A text editor optimized for RAPID code, with auto-text and tool-tip information about instructions and parameters.  
- Program check with program error marking.  
- Close access to configuration and I/O editing. |
| Create or edit a robot program in a supportive way. This is suitable for programs that mostly consist of move instructions. | The **FlexPendant**. When programming, the FlexPendant provides the following advantages:  
- Instruction pick lists  
- Program check and debug while writing  
- Possibility to create robot positions while programming |

<table>
<thead>
<tr>
<th>To...</th>
<th>Use...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add or edit robot positions.</td>
<td>The <strong>FlexPendant</strong>.</td>
</tr>
<tr>
<td>Modify robot positions.</td>
<td>The <strong>FlexPendant</strong>.</td>
</tr>
</tbody>
</table>

### Configure the robot’s system parameters

<table>
<thead>
<tr>
<th>To...</th>
<th>Use...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edit the system parameters of the running system.</td>
<td><strong>RobotStudio</strong> or the <strong>FlexPendant</strong></td>
</tr>
<tr>
<td>Save the robot’s system parameters as configuration files.</td>
<td><strong>RobotStudio</strong> or the <strong>FlexPendant</strong></td>
</tr>
<tr>
<td>Load system parameters from configuration files to the running system.</td>
<td><strong>RobotStudio</strong> or the <strong>FlexPendant</strong></td>
</tr>
<tr>
<td>Load calibration data.</td>
<td><strong>RobotStudio</strong> or the <strong>FlexPendant</strong></td>
</tr>
</tbody>
</table>

### Create, modify and install systems

<table>
<thead>
<tr>
<th>To...</th>
<th>Use...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create or modify a system.</td>
<td><strong>RobotStudio</strong> together with <strong>RobotWare</strong> and a valid <strong>RobotWare Key</strong>.</td>
</tr>
<tr>
<td>Install a system on a controller.</td>
<td><strong>RobotStudio</strong></td>
</tr>
<tr>
<td>Install a system on a controller from a USB memory.</td>
<td>The <strong>FlexPendant</strong>.</td>
</tr>
</tbody>
</table>

Continues on next page
2.6. When to use the FlexPendant and RobotStudio

Continued

### Calibration

<table>
<thead>
<tr>
<th>To...</th>
<th>Use...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibrate base frame etc.</td>
<td>The FlexPendant</td>
</tr>
<tr>
<td>Calibrate tools, work objects etc.</td>
<td>The FlexPendant</td>
</tr>
</tbody>
</table>

### Related information

The table below specifies which manuals to read, when performing the various tasks referred to:

<table>
<thead>
<tr>
<th>Recommended use...</th>
<th>for details, see manual...</th>
<th>Document number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FlexPendant</td>
<td>Operating manual - IRC5 with FlexPendant</td>
<td>3HAC16590-1</td>
</tr>
<tr>
<td>RobotStudio</td>
<td>Operating manual - RobotStudio</td>
<td>3HAC032104-001</td>
</tr>
</tbody>
</table>
2 General

2.7. Product documentation, M2004

2.7. Product documentation, M2004

Categories for manipulator documentation

The manipulator documentation is divided into a number of categories. This listing is based on the type of information in the documents, regardless of whether the products are standard or optional.

All documents listed can be ordered from ABB on a DVD. The documents listed are valid for M2004 manipulator systems.

Product manuals

All hardware, manipulators and controllers will be delivered with a Product manual that contains:

• Safety information.
• Installation and commissioning (descriptions of mechanical installation, electrical connections).
• 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).
• Reference information (article numbers for documentation referred to in Product manual, procedures, lists of tools, safety standards).
• Parts list.
• Foldouts or exploded views.
• Circuit diagrams.

Technical reference manuals

The technical reference manuals describe the manipulator software in general and contain relevant reference information.

• RAPID Overview: An overview of the RAPID programming language.
• RAPID Instructions, Functions and Data types: Description and syntax for all RAPID instructions, functions, and data types.
• RAPID Kernel: A formal description of the RAPID programming language.
• System parameters: Description of system parameters and configuration workflows.

Application manuals

Specific applications (for example 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 (for example cables, I/O boards, RAPID instructions, system parameters, CD with PC software).
• How to use the application.
• Examples of how to use the application.

Continues on next page
Operating manuals

The operating manuals describe hands-on handling of the products. The manuals are aimed at those having first-hand operational contact with the product, that is production cell operators, programmers, and trouble shooters.

The group of manuals includes:

- Emergency safety information
- General safety information
- Getting started, IRC5 and RobotStudio
- IRC5 with FlexPendant
- RobotStudio
- Introduction to RAPID
- Trouble shooting, for the controller and manipulator.
2 General

2.7. Product documentation, M2004
Index

A
ABB menu 29
activate over internet 15
Activate RobotStudio 14
  Basic functionality mode 14
  Manual activation 15
  Product Activation 14
  Trial period 14
activation wizard 15

B
backward button 26

C
calibration 37
calibration data 19
cleaning FlexPendant 31
close button 29
connector 24
control tools, overview 35
controller license key 33

e
emergency stop button
  FlexPendant 25
enabling device 24, 25
Ethernet 16

F
FlexPendant
  cleaning 31
  hardware buttons 26
  how to hold 28
  left-hander 28
  main parts 24
  overview 24
  screen 29
FlexPendant with USB port 25
FlexPendant without USB port 24
forward button 26

H
Hard buttons 26
hold-to-run button 24

J
joystick 24
  using 25

L
LAN port 16

M
Media Pool, about 34
MultiMove system 19

O
operator unit 24
operator window 29

P
program a robot 36
program execution start button 27

Q
quickset menu 29

R
reset button
  location 25
  using 26
RobotStudio
  Basic 13
  CAD Converters 13
  Complete install 13
  Custom install 13
  Minimal install 13
  overview 32
  PowerPacs 13
  Premium 13
RobotWare
  overview 33
RobotWare, about the media pool 34
run button 27

S
start button 26
status bar 29
step
  backward 26
  forward 26
stop button 26
stylus pen
  location 25
  using 26
system parameters 36

T
task bar 29
teach pendant unit 24
toggle buttons 26
tool, overview control tools 35
touch screen 24, 29
TPU 24

U
USB port
  FlexPendant 25