

ROBOTICS

Operating manual

Robot Control Mate



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Operating manual
Robot Control Mate

RobotWare 7.0.2

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Overview of this manual

About this manual

This manual contains basic instructions for OmniCore based robot systems using the Robot Control Mate (previously known as PC Jogging) . This manual describes basic aspects for jogging, position modification, control and calibration.

Usage

This manual should be used during operation.

Who should read this manual?

This manual is intended for:

- operators
- product technicians
- service technicians
- robot programmers

Prerequisites

The reader should:

- Be trained in robot operation.
- Have basic knowledge of RAPID programming language.
- Be familiar with RobotStudio.

References

Reference	Document ID
<i>Operating manual - RobotStudio</i>	3HAC032104-001
<i>Product manual - OmniCore C30</i>	3HAC060860-001
<i>Operating manual - OmniCore</i>	3HAC065036-001
<i>Operating manual - Integrator's guide OmniCore</i>	3HAC065037-001
<i>Technical reference manual - System parameters</i>	3HAC065041-001

Revisions

Revision	Description
A	Released with RobotWare 7.0.
B	The following updates are made in this revision: <ul style="list-style-type: none"> • Added a new installation method. • Updated the user interface figures of Jog tab page and Calibrate tab page. • Updated the calibration step.
C	The following updates are made in this revision: <ul style="list-style-type: none"> • Updated the installation, uninstallation and upgrade procedures.

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Revision	Description
D	<p>The following updates are made in this revision:</p> <ul style="list-style-type: none">• Updated safety related information.• Updated the installation and upgrade method.• Added new functions to Jog and Control tab pages.• Added resolver data transfer function between robot memory and controller to Calibrate group.• Updated the procedure of working with the PC Jogging add-in.• Added warning before starting revolution counter update process.
E	<p>Released with RobotWare 7.0.2. The following updates are made in this revision:</p> <ul style="list-style-type: none">• Renamed the product as Robot Control Mate from PC Jogging.• Restructured the manual to provide step-by-step procedures on controlling and jogging functions.• Added a note reminding users to disconnect the FlexPendant from the FlexPendant UI.• Updated the installation, uninstallation and upgrade procedures.
F	<p>The following updates are made in this revision:</p> <ul style="list-style-type: none">• Removed the limitation requiring only one task exists.• Added the step of task selection when program executions are performed in multitask scenarios.

Product documentation

Categories for user documentation from ABB Robotics

The user documentation from ABB Robotics 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 can be found via myABB Business Portal, www.myportal.abb.com.

Product manuals

Manipulators, controllers, DressPack/SpotPack, and most other hardware is delivered with a **Product manual** that generally contains:

- Safety information.
 - Installation and commissioning (descriptions of mechanical installation or electrical connections).
 - Maintenance (descriptions of all required preventive maintenance procedures including intervals and expected life time of parts).
 - Repair (descriptions of all recommended repair procedures including spare parts).
 - Calibration.
 - Decommissioning.
 - Reference information (safety standards, unit conversions, screw joints, lists of tools).
 - Spare parts list with corresponding figures (or references to separate spare parts lists).
 - References to circuit diagrams.
-

Technical reference manuals

The technical reference manuals describe reference information for robotics products, for example lubrication, the RAPID language, and system parameters.

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, software).
- How to install included or required hardware.
- 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 troubleshooters.

1 Introduction

About the Robot Control Mate

Overview

The Robot Control Mate (previously known as PC Jogging) provides basic instructions for OmniCore based robot systems. In cases where a FlexPendant is unavailable, the Robot Control Mate together with RobotStudio features allow users to control the robot from a connected PC.

Key functions

- Jogging

With combined selection of the motion mode and coordinate system, the robot can be jogged to a specific position.



Note

In RobotWare 7.0.2, jogging is unavailable if a virtual controller is connected.

- Position modification

You can define a desired target point in the RAPID instruction and use the target point to modify the robot position.

- Control

It allows you to make the motors on and off. It also displays the program control buttons.

- Calibration

It allows you to update the revolution counter of one or all axes for the robot, as well as memory data transfer between robot and controller.

- Status display

You can have a quick view on the controller status, such as operating mode, speed, motor state and program execution state.

Prerequisites

To work with Robot Control Mate, the following is required:

- OmniCore controller with RobotWare 7.0 or later
- RobotStudio 2019

Limitation

The Robot Control Mate,

- Supports IRB 910INV.
- Can only be used in automatic mode.

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Safety related

The OmniCore controller provides safety functions to ensure the safe operation with robots. Robot Control Mate is allowed to work in automatic mode with all safety means in place.



Note

The integrator is responsible that the safety devices necessary to protect people working with the robot system are designed and installed correctly.

The integrator is responsible for the safety of the final application.

- An emergency stop switch must be connected to the external emergency stop input interface to make sure the emergency stop function is enabled. The emergency stop switch must be positioned in easily accessible places so that the robot can be stopped quickly.
For details about how to connect an external emergency stop switch, see *Product manual - OmniCore C30*.
- The enabling device connection must be left open if there is no teach pendant connected to the controller. Then, the robot can only work in automatic mode.
For details about how to configure the enabling device connection, see *Product manual - OmniCore C30*.
- A deviation exists in OmniCore from paragraph 5.3.5 *Single point of control* (ISO 10218-1). Single point of control cannot be guaranteed in automatic mode because external clients can connect to the controller over the network. Make sure that only one client is connected to the controller at a given time.
- A safety guard device (such as a safety fence) must be active in automatic mode. When the system is powered on, entering the robot working area is not allowed. A safety fence is recommended. In case the fence is opened, the automatic stop is enabled and the robot can be stopped.
For details about how to connect an automatic stop, see *Product manual - OmniCore C30*.
- Sensitive body parts, such as the eyes and the larynx, must be protected by personal protective equipment (PPE).
- Operators working with the Robot Control Mate must be trained and have the required knowledge.

2 Getting started

Preparation before using the Robot Control Mate

Before using the Robot Control Mate, make sure:

- 1 RobotStudio has been downloaded, installed and activated on the PC.
Download RobotStudio from <http://new.abb.com/products/robotics/robotstudio/downloads>. For more information about how to install and run the RobotStudio, see *Operating manual - RobotStudio*.
- 2 The PC is connected to the controller and that the controller is powered on.
For more information about the PC connection to the controller, see section *Connecting a PC to the controller* in *Operating manual - RobotStudio*.

Installing the Robot Control Mate

Use the following procedure to install the Robot Control Mate.

- 1 Open RobotStudio and go to **RobotApps** in the **Add-Ins** ribbon tab.
- 2 In the displayed **RobotApps** window, enter a keyword in the **Search** text box.
The **Robot Control Mate** icon is displayed.
- 3 Click the icon and then click **Add** on the right pane.
- 4 Click **Accept** in the displayed disclaimer window.
The package will be downloaded and installed automatically.
- 5 Close and reopen RobotStudio.
The **Robot Control Mate** icon is displayed in the **Controller** ribbon tab.

Starting the Robot Control Mate

Use this procedure to open the Robot Control Mate

- 1 Open RobotStudio.
- 2 In the **Controller** ribbon tab, click **Robot Control Mate** in the **Robot Tools** group.
The **Robot Control Mate** ribbon tab is displayed.



Note

To close the **Robot Control Mate** tab, click **Close**.

- 3 Start working with the Robot Control Mate after connecting to a controller.



Note

If there is no controller is connected or a controller operating in a system in RobotWare version earlier than 7.0 is connected, **Unknown** will be displayed in the **Controller Status** group.

Continues on next page

Uninstalling the Robot Control Mate

Use the following procedure to uninstall the Robot Control Mate.

- 1 Open RobotStudio and click the **Add-Ins** tab.
- 2 In the **Add-Ins** window on the left pane, right-click the **Robot Control Mate** package under the **Installed Packages** navigation tree.
- 3 Choose **Uninstall Package** from the shortcut menu.
- 4 Click **Yes** to proceed.
The uninstallation procedure starts automatically.
- 5 Close and reopen RobotStudio.

The **Robot Control Mate** is removed from the navigation tree on the left pane.

Upgrading the Robot Control Mate

If a new version of the Robot Control Mate is available, uninstall the earlier versions as instructed in [Uninstalling the Robot Control Mate on page 14](#) and then reinstall as instructed in [Installing the Robot Control Mate on page 13](#).



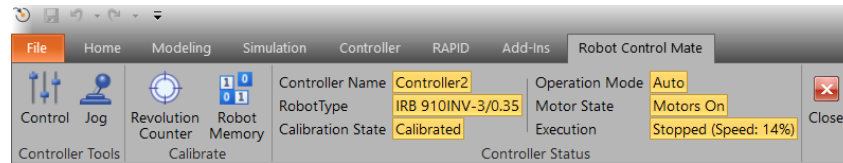
Note

Robot Control Mate was available as an integrated feature PC Jogging in RobotStudio version 2019.5. If integrated PC Jogging is used, upgrade RobotStudio to latest version first and then install the Robot Control Mate in **RobotApps** as instructed in [Installing the Robot Control Mate on page 13](#).

3 Working with the Robot Control Mate

3.1 Overview

The user interface



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Group	Description
Controller Tools	Provides controlling and jogging functions, such as motor status switching, program execution and robot position jogging.
Calibrate	Provides calibration functions to update revolution counters and to transfer robot memory between robot and controller.
Controller Status	Displays the basic information of the controller and robot.
Close	Closes the Robot Control Mate tab.

3 Working with the Robot Control Mate

3.2 Procedure

3.2 Procedure

Introduction

Use the following procedures to operate a robot system using the Robot Control Mate together with RobotStudio features.

Connecting to a controller

- 1 Switch on the main power on the controller.
- 2 Open RobotStudio.
- 3 Add a controller by choosing **One Click Connect** from the **Add Controller** category in the **Controller** ribbon tab.



Note

You can also choose **Add Controller** or **Add Controller from Device List** and then select the desired controller from the list.

The controller is loaded and displayed in the navigation tree.

- 4 Open the Robot Control Mate.
-

Performing the program executions

- 1 Check the calibration status of the robot in the **Controller Status** group in the **Robot Control Mate** tab page.
If the robot is uncalibrated, calibrate the robot as instructed in [Calibrating the robot on page 18](#).
- 2 In the **Robot Control Mate** tab page, click **Control** in the **Controller Tools** group.
The **Control** window is displayed.
- 3 Turn the motors on.
- 4 Select a task from the **Selected Tasks** drop-down list.
If there are multiple tasks, the program executes for the selected task.
- 5 Set the speed of program execution by dragging the scroll bar.
The speed of 100% indicates that the program is running at full speed.
- 6 Perform program executions.
 - **Play**: starts the program execution.
 - **Pause**: pauses a program execution.
 - **Prev**: executes one instruction backward.
 - **Next**: executes one instruction forward.

Continues on next page



Note

Click **Reset program to main** to set the program pointer to the first line of the main routine.

It is also possible to set the program pointer to routine by selecting a module and routine from the **Module** and **Routine** drop-down list first, and then click **PP to Routine**.

Jogging the robot



Note

In RobotWare version 7.0.2, jogging is unavailable if a virtual controller is connected.

- 1 In the **Robot Control Mate** tab page, click **Control** in the **Controller Tools** group.
The **Control** window is displayed.
- 2 Turn the motors on.
- 3 Click **Jog** in the **Controller Tools** group.
The **Jog** window is displayed.
- 4 Select the jogging mode.
 - **Joint**: this mode jogs the robot axis by axis. It moves one robot axis at a time.
 - **Linear**: this mode enables the tool center point of the selected tool to move along straight lines from "point A to point B" in space or to move in rotational motion based on the selected coordinate system's axis.
- 5 Select the coordinate system.
If **Tool** or **Wobj** is selected, a work object or tool must be selected from the **Work Object** or **Tool** drop-down list respectively, to specify the reference based on which the robot axis moves.
- 6 Select the increment mode.
 - **None**: the robot moves continuously to the specified point.
 - **Small/Medium/Large**: the robot will move a rated step each time based on the selected incremental movement size.
 - **Customized**: users can define increment step by clicking **Customized Increment**.
- 7 Set the jogging speed by dragging the scroll bar.
- 8 (Optional) Select load data from the **Load** drop-down list.
If equipment is mounted on any of the robot axes, then axes loads must be set. Otherwise overload errors might occur when jogging.
- 9 Click the + or - button in the **Position** area to jog the robot axes to the desired position.

Continues on next page

3 Working with the Robot Control Mate

3.2 Procedure

Continued



Note

The robot can also be jogged using target settings. Select a target from the **Target** drop-down list. Detailed position information of the selected target point is displayed. Then, press and hold **Go to** to move the robot until it reaches the target position or click **Modify Position** to apply the robot position to the RAPID program.

Calibrating the robot



WARNING

Before starting the revolution counter update procedure, make sure all robot axes are moved to the synchronization position and all the notches of synchronization marks are aligned.

If a revolution counter is incorrectly updated, it will cause incorrect manipulator positioning, which in turn may cause damage or injury! Always verify the results after calibrating any robot axis to verify that all calibration positions are correct.

Detailed information about calibration, revolution counter update, and so on can be found in the robot product manual.

- 1 Check the calibration state in the **Controller Status** group in the **Robot Control Mate** tab page.
- 2 If the state is **Uncalibrated**, check whether controller or robot has been replaced or the SMB board has been replaced.
 - If yes, proceed to step 3.
 - If no, proceed to step 7.
- 3 In the **Robot Control Mate** ribbon tab, click **Robot Memory** in the **Calibrate** group.

In the displayed **Update Memory** dialog box, choose **Update controller with robot memory data** or **Update robot memory with controller data** according to the actual situation.



CAUTION

Do not mix the memory data transfer direction.

For more details about memory data transfer, see *Operating manual - Integrator's guide OmniCore*.

- 4 A dialog box is displayed, warning that the transfer operation cannot be undone. Click **OK** to proceed or click **Cancel** to cancel.
- 5 After the data is successfully transferred, a message is displayed, warning that the controller requires to be restarted. Click **OK** to close the message.
- 6 Restart the controller.
- 7 In the **Robot Control Mate** ribbon tab, click **Revolution Counter** in the **Calibrate** group.

Continues on next page

In the displayed **Update Revolution Counter** dialog box, check the calibration status of the axes and, in the **Selection** column, select the axes for which revolution counters need to be updated.

For more details about robot revolution counter update, see the robot product manual.

- 8 A dialog box is displayed, warning that the updating operation cannot be undone. Click **OK** to proceed or click **Cancel** to cancel.
- 9 After the revolution counters of the selected axes are successfully updated, a message is displayed, warning that the controller requires to be restarted. Click **OK** to close the message.
- 10 Restart the controller.
- 11 After the calibration is done, jog the robot and check whether the robot is well calibrated.

For details about robot jogging, see [Jogging the robot on page 17](#). If the robot is not correctly calibrated, calibrate again in the **Update Revolution Counter** dialog box.

Working with the robot system

- 1 Create a testing RAPID program or load an existing RAPID program in the RAPID editor.
For more information about how to work with RAPID editor, see *Operating manual - RobotStudio*.
- 2 Jog the robot to a desired position in the **Jog** window.
For details about robot jogging, see [Jogging the robot on page 17](#).
- 3 Select a desired target point from the **Targets** drop-down list and click **Modify Position**.
- 4 In the **Robot Control Mate** ribbon tab, click **Control** in the **Controller Tools** group.
The **Control** window is displayed.
- 5 Run the RAPID program.
For details about how to execute the program, see [Performing the program executions on page 16](#).



CAUTION

If the speed is higher than 10% of the fully speed, a warning message displays, prompting to confirm the running speed. Click **Yes** to remain the speed setting or click **No** to change the speed to 10% of the fully speed.

Make sure all risks are cleared before clicking **Yes** and run the program at a high speed. If any risky situation occurs, click **Pause** in the **Control** tab to stop the program or press the external emergency stop switch.

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4 Reference information

4.1 Features in RobotStudio

Feature list

The following table provides the features in RobotStudio that will be used together with the Robot Control Mate when operating a robot system.

For more details about how to use the RobotStudio features, refer to the popup message displayed in RobotStudio or see *Operating manual - RobotStudio*.

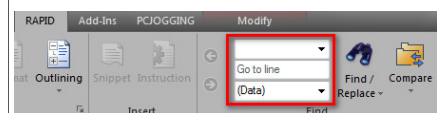
Feature group	Feature	Action
Operation	Run from the current cursor	<ol style="list-style-type: none"> 1 Make sure the RAPID program is opened by double-clicking the specific RAPID module from the Controller navigation tree. 2 In the RAPID ribbon tab, click Request Write Access in the Access group. 3 Right-click the line where the cursor is and choose Set Program Point to Cursor from the shortcut list. <div data-bbox="1077 1008 1385 1310" data-label="Image"> </div> 4 Click Play in the Control tab and then the program will run from the line where the cursor is. <div data-bbox="1013 1451 1069 1512" data-label="Image"> </div> <div data-bbox="1093 1467 1157 1496" data-label="Section-Header"> <h4>Note</h4> </div> <div data-bbox="1005 1523 1436 1635" data-label="Text"> <p>The find a desired line or program module, type the required line number or choose the module from the list in the Find group in the RAPID ribbon tab</p> </div> <div data-bbox="1005 1646 1436 1758" data-label="Image"> </div>

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Note

The find a desired line or program module, type the required line number or choose the module from the list in the Find group in the RAPID ribbon tab



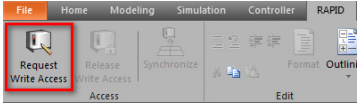
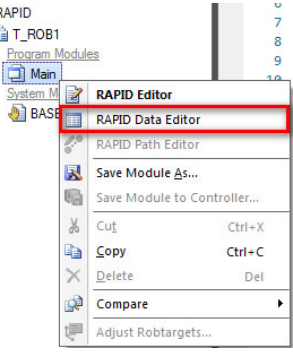
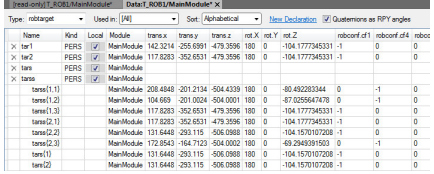
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4 Reference information

4.1 Features in RobotStudio

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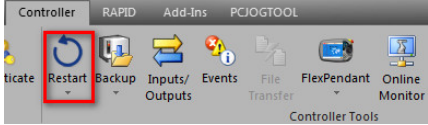
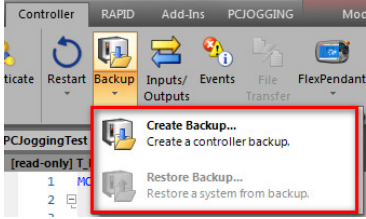
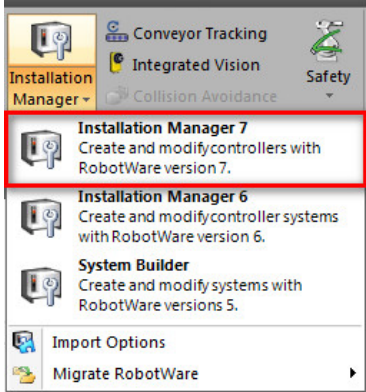
Feature group	Feature	Action
Programming	Online programming	<ol style="list-style-type: none"> 1 Make sure the RAPID program is opened by double-clicking the specific RAPID module from the Controller navigation tree. 2 In the RAPID ribbon tab, click Request Write Access in the Access group. <p>Then, the RAPID script can be edited and programmed.</p>  <p>xx1900001369</p>
	RAPID data editing	<p>Right-click a specific RAPID module from the Controller navigation tree and then choose RAPID Data Editor.</p>  <p>xx1900001368</p>
	Specific point data editing	<p>In the RAPID Data Editor window, edit the detailed data of a specific point.</p>  <p>xx1900001402</p>

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4 Reference information

4.1 Features in RobotStudio

Continued

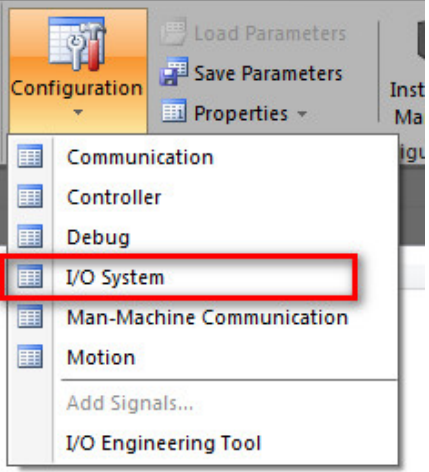
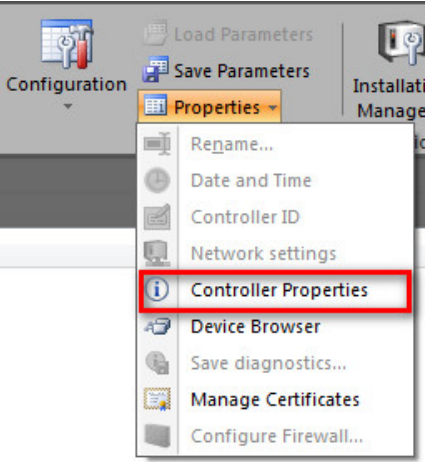
Feature group	Feature	Action
Controller management	System restart	<p>In the Controller ribbon tab, click Restart in the Controller Tools group.</p>  <p>xx1900001329</p>
	System backup and restore	<p>In the Controller ribbon tab, choose Create Backup or Restore Backup from the Backup list in the Controller Tools group.</p>  <p>xx1900001370</p>
	System installation	<p>In the Controller ribbon tab, choose Installation Manager 7 from the Installation Manager list in the Configuration group.</p>  <p>xx1900001372</p>

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4 Reference information

4.1 Features in RobotStudio

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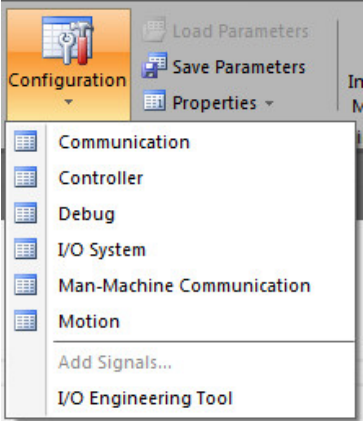
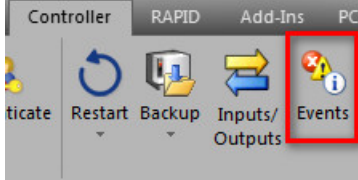
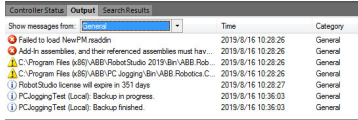
Feature group	Feature	Action
System status and configuration	I/O status checking	<p>In the Controller ribbon tab, choose I/O System from the Configuration list in the Configuration group.</p>  <p>xx1900001327</p>
	System information checking	<p>In the Controller ribbon tab, choose Controller Properties from the Properties list in the Configuration group.</p>  <p>xx1900001326</p>
	System configuration	<p>In the Controller ribbon tab, choose the required item from the Configuration list in the Configuration group.</p>

Continues on next page

4 Reference information

4.1 Features in RobotStudio

Continued

Feature group	Feature	Action
		 <p>xx1900001371</p>
Log	Log viewing	<p>View the logs by either of the following methods:</p> <ul style="list-style-type: none"> In the Controller ribbon tab, click Events.  <p>xx1900001373</p> <ul style="list-style-type: none"> Check the logs from the Output area at the bottom of the RobotStudio window.  <p>xx1900001374</p>

4 Reference information

4.2 Scenarios for controllers with FlexPendant

4.2 Scenarios for controllers with FlexPendant

Overview

The Robot Control Mate is mainly used for the controller without a FlexPendant. The FlexPendant can be disconnected from the controller in automatic mode. To disconnect the FlexPendant in automatic mode the user must have the **Safety Services** grant. The administrator must provide this grant using the **UAS Administration Tool** in RobotStudio.

This section describes how to properly disconnect the FlexPendant from a controller.

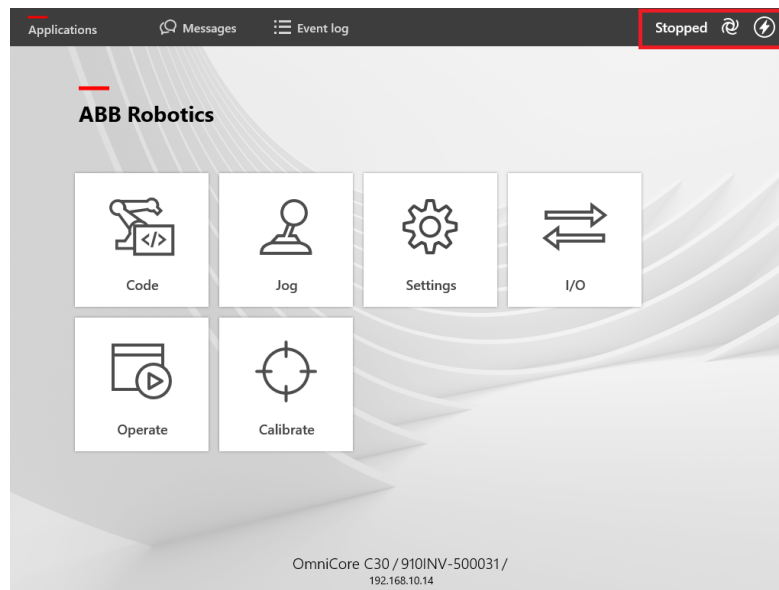
Disconnecting the FlexPendant



Note

The disconnection operation can only be executed on the FlexPendant. Do not use the Robot Control Mate to disconnect the FlexPendant.

- 1 On the status bar, tap the **QuickSet** button.
The **QuickSet** window is displayed.

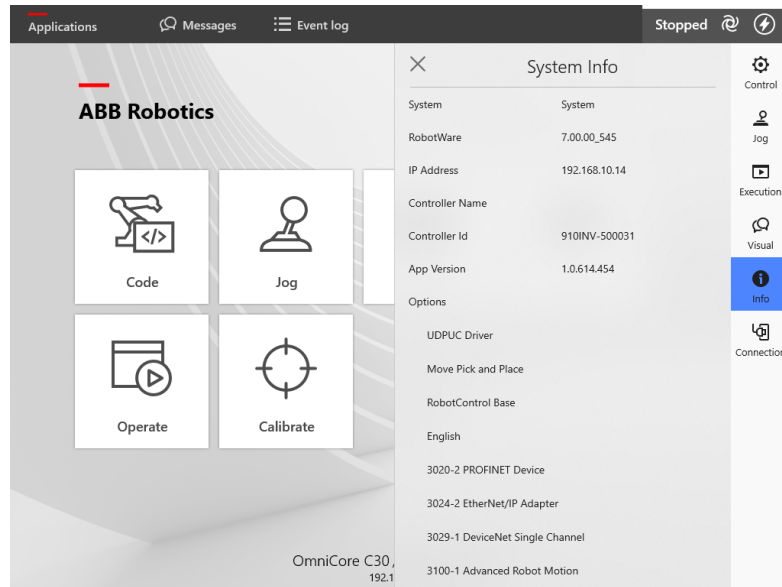


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- 2 Tap the **Info** tab.

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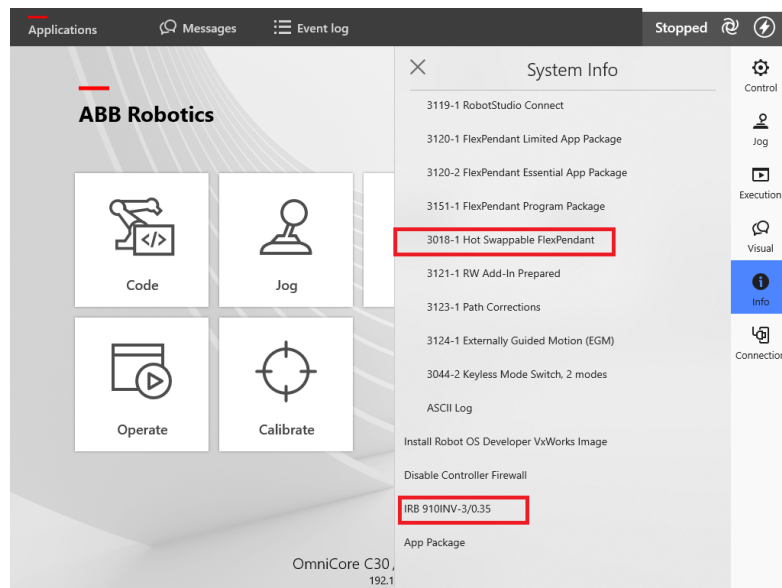
The System Info window is displayed.



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3 Check the robot type and options.

Make sure the robot type is IRB 910INV and the option 3018-1 Hot Swappable FlexPendant exists.



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Note

If the controller does not have the option 3018-1 Hot Swappable FlexPendant, contact ABB to install the RobotWare version with the option.

4 Tap the Control tab.

The Control Panel window is displayed.

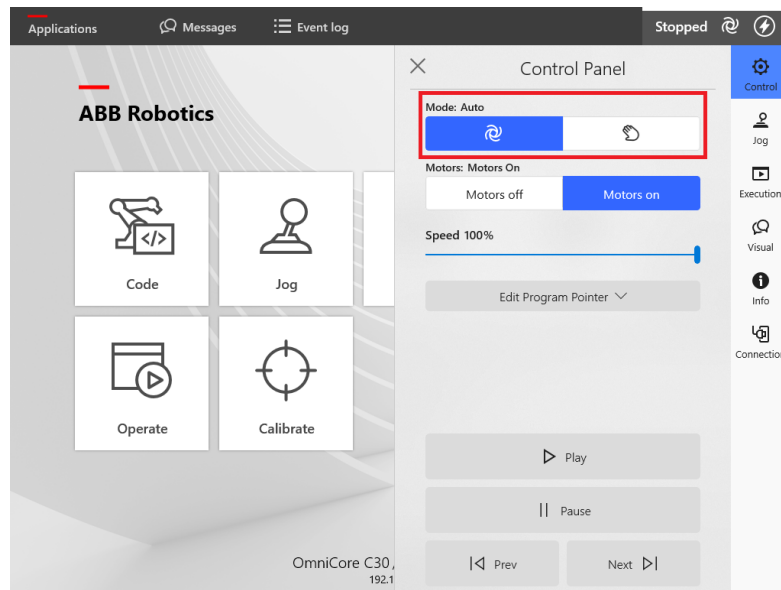
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4 Reference information

4.2 Scenarios for controllers with FlexPendant

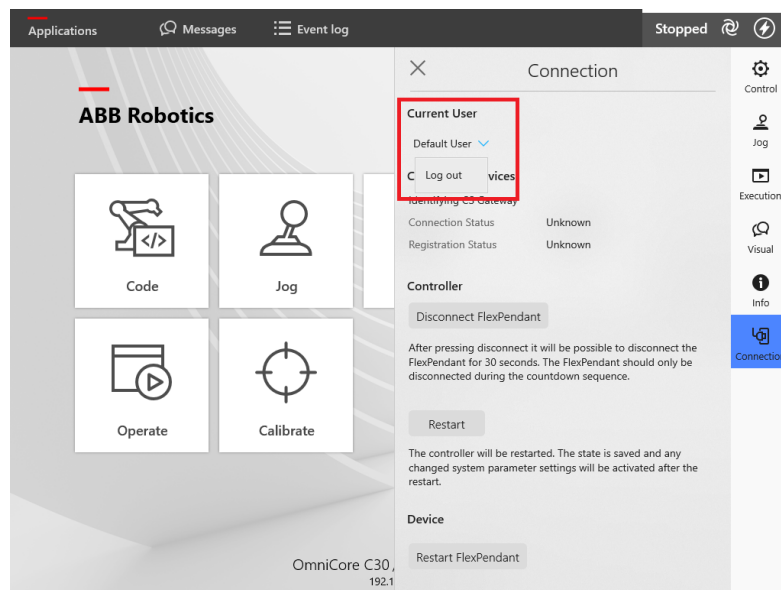
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- 5 In the **Mode** section, check the operating mode and make sure the system is in **Auto mode**.



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- 6 Tap the **Connection** tab.
The **Connection** window is displayed.
- 7 In the **Current User** section, check whether the logged-in user is the one has sufficient grant to disconnect the FlexPendant.
If not, you will get a permission denied message. In this case, tap the user name and choose **Log out**. Then, log in again using the user with the Safety Service permission is granted.

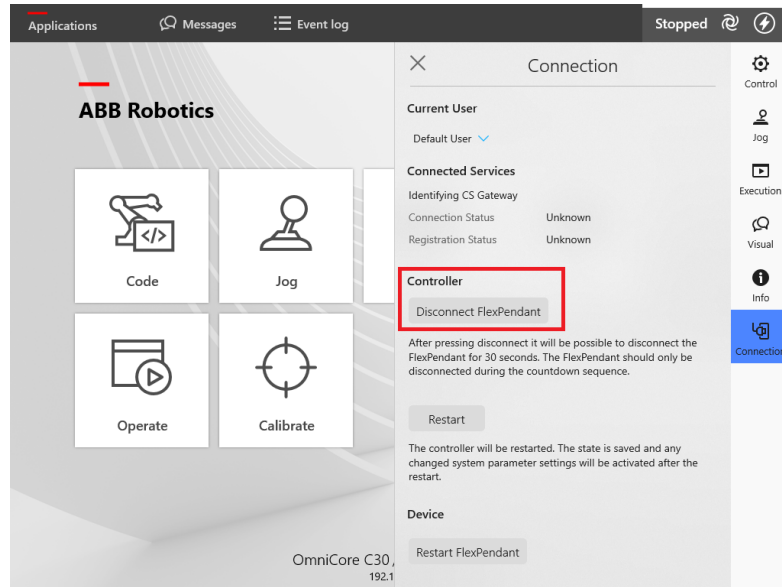


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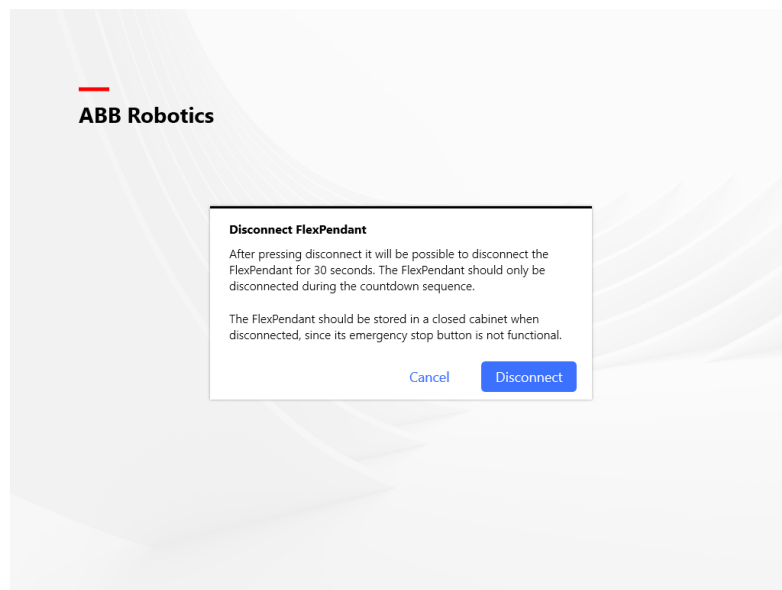
- 8 In the **Controller** section of the **Connection** window, tap **Disconnect FlexPendant**.

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A message is displayed, prompting to disconnect the FlexPendant within 30 seconds.



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9 Tap Disconnect.

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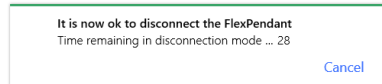
4 Reference information

4.2 Scenarios for controllers with FlexPendant

Continued

A popup window with 30 seconds countdown timer is displayed.


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10 Disconnect the FlexPendant within 30 seconds.



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