ROBOTICS

# Application manual

## Wizard

Trace back information:
Workspace Main version a344
Checked in 2020-03-10
Skribenta version 5.3.033

# Application manual

# example: IRB 14000-0.5/0.5

RobotWare 7.0.2

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Revision: A

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Original instructions.

# Table of contents

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# Overview of this manual

## About this manual

This manual introduces the user interface and instructions contained in the blocky programming application Wizard on the FlexPendent.

## Usage

This manual should be read during programming of IRB 14050 grippers.

## Who should read this manual?

This manual is intended for robot programmers, especially the beginners.

## Prerequisites

The reader should:

- Be trained in robot operation.

## References

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

| Document name | Document ID |
|---|---|
| *Operating manual - Emergency safety information* | *3HAC027098-001* |
| *Safety manual for robot - Manipulator and IRC5 or OmniCore controller* | *3HAC031045-001* |
| *Operating manual - OmniCore* | *3HAC065036-001* |
| *Product manual - OmniCore C30* | *3HAC060860-001* |
| *Product manual - IRB 14050* | *3HAC064625-001* |
| *Product manual - Grippers for IRB 14050* | *3HAC064626-001* |

## Revisions

| Revision | Description |
|---|---|
| A | First edition. |

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# 1 Introduction

## Overview

Wizard is a programming application available on the FlexPendant for users working with IRB 14050 grippers. It provides an easy and interactive programming means, enabling users to program by simply combining visible instruction blocks and setting pre-defined parameters.

## Safety information

Before using Wizard to program, make sure that all safety information included in but not restricted to the following manuals are acknowledged and necessary safety measures are conducted:

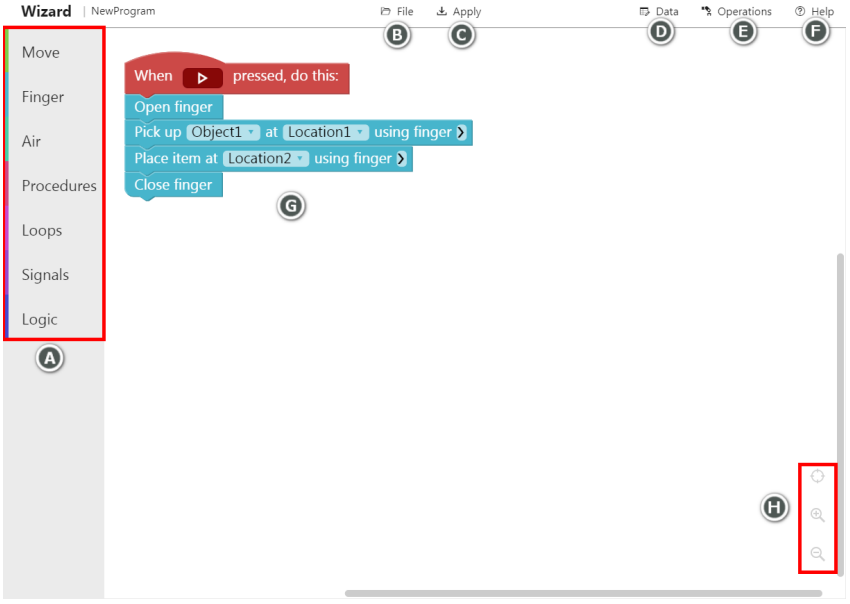
- *Operating manual - Emergency safety information*
- *Safety manual for robot - Manipulator and IRC5 or OmniCore controller*
- *Operating manual - OmniCore*
- *Product manual - OmniCore C30*
- *Product manual - IRB 14050*
- *Product manual - Grippers for IRB 14050*

## Prerequisites

To work with Wizard, the followings are required:

- OmniCore controller operating in RobotWare 7.0.2
- IRB 14050 with grippers
- Installed Smart Gripper and Wizard add-ins
- Installed options Collision Detection [3107-1] and Multitasking [3114-1].

## The user interface

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| Label | Buttons/Section | Description | |
|---|---|---|---|
| A | Block group | Tapping each block group button displays a list of available blocks in this group. During programming, tap the required block and drag it to the editing area. | |
| B | File | **New** | Clears the blocks in the editing area and creates a new program.<br>If there is a program under editing, a dialog displays, prompting to discard or save the program. |
| | | **Save as** | Saves the current program to the default directory `$HOME/Programs/`. |
| | | **Load** | Loads a program from the default program saving directory `$HOME/Programs/`. |
| | | **Rename** | Renames the current program. |
| C | Apply | Tapping the **Apply** button, the edited program will be saved to controller hard disk.<br>If the program is saved, the **Applied** button is displayed. | |
| D | Data | Tapping the **Data** button displays the quickset window. The quickset window has the **Location**, **Object** and **Tray** tabs. | |
| E | Operations | Tapping the **Operation** button allows a quick access of opening and closing operations on gripper fingers and suction cups. | |
| F | Help | Tapping the **Help** button displays the user manual. | |
| G | Editing area | The main programming window of the Wizard Users can easily sequence and edit the blocks in this area. | |
| H | View settings |  | Aligns the blocks to the left corner. |
| | |  | Zooms in the window view. |
| | |  | Zooms out the window view. |

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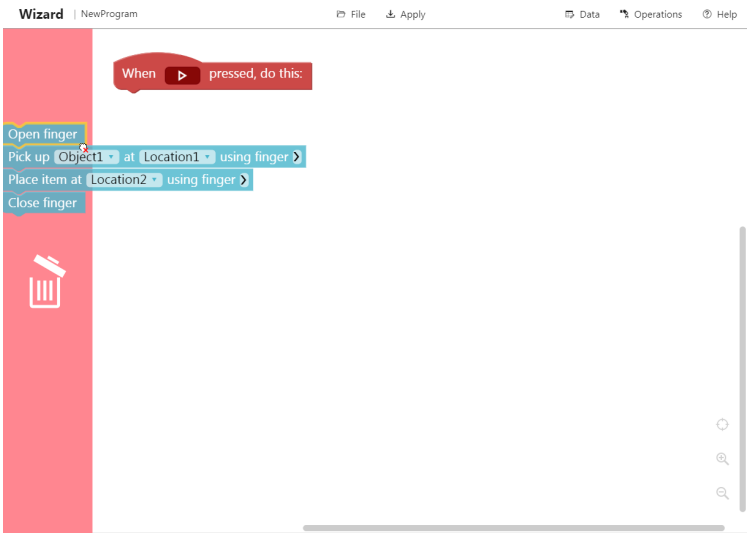
To delete unnecessary blocks, tap and press the blocks and drag them to the left pane of the window. Release the tapping when a trash can icon displays. Note that deletion cannot be undone.

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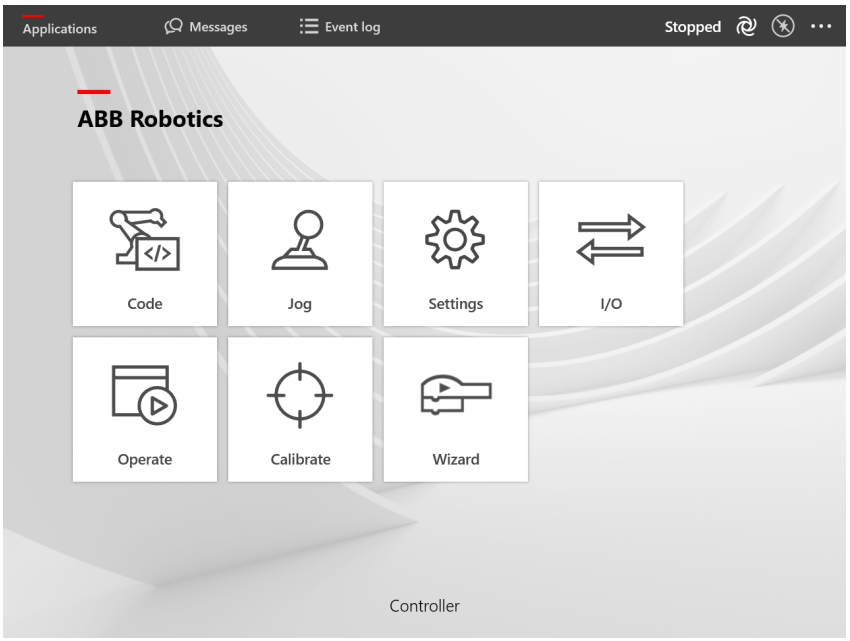
# 2 Getting started

## General

Wizard is a default application on the FlexPendant for IRB 14050. You can access the main window of Wizard directly by tapping the following application icon on the FlexPendant touch screen.

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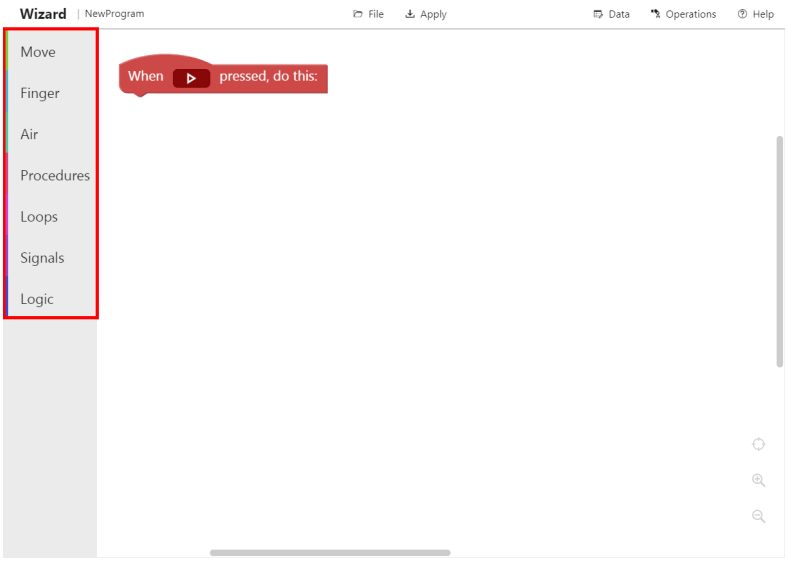
## Procedure

1 Tap the required block group icon to display the list.

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2 Drag the required block to the editing area.


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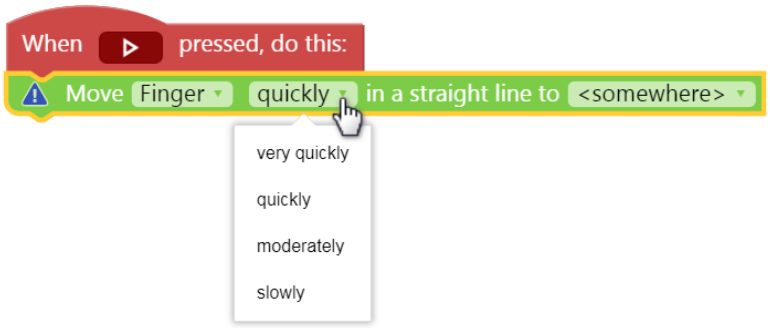
3 Set necessary parameters by choosing from the predefined list or a customized list.

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4 Repeat steps 2 and 3 until the program is created or modified as required.

**Tip**

You can drag the blocks to adjust their sequences.

5 Tap **Apply** to save the program.


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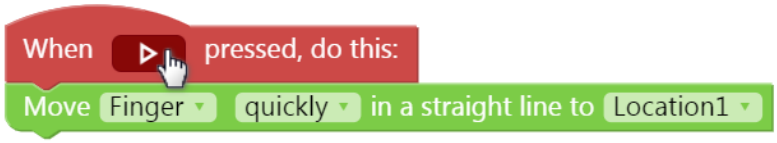
6 Tap the **Play** button in **Run** block to check whether the robot moves as programmed.

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**Note**

To view the corresponding RAPID data of the program edited in the Wizard ,

1 Tap **Application** in the status bar of the FlexPendant.
2 Tap **Code** on the start screen.
3 Tap **Wizard** in the displayed **Modules** page.

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# 3 Programming with Wizard

### Moving the gripper

Use the **Move** blocks to move the robot gripper fingers or suction cups to the destination location along a non-linear path or linearly.

- `Move` *`Finger quickly`* `to` *`<somewhere>`*
- `Move` *`Finger quickly`* `in a straight line to` *`<somewhere>`*

The movement speed is set to **quickly** by default. It can be reset to another value by users.

For details about the parameters in the blocks, see *Parameters on page 21*.

### Controlling the fingers and suction cups

To open and close the gripper fingers, use the `Open finger` and `Close finger` blocks in the **Finger** block group.

The gripper can also be configured with one or two vacuum modules. To enable and disable air supply to a suction cup, use the `Enable air for VacuumX` and `Disable air for VacuumX` blocks in the **Air** block group.

For details about the parameters in the blocks, see *Parameters on page 21*.

### Picking up and placing

The IRB 14050 grippers can pick up and place objects using either fingers or suction cups if configured. Available blocks are listed as follows.

| Use... | To... | Single object | Objects in a tray |
|---|---|---|---|
| Fingers | Pick | `Pick up <object> at <somewhere> using finger` | `Pick up next <object> from <tray> using finger` |
| | Place | `Place item at <somewhere> using finger` | `Place item at next open spot in <tray> using finger` |
| Suction cups | Pick | `Pick up <object> at <somewhere> using VacuumX` | `Pick up next <object> from <tray> using VacuumX` |
| | Place | `Place item at <somewhere> using VacuumX` | `Place item at next open spot in <tray> using VacuumX` |

The picking and placing blocks must be used in pair. If the gripper uses suction cups to pick up and place, the suction cup selected in a pair of picking and placing blocks must be the same one.

In scenarios where the gripper needs to pick up same objects that are orderly arranged in a tray and then place them to another tray for several times, use the **Index pick and place** blocks in which a tray is defined.

For details about the parameters in the blocks, see *Parameters on page 21*.

### Failure handling

For picking and placing blocks, it is possible to define the gripper behavior if the operation experiences a failure. Tapping the > button after a picking/placing block displays the **on failure** parameter.

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When a failure occurs,

- if **pause** is set, the gripper stops until users restore it manually;
- if **wait and retry** is set, the gripper will stop for a short period and then retry the operation until it succeeds.

### Operation repetitions

Operations can repeat for several times with a loop block is set. It can be a loop with defined repeated time or a while/until loop.

- `repeat X times`: defines the number that the blocks are to be repeated. The *X* parameter in the block must be set to a value equal to or larger than 1. The default repeated time is 10.
- `repeat while <condition> do <something>`: used when the blocks need to repeat under a condition. The judgement parameter can be set to `while` or `until` and is followed by a signal block as the condition.

### Working with I/O signals

The signal blocks control the responses of the gripper with the I/O signal values **1-True** and **0-False**. Available signal blocks are listed as follows:

- `set signal <signal name> to 1-True`
- `send pulse on signal <signal name>`
- `wait until DO signal <signal name> become 1-True`
- `wait until DI signal <signal name> become 1-True`
- `if signal <signal name> is 1-True do`
- `signal <signal name> is 1-True`

For details about the parameters in the blocks, see *Parameters on page 21*.

#### Logical executions

To execute an operation under a specified condition, the **if** and **if else** blocks in the **Logic** block group are used and only the `signal <signal name> is 1-True` block can be used as the trigger condition.

It is possible to expand the **if** block to the **else** and **else if** blocks with more conditions by tapping the button at the left corner.

### Programming a subroutine

#### Defining a subroutine

The `to do_something` block in the **Procedures** block group defines a subroutine.

Users can edit the subroutine as they do in the main routine. All defined subroutines will be listed in the **Procedures** block group and available for use later as a normal instruction block. This facilitates the user in programming a number of blocks which need to be reused for several times.

It is possible to name every subroutine. Tapping *do_something* displays a keyboard for entering the name.

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### Calling routine

The `call <routine>` block in the **Procedures** block group is used to call a defined and parameterless procedure from other modules in the active program in the controller.

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# 4 Defining parameters and data

## 4.1 Parameters

### Predefined parameters

The following table lists the parameters whose values are predefined. Users can only choose a value from the parameter list during programming.

| Parameter | In blocks... | Value |
|---|---|---|
| Motion speed | Move | The robot movement speed can be set to **very quickly**, **quickly**, **moderately** and **slowly**. |
| Suction | Air | The gripper can be configured with one or two vacuum modules. **Vacuum2** is available only for the gripper with two vacuum modules.<br>**Vacuum1** and **Vacuum2** are defined as follows.<br>  <br>xx1900002120 |
| Signal name | Signals | All the configured I/O signals in the controller are listed. |
| Signal value | Signals | The values can be set to **1-True** or **0-False** for signal blocks. |

### Customized parameters

The following table lists the parameters whose values can be customized.

| Parameter | In blocks... | Value |
|---|---|---|
| somewhere | Move<br>Finger<br>Air | Defines a destination location. Users can choose an existing location defined before or define a new location.<br>If specified in **Move** blocks, it refers to the location where the gripper moves to.<br>If specified in **Finger** blocks, it refers to the location where the gripper fingers moves to.<br>If specified in **Air** blocks, it refers to the location where the gripper suction cups moves to.<br>For details about how to define a location, see *Defining a location on page 24*. |

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| Parameter | In blocks... | Value |
|---|---|---|
| object | Finger<br>Air | Defines the object that requires the gripper to pick up or place using fingers or suction cups. The object defined in a pair of picking and placing blocks must be the same.<br>For details about how to define an object, see *Defining an object on page 25*. |
| tray | Finger<br>Air | Defines the tray where the object to be picked up from or to be placed to. Users can specify the tray orientation and dimensionality.<br>For details about how to define a tray, see *Defining a tray on page 26*. |

## 4.2 Data definition

**Operation**

To improve accuracy, it is recommended to use fingers and suction cups holding the object when defining data.

Click **Operation** in the main window of Wizard and choose the required operation in the **Smart Gripper** window.

It allows to open and close fingers, enable and disable air supply to a suction cup. Hold force of fingers can also be set.

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## 4.2.1 Defining a location

**Adding a location**

1. Choose **New Location** from the **<somewhere>** drop-down list in a block, or tap **Data** > **Location** > **New Location**.
2. In the displayed **Add new location** wizard, follow the instructions to add a new location.

   The added locations are listed in the **Location** tab page.

**Deleting a location**

1. Tap **Data** > **Location**.
2. In the displayed **Location** tab page, click **Select**.
3. In the displayed list, select the check box of the to-be-deleted location.
4. Tap **Delete**.
5. Tap **Delete** in the confirmation dialog box.

   The location is removed from the list.

**Modifying a location**

1. Tap **Data** > **Location**.
2. In the displayed **Location** tab page, tap **Edit** next to the to-be-modified location.
3. In the displayed **Edit location** window,

   - to modify the location name, edit the new name in the text box and click **Save**.

   - to modify other location data, tap **Redefine** and follow the instructions in the displayed **Redefine location** wizard to modify the data.

## 4.2.2 Defining an object

**Adding an object**

1. Choose **New Object** from the **<object>** drop-down list in a block, or tap **Data** > **Object** > **New Object**.
2. In the displayed **Add new object** wizard, follow the instructions to add a new object.

   The added objects are listed in the **Object** tab page.

**Deleting an object**

1. Tap **Data** > **Object**.
2. In the displayed **Objects** tab page, click **Select**.
3. In the displayed list, select the check box of the to-be-deleted object.
4. Tap **Delete**.
5. Tap **Delete** in the confirmation dialog box.

   The object is removed from the list.

**Modifying an object**

1. Tap **Data** > **Object**.
2. In the displayed **Objects** tab page, tap **Edit** next to the to-be-modified object.
3. In the displayed **Edit object** window, modify the required data:
   - object name
   - tool used for picking
   - grasping way of the fingers
   - finger position and holding force
   - air pressure of the suction cup

## 4.2.3 Defining a tray

### Adding a tray

1. Choose **New Tray** from the **<tray>** drop-down list in a block, or tap **Data** > **Tray** > **New Tray**.
2. In the displayed **Add new tray** wizard, follow the instructions to add a new tray.

   The added trays are listed in the **Tray** tab page.

### Deleting a tray

1. Tap **Data** > **Tray**.
2. In the displayed **Tray** tab page, click **Select**.
3. In the displayed list, select the check box of the to-be-deleted tray.
4. Tap **Delete**.
5. Tap **Delete** in the confirmation dialog box.

   The tray is removed from the list.

### Modifying a tray

1. Tap **Data** > **Tray**.
2. In the displayed **Tray** tab page, tap **Edit** next to the to-be-modified tray.
3. In the displayed **Edit tray** window,

   - to modify the tray name, edit the new name in the text box and click **Save**.

> **Note**
>
> The information of the object arrangement in each tray dimension is shown for reference.

## 4.3 Shortcut menu

### Shortcut commands

Tapping and holding a block or the blank area of the editing area displays the shortcut command list.

| Command | Description |
|---|---|
| Collapse Block(s) | Folds block(s) to display only a concise information of the block(s). |
| Expand Block(s) | Expands block(s) to show all information. |
| Delete Block/Delete *X* Blocks | Tapping a specific block and choosing **Delete Block** deletes only the selected block. Tapping the blank area and choosing **Delete *X* Blocks** deletes all the blocks under programming. |
| Duplicate | Creates a same block under the selected one. |
| Disable Block(s) | Disables the block(s) so that they will not be saved and functional in the program. |
| Highlight function definition | Goes to and highlights the **Procedure** block in the editing area. |

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