Manual
Connecting ArtiMinds RPS to an ABB Robot

Client Setup Instructions

Version 1.2

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Contact

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Content

1 Setup

1.1 Robot

1.1.1 Supported Controllers

ABB IRC5 Controller
ABB OmniCore Controller

1.1.2 Required software packages

ArtiMinds RPS requires the following software options to be installed on the IRC5 controller:

- 616-1 PC Interface
- 623-1 Multitasking
- 661-2 Force Control Base (for +Force functionality only)

The equivalent software options for the OmniCore controller are:

- 3119-1 RobotStudio Connect
- 3114-1 Multitasking
- 3038-1 Force Control Interface (for +Force functionality only)

The options can be installed using RobotStudio. To obtain additional Software Options, please contact your ABB Sales representative.

Minimum User Grants

ArtiMinds RPS will need the user credentials of a user on the ABB controller, which has at least the following grants:

1. **Load program** (UAS_RAPID_LOADPROGRAM)
2. **Modify current value** (UAS_RAPID_CURRVALUE)
3. **Execute program** (UAS_RAPID_EXECUTE)
4. **Program debug** (UAS_RAPID_DEBUG)
5. **I/O write access** (UAS_IO_WRITE)
6. **Modify configuration** (UAS_CFG_WRITE)
7. **Remote warmstart** (UAS_REMOTE_WARMSTART)

Checking and adjusting User Grants for a specific user can be done using RobotStudio.

1.2 ArtiMinds RPS

In order for ArtiMinds RPS functionality to fully work on the ABB controller, several modules and configuration entries need to be installed on the controller.

It is assumed that the required ABB software packages have been installed successfully on the ABB controller and a user with the correct user grants exists (See chapter *1.1.2 Required software packages*).

The setup of ArtiMinds RPS and the ABB controller is divided into two parts: First, certain settings have to be defined in ArtiMinds RPS. Then, all required components and controller settings will be installed on the controller automatically using the One-Click Installation button. After this, the controller will be restarted automatically and is then ready to be used with ArtiMinds RPS.

1.2.1   Setup in ArtiMinds RPS

The following settings have to be defined either in the ArtiMinds RPS Robot Configurator during robot setup, or in the ArtiMinds RPS settings page:

1. IP Address – the address of your ABB controller in the network connected to your PC.
2. User – The name of a local user on the ABB controller, which can be used by ArtiMinds RPS (default: "Default User")
3. Password – The password of the local user on the ABB controller (default: "robotics")
4. RPS Main Rapid Task – The name of the motion task used by ArtiMinds RPS for program execution (default: "T_ROB1"). The default motion task will be created by the ArtiMinds RPS installer if it does not exist yet.
5. RPS Service Rapid Task – The name of the non-motion background task used by ArtiMinds RPS for streaming and utility functionality (default: "T_ROB2"). The default task will be created by the ArtiMinds RPS installer if it does not exist yet.
6. RPS Service Constraint Task – The name of the non-motion background task used by ArtiMinds RPS for runtime constraint checks (default: "T_ROB3"). The default task will be created by the ArtiMinds RPS installer if it does not exist yet.

1.2.2   One-Click Installation of the required components and controller settings

The remaining installation can be done conveniently in the ArtiMinds Robot Configurator menu ("File -> Robot -> New Robot Setup") or, in case the robot has already been configured, in the ABB settings page ("File -> Settings -> ABB") using the button "**Install RPS Configuration on Controller**".

The following changes will be made on the ABB controller by the automated installation of the configuration:

Installed Modules

The following module files will be copied to the controller:

- $HOME/RPSService/RPSService.mod
- $HOME/RPSService/RPSConstraintService.mod - Since 1.14
- $HOME/RPSService/sharedTypesAndMethodsModule.mod
- $HOME/RPSService/sharedVarModule.mod

Installed Configurations

The following configuration entries will be added or overwritten should they already exist:

1. I/O System -> Signal -> "debugWait" (Internal Signal)
2. I/O System -> Signal -> "executeScript" (Internal Signal)
3. I/O System -> Signal -> "forceStreaming" (Internal Signal)
4. I/O System -> Signal -> "showDialog" (Internal Signal)
5. I/O System -> Signal -> "stopRobotMotion" (Internal Signal) – Since 1.28
6. Controller -> Automatic Loading of Modules -> Load sharedTypesAndMethodsModule.mod into ALL tasks
7. Controller -> Automatic Loading of Modules -> Load sharedVarModule.mod as SHARED
8. Controller -> Automatic Loading of Modules -> Load RPSService.mod into the RPSServiceTask (default: T_ROB2)

9. Controller -> Automatic Loading of Modules -> Load RPSConstraintService.mod into the RPSConstraintTask (default: T_ROB3)
10. Controller -> Task -> Main Motion Task for program execution (default: T_ROB1)
11. Controller -> Task -> Background RPS Service Task for helper execution and streaming (default: T_ROB2)
12. Controller -> Task -> Background RPS Constraint Task for runtime constraint checks (default: T_ROB3)

1.2.3   Update an existing ArtiMinds Installation on the ABB controller

Updating the ArtiMinds installation can be done by performing the same steps as a fresh installation. The One-Click Installer will replace all required files and configurations automatically.

Note: After updating an ArtiMinds RPS installation on the controller, all robot programs that have been compiled with previous versions of ArtiMinds RPS have to be re-compiled with the new version.

1.2.4   Downgrading an existing ArtiMinds Installation on the ABB controller

Downgrading of the ArtiMinds Installation files to a previous ArtiMinds RPS version is not officially supported by the One-Click Installer and might not work depending on the used ArtiMinds RPS versions. It is recommended to remove all ArtiMinds RPS related components manually before installing an older version.

1.2.5   Uninstalling an ArtiMinds RPS Installation from the ABB controller

Removing an existing installation can only be done manually. You can find a complete list of all installed files and configuration entries that have to be removed in chapter *1.2.2 One-Click Installation of the required components and controller settings*.

After uninstall, a **P-Start** is required to reset the RAPID modules.

2   Operation

2.1   General Communication

After successful installation, the ABB Web Interface and the RPS Service Task will handle all communication between robot configurator and ArtiMinds RPS. If you still run into trouble, make sure that:

- The RPS User has all required grants to interact with the robot as specified in chapter *1.1.2 Required software packages.* Missing grants should also be reported by ArtiMinds RPS when trying to connect to the robot for the first time. Contact your administrator to gain the required grants on the robot if necessary.
- The RPS Service Task is running on the robot. The message "RPS Service Module started" in the robot's log after startup should confirm this. A missing RPS Service Task should also be reported by ArtiMinds RPS when trying to connect for the first time. (Re-) installing the ArtiMinds RPS Setup on the robot should solve this problem
- All required software options are installed on the robot as specified in chapter *1.1.2 Required software packages.* Missing software options should be reported by ArtiMinds RPS when trying to connect for the first time. Contact your administrator to install missing options.
- The communication is not blocked by your PC's firewall.

2.2   Moving the robot

2.2.1   Manual Mode

On the IRC5 controller:

1. Start your program through the red or green "Play" buttons within ArtiMinds RPS.
2. A message will now pop up on the teach panel, asking for access to the controller's functions. Press „Grant" to allow this.
3. A second message will pop up, requiring clearance to move the robot. This needs to be confirmed via an ABB-mechanism: Toggle the clearance button 3 times within 5 seconds to confirm program start.
4. Immediately afterwards, press and hold the clearance button again to enable motors and start the program.
5. You will need to keep the clearance button pressed during the whole duration of the program in manual mode.

On the OmniCore controller:
1. Start your program through the red or green "Play" buttons within ArtiMinds RPS
2. A message will now pop up on the teach panel, asking for access to the controller's functions. Press „Grant" to allow this.
3. The program will then be copied and loaded on the controller. You still need to press the play button on the teach pendant to start it.

2.2.2 Auto Mode

On the IRC5 controller

1. Start your program through the red or green button within ArtiMinds RPS
2. No further interaction is required

The program will start immediately in automatic mode!

On the OmniCore controller:

1. Start your program through the red or green "Play" buttons within ArtiMinds RPS
2. The program will then be copied and loaded on the controller. You still need to press the play button on the teach pendant to start it.

3   Trouble-shooting

Connection to robot fails

- Possible reasons for connection problems should be reported as an error message when trying to connect.
- Otherwise, make sure to check the list in chapter *2.1 General Communication* and make sure that requirements for the robot connection are met.

Robot goes into error state, either the RPS Service Task or the RPS Constraint Task stopped

- This indicates an unexpected error within one of these tasks. Restarting the controller should reset them.
- In RobotWare versions earlier than v6.10.2, the controller could run into such an error when trying to connect to an IP address outside of its reachable address space. This can be caused by faulty IP addresses of the host PC or a configured camera system.

4   Vision

For all currently supported +Vision systems, it is sufficient to make sure that the detector shares a network connection with the robot controller and that the detector's IP address can be reached from the controller.

To setup TCP/IP connections from the robot controller, the option **616-1 PC Interface / 3119-1 RobotStudio Connect** is required (depending on your controller version).

Once the detector is reachable from the robot controller, configuring the detectors IP address in the ArtiMinds RPS vision settings should be enough to get the connection to work.

5 Force

Please note that the +Force functionality in ArtiMinds RPS requires additional ABB software packages. More details can be found in chapter *1.1.2 Required software packages*.

Before using a Force-Torque-Sensor (FTS) with ArtiMinds RPS, follow the installation instructions by ABB to connect the sensor to the controller's voltage measurement box and load the calibration file onto the robot controller.

When configuring a new ABB robot with FTS in ArtiMinds RPS, please make sure that the transformations of the sensor in the Robot Configurator (in sub-step "Mounting: Force Torque Sensor) matches the transformations defined on the robot controller. You can find the controller's FTS transformations in "Configuration -> Topic Motion -> FC Sensor".

When using Force functionality with the integrated force-torque sensor of the ABB GoFa robot, no transformations are required.

6 Error reporting

When encountering an error, please provide the following information to the ArtiMinds Robotics Support (support@artiminds.com):

1. ArtiMinds RPS log file (\documents\ArtiMinds RPS\inrop.log)
2. Describe the actions that lead to the error
3. ABB robot debug output
    a. On the ABB teach pendant, press the long bar on the top
    b. Logging messages from the ArtiMinds RPS Communicator are printed on this screen
4. .artm file of the project

Notes

Publication History

Date	Version	Description
October 2021	1.0	First Version
March 2022	1.1	Added sub-chapters for Force and Vision
March 2024	1.2	Added information about OmniCore & ABB GoFa