READY

FORGE|os 5

FANUC R-30iA Startup Guide
The documentation, best practices, and recommendations provided by READY Robotics do NOT constitute safety advice. Products sold through READY Robotics are not by themselves a fully integrated workcell. As required in ISO 10218-2, READY Robotics strongly recommends performing a complete risk assessment of the integrated workcell per ISO 12100. You may wish to use the methodology found in the ANSI/RIA TR R15.306 Task-based Risk Assessment Methodology.
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OVERVIEW

This guide will help you set up a factory FANUC R-30iA controller (style A cabinet or B cabinet) for use with Forge/OS 5.

By the end of this guide, you will control your FANUC robot with Forge/OS on the KEBA pendant!

Contact READY Robotics for FANUC software and hardware requirements.

You will complete the following steps:

1. Prepare the FANUC controller to connect to the Forge hub and KEBA pendant.
2. Connect the KEBA pendant to the FANUC controller.
3. Connect the FANUC controller to your Forge hub through Ethernet.
4. Organize the wiring and close the FANUC controller.
5. Power up the systems.
6. Install and set up Forge/OS.
7. Add your robot in the Device Configuration app on the KEBA pendant.
8. Control your FANUC robot with Forge/OS!
R-30IA STARTUP REQUIREMENTS

**Note:** This guide assumes that you have installed the FANUC robot and controller, FANUC’s robot-specific software (V7.70P/56), and required software options. The USB software install takes a few hours. Complete the software installation before moving on.

READY Robotics does not sell the items listed below. Please contact your local distributor or sales rep.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPSFTY Breakout Harness</td>
<td>NE-2020-901-002</td>
</tr>
<tr>
<td>KAREL</td>
<td>RTL-R632-HT</td>
</tr>
<tr>
<td>User Socket Messaging Option</td>
<td>RTL-R648-HT</td>
</tr>
<tr>
<td>DCS Pos./Speed Pkg. Option</td>
<td>RTL-R735-HT DCS</td>
</tr>
<tr>
<td>DCS Safety I/O Connect Option</td>
<td>RTL-J568-HT DCS</td>
</tr>
</tbody>
</table>
R-30iA SAFETY I/O INSTALLATION

You must adapt the factory-configured R-30iA to enable the KEBA pendant's safety features. Find your FANUC OPSFTY Breakout Harness before moving on.

For reference, here are interior diagrams of the R-30iA, A-cabinet and B-cabinet:
1. Install the FANUC controller and robot according to FANUC installation and safety guidance.

   **Note:** This guide assumes that you have installed the FANUC robot and controller, as well as FANUC's robot-specific software.

2. Disconnect the FANUC Controller from its power supply and open the controller.
   1. Turn off your FANUC Controller and then disconnect it from its power supply. Follow your facility's lockout/tagout procedure before proceeding.

      **Electric Shock Warning:** Disconnect all components from power sources before attempting this installation.

   2. Open the FANUC controller. Use a flat head screwdriver to turn the lock below the power switch counterclockwise. Then turn the power switch farther counterclockwise to release the door.

3. Install the Safety Breakout Harness.
   1. Find the panel board on the inside surface of the cabinet door. For the A-cabinet, the panel board is located in the Operation Box.

   2. Connect the harness connector to connector CRMA8 on the panel board.
INSTALLING THE KEBA PENDANT WITH A READY PRODUCT

The KEBA pendant includes these safety features to connect with a robot controller:

- Three-Position Enabling Switch
- Emergency Stop Button
- Robot Mode Key Switch

If Forge/OS is installed on a READY device (e.g. Forge/Hub or Forge/Ctrl), follow these steps to connect with your robot controller. If you would like to perform the integration yourself, please contact READY Robotics for the correct startup guide.
Other Requirements

<table>
<thead>
<tr>
<th>Item</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flush Cutters</td>
<td>1</td>
</tr>
<tr>
<td>Zip Ties</td>
<td>~10</td>
</tr>
</tbody>
</table>

Electric Shock Warning: Disconnect all components from power sources before attempting this installation.

1. Position your READY product with attached KEBA pendant.

   Note: If you are using a Forge/Ctrl, this guide assumes you have connected the Forge/Ctrl to the KEBA pendant using the KEBA Pendant Junction Box.

2. Attach the M12 connector on the flying lead cable to the port on the KEBA Pendant Junction Box or the Safety connector on the Forge/Hub.

3. Feed the flying leads through a controller cable entrance. Refer to FANUC documentation for cable entrance and sealing.
Wire the flying leads to the Panel Board according to the table below:

<table>
<thead>
<tr>
<th>Junction Box Wire</th>
<th>Terminal Block TBOP4</th>
<th>CRMA8 OPSFTY Harness</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pink</td>
<td>EES1</td>
<td></td>
<td>Emergency Stop circuit 1</td>
</tr>
<tr>
<td>Yellow</td>
<td>EES11</td>
<td></td>
<td>Emergency Stop circuit 1</td>
</tr>
<tr>
<td>Black</td>
<td>EES2</td>
<td></td>
<td>Emergency Stop circuit 2</td>
</tr>
<tr>
<td>Grey</td>
<td>EES21</td>
<td></td>
<td>Emergency Stop circuit 2</td>
</tr>
<tr>
<td>Brown</td>
<td></td>
<td>A7 + 24E</td>
<td>Enabling Switch Circuit 1</td>
</tr>
<tr>
<td>Blue</td>
<td></td>
<td>A1 OPSFTY11</td>
<td>Enabling Switch Circuit 1</td>
</tr>
<tr>
<td>White</td>
<td></td>
<td>B7 OV</td>
<td>Enabling Switch Circuit 1</td>
</tr>
<tr>
<td>Green</td>
<td></td>
<td>B1 OPSFTY12</td>
<td>Enabling Switch Circuit 1</td>
</tr>
<tr>
<td>Red</td>
<td></td>
<td>A8 +24E</td>
<td>Key switch circuit 1</td>
</tr>
<tr>
<td>Violet</td>
<td></td>
<td>A2 OPSFTY21</td>
<td>Key switch circuit 1</td>
</tr>
<tr>
<td>Grey/Pink</td>
<td></td>
<td>B8 0V</td>
<td>Key switch circuit 2</td>
</tr>
<tr>
<td>Red/Blue</td>
<td></td>
<td>B2 OPSFTY22</td>
<td>Key switch circuit 2</td>
</tr>
</tbody>
</table>

Wire the external safety fencing or another safeguarding device.
If you are using safety fencing or another safeguard device, you will connect it to the OPSFTY harness: On terminal block TBOP4, use jumpers to bridge EAS1 and EAS11, and bridge EAS2 and EAS21. Wire the fencing as shown in this table.

<table>
<thead>
<tr>
<th>Function</th>
<th>CRMA8 OPSFTY Harness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fence Contact 11 (Circuit 1)</td>
<td>A8 +24E</td>
</tr>
<tr>
<td>Fence Contact 12 (Circuit 1)</td>
<td>A3 OPSFTY 31</td>
</tr>
<tr>
<td>Fence Contact 21 (Circuit 2)</td>
<td>B8 0V</td>
</tr>
<tr>
<td>Fence Contact 22 (Circuit 2)</td>
<td>B3 OPSFTY 31</td>
</tr>
</tbody>
</table>

If you choose not to use a safeguard device, you will jumper the safety fencing circuits: On terminal block TBOP4, use jumpers to bridge EAS1 and EAS11, and bridge EAS2 and EAS21. On the OPSFTY harness, use jumpers to connect A8 (+24E) and A3 (OPSFTY 31), and connect B8 (0V) and B3 (OPSFTY 31).
CONNECTING THE R-30iA AND FORGE/OS THROUGH ETHERNET

Forge/OS must be able to communicate with the FANUC controller. This section will help you connect the Forge hub device and R-30iA using an Ethernet cable.

1. Locate an Ethernet cable long enough to reach from the Forge hub to inside the FANUC controller.
2. Plug one end of the Ethernet cable into a LAN port on the Forge hub device.
3. Inside the FANUC Controller, remove one of the knockouts on the foam cable panel and feed the Ethernet cable through it.
4. Plug the cable into port CD38 on the main board.
5. Manage cables (strain relief) and close the R-30iA cabinet:
   1. Use zip ties to bind cables to each other at the top and bottom of the controller enclosure. Ensure that there is enough slack for the door to open and close without creating tension.
   2. Cut the zip ties so that the cut-ends are flush with the connectors.
   3. Ensure that there is no resistance when you close the door to your FANUC Controller.
   4. Lock the controller door closed using a flat head screwdriver.

POWERING UP

Following these steps, you can now power up all of the components and prepare the controller on the FANUC teach pendant.

1. Power on your FANUC controller and Forge hub:
   1. Reconnect the FANUC controller to power and turn it on. Consult your Manufacturer’s manual for instructions on powering the FANUC controller.
   2. Plug in and turn on your Forge hub device and other integration hardware.
If there are issues, power off each device, disconnect from power supplies, and check your wiring.

Turn the switch on the front panel of the FANUC controller to **AUTO** mode.

Turn the switch on the FANUC Teach Pendant to **ON**.

**Initialize the FANUC Safety I/O Board after installation:**

1. Make sure that the FANUC controller is powered on and the switch on the front panel is switched to **AUTO** mode. Turn the switch on the FANUC teach pendant to **ON**.

2. On the FANUC Teach Pendant, navigate to the DCS screen by pressing the **MENU** button, **NEXT (0)**, **SYSTEM (6)**, then **DCS**.

3. Press **PREV** to ensure you are on the main DCS screen. There should be items named Safe I/O Status, Safe I/O connect, etc.

4. Use the arrow keys to highlight the **Safe I/O device** setting. Press **Enter**.

5. Press **INIT (F2)**, followed by **YES (F4)**. Do this process twice.

6. The **Safe I/O Board** will appear under one of the device headings. Scroll down with the arrow keys and make sure it's there. A new FANUC warning related to new DCS parameters may appear at the top of the FANUC Teach Pendant.

7. If the device does not appear, turn the FANUC controller off, check the wiring to the Safety I/O Board and the Conversion Unit. Then reboot the controller and try again.

**Set the robot’s IP address:**

1. On the FANUC Teach Pendant, navigate to the Host Communication screen: Press the **MENU** button, then scroll down to **SETUP (6)** and scroll right to **Host Comm (8)**. Press **ENTER**.

2. On the list of Protocols, highlight **TCP/IP** and press **ENTER**.
3. Highlight the line that reads Port#1 IP addr... and press ENTER.

4. If you are using the READY-made Forge/Ctrl, set the IP Address to 172.16.255.251 and set the Subnet Mask to 255.255.255.0. If you are using the READY-made Forge/Hub, set the IP Address to 192.168.1.20 and set the Subnet Mask to 255.255.255.0.
SETTING UP FORGE/OS

This section walks you through setting up Forge/OS on a KEBA pendant. Here, you will learn how to startup Forge/OS, sign in, activate a license, update the software version, and change settings. You may skip this section if Forge/OS is installed, activated, and up to date.

1. The Pendant Pairing screen shows on the KEBA pendant. This is where you connect the pendant to Forge/OS each time you reboot. It may take some time for the blue button to appear. When it does, tap **PAIR PENDANT**.

2. Tap **Admin** and sign in. The default Admin password is "forgeadmin".

3. From the Home Screen, tap on the **Settings** icon to open the Settings app.

   **Note:** If you try to open another app, you will be redirected to the Settings app until you activate a valid user license.

4. Find another USB drive to use for Forge/OS license activation.
Note: Contact READY Robotics for your license code. You can use any USB format for these steps. Don't use the USB installer that you installed Forge/OS with unless you clean and reformat it.

On the Settings app main screen, tap License Info.

1. Tap Generate Certificate.
2. Enter your license code.
3. Insert the USB into your Forge hub.
4. Tap Start Writing Certificate to USB Drive when prompted.
5. Remove the USB from your Forge hub.
6. Import the activation certificate and create the unlock certificate.

1. Insert the USB into your PC.
Find the USB in your PC file explorer. Open the new "Forge_OS-License-Activation-Certificate.txt" file from the USB and copy all the contents.

<table>
<thead>
<tr>
<th>Name</th>
<th>Date modified</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
</table>

Open an internet browser and go to the Forge/OS 5 License Portal.

Note: Access the license portal at www.activationportal.me/selfservice/activation.aspx?Type=1&cid=7461&pid=8933&lang=en-US

Paste the contents of the activation certificate file and click Activate.


Save the unlock certificate file.

Remove the USB from your PC.

Import the unlock certificate in Forge/OS
1. On the KEBA pendant, tap **Import Unlock Certificate**.

2. Insert the USB into your Forge hub.

3. Click **Load Unlock Certificate from USB Drive**.

4. Enter your license code.

5. Tap **Load Unlock Certificate**.

   **Note:** Forge/OS will return you to the licensing home screen and show an active license. If the license status isn’t Active, restart these license activation steps.

If you need to update Forge/OS from a USB drive, you can do that through the System Update screen.

   **Note:** Contact READY Robotics for an update file. Update files are too large for the FAT32 file format. Use an exFAT or NTFS formatted USB drive to download and install the update. Don’t use the USB installer that you installed Forge/OS with unless you clean and reformat it.

1. Tap **System Update** to open the update screen.
2. Connect your USB drive to the Forge hub and wait for Forge/OS to detect it.

3. When the update files show under **Available Versions**, tap the version to install.

4. Wait for the update to finish and restart Forge/OS using the power button at the bottom of the screen.

9. You can change system preferences from the Settings app before moving on.
On the Settings app main screen, tap **General Settings**.

1. Change the Time and Date settings or the Admin login password.

   **Note:** If you later forget what you change your password to, contact READY Robotics to reset it.

2. Tap **SAVE** to save changes and exit the General Settings menu.
ADDING THE ROBOT IN DEVICE CONFIGURATION

This section will show you how to add a robot in the Device Configuration app on Forge/OS. Make sure the FANUC controller and Forge/OS devices are powered on.

1. In the **Admin** role, tap the **Device Configuration** icon to open the Device Configuration app.
2 Tap **Add Device** to open the Device Library.

3 Select the **FANUC industrial robot** option. You can use the **Filter by** dropdown to show robot options. Tap **NEXT** to continue with configuration.

4 Enter the robot information. Select the robot and robot controller models.
5 Insert a USB flash drive into the Forge hub as instructed on the screen. Use an empty flash drive with at least 2GB of storage.

6 Tap **Start Transfer** and wait for it to finish.

7 Remove the USB drive when prompted.

8 Insert the USB drive into the FANUC teach pendant. Complete these steps to install the configuration files on the FANUC controller:

   1. Set the switch on the front panel of the FANUC controller to **AUTO** mode. Turn the switch on the FANUC teach pendant to **ON**.

   2. Press the **MENU** button on the FANUC teach pendant.

   3. Press **FILE (7)**.

   4. Press **UTIL (F5)**, highlight the **Set Device (1)** option, and press the **ENTER** button.

   5. Choose the **USB on TP(UT1:)** option, since the USB is in the FANUC teach pendant.

   **Note:** If you inserted the USB drive into the controller front panel, then choose the **UD1:** option.
6. Highlight the **All Files** option by using the arrow keys and press **ENTER**.

7. The contents of the USB drive will appear. Use the arrow keys and the **ENTER** key to find and highlight **FORGE_INSTALL**, then press **ENTER**.

8. Press **Yes (F4)** for the prompt asking if you want to execute the file.

9. The FANUC Controller will first display **# Backing Up Controller Config #**. Wait for the FANUC Controller to say **Execution is completed successfully**. At a later time, you may want to copy the backup files in the FANUC Backup folder off of the USB drive.

10. Press **OK (F4)** and remove the USB drive from the FANUC pendant.

11. To confirm the changes for the safety check system: Find the DCS screen by pressing the **MENU** button, **NEXT (0)**, **SYSTEM (6)**, and finally **DCS**.

12. Press **PREV** to make sure you are on the main DCS screen. You will see items named **Safe I/O Status**, **Safe I/O connect**, etc.

13. Press **APPLY** (F2), to confirm the settings. If you installed Forge/OS files onto the FANUC controller before, there may not be changes to apply.

14. Enter **1111**, confirm the settings by pressing **OK (F4)**.

15. Restart the FANUC controller to apply the settings. You can do this on the FANUC pendant. Press the **FCTN** button, then select **NEXT (0)**, then **CYCLE POWER**. Press **YES** on the screen to restart FANUC controller.

16. While the controller is restarting, turn the switch on the FANUC pendant to **OFF**.

17. Wait until the FANUC controller restarts, then move on to the next step.

9. If using a CR-series (collaborative) robot, confirm the payload after the controller boots up. Follow these sub-steps only if using a CR-series robot with your controller.

1. Find the Collaborative Robot DCS screen by pressing the **MENU** button, **NEXT (0)**, **System (6)**, then **DCS**.

2. Press **PREV**, highlight the Collaborative Robot option, and press **ENTER**.
Press **CONFIRM** (**F2**). Enter the password (default 1111) and follow the prompts by answering **YES** (**F4**).

**Note:** Each time a FANUC collaborative robot is turned off and then on again, the payload must be confirmed. It can take up to 30 minutes for the Force Sensor to calibrate.

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Confirm that the Forge/OS programs are running on the FANUC teach pendant. Press the **SELECT** button. A list of programs will appear.

Press **MONITOR** (**F4**) to show the list of running programs. There should be three "forge" programs running. If nothing happens when you press **MONITOR** (**F4**) or you see fewer than three "forge" programs on the monitor, follow these sub-steps.

1. Turn the switch on the FANUC teach pendant back to **ON**.
2. On the FANUC teach pendant, press the **PREV** button to return to the list of saved programs.
3. Use the arrow keys to highlight the program labeled **Forge_OS**.
4. Hold down one of the three-position enabling switches on the back of the FANUC pendant to the middle position.
5. While the enabling switch is depressed, press and hold the **SHIFT** button and then press the **FWD** button once, then release **SHIFT** and the enabling switch.
6. Check the monitor again. Press **MONITOR** (**F4**). There should be three programs listed.
7. Switch the FANUC teach pendant to **OFF** and return to the Forge/OS pendant to continue.

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In Forge/OS, confirm your device settings and tap **SAVE** to add the robot. Forge/OS attempts to communicate with the robot controller.

When the robot connects, you can add Tool Center Points (TCPs) or Payloads for the robot. You can come back to this later by editing the device's configuration. Tap **SAVE** to continue.
Note: The default TCP is located at the robot's tool flange, and the default Payload is 0.

(Optional): Set up the robot controller's Input/Output (IO) signals for use in the Device Control Panel and Task Canvas.

Enter a Display Name (i.e. "Open Machine Door", "Open Pneumatic Vise", or "Start Machining Cycle") to show what each signal does in other apps.
If you successfully completed this robot configuration, congratulations! You are ready to control your robot in the Device Control Panel and Task Canvas apps.

If you want a signal to appear in the Device Control Panel, check the **DCP** box next to that signal.

**Note:** To use these I/O signals, you must integrate your automation equipment with the robot controller.

**2** Tap **SAVE**.

**3** Tap **SAVE**.

**15** Forge/OS returns to the Device Configuration home screen. Make sure the robot appears in the configured devices list and that it is **enabled**.

If you successfully completed this robot configuration, congratulations! You are ready to control your robot in the Device Control Panel and Task Canvas apps.
RESOURCES

Want to learn more about how Forge/OS can empower you?

**READY.Academy** offers hands-on courses to help you deploy a robotic system, from laying out the entire workcell to programming robots. With this online academy, you can watch FREE courses whenever it is convenient for you:

[ready.academy](#)

For software manuals and hardware integration guides, check out our [Support](#) page:

[support.ready-robotics.com](#)

For articles, whitepapers, and other resources, check out our [Resources](#) page:

[ready-robotics.com/resources](#)

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[market.ready-robotics.com](#)

If you encounter a problem and need to talk to someone, reach out to us.

- Email READY Robotics: support@ready-robotics.com
- Call READY Robotics: 833-732-3977