Software manual
Flexible gripper EGH for cobots
SCHUNK software module for FANUC CRX cobots
Imprint

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Dear Customer,

thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

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⚠️ Please read the operating manual in full and keep it close to the product.
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1 General

1.1 About this manual

This manual contains information about the SCHUNK software module for FANUC CRX cobots.

The software is used to easily integrate and control the following products in FANUC CRX applications:

• Flexible gripper EGH for cobots

Illustrations in this manual are provided for basic understanding and may differ from the actual product design.

In addition to these instructions, the documents listed under Applicable documents [4] are applicable.

1.2 Applicable documents

• Assembly and operating manual for the product *
• Software guide "SCHUNK gripper with IO-Link" *
• Operating manual for FANUC CRX robots

The documents marked with an asterisk (*) can be downloaded on our homepage schunk.com
2 Description of function

The CRX software module is used for simple commissioning and programming of the SCHUNK gripper EGH in combination with FANUC CRX robots. The software module seamlessly integrates into the CRX robot's visual programming environment. Configuration of the gripper and manual control of most gripper functions are supported via the "Plugins | SCHUNK EGH" menu. The CRX software module has been tested using CRX control software v9.40P/10. SCHUNK recommends installing the latest CRX control software on the robot used.
3 Setting up EtherNet/IP

NOTE
To use the software module, the FANUC software option "EtherNet/IP Scanner" needs to be installed on the robot control system. In case of any questions about obtaining or installing the software option, please contact FANUC Service.

NOTE
EtherNet/IP slot 1 must be used for the software module. If this slot is already occupied in the application, contact SCHUNK.

The CRX software module uses the EtherNet/IP protocol to communicate with the gripper. The EtherNet/IP protocol must be set up in order to use the gripper.

Selecting EtherNet/IP
1. Select the "Menu" button at the top left of the Tablet Teach Pendant screen.
2. Select the "Full menu" button to expand the menu completely.

![Full menu button selected](image1)

3. Select the "EtherNet/IP" button.

![EtherNet/IP button selected](image2)

✓ The "EtherNet/IP" page opens up.
Setting up EtherNet/IP

Setting up the slot
1. Check the values for "Slot 1".
2. Click the "TRUE" value in the "Enable" column once.
3. Select the "FALSE" button.

✓ The value is changed to "FALSE".
✓ The value assigned for "Slot 1" has been deactivated.

4. Click once on "ADP" (adapter) in the "Type" column.
5. Select the "SCN" button.

✓ The value is changed to "SCN" (Scanner).

6. **IMPORTANT! SCHUNK recommends changing the value in the "Description" column to "EGH" to indicate use for the EGH!**
   Select the "CONFIG" button.
✓ Setup of slot 1 has been completed.

**Storing values**

1. Double-click on the settings shown in Table 1 one after the other and enter the correct value.
2. Select the "ADV" (advanced) button at the bottom of the screen.
3. Double-click on the settings shown in Table 2 one after the other and enter the correct value.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IP address</td>
<td>192.168.1.253</td>
</tr>
<tr>
<td></td>
<td>Vendor ID</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Device Type</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Product Code</td>
<td>14140</td>
</tr>
<tr>
<td></td>
<td>Input size</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Output size</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>RPI</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Assembly instance (input)</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>Assembly instance (output)</td>
<td>104</td>
</tr>
<tr>
<td></td>
<td>Configuration instance</td>
<td>106</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I/O Data Type</td>
<td>8-BIT BYTES</td>
</tr>
<tr>
<td></td>
<td>Major Revision</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Minor Revision</td>
<td>7</td>
</tr>
</tbody>
</table>
4 Installing the software module

**CAUTION**

Possible damage to product!
The product or the robot may get damaged if electrical cables are connected or disconnected during operation.

- Connect or disconnect electrical connections only when the device is switched off.

**NOTE**

To install the software module, use the enclosed USB stick. Alternatively, download the latest CRX module for the EGH from [schunk.com](http://schunk.com) and place the file in the root directory on a USB stick.

1. Connect the USB stick to the robot controller (not to the USB port of the Tablet Teach Pendant).
2. Select the "Menu" button at the top left of the Tablet Teach Pendant screen.

3. Select "PLUGINS" > "Install" in the menu.

✓ The installation page opens.
4. Select the "Install" button.

✓ The installation is executed.

5. Restart the robot controller as soon as the installation is complete.

4.1 Uninstalling the software module

1. Select the "Menu" button at the top right of the Tablet Teach Pendant screen.
2. In the "PLUGINS" menu > "select Plugin List".
3. Select "EGH" from the list.
4. Select "Uninstall" on the lower right-hand side.
5. Confirm selection.
   ✓ The message appears saying the software module has been uninstalled.
6. Restart the robot controller.
5 Configuring and testing the software module

**CAUTION**

Risk of injury possible!
Safety-relevant signals (e.g. emergency stop) must be transmitted externally, e.g. using a safety relay. In this configuration the product will not be energized in the event of a safety incident.

- Review safety aspects as part of a risk assessment.

The following settings may be adjusted:

- Selection of the digital output signals (DO) connected to the gripper in conjunction with the light band signals

1. Select the "Menu" button at the top right of the Tablet Teach Pendant screen.
2. In the "PLUGINS" menu > Select "SCHUNK EGH".

![Diagram of digital output signals configuration](image)

- On this page the digital output signals (DO) of the gripper can be configured.
- The standard (recommended) signal connections are shown.

<table>
<thead>
<tr>
<th>Gripper Function</th>
<th>Controller Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Band Green</td>
<td>DO 101</td>
</tr>
<tr>
<td>Light Band Yellow</td>
<td>DO 102</td>
</tr>
</tbody>
</table>

- Settings have been configured.
3. Select the "+" button next to the section headings to view commands.

4. Test the gripper using the commands. **CAUTION! Moving parts! Do not handle or interfere with moving parts.**
6 Using Gripper Commands in the Program

As soon as the CRX plug-in for SCHUNK gripper EGH is installed, all gripper commands will become visible in the "I/O" section of the CRX program editor.

Refer to the FANUC CRX manuals for more information about programming using the visual editor.

The available gripper commands that can be dragged into a program and their parameters are described below. For all CRX commands, the parameters of a command can be edited. To do this, select the command in a program and select the "Details" tab.

NOTE

A single gripper status line is displayed for each command at the bottom of the respective detail screen. This line shows the current status of the gripper and contains the most important gripper controls for the respective command. **CAUTION Moving parts! Do not handle or interfere with moving parts.**

Details of gripper commands are shown in the chapter "Configuring and testing the software module", Configuring and testing the software module [13].
**6.1 Acknowledge**

This command acknowledges all faults present on the gripper.

**NOTE**

The gripper is in error state immediately after startup. Execute the Acknowledge command to be able to execute all other gripper commands.

**Parameter**

*none*

**6.2 Reference**

This command moves the gripper to its home position and sets this position to zero. This command activates position feedback for the gripper as well as commands that use a target position.

**Parameter**

- *(optional)* **Wait for command to complete:**
  Using this parameter, the program will wait after the command until the operation is completed before it moves to the next command.

**6.3 Grip**

This command is used to grab a part.

**Parameter**

- **Grip direction:** This parameter defines the direction of the gripping process. With O.D. gripping, the gripper fingers are moved from the "gripper open" state to the "gripper closed" state and the workpiece is gripped from the outside. With I.D. gripping, the gripper fingers are moved from the "gripper open" state to the "gripper closed" state and the workpiece is gripped from the outside.

- **Grip force:** This parameter defines what percentage of the maximum grip force should be applied: 100%, 75%, 50% or 25%.

- *(optional)* **Wait for command to complete:**
  Using this parameter, the program will wait after the command until the operation is completed before it moves to the next command.
6.4 Release
This command releases the gripped workpiece. In the process, the gripper fingers move in the opposite direction to that defined in the "Grip direction" parameter until end position is reached.

**Parameter**
- **Grip direction:** This parameter defines the direction of the gripping process. With O.D. gripping, the gripper fingers are moved from the "gripper open" state to the "gripper closed" state and the workpiece is gripped from the outside. With I.D. gripping, the gripper fingers are moved from the "gripper open" state to the "gripper closed" state and the workpiece is gripped from the outside.

- **(optional) Wait for command to complete:**
  Using this parameter, the program will wait after the command until the operation is completed before it moves to the next command.

6.5 Move Absolute
This command moves the gripper fingers to a defined position.

**Parameter**
- **Target position:** The gripper fingers move to the position defined by this parameter. In zero position, the gripper fingers are fully open. The further the fingers are closed, the more the position values increase.

- **(optional) Wait for command to complete:**
  Using this parameter, the program will wait after the command until the operation is completed before it moves to the next command.

6.6 Move Relative
This command moves the gripper fingers a defined distance from their current position.

**Parameter**
- **Step size:** The gripper fingers move by the distance defined by this parameter. Positive step sizes close the gripper fingers, negative step sizes open the gripper fingers.

- **(optional) Wait for command to complete:**
  Using this parameter, the program will wait after the command until the operation is completed before it moves to the next command.
6.7 Stop
This command is used to stop all current movement processes on the gripper.

Parameter
- Stop / Fast stop: This parameter can be used to trigger a stop process or a fast stop process. A normal stopping process brings the gripper to a controlled standstill with constant gripping force. In contrast, in the case of a quick stop, the electrical supply is interrupted immediately and the gripper is stopped in an uncontrolled manner. A quick stop creates an error condition that must be cleared using the Acknowledge command.

6.8 Light Band
This command is used to switch the light band on or off and to set the color of the light band.

Parameter
- State / Color: This parameter indicates the new state of the light band. The following options are available:
  - Off
  - Green
  - Yellow
  - Red
6.9 Query EGH

This command is used to retrieve information about the current state of the gripper and store it in a register. This information can then be used in conditional statements and other control logic in a program.

Parameter

- **Register number**: This parameter determines which register number is assigned to the value.
- **Value**: This parameter determines which value is retrieved. The following values can be read out:
  - **Status**
    0: Errors
    1: Outside of the specification
    2: Maintenance required
    3: Ready for operation
  - **Referenced**
    0: Not referenced
    1: Referenced
  - **Success**
    0: Previous command was not executed successfully
    1: Previous command was executed successfully
  - **End Stop**
    0: End stop not reached
    1: End stop reached
  - **Blocked**
    0: Not blocked
    1: Blocked
  - **Position**
    The current position of the gripper fingers in millimeters.
Setting the Tool Center Point (TCP) and gripper weight

NOTE
For further information on Tool Center Point (TCP), see the operating manual of the FANUC CRX robot, Applicable documents [4].

To use the EGH correctly on the FANUC CRX robot, we recommend storing the Tool Center Point (TCP) and the gripper weight in the robot settings. The following procedure shows only one of several possibilities for the configuration.

1. Select the "Menu" button at the top left of the Tablet Teach Pendant screen.

2. Select the "Full menu" button to expand the menu completely.
3. Select "SETUP" > "Frames" in the menu.

✓ The SETUP Frames page opens.

4. Set the value for "Z" to 124.8 mm added to the length of the mounted gripper fingers.

5. Set value for "W" to -180 degrees.

6. Set values for "X", "Y", "P" and "R" to 0.
Setting the Tool Center Point (TCP) and gripper weight

7. Select the "Menu" button at the top left of the Tablet Teach Pendant screen.

8. Select "Setup" > "UTool Payload Setup" in the menu.

✓ The process for configuring the payload opens.

9. Follow individual steps of the setup process.

✓ Set the "Payload Mass" value to 0.95 kg.

10. Complete the configuration process.

✓ The payload has been configured for the gripper without a gripped workpiece.

11. Configure the payload for each workpiece to be handled. Add the mass of the gripper (0.95 kg) to the workpiece mass for the "Payload Mass" value and enter it in the configuration process.

Commands for switching between configured payloads can be found in the FANUC CRX Robot Instruction Manual, Applicable documents [4]
8 Example of a robot program

Acknowledge

Directly after commissioning, the gripper will be in error state. This command resets the error state.

Reference

Approach the zero point of the gripper fingers.

- **Parameter:** Wait for command to complete [YES]

Linear Move

Move the robot to the program's start position.

Light Band

Set the color of the light band to yellow.

- **Parameter:** Color [Yellow]

Move Absolute

Move the gripper finger to a defined position.

- **Parameter:**
  Target Position [15.0 mm]
  Wait for command to complete [YES]
Example of a robot program

**Linear Move**

Move the robot to the workpiece.

**Grip**

Grip the workpiece

- **Parameter:**
  - Direction [OUTER DIAMETER]
  - Grip force [100%]
  - Wait for command to complete [YES]

**Query Gripper**

Acknowledge whether the previous "Grip" command was executed successfully and store success in R[1].

- **Parameter:** R[1] = SUCCESS

**Query Gripper**

Acknowledge whether the gripper is located at one of the two end stops. If it is, this means the gripper has missed the workpiece.

- **Parameter:** R[2] = END STOP

**IF statement**

The IF statement uses the results of the two "query" commands to determine the subsequent course of the program.

- **Parameter:** R[1] = 1 AND R[2] = 0
  - If the grip command was successful and the gripper is not located at one of the two end stops (R[1] = 1 AND R[2] = 0), the next three commands "Light Band = green", "Linear Move" and "Release" will be executed. Otherwise the program will jump to the last command "Light Band = red".

**Light Band**

Sets the color of the light band to green.

- **Parameter:** Color [Green]
### Example of a robot program

<table>
<thead>
<tr>
<th>Linear Move</th>
<th>Move the gripper to the position at which it is to deposit the workpiece.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release</td>
<td>Release the workpiece.</td>
</tr>
</tbody>
</table>

- **Parameter:**
  - Direction [OUTER DIAMETER]
  - Wait for command to complete [YES]

<table>
<thead>
<tr>
<th>ELSE Light Band</th>
<th>Set the color of the light band to red.</th>
</tr>
</thead>
</table>

- **Parameter:** Color [Red]