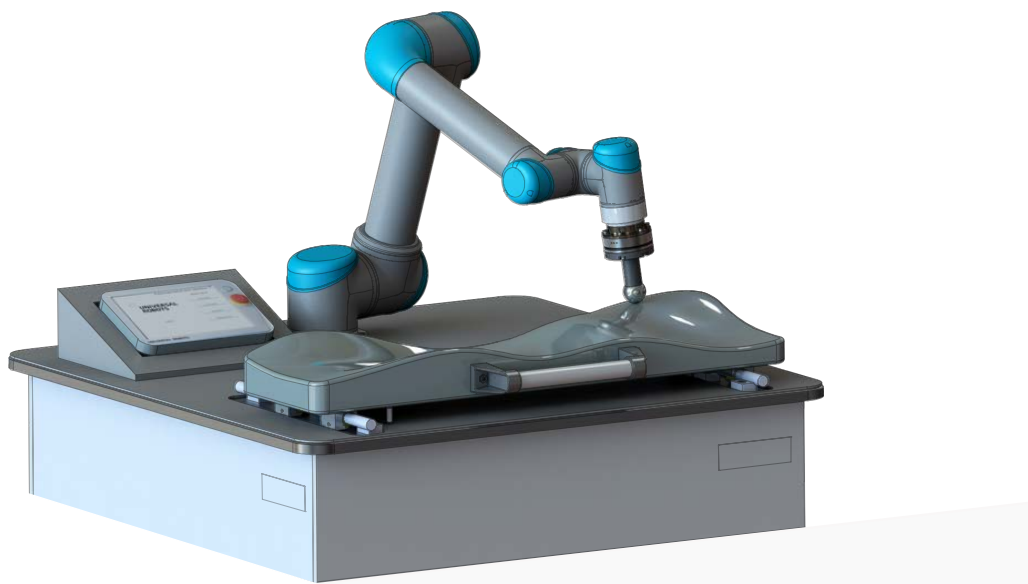




Axia80 Universal Robot (UR) FT Sensor Manual



Document #: 9610-05-1036

Engineered Products for Robotic Productivity

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Note

Please read the manual before calling customer service. Before calling, have the following information available:

1. Serial number (e.g., FT01234)
2. Sensor model (e.g., Axia)
3. Calibration (e.g., US-15-50, SI-65-6, etc.)
4. Accurate and complete description of the question or problem
5. Computer and software information. Operating system, PC type, drivers, application software, and other relevant information about your configuration.

If possible, be near the F/T system when calling.

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Glossary of Terms

Term	Definition
Acceptable Status Condition	A user set state during which the UR™ Cap software ignores certain status bits from the ATI F/T sensor so that the UR robot can continue operation.
Algorithm	A process or set of rules the robot uses to provide force feedback to control the robot motion.
ATI Ethernet Axia80 F/T Sensor or Axia 80	An ATI F/T sensor that uses Ethernet protocol.
“ATI FT Daemon failed” Error	An error that occurs if the UR Cap software is not able to connect to user entered static IP Address of the ATI F/T sensor.
ATI NET F/T Sensor	An ATI Ethernet F/T sensor that is not an Axia80.
Bias	A command that eliminates the effects of gravity such as tool weight or other acting forces from the F/T data that is provided by the ATI F/T sensor.
Center of Gravity (CG)	The point of a mass around which the resultant torque from gravity forces is zero.
Daemon	A program that runs continuously and handles periodic service requests that the UR Cap software expects to receive. The daemon program can forward these requests to other programs or processes as appropriate.
Demo Program	A downloadable program that demonstrates the capabilities of the UR Cap software and ATI F/T sensor.
Disable	A command that stops using the F/T data from an ATI sensor and starts using the internal force sensing of the UR program.
DoF	Degrees of Freedom. See Six Degrees of Freedom.
Enable	A command that starts streaming the F/T data from the ATI F/T sensor for force feedback control.
Ethernet	An IEEE standard for local network technology.
Force	The push or pull exerted on an object.
F/T	Force/Torque.
F/T Sensor	The device that converts sense loads from force and torque into an electrical signal.
Interface Plate Assembly	The Mounting Adapter Plate (MAP) is the transducer plate that attaches to the fixed surface or robot arm.
Logging Level	A Program Node Option that sets the type of information that the UR Cap software records in the log file on the UR controller. There are (4) levels: none, error, warning, and info.
Plug-in Technology	A customized program that when downloaded and installed onto a host device adds a specific feature to an existing computer program.
Polyscope	UR customer interface.
Program Node	Commands and options available within the UR Cap software that can be used on the incoming data from the ATI F/T sensor.
Program Node Command	Commands within the UR Cap software that can enable, disable, and bias the data from the ATI F/T sensor.
Program Node Options	Optional commands within the UR Cap software that can be used to log or ignore status bits from the ATI F/T sensor.

Term	Definition
Protective Stop Error	An error message that occurs when communication between the F/T sensor and URcap software is lost.
RDT	Raw Data Transfer (RDT) is a fast and simple Ethernet protocol for control and data transfer via User Datagram Protocol (UDP).
RDTE	Real-Time Data Exchange. A way to synchronize external applications with the UR controller over a standard TCP/IP connection without breaking any real-time properties of the UR controller.
SFTP	Secure File Transfer Protocol (SFTP) or SSH (Secure Shell) File Transfer Protocol is a secure version of File Transfer Protocol (FTP), which facilitates data access and data transfer over a Secure Shell (SSH) data stream.
Simple Demo Program	An abbreviated program that moves the robot down until attached customer tooling contacts a surface or a force greater than 2 N.
Six Degrees of Freedom	Fx, Fy, Fz, Tx, Ty, and Tz
SSH	Secure Shell (SSH) is a cryptographic network protocol for operating network services securely over an unsecured network.
Standard Demo	A program that moves the robot and customer tooling across an uneven surface based on the feedback from an ATI F/T sensor.
Start Position	The coordinates the robot begins a demo program.
Status Bit	A unit of computer data sent from the ATI F/T sensor.
TCP	Tool Center Point.
Teach Pendant	A handheld device or control box for programming the motions of a robot.
Torque	The measurement of force exerted on an object causing it to rotate.
URcap Software	An ATI software program that enables the UR robot to bypass data from an internal sensor on the robot to use data from an ATI F/T sensor for force feedback control.
UR	A collaborative robot manufactured and distributed by the company, Universal Robots (UR).
UR Kit	A packaged option that includes the Ethernet Axia F/T sensor, interface plate, Ethernet and power cables, mounting hardware, and downloadable URcap software.
USB Disk	A universal serial bus, USB, is a device that data such as the downloaded URcap software and can be attached to a host device with plug-in technology.

1. Safety

The safety section describes general safety guidelines to be followed with this product, explanations of the notifications found in this manual, and safety precautions that apply to the product. More specific notifications are imbedded within the sections of the manual where they apply.

1.1 Explanation of Notifications

The following notifications are specific to the product(s) covered by this manual. It is expected that the user heed all notifications from the robot manufacturer and/or the manufacturers of other components used in the installation.



DANGER: Notification of information or instructions that if not followed will result in death or serious injury. The notification provides information about the nature of the hazardous situation, the consequences of not avoiding the hazard, and the method for avoiding the situation.



WARNING: Notification of information or instructions that if not followed could result in death or serious injury. The notification provides information about the nature of the hazardous situation, the consequences of not avoiding the hazard, and the method for avoiding the situation.



CAUTION: Notification of information or instructions that if not followed could result in moderate injury or will cause damage to equipment. The notification provides information about the nature of the hazardous situation, the consequences of not avoiding the hazard, and the method for avoiding the situation.

NOTICE: Notification of specific information or instructions about maintaining, operating, installing, or setting up the product that if not followed could result in damage to equipment. The notification can emphasize, but is not limited to: specific grease types, best operating practices, and maintenance tips.

1.2 General Safety Guidelines

The customer should verify that the sensor selected is rated for maximum loads and torques expected during operation. Because static forces are less than the dynamic forces from the acceleration or deceleration of the robot, be aware of the dynamic loads caused by the robot.

1.3 Safety Precautions



CAUTION: When initially setting up the Demo Programs, position the robot manually in order to avoid damaging parts, especially the sensor cable.

2. Overview

This manual explains how to install and operate the ATI Universal Robot(UR)Cap software and demo programs so that the UR robot can be used with an ATI Ethernet Force/Torque (F/T) sensor rather than the UR robot's calculated F/T readings. The ATI URcap software is compatible with Ethernet protocol only.

F/T sensors convert sensed loads from forces and torques into electrical signals. The F/T sensor provides data to the robot. This data is the six degrees of freedom (DoF): Fx, Fy, Fz, Tx, Ty, and Tz. UR robots have algorithms to use force feedback to control the robot motion. The ATI URcap software provides a way to input data from an ATI sensor into those algorithms by using plugin technology.

For more information on UR robots and the UR user interface, PolyScope, refer to <https://www.universal-robots.com/support/>. For more information on the ATI F/T Ethernet sensors refer to the 9610-05-Ethernet Axia manual for the Axia80 sensor and 9620-05-Net FT for all other ATI Ethernet sensors.

2.1 UR Kit, Part Number 9105-UR-Axia80

Refer to [Figure 2.1](#).

ATI provides a bundle that includes the following:

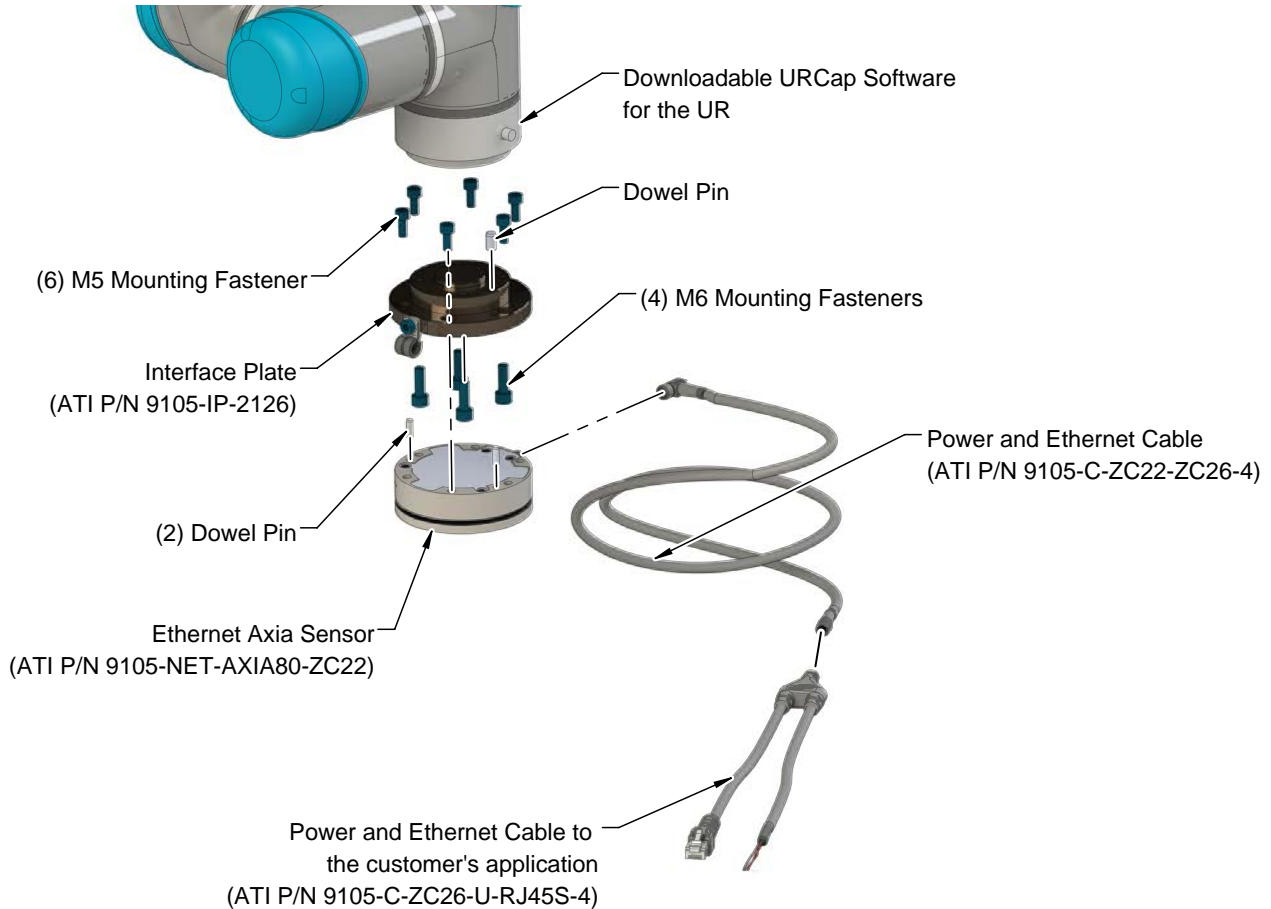
- downloadable ATI URcap software
- (1) Ethernet Axia F/T sensor, part number 9105-NET-AXIA80-ZC22.
- (1) interface plate assembly, part number 9105-IP-2126.
- (1) Ethernet and power cable with a 6-pin connector and 8-pin M12 connector, part number 9105-C-ZC22-ZC26-4.
- (1) cable with an 8-pin M12 connector that splits to a RJ45 Ethernet connection and an unterminated end for power, part number 9105-C-ZC26-U-RJ45S-4.

The interface plate assembly (ATI P/N 9105-IP-2126) includes the following:

- (6) M5-0.8 x 12 mm socket head cap screws, part number 3500-1064012-15.
- (4) M6-1 x 18 mm socket head cap screws, part number 3500-1066018-15.
- (1) clamp loop for routing the 9105-C-ZC22-ZC26-4 cable.
- (1) 4 mm Allen® wrench or hex key, part number 3810-05-2182.

Refer to the 9610-05-Ethernet Axia manual, for information about the Ethernet Axia F/T sensor. The 9610-05-Ethernet Axia manual includes mechanical and electrical specifications.

Figure 2.1—UR Kit, Part Number 9105-UR-Axia80



2.1.1 Unpacking the UR Kit

- Check the shipping container and components for damage that may have occurred during shipping. Report damage to ATI Industrial Automation.
- Verify the components from the packing list are included in the UR Kit.
- Refer to [Section 2.1—UR Kit, Part Number 9105-UR-Axia80](#), for standard components included in the UR Kit.

2.1.2 Installing the Ethernet Axia Sensor

Refer to the 9610-05-Ethernet Axia manual, for mechanical installation, cable routing, wiring information for the connectors, and electrical specifications.

3. URCap Software

URCap software is required to bypass the UR robot's calculated F/T readings and program the robot to use an ATI F/T sensor. URCap software is compatible with the ATI Ethernet Axia F/T sensor and other F/T Ethernet sensors. Contact ATI for help in selecting the proper sensor for your application. Refer to [Section 5—Demo Programs](#), for information about the simple and standard demo programs available through the ATI URCap software. The demo programs are included in the URCap software package that is downloaded from the ATI website.

3.1 Downloading URCap Software from the ATI Website

Supplies required: Computer with web browser and internet access, USB drive

1. Using a web browser, navigate to http://www.ati-ia.com/Products/ft/software/axia_software.aspx
2. Download the URCap software package “ENET Axia80 UR Software”.
3. Save the file to your local drive.
4. Unzip the file on your local drive.
5. Save the *ATI_FT-version.urcap* file to a portable USB drive.
6. Optional: save the “ATI Demo Program.urp to the portable USB drive.
7. Eject the USB drive.
8. The software is ready to be loaded onto the UR Teach Pendant.

3.2 Installing URCap Software

URCap software is installed onto the UR Teach Pendant using a portable USB drive.

1. Insert a USB drive that contains the URCap package into the USB port on the back of the UR Teach Pendant.

Figure 3.1—UR Teach Pendant



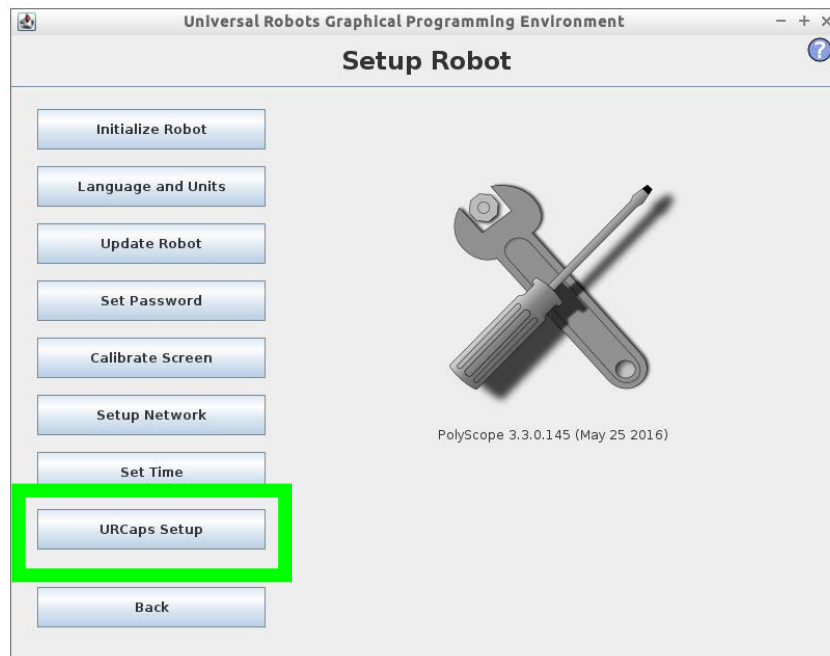
2. On the UR Teach Pendant, “PolyScope Robot User Interface” screen or main menu, click **Setup Robot**.

Figure 3.2—PolyScope Robot User Interface



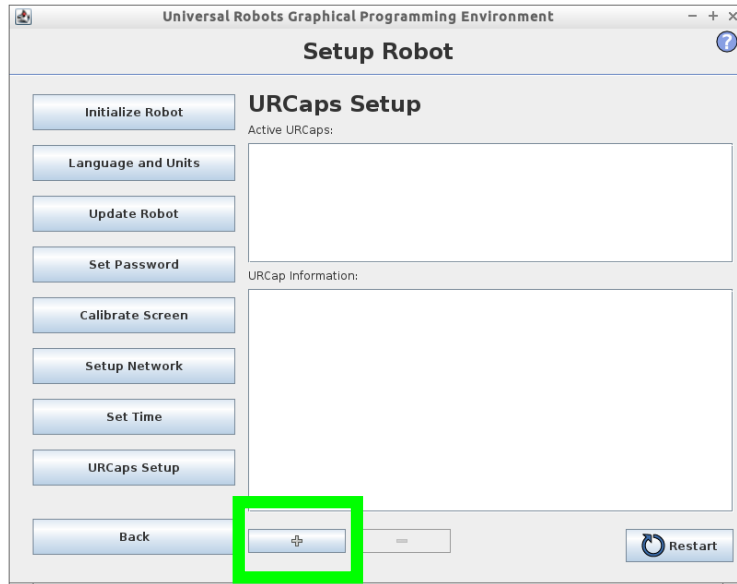
3. On the “Setup Robot” screen, click **URCaps Setup**.

Figure 3.3—Setup Robot



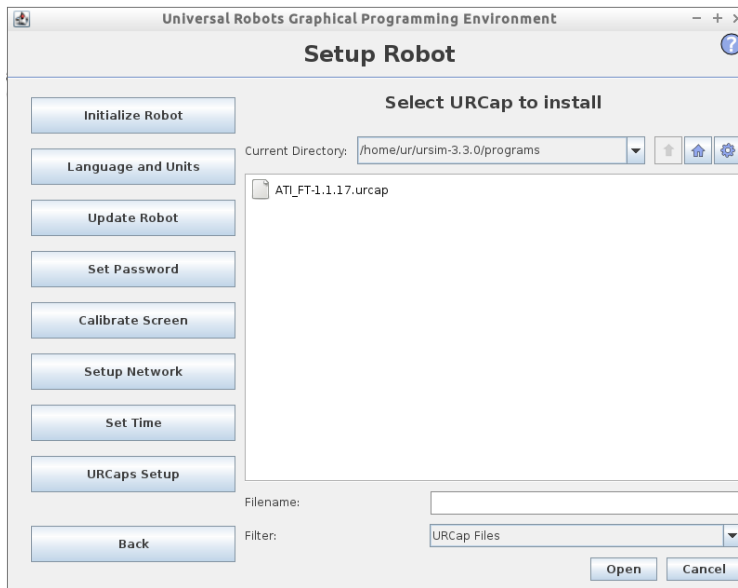
4. On the “Setup Robot”, “URCaps Setup” screen, click +.

Figure 3.4—Setup Robot, URCaps Setup, Add a File



5. Select the latest version of the file: *ATI_FT-version.urcap*. Click **Open**.

Figure 3.5—Setup Robot, Select URCap to Install



- On the “Setup Robot”, “URCaps Setup” screen , *ATI Axia Force/Torque Sensor* appears in the “Active URCaps” field. Click **Restart**.

Figure 3.6—Finish Installation of the URCaps Software



- When the installation completes, remove the USB stick.

3.3 Setting up URCap Software

Perform the following steps to prepare the URCap software to work with the UR robot and sensor.

1. On the UR Teach Pendant, “PolyScope Robot User Interface” screen or main menu, click **Program Robot**.

Figure 3.7—PolyScope Robot User Interface



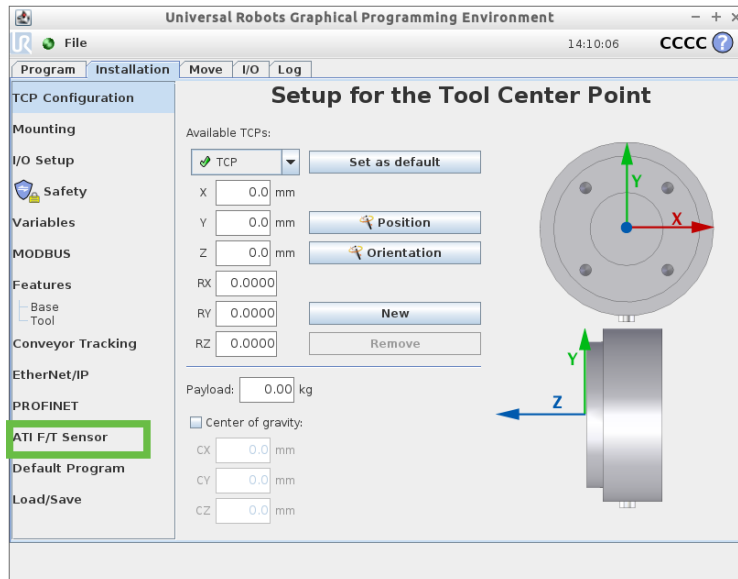
2. The “New Program” screen displays. Select the **Installation** tab.

Figure 3.8—New Program screen



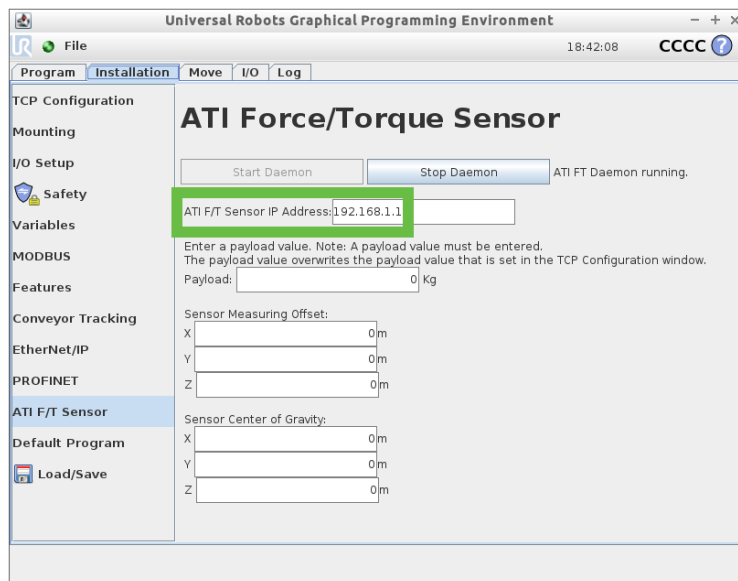
- The “Setup for the Tool Center Point” screen displays. Refer to [Section 3.4—Determining the Tooling Mass and Offset](#) for filling in the fields on the screen. On the sidebar, click **ATI F/T Sensor**.

Figure 3.9—Setup for the Tool Center Point



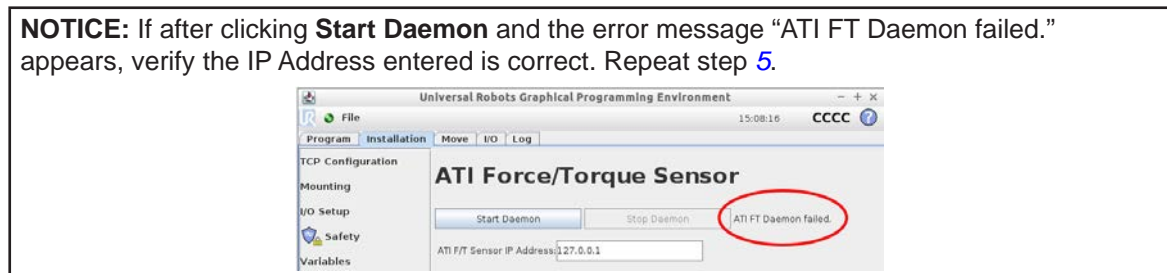
- The “ATI Force/Torque Sensor” screen displays. Enter the sensor’s IP address. The ATI sensor is shipped with a default sensor IP address: “192.168.1.1”.

Figure 3.10—Enter the Sensor’s IP Address



- Click **Start Daemon**. The setup completes.

NOTICE: If after clicking **Start Daemon** and the error message “ATI FT Daemon failed.” appears, verify the IP Address entered is correct. Repeat step 5.



3.4 Determining the Tooling Mass and Offset



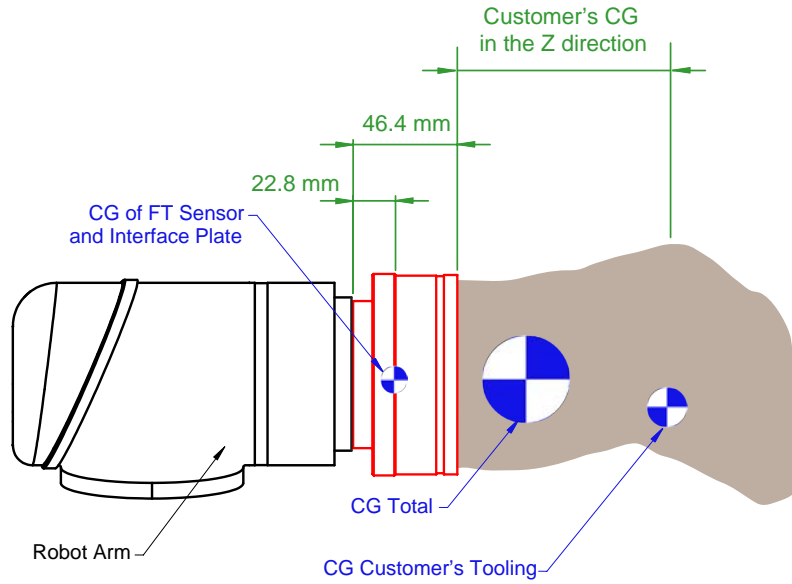
CAUTION: Do not enter the following default values into the robot controller without accounting for the tooling mass by using the following equations. Failure to account for the tooling mass and offset reduces the performance of the UR robot. Properly account for the customer tooling, when setting up the tool center point or TCP.

The ATI-provided sensor and interface plate in the UR Kit have the following mass characteristics with no customer tooling installed:

- Mass = 0.558 kg
- Offset to the Center of Gravity in the Z direction = 22.8 mm
- Offset to the Center of Gravity in the X, Y directions = 0 mm
- Total Stack Height or Offset from the robot reference plane to the sensor reference plane = 46.4 mm

When the customer tooling is mounted to the sensor, these default values change to account for both the mass of the tool and the mass of the sensor. Use the following equations to determine the values to enter in the fields of the “Setup for the Tool Center Point” screen; refer to [Figure 3.9](#). The following diagram can be used as a reference for the equations.

Figure 3.11—Center of Gravity Diagram



$$\text{Payload(kg)} = 0.558 + \text{Customer's Tooling Mass}$$

$$\text{Center of Gravity (x, mm)} = \frac{\text{Customer's Tooling Mass} \times \text{Customer's CG in the x direction}}{0.558 + \text{Customer's Tooling Mass}}$$

$$\text{Center of Gravity (y, mm)} = \frac{\text{Customer's Tooling Mass} \times \text{Customer's CG in the y direction}}{0.558 + \text{Customer's Tooling Mass}}$$

$$\text{Center of Gravity (z, mm)} = \frac{12.7224 + \text{Customer's Tooling Mass} \times (\text{Customer's CG in the z direction} + 46.4)}{0.558 + \text{Customer's Tooling Mass}}$$

Where:

Center of Gravity (CG):

The point of a mass around which the resultant torque from gravity forces is zero.

Customer's Center of Gravity in the X, Y, Z Direction:

The distance in mm from the F/T sensor's sensing reference frame origin (refer to the customer drawing) to the center of gravity of the customer's tooling.

This should include the mass and location of all customer-provided fasteners and not ATI-provided parts.

The location of a center of gravity can be found in most CAD packages used to design robot tooling.

Customer's Tooling Mass:

The mass of the customer's tooling that includes all fasteners not provided by ATI, in kilograms.

F/T Mass:

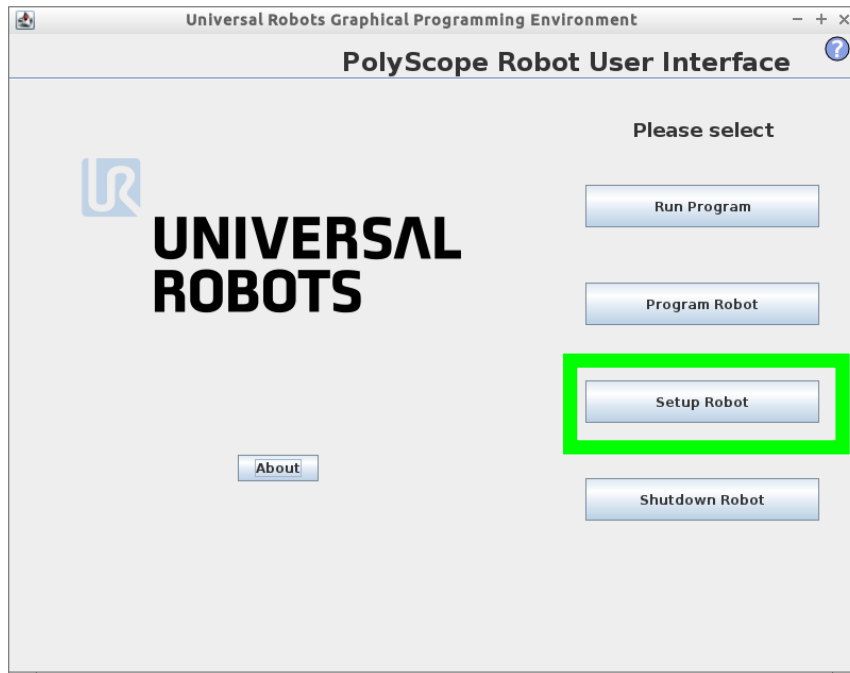
The mass of the F/T sensor including the interface plate and all hardware required to connect the F/T sensor to the robot.

The F/T mass does not include any hardware the customer uses to mount their tooling to the F/T sensor.

3.5 Uninstalling URcap Software

1. On the UR Teach Pendant, “PolyScope Robot User Interface” screen or main menu, click **Setup Robot**.

Figure 3.12—PolyScope Robot User Interface



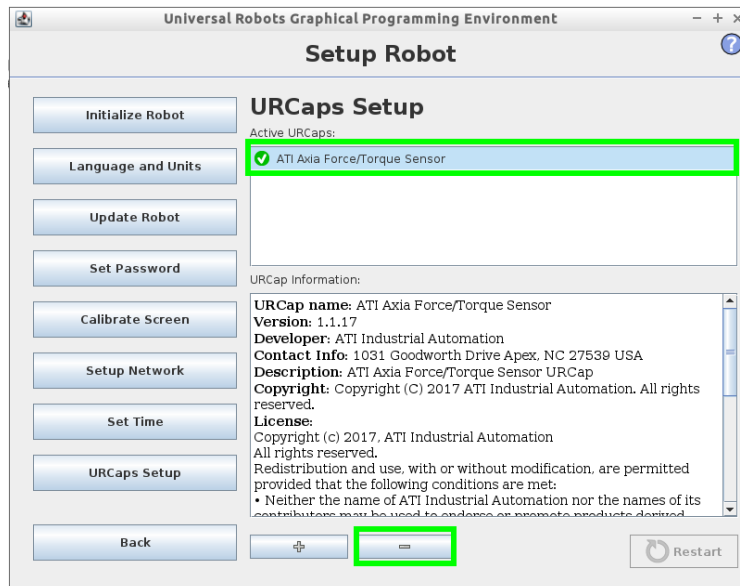
2. On the “Setup Robot” screen, click **URCaps Setup**.

Figure 3.13—Setup the URCaps on the Robot



3. On the “Setup Robot” “URCaps” screen, select **ATI Axia Force/Torque Sensor**.

Figure 3.14—Setup Robot, Remove ATI Axia Force/Torque Sensor



4. Click -. *ATI Axia Force/Torque Sensor* is removed from the “Active URCaps” field.
5. Click **Restart**. The changes require a restart for the uninstallation to be complete.

4. Operation of the URCap Software

The following section provides information required when using the URCap software, during operation of the robot and sensor. Communicating with the sensor and UR robot, requires a knowledge of Ethernet standards and operation and UR interface, Polyscope. For more information about UR, refer to <https://www.universal-robots.com>.

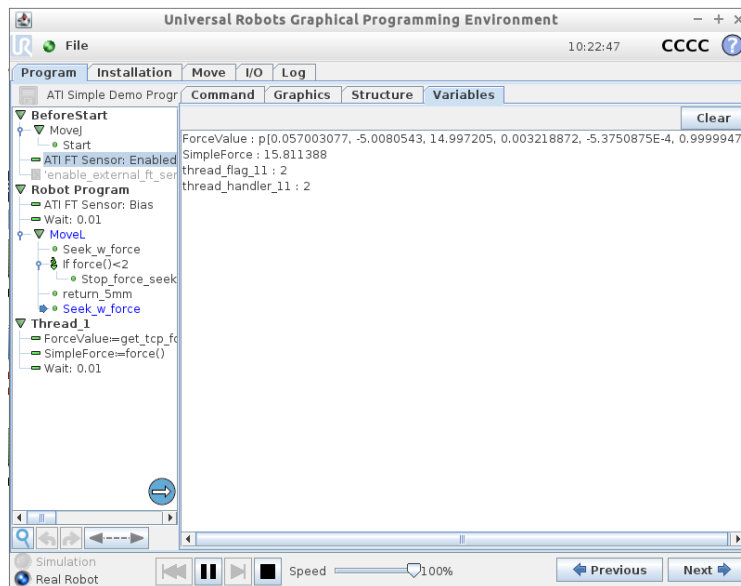
4.1 Sample Rate

The power-on default sample rate for UR robots is 125 Hz.

4.2 View Force and Torque Readings

While the program is operating, the user can view the force and torque readings. Select the “Variables” tab. The values are labeled “ForceValue” and are in the order [Fx, Fy, Fz, Tx, Ty, Tz] in N/Nm.

Figure 4.1—Viewing FT Readings



4.3 Program Node Commands and Options

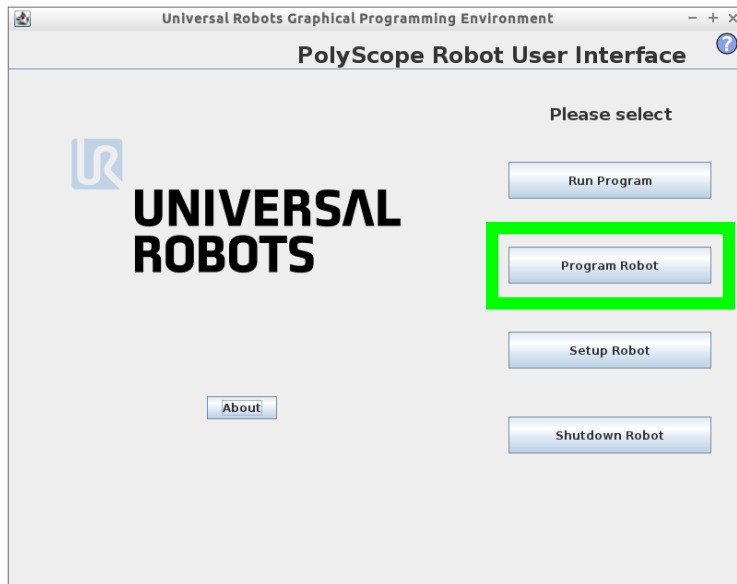
There are (5) commands that the user can issue, during operation of the robot. These (5) commands are divided into (2) Program Nodes: Program Node Command and Program Node Options. Refer to the following table for a list of commands associated with each Program Node.

Table 4.1—URCap Software Commands		
Program Node	Command	Reference
Program Node Command	Enable.	Section 4.3.1.1—Enable Command
	Disable.	Section 4.3.1.2—Disable Command
	Bias.	Section 4.3.1.3—Bias Command
Program Node Options	Logging Level.	Section 4.3.2.1—Logging Level
	Acceptable Status Conditions.	Section 4.3.2.3—Acceptable Status Conditions

In order to access the commands, the user must complete the following steps:

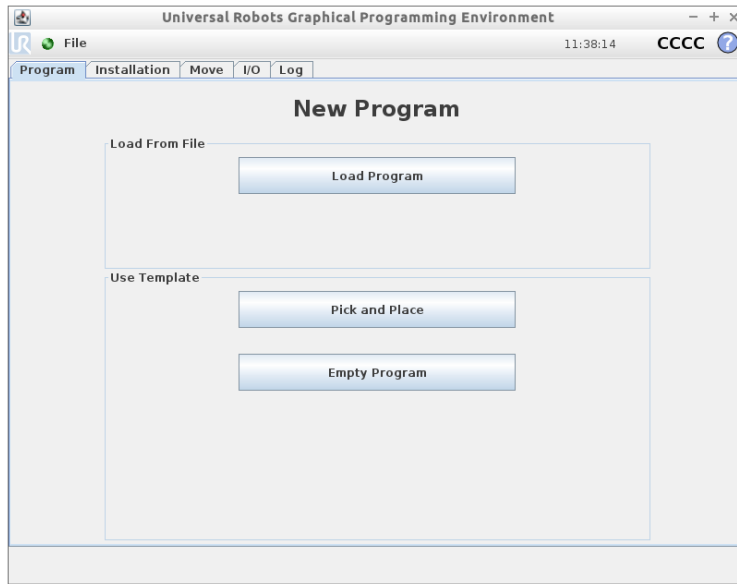
1. On the UR Teach Pendant, “PolyScope Robot User Interface” screen or main menu, click **Program Robot**.

Figure 4.2—PolyScope Robot User Interface



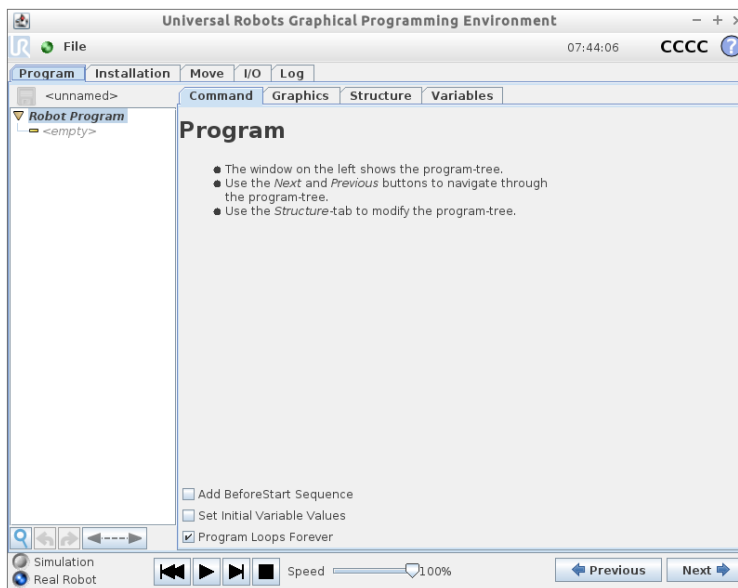
2. The “New Program” screen displays. Click the **Empty Program** button.

Figure 4.3—New Program Screen



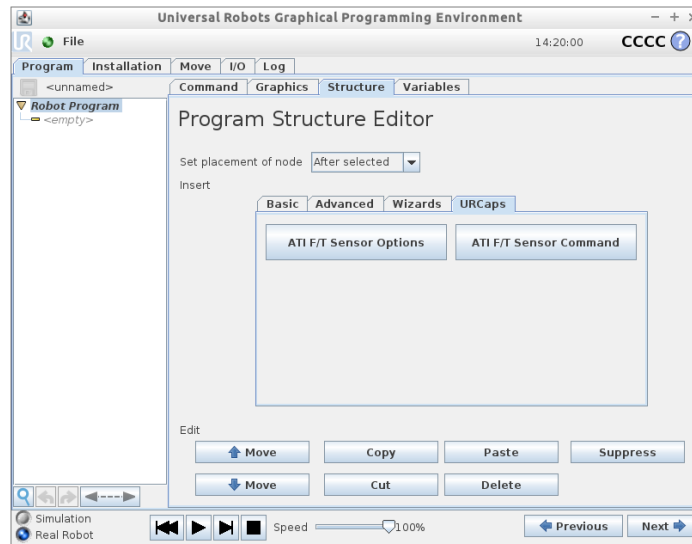
3. The following “Program” screen appears. Click the **Structure** tab.

Figure 4.4—Program Screen



4. The “Program Structure Editor” screen appears. Click the **URCaps** tab.
5. Click the **Program Node**.
 - To access the Program Node Command, click the **ATI F/T Sensor Command** button.
 - i. Refer to [Section 4.3.1—Program Node Commands](#).
 - To access the Program Node Operations, click the **ATI F/T Sensor Options** button.
 - i. Refer to [Section 4.3.2—Program Node Options](#).

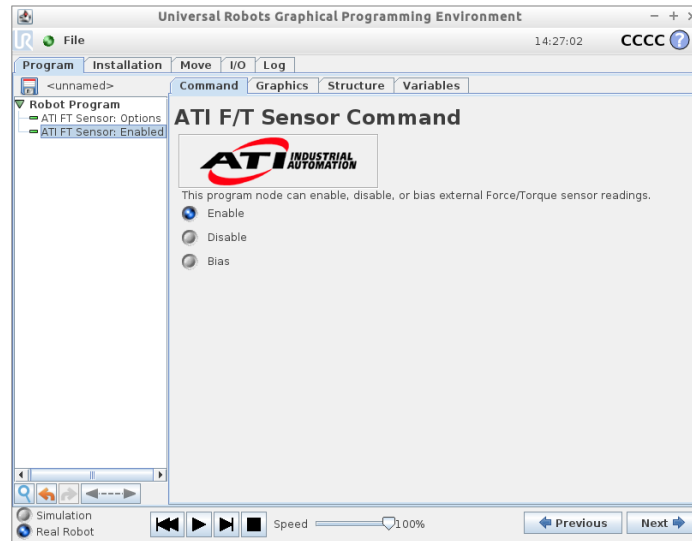
Figure 4.5—Program Node Commands



4.3.1 Program Node Commands

There are (3) Program Node Commands that the user can select by clicking on the radio button on the “ATI F/T Sensor Command” screen.

Figure 4.6—Program Node Commands



4.3.1.1 Enable Command

The Enable command completes the following operations:

- streaming F/T data over the RDT interface on the sensor.
- forwarding the F/T data to the UR robot over the UR RTDE interface.
- using the F/T data in the UR program force feedback controls.

4.3.1.2 Disable Command

The Disable command completes the following operations:

- stops using F/T data from an ATI F/T sensor.
- starts using the internal force sensing of the UR robot.

4.3.1.3 Bias Command

Biasing is useful for eliminating the effects of gravity (tool weight) or other acting forces from the force/torque data that is provided by the ATI F/T sensor.

The bias command completes the following operations:

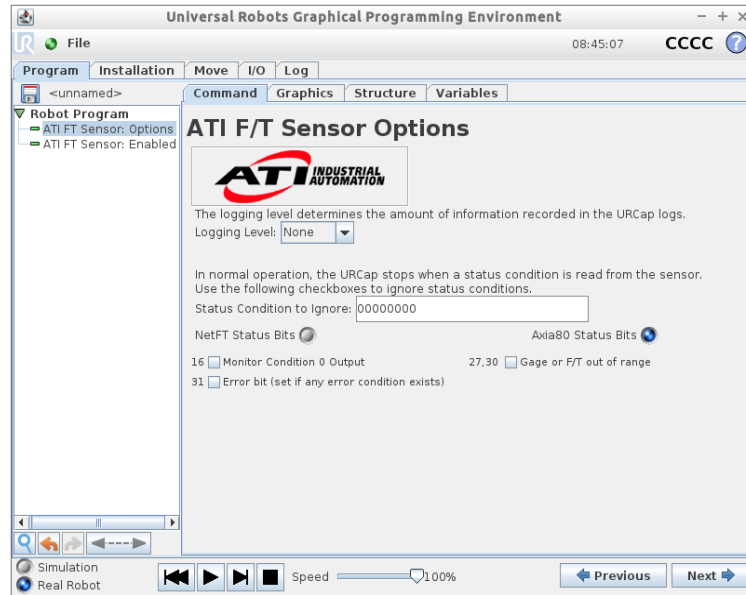
- data collection for the forces and torques, which are currently acting on the sensor.
- use collected data as a reference for future data.
- future data has this reference subtracted, before the values are transmitted.

NOTICE: When biasing, ensure the force and torque readings are steady-state. Biasing while the sensor is vibrating, accelerating, or decelerating can provide a poor reference for the user’s application.

4.3.2 Program Node Options

Under the **Command** tab and on the “ATI F/T Sensor Options” screen, the user selects the Logging Level and Acceptable Status Conditions.

Figure 4.7—ATI Sensor Options



4.3.2.1 Logging Level

The Logging Level sets the type of information that the URcap software records in the log file on the UR controller and in the Polyscope Log tab. In *Figure 4.7*, when the user clicks on the down arrow, a drop down menu with all the logging levels appears. From the menu, the user can select the Logging Level. Refer to the following table for each of the (4) Logging Levels.

Level	Definition
None	No information will be recorded in the log file.
Error	Record information of errors that could cause the URcap to fail.
Warning	Record information of errors and warnings that could degrade the URcap performance.
Info	Record errors, warnings, and additional information about the URcap operation.

4.3.2.2 Logging File

The log file is located in GUI/felix-cache/bundleXX/data/com/ur/urcap/ATI_FT/impl/daemon/URlog.txt. Where bundleXX is the latest installation bundle. To view the log file, it is possible to SSH into the UR Controller. To copy the log file to another location, it is possible to SFTP to the UR Controller.

Table 4.3 lists messages written in the log for the applicable Logging Level.

Table 4.3—URCap Software Logging File Messages

Logging Level	Message	Description
Error.	Unable to negotiate RTDE protocol version.	Universal Robots software version is less than 3.3.X and needs to be upgraded to 3.3.X or greater.
	Detected RTDE Setup Error.	Communication problem with UR controller.
	Detected RTDE Loop Error.	
	RTDE missed too many updates.	Communication problem with F/T sensor. The cable connections may not be secure or power is not supplied to the sensor.
	Detected F/T Setup Error.	
	Detected F/T Loop Error.	
	Invalid status condition: #.	F/T sensor has a status condition that is not ignored in ATI F/T Sensor: Options. Reference the sensor manual for status codes or conditions.
Warning	RTDE protocol V2 not supported. Downgrading to RTDE protocol V1.	Universal Robots software version is 3.3.X and needs to be upgraded to 3.4.X or better.
	F/T data not updated since last check. previous sequence: #. current sequence: #.	Communications between F/T sensor and UR Controller are not perfectly synchronous.
	Long RTDE packet: #. RTDE Packet count: #.	Communication with UR Controller took longer than expected.
	New longest period between RTDE packets: #.	This is the longest period of time gone without communication with the UR controller.
	Connection Reset at #. Connection Re-established at #. Time taken to Re-establish connection: #.	UR Controller reset the RTDE connection.
	Long packet: #. Packet count: #.	Communication with F/T sensor took longer than expected.
	New longest period between packets: #.	This is the longest period of time gone without communication with the F/T sensor.
Info	RTDE Setup completed, entering F/T forwarding loop	The RTDE interface was successfully configured. Starting F/T communications.
	RTDE Thread safely closed. Time run: #.	URCap successfully stopped.
	F/T Setup completed, entering F/T forwarding loop.	The F/T sensor was successfully configured. Starting F/T communications.
	Time run: #. Loop iterations: #. Rate: #.	URCap operating information. Generated roughly every 10 seconds. Rate should be around 125 Hz.
	F/T Thread safely closed. Time run: #. Loop iterations: #.	URCap successfully stopped.

4.3.2.3 Acceptable Status Conditions

ATI F/T sensors provide status conditions, status bits, to the UR robot, during operation. The user can set Acceptable Status Conditions so that the URCap software ignores the status condition and continues operation. The user sets Acceptable Status Conditions using the following steps:

1. Under the **Logging Level**, click on the radio dial button for either **Net F/T Status Bits** or **Axia80 Status Bits**. Depending upon, the sensor selected, certain status conditions appear on the screen. Refer to the following figures.
2. To turn the status bits to an Acceptable Status Condition, select the boxes for the status bits. For an explanation of the status bits refer the 9610-05-Ethernet Axia manual for the Axia80 sensor and the 9620-05-Net FT for all other ATI Ethernet sensors.

Figure 4.8—Net F/T Status Bits

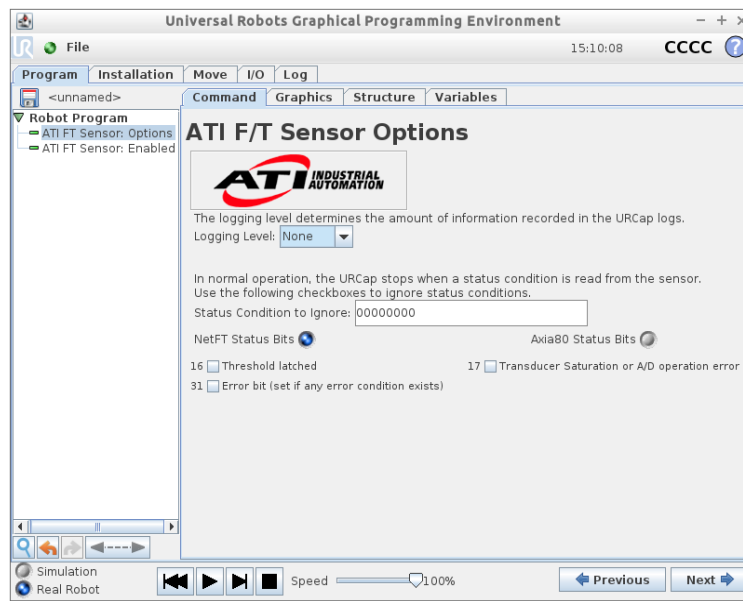
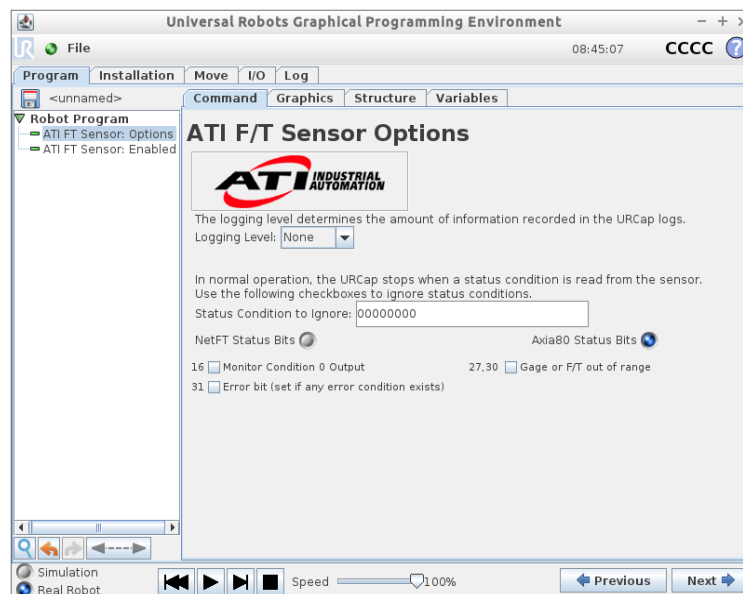


Figure 4.9—Axia80 Sensor Bits



4.4 Protective Stop Error

Whenever communication between the sensor and the URcap software is lost, the error “Protective Stop C207A0: Fieldbus Disconnected” appears. Clicking on the **Enable Robot** button, attempts to re-establish communication. Verify that all cables are connected, and the sensor is powered.

If one or both of the acceptable status conditions from [Section 4.3.2.3—Acceptable Status Conditions](#) are selected, then those status condition will be ignored and the UR robot does not stop with the following error message .

Figure 4.10—Protective Stop Error Message



5. Demo Programs

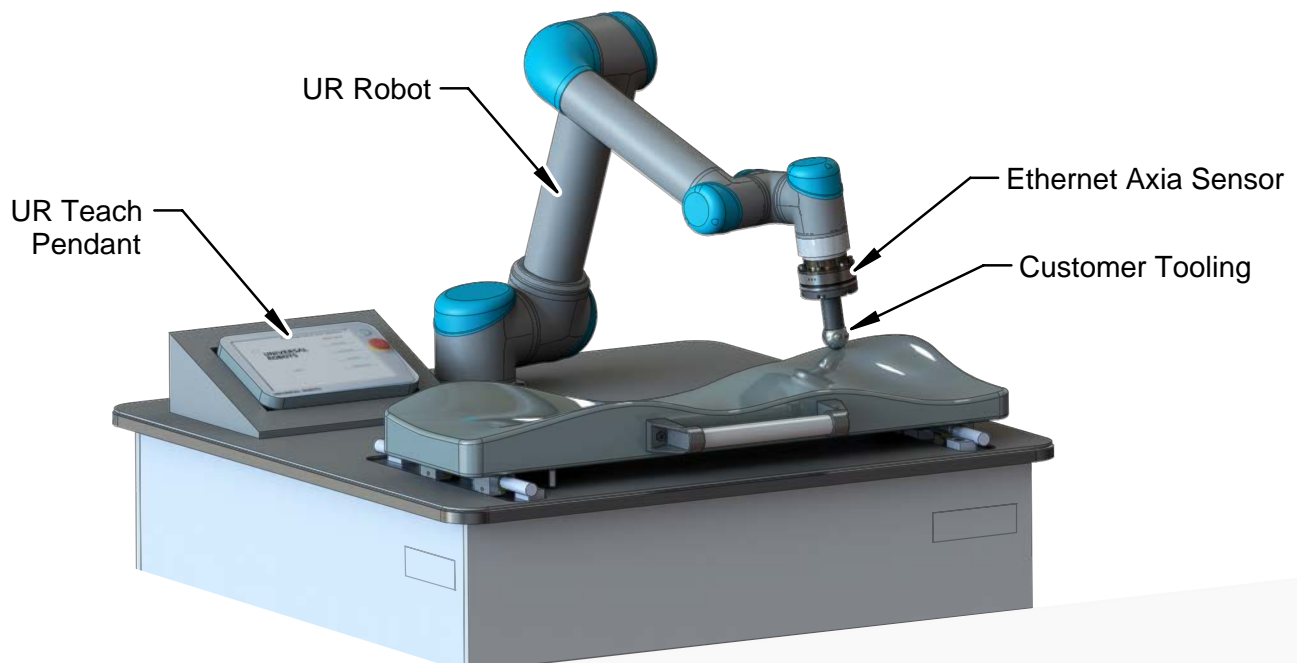
ATI provides the following (2) demo program options for use with UR robots:

- a standard demo, which moves the robot and customer tooling across an uneven surface based on feedback from the ATI F/T sensor. The file name is “ATI Demo Program.urp”.
- a simple demo, which moves the robot down until attached customer tooling contacts a surface or a force greater than 2 N. The file name is “ATI Simple Demo Program.urp”.

The Demo consists of a robot, a sensor, a program loaded from a USB drive, a customer supplied tool, and an uneven surface. See [Figure 5.1](#).

The following sections includes information on downloading, installing, and operating the demo programs.

Figure 5.1—Demo featuring the Axia80 UR F/T System Components



5.1 Downloading Demo Programs

The Demo Program is included in the same package file that contains the URCap software. Refer to [Section 3.1—Downloading URCap Software from the ATI Website](#).

5.2 Installing Demo Programs and Setting a Start Position

The Demo Programs are installed onto the UR Teach Pendant. The robot must be taught a Start position before operating the Demo Programs.

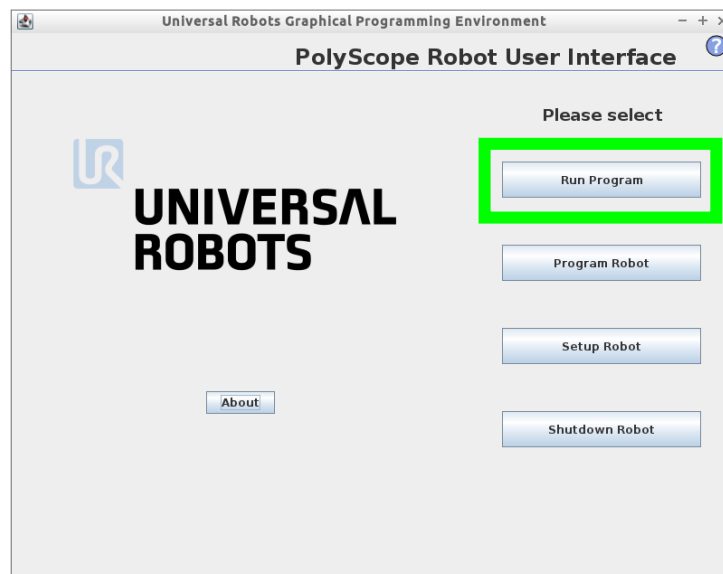
1. Insert a USB stick that contains the Demo package into the USB port on the UR Teach Pendant.

Figure 5.2—UR Teach Pendant



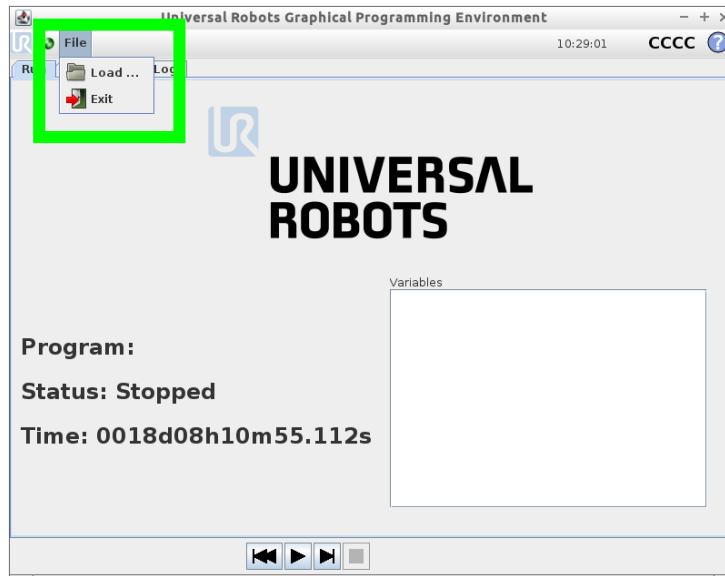
2. On the UR Teach Pendant, “PolyScope Robot User Interface” screen or the main menu, select **Run Program**.

Figure 5.3—PolyScope Robot User Interface Screen or Main Menu



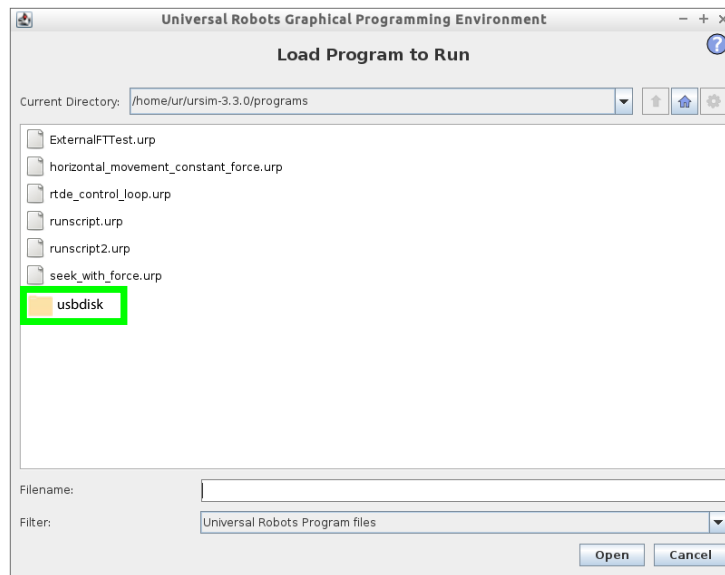
3. On the Universal Robots Run Program Screen in the following figure, select **File > Load**.

Figure 5.4—Universal Robots Run Program Screen



4. Select the folder **usbdisk**.

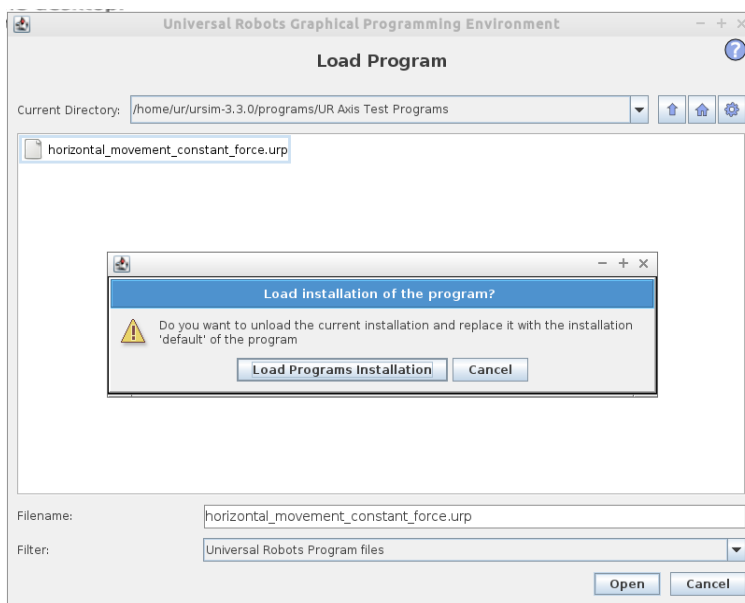
Figure 5.5—Open the “usbdisk” Folder



5. Double click the program or select the program > **Open**

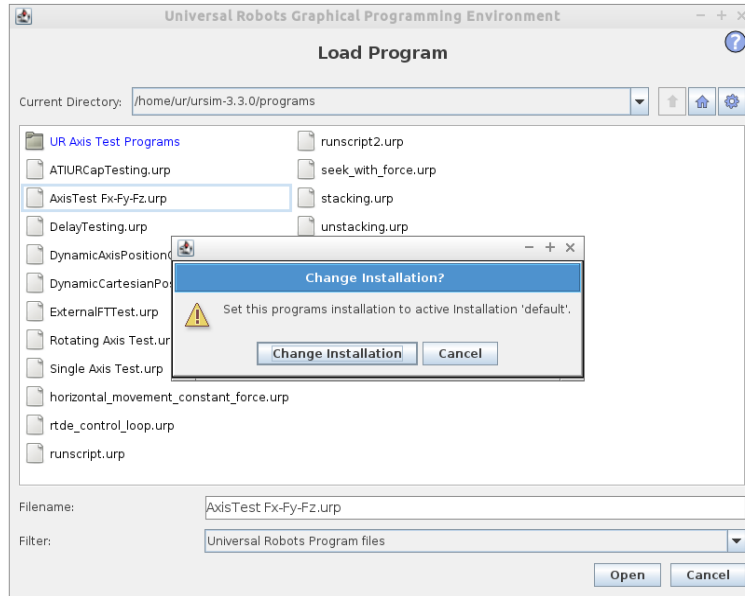
6. The Universal Robots Home screen, [Figure 5.4](#), with program control buttons displays. The demo includes the ATI default safety settings.
 - a. If the customer's UR robot has different safety settings, the user is prompted to either load the ATI default settings or keep the current safety settings.
 - To use the ATI default safety settings, click **Load Programs Installation**.
 - To use current safety settings installed on the UR robot, click **Cancel**.

Figure 5.6—Load Programs Installation Default Safety Settings



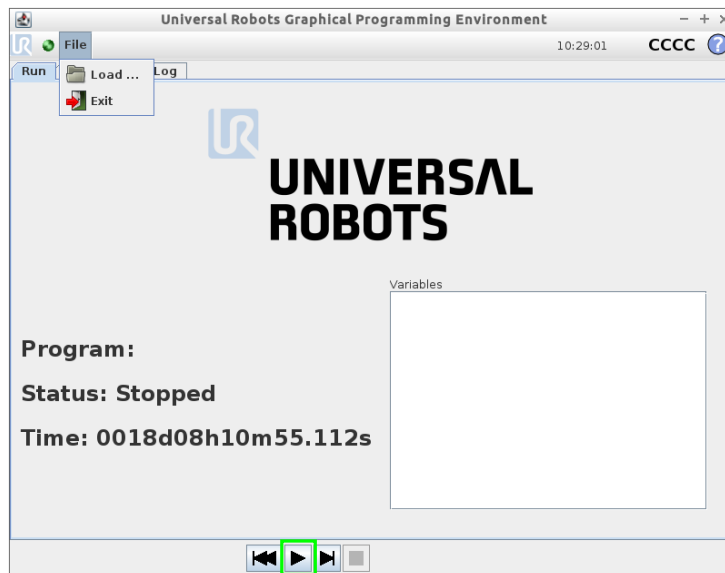
- b. If the user selects to not load the default settings, the following message appears.
 - If the user selects **Cancel**, the user will be prompted to **Load Programs Installation** the next time the demo program is run.
 - If the user selects **Change Installation**, the default safety settings are not installed, and the user will not be prompted to **Load Programs Installation** the next time the demo program is run.

Figure 5.7—Not Loading the Default Safety Settings




- 7. The Universal Robots Run Program control screen displays. Click the **Play** button. The robot moves to a Start position.

Figure 5.8—Universal Robots Home Screen



NOTICE: When the user plays the demo program, the robot will move to a Start Position. The user is prompted by the screen in [Figure 5.9](#) to either use the default Start Position or edit the demo program to teach the robot a new Start Position. Refer to the following step [a](#).

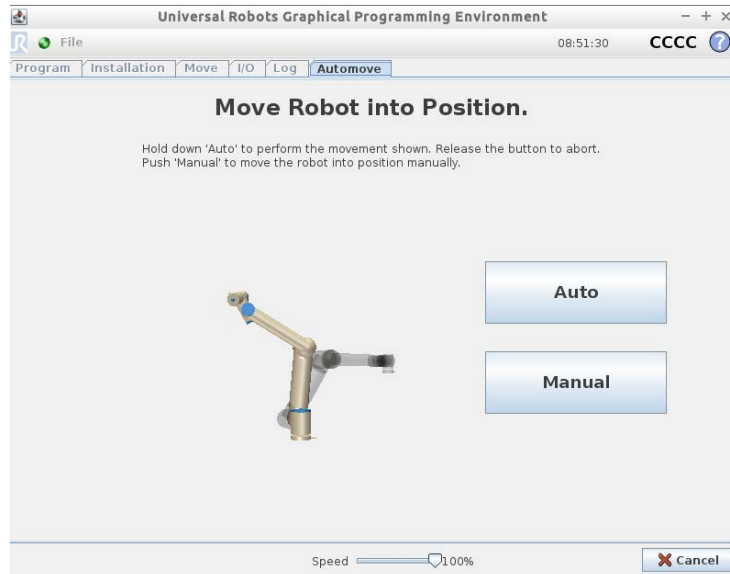
- a. Move the robot to a Start Position. The user can either use the default Start Position or edit the demo program to teach the robot a Start Position.



CAUTION: When initially setting up the Demo Program, the user should move the robot manually in order to avoid damaging parts, especially the sensor cable.

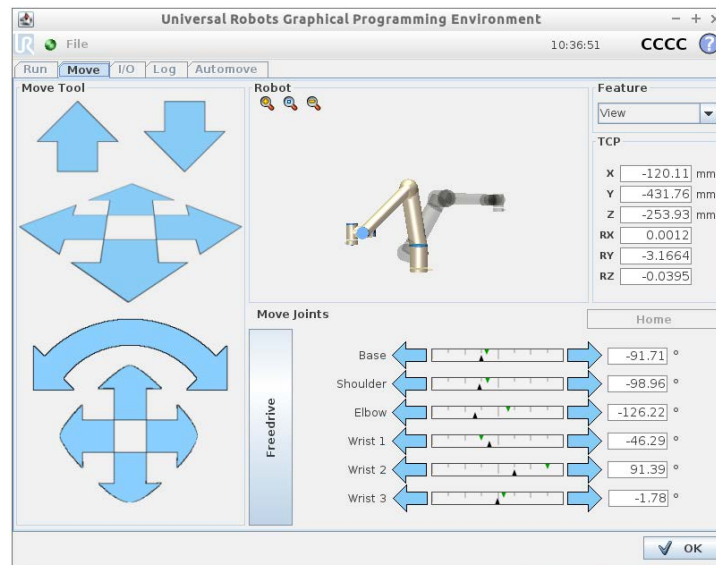
- To use the default Start Position, click and hold **Auto** button. The robot moves to the default Start Position and the **Auto** button becomes grayed out.
- To edit the demo program to teach the robot a Start Position, click **Manual**.

Figure 5.9—Move Robot into a Start Position



- Under the **Move** tab, use the manual controls to move the robot to the **Start** Position. Click **Ok**.

Figure 5.10—Manually Moving the Robot



- b. After the robot moves to a Start Position, the Run Program control screen from [Figure 5.8](#) appears. Click **Play**.

5.3 Operation

The following sections explain the operation of the Standard and Simple Demo Programs.

5.3.1 Standard Demo Program

The Demo program consists of the following steps:

1. The robot arm is moved to its start position above the surface.

NOTICE: Steps 2 and 3 are the only commands created by the UR Cap Software plugin. All other steps are standard UR programming commands.

2. The ATI F/T sensor starts sending force/torque data to the UR program.
3. The program waits 1 second for the tool to settle, then biases the F/T sensor.

NOTICE: Steps 4 to 6, can use either the UR built-in F/T sensor data or the ATI UR Cap data. The Demo Program uses the ATI UR Cap data through the Enable command. The Demo Program does not use the Disable command. Refer to [Section 4.3.1—Program Node Commands](#) for more information on the Enable, Disable, and Bias commands.

4. The tool is moved straight down, until the sensor measures a force greater than 2 N or the tool touches the surface.
5. The tool is pressed against the surface with 10 N of force and moved from the left side of the surface to the right. The robot adjusts the tool up and down to maintain 10 N of force as it travels across the surface.
6. When the tool reaches the right side of the surface, it stops and then moves up to its checkpoint position.
7. The process repeats in reverse. The tool moves down until it touches the surface, travels from the right side of the surface to the left at 10 N, and lifting up.
8. This program loops until stopped.

NOTICE: ATI F/T Sensors provide status conditions to the robot. Refer to [Section 4.3.2.3—Acceptable Status Conditions](#) for Acceptable Status Conditions that the user can set the UR Cap software to ignore so that the UR robot continuously operates.

5.3.2 Simple Demo

The Simple Demo consists of the following steps:

1. The Simple Demo Program moves the end of the robot arm straight up and down.
2. If the sensor detects the force of the robot arm moving down onto an object, the robot arm stops and moves upwards again.

NOTICE: The Simple Demo Program stops when the sensor detects a force greater than 2 N.

3. This motion repeats until the program is stopped.

6. Maintenance

6.1 Software Updates

Periodically check the ATI website for URCap software updates.

7. Troubleshooting

This section includes answers to some issues that might arise when setting up and using the ATI URCap software with an ATI Ethernet sensor. The question or problem is listed followed by its probable answer or solution. They are categorized for easy reference.

The information in this section should answer many questions that might arise in the field. Customer service is available to users, who have problems or questions addressed in the manuals.

Note

Please read the manual before calling customer service. Before calling, have the following information available:

1. Serial number (e.g., FT01234)
2. Sensor model (e.g., Ethernet Axia80)
3. Calibration (e.g., US-15-50, SI-65-6, etc.)
4. Accurate and complete description of the question or problem
5. Computer and software information. Operating system, PC type, drivers, application software, and other relevant information about your configuration.

If possible, be near the F/T system when calling.

How to Reach Us

Sale, Service and Information about ATI products:

ATI Industrial Automation

1031 Goodworth Drive

Apex, NC 27539 USA

www.ati-ia.com

Tel: +1.919.772.0115

Fax: +1.919.772.8259

E-mail: info@ati-ia.com

Technical support and questions:

Application Engineering

Tel: +1.919.772.0115, Option 2, Option 2

Fax: +1.919.772.8259

E-mail: ft_support@ati-ia.com

7.1 Errors with the URCap Software

The following table lists basic problems and possible answers/solutions for the operation of the URCap software.

Problem	Answer/Solution
After clicking Start Daemon on the “ATI Force/Torque Sensor screen “during the URCap Software Setup, an error message “ATI FT Daemon failed” appears.	The ATI F/T Sensor IP Address entered may be incorrect. Verify the IP address and reenter. Refer to Section 3.3—Setting up URCap Software .
During operation, a “Protective Stop” error message appears.	There has been a loss of communication between the sensor and the URCap software. Verify that all cables are connected, and the sensor is powered. Select the Enable Robot button on the error message to re-establish communication. Refer to Section 4.4—Protective Stop Error .
The UR is not using data from an ATI F/T sensor that the user installed on the robot arm.	Verify that the Enable command is selected. Refer to Section 4.3.1—Program Node Commands .
The URCap software is malfunctioning.	Another method to review the activity of the URCap software is to make sure a Logging Level is set and reference the logging file for details. Refer to Section 4.3.2.1—Logging Level and Section 4.3.2.2—Logging File .
The ATI F/T Axia80 sensor is malfunctioning.	Refer to the 9610-05-Ethernet Axia manual.
The ATI NET F/T sensor is malfunctioning.	Refer to the 9620-05-NET FT manual.

8. Terms and Conditions of Sale

The following Terms and Conditions are a supplement to and include a portion of ATI's Standard Terms and Conditions, which are on file at ATI and available upon request.

ATI warrants to Purchaser that force torque sensor products purchased hereunder will be free from defects in material and workmanship under normal use for a period of one (1) year from the date of shipment. The warranty period for repairs made under a RMA shall be for the duration of the original warranty, or ninety (90) days from the date of repaired product shipment, whichever is longer. ATI will have no liability under this warranty unless: (a) ATI is given written notice of the claimed defect and a description thereof with thirty (30) days after Purchaser discovers the defect and in any event, not later than the last day of the warranty period and (b) the defective item is received by ATI not later than (10) days after the last day of the warranty period. ATI's entire liability and Purchaser's sole remedy under this warranty is limited to repair or replacement, at ATI's election, of the defective part or item or, at ATI's election, refund of the price paid for the item. The foregoing warranty does not apply to any defect or failure resulting from improper installation, operation, maintenance, or repair by anyone other than ATI.

ATI will in no event be liable for incidental, consequential, or special damages of any kind, even if ATI has been advised of the possibility of such damages. ATI's aggregate liability will in no event exceed the amount paid by the purchaser for the item which is the subject of claim or dispute. ATI will have no liability of any kind for failure of any equipment or other items not supplied by ATI.

No action against ATI, regardless of form, arising out of or in any way connected with products or services supplied hereunder, may be brought more than one year after the cause of action accrued.

No representation or agreement varying or extending the warranty and limitation of remedy provisions contained herein is authorized by ATI, and may not be relied upon as having been authorized by ATI, unless in writing and signed by an executive officer of ATI.

Unless otherwise agreed in writing by ATI, all designs, drawings, data, inventions, software, and other technology made or developed by ATI in the course of providing products and services hereunder, and all rights therein under any patent, copyright, or other law protecting intellectual property, shall be and remain ATI's property. The sale of products or services hereunder does not convey any expressed or implied license under any patent, copyright, or other intellectual property right owned or controlled by ATI, whether relating to the products sold or any other matter, except for the license expressly granted below.

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Without ATI's prior written permission, Purchaser will not use such information for any other purpose or provide or otherwise make such information available to any third party. Purchaser agrees to take all reasonable precautions to prevent any unauthorized use or disclosure of such information.

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