EPSON®

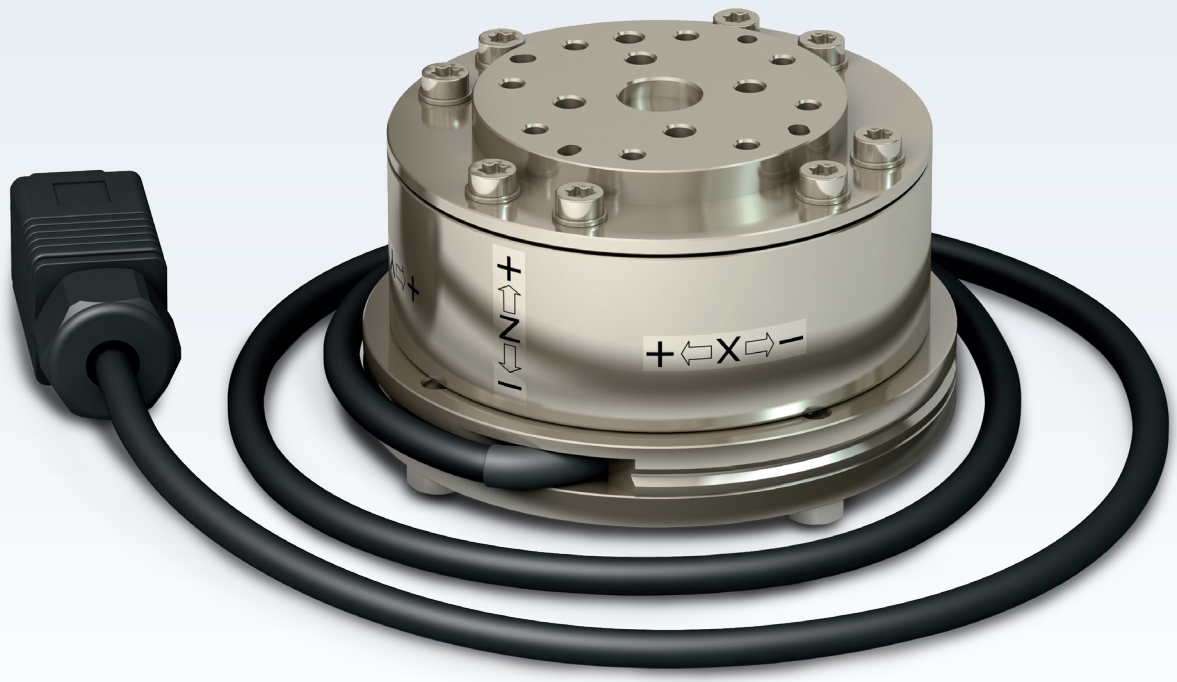
Force Guide

Integrated Robot Guidance



Intuitive robot force guidance for high-precision performance

Powered by proprietary Epson Quartz Technology, Force Guide enables Epson robots to detect six axes of force with precision down to 0.1 N. Driven by real-time servo system integration, Force Guide delivers fast, tactile feedback to guide robots for high-precision parts placement. Easy to set up, Force Guide features a point-and-click interface with pre-configured solutions and built-in objects, helping to reduce the development time for precision applications.



New possibilities

Force Guide features three linear and three rotational measurement axes for extraordinary precision and remarkable rigidity—the perfect solution for advanced robot automation.



Epson Force Guide

Take automation to the next level with Force Guide

Powerful performance — integrated force control system driven by proprietary Quartz Technology from Epson

Ultra precise — detects force and adjusts motion with amazing precision—down to 0.1 N

Superior rigidity — durable sensor built to withstand excessive force

Fast robot/force guidance response — internal sensor with real-time servo system integration

Point-and-click setup — easy-to-use interface with graphical wizards, charts and more

Fast, easy implementation — helps reduce the amount of coding with decision-based flowcharts and intelligent object tools

Multi-axis force/torque sensor — includes three linear and three rotational measurement axes

Industry solutions

Force Guide is the perfect automation tool for a wide variety of manufacturing industries. Our customers range from large Fortune 100 companies to small manufacturing facilities.

Automotive

Medical Devices

Medical Lab Automation

Consumer Electronics

Electronic Components

Industrial

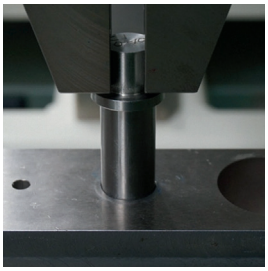


Simplicity redefined in a compact All-in-One solution

Force and torque sensors are an increasingly significant component for material testing, assembly, development and quality assurance. More and more companies around the world are using them because of their accuracy, versatility and reliability. Force Guide provides a wide range of automation possibilities:

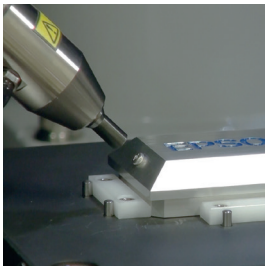
Parts and connector insertion

With Force Guide, parts and connector insertion can be easily automated, for everything from pin-in-socket insertion to high-precision valve assembly. Epson sensors detect misalignment. And, because of their high sensitivity, the part or connector is easily inserted, helping to reduce the potential for damage.



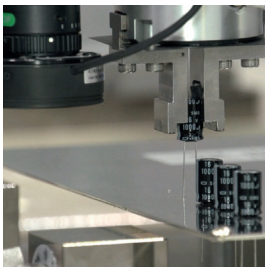
Screw driving

Thanks to real-time force/torque feedback, the smallest of screws can be easily tightened, even when there is deviation in angle or location. By detecting the force, the robot can successfully execute the task, while preventing any stripping of the threads.



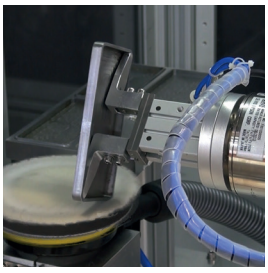
Delicate parts handling

Because of its tight integration with the servo system, Force Guide makes it easy to handle glass and other delicate materials. Our quartz-based sensors allow for soft placement in applications that could otherwise result in breakage of glass or other fragile materials.



Grinding/polishing

Deburring and grinding of parts to accurately remove excess flash is possible with Force Guide, despite deviations in casting or dimensions. The tool remains on its path, due to real-time force feedback. Similarly, polishing can be automated so as to keep the tool pressing with constant and precise force to the part.



Gear meshing

On assembly operations, Force Guide provides the robot with the tools and data necessary to align and match the faces of various components, including multiple gears.

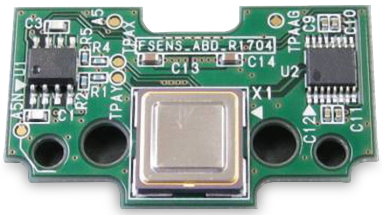


Advantage Epson

Drawing on our global expertise in robotic solutions, Epson created Force Guide as a tool to improve productivity in automated manufacturing processes. Force Guide features proprietary Quartz Technology which provides remarkable rigidity and powerful performance, allowing customers to complete automation tasks that previously may not have been possible.

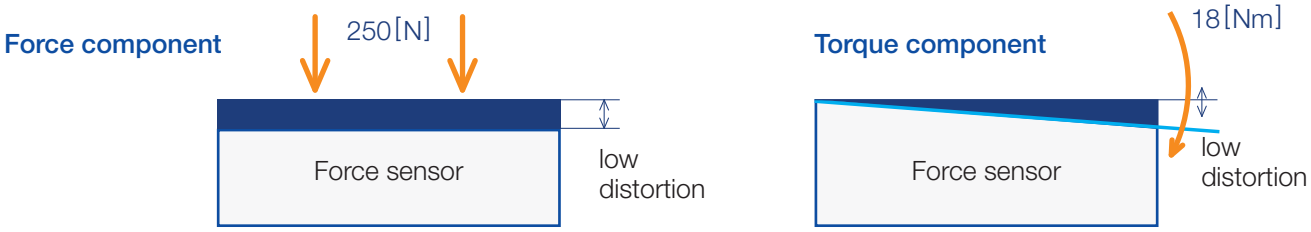
Epson Quartz Technology

Because of its proprietary Quartz Technology, Force Guide offers exceptionally high sensitivity. At just 0.035 N, the digital noise in Epson sensors is extremely low. This results in a measurement resolution of just 0.1 N. This value level enables force measurements to be captured with superior sensitivity.



High rigidity

Epson Force Sensors are incredibly robust and durable, with exceptional resistance to both shock and external forces. Even with significant force and torque applied, you can still get precise results. Epson Force Sensors are built to withstand forces of up to 1,000 N.



Powerful performance

Driven by real-time servo system integration, Force Guide delivers fast, tactile feedback to guide robots with remarkable precision. This allows for a whole new level of performance for applications including parts insertion, handling of delicate components and more.

Force Guide tools

Pre-configured force guidance object tools provide a simple method for creating robot force-based motions and applications.

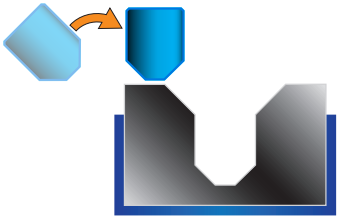
Contact



Find the object

- Move to the object
- Detect the force based on touch
- Use soft touch so as to prevent damage

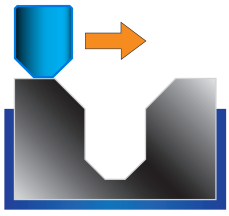
Align



Align the object, as needed

- Align the part to the placement surface
- Detect when the part and the surface are parallel or aligned
- Align the objects, whatever the orientation

Probe



Find the holes or steps needed

- Slide across the surface while pressing downward
- Detect downward force changes
- Utilize the preset probing patterns available (clover, spiral, etc.)

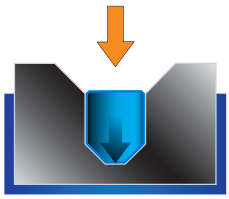
Follow



Move the robot based on the force detected

- Detect the direction and value of force
- Calculate the difference vs. the target force
- Move the robot so the force becomes zero

Press



Continue to apply the necessary force to the object to complete placement of the part

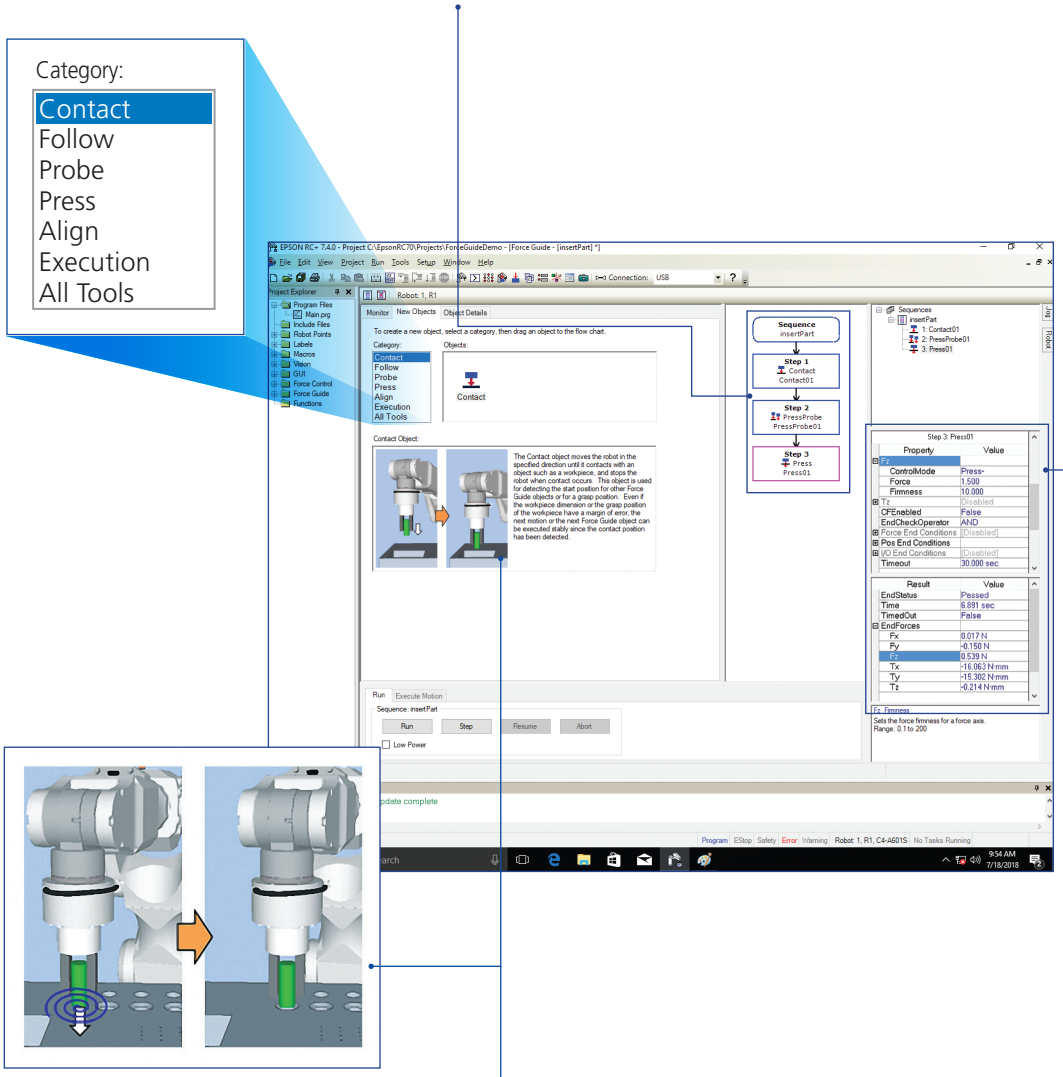
- Detect the value of the pressing force
- Calculate the difference between that and the target force
- Move the components until the target force is reached

Intuitive interface

Fully integrated in the Epson RC+® development environment, Force Guide applications can be created and tested in an easy-to-use point-and-click fashion.

Force Guide sequence

The Force Guide sequence flowchart provides a simple drag-and-drop mechanism for defining the force guidance operational flow (ordering of steps). This reduces the amount of programming required for Force Guide applications.



Object properties and results

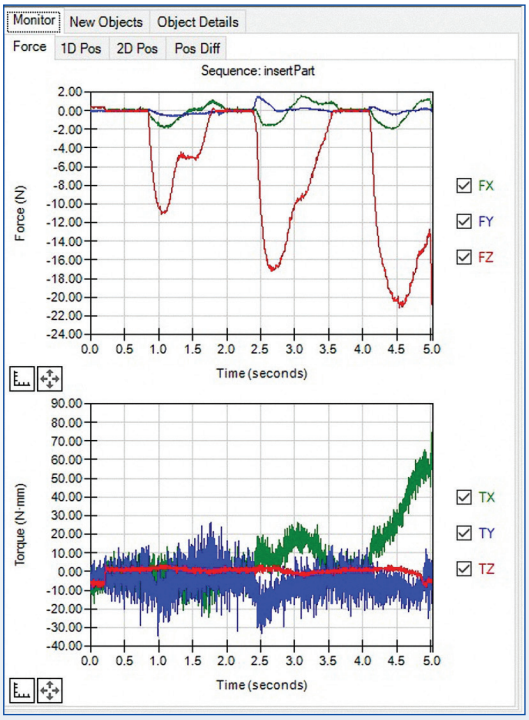
Users can input and adjust force and torque data. The software automatically generates associated results based on input parameters.

Object function preview

A graphical representation is shown to illustrate the robot motions associated with specific Force Guide tools.

Real-time Force Guide monitoring

Force Guide provides real-time graphical representations of both force and torque, allowing users to see and adjust force guidance based on object parameters. Force Guide also provides visual feedback, and records and displays data logs to ensure operational reliability.



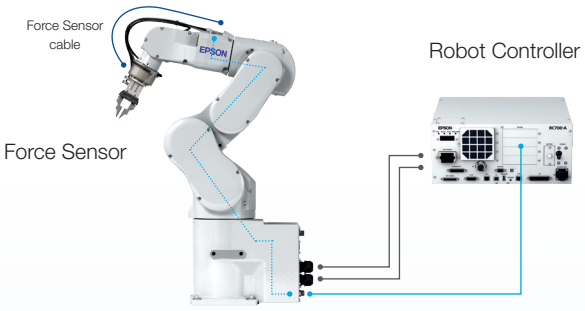
Simple teaching through manual guidance

With manual guidance, users can reduce the time and complexity involved in teaching robot positions. Soft Servo Mode, soft motion assist and hand-eye guidance all play a part in minimizing jogging and creating a more efficient teaching process. Users simply move the robot by hand to the desired positions and record those positions on the touchscreen teach pendant.

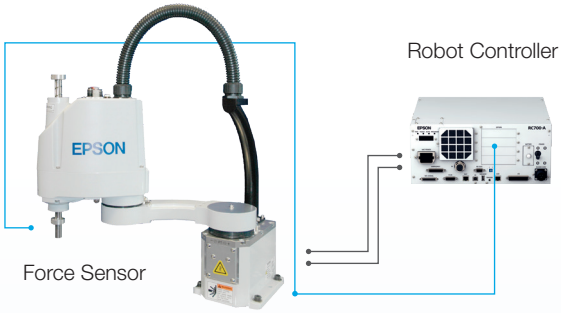


Force Guide works with both Epson 6-Axis and SCARA robots

Internal Cable Routing Example



External Cable Routing Example



Note: Some robots come with internal cabling configurations, while others require external cabling for Force Guide connection. See table below for more details.

Force Sensor cable

Robot M/C cable

SCARA Robot Specifications		
Measured Degrees of Freedom		6-Axis: 3 force components (Fx, Fy, Fz) and 3 torque components (Tx, Ty, Tz)
Rated Load	Force (Fx, Fy, Fz)	250 N
	Torque (Tx, Ty, Tz)	18 Nm
Maximum Allowable Static Load	Force (Fx, Fy, Fz)	1,000 N
	Torque (Tx, Ty, Tz)	36 Nm
Measured Resolution[1]	Force (Fx, Fy, Fz)	±0.1 N or less (5 sec, 25 °C)
	Torque (Tx, Ty, Tz)	±0.003 Nm or less (5 sec, 25 °C)
Measurement Accuracy[2]		±5% RO or less
Operating Environment	Temperature	-10 °C ~ 40 °C
	Humidity	10% to 80% relative humidity, no condensation
Protection Class		IP20–IP67
What's Included		Force Sensor, Force Control Board or I/F Box, Cables, Mounting Flange
Safety Standards		CE Mark, EMC Directive, KC Mark
Support		Customer Service (562) 290-5920 service@robots.epson.com Applications Support (562) 290-5930 applications@robots.epson.com Sales Inquiries (562) 290-5997 info@robots.epson.com

1 The measurement resolution including the noise level and time drift (25 °C), when the measurement time is 5 seconds.
2 The measurement accuracy when the measurement time is 6 minutes.



Why Epson Robots?

As precision automation specialists, the Epson Robots team has been building automation products for over 40 years. Leading the industry in small-parts assembly applications, we've introduced many firsts. As a result, our innovative products are hard at work in thousands of manufacturing facilities throughout the world.

Leading Epson technology

- Epson is the #1 SCARA robot manufacturer in the world
- We introduced the world's first folding-arm 6-Axis robot
- Many of our robots contain integrated motion sensors to reduce vibration and increase performance

What you need, when you need it

- The Epson lineup features 6-Axis and SCARA robots with payloads up to 50 kg and a reach ranging from 175 mm to 1,400 mm
- We offer a wide range of integrated options including vision guidance, force guidance and more

Intuitive programming software

- Epson RC+ software is extremely user friendly, making automation setup fast and easy

Reliability you can count on

- Our team is dedicated to helping you find the best solution for your automation needs
- Epson robots are designed to last a long time with little maintenance

EPSON®

Epson Business Solutions

Driven by a relentless pursuit of innovation and market leadership, Epson empowers organizations to achieve their unique goals through a wide breadth of precision-engineered solutions. With a full suite of efficient and compact products ranging from printers to projectors and robots to microdevices, Epson is uniquely positioned to provide enduring partnerships and world-class expertise to those we serve every step of the way.

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