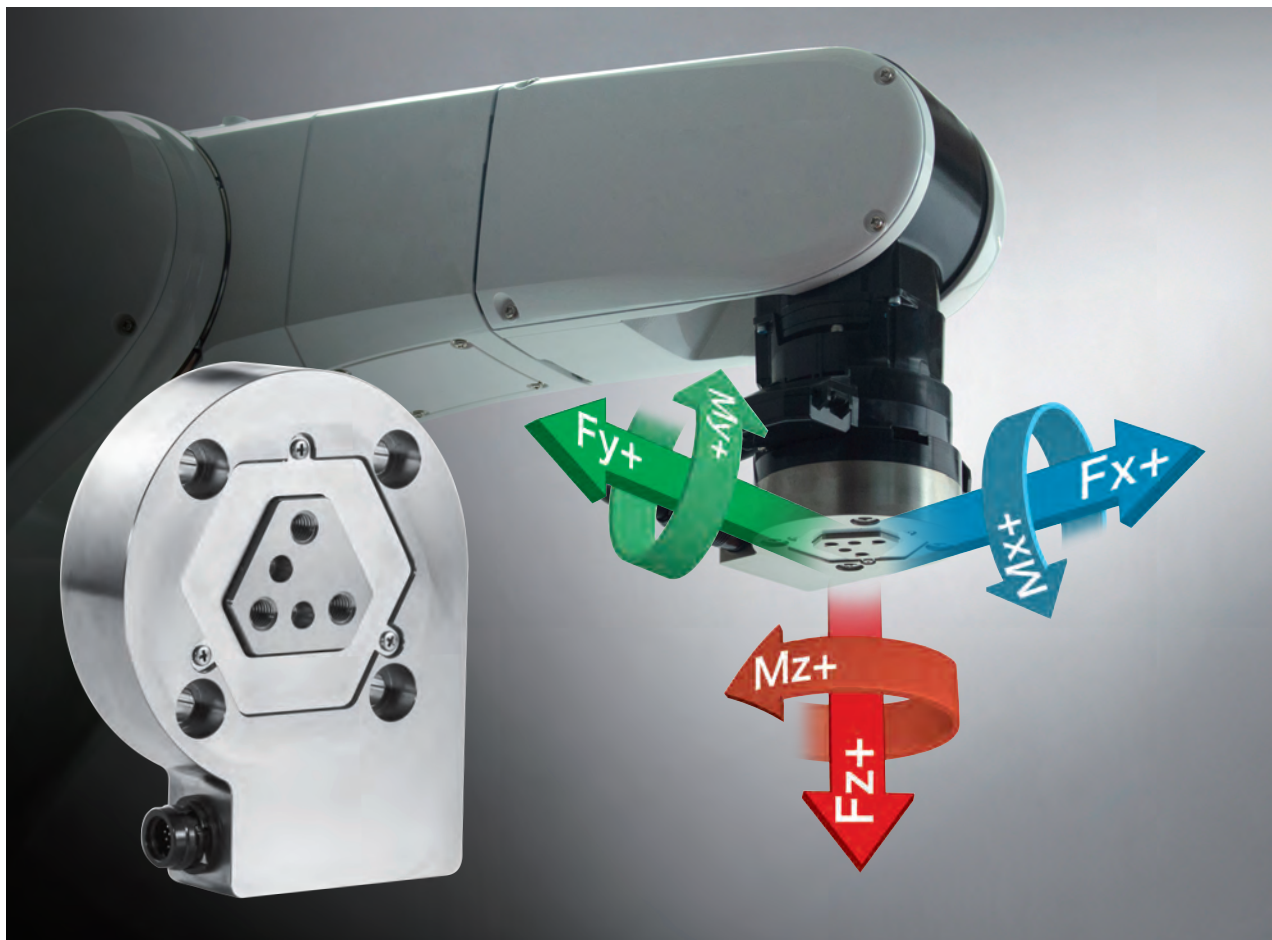


6-axis force sensor **ZYXer™**

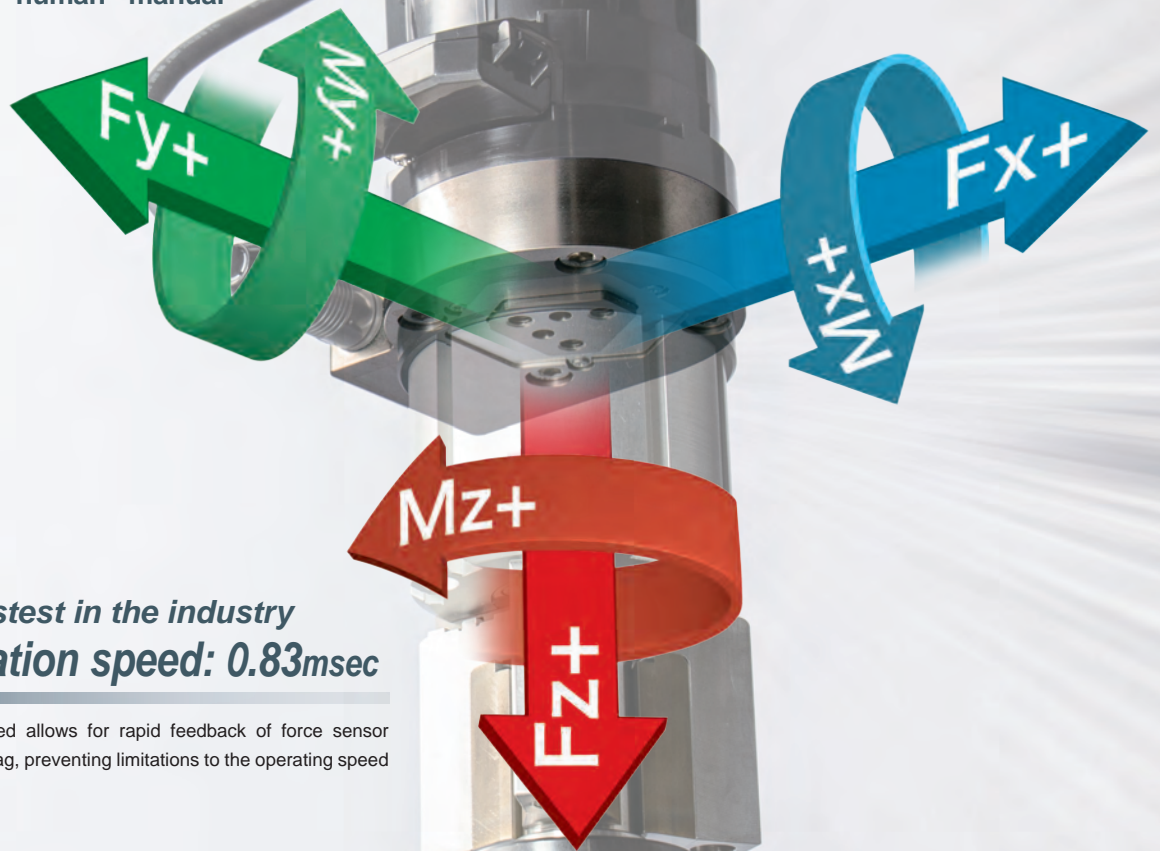


**Automation of
expert work can be
achieved with**

ZYXer™

Our 6-axis force sensor ZYXer™ is a sensor that simultaneously detects the load (F) along three axes (XYZ) and the moment (M) around each axis.

By mounting the sensor on a robotic arm, you can achieve the kind of precise control expected of human manual work.



Among the fastest in the industry
Communication speed: 0.83msec

Fast communication speed allows for rapid feedback of force sensor detected values with low lag, preventing limitations to the operating speed of the robot.

Industry-leading high precision
Resolution: 1/4000
(rated capacity comparison)

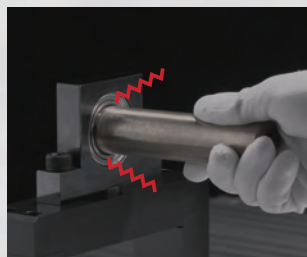
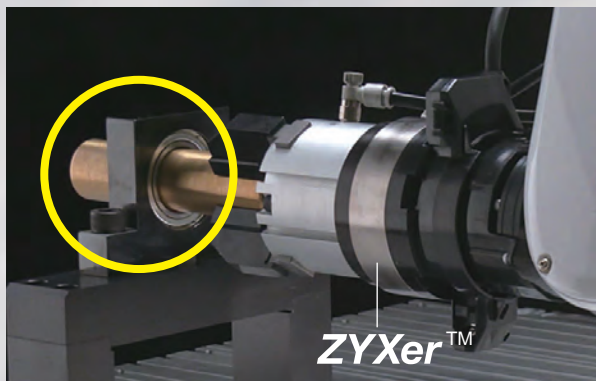
ZYXer™ incorporates strain gauge sensors with finer resolution compared to force sensors with other detection methods, for higher detection accuracy. This makes it possible to achieve ultra-precision action including H7

Highly reliable detection data
Nonlinearity: $\pm 2.0\%$

Our original design results in smaller differences between actual load and detected value. With low variation in repeated values, ZYXer™ boasts high reliability in terms of traceability.

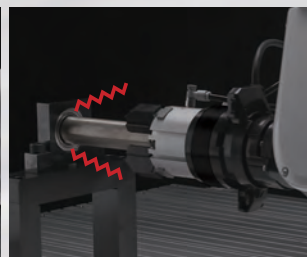
Reproduces the precise actions of a skilled worker

Robot mounted ZYXer™ units detect force in real time with automatic position correction, enabling reliable insertion.



Insertion with manual work

Trying to forcibly insert a hard object can lead to jamming.



Normal robot

Robot repetition results in misalignment beyond tolerance levels, leading to potential damage or stoppage.

Advantages of installing ZYXer™

Labor savings

Solving human resource shortages

ZYXer™ is able to detect the amount of force used by experienced workers to train the robot. The robot then can automate the treatment work with high precision.



Takt time reduction

Supports high-speed robotic motion

Equipped with rated moment to withstand high-speed arm motion. Communication speeds are among the fastest in the industry, limiting the occurrence of time lags.



Quality assurance

Reduction of defects with high-precision detection

Since the minimum detection load is very small, it can detect unexpected contact and prevent damage to the hand or workpiece.



Contributions to traceability

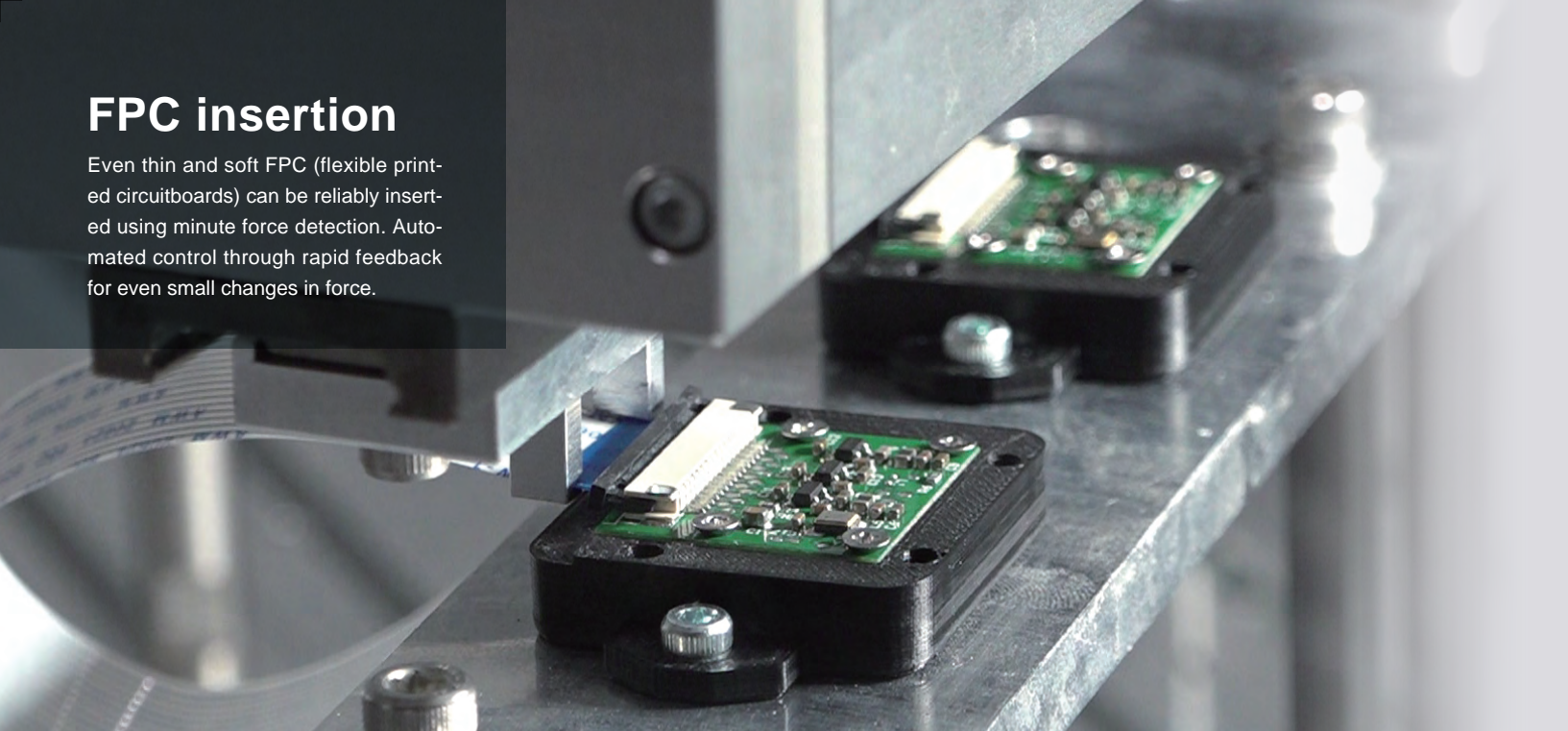
Records all 6-axis detected loads

Record the force applied to the robot to enable verification of the conditions/production lot when a malfunction occurs. This is useful for tracking down the cause of malfunctions as well as making improvements.



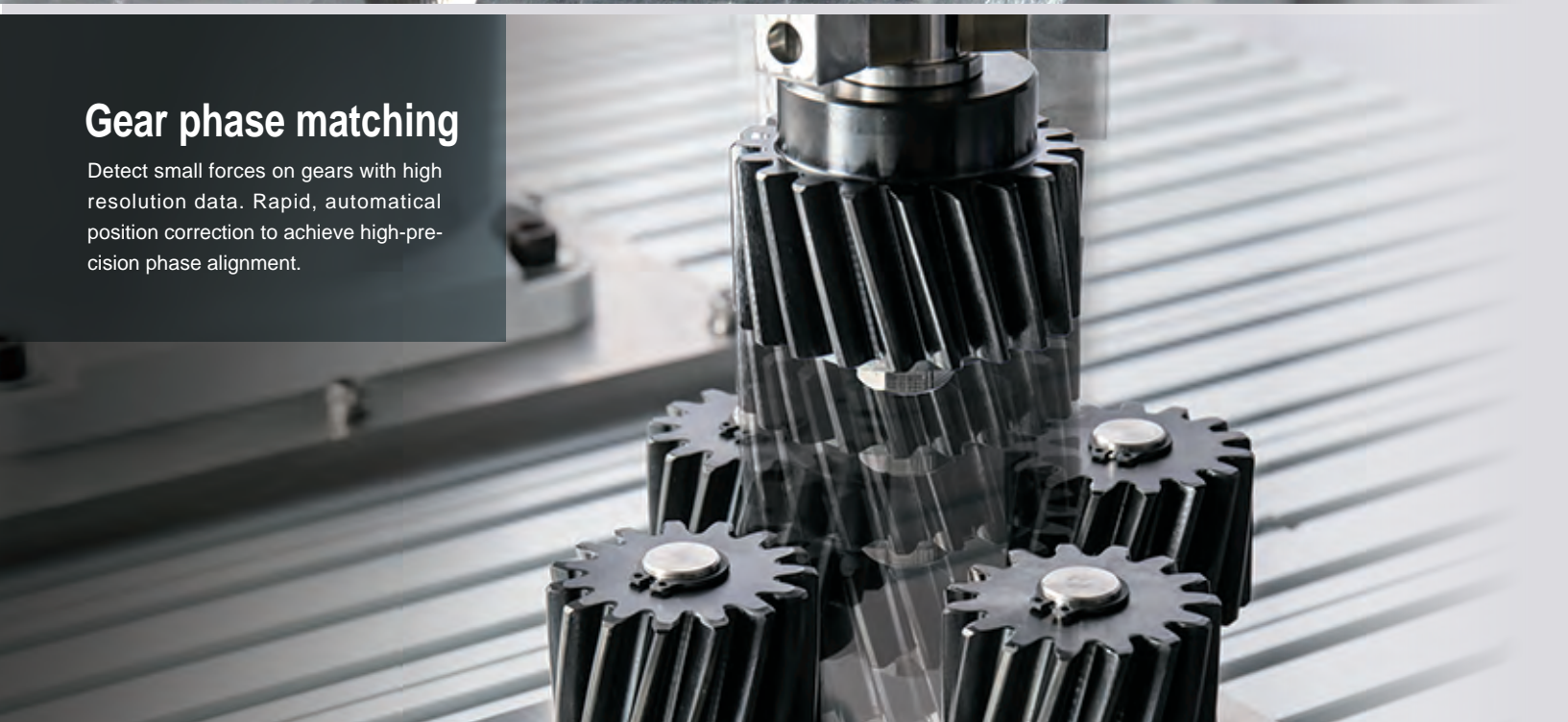
FPC insertion

Even thin and soft FPC (flexible printed circuitboards) can be reliably inserted using minute force detection. Automated control through rapid feedback for even small changes in force.



Gear phase matching

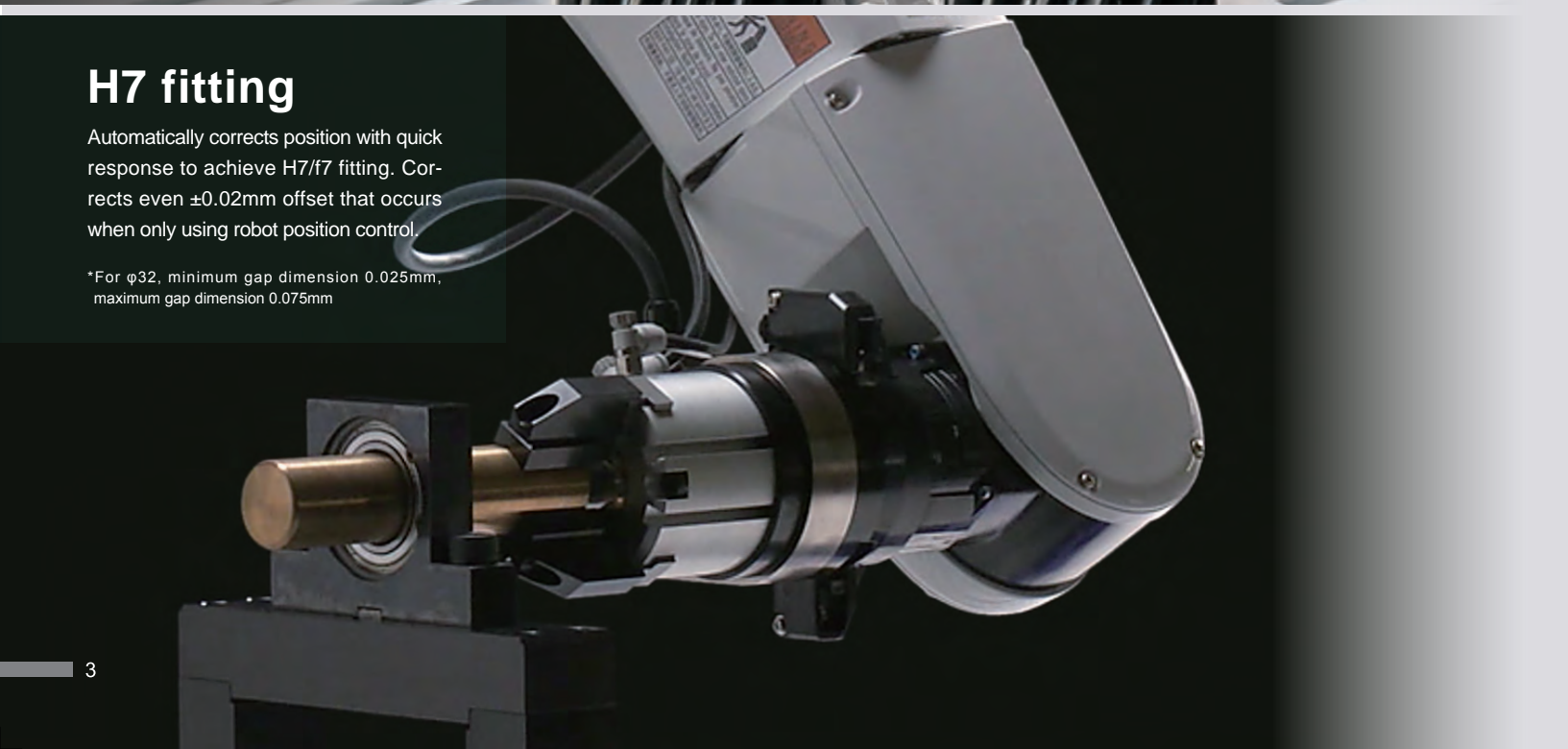
Detect small forces on gears with high resolution data. Rapid, automatic position correction to achieve high-precision phase alignment.



H7 fitting

Automatically corrects position with quick response to achieve H7/f7 fitting. Corrects even $\pm 0.02\text{mm}$ offset that occurs when only using robot position control.

*For $\phi 32$, minimum gap dimension 0.025mm , maximum gap dimension 0.075mm



Realize automation even when difficult for robots

Giving the robot the ability to sense force enables control of the robot arm in response to contact with products, jigs or other objects. Even irregular surface profiling work, which is conventionally difficult to automate, can be robotically automated using the ZYXer™ force sensor.



Deburring

Changes in load are used to detect burr residue to ensure the finish of the workpiece. While tracing the product shape, changes in load from burrs are detected.



Sealing

Maintaining consistent distance between surface and nozzle, the robot traces along the surface shape to achieve a beautiful finish.



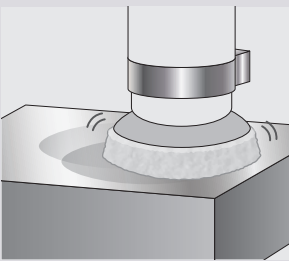
Remote operation

The robot reproduces the amount of force by the worker while also giving the worker feedback of the actual load on the robot, simulating contact for the remote worker.



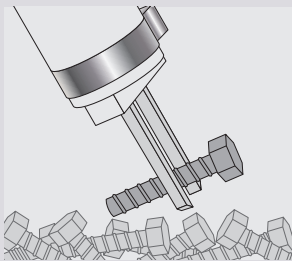
Machine operation assistance

Control operation with detection of operator force. Even when moving heavy loads, the motion is assisted to lessen the burden.



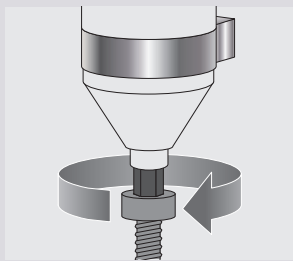
Buffing

Trace along uneven polished surfaces to buff with consistent force.



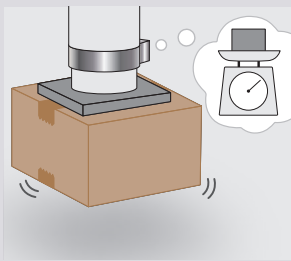
Picking

Picking is possible without damaging the products or robot hand.



Screwing

Ensure screw tightening to the required torque.



Measuring center of gravity

Measure mass and center of gravity of a product being held by the robot.

Even more powerful when paired with a vision sensor



Characteristics of the vision sensor (camera)

- Enables understanding of position using photography
- × Unable to support changes after photographs
- × Low precision, vulnerable to environmental light and dust

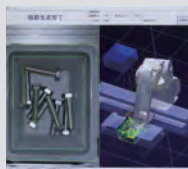


Characteristics of force sensor

- Detects contact and gripping errors
- Not affected by outside disturbances
- × Unable to prevent contact in advance



Example use: Picking



The vision sensor enables rapid selection among target objects and the force sensor prevents excessive contact with the gripped object. This gentle picking work prevents defects resulting from screw thread damage.



Easy installation for reduced burden on the customer

Even when using the force sensor for the first time, connection and setup is easy.
We offer a variety of software to match each use scenario, including support for robot teaching offline.

Simple instruction with offline teaching software

Normal teaching



Use the teaching pendant and adjust the motion while visually checking for collision with the product. This results in differences in the amount of trial and error based on experience, as well as potentially dangerous situations.



ZYXerPath

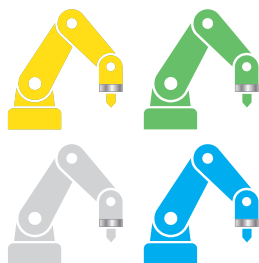
Offline teaching software supporting the force sensor



By combining with a **ZYXer™** double output module, force data can be viewed on a computer in real time. Automatically adjusts even the slightest misalignment between the CAD simulation and the actual object. This greatly reduces the burden of teaching with the pendant.

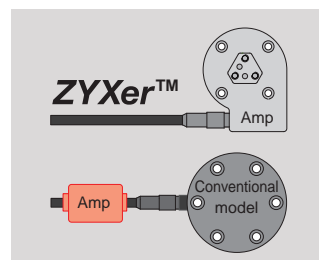
Support for robots from many manufacturers

We have experience with installations for many robot manufacturers. With our original design and strain gauge sensors, we offer excellent resolution and high speed communication compared to sensors using other detection methods.



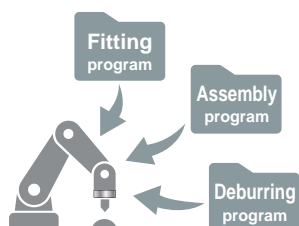
Built-in, space-saving amplifier

Our standard model includes a built-in amplifier. This results in tidier wiring by eliminating an extra connection to the amp and also reduces electrical noise, optimal for precision work.



Force control programs provided

We provide basic operating programs with force control for major applications including fitting and phase matching. Installation is easy.





Comprehensive coverage of large, small and custom applications and support for order-made solutions

We can offer designs optimized for customers' applications including supported loads and resolution. We handle requests not only for changing sensor specifications for different sizes or output methods, but also for adding software functions such as monitoring software.

Improve teaching and traceability

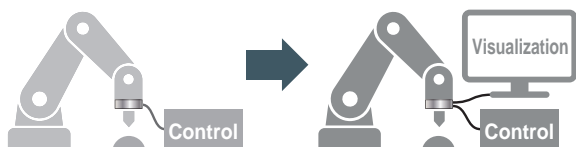
■ Double output model

This model can be used for force control and monitoring on a computer when attached to a robot. Visualization of force data during control is possible.



Normal (single output)

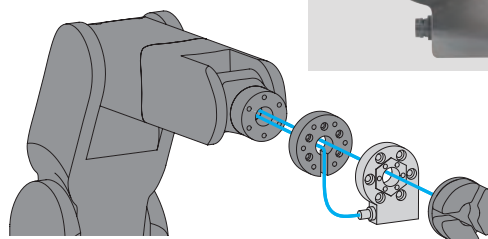
Double output



Store wires tidily

■ Hollow model

Since there is a hole through the center, wires and pipes for the robot hand can be passed through the center space.



Measure the weight of a small car

■ Ultra heavy model

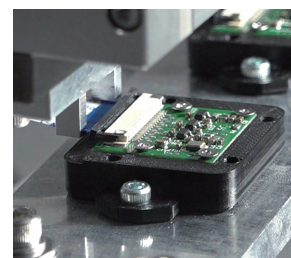
Rated capacity F_z : 14,000N. Capable of heavy-weight tasks such as detecting force for conveyance of objects heavier than 1 ton and assisting with installation of tires for heavy machinery.



Industry-leading precision

■ Ultra-high precision model

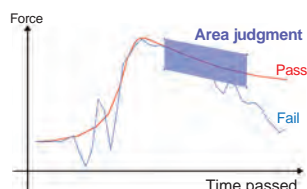
Minimum detectable load 0.005N. Able to detect even slight changes in mass at the level of 0.5g, automating minute work such as FPC insertion.



Quality judgment based on load change

■ Quality judgment monitoring software

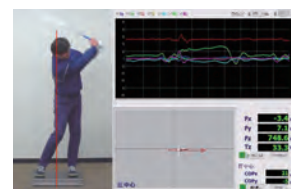
In addition to robot control, it monitors load changes and displays alerts such as a failure indicator when beyond the specified range.



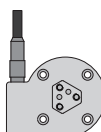
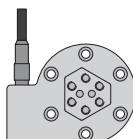
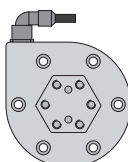
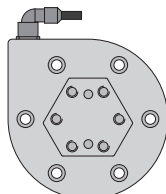
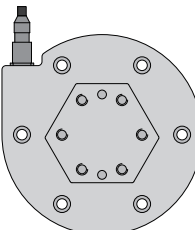
Measure balance variation

■ Force plate

Capable of measuring variation in center of gravity when people get on. This can be used in sports for golf swings or kicking off, or in rehabilitation such as walking analysis.



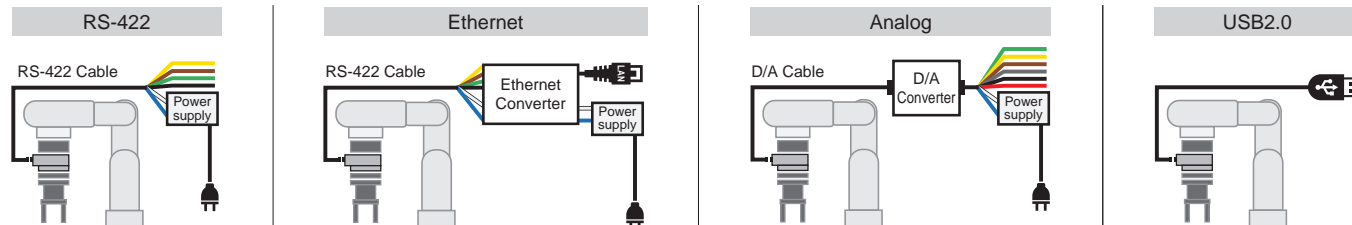
From small to large capacity, proposals that match your application

Model number		ZYX 080A501Z	ZYX 080A501	ZYX 080S102	ZYX 100A102	ZYX 100S202	ZYX 125A102	ZYX 125S202	ZYX 160A302	ZYX 160S402	ZYX 200A352	ZYX 200S902
Size		φ80×H25	φ80×H22		φ100×H30		φ125×H35		φ160×H40		φ200×H40	
Mounting method	Tool side	3×M6 P.C.D.21		3×M8 P.C.D.20	6×M8 P.C.D.32		6×M8 P.C.D.46		6×M10 P.C.D.63		6×M10 P.C.D.80	
	Robot panel	4×M6 P.C.D.63			6×M8 P.C.D.80		6×M8 P.C.D.100		6×M10 P.C.D.125		6×M10 P.C.D.160	
Fixed frame capacity Fx Fz Mx My Mz		± 500N ± 500N ± 20Nm ± 20Nm		± 1,000N ± 1,000N ± 40Nm ± 40Nm	± 1,000N ± 1,000N ± 45Nm ± 45Nm	± 2,000N ± 2,000N ± 100Nm ± 100Nm	± 1,000N ± 1,000N ± 75Nm ± 75Nm	± 2,000N ± 2,000N ± 200Nm ± 200Nm	± 3,000N ± 3,000N ± 120Nm ± 120Nm	± 4,000N ± 4,000N ± 320Nm ± 320Nm	± 3,500N ± 3,500N ± 260Nm ± 260Nm	± 9,000N ± 9,000N ± 600Nm ± 600Nm
Overload allowance R.C.=Fixed frame capacity (Rated Capacity)		± 500% R.C.	± 200% R.C.	± 500% R.C.								
Mass		Approx. 320g	Approx. 280g	Approx. 650g	Approx. 500g	Approx. 1.4kg	Approx. 850g	Approx. 2.4kg	Approx. 1.6kg	Approx. 4.5kg	Approx. 2.6kg	Approx. 7.3kg
Body materials		Aluminum alloy		SUS	Aluminum alloy	SUS	Aluminum alloy	SUS	Aluminum alloy	SUS	Aluminum alloy	SUS
External shape diagram												

- Nonlinearity | ± 2.0% R.O. R.O.=Fixed-frame out power (Rated Output)
- Other-axis interference | ± 3.0% R.O.
- Hysteresis | ± 0.2% R.O.
- Temperature characteristics | ± 0.3% R.O./°C
- Operating temperature range | 0-50°C.
- Resolution | ± 1/4000(DC)
- Power supply | DC5V+5%
- Converter | Built-in
- Consumption current | 120mATyp
- Output frequency | 1.2kHz
- Interface | RS-422(Compatible with ethernet, analog output, and USB 2.0)

If you do not see what you are looking for in our product lineup, please feel free to contact us. Free rental machines are also available. The ZYX080A501 model has IP67 (waterproof and dustproof standard) and both CE and UL certification.

Connection method Even the standard specification supports four kinds of cable.



Example installation video:



ZYXer™ and ZYXerPath are designation of Sintokogio, Ltd.

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