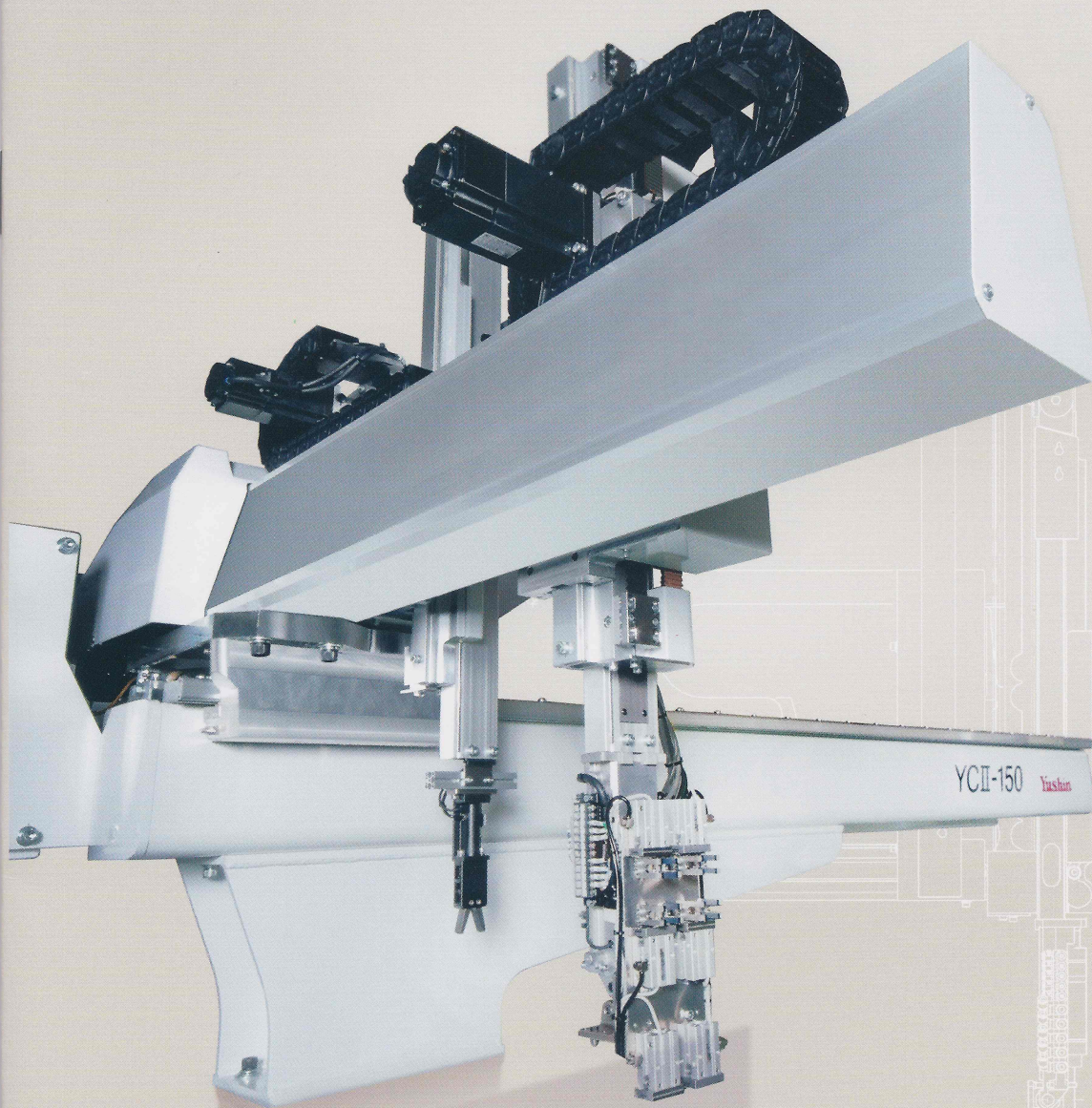


*Heartful Technology*

***Yushin***



*YC / YCII*

**Yushin Precision Equipment Co., Ltd.**



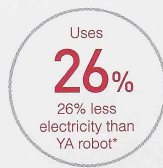
# Optimal Design YC

## Energy Conservation

### 1. Design Optimization



Enabled use of smaller servo motors



### 2. ECO Vacuum® Standard-Equipped



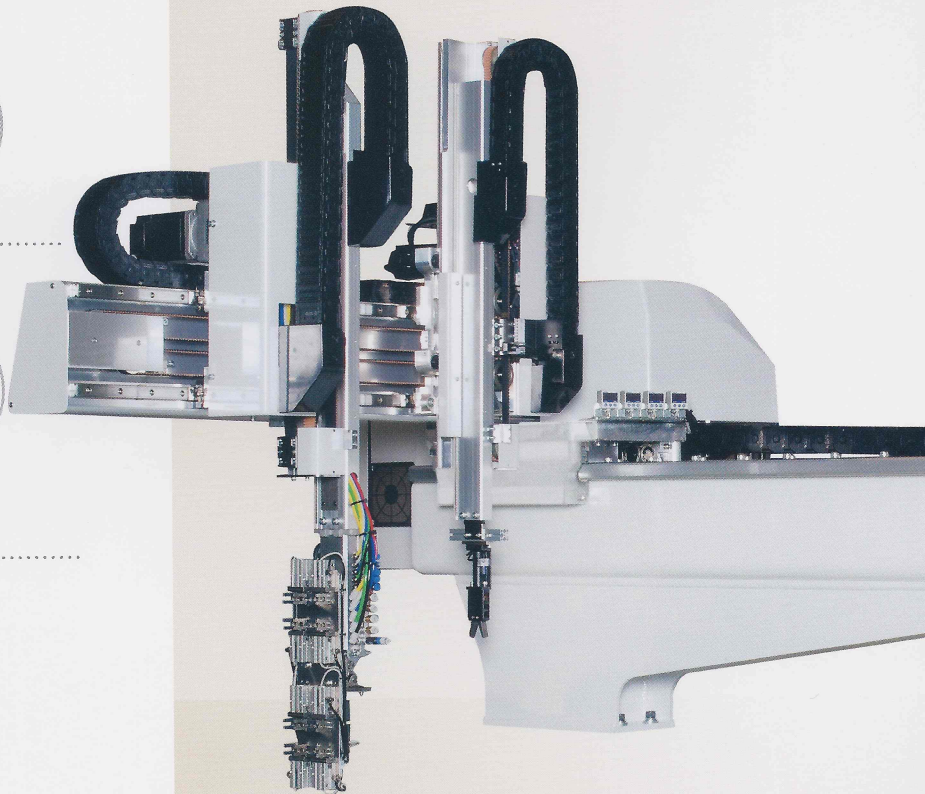
Reduces air consumption by 75%



### 3. New ECO Monitor® Function



Energy and air usage may be measured in real-time



## Design Optimization

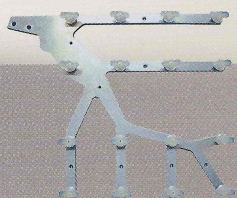
Design Optimization is what Yushin calls the practice of applying CAE (Computer-Aided Engineering) to seek the most theoretically optimal form for a robot based on its mechanism and motions.

This approach is used to design lighter weight and increased reliability in automobiles and aircraft.

Conceived with design optimization, the YC series is lighter and less prone to vibration. The resulting 26% savings in electricity usage and 72% shorter settling times directly benefit your company's productivity.



# YCII SERIES Robots



## Co-Research with Kyoto University

Yushin's design optimization began with research conducted in cooperation with Kyoto University. After successfully optimizing end-of-arm tools, Yushin employed the process with HSA, TSXA, and now YC robots.

## Vibration suppression

1. Design Optimization + CFRP\*\* + Anti-vibration Routines



72% reduction of settling time

**72%**

less settling time  
than YA robot  
Shortens overall  
take-out time

2. Improved Vibration Damping



Smoother, more precise take-out

## More Standard Features

1. Eight features, formerly options, are standard-equipped on YC

**8**

new standard  
features added

2. New "Predictive Maintenance" function is standard

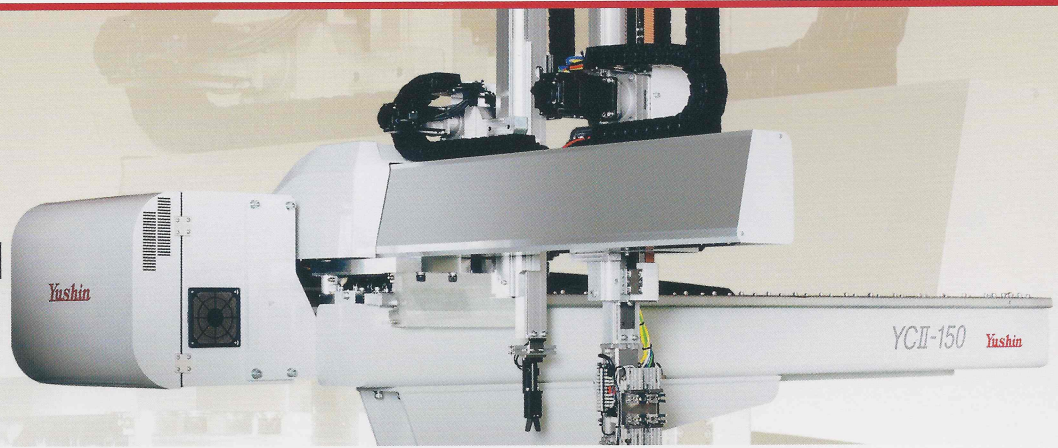


## JSPE Young Engineer Award Winner

In 2009, the Japan Society for Precision Engineering awarded their "Young Engineer Award" to Yushin engineers for groundbreaking work in their project entitled "Design Optimization of End-of-Arm-Tools for Injection-Molding Take-Out Robots."



## ENERGY CONSERVATION



### Optimized, Lighter Weight

#### Lighter Weight Through Optimization Technology

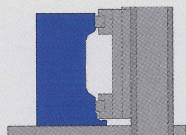
In a relentless pursuit of lighter weight, each component of the YC robot has been re-engineered at the structural level using optimization technology. The result: a successful weight reduction of 34.1kg on the YC's moving units (25.5% lighter than the YA robot). Less weight brings added benefits such as much higher energy efficiency and better longevity.

#### Comparison with prior YA series Robot



#### STEP.1

##### Set the Optimization Area

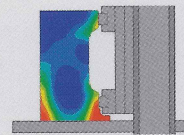


Define the area to optimize (in blue above) and input fixed points and load values.

#### Optimize

#### STEP.2

##### Optimization Result 1

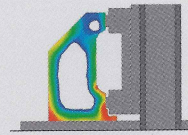


Stresses are low on blue areas. Trim optimization area to suit.

#### Optimize

#### STEP.3

##### Optimization Result 2

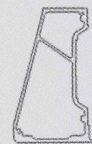


Over several rounds of optimizations, the topology (form) of the material changes.

#### Structural Analysis

#### STEP.4

##### Final Version of Frame



Apply structural analysis to the optimized frame's cross section to decide the final, detailed shape for production.

## BENEFITS

### Higher Energy Efficiency

With lower weight courtesy of design optimization, less energy is required to drive the robot. Accordingly, Yushin is able to employ smaller servo motors in the YC to lower its electricity consumption as much as 26% compared to the YA series. (Electricity Usage Cut by 26%)

Electricity Usage Cut by

**26%**

### Increased Longevity

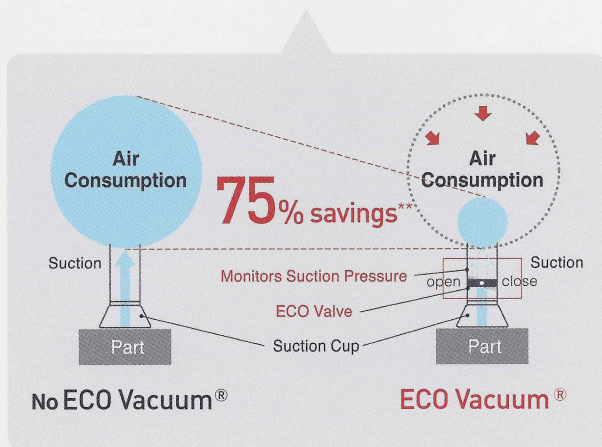
**Increased Longevity**  
Lighter-weight components lower the stress placed on the robot's traverse frame, helping to reduce the likelihood of failures and extend the robot's service life.



## Better Air Economy

### Saving Energy by Economizing Air Used During Suction Grip Take-out

ECO Vacuum is Yushin's proprietary compressed air economizing system. By monitoring suction pressure and shutting off the air supply as long as gripping power is maintained, it cuts air usage by as much as 75%. That efficiency translates into lower air compressor electricity bills and lower equipment costs over time.



\*\*As measured in company tests

STANDARD  
EQUIPPED

Air Economizing Tool

**ECO Vacuum** <sup>®</sup> PAT.

#### BENEFITS

Annual Electricity Savings  
for One Compressor

**USD \$700** \*\*\*

#### Test Conditions

Daily Operating Time	24hrs
Molding Cycle	15sec (Where take-out interval [from part take-out to part release] is 25% of cycle, ECO Vac is active for 75% of every cycle)
Amount of Air Consumption (1 vac circuit)	19NI/Cycle (No ECO Vacuum) 4.75NI/Cycle (ECO Vacuum)
Compressor Air Supply	2,300NI/min
Compressor Motor Electric Usage	16kW
Electricity Cost	16 cents/kWh***
Air Consumption Reduction Rate Due to ECO Vacuum	75%

\*\*\* converted from JPY at JPY 80 = USD \$1

#### NEW FEATURE

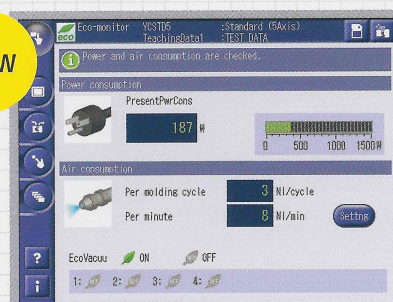


Energy Conservation Tool

**ECO Monitor** <sup>®</sup> PAT.

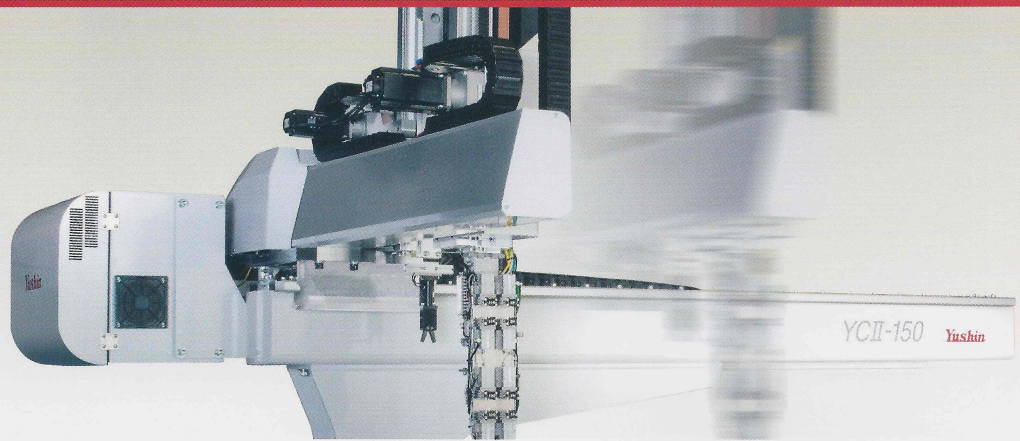
Displays the robot's usage of electricity and air in real-time to assist operators with energy-saving measures.

NEW





# VIBRATION CONTROL

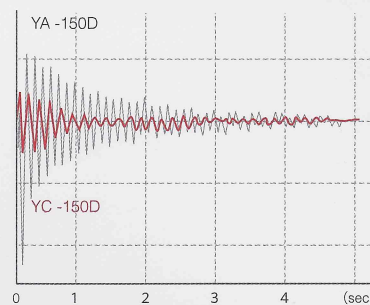


## Shorter Settling Times

### Design Optimization + CFRP + Anti-vibration Controls

By examining such factors as natural oscillation and damping characteristics, design optimization led to much better vibration control for the YC. Specifically, settling time (time required for oscillations to calm down to within a set value) was reduced by 72%.

■ Comparison with prior YA series Robot



**72%**

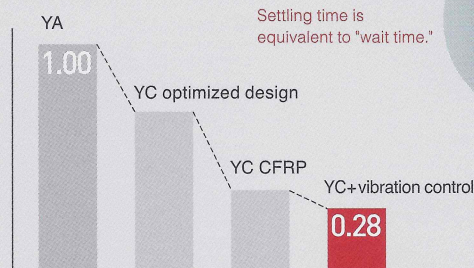
Shorter Settling Times

\* Comparison of YC-150D and YA-150D vertical arms at extended position

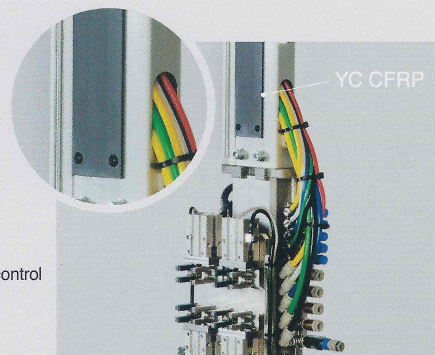
### Utilizing the Enhanced Vibration-Damping Power of CFRP PAT.P

YC robots incorporate panels made of CFRP (carbon fiber reinforced plastic; a material with strong vibration-damping properties) into vertical arms to help shorten settling time.

■ Graph of Settling Time Reduction



Settling time is equivalent to "wait time."



## BENEFITS

### Shorter Timers

With such an extreme reduction in settling time, each wait timer on the YC can be shortened to allow for faster overall molding cycles.

### Smooth, Stable Take-out

Part take-out, handling, and release motions are smooth on the YC. Its superior vibration damping during movement and stops helps ensure steady, accurate take-out.



# Powerful Selection of Standard Features

## Enhanced Convenience

### Loaded with Convenient New Functions like Predictive Maintenance

The E-touch Compact-YC controller features a highly visible 7.5in full-color touchscreen, a comfortable one-handed grip, and powerful yet user-friendly robot controls.

STANDARD  
EQUIPPED

## E-touch compact-YC<sup>PAT.</sup>



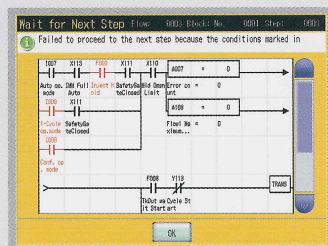
### NEW Predictive Maintenance

Continuously monitors robot during operation and alerts operator with a message if potential trouble symptoms are detected. This function elevates maintenance from preventative to predictive.



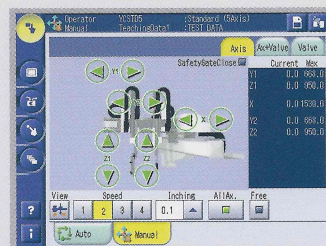
### NEW Flowchart Display

If an operation goes awry (such as when run conditions are not met at the start of auto operation) rather than just read an error message, the operator can open a flowchart screen to check conditions quickly and speed up troubleshooting.



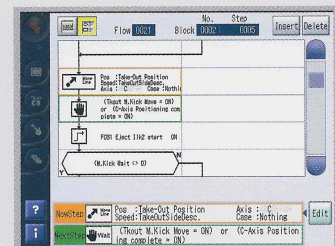
### NEW Enhanced Manual Operation Screen

- 1) Manual controls for all axes are grouped on one screen for easier operation.
- 2) For easier reference, operators may now access the robot control guide even while using the manual operation screen.



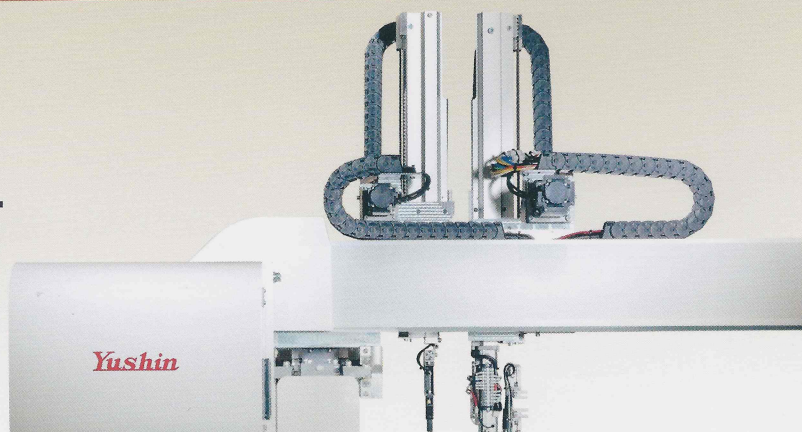
### Lead Through Teaching

Allows users to easily make various kinds of changes to robot programs right on the shop floor, helping to save time and programming costs.





# STANDARD EQUIPMENT



## **STND** ECO Vacuum® Circuit (1 circuit)

Automatically monitors vacuum pressure when suction-gripping parts to reduce compressed air usage by as much as 75%\*. The YC comes standard with one ECO Vacuum circuit.

## **NEW** ECO Monitor ®

Displays the robot's usage of electricity and air in real-time to assist operators with energy-saving measures.

## **NEW** Predictive Maintenance

Continuously monitors robot during operation and alerts operator with a message if potential trouble symptoms are detected. This function elevates maintenance from preventative to predictive

## **STND** Reject Circuit

After receiving a "defect product" signal from the molding machine, robot releases the defective part at a position separate from the ordinary parts.

## **STND** Initial Shots Discharge Motion

At the start of auto operation, for a set number of shots the robot automatically places part at a position separate from the ordinary parts.

## **STND** Sampling Motion

During auto operation, the robot will place products at a sample release position once after every set number of molding cycles.

## **STND** Under-Cut Motion

Up to 3 additional teaching positions may be programmed in order to extract products from an under-cut mold.

## **STND** High-Cycle Motion

Traverse and wrist flip motions are performed simultaneously to shorten the robot's overall cycle time.

## **STND** Wait on Traverse

While the mold is closed, if the robot is unable to wait above the mold (due to obstacles, etc), a second wait position may be designated at another point along the traverse axis.

## Stationary Side/ Moveable Side Selection

Motion mode-select where operator may choose to perform product take-out from either fixed side or moveable side of mold. (Standard feature on 250 and smaller models; optional on 400 and larger models.)

## **STND** Wait for Descent Order

When downstream machinery is not ready, the robot waits for a set interval for the Descent Order signal to turn ON. In the event it does not receive the Descent Order, the user may mode-select whether the robot immediately error-stops the line, or if it just continues the cycle and releases parts.

## Detection OFF Verification

Robot verifies that product and sprue detection inputs are OFF when it returns to its waiting position.

## Lead Through Teaching

Allows users to easily add positions, add timers, change motion speeds, or make other kinds of changes to robot programs.

## Production Status Monitor

Logs production status such as quantity of products and cumulative operating hours. It also forecasts time required to produce a target number of products.

## Bilingual Display

Controller is standard-equipped with 2 user-selectable display languages; default Japanese plus one alternate language (user orders one of nine languages for the alternate).

## Product Chuck Circuit (1 circuit)

The YC series comes standard with one product chuck circuit; additional circuits are available as options.

## Sprue Chuck Circuit (1 circuit)

Operator may determine the sprue release timing via a mode selection. One sprue chuck circuit is standard-equipped; additional circuits are available as options.

**NEW** New features developed for the YC series

**STND** Former options which are standard features on the YC

\* As measured in company tests

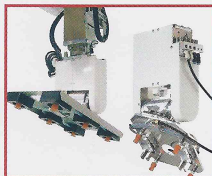


# OPTIONS

## ■ NC Servo Wrist (2 models)

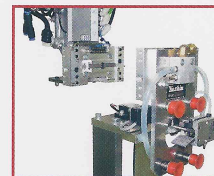
Dual-axis NC servo-powered modules take the place of wrist flip mechanism to give the YC the deft versatility of an articulated robot. Two models available: flip and "B-axis" rotator type, and flip and "A-axis" rotator type.

\* Please consult your Yushin sales rep about NC servo wrist payload limits.



## ■ EOAT Quick-Change Unit

End-of-arm-tools simply snap on or off of robot arm with this unit, which also enables robot to automatically change EOATs.



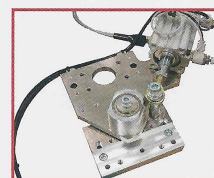
## ■ External Beam-Mounted Nipper Unit

After removal from the mold, gated products may be inserted into this beam-mounted external nipper unit which separates the gate from the products.



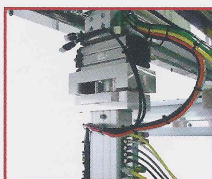
## ■ Vertical Wrist Rotation Unit (incl. detection function)

Adding this unit to the wrist-flip mechanism allows the orientation of released products to be changed.



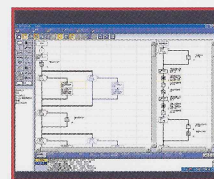
## ■ Horizontal "B-Axis" Wrist Rotation Unit

Adding this unit to the main arm wrist allows the orientation of released products to be changed.



## ■ Flexible Teaching

Software kit which enables users to create and modify complex motion programs.



## OTHER OPTIONS

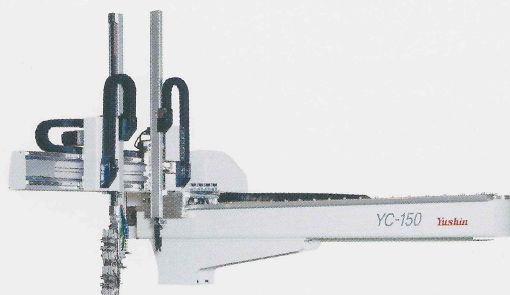
Option Name	Description
Additional Vacuum Circuits Add Release Points	Up to 3 optional vacuum circuits may be added to the one standard-equipped circuit to expand release positions up to 4.
Additional Product Chuck Circuits	1 or 3 optional chuck circuits may be added to the single standard-equipped circuit for a total of 2 or 4 product gripper circuits.
Additional Sprue Chuck Circuit	Allows the timing of the sprue release to be set via mode selection. 1 or more additional circuits may be added to the single, standard-equipped circuit.
Pitch Revise Circuit	Allows operator to specify pitch of parts gripped by the end-of-arm tool.
Sprue Cut Circuit	Allows nippers on-board the end-of-arm tool to cut sprues. May not be equipped together with EOAT Gate Cut Circuit option.
EOAT Gate Cut Circuit	Enables cutter within end-of-arm tool to approach the gate of a part and cut it. May not be equipped together with Sprue Cut Circuit option.
Chuck Soft Grip Circuit	A pressure reducing valve is added to adjust chuck grip and prevent deformation of molded products.
EOAT One-Touch Quick-Release Fitting	Allows for fast manual attachment/detachment of end-of-arm tool.
Stationary-side/movable-side selection	It is a motion mode to switch the side of product extraction between stationary-side and movable-side.(standard on 250 and smaller models)
Signal Light (Single or Tower)	Robot status indicator lights. Available in single red, single yellow, or tower (red + yellow + green) models.
Ascent Limit Product Verification	After product take-out, product presence is verified at the ascent limit position by a remote-mounted limit switch.
Traverse Beam Stanchion	Support stanchion is installed on the end of extended-length traverse beams or when extra precision is necessary when placing products.
Increased Maximum Payload	Power along the vertical axis is increased, enabling the robot to handle heavier payloads.
Increased Wrist Flip Torque	High-power wrist for heavy tools or tools that are mounted with large offsets from center.
Maintenance Steps	A ladder and stage for maintenance work can be installed on the robot.
Custom Color	Robot body, frame caps, and control boxes will be painted with a color specified by the customer.
8-Pin Stocker Unit Connector	Metal connector which allows robot to interface with Yushin-made stocker unit.
Pause for Mold Open	Used for manual ejection.
Centralized Manual Lubrication System	Delivers lubricant from manual pump to necessary areas.
Centralized Automatic Lubrication System	Delivers lubricant from electric pump to necessary areas.
Cleanroom Lubrication (customer-specified)	Robot will be lubricated with the customer's choice of cleanroom-approved grease.
Protective sheet for touch screen	It is a cover sheet to protect the touch screen.
Dropped Product Detection	After extracting products, robot continuously verifies its hold on the products until it finally releases them.
Take-out Failure Stop at Ascent Limit	If a take-out failure occurs during automatic operation, robot ascends to vertical limit and error-stops (standard robot completes 1 full cycle before e-stopping).
Low Air Pressure Detection	Robot error-stops if air supply's pressure drops below a set value.
Molding Machine Interface	Robot communicates mold numbers and other information with the molding machine to automatically synchronize set-up data.
Trilingual Display	3 user-selectable display languages are installed in controller (Japanese and one alternate language are standard-equipped; a third language is installed with this option).
Casing Reset Interface	Interface with stocker unit which, when stocker returns to its home position, instructs robot to reset its casing counter and resume casing from position no. 1.
Flipped Gate Cut Mode	Mode where robot wrist flips prior to gate-cut sequence.
4-Position Gate Cut	User can set up to 4 gate-cut sequences, each with a different wait position prior to advancing to cut (up to 3 wait positions may be set).



## SPECIFICATION

# YC/YCII SERIES

### YC-100 / 150 / 250



#### Standard specifications

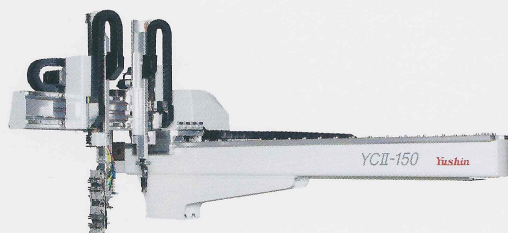
Power source	Driving method	Control method	Air pressure	Wrist flip angle
Single phase AC200V/220V (50/60Hz)	Digital servo motor 3/5-axis	Micro computer control	0.49MPa Maximum air pressure 0.7MPa	90 deg.

#### Specification

Model	Maximum power consumption	Traverse stroke (mm)	Kick stroke (mm)		Vertical stroke (mm)		Air consumption (Nl/cycle)	Maximum payload (kg)	Clamping force (tf)
			main arm	sub arm	main arm	sub arm			
YC-100S	S type 1.9kVA AC200V 9.5A	1100 [1500] [1700]	625	-	650 [800]	-	5.7	5	80~130
YC-100D			540	540		700 [850]			
YC-150S	D type 2.5kVA AC200V 12.5A	1500 [1700] [1900]	625	-	800 [900]	-			100~220
YC-150D			540	540		850 [950]			
YC-250S			775	-	900 [1050]	-			180~300
YC-250D			690	690		950 [1100]			

S type: Equipped with main arm only D type: Equipped with main and sub arms [ ] = Extended traverse stroke  
Maximum payload includes the end-of-arm-tool.  
Higher payloads possible, depending on take-out settings and speeds.

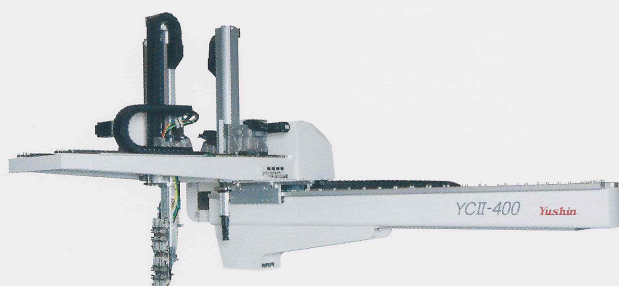
### YCII-100 / 150 / 250



Model	Maximum power consumption	Traverse stroke (mm)	Kick stroke (mm)		Vertical stroke (mm)		Air consumption (Nl/cycle)	Maximum payload (kg)	Clamping force (tf)	
			main arm	sub arm	main arm	sub arm				
YC II-100S	S type 1.9kVA AC200V 9.5A  D type 2.5kVA AC200V 12.5A	1100 [1500] [1700]	578	-	700 [850]	-	7.1	5	80~130	
YC II-100D			518	518		700 [850]				
YC II-150S		1500 [1700] [1900]	578	-	850 [950]	-			100~220	
YC II-150D			518	518		850 [950]				
YC II-250S			728	-	950 [1100]	-				180~300
YC II-250D			668	668		950 [1100]				

S type: Equipped with main arm only D type: Equipped with main and sub arms [ ] = Extended traverse stroke  
Maximum payload includes the end-of-arm-tool.  
Higher payloads possible, depending on take-out settings and speeds.

### YCII-400



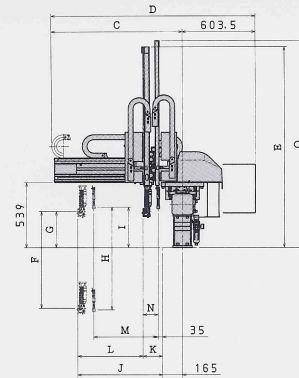
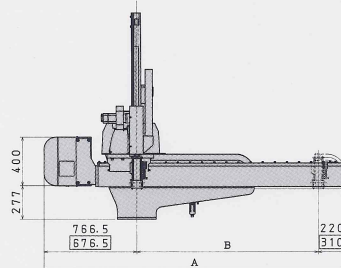
Model	Maximum power consumption	Traverse stroke (mm)	Kick stroke (mm)		Vertical stroke (mm)		Air consumption (Nl/cycle)	Maximum payload (kg)	Clamping force (tf)
			main arm	sub arm	main arm	sub arm			
YCII-400S	S type 2.2kVA AC200V 11.0A	1700 [1900] [2200]	1000	-	1100 [1300]	-	11.5	10	280~450
YCII-400D	D type 2.8kVA AC200V 14.0A		868	868		1100 [1300]			

S type: Equipped with main arm only D type: Equipped with main and sub arms [ ] = Extended traverse stroke  
Maximum payload includes the end-of-arm-tool.  
Higher payloads possible, depending on take-out settings and speeds.



### ■ Dimensions(mm)

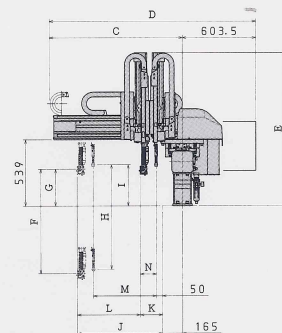
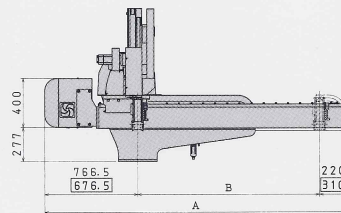
- ( ) Extended traverse stroke  
 < > Extended vertical stroke  
 [ ] S-Type Dimensions  
 □ for rear-side models



Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
YC-100	2086.5 (2486.5) (2686.5)	1100 (1500) (1700)	1082.5	1686	1498 <1650>	650 <800>	300	700 <850>	335	700	160 [75]	540 [625]	540	125	1548 <1700>
YC-150	2486.5 (2686.5) (2886.5)	1500 (1700) (1900)			1650 <1754>	800 <900>		850 <950>				690 [775]	690		1700 <1804>
YC-250			1232.5	1836	1754 <1906>	900 <1050>		950 <1100>		850					1804 <1956>

### ■ Dimensions(mm)

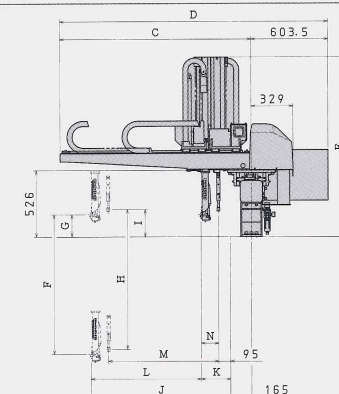
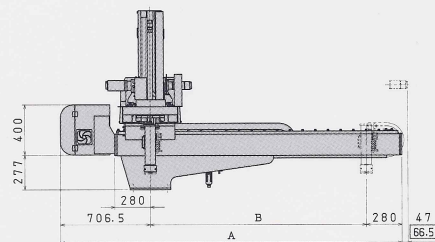
- ( ) Extended traverse stroke  
 < > Extended vertical stroke  
 [ ] S-Type Dimensions  
 □ for rear-side models



Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N
YCII-100	2086.5 (2486.5) (2686.5)	1100 (1500) (1700)	1092.5	1696	1182 <1254>	700 <850>	300	700 <850>	335	700	182 [122]	518 [578]	518	132
YCII-150	2486.5 (2686.5) (2886.5)	1500 (1700) (1900)			1254 <1310>	850 <950>		850 <950>				668 [728]	668	
YCII-250			1242.5	1846	1310 <1382>	950 <1100>		950 <1100>		850				

### ■ Dimensions(mm)

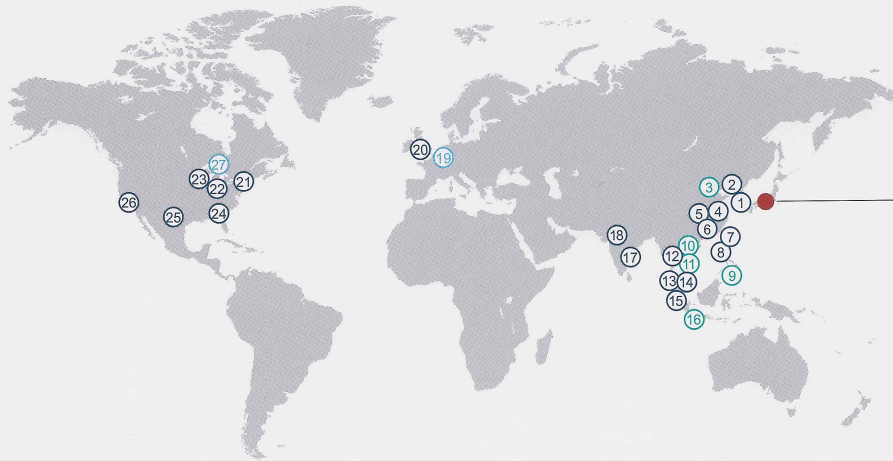
- ( ) Extended traverse stroke  
 < > Extended vertical stroke  
 [ ] S-Type Dimensions  
 □ for rear-side models



Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N
YCII-400	2686.5 (2886.5) (3186.5)	1700 (1900) (2200)	1505	2108.5	1414 <1514>	1100 <1300>	176	1100 <1300>	216	1100	232 [100]	868 [1000]	868	137



# Yushin Worldwide Network



HEADQUARTERS & FACTORY



②① Yushin America, Inc.



②① Yushin Automation Ltd.



⑤ Guangzhou Yushin Precision Equipment Co., Ltd.



② Yushin Korea Co., Ltd.

## HEADQUARTERS&FACTORY

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- ⑰⑱ India  
Yushin Precision Equipment (India) Pvt. Ltd.

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Yushin Automation Ltd.

- ②①②③ U.S.A  
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Polymac-Yushin B.V.
- ⑲ Canada  
En-Plas, Inc.



### Safety information

- These products are industrial robots as defined in the labor safety rules. Always take great care when operating any robots.
- To improve visual clarity, these robots may be shown without the safety guards that are identified in the safety rules. Never operate the robots without all safety guards in place.
- Before using any product introduced in this literature, all operators must read and understand the instruction manual and other related documents for proper and safe equipment operation.

\* The contents in this catalog are subject to change without notice.



Yushin commits itself to contributions to the creation of more eco-sensitive technologies by employing eco-friendly principles.

Heartful Technology  
**Yushin**

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