Robot cable

* All cables are bending cables.

### Flexible encoder cable + Power cable

<table>
<thead>
<tr>
<th>Cable length</th>
<th>Product model</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3m</td>
<td>YLECC-PE-R3</td>
<td>KFB-M4751-31</td>
</tr>
<tr>
<td>5m</td>
<td>YLECC-PE-R5</td>
<td>KFB-M4751-51</td>
</tr>
<tr>
<td>10m</td>
<td>YLECC-PE-R10</td>
<td>KFB-M4751-A1</td>
</tr>
</tbody>
</table>

### Flexible brake cable + Sensor cable

<table>
<thead>
<tr>
<th>Cable length</th>
<th>Product model</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3m</td>
<td>YLECC-BS-R3</td>
<td>KFB-M4752-30</td>
</tr>
<tr>
<td>5m</td>
<td>YLECC-BS-R5</td>
<td>KFB-M4752-50</td>
</tr>
<tr>
<td>10m</td>
<td>YLECC-BS-R10</td>
<td>KFB-M4752-A0</td>
</tr>
</tbody>
</table>

Specifications and appearance are subject to change without prior notice.

IM Operations FA Section
127 Toyokan, Kita-ku, Hamamatsu, Shizuoka 433-8103, Japan
Tel. +81-53-525-8350 Fax. +81-53-525-8378
E-mail robotn@yamaha-motor.co.jp
Yamaha's own unique universal robot control concept offers Total Optimization of your production line.

Helps building fully automated production line efficiently at lower cost in a short period of time. YAMAHA's Advanced Robotics Automation Platform in the product lineup is a good match with IoT. Full range of robotic products used for various automated processes including transport, handling, assembly, and image recognition have been completely renewed. The newly released Universal Controller YHX series enables cooperative and synchronous control of the Yamaha robotic products. In addition, the linear conveyor module LCM-X series, new SCARA robot YKX series, single-axis robot GX and YLE series, and robot vision system YFAEYE are being released.

Yamaha is proud to offer this new product lineup providing solutions to the challenges in today’s manufacturing scenes, and dramatically accelerate automated production to maximize your return of investment.

Advanced Robotics Automation Platform

The new universal control robot system that sharpens your competitive edge
Highly efficient, highly accurate ground ball screws are now standard feature for all types and models.

The high precision models with reliability and durability

**Specification**

<table>
<thead>
<tr>
<th>Type Model</th>
<th>Motor output AC (W)</th>
<th>Repeat-ability (mm)</th>
<th>Ballscrew diameter (Class C5)</th>
<th>Overall length (mm)</th>
<th>Maximum payload (kg)</th>
<th>Lead (mm)</th>
<th>Maximum speed (mm/sec)</th>
<th>Stroke (mm) Increment</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX05</td>
<td>50</td>
<td>±0.005</td>
<td>W98 x H65</td>
<td>ST +188</td>
<td>ST +208.5</td>
<td>20 5</td>
<td>2 64 1333</td>
<td>50 to 800</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>GX07</td>
<td>100</td>
<td>±0.005</td>
<td>W98 x H65</td>
<td>ST +230</td>
<td>ST +270.5</td>
<td>10 20</td>
<td>8 136 333</td>
<td>50 to 1100</td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>GX10</td>
<td>200</td>
<td>±0.005</td>
<td>W100 x H93.5</td>
<td>ST +245</td>
<td>ST +285.5</td>
<td>30 50</td>
<td>113 1800</td>
<td>100 to 1250</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>GX11</td>
<td>400</td>
<td>±0.005</td>
<td>W125 x H101</td>
<td>ST +277</td>
<td>ST +317.5</td>
<td>30 50</td>
<td>170 1200</td>
<td>100 to 1250</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GX12</td>
<td>750</td>
<td>±0.005</td>
<td>W160 x H130</td>
<td>ST +339.5</td>
<td>ST +385.5</td>
<td>40 50</td>
<td>120 2400</td>
<td>100 to 1450</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GX13</td>
<td>1000</td>
<td>±0.005</td>
<td>W200 x H140</td>
<td>ST +385.5</td>
<td>ST +432.5</td>
<td>40 50</td>
<td>145 2400</td>
<td>100 to 1490</td>
</tr>
</tbody>
</table>

Note 1: The size shows approximate maximum cross sectional size.

Note 2: The maximum speed will vary according to the stroke length. Refer to the descriptions of each model (pages 08 to 14) for details.
High precision, high rigidity, high durability

All product models employ highly efficient, highly accurate ground ball screws as the standard features. The lead accuracy complies with JIS accuracy class C5 that brings about the positioning accuracy repeatability of +/-5 µm. The accuracy is about two times higher than the previous models. These new features contribute to improving yield. In addition, noise level is reduced and structural life is extended.

- LM guide
- Ball retainers
- Accuracy to JIS C5

Shortest overall length in the industry

The industry’s shortest class is achieved for the total length in relation to the operation stroke. This significantly contributes to saving production facility footprints.

- All models can be mounted (fixed) from the top surface or bottom surface

The main unit can be fixed from either the bottom face or top face to respond to the system’s densification and space saving.

- Clean specification as a standard feature

Dust-proof structure ... Upper surface of main frame of all models is protected with durable stainless steel dust shield. This structure helps reducing foreign particle contamination from outside. By applying negative air pressure from suction port it can be used in a clean environment.

- Battery-less absolute system / No origin process needed

The complete absolute method is adopted so there is no need to perform return-to-origin when restart and initial start up process. The battery-less absorber is also supported.

- Easy to alter specifications

Options available for retrofit

- Changing the location of robot cable outlet

With conversion adapter on a standard motor orientation of cable outlet can be changed.

- Convert the direction of cable outlet

Changing the location of robot cable outlet

- Total system control by Universal Controller YHX series

Synchronously control all robots in production line by Universal Controller YHX series.

- Controllability

The complete absolute method is adopted so there is no need to perform return-to-origin when restart and initial start up process. The battery-less absorber is also supported.

- Sensorless absolute system

The complete absolute method is adopted so there is no need to perform return-to-origin when restart and initial start up process. The battery-less absorber is also supported.
**GX05**

- **Single-axis AC servo motor robot**

### Ordering method

<table>
<thead>
<tr>
<th>GX05</th>
<th>Model</th>
<th>Product code</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Specifications

- **Effective stroke** (mm): 50, 100, 150, 200, 300, 400, 500, 600, 700, 800
- **Rated thrust** (N): 40.5 (with brakes) 131.5 (when origin is on motor side)
- **Rated speed** (mm/sec): 30.5 (with brakes) 66.5+/-1 (Note 1)
- **Motor side** (direction): 128.5+/-1 (Note 1)
- **Linear guide** (Note 1): 100+/-1 (Note 1)
- **Ball screw lead** (mm): 20
- **Rated payload** (kg): 3, 6, 12
- **Rated current** (A): 100, 50, 20

### Robot cable extraction

- **Motor side (direction)**: 128.5+/-1 (Note 1)
- **Linear guide (direction)**: 100+/-1 (Note 1)
- **Ball screw lead**: 5

### Static loading moment

- **Maximum dimensions of overall length (Horizontal)**: W 48 mm x H 65 mm
- **Overall length (Horizontal)**: 12kg
- **Intake air** (Note 4):GX05L-5

### Allowable overhang

- **Horizontal installation (mm)**: 0-12
- **Wall installation (mm)**: 12-18
- **Vertical installation (mm)**: 18-24

### Note

- **Note 1**: The maximum speed may not be reached if the travel distance exceeds the horizontal installation range.
- **Note 2**: The maximum speed may not be reached if the travel distance exceeds the wall installation range.
- **Note 3**: The maximum speed may not be reached if the travel distance exceeds the vertical installation range.
- **Note 4**: The required suction amount will vary according to the robot cable extraction direction.
- **Note 5**: The required suction amount will vary according to the robot cable extraction direction.
- **Note 6**: The service life is calculated for 600mm stroke models.
GX12

Single-axis AC servo motor robot

Ordering method

<table>
<thead>
<tr>
<th>GX12</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Motor sp</td>
<td>Lead Motor sp</td>
</tr>
<tr>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>/min to 90 N</td>
<td></td>
</tr>
</tbody>
</table>

YAMAHA GX/YLE series

Specifications

- Maximum travel distance (GX12-10): 100 mm to 1450 mm (50mm pitch)

Allowable overhang

- OVERALL LENGTH (Horizontal):
  - GX12: 232 (with brakes)
  - GX16: 240 (with brakes)

Robot cable

- Product model:
  - R5F (5 m/extracted to front)

Static loading moment

- Note 1: Positioning repeatability in one direction.
- Note 2: The maximum travel distance may be reached if the travel distance is reduced by about 0.02 mm.
- Note 3: When using the mounting countersunk holes (section C cross-section) to mount the body, remove the seal, and then tap hole specifications.
- Note 4: When using a hex socket head bolt, the weight of the robot body is 0.3 kg.
- Note 5: The weight of the robot body is 0.3 kg.

Note on cables

- Encoder cable:
  - GXCC-ENC-R5F (5 m/extracted to front)

Note on permissible overhang

- Note 6: The permissible overhang is 50 mm.

Note on speed

- Note 7: The robot cable dimensions are calculated for 800 mm stroke models.
Note 3. When using in a clean environment, attach a suction air joint.

Note 4. The required suction amount will vary according to the operating conditions and operating environment.
GX series  Robot cable  * All cables are bending cables.

### Encoder cable

#### Common for GX series

**[Diagram]**

### Power cable

#### GX10 / GX12

**[Diagram]**

#### GX05 / GX05L / GX07

**[Diagram]**

#### GX16 / GX20

**[Diagram]**

### Extraction specifications

- **[Table]**

<table>
<thead>
<tr>
<th>Cable length</th>
<th>Product model</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 m</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* All cables are bending cables.
Mix-and-match from wide selections

<table>
<thead>
<tr>
<th>YLEF</th>
<th>Slider Type</th>
<th>11 types</th>
</tr>
</thead>
<tbody>
<tr>
<td>YLEFS</td>
<td>Ball Screw Drive</td>
<td></td>
</tr>
<tr>
<td>YLEF</td>
<td>Belt Drive</td>
<td></td>
</tr>
<tr>
<td>YLEFS</td>
<td>Motor mounting position: In-line</td>
<td></td>
</tr>
<tr>
<td>YLEF</td>
<td>Motor mounting position: Parallel (Right) [Left]</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>YLEP</th>
<th>Miniature Type</th>
<th>4 types</th>
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<tbody>
<tr>
<td>YLEPY</td>
<td>Miniature Rod Type</td>
<td></td>
</tr>
<tr>
<td>YLEPS</td>
<td>Miniature Slide Table Type</td>
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</tr>
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</table>

<table>
<thead>
<tr>
<th>YLEY</th>
<th>Rod Type</th>
<th>16 types</th>
</tr>
</thead>
<tbody>
<tr>
<td>YLEY</td>
<td>Guide Rod Type</td>
<td></td>
</tr>
<tr>
<td>YLEY</td>
<td>Motor mounting position: In-line</td>
<td></td>
</tr>
<tr>
<td>YLEY</td>
<td>Motor mounting position: Top/Parallel</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YLEH</th>
<th>Electric Gripper Type</th>
<th>20 types</th>
</tr>
</thead>
<tbody>
<tr>
<td>YLEH</td>
<td>2-Finger</td>
<td></td>
</tr>
<tr>
<td>YLEH</td>
<td>2-Finger With Dust Cover</td>
<td></td>
</tr>
<tr>
<td>YLEH</td>
<td>2-Finger Long Stroke</td>
<td></td>
</tr>
<tr>
<td>YLEH</td>
<td>3-Finger</td>
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</tr>
</tbody>
</table>

Refer to the YAMAHA website for details on the specifications and outline drawings, etc.

**Specifications**

<table>
<thead>
<tr>
<th>Size</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>50 to 500</td>
</tr>
<tr>
<td>25</td>
<td>50 to 800</td>
</tr>
<tr>
<td>32</td>
<td>50 to 1000</td>
</tr>
<tr>
<td>40</td>
<td>150 to 2000</td>
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</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>Stroke (mm)</th>
</tr>
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<tbody>
<tr>
<td>16</td>
<td>300 to 1000</td>
</tr>
<tr>
<td>25</td>
<td>300 to 2000</td>
</tr>
<tr>
<td>32</td>
<td>300 to 2000</td>
</tr>
<tr>
<td>40</td>
<td>300 to 2000</td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th>Size</th>
<th>Stroke (mm)</th>
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</thead>
<tbody>
<tr>
<td>6</td>
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<tr>
<td>10</td>
<td>30, 50, 75</td>
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</tbody>
</table>

<table>
<thead>
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<th>Size</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
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<tr>
<td>30</td>
<td>10</td>
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<tr>
<td>48</td>
<td>22</td>
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<table>
<thead>
<tr>
<th>Size</th>
<th>Stroke (mm)</th>
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<tbody>
<tr>
<td>16</td>
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<tr>
<td>20</td>
<td>10</td>
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<tr>
<td>32</td>
<td>14</td>
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<tr>
<td>48</td>
<td>10</td>
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</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>32</td>
<td>14</td>
</tr>
<tr>
<td>48</td>
<td>10</td>
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<table>
<thead>
<tr>
<th>Size</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>4</td>
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<tr>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>32</td>
<td>8</td>
</tr>
<tr>
<td>40</td>
<td>12</td>
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</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
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<tr>
<td>20</td>
<td>24 (48)</td>
</tr>
<tr>
<td>32</td>
<td>32 (64)</td>
</tr>
<tr>
<td>40</td>
<td>40 (80)</td>
</tr>
</tbody>
</table>

**Motor Mounting Position**

- In-line
- Top/Parallel
- Top mounting

**Type**

- Symmetrical type (L type)
- Basic type (R type)
- In-line motor type (D type)
### Stepping motor electric actuator Specification

#### Type
- **YLEFS**
  - **Model**
    - YLEFS16
    - YLEFS25
    - YLEFS32
  - **Series**
    - Ball Screw Drive
    - Belt Drive
  - **Type**
    - YLEFS16
      - **Model**
        - YLEFS16: 48
      - **Repeatability (µm)**
        - +/-0.08
      - **Maximum payload (kg)**
        - 10
    - YLEFS25
      - **Model**
        - YLEFS25: 48
      - **Repeatability (µm)**
        - +/-0.08
      - **Maximum payload (kg)**
        - 20
    - YLEFS32
      - **Model**
        - YLEFS32: 48
      - **Repeatability (µm)**
        - +/-0.08
      - **Maximum payload (kg)**
        - 40

#### Type
- **YLEFB**
  - **Model**
    - YLEFB16
    - YLEFB25
    - YLEFB32
  - **Series**
    - Ball Screw Drive
    - Belt Drive
  - **Type**
    - YLEFB16
      - **Model**
        - YLEFB16: 48
      - **Repeatability (µm)**
        - +/-0.08
      - **Maximum payload (kg)**
        - 10
    - YLEFB25
      - **Model**
        - YLEFB25: 48
      - **Repeatability (µm)**
        - +/-0.08
      - **Maximum payload (kg)**
        - 10
    - YLEFB32
      - **Model**
        - YLEFB32: 48
      - **Repeatability (µm)**
        - +/-0.08
      - **Maximum payload (kg)**
        - 10

#### Type
- **YLEFS**
  - **Model**
    - YLEFS16
    - YLEFS25
    - YLEFS32
  - **Series**
    - Ball Screw Drive
    - Belt Drive
  - **Type**
    - YLEFS16
      - **Model**
        - YLEFS16: 48
      - **Repeatability (µm)**
        - +/-0.08
      - **Maximum payload (kg)**
        - 10
    - YLEFS25
      - **Model**
        - YLEFS25: 48
      - **Repeatability (µm)**
        - +/-0.08
      - **Maximum payload (kg)**
        - 20
    - YLEFS32
      - **Model**
        - YLEFS32: 48
      - **Repeatability (µm)**
        - +/-0.08
      - **Maximum payload (kg)**
        - 40

#### Type
- **YLEFS**
  - **Model**
    - YLEFS16
    - YLEFS25
    - YLEFS32
  - **Series**
    - Ball Screw Drive
    - Belt Drive
  - **Type**
    - YLEFS16
      - **Model**
        - YLEFS16: 48
      - **Repeatability (µm)**
        - +/-0.08
      - **Maximum payload (kg)**
        - 10
    - YLEFS25
      - **Model**
        - YLEFS25: 48
      - **Repeatability (µm)**
        - +/-0.08
      - **Maximum payload (kg)**
        - 10
    - YLEFS32
      - **Model**
        - YLEFS32: 48
      - **Repeatability (µm)**
        - +/-0.08
      - **Maximum payload (kg)**
        - 10

Refer to the YAMAHA website for details on the specifications and outline drawings, etc.
Ball screw increases prevention

Compact integrated guide rod enables lateral load resistance and high precision turn prevention

Selectable motor layout: upward fold, straight

Improved non-rotating precision

Scraper to prevent entry of foreign matter

Positioning pin hole

Slider type with suppressed height dimensions

Size

16 25 32 40

Height (mm)

40 48 60 68

The guide, ball screw, and belt are covered. Grease splatter, and entry of foreign matter from outside are prevented.

Ball screw

Non-rotating precision when pulling in cylinder (initial value), with no-load, and excluding guide rod deflection should be less than the value given in the table.

Sliding bearing

Ball bushing bearing

+-0.05°

+-0.06°

+-0.02 mm

+-0.015 mm

+/-0.02°

+/-0.015°

+/-0.02 mm

The body can be installed without removing exterior parts such as the cover.

Specify motor layout:

- Motor mounting position: Top mounting
- Motor mounting position: In-line

Reduce installation man-hours with the standard sealed hand

Selectable motor layout

- Motor is folded up with standard layout.
- For manually driving piston rod
- Adjustment work possible when power is OFF

Belt type with suppressed height dimensions

Scrapers

Prevent entry of foreign matter

Slider type with suppressed height dimensions

Standard sealed hand

The guide, ball screw, and belt are covered. Grease splatter, and entry of foreign matter from outside are prevented.

Maximum payload: 65 kg

Maximum speed: 1200 mm/s

Repeatability: +/-0.02 mm

(High precision: +/-0.015 mm)

The body can be installed without removing exterior parts such as the cover.

Maximum stroke: 2000 mm supported

Maximum speed: 2000 mm/s

Refer to the YAMAHA website for details on the specifications and outline drawings, etc.
Choose from Symmetrical type / L type, In-line motor type / D type

Symmetrical type / L type
The table and cable outlet positions are the opposite of the R type for user's convenience.

In-line motor type / D type
Smaller dimension width: maximum 45% reduction

Compact YLES
Max. 12% reduction
* Workpiece mounting height 
Compared with YLESH16D

Increased vertical payload: Max. 50% increase
* Through reduction of moving part weight
Compared with YLESH16

Light weight: Max. 29% reduction

High rigidity YLESH
Deflection amount: 0.016 mm*
* Compared with YLESH8D-50

Motor built into body
Volume ratio: 61% reduction*
* Compared with YLESH8H-50
* For L type

Example of applications
Pick & Place
Repeatability: +/-0.02 mm

Positoning
Unloading
Press fit
Maximum pressing thrust: 50 N

Mounting method
Multiple methods to choose from
Horizontal mounting
[BODY THROUGH HOLE]
Slide table type can be mounted on both sides

Vertical mounting [Body tap]
Vertical mounting [Body tap]
Axial direction mounting
* Only rod type [Body tap]

Motor cable outlet orientation
Choose from four directions
Exit to top [Basic style]
Exit to bottom [When U is selected]
Exit to right [When R is selected]
Exit to left [When L is selected]

For YLES16H 50 m stroke

Integrated guide rail and table
### YLER - Rotary Table Type

**Basic type YLER**
- Rolling bearing
- Oscillating angle: 360°, 320° (310°, 180°, 90°) - LER10 only
- High-precision bearing
- Table’s displacement in the radial and thrust directions is reduced by adopting highly rigid bearings.
- Compact stepping motor (servo 24 VDC)
- Manual operation screw / both sides
  - The table can be manually rotated even when the power is OFF

**High precision type YLERH**
- Pouring mushroom bearings
- Gear ratio 30-fold
- Special worm gears that reduce backlash
- Two torque values to choose from:
  - Two reduction rates
  - YLER10 0.22, 0.30
  - YLER30 0.9, 1.2
  - YLER50 4.6, 10.0
- High torque

### YLEH - Electric Gripper Type

**2-Finger YLEHZ**
- Compact / Light weight
- Size: 10, 16, 20, 25, 32, 40
- Weight: 165 g
- Finger option:
  - Side tap mounting method
  - Open/close direction through-hole method
  - Flat type finger method

**2-Finger With Dust Cover YLEHZJ**
- With sealed structure dust cover (IP50 or equivalent)
- Three types of cover matters
  - Chloroprene rubber: Black
  - Fluororubber: Black
  - Silicone rubber: Ivory
- Projection-free cover shape
- The cover does not create projections when opening or closing.
- The structure folds inward to prevent interface with other devices.

**2-Finger Long Stroke YLEHF**
- Long stroke supports various workpieces
- Stroke: 80 mm
- Weight: 135 g

**3-Finger YLEHS**
- Stroke: 40 mm
- Weight: 185 g
- Finger option:
  - Near-dog
  - For positioning direction of rotation
  - Hollow hole (store workpiece wiring and piping)
- Drop prevention function (self-locking function)
- Maintains gripping force when stopped and restarting
- Workpiece can be released with manual operations
- Energy saving with lower power consumption
- Selectable motor cable exit direction
- Diverse mounting variations

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Refer to the YAMAHA website for details on the specifications and outline drawings, etc.