Introducing the new
the perfect replacement

Tsubaki's Worm Series features our time-tested high
It's the ideal replacement

Comparison between LPWB and our regular Power Cylinder

**Compact**
An in-house manufactured high precision worm gear is used in the reducer. The integrated ball screw and gear supporting structure eliminate the need for a bracket and greatly reduces total unit length. Uses clevises on both ends, which is the most widely used hydraulic cylinder mounting method.

**Conventional product**

**Worm series**

**Low cost**
The simple structure vastly reduces the number of parts and keeps costs down.

**Quiet**
Replacing the helical gear with a worm gear reduces noise.

**High load capacity**
The special copper allows the LPWB Series to handle the same heavy loads as jacks. The maximum load capacity is 50 tons in the high thrust zone (with higher loads being considered).

**Wide variety of options**
C (clevis fittings) can be combined with Y, K2, K4, P, and R (position detecting units).

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Cannot be paired

Can be paired with Worm Series!

Position detecting unit

Clevis fitting
Series Power Cylinder

LPWB Power Cylinder, for hydraulic cylinders.

efficiency ball screw and high precision worm gear.
for hydraulic cylinders.

Comparison between Power Cylinders and hydraulic cylinders

Low energy costs
Power Cylinders are recognized as having low energy costs and for their LCA (Life Cycle Assessment). Their extremely simple system set-up gives them a remarkably high power conversion efficiency.

What's LCA?
Life Cycle Assessment
Life Cycle Assessment is a tool for the systematic evaluation of the environmental aspects of a product or service system through all stages of its life cycle.

LCA of Power Cylinder

<table>
<thead>
<tr>
<th>CO₂ emission</th>
<th>Comparative evaluation result by Shinko Research Co., Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual CO₂ emission (kg-CO₂/year)</td>
</tr>
<tr>
<td></td>
<td>Top level: CO₂ emission from operation</td>
</tr>
<tr>
<td></td>
<td>Bottom level: CO₂ emission from production</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hydraulic Cylinder</td>
</tr>
<tr>
<td></td>
<td>493</td>
</tr>
<tr>
<td></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Power Cylinder</td>
</tr>
<tr>
<td></td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

CO₂ Comparison
Hydraulic cylinders have 3.8 times more CO₂ emissions than Power Cylinders.

<table>
<thead>
<tr>
<th>Power consumption</th>
<th>Annual power consumption comparison per unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Power Cylinder</td>
</tr>
<tr>
<td></td>
<td>310</td>
</tr>
<tr>
<td></td>
<td>Hydraulic Cylinder</td>
</tr>
<tr>
<td></td>
<td>1676</td>
</tr>
</tbody>
</table>

Annual power consumption comparison per unit
Hydraulic cylinders require 5.4 times more electricity costs than Power Cylinders.

Annual electricity cost/plant
Comparison conditions:
Thrust: 3000N
Speed: 200mm/min
Stroke: 500mm
1 cycle/min x 12 hrs/day x 250 days/yr
Includes drive system (servo motor, hydraulic unit)

What is LCA?
Life Cycle Assessment

Reduces power consumption 82% and saves 1.5 million yen compared to hydraulic cylinders.

Clean
Power Cylinders require no hydraulic piping and do not leak oil from the joints. Maintenance is extremely simple, with no need to flush pipes or dispose of waste oil. They are quiet, with no unpleasant oil odors, to help maintain a healthy work environment.

Simple installation with no hydraulic piping
Ready for operation simply by connecting to a three-phase power supply. No need for large-scale hydraulic piping work or equipment.

Accurate speed and position control
The brake motor can be accurately controlled with an inverter to allow the speed to be changed as needed. Accurate positioning is also possible because changes in the ambient environment (temperature) or in the oil temperature do not cause mispositioning.

Accurate load holding
Brake motors are used on all Worm Series to allow for reliable load holding at any position, even during a power failure.
**Worm Series**

**System Set-up**

**Power Cylinder**
- Remarkably high power conversion efficiency thanks to the Power Cylinder's simple system set-up.

**Hydraulic Cylinder**
- Regulator
  - Pressure control valve
  - Flow control valve
  - Directional control valve
- Hydraulic pump
- Motor
- Oil tank
- Hydraulic piping

**Shipping & Port Industries**

Nowadays, in shipping and port industries worldwide, the promotion of energy savings and the prevention of marine pollution are driving the shift from hydraulic to electric hybrid or all electric cylinders.

- **Container crane**
- **Container Tilting**
  - Adjusts container skew by pulling on ropes.
- **Transfer crane**
- **Steering**
  - Rotates the tires 90 degrees when the transfer crane changes direction. The Worm Series can also handle heavy loads.

- **Arm Extension**
  - Adjusts arm length to handle double containers or different container sizes.

- **Moves wire drums in four directions and counteracts container swing during trolley drive.**

**Hydraulic piping**
- **Power Cylinder**
- **Power cable**
- **Regulator**
  - Pressure control valve
  - Flow control valve
  - Directional control valve
- **Hydraulic pump**
- **Motor**
- **Oil tank**
Palm Oil Mill

**Point**

- **Low energy costs**
  Can reduce standby power.

- **Clean**
  Can prevent contamination of conveyed goods and peripheral equipment from oil leaks.

- **Simply handling**
  Can reduce installation work hours.

- **Accurate speed and position control**
  Helps maintain consistent quality.

- **Accurate load holding**
  Brake motor ensures accurate load holding during power failures.

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Boom Luffing

Used in luffing the booms of stackers, reclaimers, unloaders, ship unloaders, and other yard machines.

**Point**

- Can handle large loads.
- Can handle two units used synchronously.
Lifter
Elevates tables or workbenches.

**Point**
- Worm gear and brake motor ensure accurate load holding when stopped.

Medical Equipment
Elevates examination beds or tilt frames.

**Point**
- Accurate operation – Can be stopped at any position, holds loads reliably.
Model Numbering

LP W B  DR  10  C

Model list

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Allowable thrust (kN)</th>
<th>50/60Hz Nominal speed (mm/s)</th>
<th>Nominal stroke (mm)</th>
<th>Motor specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPWB5000</td>
<td>49</td>
<td>12/14.4</td>
<td>200~1000</td>
<td>With nonexcitation-operated electromagnetic brake</td>
</tr>
<tr>
<td>LPWB10000</td>
<td>98</td>
<td>10/12</td>
<td>500~1500</td>
<td>Three-phase induction motor</td>
</tr>
<tr>
<td>LPWB20000</td>
<td>196</td>
<td>12/14.4</td>
<td>500~2000</td>
<td>IP55 equivalent</td>
</tr>
<tr>
<td>LPWB30000</td>
<td>294</td>
<td>12/14.4</td>
<td>500~2000</td>
<td></td>
</tr>
</tbody>
</table>

Options

- L: With two stroke adjusting external limit switches
- R: Rotary encoder
- Y: Limit switch counter *1
- K2, K4: Stroke adjusting internal limit switch
- P: Potentiometer
- C: With clevis fitting
- J: With bellows *2

Model list

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<tr>
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<th>Allowable thrust (kN)</th>
<th>Nominal speed (mm/s)</th>
<th>Nominal stroke (mm)</th>
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Electric Motor

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>2. Speed</td>
<td></td>
<td>mm/s (at 50Hz, 60Hz)</td>
<td></td>
</tr>
<tr>
<td>3. Stroke</td>
<td></td>
<td>mm</td>
<td>Max stroke (mm)</td>
</tr>
<tr>
<td>4. Power</td>
<td>3-phase 200V/50Hz, 3-phase 400V/50Hz, 440V/60Hz</td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Direct-driven</td>
<td></td>
<td>Inverter-driven</td>
</tr>
<tr>
<td>5. Special specification</td>
<td>Brake</td>
<td>Others</td>
<td>Explosion-proof</td>
</tr>
</tbody>
</table>

Operating Environment

<table>
<thead>
<tr>
<th>6. Operation</th>
<th>times/min x min/hr x hrs/day x days/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Ambient temperature</td>
<td>°C</td>
</tr>
<tr>
<td>8. Mounting location</td>
<td>Indoor, Outdoor, Explosion-proof, Others</td>
</tr>
<tr>
<td>9. Dust</td>
<td>Average, High</td>
</tr>
<tr>
<td>10. Control device</td>
<td>Stroke adjustment external LS, Internal LS, Potentiometer, Thrust detection LS, Rotary encoder, Others</td>
</tr>
</tbody>
</table>

Layout

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