### Product Description

#### The Tasks
- Driving, transporting, positioning

---

#### Length
Up to 5500 mm

---

#### Load capacities and moments
- Load capacity $C$ up to 79300 N
- Longitudinal moment $M_L$ up to 8560 Nm
- Torsional moment $M_T$ up to 970 Nm

---

#### Permissible drive torque
Up to 154 Nm

---

#### Travel speed
Up to 5 m/s

---

#### Precision
Repeatability $\pm 0.10$ mm

---

#### Complete system
IndraDyn S servo motors with gear unit, complete with controller and control unit

---

#### Switch mounting arrangements
Mechanical and proximity switches over the entire travel range

---

#### Multiple axis unit
Combination options provided by connectors

---

#### Accessories
Clamping fixtures, motor mounts, sliding blocks, etc.

---

#### Documentation
Standard report

---

Rexroth
Omega Modules OBB
Product Description

Omega Modules (OBB) with ball rail systems and toothed belt drive for travel speeds up to 5.0 m/s. Omega Modules are ready-to-install linear axes for any desired mounting orientation in freely configurable lengths up to 5500 mm.

Because of their low travelling system mass, Omega Modules are ideally suited for operation as vertical axes, as the drive can be mounted as a stationary unit while the module frame executes the vertical motion.

Omega Modules consist of:
- A compact, anodized aluminum profile frame
- The integrated zero-clearance Rexroth Profiled Rail System. With its high load capacities and high rigidity this enables optimal travel performance when moving large loads at high speed.
- A carriage with one-point lubrication
- Easy-2-Combine interface in the carriage and on the end plates
- The pre-tensioned toothed belt
- Mountable switches
- Available complete with motor, controller and control unit
- Straight or angled gear reducer for attachment of motor
- Pneumatic clamping units (optional)
- Extensive range of accessories available

Sectors:
- Handling and assembly
- Electronics and semiconductor industry
- Automotive suppliers and OEMs
- Robotics and automation
- Special-purpose machines
- Packaging technology
- Building services
- Plastics processing
- Textile industry

Application areas:
- Pick and place
- Handling systems
- Component assembly systems, palletizers
- Feed units for machine tools
- Testing and analysis systems
- Feed units in transfer lines
- Load shifters

For mounting, maintenance and start-up, see the Instructions.

Attachment examples

Versatile attachment mounting options are provided by the threads and locating holes on the two end plates of the frame.

Precise fastening thanks to locating holes on the carriage.

Attachment of Grippers or Rotary Compact Modules

Attachment of Mini Slides
OBB as a Z-axis
Carriage stationary, frame travels
Motor attachment via angled gear reducer

OBB as an X-axis
Carriage stationary, frame travels
Motor attachment via straight gear reducer

On request:
OBB with two carriages for X-axis
Example: Carriage 1 with straight gear reducer, carriage 2 with angled gear reducer
(frame stationary, carriages travel independently of each other)
Type Designations, Structural Design

Type Designation (size)

Omega Modules OBB are designated according to type and size.

<table>
<thead>
<tr>
<th>Designation</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omega Module</td>
<td>OBB</td>
<td>85</td>
</tr>
<tr>
<td>Guideway</td>
<td>Ball Rail System</td>
<td></td>
</tr>
<tr>
<td>Drive unit</td>
<td>Belt Drive</td>
<td></td>
</tr>
</tbody>
</table>

Structural design (without switches)

1. End plate
2. Belt clamp
3. Toothed belt
4. Carriage with runner blocks
5. Frame
6. Clamping shaft for motor attachment
7. Lube port (at both end faces)
8. Air port (for carriage with clamping unit)
9. Angled gear reducer
10. Motor
11. Straight gear reducer

For customer-built motor attachment:

- OBB with drive, without gear reducer (MA01)
- OBB with angled gear reducer (MG01 to MG04)
- OBB with straight gear reducer (MG10)
Attachments
Carriage stationary, frame travels

1 Switch mounting profile
2 Mechanical switch (with mounting accessories)
3 Switching strip on the frame
4 Proximity switch (with mounting accessories)
5 Socket and plug
6 Frame
7 Carriage

Frame stationary, carriage travels

1 Socket and plug
2 Switching strip
3 Mechanical switch (with mounting accessories)
4 Proximity switch (with mounting accessories)
5 Frame
6 Carriage

7 Shock absorbers
Technical Data

General technical data

Modulus of elasticity $E$

Note on dynamic load capacities and moments

Determination of the dynamic load capacities and moments is based on a travel life of 100 000 m. Often only 50 000 m are actually stipulated.

For comparison:
Multiply values $C$, $M_t$ and $M_L$ from the table by 1.26.

<table>
<thead>
<tr>
<th>Dimensions (mm)</th>
<th>Length Carriage</th>
<th>Length Omega Module</th>
<th>Max. drive torque for mechanical system</th>
<th>Frictional torque of system (without gear unit, without motor)</th>
<th>Max. travel speed for mechanical system</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$A / H$</td>
<td>$B$</td>
<td>$H_1$</td>
<td>$L_{ca}$</td>
<td>$L_{min}$</td>
</tr>
<tr>
<td>OBB 55</td>
<td>55</td>
<td>75</td>
<td>135</td>
<td>230</td>
<td>450</td>
</tr>
<tr>
<td>OBB 85</td>
<td>85</td>
<td>107</td>
<td>222</td>
<td>260</td>
<td>500</td>
</tr>
<tr>
<td>OBB 120</td>
<td>120</td>
<td>135</td>
<td>285</td>
<td>330</td>
<td>600</td>
</tr>
</tbody>
</table>

1) For a theoretical stroke of 100 mm

<table>
<thead>
<tr>
<th>Length Carriage</th>
<th>Dynamic load capacity</th>
<th>Dynamic load moments</th>
<th>Maximum permissible loads</th>
<th>Planar moment of inertia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$L_{ca}$ (mm)</td>
<td>$C$ (N)</td>
<td>$M_t$ (Nm)</td>
<td>$M_L$ (Nm)</td>
</tr>
<tr>
<td>OBB 55</td>
<td>230</td>
<td>16250</td>
<td>156</td>
<td>1100</td>
</tr>
<tr>
<td>OBB 85</td>
<td>260</td>
<td>49400</td>
<td>700</td>
<td>3750</td>
</tr>
<tr>
<td></td>
<td>308</td>
<td>49400</td>
<td>700</td>
<td>4900</td>
</tr>
<tr>
<td>OBB 120</td>
<td>330</td>
<td>79300</td>
<td>970</td>
<td>8560</td>
</tr>
</tbody>
</table>
Mass of the linear system

Weight calculation does not include motor or switch attachments.

Weight formula:

Weight factor (kg/mm) x length L (mm) + weight of all parts of fixed length (carriage, end plates, etc.) (kg)

Suitable loads

As far as the desired service life is concerned, loads of up to approximately 20% of the dynamic characteristic values \( C, M_t, M_L \) have proved acceptable.

At the same time, the following may not be exceeded:
- the permissible drive torque
- the maximum permissible loads
- the permissible travel speed
- the maximum permissible deflection
Technical Data

Constants $k_{J_{\text{fix}}}$, $k_{J_{\text{var}}}$, $k_{J_{m}}$

The constants are required to determine the mass moment of inertia of the system $J_s$.
Values without gear unit, and without motor

<table>
<thead>
<tr>
<th></th>
<th>Constants</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$k_{J_{\text{fix}}}$</td>
</tr>
<tr>
<td>OBB 55</td>
<td>Carr.</td>
<td>3370</td>
</tr>
<tr>
<td></td>
<td>Frame</td>
<td>580</td>
</tr>
<tr>
<td>OBB 85</td>
<td>Carr.</td>
<td>15050</td>
</tr>
<tr>
<td></td>
<td>Frame</td>
<td>2730</td>
</tr>
<tr>
<td>OBB 120</td>
<td>Carr.</td>
<td>52600</td>
</tr>
<tr>
<td></td>
<td>Frame</td>
<td>13700</td>
</tr>
</tbody>
</table>

Carr. = traveling carriage
Frame = traveling frame

Gear unit data
Frictional torque of gear $M_{\text{Rge}}$

<table>
<thead>
<tr>
<th>Gear reducer ratio</th>
<th>Gear unit</th>
<th>$M_{\text{Rge}}$ (Nm)</th>
<th>Weight (kg)</th>
<th>Mass moment of inertia $J_s$ (kgm$^2$ 10$^{-6}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>3</td>
<td>SG</td>
<td>0.15</td>
<td>1.1</td>
<td>13.5</td>
</tr>
<tr>
<td>5</td>
<td>SG</td>
<td>0.10</td>
<td>1.1</td>
<td>7.8</td>
</tr>
<tr>
<td>8</td>
<td>SG</td>
<td>0.10</td>
<td>1.1</td>
<td>6.5</td>
</tr>
<tr>
<td>3</td>
<td>AG</td>
<td>0.30</td>
<td>1.9</td>
<td>24.6</td>
</tr>
<tr>
<td>5</td>
<td>AG</td>
<td>0.25</td>
<td>1.9</td>
<td>18.9</td>
</tr>
<tr>
<td>8</td>
<td>AG</td>
<td>0.20</td>
<td>1.7</td>
<td>17.6</td>
</tr>
<tr>
<td>OBB 85</td>
<td>1</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>5</td>
<td>SG</td>
<td>0.40</td>
<td>3.5</td>
<td>45.0</td>
</tr>
<tr>
<td>8</td>
<td>SG</td>
<td>0.25</td>
<td>3.5</td>
<td>39.0</td>
</tr>
<tr>
<td>5</td>
<td>AG</td>
<td>0.70</td>
<td>5.8</td>
<td>86.9</td>
</tr>
<tr>
<td>8</td>
<td>AG</td>
<td>0.55</td>
<td>5.8</td>
<td>80.9</td>
</tr>
<tr>
<td>OBB 120</td>
<td>1</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>9</td>
<td>SG</td>
<td>0.90</td>
<td>7.8</td>
<td>262.0</td>
</tr>
<tr>
<td>9</td>
<td>AG</td>
<td>1.35</td>
<td>13.8</td>
<td>573.0</td>
</tr>
</tbody>
</table>

SG = straight gear reducer
AG = angled gear reducer
### Drive data

<table>
<thead>
<tr>
<th></th>
<th>Gear reducer ratio</th>
<th>Max. drive torque for mechanical system $M_a$ (Nm)</th>
<th>Lead constant $(\text{mm/rev})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBB 55</td>
<td>(-)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 (w/o gear unit)</td>
<td>12.0</td>
<td>165.0</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4.0</td>
<td>55.0</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>2.4</td>
<td>33.0</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>1.5</td>
<td>20.63</td>
</tr>
<tr>
<td>OBB 85</td>
<td>1 (w/o gear unit)</td>
<td>40.0</td>
<td>255.0</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>8.0</td>
<td>51.0</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>5.0</td>
<td>31.87</td>
</tr>
<tr>
<td>OBB 120</td>
<td>1 (w/o gear unit)</td>
<td>154.0</td>
<td>340.0</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>17.1</td>
<td>37.77</td>
</tr>
</tbody>
</table>

### Belt data

<table>
<thead>
<tr>
<th></th>
<th>Belt type</th>
<th>Width</th>
<th>Tooth pitch</th>
<th>Max. belt drive transmission force $F_{t,\text{max}}$ (N)</th>
<th>Cord strength $F_{c}$ (N)</th>
<th>Specific spring rate $c_{\text{spec}}$ (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBB 55</td>
<td>25 AT 5</td>
<td>25</td>
<td>5</td>
<td>460</td>
<td>1750</td>
<td>$0.44 \cdot 10^6$</td>
</tr>
<tr>
<td>OBB 85</td>
<td>50 AT 5</td>
<td>50</td>
<td>5</td>
<td>992</td>
<td>3500</td>
<td>$0.875 \cdot 10^3$</td>
</tr>
<tr>
<td>OBB 120</td>
<td>70 AT 10</td>
<td>70</td>
<td>10</td>
<td>2844</td>
<td>11750</td>
<td>$2.968 \cdot 10^3$</td>
</tr>
</tbody>
</table>
Calculations

Calculation principles

Maximum permissible load

\[
\frac{|F_y|}{F_{y\text{max}}} + \frac{|F_z|}{F_{z\text{max}}} + \frac{|M_x|}{M_{x\text{max}}} + \frac{|M_y|}{M_{y\text{max}}} + \frac{|M_z|}{M_{z\text{max}}} \leq 1
\]

Combined equivalent load on bearing of the linear guide

\[
F_{\text{comb}} = |F_y| + |F_z| + C \cdot \frac{|M_x|}{M_{t\text{max}}} + C \cdot \frac{|M_y|}{M_{L\text{max}}} + C \cdot \frac{|M_z|}{M_{L\text{max}}}
\]

Service life

Nominal life of the guideway in meters:

\[
L = \left( \frac{C}{F_{\text{comb}}} \right)^3 \cdot 10^6
\]

Nominal life of the guideway in hours:

\[
L_h = \frac{L}{3600 \cdot v_m}
\]

Frictional torque with drive unit

without gear reducer (MA01)

\[
M_R = M_{R\text{s}}
\]

with gear reducer (MG)

\[
M_R = \frac{M_{R\text{fix}}}{i} + M_{R\text{var}}
\]

Mass moment of inertia of the linear motion system \( J_s \) referred to the drive journal

\[
J_s = (k_{j\text{fix}} + k_{j\text{var}} \cdot L) \cdot 10^{-6}
\]

<table>
<thead>
<tr>
<th>OBB 55</th>
<th>76.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBB 85</td>
<td>126.5</td>
</tr>
<tr>
<td>OBB 120</td>
<td>138.0</td>
</tr>
</tbody>
</table>

Bosch Rexroth Corporation, R310A 2407/02.2012
Mass moment of inertia of the mechanical system referred to the motor journal

Motor attachment
without gear reducer (MA01)

\[ J_{ex} = J_s + \frac{J_t}{i^2} + J_{ge} \]

with gear reducer (MG)

\[ J_{ex} = J_s + J_t + J_{br} \]

Translatory mass moment of inertia of external load referred to the drive journal

\[ J_t = m_{ex} \cdot k_m \cdot 10^{-6} \]

Mass moment of inertia of the drive train referred to the motor journal

\[ J_{dc} = J_{ex} + J_{tr} \]

Mass moment of inertia ratio

\[ V = \frac{J_{dc}}{J_m} \]

<table>
<thead>
<tr>
<th>Application area</th>
<th>( V )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handling</td>
<td>( \leq 6.0 )</td>
</tr>
<tr>
<td>Processing</td>
<td>( \leq 1.5 )</td>
</tr>
</tbody>
</table>

Total mass moment of inertia referred to the motor journal

\[ J_{tot} = J_{dc} + J_m \]

Maximum permissible rotary speed for mechanical system

\[ n_{mech} = \frac{v_{mech} \cdot i \cdot 1000 \cdot 60}{v} \]

\[ n_{mech} < n_{m, max} \]
Additional Technical Data

Deflection

A special feature of Omega Modules is the possibility to mount them by the carriage, which remains stationary while the frame travels. Deflection of the frame must, however, be taken into consideration, because it limits the possible load.

Example

Omega Modules OBB 85:
\[ L_1 = 1000 \text{ mm} \]
\[ F = 400 \text{ N} \]

From the OBB 85 diagram (load applied in the z-direction): \( f = 1.6 \text{ mm} \)

The deflection \( f \) can affect the precision. Users should check whether the deviation is within the tolerance limits.
Rigidity charts for loads from the z and y directions

The graphs apply under the following conditions: 4 clamping fixtures per side, 8 screws per side, solid mounting base

OBB 55
Additional Technical Data

Rigidity charts for loads from the z and y directions

OBB 85
OBB 120

\[
\begin{align*}
F_z &\quad \text{(N)} \\
F_y &\quad \text{(N)}
\end{align*}
\]