# OSP-E..BHD Belt Actuator with Integrated Guide

## Ball Bearing Guide
## Roller Guide

**Content**

# Belt Actuator with Integrated Guide for Heavy Duty Applications

The latest generation of high capacity actuators, the OSP-E..BHD series combines robustness, precision and high performance. The aesthetic design is easily integrated into any machine constructions by virtue of extremely adaptable mountings.

## Belt Actuator with Integrated Guide - selective with Ball Bearing Guide or Roller Guide

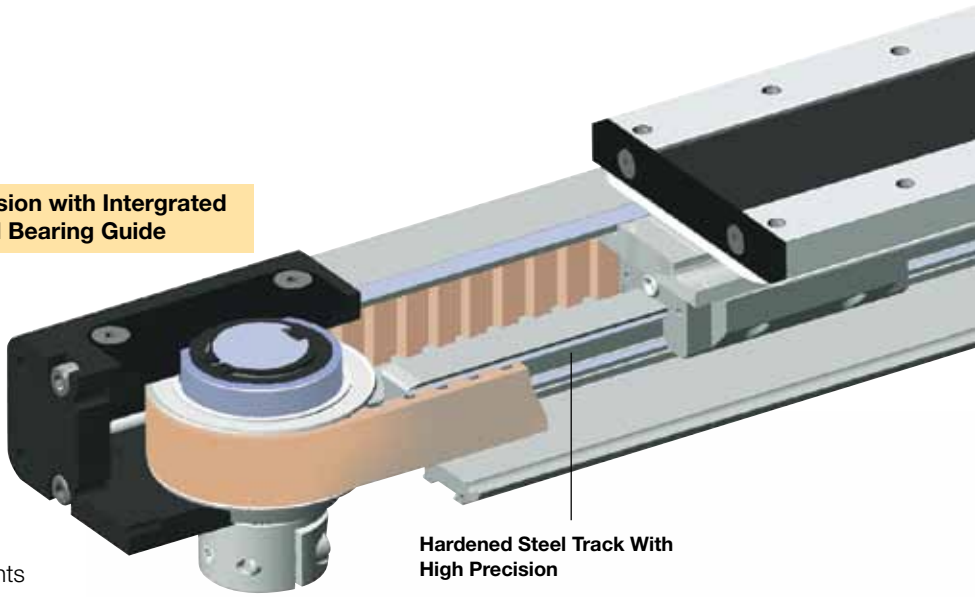
**Advantages:**

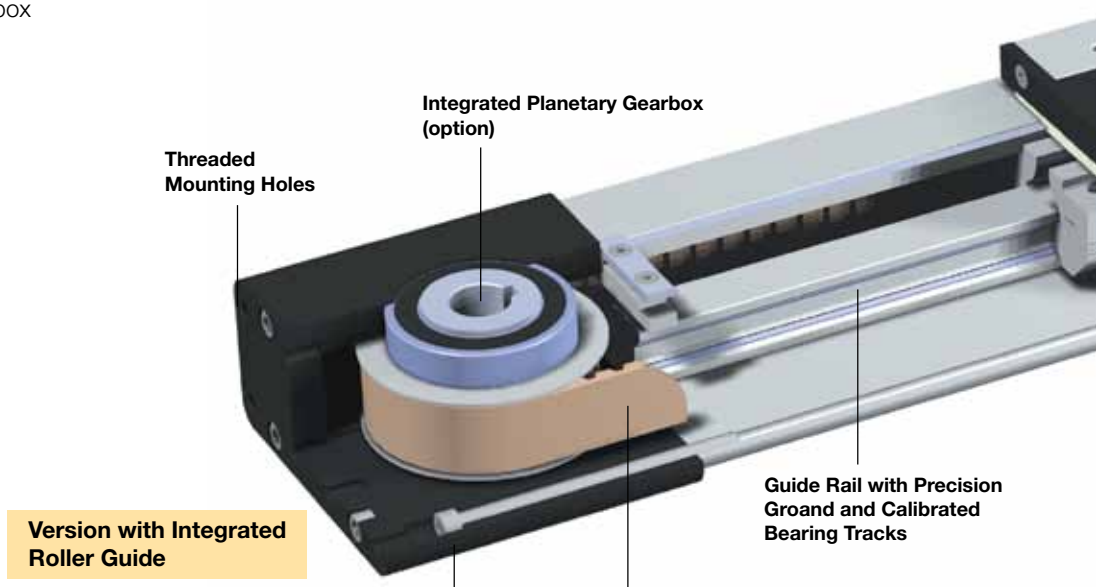
- Accurate Path and Position Control
- High Force Output
- High Speed Operation
- High Load Capacity
- Easy Installation
- Low Maintenance
- Ideal for Multi-Axis Applications

**Features:**

- Integrated Ball Bearing Guide or Integrated Roller Guide
- Diverse Range of Multi-Axis Connection Elements
- Diverse Range of Accessories and Mountings
- Complete Motor and Control Packages
- Optional Integrated Planetary Gearbox
- Special Options on Request

**Version with Intergrated Ball Bearing Guide**

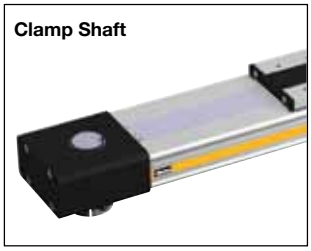


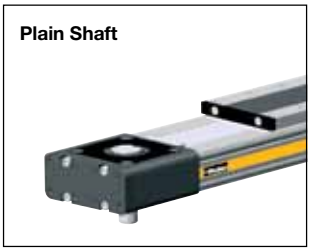

**Version with Integrated Roller Guide**

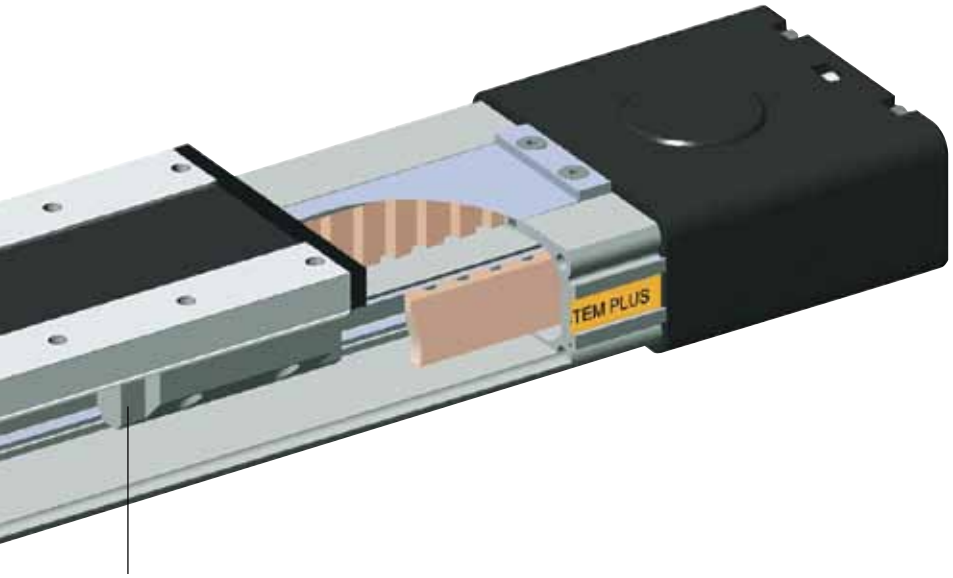
## Drive Shaft Versions

**Clamp Shaft**



**Plain Shaft**



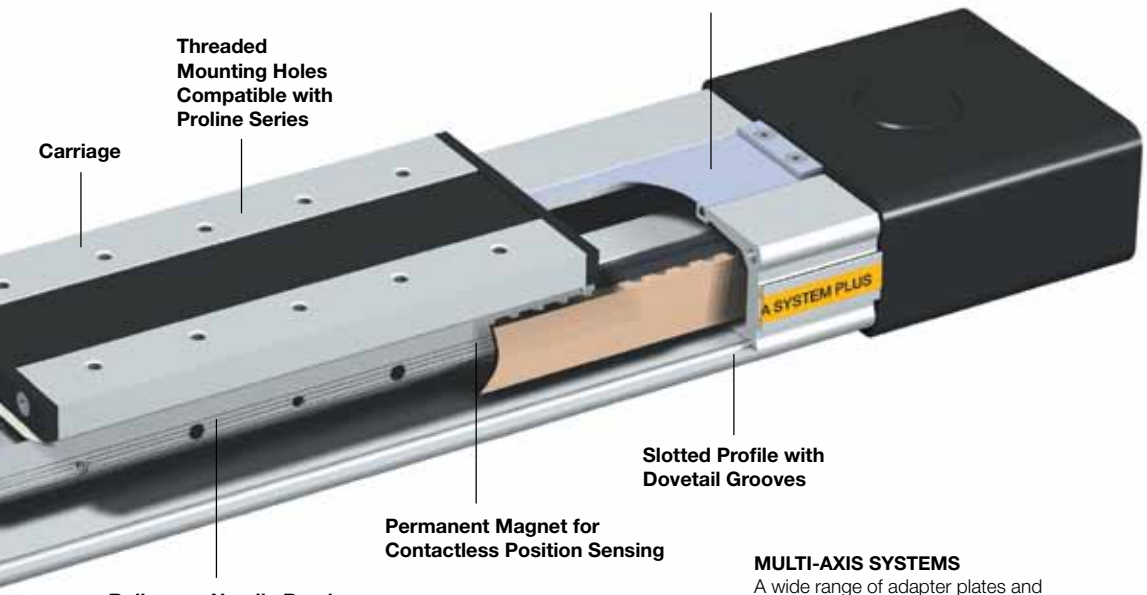



**Steel Runner Block with Integrated Scraper System and Grease Nipples**

**Corrosion Resistant Steel Sealing Band**

**Threaded Mounting Holes Compatible with Proline Series**

**Carriage**

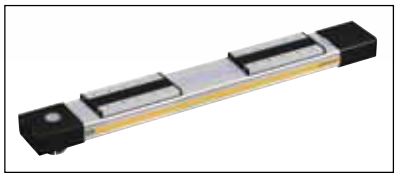



**Slotted Profile with Dovetail Grooves**

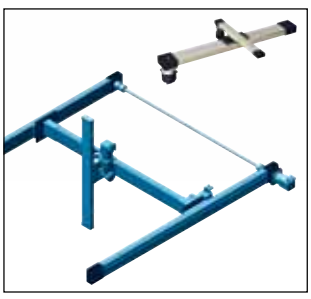
**Permanent Magnet for Contactless Position Sensing**

**Rollers on Needle Bearings For Smooth Operation up to 10 m/s.**

**BI-PARTING Version**
for perfectly synchronised bi-parting movements.

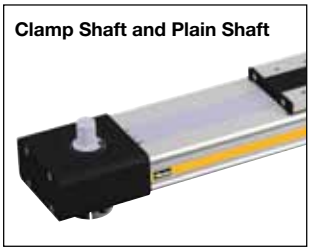


**MULTI-AXIS SYSTEMS**
A wide range of adapter plates and intermediate drive shafts simplify engineering and installation



## Drive Shaft OPTIONS

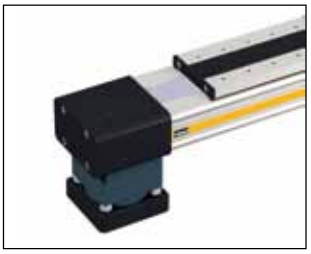
**Clamp Shaft and Plain Shaft**



**Hollow Shaft with Keyway**

## OPTION

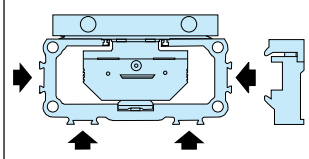
**Integrated planetary gearbox**



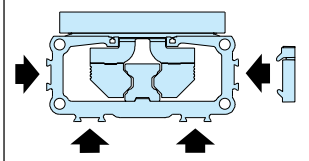
- **Highly compact and rigid solution fully integrated in the drive cap housing**
- **Purpose designed for the BHD series**
- **Available with three standard ratios (3, 5 and 10)**
- **Very low backlash**
- **A wide range of available motor flanges**

The dovetailed mounting rails of the new linear actuator expand its function into that of a universal system carrier.
Modular system components are simply clamped on.

**Version with Integrated Ball Bearing Guide**



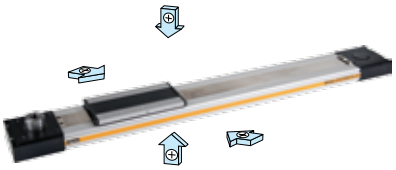
**Version with Integrated Roller guide**



## OSP-E..BHD Belt Actuator with Integrated Guide

### Standard Versions
### OSP-E..BHD

Standard carrier with integrated guide and magnets for contactless position sensing. Dovetail profile for mounting of accessories and the actuator itself.

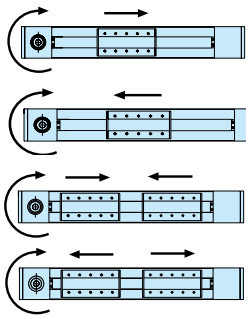


### Drive Shaft with Clamp Shaft

### Drive Shaft with Plain Shaft

### Actuating Direction

Important in parallel operations, e.g. with intermediate drive shaft



Standard

Standard – bi-parting Version

### Options

### Tandem

For higher moment support

### Bi-parting Version

For perfectly synchronised bi-parting movements.

### Drive Shaft with Clamp and Plain Shaft

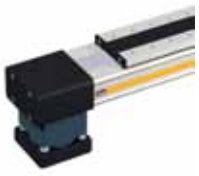
For connections with intermediate drive shaft

### Hollow Shaft with Keyway

For close coupling of motors and external gears

### Integrated Planetary Gearbox

For compact installation and very low backlash

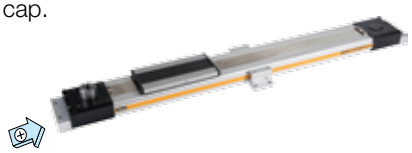


### Accessories

### Motor Mountings

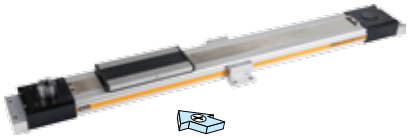
### End Cap Mounting

For mounting the actuators on the end cap.



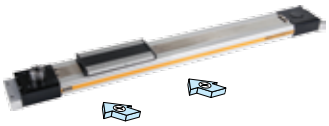
### Profile Mounting

For supporting long actuators or mounting the actuators on dovetail grooves



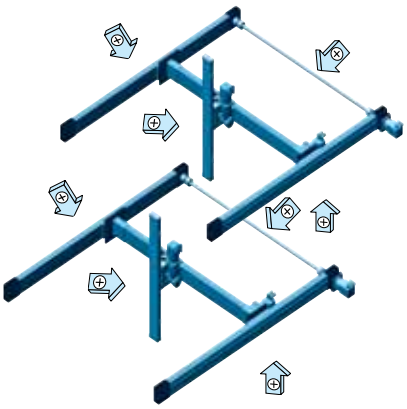
### Magnetic Sensors Type RS / ES

For contactless position sensing of end stop and intermediate carrier positions.



### Multi-Axis-Systems

For modular assembly of actuators up to multi-axis systems.



## Standard Versions

- Belt Actuator with Integrated Ball Bearing Guide
- Drive Shaft with Clamp Shaft or Plain Shaft
- Choice of Motor Mounting Side
- Dovetail Profile for Mounting of Accessories and the Actuator itself

## Options

- Tandem Version for Higher Moments
- Bi-parting Version for Synchronised Movements
- Integrated Planetary Gearbox
- Drive Shaft with
  - Clamp Shaft and Plain Shaft
  - Hollow Shaft with Keyway
- Special Drive Shaft Versions on Request

## Characteristics

| | | Symbol | Unit | Description |
|---|---|---|---|---|
| General Features | | | | |
| Series | | | | OSP-E..BHD |
| Name | | | | Belt Acutator with Integrated Ball Bearing Gear |
| Mounting | | | | see drawings |
| Ambient Temperature Range | | $\vartheta_{min}$<br>$\vartheta_{max}$ | °C<br>°C | -30<br>+80 |
| Weight (mass) | | | kg | see table |
| Installation | | | | in any position |
| Material | Slotted profile | | | Extruded Anodized Aluminium |
| | Belt | | | Steel-corded Polyurethane |
| | Pulley | | | Aluminium |
| | Guide | | | Ball Bearing Guide |
| | Guide Rail | | | Hardened Steel Rail with High Precision, Accuracy Class N |
| | Guide Carrier | | | Steel Carrier with Integrated Wiper System, Grease Nipples, Preloaded 0.02 x C, Accuracy Class H |
| | Sealing Band | | | Hardened, Corrision Resistant Steel |
| | Screws, Nuts | | | Zinc Plated Steel |
| | Mountings | | | Zinc Plated Steel and Aluminium |
| Protection Class | | | IP | 54 |

## Weight (mass) and Inertia

| Series | Weight (mass) [kg] | | | Inertia [x $10^{-6}$ kgm$^2$] | | |
|---|---|---|---|---|---|---|
| | at stroke 0 m | add per metre stroke | moving mass | at stroke 0 m | add per metre stroke | per kg mass |
| OSP-E20BHD | 2.8 | 4.0 | 0.8 | 280 | 41 | 413 |
| OSP-E25BHD | 4.3 | 4.5 | 1.5 | 1,229 | 227 | 821 |
| OSP-E32BHD | 8.8 | 7.8 | 2.6 | 3,945 | 496 | 1459 |
| OSP-E50BHD | 26.0 | 17.0 | 7.8 | 25,678 | 1,738 | 3,103 |
| OSP-E20BHD* | 4.3 | 4.0 | 1.5 | 540 | 41 | 413 |
| OSP-E25BHD* | 6.7 | 4.5 | 2.8 | 2,353 | 227 | 821 |
| OSP-E32BHD* | 13.5 | 7.8 | 5.2 | 7,733 | 496 | 1,459 |
| OSP-E50BHD* | 40.0 | 17.0 | 15.0 | 49,180 | 1,738 | 3,103 |

*Version: Tandem and Bi-parting (Option)

### Installations Instructions

Use the threaded holes in the end cap for mounting the actuator. Check if profile mountings are needed using the maximum allowable unsupported length graph on page 17. At least one end cap must be secured to prevent axial sliding when profile mountings are used.

### Maintenance

Depending on operating conditions, inspection of the actuator is recommended after 12 months or 3000 km operation. Please refer to the operating instructions supplied with the actuator.

### First service start-up

The maximum values specified in the technical data sheet for the different products must not be exceeded. Before taking the actuator as a machine into service, the user must ensure the adherence to the EC Machine Directive 2006/42/EG.

### Sizing of Actuator

The following steps are recommended:

1. Determination of the lever arm length $l_x$, $l_y$ and $l_z$ from $m_e$ to the centre axis of the actuator.
2. Calculation of the load $F_x$ or $F_y$ to the carrier caused by $m_e$
   $F = m_e \cdot g$
3. Calculation of the static and dynamic force $F_A$ which must be transmitted by the belt.
   $F_{A(horizontal)} = F_a + F_0$
   $= m_g \cdot a + M_0 \cdot 2\pi / U_{ZR}$
   $F_{A(vertical)} = F_g + F_a + F_0$
   $= m_g \cdot g + m_g \cdot a + M_0 \cdot 2\pi / U_{ZR}$
4. Calculation of all static and dynamic moments $M_x$, $M_y$ and $M_z$ which occur in the application.
   $M = F \cdot l$
5. Selection of maximum permissible loads via Table T3.
6. Calculation and checking of the combined load, which must not be higher than 1.
7. Checking of the maximum torque that occurs at the drive shaft in Table T2.
8. Checking of the required action force $F_A$ with the permissible load value from Table T1.

For motor sizing, the effective torque must be determined, taking into account the cycle time.

### Legend

- $l$ = distance of a mas s in the x-, y- and z-direction from the guide [m]
- $m_e$ = external moved mass [kg]
- $m_{LA}$ = moved mass of actuator [kg]
- $m_g$ = total moved mass ($m_e + m_{LA}$) [kg]
- $F_{x/y}$ = load excerted on the carrier in dependence of the installation position [N]
- $F_A$ = action force [N]
- $M_0$ = no-load torque [Nm]
- $U_{ZR}$ = circumference of the pulley (linear movement per revolution) [m]
- $g$ = gravity [m/s²]
- $a_{max.}$ = maximum acceleration [m/s²]

### Performance Overview

T1

| Characteristics | | Unit | Description | | | |
|---|---|---|---|---|---|---|
| Series | | | OSP-E20BHD | OSP-E25BHD | OSP-E32BHD | OSP-E50BHD |
| Max. Speed | | [m/s] | 3[1)] | 5[1)] | 5[1)] | 5[1)] |
| Linear Motion per Revolution of Drive Shaft | | [mm] | 125 | 180 | 240 | 350 |
| Max. rpm on Drive Shaft | | [min⁻¹] | 2,000 | 1,700 | 1,250 | 860 |
| Max. Effective Action Force $F_A$ at Speed | < 1 m/s: | [N] | 550 | 1,070 | 1,870 | 3,120 |
| | 1-3 m/s: | [N] | 450 | 890 | 1,560 | 2,660 |
| | > 3 m/s: | [N] | – | 550 | 1,030 | 1,940 |
| No-load Torque | | [Nm] | 0.6 | 1.2 | 2.2 | 3.2 |
| Max. Acceleration/Deceleration | | [m/s²] | 50 | 50 | 50 | 50 |
| Repeatability | | [mm/m] | ±0.05 | ±0.05 | ±0.05 | ±0.05 |
| Max. Standard Stroke Length | | [mm] | 5,760[2)] | 5,700[2)] | 5,600[2)] | 5,500[2)] |

[1)] up to 10 m/s on request
[2)] longer strokes on request

### Maximum Permissible Torque on Drive Shaft Speed / Stroke

T2

| OSP-E20BHD | | | | OSP-E25BHD | | | | OSP-E32BHD | | | | OSP-E50BHD | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Speed [m/s] | Torque [Nm] | Stroke [m] | Torque [Nm] | Speed [m/s] | Torque [Nm] | Stroke [m] | Torque [Nm] | Speed [m/s] | Torque [Nm] | Stroke [m] | Torque [Nm] | Speed [m/s] | Torque [Nm] | Stroke [m] | Torque [Nm] |
| 1 | 11 | 1 | 11 | 1 | 31 | 1 | 31 | 1 | 71 | 1 | 71 | 1 | 174 | 1 | 174 |
| 2 | 10 | 2 | 11 | 2 | 28 | 2 | 31 | 2 | 65 | 2 | 71 | 2 | 159 | 2 | 174 |
| 3 | 9 | 3 | 8 | 3 | (25) | 3 | 31 | 3 | 59 | 3 | 60 | 3 | 153 | 3 | 138 |
| 4 | | 4 | 7 | 4 | 23 | 4 | 25 | 4 | 56 | 4 | 47 | 4 | 143 | 4 | 108 |
| 5 | | 5 | 5 | 5 | 22 | 5 | (21) | 5 | 52 | 5 | 38 | 5 | 135 | 5 | 89 |

**Important:**
The maximum permissible torque on the drive shaft is the lowest value of the speed- or stroke-dependent torque value.

**Example above:**
OSP-E25BHD, stroke 5 m, required speed 3 m/s from table T2 speed 3 m/s gives 25 Nm and stroke 5 m gives 21 Nm. Max. torque for this application is 21 Nm.

### Maximum Permissible Loads

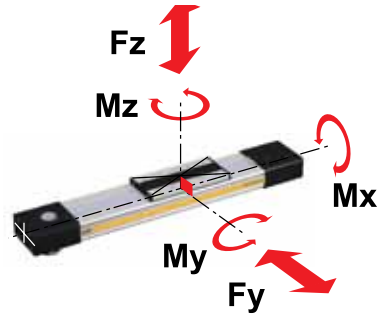
T3

| Series | Max. Applied Load | | Max. Moments [Nm] | | |
|---|---|---|---|---|---|
| | $F_y$ [N] | $F_z$ [N] | $M_x$ | $M_y$ | $M_z$ |
| OSP-E20BHD | 1,600 | 1,600 | 21 | 150 | 150 |
| OSP-E25BHD | 2,000 | 3,000 | 50 | 500 | 500 |
| OSP-E32BHD | 5000 | 10,000 | 120 | 1,000 | 1,400 |
| OSP-E50BHD | 12,000 | 15,000 | 180 | 1,800 | 2,500 |

# Loads, Forces and Moments

## Combined Loads

If the actuator is subjected to several forces, loads and moments at the same time, the maximum load is calculated with the equation shown here.
The maximum permissible loads must not be exceeded.




## Equation of Combined Loads

$$\frac{F_y}{F_y\,(max)} + \frac{F_z}{F_z\,(max)} + \frac{M_x}{M_x\,(max)} + \frac{M_y}{M_y\,(max)} + \frac{M_z}{M_z\,(max)} \leq 1$$

The total of the loads must not exceed >1 under any circumstances.

$M = F \cdot l$ [Nm]
$M_x = M_{x\,static} + M_{x\,dynamic}$
$M_y = M_{y\,static} + M_{y\,dynamic}$
$M_z = M_{z\,static} + M_{z\,dynamic}$

The distance ($l_x$, $l_y$, $l_z$) for calculation of moments relates to the centre axis of the actuator. Bending moments are calculated from the centre of the actuator and F indicates actual force.

# Maximum Permissible Unsupported Length

## Stroke Length

The stroke lengths of the actuators are available in multiples of 1 mm up to 5,700 mm.

Other stroke lengths are available on request. The end of stroke must not be used as a mechanical stop.
Allow an additional safety clearance at both ends equivalent to the linear movement of one revolution of the drive shaft, but at least 100 mm.

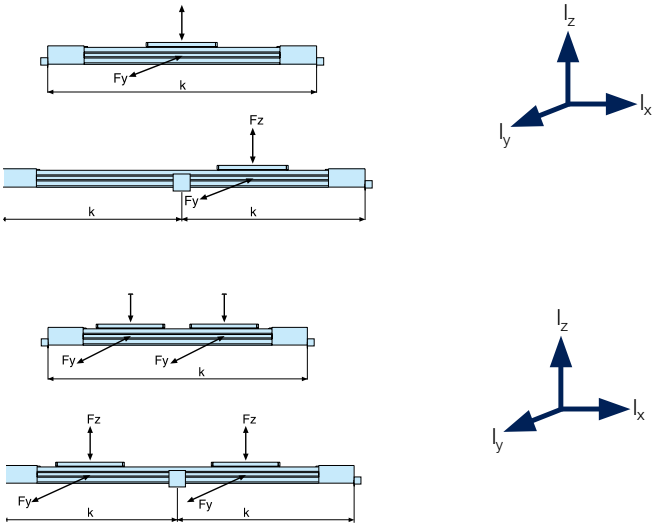
The use of an AC motor with frequency converter normally requires a larger clearance than that required for servo systems.
For advice, please contact your local Parker technical support department.

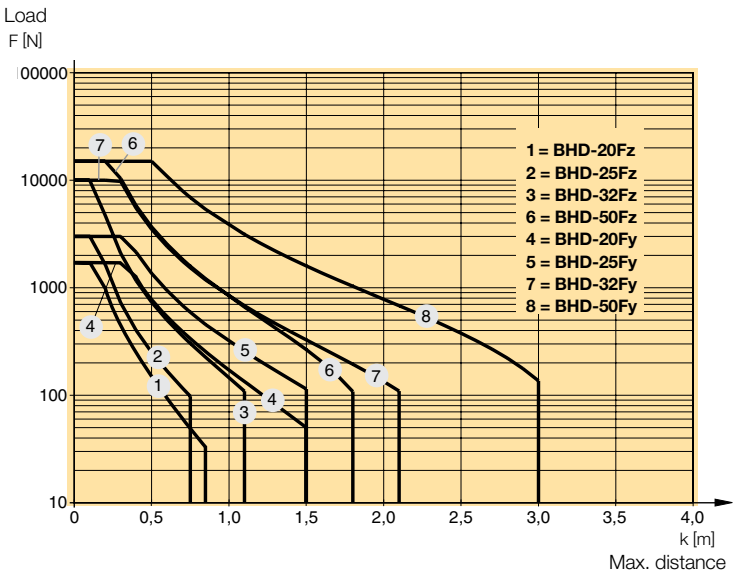
* For Bi-parting version the max. load (F) is the total load of both carriers
$F = F_{carrier\ 1} + F_{carrier\ 2}$

k = Max. permissible distance between mountings/Profile Mounting for a given load F.

When loadings are below or up to the curve in the graph below the deflection will be max. 0.01 % of distance k.

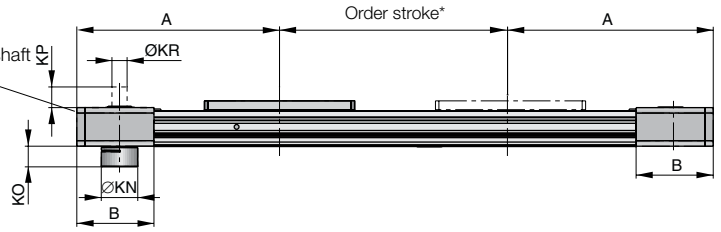
## Maximum Permissible Unsupported Length – Placing of Profile Mounting

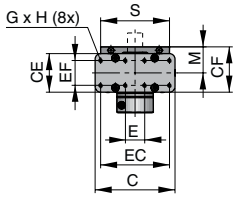


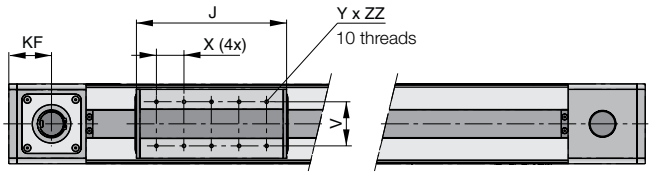



## OSP-E..BHD
## Linear Drive with Toothed Belt and Integrated Recirculating Ball Bearing Guide - Basic Unit

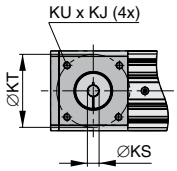
Drive shaft versions with
- clamp shaft
- plain shaft or
- clamp shaft with plain shaft (Option)



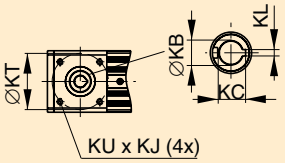




Mounting holes for motor flange or external planetary gearbox **1)**




**Hollow shaft with Keyway (Option)**
**Dimension Table [mm]**

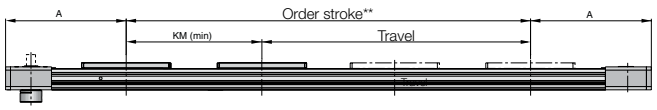
| Series | KB* | KC | KL | KT | KU x KJ |
|---|---|---|---|---|---|
| OSP-E20BHD | $12^{H7}$ | 13.8 | 4 | 65.7 | M6 x 8 |
| OSP-E25BHD | $16^{H7}$ | 18.3 | 5 | 82 | M8 x 8 |
| OSP-E32BHD | $22^{H7}$ | 24.8 | 6 | 106 | M10 x 12 |
| OSP-E50BHD | $32^{H7}$ | 35.3 | 10 | 144 | M12 x 19 |



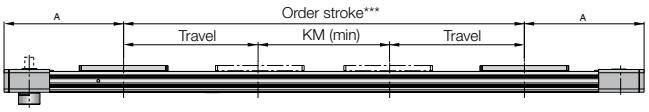

**1) Note:** The mounting holes for the coupling housing / motor flange / gearbox are located on the opposite side to the carrier (motor mounting standard). They also can be located on the same side as the carrier (motor mounting 180° standard).

*** Note:** The mechanical end position must not be used as a mechancial end stop. Allow an additional safety clearance at both ends equivalent to the linear movement of one revolution of the drive shaft, but at least 100 mm. Order stroke = required travel + 2 x safety distance. The use of an AC motor with frequency converter normally requires a larger safety clearance than that required for servo systems. For further information please contact you local Parker representative.

### Option Tandem - Series OSP-E.. BHD




### Option - Bi-Parting - Series OSP-E.. BHD




** Order stroke = required travel + KM min + 2 x safety distance

### Dimension Table [mm]

| Series | A | B | C | E | GxH | J | K | M | S | V | X | YxZZ | CE | CF | EC | EF | FB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OSP-E20BHD | 185 | 76.5 | 73 | 18 | M5x8.5 | 155 | 21.1 | 27.6 | 67 | 51 | 30 | M5x8 | 38 | 49.0 | 60 | 27 | 73 |
| OSP-E25BHD | 218 | 88.0 | 93 | 25 | M5x10 | 178 | 21.5 | 31.0 | 85 | 64 | 40 | M6x8 | 42 | 52.5 | 79 | 27 | 92 |
| OSP-E32BHD | 262 | 112 | 116 | 28 | M6x12 | 218 | 28.5 | 38.0 | 100 | 64 | 40 | M6x10 | 56 | 66.5 | 100 | 36 | 116 |
| OSP-E50BHD | 347 | 147 | 175 | 18 | M6x12 | 288 | 43.0 | 49.0 | 124 | 90 | 60 | M6x10 | 87 | 92.5 | 158 | 70 | 164 |

| Series | FH | KF | $KM_{min}$ | $KM_{empf.}$ | KN | KO | KP | KR | KS | KT | KUxKJ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| OSP-E20BHD | 36.0 | 42.5 | 180 | 220 | 27 | 18.0 | 25 | $12_{h7}$ | $12^{H7}$ | 65.7 | M6x8 |
| OSP-E25BHD | 39.5 | 49.0 | 210 | 250 | 34 | 21.7 | 30 | $16_{h7}$ | $16^{H7}$ | 82.0 | M8x8 |
| OSP-E32BHD | 51.7 | 62.0 | 250 | 300 | 53 | 30.0 | 30 | $22_{h7}$ | $22^{H7}$ | 106.0 | M10x12 |
| OSP-E50BHD | 77.0 | 79.5 | 354 | 400 | 75 | 41.0 | 35 | $32_{h7}$ | $32^{H7}$ | 144.0 | M12x19 |

(Other dimensions for KS and KB for special drive shafts on request – see order instructions.)

## Features

- Highly Compact and Rigid Solutio Fully Integrated in the Drive Cap Housing
- Purpose Designed for the BHD Series.
- Available with three Standard Ratios (3, 5 and 10)
- Very Low Backlash
- Wide Range of Available Motor Flanges

**Material:** Aluminium (AL-H) / Steel (St-H)

## Standard Version:

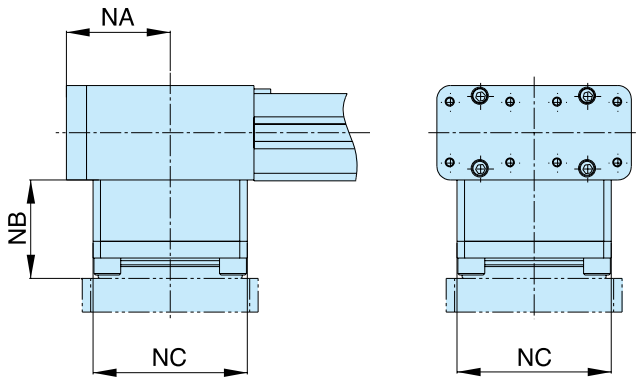
- Gearbox on Opposite Side to Carrier

**Note:** When ordering, specify model/Type of motor and manufacturer for correct motor flange.

Please contact your local Parker technical support for available motor flange.

## Series OSP-E..BHD – with Integrated Planetary Gearbox (Option)

## Dimensions




## Performance Overview

| Characteristics | Symbol | Unit | Description | | |
|---|---|---|---|---|---|
| **Series** | | | **OSP-E25BHD** | **OSP-E32BHD** | **OSP-E50BHD** |
| Ratio (1-stage) | i | | | 3/5/10 | |
| Max. Axial Load | $F_{a\,max}$ | [N] | 1,550 | 1,900 | 4,000 |
| Torsional Rigidity (i=5) | $C_{t.21}$ | [Nm/arcmin] | 3.3 | 9.5 | 25.0 |
| Torsional Rigidity (i=3/10) | $C_{t.21}$ | [Nm/arcmin] | 2.8 | 7.5 | 22.0 |
| Torsional Backlash | $J_t$ | [arcmin] | | <12 | |
| Linear Motion per Revolution of Drive Shaft | | [mm] | 220 | 280 | 360 |
| Nominal Input Speed | $n_{nom}$ | [$min^{-1}$] | 3,700 | 3,400 | 2,600 |
| Max. Input Speed | $n_{1max}$ | [$min^{-1}$] | | 6,000 | |
| No-load Torque at Nominal Input Speed | $T_{012}$ | [Nm] | <0.14 | <0.51 | <1.50 |
| Lifetime | | [h] | | 20,000 | |
| Efficency | $\eta$ | [%] | | >97 | |
| Noise Level ($n_1$=3000 $min^{-1}$) | $L_{PA}$ | [db] | <70 | <72 | <74 |

## Dimension Table [mm] and Additional Weight

| Series | NA | NB | NC | Weight (mass) [kg] |
|---|---|---|---|---|
| OSP-E25BHD | 49 | 43 | 76 | 2.6 |
| OSP-E32BHD | 62 | 47 | 92 | 4.9 |
| OSP-E50BHD | 80 | 50 | 121 | 9.6 |

## Standard Versions

- Belt Acutator with Integrated Roller Guide
- Drive Shaft with Clamp Shaft or Plain Shaft
- Choice of Motor Mounting Side
- Dovetail Profile for Mounting of Accessories and the Actuator Itself

## Options

- Tandem Version for Higher Moments
- Bi-parting Version for Synchronised Movements
- Integrated Planetary Gearbox
- Drive shaft with
  - clamp shaft and plain shaft
  - hollow shaft with keyway
- Special Drive Shaft Versions on Request

## Characteristics

| | | Symbol | Unit | Description |
|---|---|---|---|---|
| General Features | | | | |
| Series | | | | OSP-E..BHD |
| Name | | | | Linear Drive with Toothed Belt and Integrated Roller Guide |
| Mounting | | | | see drawings |
| Ambient Temperature Range | | $\vartheta_{min}$<br>$\vartheta_{max}$ | °C<br>°C | -30<br>+80 |
| Weight (mass) | | | kg | see table |
| Installation | | | | in any position |
| Material | Slotted Profile | | | Extruded Anodized Aluminium |
| | Toothed Belt | | | Steel-corded Polyurethane |
| | Pulley | | | Aluminium |
| | Guide | | | Roller Guide |
| | Guide Rail | | | Aluminium |
| | Track | | | High Alloyed Steel |
| | Roller Cartige | | | Steel rollers in Aluminium Housing |
| | Sealing Band | | | Hardended, Corrision Resistant Steel |
| | Screws, Nuts | | | Zinc Plated Steel |
| | Mountings | | | Zinc Plated Steel and Aluminium |
| Protection Class | | | IP | 54 |

## Weight (mass) and Inertia

| Series | Weight (mass) [kg] | | | Inertia [x $10^{-6}$ kgm$^2$] | | |
|---|---|---|---|---|---|---|
| | at stroke 0 m | ad per metre stroke | Moving mass | at stroke 0 m | ad per metre stroke | Moving mass |
| OSP-E25BHD | 3.8 | 4.3 | 1.0 | 984 | 197 | 821 |
| OSP-E32BHD | 7.7 | 6.7 | 1.9 | 3,498 | 438 | 1,459 |
| OSP-E50BHD | 22.6 | 15.2 | 4.7 | 19,690 | 1,489 | 3,103 |
| OSP-E25BHD* | 5.7 | 4.3 | 2.0 | 1,805 | 197 | 821 |
| OSP-E32BHD* | 11.3 | 6.7 | 3.8 | 6,358 | 438 | 1,459 |
| OSP-E50BHD* | 31.7 | 15.2 | 9.4 | 34,274 | 1,489 | 3,103 |

* Version: Tandem and Bi-parting (Option)

### Installation Instructions

Use the threaded holes in the end cap for mounting the actuator. Check if profile mountings are needed using the maximum allowable unsupported length graph on page 22.
At least one end cap must be secured to prevent axial sliding when profile mountings are used.

### Maintenance

Depending on operating conditions, inspection of the actuator is recommended after 12 months or 3000 km operation. Please refer to the operating instructions supplied with the actuator.

### First Service Start-up

The maximum values specified in the technical data sheet for the different products must not be exceeded. Before taking the actuator as a machine into service, the user must ensure the adherence to the EC Machine Directive 2006/42/EG.

## Performance Overview (T1)

| Characteristics | | Symbol | Description | | |
|---|---|---|---|---|---|
| **Series** | | | **OSP-E25BHD** | **OSP-E32BHD** | **OSP-E50BHD** |
| Max. Speed | | [m/s] | 10 | 10 | 10 |
| Linear Motion per Revolution Drive Shaft | | [m/s] | 180 | 240 | 350 |
| Max. rpm. Drive Shaft | | [min$^{-1}$] | 3,000 | 2,500 | 1,700 |
| Max. Effective Action Force $F_A$ at Speed | < 1 m/s: | [N] | 1,070 | 1,870 | 3,120 |
| | 1-3 m/s: | [N] | 890 | 1,560 | 2,660 |
| | > 3-10 m/s: | [N] | 550 | 1,030 | 1,940 |
| No-load Torque | | [Nm] | 1.2 | 2.2 | 3.2 |
| Max. Acceleration/Deceleration | | [m/s$^2$] | 40 | 40 | 40 |
| Repeatability | | [mm/m] | ±0.05 | ±0.05 | ±0.05 |
| Max. Standard Stroke Length | | [mm] | 7,000 | 7,000 | 7,000 |

## Maximum Permissible Torque on Drive Shaft Speed and Stroke (T2)

| OSP-E25BHD | | | | OSP-E32BHD | | | | OSP-E50BHD | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Speed [m/s] | Torque [Nm] | Stroke [m] | Torque [Nm] | Speed [m/s] | Torque [Nm] | Stroke [m] | Torque [Nm] | Speed [m/s] | Torque [Nm] | Stroke [m] | Torque [Nm] |
| 1 | 31 | 1 | 31 | 1 | 71 | 1 | 71 | 1 | 174 | 1 | 174 |
| 2 | 28 | 2 | 31 | 2 | 65 | 2 | 71 | 2 | 159 | 2 | 174 |
| 3 | (25) | 3 | 31 | 3 | 59 | 3 | 60 | 3 | 153 | 3 | 138 |
| 4 | 23 | 4 | 25 | 4 | 56 | 4 | 47 | 4 | 143 | 4 | 108 |
| 5 | 22 | 5 | (21) | 5 | 52 | 5 | 38 | 5 | 135 | 5 | 89 |
| 6 | 21 | 6 | 17 | 6 | 50 | 6 | 32 | 6 | 132 | 6 | 76 |
| 7 | 19 | 7 | 15 | 7 | 47 | 7 | 28 | 7 | 126 | 7 | 66 |
| 8 | 18 | | | 8 | 46 | | | 8 | 120 | | |
| 9 | 17 | | | 9 | 44 | | | 9 | 116 | | |
| 10 | 16 | | | 10 | 39 | | | 10 | 108 | | |

**Important:**
The maximum permissible torque on the drive shaft is the lowest value of the speed- or stroke-dependent torque value.

**Example above:**
OSP-E25BHD, stroke 5 m, required speed 3 m/s from table T2 speed 3 m/s gives 25 Nm and stroke 5 m gives 21 Nm. Max. torque for this application is 21 Nm.

## Maximum Permissible Loads (T3)

| Series | Max. applied load | Max. moments [Nm] | | |
|---|---|---|---|---|
| | $F_y$ , $F_z$ [N] | $M_x$ | $M_y$ | $M_z$ |
| OSP-E25BHD | 986 | 11 | 64 | 64 |
| OSP-E32BHD | 1,348 | 19 | 115 | 115 |
| OSP-E50BHD | 3,704 | 87 | 365 | 365 |

## Sizing of Actuator

The following steps are recommended:

1. Determination of the lever arm length $l_x$, $l_y$ and $l_z$ from $m_e$ to the centre axis of the actuator.
2. Calculation of the load $F_x$ or $F_y$ to the carrier caused by $m_e$
   $F = m_e \cdot g$
3. Calculation of the static and dynamic force $F_A$ which must be transmitted by the belt.
   $F_{A(horizontal)} = F_a + F_0$
   $= m_g \cdot a + M_0 \cdot 2\pi / U_{ZR}$
   $F_{A(vertical)} = F_g + F_a + F_0$
   $= m_g \cdot g + m_g \cdot a + M_0 \cdot 2\pi / U_{ZR}$
4. Calculation of all static and dynamic bending moments $M_x$, $M_y$ and $M_z$ which occur in the application
   $M = F \cdot l$
5. Selection of maximum permissible loads via Table T3.
6. Calculation and checking of the combined load, which must not be higher than 1.
7. Checking of the maximum torque that occurs at the drive shaft in Table T2.
8. Checking of the required action force $F_A$ with the permissible load value from Table T1.

For motor sizing, the effective torque must be determined, taking into account the cycle time.

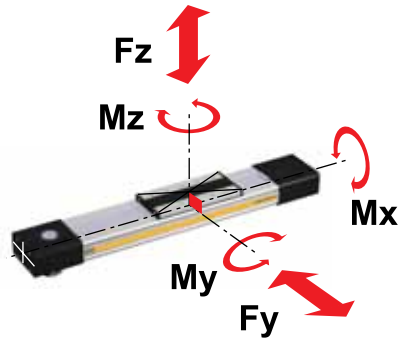
### Legend

$l$ = distance of a mass in the x-, y- and z-direction from the guide [m]
$m_e$ = external moved mass [kg]
$m_{LA}$ = moved mass of actuator [kg]
$m_g$ = total moved mass ($m_e + m_{LA}$) [kg]
$F_{x/y}$ = load excerted on the carrier in dependence of the installation position [N]
$F_A$ = action force [N]
$M_0$ = no-load torque [Nm]
$U_{ZR}$ = circumference of the pulley (linear movement per revolution) [m]
$g$ = gravity [m/s$^2$]
$a_{max.}$ = maximum acceleration [m/s$^2$]

# Loads, Forces and Moments

## Combined Loads

If the actuator is subjected to several forces, loads and moments at the same time, the maximum load is calculated with the equation shown here.
The maximum permissible loads must not be exceeded.




## Equation of Combined Loads

$$\frac{Fy}{Fy\,(max)} + \frac{Fz}{Fz\,(max)} + \frac{Mx}{Mx\,(max)} + \frac{My}{My\,(max)} + \frac{Mz}{Mz\,(max)} \leq 1$$

The total of the loads must not exceed >1 under any circumstances.

$M = F \cdot l$ [Nm]
$M_x = M_{x\,static} + M_{x\,dynamic}$
$M_y = M_{y\,static} + M_{y\,dynamic}$
$M_z = M_{z\,static} + M_{z\,dynamic}$

The distance ($l_x$, $l_y$, $l_z$) for calculation of moments relates to the centre axis of the actuator. Bending moments are calculated from the centre of the actuator and F indicates actual force.

## Maximum Permissible Unsupported Length

### Stroke length

The stroke lengths of the actuators are available in multiples of 1 mm up to 5700 mm.

Other stroke lengths are available on request.
The end of stroke must not be used as a mechanical stop.
Allow an additional safety clearance at both ends equivalent to the linear movement of one revolution of the drive shaft, but at least 100 mm.
The use of an AC motor with frequency converter normally requires a larger clearance than that required for servo systems.

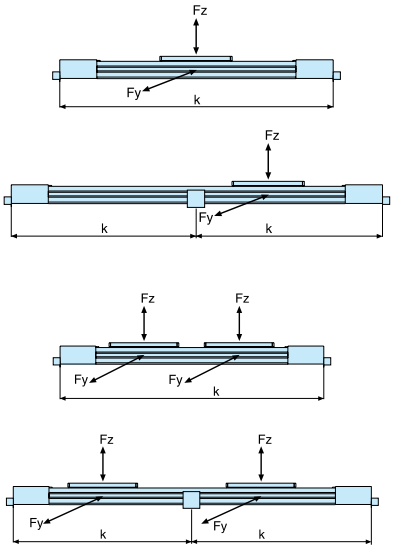
For advice, please contact your local Parker technical support department.

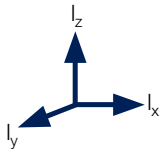
* For the bi-parting version the maximum load (F) complies with the total of the load at both carriers.
$F = F_{carriage\ 1} + F_{carriage\ 2}$

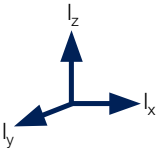
k = Maximum permissible distance between mountings/mid-section support for a given load F.

If the loads are below or up to the curve in the graph the deflection will be max. 0.01 % of distance k.

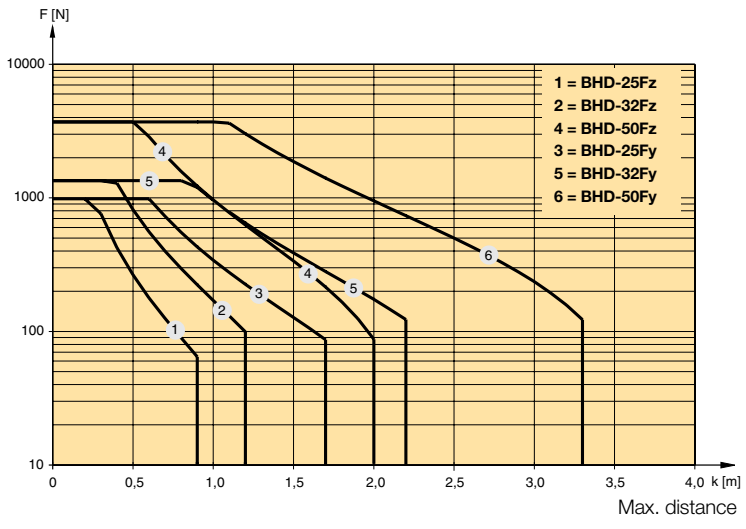
## Maximum Permissible Unsupported Length – Placing of Profile Mounting



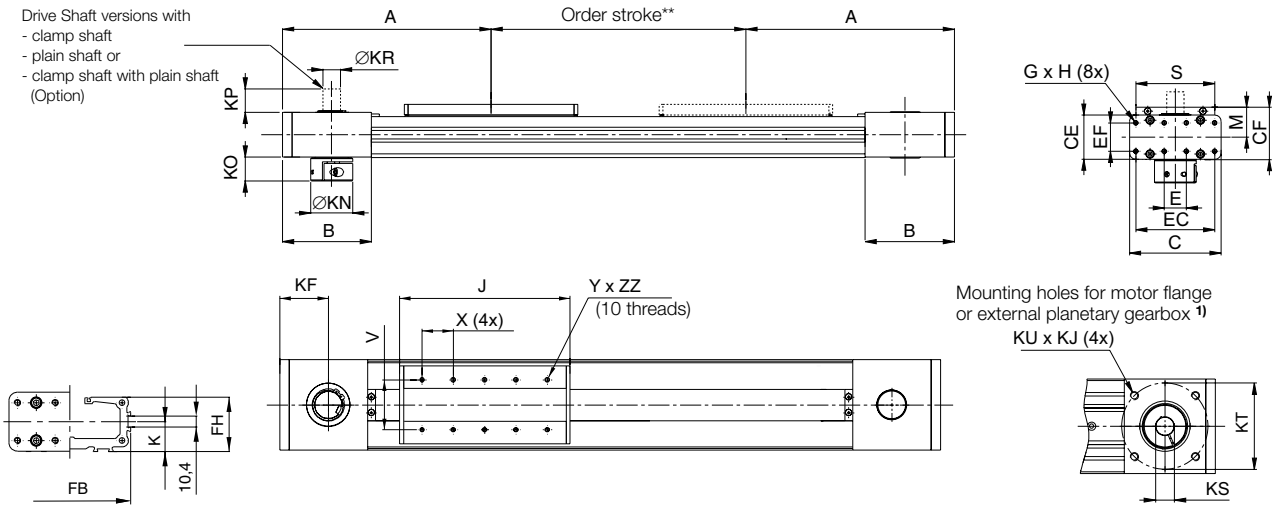




Loads



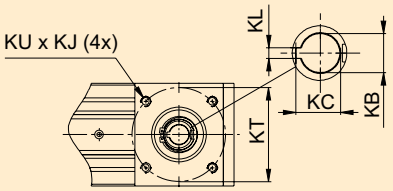

Max. distance

## Linear Drive with Toothed Belt and Integrated Roller Guide - Basic Unit OSP-E..BHD




**Hollow Shaft with Keyway (Option)**
**Dimension [mm]**

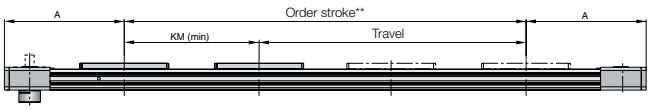
| Series | KB* | KC | KL | KT | KU x KJ |
|---|---|---|---|---|---|
| OSP-E25BHD | $16^{H7}$ | 18.3 | 5 | 82 | M8 x 8 |
| OSP-E25BHD | $22^{H7}$ | 24.8 | 6 | 106 | M10 x 12 |
| OSP-E50BHD | $32^{H7}$ | 35.3 | 10 | 144 | M12 x 19 |




**1) Note:** The mounting holes for the coupling housing / motor flange / gearbox are located on the opposite side to the carrier (motor mounting standard). They also can be located on the same side as the carrier (motor mounting 180° standard).

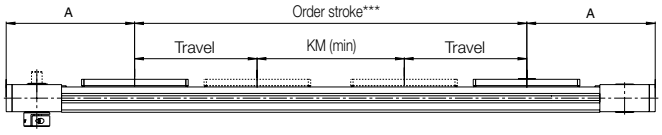
*** Note:** The mechanical end position must not be used as a mechancial end stop. Allow an additional safety clearance at both ends equivalent to the linear movement of one revolution of the drive shaft, but at least 100 mm. Order stroke = required travel + 2 x safety distance.
The use of an AC motor with frequency converter normally requires a larger safety clearance than that required for servo systems. For further information please contact you local Parker representative.

### Option Tandem




** Order stroke = required travel + KM min + 2 x safety distance

### Option - Bi-Parting




*** Order stroke = 2 x required travel + KM min + 2 x safety distance

### Dimension Table [mm]

| Series | A | B | C | E | GxH | J | K | M | S | V | X | YxZZ | CE | CF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OSP-E25BHD | 218 | 88.0 | 93 | 25 | M5x10 | 178 | 21.5 | 31.0 | 85 | 64 | 40 | M6x8 | 42 | 52.5 |
| OSP-E32BHD | 262 | 112 | 116 | 28 | M6x12 | 218 | 28.5 | 38.0 | 100 | 64 | 40 | M6x10 | 56 | 66.5 |
| OSP-E50BHD | 347 | 147 | 175 | 18 | M6x12 | 263 | 43.0 | 49.0 | 124 | 90 | 60 | M6x10 | 87 | 92.5 |

| Series | EC | EF | FB | FH | KF | $KM_{min}$ | $KM_{empf.}$ | KN | KO | KP | KR | KS | KT | KUxKJ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OSP-E25BHD | 79 | 27 | 92 | 39.5 | 49.0 | 210 | 250 | 34 | 21.7 | 30 | $16_{h7}$ | $16^{H7}$ | 82.0 | M8x8 |
| OSP-E32BHD | 100 | 36 | 116 | 51.7 | 62.0 | 250 | 300 | 53 | 30.0 | 30 | $22_{h7}$ | $22^{H7}$ | 106.0 | M10x12 |
| OSP-E50BHD | 158 | 70 | 164 | 77.0 | 79.5 | 295 | 350 | 75 | 41.0 | 35 | $32_{h7}$ | $32^{H7}$ | 144.0 | M12x19 |

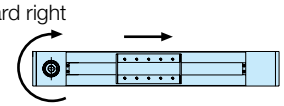
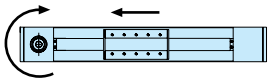
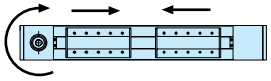
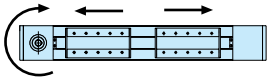
Other dimensions for KS and KB for special drive shafts on request - see other instructions.

| Order Instructions | OSPE20 | – | 6 | 0 | 0 | 02 | – | 00000 | – | 0 | 00 | 0 | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

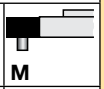
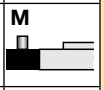
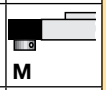
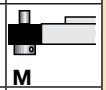
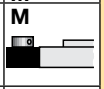
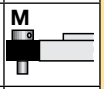
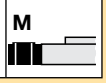
| Size of Actuator | |
|---|---|
| **20** | Size 20 (only Type of actuator 6) |
| **25** | Size 25 |
| **32** | Size 32 |
| **50** | Size 50 |

| Type of Actuator | |
|---|---|
| **5** | Belt Actuator with Integrated Roller Guide (for size 25, 32 and 50) |
| **6** | Belt Actuator with Integrated Ball Bearing Guide |

| Carriage | |
|---|---|
| **0** | Standard |
| **1*** | Tandem |
| **2*** | Bi-parting |

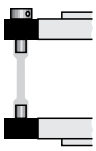
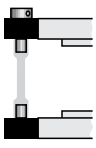
| Operating Direction | |
|---|---|
| **0** | Standard right  |
| **1** | Standard left  |
| **2** | Bi-parting right  |
| **3** | Bi-parting left  |

| Order stroke |
|---|
| 5 digits input in mm |

| Drive Shaft | Special drive shaft on request (8/9) | Motor mounting position see **M** |
|---|---|---|
| **0 A** | Plain Shaft |  |
| **0 B** | Plain Shaft |  |
| **0 2** | Clamp Shaft |  |
| **0 3*** | Clamp Shaft with Plain Shaft |  |
| **0 4** | Clamp Shaft |  |
| **0 5*** | Clamp Shaft with Plain Shaft |  |
| **0 6*** | Hollow Shaft with Keyway |  |
| **0 7*** | Hollow Shaft with Keyway |  |

| Integrated Gear * | | |
|---|---|---|
| **1 x**** | Ratio i=3 |  |
| **2 x**** | Rratio i=5 | |
| **3 x**** | Ratio i=10 | |
| **4 x**** | Ratio i=3 |  |
| **5 x**** | Ratio i=5 | |
| **6 x**** | Ratio i=10 | |

**OSP-E.. BHD as Parallel Actuator with Intermediate Drive Shaft MAS-..**

| | |
|---|---|
| OSP-E..60**0**0**5**-.. <br> OSP-E..60**1**0**A**-.. | **M**  |
| OSP-E..60**0**0**3**-.. <br> OSP-E..60**1**0**B**-.. | **M**  |

Drive shaft
Operating direction

| Magnetic Sensors * | see page 165 ff |
|---|---|
| **0** | without |
| **1** | 1 pc. RST-K 2NO / 5 m cable |
| **2** | 1 pc. RST-K 2NC / 5 m cable |
| **3** | 2 pc. RST-K 2NC / 5 m cable |
| **4** | 2 pc. RST-K 2NC,<br>1 pc. RST-K 2NO / 5 m cable |
| **5** | 1 pc. RST-S 2NO / M8 plug |
| **6** | 1 pc. RST-S 2NC / M8 plug |
| **7** | 2 pc. RST-S 2NC / M8 plug |
| **8** | 2 pc. RST-S 2NC,<br>1 pc. RST-S 2NO / M8 plug |
| **A** | 1 pc. EST-S NPN / M8 plug |
| **B** | 2 pc. EST-S NPN / M8 plug |
| **C** | 3 pc. EST-S NPN / M8 plug |
| **D** | 1 pc. EST-S PNP / M8 plug |
| **E** | 2 pc. EST-S PNP / M8 plug |
| **F** | 3 pc. EST-S PNP / M8 plug |

| Mounting Kit for Gear * | | | | | |
|---|---|---|---|---|---|
| **Size** | | **20** | **25** | **32** | **50** |
| **A7** | PS60 | x [2] | x [1] | | |
| **A8** | PS90 | | | x [1] | |
| **A9** | PS115 | | | | x [1] |
| **C0** | LP050 / PV40-TA | x [1] | | | |
| **C1** | LP070 / PV60-TA | x [2] | x [1] | | |
| **C2** | LP090 / PV90-TA | | | x [1] | |
| **C3** | LP120 | | | | x [1] |

x [1]: Kit for **Drive Shaft** with clamp shaft (02 / 03 / 04 / 05)

x [2]: Kit for **Drive Shaft** with plain shaft (0A / 0B)

**Info:** Motor and gear mounting dimensions see page 191

| Profile Mounting * | see page 147 ff |
|---|---|
| **0** | without |
| **1** | 1 Pair Type E1 |
| **2** | 1 Pair Type D1 |
| **3** | 1 Pair Type MAE |
| **4** | 2 Pair Type 1 |
| **5** | 2 Pair Type D1 |
| **6** | 2 Pair Type MAE |
| **7** | 3 Pair Type 1 |
| **8** | 3 Pair Type D1 |
| **9** | 3 Pair Type MAE |
| **A** | 4 Pair Type 1 |
| **B** | 4 Pair Type D1 |
| **C** | 4 Pair Type MAE |

| Niro | |
|---|---|
| **0** | Standard |
| **1*** | Niro Screws |

| End Cap Mounting * | see page 141 ff |
|---|---|
| **0** | without |
| **A** | 1 pair Type CN |
| **B** | 1 pair Type CO |

| Accessories - please order separately | |
|---|---|
| **Description** | **Page** |
| Motor Mountings | 135 |
| Multi-Axis Systems for Actuators | 177 ff |

***** Option
** for sizes 25, 32 and 5