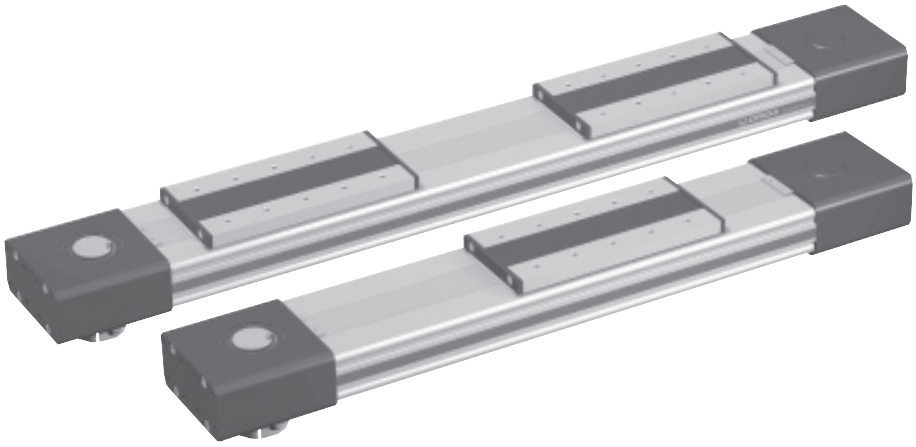
Linear Actuator with Toothed Belt and Integrated Roller Guide Series OSP-E..BHD



Contents

HOERBIGER ORIGA

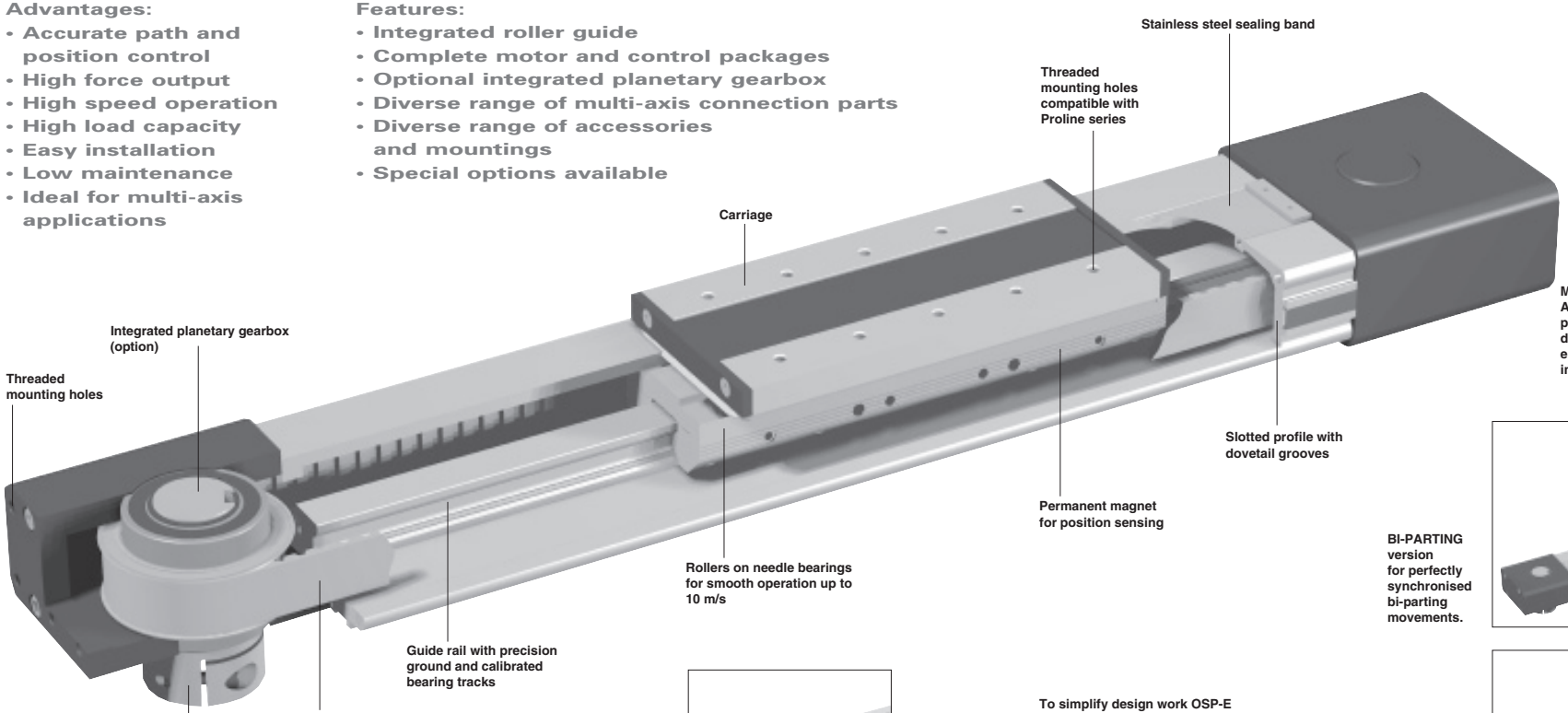
ELECTRIC LINEAR ACTUATOR FOR HEAVY DUTY APPLICATIONS

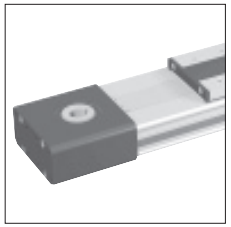
The latest generation of high capacity linear drives, the OSP-E..BHD series combines robustness, precision and high performance. The aesthetic design is easily integrated into machine constructions by virtue of extremely adaptable mountings.

Linear Actuator with Toothed Belt and Integrated 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

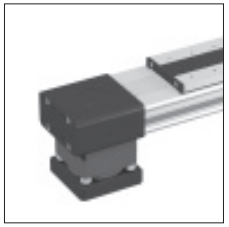
Features:
- Integrated roller guide
- Complete motor and control packages
- Optional integrated planetary gearbox
- Diverse range of multi-axis connection parts
- Diverse range of accessories and mountings
- Special options available

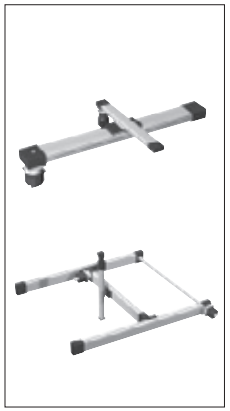




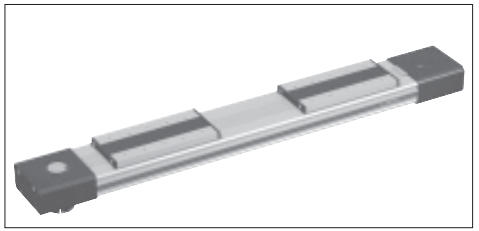
Hollow shaft with keyway (option)

Optional Integrated PLANETARY GEARBOX
- Highly compact and rigid solution fully integrated in the drive end 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





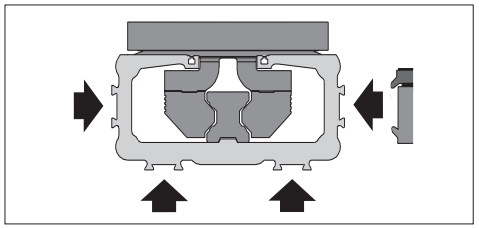
MULTI-AXIS
A wide range of adapter plates and intermediate drive shafts simplify engineering and installation



BI-PARTING version for perfectly synchronised bi-parting movements.

To simplify design work OSP-E system CAD files are available, which are compatible with most common CAD systems.

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.



Accessories

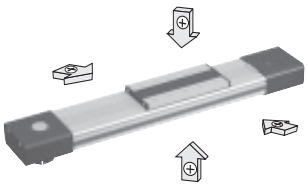
OPTIONS AND ACCESSORIES

SERIES OSP-E, BELT DRIVE WITH INTEGRATED ROLLER GUIDE

STANDARD VERSIONS OSP-E..BHD

Data sheets 1.15.002E-1, -2

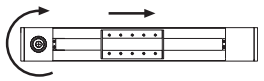
Standard carrier with integrated roller guide. Dovetail profile for mounting of accessories and the actuator itself.



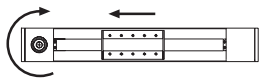
BASIC ACTUATOR OPTIONS

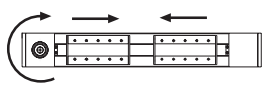
BI-PARTING VERSION
Data sheet 1.15.002E
For perfectly synchronised bi-parting movements.

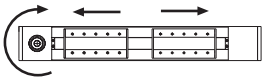
DRIVE SHAFT OPTIONS
ACTUATING DIRECTION
Important in parallel operations, e.g. with intermediate drive shaft
Data sheet 1.15.002-6E



(Standard)







(Standard – Bi-Parting Version)

INTEGRATED PLANETARY GEARBOX

Data sheet 1.15.002E-5
For required torque and speed reduction

CLAMP SHAFT WITH CONNECTION SHAFT
For connection to connecting shaft (Data sheet 1.38.004E)

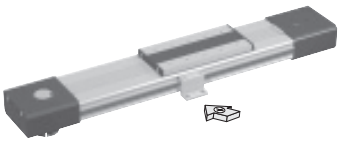
HOLLOW SHAFT WITH KEYWAY
For close coupling of motors and external gears

ACCESSORIES

END CAP MOUNTING
Data sheet 1.45.022E
For mounting the drives on the end cap

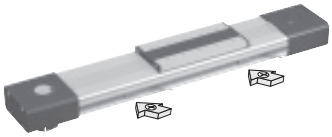
MID-SECTION SUPPORT

Data sheet 1.45.023 E
For supporting long actuators or mounting the actuator on dovetail grooves.



PROXIMITY SENSOR SERIES RS AND IS

Data sheet 1.45.101E
For electrical sensing of end of stroke and intermediate carrier positions.



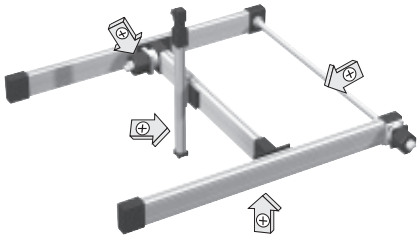
MOTOR MOUNTINGS

Data sheet 1.45.0028E
For linear drive with clamp shaft

MULTI-AXIS CONNECTIONS

Data sheet 1.38.001E

For connection of linear drives in multi-axis systems. Carrier to carrier or carrier to profile and connecting shaft for parallel drive arrangements are available.



Linear Actuator with Toothed Belt

and Integrated Roller Guide

Series OSP-E..BHD
Size 25, 32, 50

OSP
ORIGA SYSTEM PLUS

Characteristics				
Characteristics		Symbol	Unit	Description
General Features				
Type				Belt-Driven Linear Actuator with integrated roller guide
Series				OSP-E..BHD / OSP-E..BHD-BP
Mounting				See drawings
Ambient Temperature range		ϑ_{min} ϑ_{max}	°C °C	-30 +80
Weight (mass)			kg	See table
Installation				In any position
Material	Slotted profile			Extruded anodized aluminium
	Toothed belt			Steel-corded polyurethane
	Belt wheels			Aluminium
	Rails			Aluminium
	Tracks			High alloy spring steel
	Roller cassettes			Roller bearing steel in aluminium casing
	Sealing band			Hardened stainless steel
	Screws, nuts			Zinc plated steel
	Mountings			Zinc plated steel and aluminium
Encapsulation class			IP	54

Weight (mass) kg 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
OSP-E25BHD	3.8	4.3	1.0	984	197
OSP-E32BHD	7.7	6.7	1.9	3498	438
OSP-E50BHD	22.6	15.2	4.7	19690	1489
OSP-E25BHD-BP	5.7	4.3	2.0	1805	197
OSP-E32BHD-BP	11.3	6.7	3.8	6358	438
OSP-E50BHD-BP	31.7	15.2	9.4	34274	1489

Standard Versions:

- Standard carrier with integrated roller guide
- Dovetail profile for mounting of accessories and the actuator itself
- Clamp shaft

Special Versions:

- Bi-parting version for synchronised movements (OSP-E..BHD -BP).
- Integrated planetary gearbox.
- Drive shaft / Actuating direction
- Clamp shaft with connection shaft (for use in Multi-Axis systems with connecting shaft)
- Hollow shaft with keyway

Installation Instructions

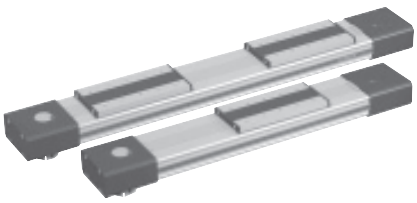
Use the threaded holes in the end cap for mounting the linear actuator. Check if mid-section supports are needed using the maximum allowable unsupported length graph on data sheet 1.15.002E-3.
At least one end cap must be secured to prevent axial sliding when mid-section support is used.

Maintenance

All moving parts are lifetime-lubricated. We recommend a check of the linear actuator after an opera-tion time of 12 months of operation or 3000 km, depending on the type of application. Please see separate instructions.

Commissioning

The products in this data sheet should not be operated until the machine/application in which they are used has passed necessary inspection.



For **Proximity Sensors** see 1.45.101E
For **Mountings and Accessories** see 1.45.020E to 028E
For **Multi-Axis Connections** see 1.38.001E

HOERBIGER
ORIGA

Sizing Performance Overview Maximum Loadings

Sizing of Linear Actuator

The following steps are recommended:

1. Calculate the static and the dynamic moments [Nm] created by the load **L** [N], the distance **r** [m] and the acceleration **a** [m/s^2] in all directions (M, M_s and M_v) according to the diagram below.
2. Make a preliminary choice and get the calculation factors from the table.
3. Check maximum allowable torque on the drive shaft (pay attention to the note under the table). If the value is lower than required, overview the moving profile or select if possible a bigger unit.
4. Before sizing and specifying the motor, the rms torque must be calculated using the cycle time of the application.
5. Check that maximum allowable unsupported length is not exceeded (see data sheet 1.15.002E-3).

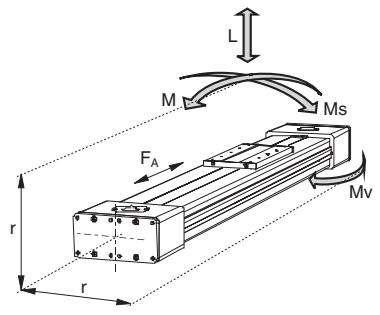
Performance Overview

Characteristics		Unit	Description		
Series			**OSP-E25BHD**	**OSP-E32BHD**	**OSP-E50BHD**
Max. speed		[m/s]	10	10	10
Linear motion per revolution, drive shaft		[mm]	180	240	350
Max. rpm. drive shaft		[min^{-1}]	3000	2500	1700
Max. effective	< 1 m/s:	[N]	1070	1870	3120
action force	1-3 m/s:	[N]	890	1560	2660
F_A at speed*	> 3-10 m/s:	[N]	550	1030	1940
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]	7000	7000	7000

Maximum Allowable 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 moment on the drive shaft is the lowest value of the speed- or stroke-dependent moment 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.
When sizing Bi-parting units the stroke is the ordering stroke, see data sheet 1.15.002E-4.



$M = F \cdot r$
Bending moments are calculated from the centre of the linear actuator and F indicates actual force

$M = M_{stat} + M_{dyn}$
$M_s = M_{s,\,stat} + M_{s,\,dyn}$
$M_v = M_{v,\,stat} + M_{v,\,dyn}$

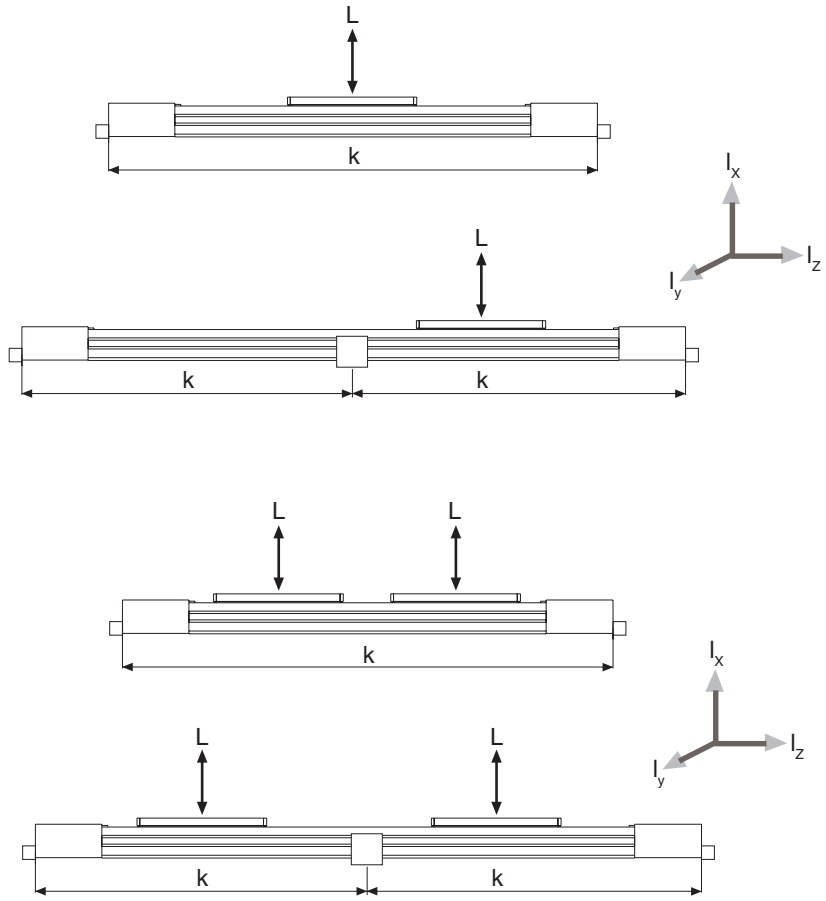
Maximum Allowable Static Loadings

Series	Max. applied load L[N]	Max. moments [Nm] M	M_s	M_v
OSP-E25BHD	986	64	11	84
OSP-E32BHD	1348	115	19	115
OSP-E50BHD	3704	365	87	365

$$\frac{L}{L\,(max)} + \frac{M}{M\,(max)} + \frac{M_s}{M_s\,(max)} + \frac{M_v}{M_v\,(max)} \leq 1$$

With a load factor ≤ 1 the service life is 5000 km.
The total of the loads must not exceed 1 under any circumstances.

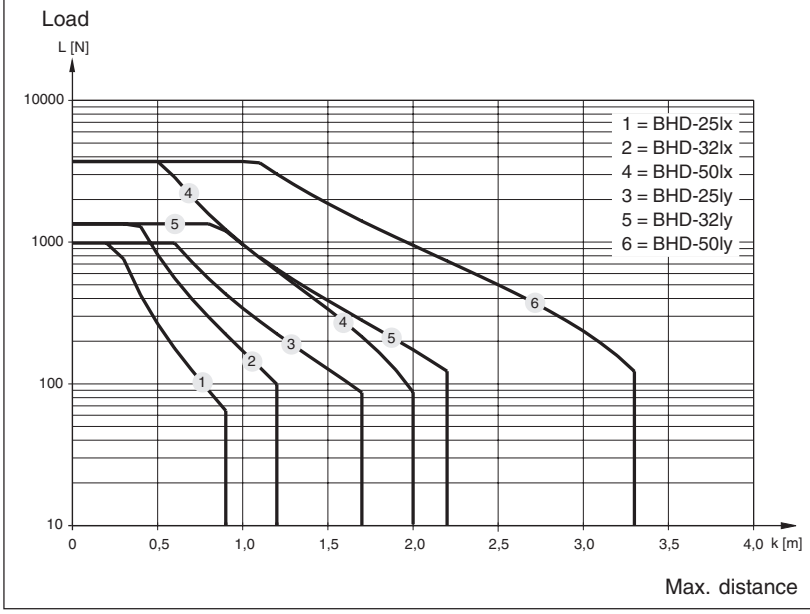
Maximum Allowable Unsupported Length – Placing of Mid-Section Support



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

k = Max. allowable distance between mountings/mid-section support for a given load L

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



Maximum Allowable Unsupported Length

Stroke Length

Stroke Length

The stroke lengths of the linear actuators are available in multiples of 1 mm up to 7000 mm

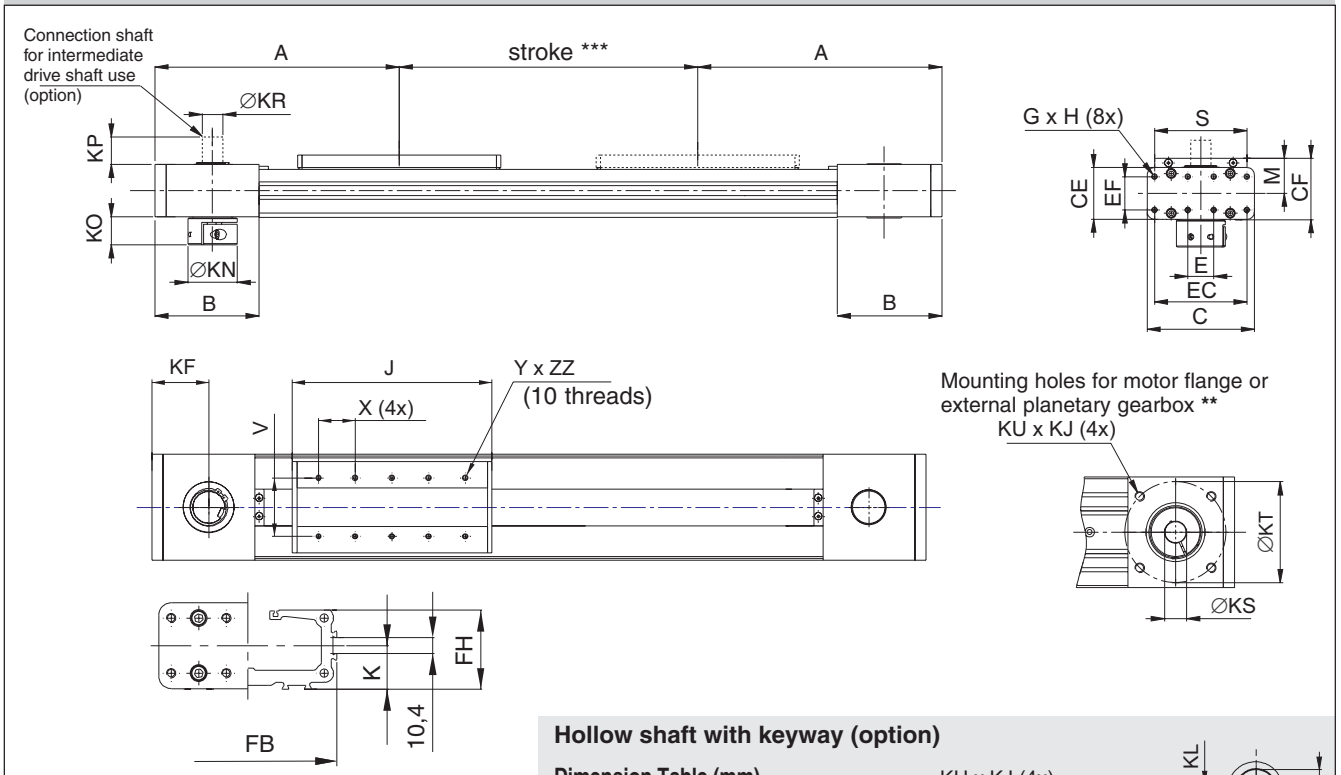
Other stroke lengths are available on request.

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 HOERBIGER-ORIGA technical support department.

Belt Driven Linear Actuator – Basic Unit
Series OSP-E25BHD, -E32BHD, -E50BHD

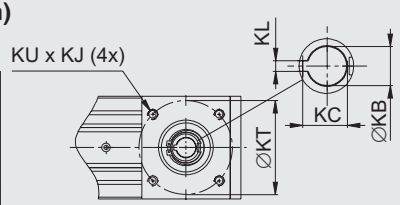


**** Note:**
The mounting holes for the coupling housing/motor flange/gearbox are located on the opposite side to the carrier as standard. As an option they can be located on the same side as the carrier.
(For additional drive shaft/actuating direction options see the Order Instructions on Data Sheet 1.15.002E-6).

Hollow shaft with keyway (option)

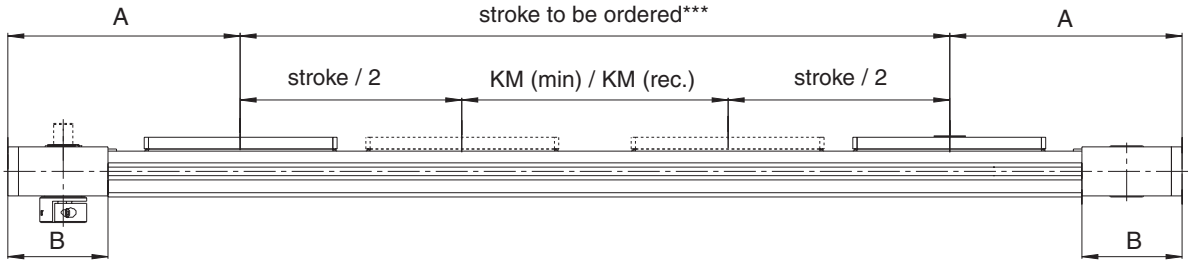
Dimension Table (mm)

Serie	KB*	KC	KJ	KL	KT	KU
OSP-E25BHD	16^{H7}	18.3	8	5	82	M8
OSP-E32BHD	22^{H7}	24.8	12	6	106	M10
OSP-E50BHD	32^{H7}	35.3	19	10	144	M12



*Other dimensions for KB on request, see ordering information on data sheet 1.15.002E-6

Options – Bi-Parting Version
Series OSP-E25BHD-BP, -E32BHD-BP, -E50BHD-BP



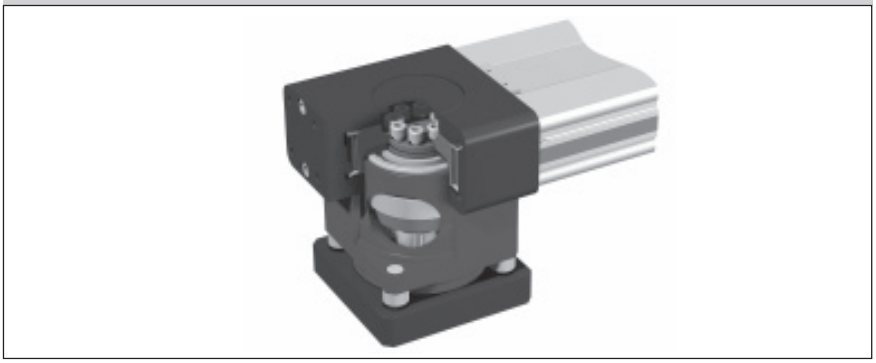
***** Note**:
The mechanical end position must not be used as a mechancial end stop.
Allow an additional safety clearance at both ends equivalent to the linear movement of one revolution of the drive shaft, but at least 100 mm.
The use of an AC motor with frequency converter normally requires a larger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

Dimension Table (mm)

Series	A	B	C	E	G	H	J	K	M	S	V	X	Y	CE	CF	EC	EF	FB	FH	KF	KJ	KM_{min}	$KM_{rec.}$	KN	KO	KP	KR	KS*	KT	KU	ZZ
OSP-E25BHD	218	88	93	25	M5	10	178	21.5	31	85	64	40	M6	42	52.5	79	27	92	39.5	49	8	210	250	34	21.7	30	16^{h7}	16^{H7}	82	M8	8
OSP-E32BHD	262	112	116	28	M6	12	218	28.5	38	100	64	40	M6	56	66.5	100	36	116	51.7	62	12	250	300	53	30	30	22^{h7}	22^{H7}	106	M10	10
OSP-E50BHD	347	147	175	18	M6	12	263	43	49	124	90	60	M6	87	92.5	158	70	164	77	79.5	19	295	350	75	41	35	32^{h7}	32^{H7}	144	M12	10

*Other dimensions for KS on request, see ordering information on data sheet 1.15.002E-6

Series OSP-E..BHD – with optional Integrated Planetary Gearbox



Integrated Planetary Gearbox

Features
- Highly compact and rigid solution fully integrated in the drive end 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

Please contact your local HOERBIGER-ORIGA technical support for available motor flanges.

For motors and controllers, see separate catalogue.

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

Standard Version:
- Gearbox on opposite side to carrier

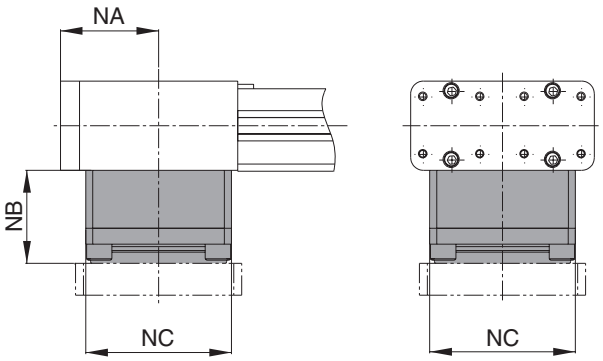
Special Version:
- Gearbox on same side as carrier

Note:
When ordering, specify type of motor and model for correct motor flange.

Performance Overview

Characteristics		Unit	Description		
			OSP-E25BHD	**OSP-E32BHD**	**OSP-E50BHD**
Ratio (1-stage)	i		3/5/10	3/5/10	3/5/10
Max axial load	F_{amax}	[N]	1550	1900	4000
Torsional rigidity (i=5)	$C_{t.21}$	[Nm/arcmin]	3.3	9	24
Torsional rigidity (i=3/10)	$C_{t.21}$	[Nm/arcmin]	2.8	7.5	20.5
Torsional backlash	J_t	[arcmin]	<12	<12	<12
Linear movement per rotation of drive shaft		[mm]	220	280	360
Nominal input speed	n_{nom}	[min^{-1}]	3700	3400	2600
Max input speed	n_{1max}	[min^{-1}]	6000	6000	6000
No-load running torque at Nominal input speed	T_{012}	[Nm]	<0.14	<0.51	<1.5
Lifetime		[h]	20 000	20 000	20 000
Efficiency (1-stage)	η	[%]	>97	>97	>97
Noise level (n_1=3000 min^{-1})	L_{PA}	[db]	<70	<72	<74

Dimensions



(For drive shaft/actuating direction options, see information on data sheet 1.15.002E-6).

Dimension Table (mm) and additional Weight (kg)

Series	NA	NB	NC	Weight (mass) [kg]
OSP-E25BHD	49	43	76	2.6
OSP-E32BHD	62	47	92	4.9
OSP-E50BHD	79.5	49.5	121	9.6

Order Instructions – Basic Electric Linear Actuator - Series OSP-E..BHD

Electric Linear Actuator

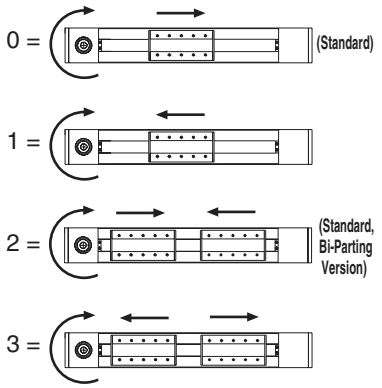
OSP-E	25 – 5	0	0	0	2 – 00500

Size
25 = Size 25
32 = Size 32
50 = Size 50

Actuator
5 = Belt-driven Heavy Duty (BHD)

Carrier Mounting
0 = Standard
1 = Tandem
(Option, please contact customer support)
2 = Bi-Parting

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



Integrated Gearbox

0 =	Without integrated gearbox
1 =	Integrated gearbox, Ratio i = 3 Gearbox on opposite side to carrier
2 =	Integrated gearbox, Ratio i = 5 Gearbox on opposite side to carrier
3 =	Integrated gearbox, Ratio i = 10 Gearbox on opposite side to carrier
4 =	Integrated gearbox, Ratio i = 3 Gearbox on same side as carrier
5 =	Integrated gearbox, Ratio i = 5 Gearbox on same side as carrier
6 =	Integrated gearbox, Ratio i = 10 Gearbox on same side as carrier

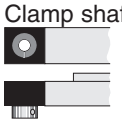
Specify type of motor and model for correct motor flange

Stroke
Input (five digits) in mm

Drive Shaft Options

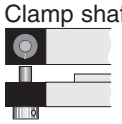
X = No option (Integrated gearbox)

2 = Clamp shaft, Standard



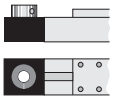
Motor on opposite side to carrier

3 = Clamp shaft + connection shaft



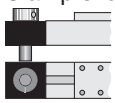
Motor on opposite side to carrier

4 = Clamp shaft, Standard



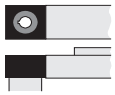
Motor on the same side as carrier

5 = Clamp shaft + connection shaft



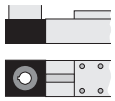
Motor on the same side as carrier

6 = Hollow shaft with keyway (Option)



Motor on opposite side to carrier

7 = Hollow shaft with keyway (Option)



Motor on the same side as carrier

8 = Non-standard drive shaft
Motor on the same side as carrier

9 = Non-standard drive shaft
Motor on opposite side to carrier

Please contact customer support for specification of drive shaft type, location placing and KB/KS dimension

Accessories - please order separately

Description	Data Sheet No.
End Cap Mountings	**1.45.022E**
Mid-Section Support	**1.45.023E**
Adaptor Profile	**1.45.026E-1**
T-Nut Profile	**1.45.026E-2**
Coupling Housing (for motor, Clamp Shaft version only)	**1.45.028E-2**
Flange for Planetary Gearbox LP	**1.45.028E-3**
Proximity Sensors	**1.45.101E**
Multi-Axis Connection Systems for linear drives	**1.38.001E**
Stepper Motor and Controller	**1.60.001E-1.60.004E**
AC-Servo Motor and Controller	**1.60.001E-1.60.004E**