

Vertical Linear Drive with Toothed Belt and Integrated Recirculating Ball Bearing Guide Series OSP-E..BV



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TOOTHED BELT DRIVE FOR VERTICAL MOVEMENTS IN MULTI-AXIS SYSTEMS

The OSP-E..BV vertical linear drive with toothed belt and integrated recirculating ball bearing guide has been specially developed for lifting movements in the Z-axis. The especially low vibration OSP-E..BV vertical drive in combination with the heavy duty series OSP-E..BHD meets the highest demands in portal and handling applications.

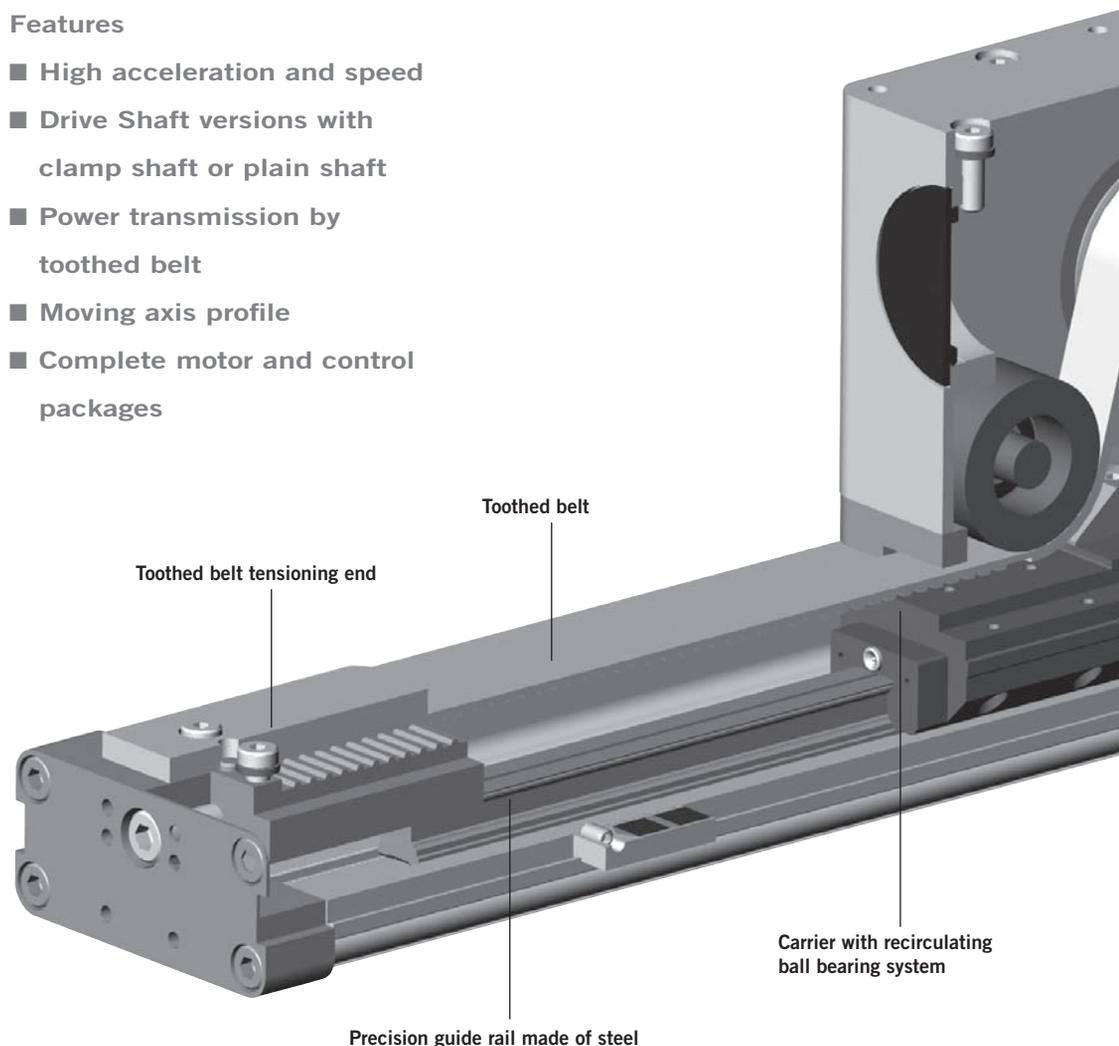
Vertical Linear Drive with Toothed Belt and integrated Recirculating Ball Bearing Guide

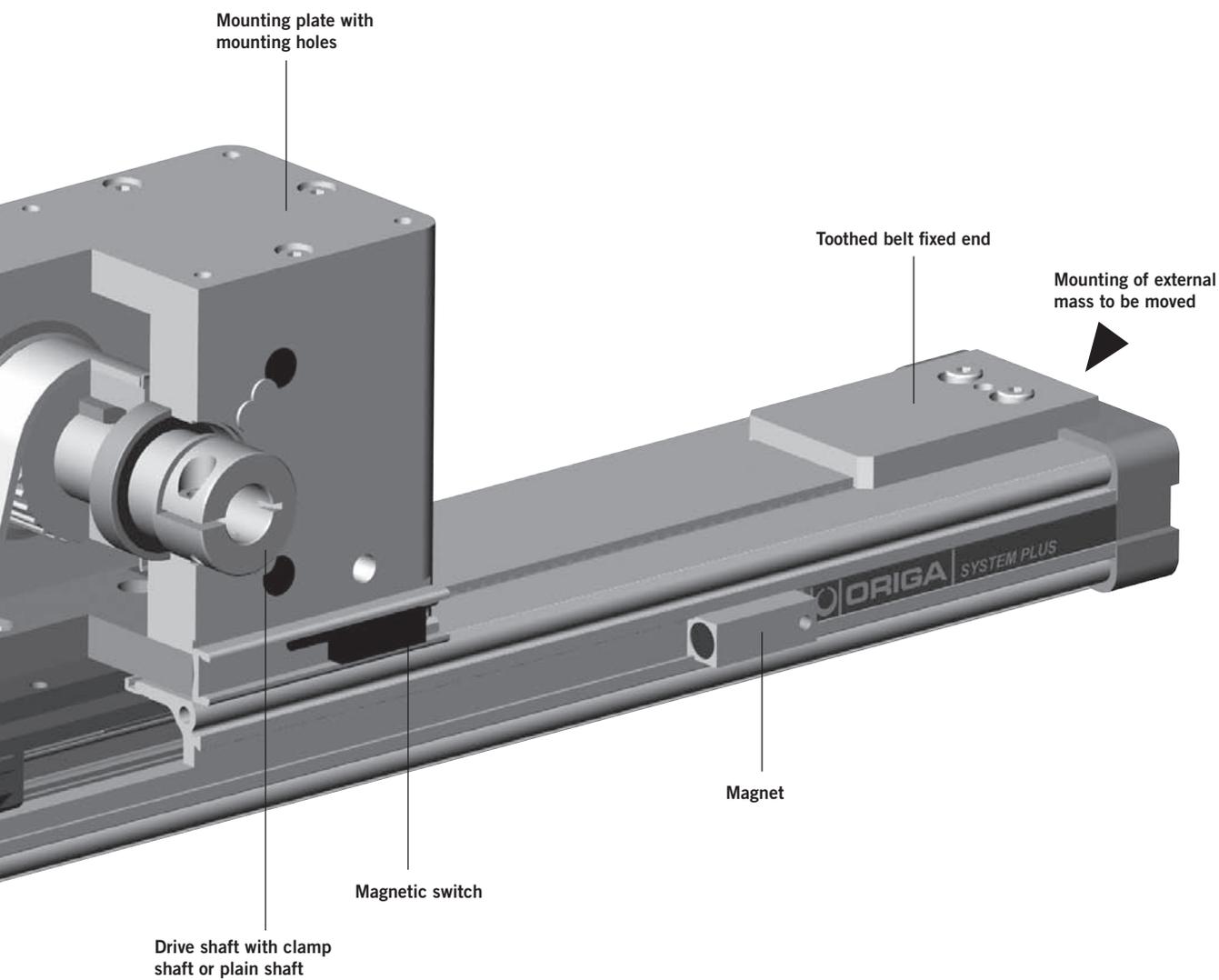
Advantages

- Fixed drive head for low moving mass
- Integrated recirculating ball bearing guide for high bending moments
- Magnetic switch set for contactless position sensing
- Easy to install
- Low maintenance

Features

- High acceleration and speed
- Drive Shaft versions with clamp shaft or plain shaft
- Power transmission by toothed belt
- Moving axis profile
- Complete motor and control packages





Take the easy route and load all the dimensions into your system. The file is suitable for all current CAD systems – available on CD-Rom or at www.parker-origa.com



OPTIONS AND ACCESSORIES

SERIES OSP-E, VERTICAL LINEAR DRIVE WITH TOOTHED BELT AND INTEGRATED RECIRCULATING BALL BEARING GUIDE

STANDARD VERSION OSP-E..BV

Data Sheet No. 1.20.016E-1, -2
Standard drive head with clamp shaft or tenon and integrated recirculating ball bearing guide with two carriers. Choice of side on which gearbox or motor is to be mounted.

Drive Shaft with Clamp Shaft



Drive Shaft with Plain Shaft



DRIVE SHAFT
"CLAMP SHAFT AND PLAIN SHAFT"
OR "DOUBLE PLAIN SHAFT"
e.g. for parallel operation of two Z-axes with an intermediate drive shaft.

Drive Shaft with Clamp Shaft and Plain Shaft



Drive Shaft with Double Plain Shaft

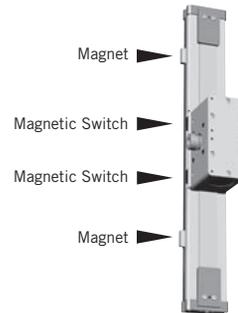


ACCESSORIES

MOTOR MOUNTINGS
Data Sheet No. 1.44.006E-3
For connection of gearbox or motor direct to drive shaft with clamp shaft, or with a motor coupling to drive shaft with plain shaft.



MAGNETIC SWITCHES SET
Data Sheet No. 1.20.016E-4
Magnetic switches with connector, mounting rail and magnets for contactless sensing of the end positions. Cable (suitable for cable chain) can be ordered separately in 5 m, 10 m or 15 m length.



OPTIONS

TANDEM
Data Sheet No. 1.20.016-1, -2
Additional drive head and two additional carriers for higher bending moments.



HOLLOW SHAFT WITH KEYWAY
For direct connection of gearbox or motor with keyway.



MULTI-AXIS SYSTEMS
Data Sheet No. 1.38.001E, 1.38.002E, 1.38.004E
For modular assembly of linear drives up to multi-axis systems.



A3P750E00GAG50X

The right to introduce technical modifications is reserved

Characteristics			
Characteristics	Symbol	Unit	Description
General Features			
Series			OSP-E..BV
Name			Vertical linear drive with toothed Belt and integrated recirculating ball bearing guide
Mounting			See drawings
Temperature range	ϑ_{\min} ϑ_{\max}	°C °C	-30 +80
Weight (mass)		kg	See table
Installation			vertical
Material	Profile		Extruded anodized aluminium
	Toothed belt		Steel-corded polyurethane
	Pulley		Aluminium
	Guide		Recirculating 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 0.08 x C, accuracy class N
	Screws, nuts		Zinc plated steel
Encapsulating class		IP	20

Weight (mass) and Inertia							
Series	Total weight (Mass) [kg]		Moving mass [kg]		Inertia [x 10 ⁻⁶ kgm ²]		
	At stroke 0 m	Drive head	At stroke 0 m	Add per metre stroke	At Stroke 0 m	Add per metre stroke	Add per kg mass
OSP-E20BV	3.4	1.9	1.6	4.0	486	1144	289
OSP-E25BV	7.7	5.3	2.4	4.4	1695	2668	617.5
OSP-E20BV*	5.3	2 x 1.9	1.6	4.0	533	1144	289
OSP-E25BV*	13	2 x 5.3	2.4	4.4	1915	2668	617.5

* Version: Tandem (Option)

Installation Instructions

Make sure that the OSP-E..BV is always operated with a brake on the drive side. For the mounting of the external mass to be moved there are threaded holes in the end caps. Before mounting, check the correct centre of gravity distance from the table on Data Sheet No. 1.20.016E-3. Mount the external mass on the toothed belt fixed end, so that the belt tension can be checked and adjusted at the toothed belt tensioning end without dismantling.

Maintenance

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

First service start-up

The maximum values specified in the technical data sheet for the different products must not be exceeded. Before taking the linear drive machine into service, the user must ensure the adherence to the EC Machine Directive 91/368/EEC.

Vertical Linear Drive with Toothed Belt and Integrated Recirculating Ball Bearing Guide

Series OSP-E..BV Size 20, 25



Standard Version:

- Toothed Belt drive with integrated recirculating ball bearing guide
- Drive shaft with clamp shaft or plain shaft
- Choice of motor mounting side

Options:

- Tandem version for higher moments
- Drive shaft with
 - clamp shaft and plain shaft or double plain shaft
 - hollow shaft with keyway
- Special drive shaft versions on request.



The right to introduce technical modifications is reserved

Magnetic Switches see 1.44.030E

Sizing Performance Overview

Maximum Loadings

Sizing of Linear Drive

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 linear drive.
2. Calculation of the static and dynamic force F_A which must be transmitted by the toothed belt.

$$F_A = F_g + F_a + F_0$$

$$= m_g \cdot g + m_g \cdot a + M_0 \cdot 2\pi / U_{ZR}$$
3. Calculation of all static and dynamic moments M_x , M_y and M_z which occur in the application.
 $M = F \cdot l$
4. Selection of maximum permissible loads via Table T3.
5. Calculation and checking of the combined load, which must not be higher than 1.
6. Checking of the maximum moment that occurs at the drive shaft in Table T2.
7. 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 linear drive [kg]
- m_g = total moved mass ($m_e + m_{LA}$) [kg]
- 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]

Performance Overview			T1	
Characteristics	Unit	Description		
Series		OSP-E20BV	OSP-E25BV	
Max. Speed	[m/s]	3.0	5.0	
Linear motion per revolution of drive shaft	[mm/U]	108	160	
Toothed Belt		35ATL3	40ATL5	
Max. rpm. drive shaft	[min^{-1}]	1700	1875	
Max. effective action force F_A at speed	1 m/s	[N]	650	1430
	1 - 2 m/s	[N]	450	1200
	> 3 - 5 m/s	[N]	–	1050
No-load torque ²⁾	[Nm]	0.6	1.2	
Max. acceleration/deceleration	[m/s^2]	20	20	
Repeatability	+/- [mm/m]	0.05	0.05	
Max. standard stroke length ¹⁾	[mm]	1000	1500	
Max. recommended permissible mass ³⁾	[kg]	10	20	

¹⁾ Longer strokes on request and only with profile stiffening

²⁾ As a result of static friction force

³⁾ vertical

Max. Permissible Torque on Drive Shaft Speed / Stroke								T2
OSP-E-20BV				OSP-E-25BV				
Speed [m/s]	Torque [Nm]	Stroke [m]	Torque [Nm]	Speed [m/s]	Torque [Nm]	Stroke [m]	Torque [Nm]	
1	19	1	17	1	36	1	36	36
2	17	2	10.5	2	30	2	36	
3	15.5			3	30			
				4	28			
				5	27			

Important:

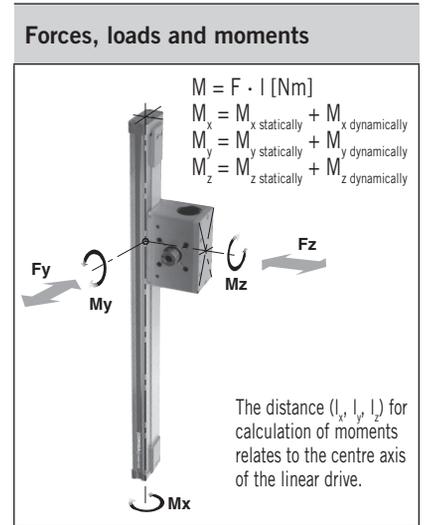
The maximum permissible moment on the drive shaft is the lowest value of the speed- or stroke-dependent moment value.

Example above:

OSP-E25BV required speed $v = 3$ m/s and stroke = 1 m.

Accordingly Table T2 shows permissible moments of 30 Nm for the speed and 36 Nm for the stroke. Therefore the maximum moment at the drive shaft is determined by the speed and must not exceed 30 Nm.

Maximum Permissible Loads T3					
Series	Max. applied load		Max. moments		
	Fy [N]	Fz [N]	Mx [Nm]	My [Nm]	Mz [Nm]
OSP-E20BV	1600	1600	20	100	100
OSP-E25BV	2000	3000	50	200	200



Equation for Combined Loads

$\frac{F_y}{F_y \text{ (max)}}$	$+$	$\frac{F_z}{F_z \text{ (max)}}$	$+$	$\frac{M_x}{M_x \text{ (max)}}$	$+$	$\frac{M_y}{M_y \text{ (max)}}$	$+$	$\frac{M_z}{M_z \text{ (max)}}$	≤ 1
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The total of the loads must not exceed >1 under any circumstances.

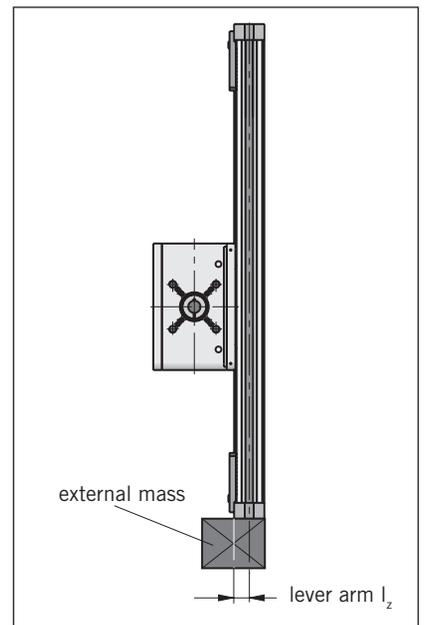
Combined Loads

If the linear drive is subjected to several forces, loads and moments at the same time, the maximum load is calculated with the equation shown here.

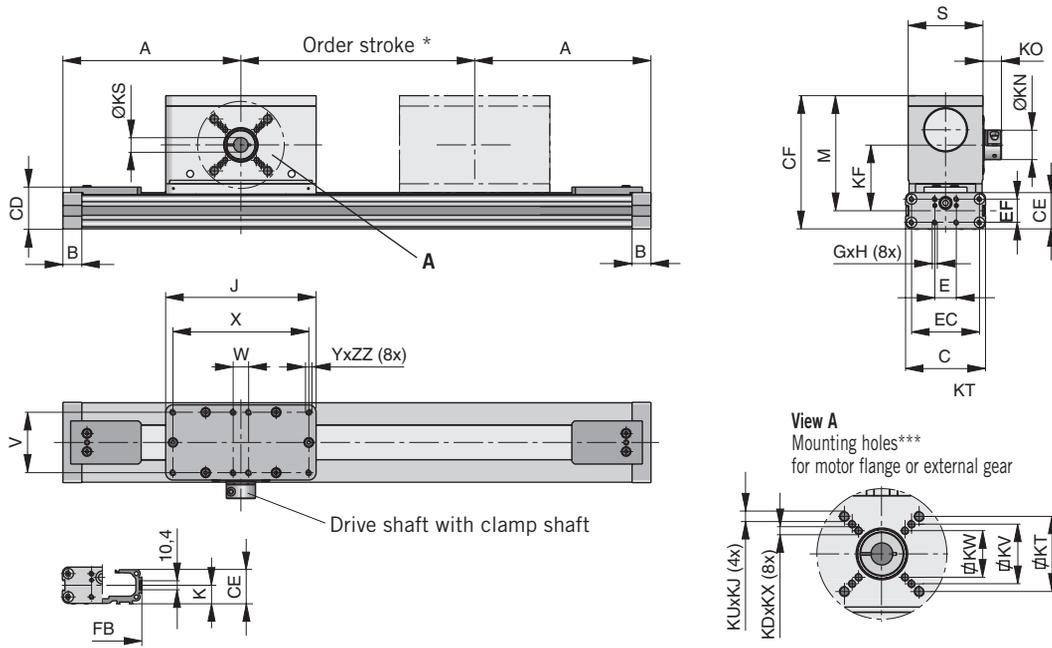
The maximum permissible loads must not be exceeded.

Distance of Centre of Gravity of External Mass from Mid-Point of Drive

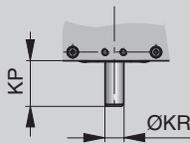
Mass [kg]	OSP-E20BV		OSP-E25BV	
	Lever arm l_z [mm]	Max. permissible acceleration/ deceleration [m/s ²]	Lever arm l_z [mm]	Max. permissible acceleration/ deceleration [m/s ²]
> 3 to 5	0	20	50	20
> 5 to 10	0	20	40	20
> 10 to 15	-	-	35	20
> 15 to 20	-	-	30	15



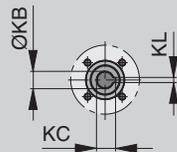
Vertical Linear Drive with Toothed Belt and integrated Recirculating Ball Bearing – Basic Unit
Series OSP-E.. BV



Plain shaft



Hollow shaft with keyway (Option)



Series	ØKB	KC	KL	KP	ØKR
OSP-E22BV	12 ^{H7}	13.8	4	28.5	12 _{h7}
OSP-E25BV	16 ^{H7}	18.3	5	31.5	16 _{h7}

*** Note:**

The mechanical end position must not be used as a mechanical end stop.

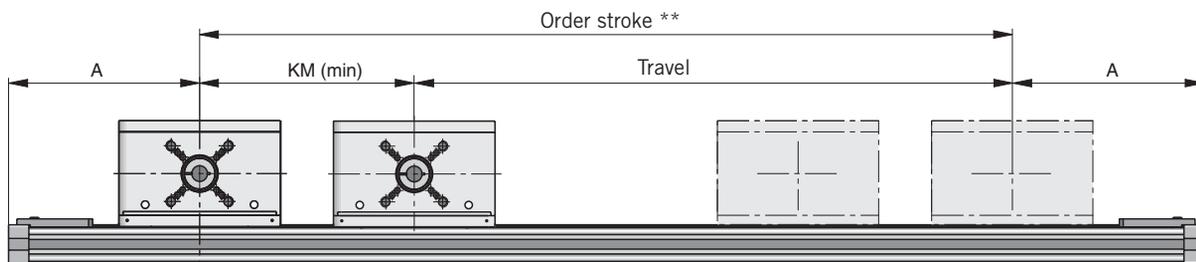
Allow an additional safety clearance at both ends equivalent to the linear movement of one revolution of the drive shaft, but at least 100 mm.

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 Origa representative.

Option – Tandem
Series OSP-E.. BV



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

Dimension Table [mm]																
Series	A	B	C	E	GxH	J	K	M	S	V	W	X	Y	CD	CE	CF
OSP-E20BV	148	22	93	25	M5x12	139	21.1	102.3	68	51	40	120	M6	40.4	34	123.3
OSP-E25BV	210	22	93	25	M5x12	175	21.5	133.5	87	70	18	158	M6	49	42	154.5

Series	EC	EF	FB	FH	KDxKX	KF	KM _{min}	KN	KO	KS	KT	KUxKJ	KV	KW	ZZ
OSP-E20BV	59	21	73	36.0	–	61.3	155	27	16	12 ^{H7}	46.5	M6x10	36	–	10
OSP-E25BV	79	27	92	39.5	M6x16	76	225	34	21.5	16 ^{H7}	58	M8x16	46	36	10

*** The mounting holes for the coupling housing are on the motor-mounting side. Therefore please ensure that the motor-mounting side is correctly stated when ordering the drive.

(For special drive shafts, other dimensions for KS and KB are available on request – see Order Instructions.)

Dimensions

The magnetic switches and magnets can be mounted on either sides

Dimension table [mm]

Series	MA	MB	MC	MD
OSP-E20BV	46	23.7	42.3	35
OSP-E25BV	56	26.0	51.0	35

Contactless Position Sensing with Magnetic Switches

The magnetic switch set, comprising two magnetic switches, a mounting rail and two magnets, is for contactless sensing of the end positions. The mounting rail and magnetic switches are mounted on the drive head and the magnets are mounted in the dovetail slot on the profile.

The magnetic switches are the RS-S type (connector version).

For the connecting cable

Parker Origa recommends the use of cable suitable for cable chain.

Order instructions	
Description	Ident-No.
Magnetic switch set, obtaining: - 2 magnetic switches - KL3087, TypRS-S - 1 mounting rail - 2 magnets	15886
Connecting cable, suitable for cable chain	
5 m	KL3186
10 m	KL3217
15 m	KL3216

Order Instructions

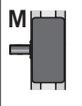
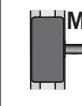
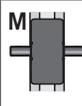
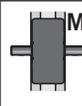
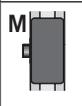
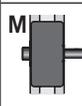
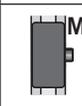
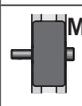
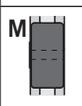
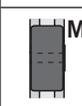
OSP-E 25 - 7 0 0 0 2 - 00500

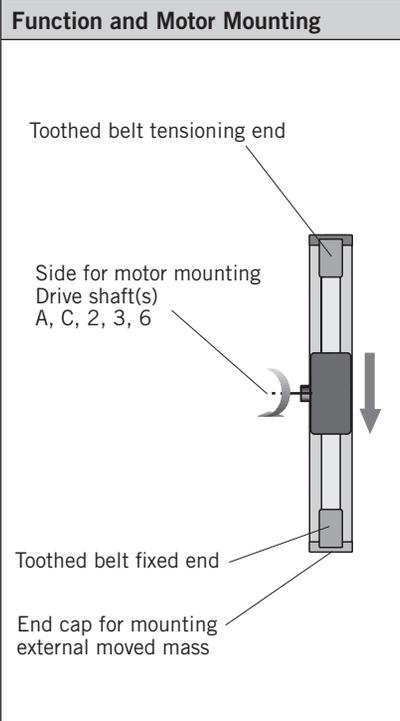
Size	
20	Size 20
25	Size 25

Type of Drive	
7	Vertical linear drive with toothed belt and integrated recirculating ball bearing guide (...BV)

Drive Head	
0	Standard
1	Tandem (Option)

Stroke
Input (five digits) in mm

Drive Shaft		
Motor mounting position see M		
A	Plain shaft	
B	Plain shaft	
C	Double plain shaft (Option)	
D	Double plain shaft (Option)	
2	Clamp shaft	
3	Clamp shaft with plain shaft (Option)	
4	Clamp shaft	
5	Clamp shaft with plain shaft (Option)	
6	Hollow shaft with keyway (Option)	
7	Hollow shaft with keyway (Option)	
Special drive shaft versions on request		



Accessories – please order separately

Description	For more information see Data Sheet No.
Motor mounting Type 25BHD for clamp shaft, code 2-5	1.44.006E-3
Motor mounting Type 50SB for plain shaft, code A-D	1.44.006E-3
Magnetic switches (for magnetic switch set see Data Sheet No. 1.20.016E-4)	1.44.030E
Multi-axis system for linear drives	1.38.001E, 1.38.002E, 1.38.004E
Drive systems and components for electric linear drives OSP-E	A4P019E