

Introduction

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The **Hepco**Motion SBD is an exceptionally rugged, quiet and precise linear unit. It uses super-smooth Hepco LBG caged linear ball guides having such high load capacity that system life is rarely an issue. Drive is provided by a new high strength tooth belt. The unit is housed in an anodised aluminium beam and is completely enclosed with a stainless steel cover to provide excellent protection from dirt and debris. A corrosion resistant version with all external components made in stainless steel or anodised aluminium is an option. A version for use in high specification cleanrooms is also available \square 5-6.

Stainless Steel Cover-· Helps protect internal mechanism from ingress of debris · Effective in any orientation · Enhances safety and appearance Removable Carriage Plate · Easily detachable for customising · Can be rotated 180° to change handing of switch cam **Mounting Platform** · Tapped holes for ease of component attachment · Direct fixing of mutli-axis mounting brackets **Limit Switch & Bracket** · Mechanical and inductive versions IP67 rating Easily adjustable **Aluminium Beam** Available up to 6 metres in one piece Stiff self supporting beam may form part of machine construction · 6 T-slots for ease of mounting · T-slot compatible with Hepco MCS and other profiles · T-nuts, T-slot covers, mounting brackets & multi-axis connection brackets available

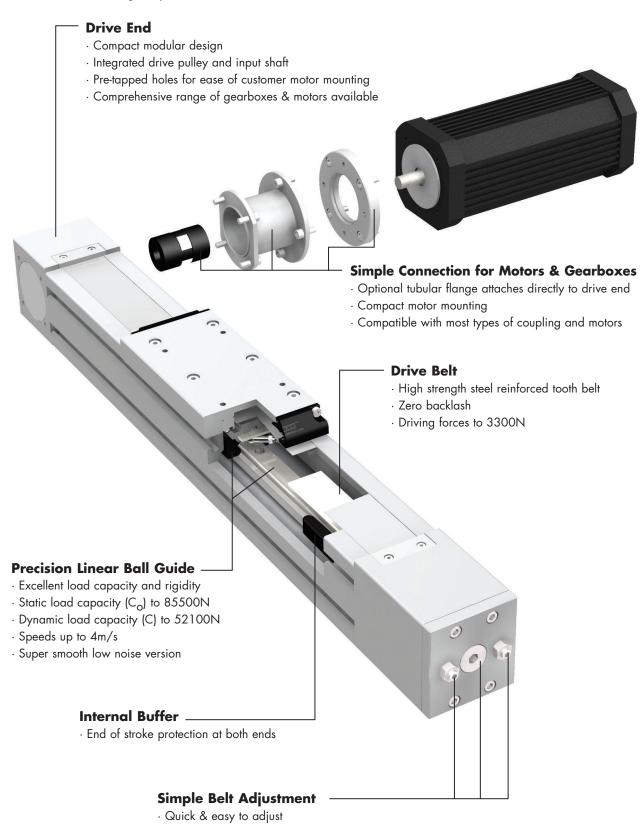
· Supplied with fitted key

Drive Shaft

- · Right, left, double & hollow shaft options (right hand shown)
- · Motor connection kits available

System Composition

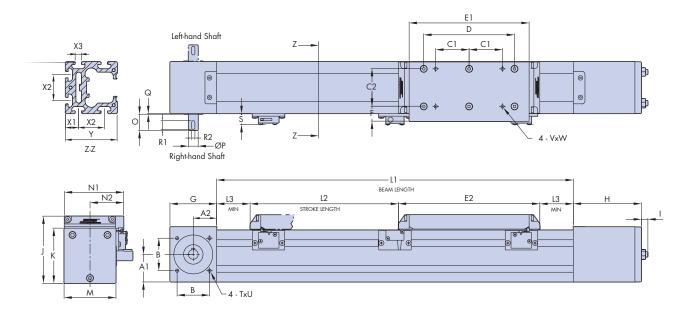
SBD units are available in lengths up to 6m in one piece and unlimited lengths can be achieved with joined beams. Units are factory adjusted and lubricated. Re-lubrication of the linear ball guide is easily achieved via an access hole in the beam. SBD units are suitable for single or multi-axis applications and can be supplied with a wide range of gearboxes, motors and drives. The beam profiles and T-slots are compatible with Hepco's MCS frame building system and its extensive range of accessories, allowing complete machines to be built.



· Externally accessible

Data & Dimensions

The main dimensions of the SBD unit are shown below. Further details can be obtained from the 3D CAD files available from Hepco's technical department or at www.HepcoMotion.com. Units are supplied in increments of 60mm (SBD20-80) and 80mm (SBD30-100) up to 6000mm in one piece 10. Longer units are made from more than one piece. The nominal stroke length is calculated with the carriage against the internal buffers. In practice a clearance should be provided to allow for overrun.

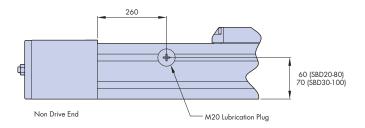


SBD Unit	A1	A2	В	C1	C2	D	E1	E2	F	G	н	-	J	K	L1 (min)	L2 Nominal Stroke	L3 (min)
SBD20-80	42.4	36	50	51.5	58	140	185	218	23	72	105	12	103.5	85	550	L1 - 300	41
SBD30-100	51.6	48	65	65	76	180	235	268	24.5	96	145.5	13	123.5	105	580	L1 - 365	48.5

SBD Unit	M	N1	N2	0	P	Q	R1	R2	S	TxU	VxW	X1	X2	ХЗ	Y
SBD20-80	80	91.5	52	25	15	1	13.5	5	17	M6 x 15	M6 x 9.5	20	40	10	80
SBD30-100	100	112	62.5	36	20	1	22	6	17	M6 x 15	M8 x 9.5	30	40	10	100

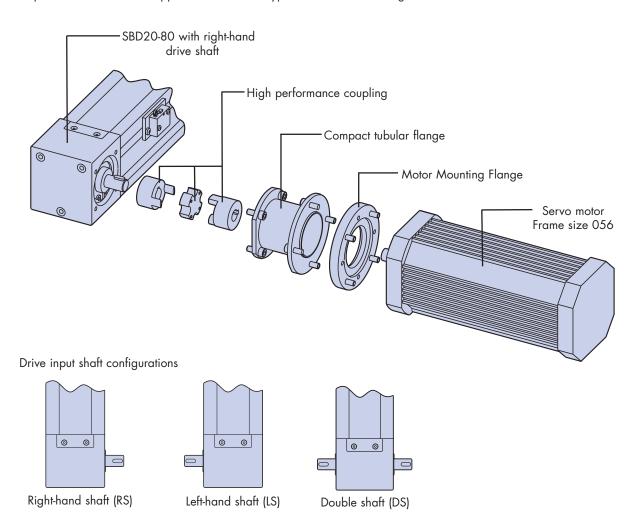
All dimensions in mm

Re-lubrication of the ball guide carriage block is via an access point in the side of the beam (see below), which is closed off with a threaded plug. The lubrication interval depends on length of stroke, speed and duty. Contact Hepco's technical department for further details.

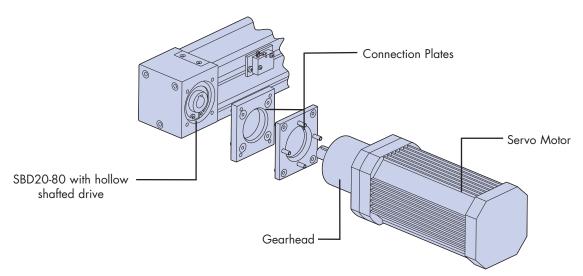


Drive Connections

The **Hepco**Motion SBD can be supplied with a fitted motor or gearbox to suit many different applications. Connection to other motors and gearboxes is quick and simple using one of the fixing kits. Standard kits to suit a range of servo motor frame sizes 036, 056 & 071 are stock items. Hepco can offer a fast service on special connection kits for attachment of customer's motors and gearboxes. Hepco can supply AC motors, stepper and servo systems including braked motors, encoders and inverter drives for power and control. Please contact Hepco for full details and application advice. A typical servo motor arrangement is shown in the illustration below.

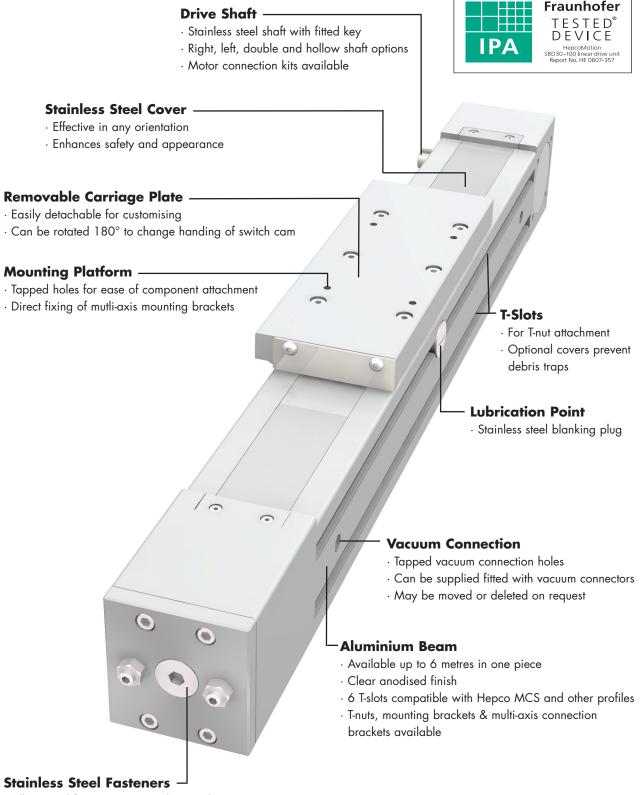


The hollow shafted arrangement may offer a more compact and lower cost means of retro-fitting a motor and/or gearbox onto an SBD. For further details of motor connections please visit www.HepcoMotion.com/sbddatauk and select datasheet No. 1 SBD motor connections.



Cleanroom Version

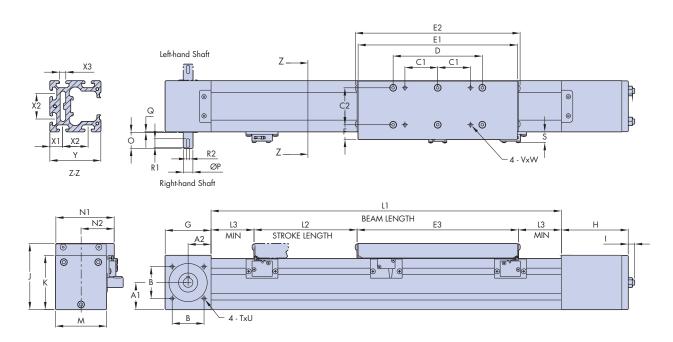
The cleanroom version of the SBD unit has been designed to meet an increasing demand for clean manufacturing processes and environments. This version of the SBD unit is ready for connection to vacuum extraction which minimises particle emissions. All external parts are made from anodised aluminium or stainless steel. This SBD cleanroom unit is certified by the Fraunhofer IPA Institute for use in cleanroom environments and meets air cleanliness class 3 according to ISO 14644-1. For further details please visit www.HepcoMotion.com/sbddatauk and select datasheet No. 5 cleanroom qualification.



· All external fasteners are stainless steel

Data & Dimensions

The main dimensions of the SBD cleanroom version are shown in the table below. Further details can be obtained from the 3D CAD files available from Hepco's technical department or at www.HepcoMotion.com. Units are supplied in increments of 60mm (SBD20-80) and 80mm (SBD30-100) up to 6000mm in one piece 10. Longer units are made from more than one piece. The nominal stroke length is calculated with the carriage against the internal buffers. In practice a clearance should be provided to allow for overrun.

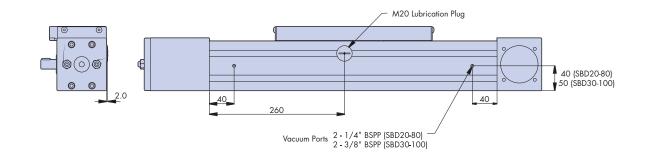


SBD Unit	A1	A2	В	C 1	C2	D	E1	E2	E 3	F	G	н	1	J	K	L1 (min)	L2 Nominal Stroke	L3 (min)
SBD20-80	42.4	36	50	51.5	58	140	250	259	253	23	72	105	12	103.5	85	550	L1 - 300	23.5
SBD30-100	51.6	48	65	65	76	180	300	309	303	24.5	96	145.5	13	123.5	105	580	L1 - 365	31

SBD Unit	M	NI	N2	0	P	Q	R1	R2	S	TxU	VxW	X1	X2	ХЗ	Y
SBD20-80	80	91.5	52	25	15	1	13.5	5	17	M6 x 15	M6 x 9.5	20	40	10	80
SBD30-100	100	112	62.5	36	20	1	22	6	17	M6 x 15	M8 x 9.5	30	40	10	100

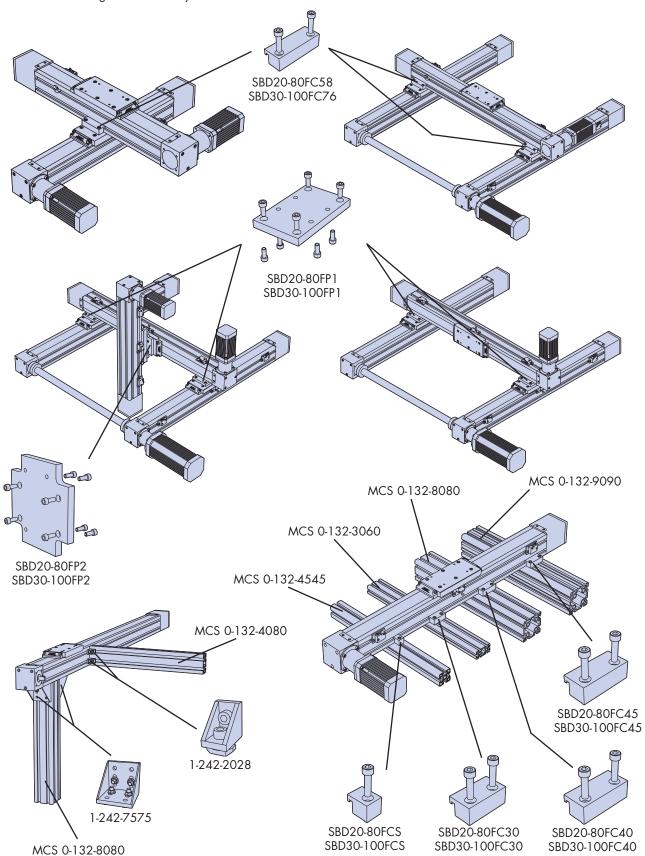
All dimensions in mm

The vacuum extraction connection hole positions together with the lubrication access plug are shown below. Hepco can supply vacuum connections pre-fitted on request. Vacuum holes can be repositioned to suit customer requirements or deleted.



Axis Connections

The **Hepco**Motion SBD design allows for easy construction of multi-axis systems onto Hepco MCS and other frames and machine elements. A comprehensive range of mounting kits and accessories is available. Some typical system configurations are shown below to illustrate the versatility of the SBD design. Connection components have been identified together with their part numbers for ease of selection. Hepco's technical department can assist with application enquiries or undertake the design of multi-axis systems.



Load & Life Calculations

The nominal load capacities for the SBD (based on LBG ball guide dynamic load capacity) and a typical load corresponding to 10 000km* travel are included in the table below for each of the 5 direct and moment loading directions.

SBD Unit		0.000	Ms	Mv	
SBD20-80	21200N nominal	21200N nominal	189Nm nominal	175Nm nominal	175Nm nominal
	1813N @ 10 000km	1813N @ 10 000km	16.2Nm @ 10 000km	14.9Nm @ 10 000km	14.9Nm @ 10 000km
SBD30-100	52100N nominal	52100N nominal	639Nm nominal	755Nm nominal	755Nm nominal
	4455N @ 10 000km	4455N @ 10 000km	54Nm @ 10 000km	64Nm @ 10 000km	64Nm @ 10 000km

^{*} The tabulated load figures above for 10 000km assume a value for variable load factor f_v = 2 which is suitable for most applications.

To calculate the life of an SBD unit, first calculate the load factor L_E using the equation below:

$$L_F = \frac{L_1}{L_{1(max)}} + \frac{L_2}{L_{2(max)}} + \frac{M_S}{M_{S(max)}} + \frac{M}{M_{(max)}} + \frac{M_V}{M_{V(max)}} \leq 0.2$$

The life of the system is then calculated using the equation below:

System Life (km) =
$$50 \times \left(\frac{1}{L_F \times f_V}\right)^3$$

Note: f_v is the variable load factor which takes account of speed and vibration/impact conditions. A value of 2 is appropriate for typical SBD applications, but consult Hepco for specific advice. For further guidance on load life calculations please visit **www.HepcoMotion.com/sbddatauk** and select datasheet No. 2 SBD load life calculations.

Technical Data

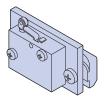
The table below includes the parameters necessary to calculate the performance and duty of an SBD system.

_			SBD2	20-80	SBD3	0-100
Parameter			Standard	Cleanroom	Standard	Cleanroom
Mass of carriage	Мс	kg	1.4	1.6	3.6	3.9
Mass of belt per m	Mb	kg/m	0.	12	0.	34
Mass of SBD unit	Мυ	kg	9.7 x L + 6.0	9.7 x L + 6.2	15.7 x L + 12.2	15.7 x L +12.5
Pulley radius	r	cm	2.	39	3	.5
Drive efficiency			0	.9	0	.9
Break away friction	Fba	N	25	10	35	25
Coefficient of friction	h		0.	01	0.	01
Beam moment of inertia*	l _{x-x}	mm ⁴	1500	0000	3700	0000
beam moment of mertia	l _{y-y}	mm	1800	0000	4600	0000
Max linear force (belt)	Fmax	N	10	000	33	00
Linear movement per shaft rev		mm	13	50	22	20
Belt tooth pitch		mm		5	1	0
LBG carriage basic load rating (dynamic)	С	N	212	200	52	100

^{*} The beam moment of inertia figure is used in the calculation of beam deflection, with a high figure corresponding to a stiff beam. For further guidance on beam deflection calculations please visit www.HepcoMotion.com/sbddatauk and select datasheet No. 3 SBD beam deflection calculations.

Ancillary Components

Limit switch assembly includes mechanical switch, bracket, fixing screws and T-nuts.



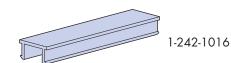
SBD20-80-V3SWA-M SBD30-100-V3SWA-M

Limit switch assembly includes inductive switch, bracket, fixing screws and T-nuts.



SBD20-80-V3SWA-I SBD30-100-V3SWA-I

Plastic T-slot cover supplied fitted in each of the T-slots in the beam.

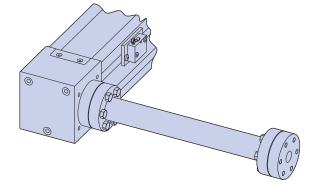


The quick fit type T-nut can be inserted into T-slot and rotated through 90° to engage. T-nuts are available threaded M4, M5, M6 and M8.



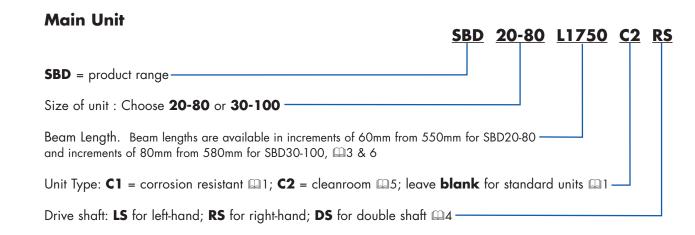
M4 = 1-242-1029 M5 = 1-242-1030 M6 = 1-242-1001 M8 = 1-242-1002

Drive shafts in a number of sizes and designs are available. Contact Hepco for details.



Ordering Details

The ordering information below is given to assist communication, but you are recommended to discuss your application with Hepco first so that we can help to specify the best unit configuration to suit your needs. A step-by-step SBD enquiry form is available please visit www.HepcoMotion.com/sbddatauk and select datasheet No. 4 SBD enquiry form.



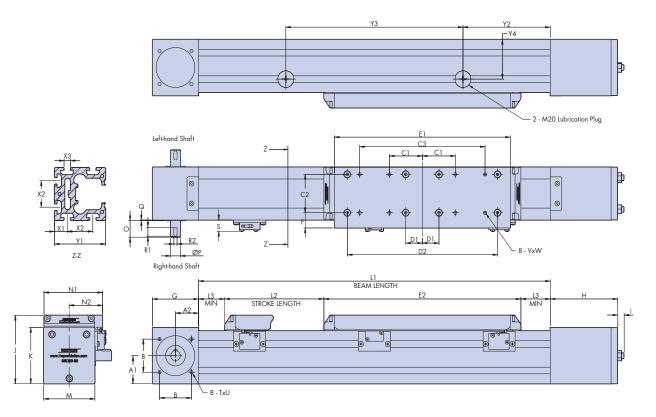
Notes

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SBD Long Carriage Option

SBD units in both standard and cleanroom versions are available with a long carriage option. This version has two LBG bearing blocks in the carriage and has much improved load capacity, particularly in M & Mv directions. The main dimensions of the standard long carriage SBD units are shown below. Further details can be obtained from the 3D CAD files available from Hepco's technical department or at www.HepcoMotion.com. Standard & cleanroom units are supplied in increments of 60mm (SBD20-80) and 80mm (SBD30-100) up to 6000mm. Longer units are made from more than one piece. The nominal stroke length is calculated with the carriage against the internal buffers. In practice a clearance should be provided to allow for overrun. Re-lubrication of the ball guide carriage blocks is via two access points in the side of the beam (see below), and closed off with a threaded plug. The lubrication interval depends on length of stroke, speed and duty, contact Hepco's technical department for further details.



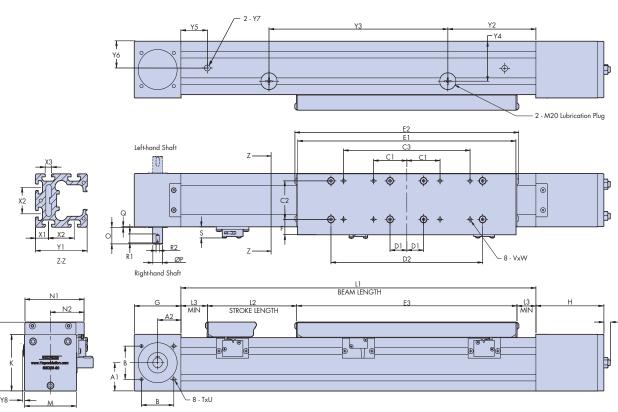
SBD Unit	A1	A2	В	C1	C2	сз	D1	D2	E1	E2	F	G	н	I	J	K	L1 (min)	L2 Nominal Stroke	L3 (min)
SBD20-80	42.4	36	50	51.5	58	196	26	235	275	308	23	72	105	12	103.5	85	550	L1 - 390	41
SBD30-100	51.6	48	65	65	76	260	46	295	340	373	24.5	96	145.5	13	123.5	105	580	L1 - 470	48.5

SBD Unit	M	NI	N2	0	Р	Q	R1	R2	S	TxU	VxW	X1	X2	хз	Υl	Y2	Y3	Y4
SBD20-80	80	91.5	52	25	15	1	13.5	5	17	M6 x 15	M6 x 9.5	20	40	10	80	162.5	205	60
SBD30-100	100	112	62.5	36	20	1	22	6	17	M6 x 15	M8 x 9.5	30	40	10	100	164	252.5	70

SBD Long Carriage Option

The cleanroom version of the SBD unit has been designed to meet an increasing demand for clean manufacturing processes and environments. This version of the SBD unit is ready for connection to vacuum extraction which minimises particle emissions. All external parts are made from anodised aluminium or stainless steel. This SBD cleanroom unit is certified by the Fraunhofer IPA Institute for use in cleanroon environments and meets air cleanliness class 3 according to ISO 14644-1. For further details please visit www.HepcoMotion.com/sbddatauk and select datasheet No. 5 cleanroom qualification. The main dimensions of the cleanroom long carriage SBD units are shown below. Further details can be obtained from the 3D CAD files available from Hepco's technical department or at www.HepcoMotion.com.



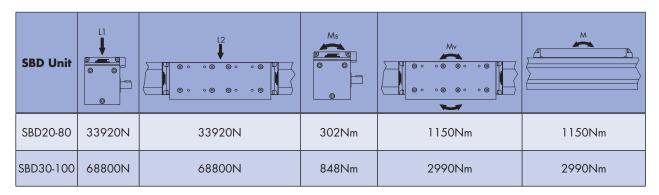


SBD Unit	Α1	A2	В	CI	1	C2	C3	DI	D:	2 E1	E2	E3	ŀ	F	G	н	1	J	K	L1 (mi	n)	L2 Nominal Stroke	L3 (min)
SBD20-80	42.4	36	50	51.	.5	58	196	26	23	5 338	347	341	2	3	72	105	12	103.5	85	55	0 1	L1 - 390	24.5
SBD30-100	51.6	48	65	65	5 7	76	260	46	29	5 404	4 413	407	24	1.5	96	145.5	13	123.5	105	58	0 1	L1 - 470	31.5
SBD Unit	M	N1	N2	0	Р	Q	R1 I	R2 !	5 T	xU	VxV	W	X1	X2	х3	Υl	Y2	Y3	Y4	Y5	Y6	Y7	Y8
SBD20-80	80	91.5	52	25	15	1 1	3.5	5 1	7 M6	x 15	M6 x	9.5	20	40	10	80	162.5	205	60	40	40	1/4" BS	PP 2
SBD30-100	100	112	62.5	36	20	1	22	6 1	7 M6	x 15	M8 x	9.5	30	40	10	100	164	252.5	70	40	50	3/8" BS	PP 2

The vacuum extraction connection holes (see dimensions Y5 & Y6) can be repositioned to suit customer requirements or deleted. Hepco can supply vacuum connections pre-fitted on request.

Technical Data

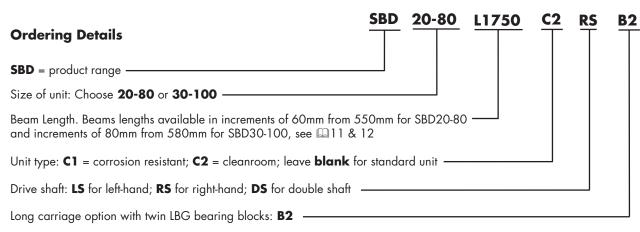
The nominal load capacities for the SBD long carriage units are based on LBG ball guide dynamic load capacities combined with a mounting factor of 0.8 (see LBG catalogue 19). They are shown in the table below for each of the 5 direct and moment loading directions. For guidance on load life calculations please refer to the SBD catalogue 8 and visit www.HepcoMotion.com/sbddatauk and select datasheet No.2 load life calculations.



The table below includes the parameters necessary to calculate the performance and duty of an SBD system.

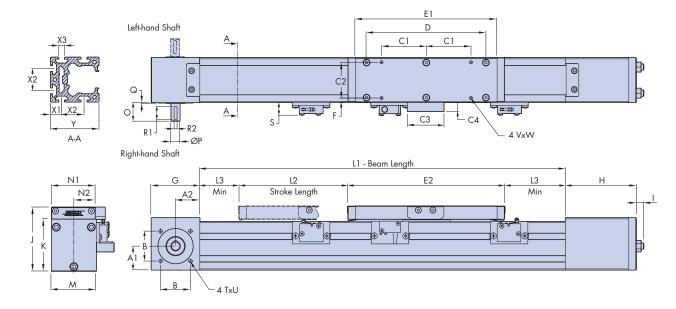
			SBD2	20-80	SBD30	D-100
Parameter			Standard	Cleanroom	Standard	Cleanroom
Mass of carriage	Мс	kg	2.3	2.5	5.2	5.5
Mass of belt per m	Mb	kg/m	0.	12	0.0	34
Mass of SBD unit	Мυ	kg	9.7 x L + 6.9	9.7 x L + 7.2	15.7 x L + 13.7	15.7 x L + 14.0
Pulley radius	r	cm	2.	39	3.	5
Drive efficiency			0	.9	0.	9
Break away friction	Fba	N	29	14	46	36
Coefficient of friction	h		0.	01	0.0	01
Beam moment of inertia*	l _{x-x}	mm ⁴	1500	0000	3700	0000
beam moment or therita	l _{y-y}	mm	1800	0000	4600	0000
Max linear force (belt)	Fmax	Ν	10	000	33	00
Linear movement per shaft rev		mm	1:	50	22	20
Belt tooth pitch		mm		5	1	0
LBG carriage basic load rating (dynamic)	С	Ν	339	920	688	300

^{*} The beam moment of inertia figure is used in the calculation of beam deflection, with a high figure corresponding to a stiff beam. For further guidance on beam deflection calculations please visit www.HepcoMotion.com/sbddatauk and select datasheet No. 3 SBD beam deflection calculations.



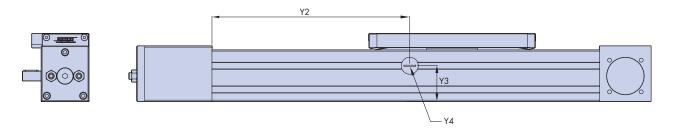
SBD 15-60

The **Hepco**Motion® SBD 15-60 is a new smaller addition to the SBD range of linear actuators. It shares the key features and benefits of the existing SBD range, but using a HepcoMotion LBC15 Linear Ball Guide. Units are supplied in increments of 60mm up to 6000mm in one piece, and unlimited lengths can be achieved with joined beams. The nominal stroke is calculated with the carriage against the internal buffers. In practice a clearance should be provided to allow for overrun. The main dimensions of the standard unit are shown below. Further details can be obtained from Hepco's technical department.



SBD Unit	A1	A2	В	C1	C2	СЗ	C4	D	E1	E2	F	G	н	-	٦	K	L1 (min)	L2 Nominal stroke	L3 (min)
SBD15-60	32	33	41	60	48	50	12.5	150	180	200	5.5	65	95	11	84	70	550	L1-240	20

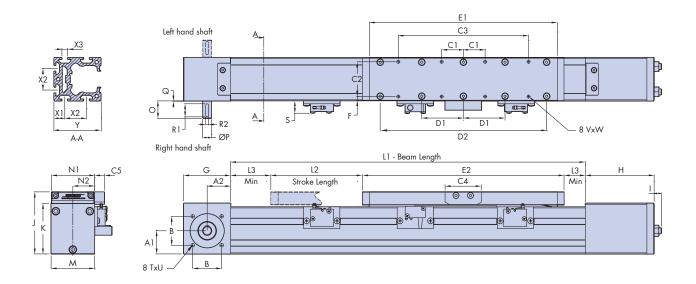
SBD Unit	M	NI	N2	0	Р	Q	R1	R2	S	TxU	VxW	X1	X2	хз	Y	Y2	Y3	Y4
SBD15-60	60	59	29.5	25	12	1	18	4	17	M5x10	M5x8	15	30	8	65	250	43	M15



Re-lubrication of the ball guide carriage block is via an access point in the side of the beam (see above), which is closed off with a threaded plug. The lubrication interval depends on the length of stroke, speed and duty. For further details regarding lubrication procedures please contact Hepco's technical department.

SBD15-60 - Long Carriage Option

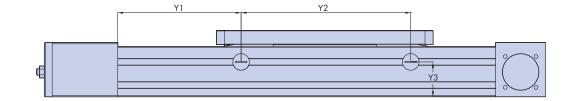
The SBD15-60 unit is available with a long carriage version, this option has two LBG bearing blocks in the carriage and has much improved load capacity particularly in the M & Mv directions. The main dimensions of the long carriage units are shown below. Further details can be obtained from Hepco's technical department.



SBD Unit	Αl	A2	В	C1	C2	СЗ	C4	C 5	DI	D2	E1	E2	F	G	Н	- -	J	K	L1 (min)	1	L2 ominatroke		L3 min)
SBD15-60	32	33	41	30	48	180	50	12.5	57.5	220	250	270	5.5	65	95	11	84	70	550	L	.1-310)	20
SBD Unit	М	1	V1	N:	2	0	P	Q	R1	R2	S	Tx	U	V2	ĸW	X	1 2	(2	хз	Y	Υ1	Y2	Y3
SBD15-60	60) 5	59	29.	.5	25	12	1	18	4	17	M5×	:10	M	5×8	15	5 ;	30	8	65	250	158	43

(All dimensions in mm)

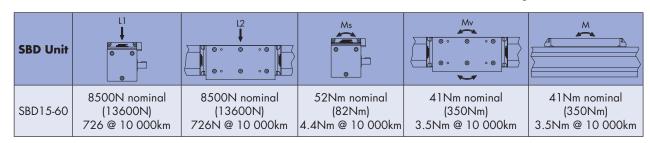




Re-lubrication of the ball guide carriage blocks is via two access points in the side of the beam (see above), and closed off with a threaded plug. The lubrication interval depends on length of stroke, speed and duty. For further details regarding lubrication procedures please contact Hepco's technical department.

Technical Information

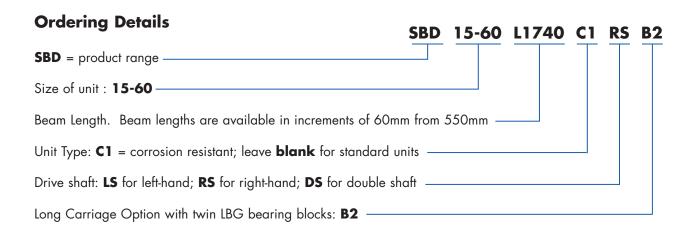
The nominal load capacities for the SBD (based on LBG ball guide dynamic load capacity) and a typical load corresponding to 10 000km*1 travel are included in the table below for each of the 5 direct and moment loading directions*2.



(Figures shown in brackets relate to the long carriage version.)

The table below includes the parameters necessary to calculate the performance and duty of the SBD system.

Dawanaskan	SBD15-60	SBD15-60		
Parameter	Standard	Long Carriage		
Mass of carriage	Мс	kg	0.8	1.3
Mass of belt per m	Mb	kg/m	0.09	0.09
Mass of SBD unit	Mυ	kg	5.5 x L + 2.9	5.5 x L + 3.4
Pulley radius	r	cm	1.91	1.91
Drive efficiency			0.9	0.9
Break away friction	Fba	N	24	28
Coefficient of friction	þ		0.01	0.01
Beam moment of inertia* ³	l _{x-x}	mm ⁴	560000	560000
Beam moment of therita	l _{у-у}	mm ⁴	600000	600000
Max linear force (belt)	Fmax	N	700	700
Linear movement per shaft rev		mm	120	120
Belt tooth pitch		mm	5	5
LBG carriage basic load rating (dynamic)	С	N	16500	26400



- 1. The tabulated load figures above for 10,000km assume a value for variable load factor $f_V = 2$ which is suitable for most applications.
- 2. For load & life calculations please refer to 48 of the SBD catalogue.
- 3. The beam moment of inertia figure is used in the calculation of beam deflection, with a high figure corresponding to a stiff beam. For further guidance on beam deflection calculations please visit www.HepcoMotion.com/sbddatauk and select datasheet No. 3 SBD beam deflection calculations.

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HepcoMotion® Product Range



Bishop-Wisecarver Product Range

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