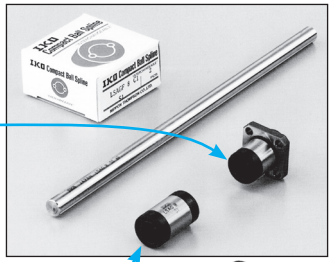
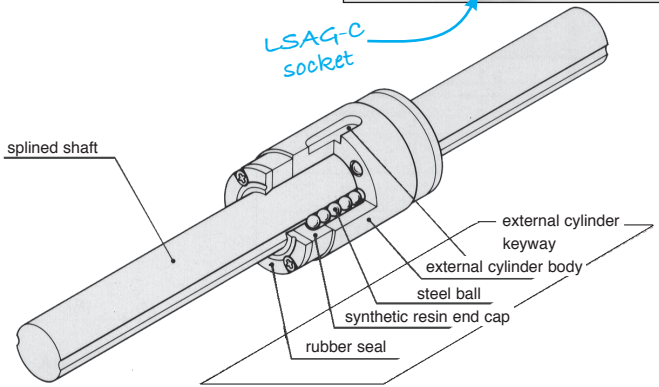
LSAG IKO
LSAGC
LSAGF-C

Introduction





The LSAG series of linear ball splines consists of a splined shaft and an external cylinder. Two rows of rotating balls are housed in the external cylinder and turn on tracks in the shaft. These tracks have been precision-ground and allow ***an almost unlimited lateral movement****. The splines stop the cylinder from rotating around the shaft.* ***It is therefore impossible to drive the cylinder in rotation****. The splined shaft and the external cylinder can be replaced easily.*
As with the linear slide rule series, the concept of two tracks for rotating balls having four point contact has been put in place for this simple, compact, and efficient linear system. ***This series is suited to applications requiring a smooth lateral movement and a precise angle positioning*** *such as LCD manufacturing machines, integrated circuit production, industrial robots, measuring apparatus, etc...*
Two types of external cylinder: the standard type ***LSAG-C*** *and the flanged type* ***LSAGF-C*** *are available thus covering the majority of most applications.*

User safety

The normal continuous operating temperature of the LWL linear slides is 100°C with occasional use at up to 120°C. If your application will exceed 100°C, please contact us for advice.
When mounting two or more cylinders on to one shaft, we recommend only attaching one cylinder with a key, with the proviso that the moment of rotation could be supported by a single cylinder Where it is necessary to use two (or more) keys to attach two (or more) cylinders or to assemble two cylinders end-to-end, please consult us.

Adjusting the cylinder

Generally, a transition fit (J7) is required between the external cylinder of and the housing bore. When high accuracy and rigidity are not required, a clearance fit (H7) may also be acceptable

Load capacity and life expectancy

Basic dynamic load

The basic dynamic load rating is defined as a constant load, both in direction and magnitude to which a group of identical LSAG linear splines are subjected individually and where 90% of the slides in that group can travel for 50km without suffering material damage due to rolling contact fatigue.

Basic static load capacity

The basic static load rating (Figure 1) is defined as a static load that gives a prescribed constant stress at the centre of the contact area between the rolling element and track whilst receiving the maximum load.

Dynamic torque

The dynamic torque rating is defined as the moment of rotation at constant load, both in direction and magnitude to which a group of identical LSAG linear splines are subjected individually and where 90% of the slides in that group can travel for 50km without suffering material damage due to rolling contact fatigue

Static moment of torsion and static moment

The static torque (figure 1) and the static moment (figure 2) are defined as exerting a constant contact at the centre of the contact zone of the moving parts and the tracks where the maximum load is exerted. The Tx values in the tables apply to one cylinder or to two cylinders placed end-to-end

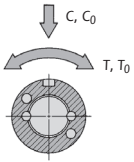


Figure 1 Load direction and torque

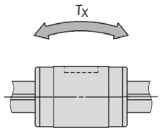


Figure 2 Moment direction

Life expectancy

The life expectancy of LSAG linear rotary ball splines can be calculated using the following formula:

$$L = 50 \left(\frac{C}{fwFr}\right)^3 \quad (1)$$

$$L = 50 \left(\frac{T}{fwFr}\right)^3 \quad (2)$$

where:

L : *Life expectancy in kilometres (or 10^3m)*
C : *Basic Dynamic load capacity* (**N**)
T : *Dynamic load* (**N**)
Fr : *calculated radial load*
Ft : *moment of torsion*
fw : *load factor (see table 1)*

In applications where the stroke length and the number of strokes per minute are known, the life expectancy in hours can be calculated as follows:

$$L^h = \frac{10^6 L}{2Sn_1 x60} \quad (3)$$

Lh : *Life expectancy in hours* (**h**).....**S** : *Stroke length* (**mm**)
n1 : *Number of strokes per minute* (**spm**)

Table 1 Load factor

Operating conditions	fw
Smooth working without vibrations and/or shocks	1.0 ~ 1.2
Normal working	1.2 ~ 1.5
Working with vibrations and/or shocks	1.5 ~ 3.0

Static security factor

Excessively heavy loads or violent shocks can cause permanent damage to the balls or tracks, causing the overall performance to suffer. The acceptable load will depend on the working conditions and the application, the factor of safety will be determined based on these requirements.
The static safety factor of the LSAG series splined cylindrical linear ball guidance models is calculated using the formula below. Common values are given in table 2.
fs : *static safety factor*
C_o : *basic static load capacity*

$$fs = \frac{C_0}{P_0} \quad (4)$$

P_o : *static load*
T_o : *static torque*
Pr_o : *static radial load*
Pt_o : *static moment*

Table 2 Static safety factor

Operating conditions	fs
Smooth working without vibrations and/or shocks	3 ~ 5
Normal working	2 ~ 4
Working with vibrations and/or shocks	1 ~ 3

Splined shaft

The geometrical moment of inertia of the section and the shaft section modules are given in table 3.

Table 3 Geometrical moment of inertia of the section and shaft section modulus

PART NUMBER	Geometrical moment of inertia (mm^4)		Section modulus (mm^3)	
	Compact shaft	Hollow shaft	Compact shaft	Hollow shaft
LSAG(T) 5 R	29	29	12	12
LSAG(T) 6 R	61	61	21	21
LSAG(T) 8 R	190	190	49	49
LSAG(T) 10 R	470	460	95	94
LSAG(T) 12 R	990	960	170	160

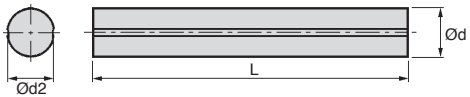
Lubrication and dust protection

LSAG *splined slides are supplied lubricated with a Lithium soap based grease containing extreme pressure additives.*

LSAG *series precision linear rotary ball splines are protected from dust by special rubber seals. In a particularly polluted atmosphere, for example where sand or swarf can fall on to the shaft, we recommend you install protection for the whole shaft.*

LSAG IKO Dynamic loads from 558 N to 1862 N

- ***Shafts and cylindrical slides have separate part numbers, remember to order both***
- *2 rows of balls which prevent the cylinder from rotating*
- *Material: Steel*

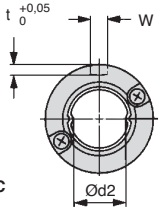


DISCOUNTS

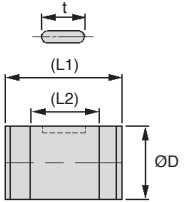
Qty	1+	4+	8+
Disc.	List	-6%	On request

Part number	Ød	Ød2	L	Max. length (mm)	Type of cylinder	Weight / 100mm (g)	Stock*	Price each 1 to 3
LSAG5-100	5 0/-0,012	4,2	100	200	-	14,9	✔	59,23 €
LSAG5-150	5 0/-0,012	4,2	150	200	-	14,9	-	88,50 €
LSAG5-200	5 0/-0,012	4,2	200	200	-	14,9	-	120,80 €
LSAG5-C	5 0/-0,012	-	Cylinder	-	Standard	-	✔	85,61 €
LSAG5F-C	5 0/-0,012	-	Cylinder	-	Flanged	-	✔	103,24 €
LSAG6-150	6 0/-0,012	5,2	150	300	-	19,0	✔	82,58 €
LSAG6-200	6 0/-0,012	5,2	200	300	-	19,0	-	115,06 €
LSAG6-250	6 0/-0,012	5,2	250	300	-	19,0	-	146,19 €
LSAG6-300	6 0/-0,012	5,2	300	300	-	19,0	-	176,83 €
LSAG6-C	6 0/-0,012	-	Cylinder	-	Standard	-	✔	88,50 €
LSAG6F-C	6 0/-0,012	-	Cylinder	-	Flanged	-	-	106,26 €
LSAG8-150	8 0/-0,015	7,0	150	500	-	39,0	✔	70,70 €
LSAG8-200	8 0/-0,015	7,0	200	500	-	39,0	-	88,50 €
LSAG8-250	8 0/-0,015	7,0	250	500	-	39,0	-	112,03 €
LSAG8-300	8 0/-0,015	7,0	300	500	-	39,0	-	134,71 €
LSAG8-400	8 0/-0,015	7,0	400	500	-	39,0	-	182,75 €
LSAG8-500	8 0/-0,015	7,0	500	500	-	39,0	-	235,87 €
LSAG8-C	8 0/-0,015	-	Cylinder	-	Standard	-	✔	91,36 €
LSAG8F-C	8 0/-0,015	-	Cylinder	-	Flanged	-	-	109,15 €
LSAG10-200	10 0/-0,015	8,9	200	600	-	60,5	-	59,23 €
LSAG10-300	10 0/-0,015	8,9	300	600	-	60,5	-	94,41 €
LSAG10-400	10 0/-0,015	8,9	400	600	-	60,5	-	129,60 €
LSAG10-500	10 0/-0,015	8,9	500	600	-	60,5	-	165,15 €
LSAG10-600	10 0/-0,015	8,9	600	600	-	60,5	-	200,68 €
LSAG10-C	10 0/-0,015	-	Cylinder	-	Standard	-	-	97,47 €
LSAG10F-C	10 0/-0,015	-	Cylinder	-	Flanged	-	-	115,71 €

**Depending on availability - Dimensions in mm*

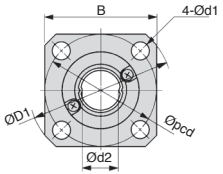


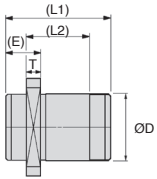
LSAG-C



Part number	Weight (g)	ØD	L1	L2	W	l	t	Basic dynamic load C (N)	Basic static load Co (N)	Dynamic torque T (Nm)	Static torque To (Nm)	Static moment Tx (Nm)(1)	
LSAG5-C	4,8	10 0/-0,09	18	9,4	2,0	6,0	1,2	588	637	1,76	1,96	1,08	7,84
LSAG6-C	8,9	12 0/-0,011	21	12,4	2,0	8,0	1,2	715	852	2,45	3,04	1,76	11,76
LSAG8-C	15,5	15 0/-0,013	35	14,6	2,5	8,5	1,5	1176	1372	5,49	6,17	3,23	21,56
LSAG10-C	31,5	19 0/-0,013	30	18,2	3,0	11,0	1,8	1862	2156	10,78	12,74	6,96	41,16

LSAGF-C





Part number	Weight (g)	ØD	L1	L2	ØD1	B	E	T	Øpcd	Ød1
LSAG5F-C	8,9	10 0/-0,09	18	9,4	23	18	7	2,7	17	3,4
LSAG6F-C	13,9	12 0/-0,011	21	12,4	25	20	7	2,7	19	3,4
LSAG8F-C	23,5	15 0/-0,013	25	14,6	28	22	9	3,8	22	3,4
LSAG10F-C	45,0	19 0/-0,013	30	18,2	36	28	10	4,1	28	4,5

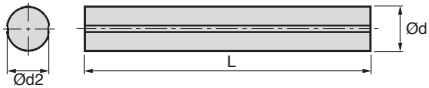
Part number	Basic dynamic load C (N)	Basic static load Co (N)	Static torque T (Nm)	Static torque To (Nm)	Static moment Tx (Nm)(1)	
LSAG5F-C	558	637	1,76	1,96	1,08	7,84
LSAG6F-C	715	852	2,45	3,04	1,76	11,76
LSAG8F-C	1176	1372	5,49	6,17	3,23	21,56
LSAG10F-C	1862	2156	10,78	12,74	6,96	41,16

(1) Tx: The values in the second column are for two cylinders in close contact

LSAG IKO

Dynamic loads from 2156 N to 15386 N

- ***Shafts and cylindrical slides have separate part numbers, remember to order both***
- *2 rows of balls which prevent the cylinder from rotating*
- *Material: Steel*

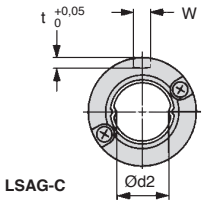


DISCOUNTS

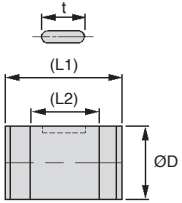
Qty	1+	4+	8+
Disc.	List	-6%	On request

Part number	Ød	Ød2	L	Max. length (mm)	Type of cylinder	Weight / 100mm (g)	Stock*	Price each 1 to 3
LSAG12-200	12,0 0/-0,018	10,9	200	800	-	87,5	✔	59,23 €
LSAG12-300	12,0 0/-0,018	10,9	300	800	-	87,5	-	91,36 €
LSAG12-400	12,0 0/-0,018	10,9	400	800	-	87,5	✔	129,96 €
LSAG12-800	12,0 0/-0,018	10,9	800	800	-	87,5	-	288,68 €
LSAG12-C	12,0 0/-0,018	-	Cylinder	-	Standard	-	✔	106,26 €
LSAG12F-C	12,0 0/-0,018	-	Cylinder	-	Flanged	-	✔	121,49 €
LSAG15-200	13,6 0/-0,018	11,6	200	1000	-	111,0	✔	59,23 €
LSAG15-300	13,6 0/-0,018	11,6	300	1000	-	111,0	-	94,41 €
LSAG15-400	13,6 0/-0,018	11,6	400	1000	-	111,0	-	135,51 €
LSAG15-C	13,6 0/-0,018	-	Cylinder	-	Standard	-	-	118,09 €
LSAG15F-C	13,6 0/-0,018	-	Cylinder	-	Flanged	-	✔	139,77 €
LSAG20-300	18,2 0/-0,021	15,7	300	1000	-	202,0	✔	88,50 €
LSAG20-400	18,2 0/-0,021	15,7	400	1000	-	202,0	✔	123,85 €
LSAG20-500	18,2 0/-0,021	15,7	500	1000	-	202,0	-	165,15 €
LSAG20-600	18,2 0/-0,021	15,7	600	1000	-	202,0	-	206,28 €
LSAG20-1000	18,2 0/-0,021	15,7	1000	1000	-	202,0	-	394,78 €
LSAG20-C	18,2 0/-0,021	-	Cylinder	-	Standard	-	✔	135,51 €
LSAG20F-C	18,2 0/-0,021	-	Cylinder	-	Flanged	-	✔	176,32 €
LSAG25-300	22,6 0/-0,021	19,4	300	1200	-	310,0	-	100,15 €
LSAG25-400	22,6 0/-0,021	19,4	400	1200	-	310,0	-	117,95 €
LSAG25-500	22,6 0/-0,021	19,4	500	1200	-	310,0	-	194,60 €
LSAG25-600	22,6 0/-0,021	19,4	600	1200	-	310,0	-	218,10 €
LSAG25-800	22,6 0/-0,021	19,4	800	1200	-	310,0	-	280,03 €
LSAG25-1100	22,6 0/-0,021	19,4	1100	1200	-	310,0	-	470,26 €
LSAG25-1200	22,6 0/-0,021	19,4	1200	1200	-	310,0	-	533,18 €
LSAG25-C	22,6 0/-0,021	-	Cylinder	-	Standard	-	-	156,19 €
LSAG25F-C	22,6 0/-0,021	-	Cylinder	-	Flanged	-	-	206,28 €
LSAG30-400	27,2 0/-0,021	23,5	400	1200	-	450,0	-	176,83 €
LSAG30-500	27,2 0/-0,021	23,5	500	1200	-	450,0	-	212,20 €
LSAG30-600	27,2 0/-0,021	23,5	600	1200	-	450,0	-	253,47 €
LSAG30-700	27,2 0/-0,021	23,5	700	1200	-	450,0	-	300,53 €
LSAG30-800	27,2 0/-0,021	23,5	800	1200	-	450,0	-	347,22 €
LSAG30-1100	27,2 0/-0,021	23,5	1100	1200	-	450,0	-	518,44 €
LSAG30-1200	27,2 0/-0,021	23,5	1200	1200	-	450,0	-	577,34 €
LSAG30-C	27,2 0/-0,021	-	Cylinder	-	Standard	-	-	176,83 €
LSAG30F-C	27,2 0/-0,021	-	Cylinder	-	Flanged	-	-	242,81 €

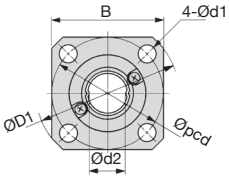
**Depending on availability - Dimensions in mm*



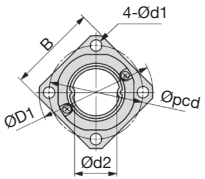
LSAG-C

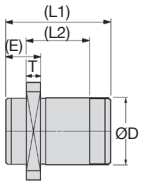


Part number	Weight (g)	ØD	L1	L2	W	l	t	Basic dynamic load C (N)	Basic static load C0 (N)	Dynamic torque T (Nm)	Static torque T0 (Nm)	Static moment Tx (Nm)(1)	
LSAG5-C	4,8	10 0/-0,09	18	9,4	2,0	6,0	1,2	588	637	1,76	1,96	1,08	7,84
LSAG6-C	8,9	12 0/-0,011	21	12,4	2,0	8,0	1,2	715	852	2,45	3,04	1,76	11,76
LSAG8-C	15,5	15 0/-0,013	35	14,6	2,5	8,5	1,5	1176	1372	5,49	6,17	3,23	21,56
LSAG10-C	31,5	19 0/-0,013	30	18,2	3,0	11,0	1,8	1862	2156	10,78	12,74	6,96	41,16



LSAGF-C





Part number	Weight (g)	ØD	L1	L2	ØD1	B	E	T	Øpcd	Ød1
LSAG12F-C	59	21 0/-0,013	35	23,0	38	30	10	4,0	30	4,5
LSAG15F-C	77	23 0/-0,013	40	27,0	40	31	11	4,5	32	4,5
LSAG20F-C	150	30 0/-0,016	50	33,0	46	35	14	5,5	38	4,5
LSAG25F-C	255	37 0/-0,016	60	39,2	57	43	17	6,6	47	5,5
LSAG30F-C	476	45 0/-0,016	70	43,0	65	50	21	7,5	54	6,6

Part number	Basic dynamic load C (N)	Basic static load C0 (N)	Dynamic torque T (Nm)	Static torque T0 (Nm)	Static moment Tx (Nm)(1)	
LSAG12F-C	2156	2646	14,7	18,6	10,78	58,8
LSAG15F-C	4214	6076	31,4	45,0	27,44	152,0
LSAG20F-C	6566	9016	65,7	90,0	49,00	287,0
LSAG25F-C	11172	14308	139,0	178,0	93,00	550,0
LSAG30F-C	15386	19404	231,0	291,0	147,00	873,0

(1) Tx: *The values in the second column are for two cylinders in close contact*

Our other products

CHTRB

Single and dual output gearboxes, Up to 87,3 Nm

CHAE3030PA

Square decorative screwed hinges, Polyamide

CLLCLLP

Clevis components, long version, Steel - long version

PTGP

Tensioner pulley, For flat belts

GAL22

Conveyor wheel, Zinc plated steel

PTGT

Tensioner pulley, For V belts

CAP881

Side flexing slim slat top chain stainless steel, Narrow range 881

DILC

Indexing plunger with cam, with cam

RPCpl

Swivel castor with plate, Steel - Polyamide

CAP805

Slat top chain stainless steel, Large range 805

RFK28C

Hypoid gearbox - Stainless steel, up to 130 Nm

PRF_CHA

Hinge for aluminium profile, Surface mounting hinge

Complementary products

LSAG

Precision linear rotary ball spline, Rail - from 514 N to 15386 N