

Synchronous Linear Motors with integrated Water Cooling L1SK Series



- Integrated water cooling for up to 50% more continuous power at equal dimensions in comparison to L1S series
- Significant increase of duty cycle, possible due to patented heat dissipation
- Mounting device for additional external cooler for extreme requirements and improved thermal control
- NeFeB magnets for optimized peak force to mass ratio
- Different voltage constants for DC bus voltages of 560 V_{DC} or 330 V_{DC}
- Peak forces from 450 N up to 11000 N for various applications
- Perfectly controllable due to low electrical time constants
- Simple and cost-effective design due to modular concept
- Modular design of magnetic ways for simple usage and installation
- Complete encapsulation of all motor parts for excellent protection
- Integrated thermal overload protection against machine failures
- Highly flexible, shielded cable for easy and cost-effective connection

Rugged Design

The simple and cost-effective design of our linear motors provides a 100% duty cycle. Their ruggedness and reliability distinguishes them for continuous operation even under extreme ambient conditions. Highly flexible EMC cables instead of expensive connectors result in cost reduction and minimum space requirements. The integration of the thermo switch connector into the motor cable additionally reduces cabling efforts.

Due to its vacuum encapsulation the slide is fully protected (IP 65) even without any costly housing. The herewith achieved weight reduction even enlarges the already existing high acceleration capability. A complete encapsulation of the magnetic ways avoids damages of the magnets during mounting and operation.

All these features stand for a high quality, field optimized and nevertheless easy-to-handle linear drive.

Integrated Water Cooling for extended Power

As a difference to already existing systems, the cooling is not integrated into the winding in a complicated and costly manner or realized through encapsulated aluminum heat sinks. This new principle - which has been applied for patent - uses a special technique to lead the heat out of the laminated core into a cooling pipe adapted to the end turn of the winding.

The heat – generated by copper losses – is dissipated from the core to the winding ends with conduction channels which are integrated into the winding. From the winding ends the heat is lead away from the motor through a cooling pipe which is attached to the winding end.

The cooling system is integrated into the space between lamination core and winding end which is existing anyway in all flat-bed linear motors. Thus length and width of the motor remain unchanged. The advantage for the user is, that he can achieve at least the same continuous power with the same motor size he would normally achieve with an external water cooler. The necessary mounting space for the external cooler can be saved, the machine gets more compact and the motor can be coupled even closer to the machine.

For more sophisticated requirements (such as higher effective continuous power, better cooling) the continuous power of the motor can be increased even more by using an additional external cooler. Thus the pulse rate of the machine can be raised up to 50 %. The internal cooler than works as a base load cooler while the external one absorbs the remaining power loss and controls the transitional temperature between motor and driven machine. This enables a considerably enhanced control of the thermal expansion of the machine.

Modular Design for individual Adaptation to your Application

The mutual operation of several slides on one magnetic way allows multi-axis applications as well as increased thrust forces.

5 different sizes allow optimized linear motor combinations even under critical mechanical requirements.

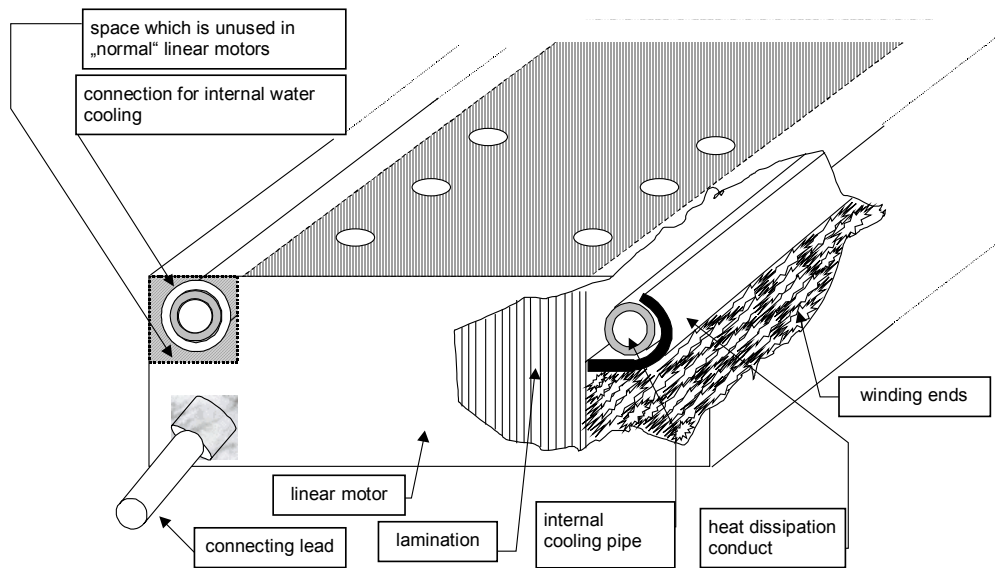
All linear motors are available with windings for 560 V_{DC} or 330 V_{DC} bus voltage. This allows a free choose of the best possible drive package optimizing size, performance and costs.

The requested thrust force is achieved by combining a suitable slide length with an appropriate width of the magnetic way. The necessary effective stroke is realized by putting together several magnetic ways which are available in three different lengths.

Due to the modular construction the magnet material can be reduced to the quantity which is really necessary for the realization of the requested effective stroke. Furthermore the easy handling of the short elements simplifies the mounting of the motor. All together the modular concept results in a substantial cost reduction.

If you should not be able to find a suitable drive combination out of our standard components our team will be pleased to assist you in finding the perfect solution for your application.

Design of the integrated Water Cooling



Technical Data

Mechanical Data

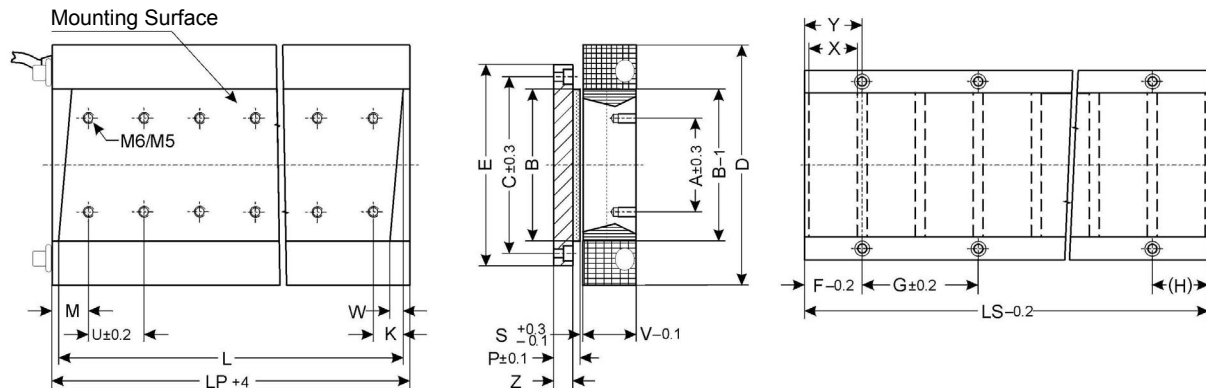
			L1SK045P-2608-JL	L1SK075P-2608-KL	L1SK075P-3208-IL	L1SK080P-3211-NH	L1SK080P-4111-KH	L1SK120P-4711-LH	L1SK160P-6511-NH
Peak Force	F_{PEAK}	N	450	1100	1400	1900	2400	4200	7200
Continuous Force (internal water cooler)	F_{WCI}	N	250	380	420	800	1000	2000	4500
Continuous Force (internal + external water cooler)	F_{WCIE}	N	400	500	620	1000	1400	2750	5800
Attraction Force	F_A	N	2000	3500	4000	4400	5600	11000	24000
Max. Acceleration	A_{MAX}	m/s^2	225	366	400	180	180	195	168
Max. Ambient Temperature	T_{umax}	$^{\circ}C$	40	40	40	40	40	40	40
Mech. Air Gap (-0,1; +0,3)	δ_{MECH}	mm	0,4	0,4	0,4	0,5	0,5	0,5	0,5
Protection Class			IP55	IP55	IP55	IP55	IP55	IP55	IP55

Electrical Data

DC Bus Voltage	U_Z	V_{DC}	330	330	330	560	560	560	560
Max. Velocity without Load	V_0	m/s	10,0	3,5	3,1	3,4	3,3	4,6	2,9
Back EMF Constant	K_E	Vsm^{-1}	57,2	48,0	54,0	95,8	97,1	70,9	105,0
Force Constant	k_F	N/A	100,0	89,0	96,0	157,0	176,5	125,0	177,0
Max. Current	I_{PEAK}	A	4,8	15,0	9,7	15,0	16,5	41,0	35,0
Continuous Current (internal water cooler)	I_{WCI}	A	2,3	3,9	4,0	4,2	5,6	15,6	22,0
Continuous Current (internal + external water cooler)	I_{WCIE}	A	4,0	5,4	6,0	6,1	7,8	22,5	31,5
Insulation Class			F	F	F	F	F	F	F

further types available upon request

Mechanical Dimensions



all sizes in mm

* M5 for L1SK045/075, M6 for L1SK080/120/160

		A	B	C	D	E	F	G	H	K	L	LP	LS	M	P	U	V	Z	Weight (kg)
L1SK045P-2608-JL-X0	Slide	30	45		80					29	208	230		32		50	25		
L1S050S-0624	Magnetic Ways	50	66		80	24	48	24					144	12			7,5	0,85	
L1S050S-0824		50	66		80	24	48	24					192	12				1,14	
L1S050S-1024		50	66		80	24	48	24					240	12				1,42	
L1SK075P-2608-KL-X0	Slide	35	75		120					29	208	233		36		50	25		3,0
L1S050S-0624	Magnetic Ways	75	92		106	24	48	24					144	12			7,5	1,21	
L1S050S-0824		75	92		106	24	48	24					192	12				1,62	
L1S050S-1024		75	92		106	24	48	24					240	12				2,0	
L1SK075P-3208-IL-X0	Slide	35	75		120					28	256	282		35		50	25		3,5
L1S075S-0624	Magnetic Ways	75	92		106	24	48	24					144	12			7,5	1,21	
L1S075S-0824		75	92		106	24	48	24					192	12				1,62	
L1S075S-1024		75	92		106	24	48	24					240	12				2,0	
L1SK080P-3211-NH-X0	Slide	40	80		140					26	352	377		33,0		50	38		13,2
L1S080S-0633	Magnetic Ways	80	98		114	33	66	33					198	14			8,5	2,2	
L1S080S-0833		80	98		114	33	66	33					264	14				2,96	
L1S080S-1033		80	98		114	33	66	33					330	14				3,7	
L1SK080P-4111-IL-X0	Slide	40	80		140					25,5	451	477		35,5		50	38		13,2
L1S080S-0633	Magnetic Ways	80	98		114	33	66	33					198	14			8,5	2,2	
L1S080S-0833		80	98		114	33	66	33					264	14				2,96	
L1S080S-1033		80	98		114	33	66	33					330	14				3,7	
L1SK120P-4711-LH-X0	Slide	60	120		180					33,5	517	542		40,5		50	38		21,5
L1S120S-0633	Magnetic Ways	120	138		154	33	66	33					198	14			8,5	3,06	
L1S120S-0833		120	138		154	33	66	33					264	14				4,13	
L1S120S-1033		120	138		154	33	66	33					330	14				5,16	
L1SK160P-6511-NH-X0	Slide	80	160		230					32,5	715	740		35,0		50	38		37,0
L1S160S-0633	Magnetic Ways	160	178		194	33	66	33					198	14			8,5	4,0	
L1S160S-0833		160	178		194	33	66	33					264	14				5,92	
L1S160S-1033		160	178		194	33	66	33					330	14				7,4	

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subject to change without notice