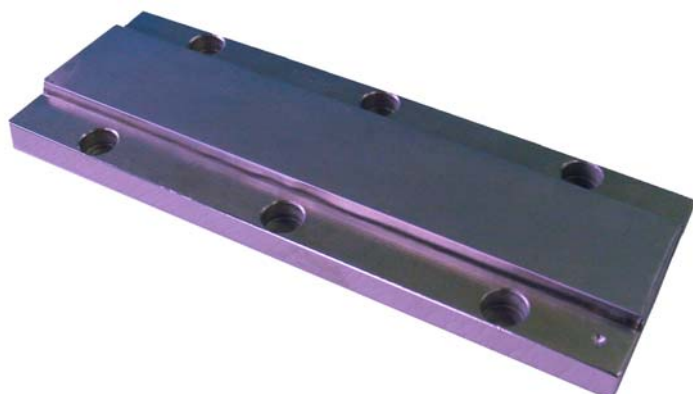
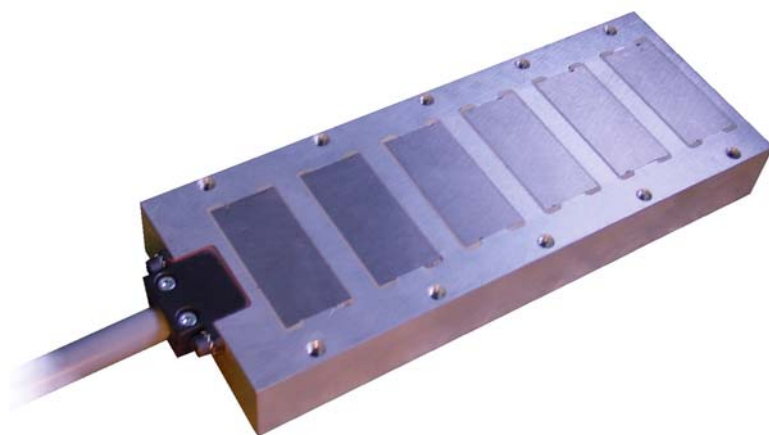


AC-synchronous motors

Series LSM-24.

Catalogue

Motor →



←Magnet way

Minsk 2008

Rev. Nov. 2008

The firm «Ruchservomotor» develops and makes direct drive systems on the base of step and synchronous motors. In addition to standard samples, introduced in the catalogue of production, we offer development of motors in according the requirements of the customer, including the different sizes, joint dimensions, dynamic, accuracy and capacity of the characteristic.

Next technical parameters are possible:

- *Length of movement up to 5m*
- *Peak effort (moment) up to 1000N*
- *Position accuracy up to 0,1mm*
- *Max. speed up to 3,6 m/s*
- *Max. acceleration up to 8 g.*

The Direct Drives Ruchservomotor JV are constructed on the basis of AC-synchronous motors with permanent magnets.

The primary part (forcer in linear motors or stator in rotary motors) contains a magnetic circuit and three-phase system of a winding, are connected in a star or in a triangle.

By means of a magnet system forms linearly - distributed or circle magnetic field. The position of a resultant is determined by currents phases of the inverter, and the amplitude of vector, so and effort, developed by a motor, is set by amplitudes of phase currents.

The secondary part (magnetic road in linear engines or rotor in rotary motors) contains permanent magnets with alternating polarity, which at the expense of interaction with a magnetic field of a primary part provide a thrust effort.

Advantages of a direct drives "Ruchservomotor" JV

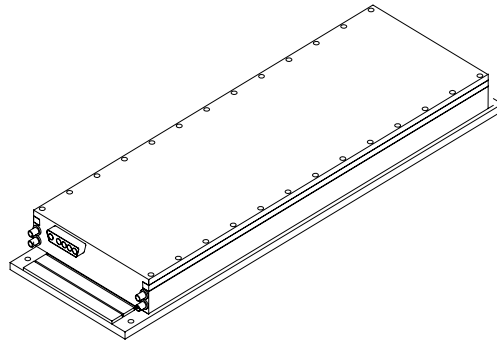
- High dynamics, rigidity, accuracy and reliability stipulated by absence of a mechanical transmission (of ballscrews transmissions, reduction gearboxes, gear belts).
- Low detent effort (torque) at the expense of an optimum licensed design of a magnet system, wide band of speed regulation.
- The high specific thrust characteristics in all speed range, compact design.
- High scale of protection.
- Capability of water cooling of a primary part ensuring absence of the temperature extension in precision machine tools.
- Capability of built fulfillment, including rotary motors with a hollow shaft ensuring optimum design integration

Ruchservomotor JV makes 3 types of Linear Synchronous Motors:

1. **Linear Synchronous Motors (LSM Series):** correspond to the motors with one magnetic way.

Features: there is a strong attractive force between the motor and the magnetic way, so this is an ideal solution for the systems where bearings preload must be present. For an example, this type of motors could be used in systems with air bearings.

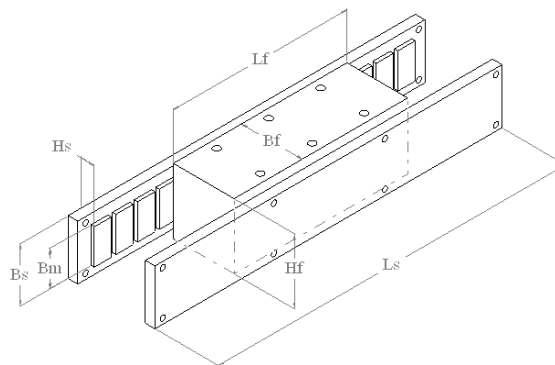
Applications: pick and place machines, waterjet, wirebonders, positioning and assembling robots, machinery construction, laser-cutting machines, transportation systems., gantry.



2. **Linear Synchronous Symmetrical Motors (LSSM Series):** correspond to the motors with two magnetic way.

Features: there is a little attractive force between the motor and the magnetic ways, so they could be used in the wide-range systems where high dynamic is required. Also a little attraction force increases the lifetime for the linear guideways.

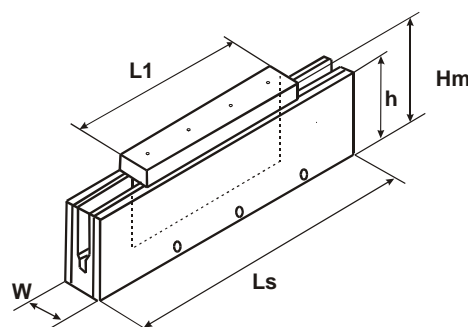
Applications: engineering industry, laser-cutting machines, measuring systems, transportation systems, different kind of systems where high dynamic and precision are required.



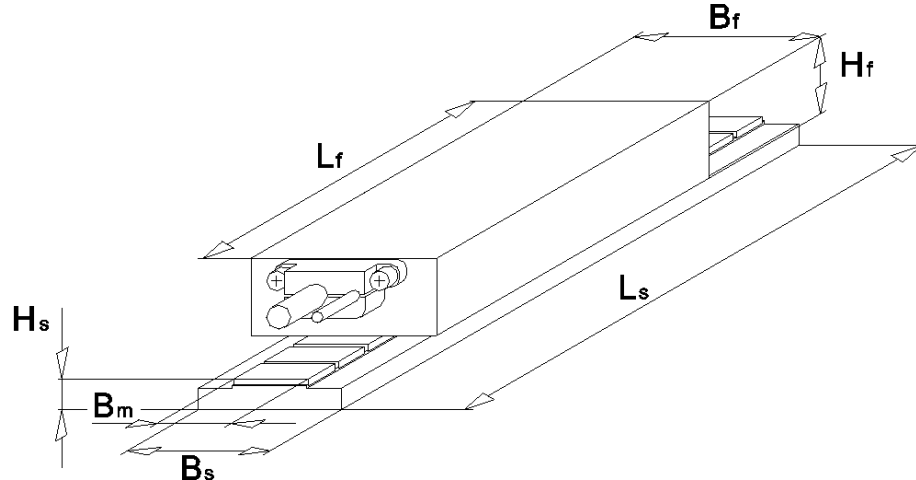
3. **Linear Synchronous Motors without Iron Core (LSIM Series):** correspond to the motors without iron core.

Features: motors within this series have not the iron magnetic core. This allows for the motors to have a very smooth motion with high dynamic, but no detent force.

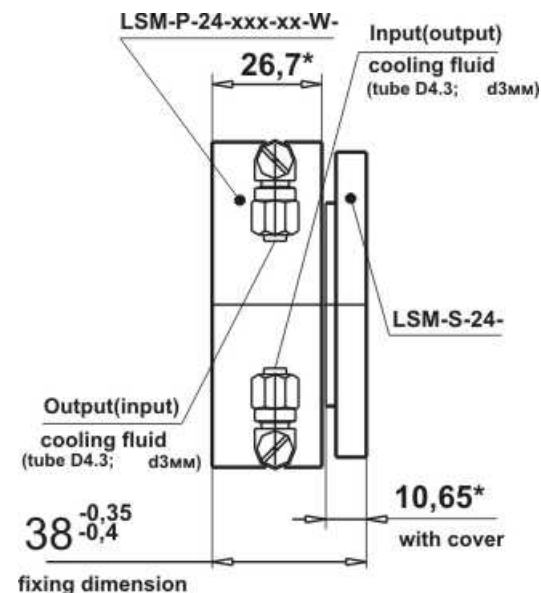
Applications: engineering industry, laser-cutting machines, measuring systems, transportation systems, different kind of systems where high dynamic and precision are required.



Linear Synchronous Motor series LSM-24.



Overall and join dimensions



Coolant connection and montage dimensions

Specification

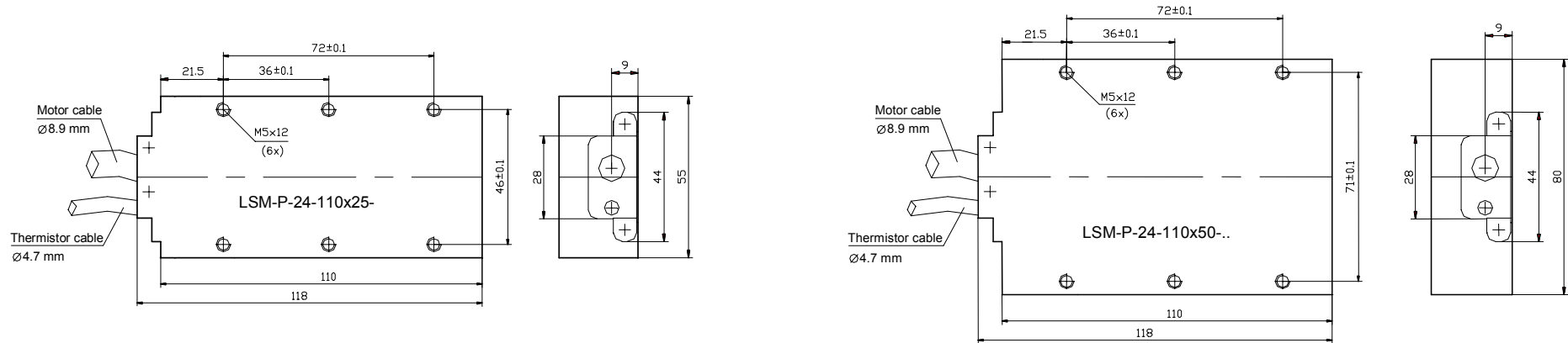
	Peak force (coil at 20C)	Continuous force at water cooling (coil at 120C).	Continuous force at convection cooling (coil at 120C).	Recommended supply voltage V DC	Max. velocity at Fa and Us (coil at 20C)	Forcer weight	Forcer length	Forcer height	Forcer width	Magnet way height **
	Fp, N	Fw, N	Fa, N	Us, V	Va, m/s [S/T]	Mf, kg	Lf, mm	Hf, mm	Bf, mm	Hs, mm
LSM-P-24-110*25-...	162	98	61	70	1,9/3,4	0,74	110	27,0	55,0	8,5
LSM-P-24-110*50-...	323	192	113	70	2,3/3,6	1,1	206		80,0	
LSM-P-24-206*25-...	323	196	115	155	2,2/3,6	1,4			55,0	
LSM-P-24-206*50-...	647	384	226	540	3,6/3,6	2,0	80,0			
LSM-P-24-302*25-...	485	294	173	310	3,0/3,6	2,02	302		55,0	
LSM-P-24-302*50-...	970	576	339	310	3,5/3,6	2,94			80,0	

Notes:

1. Motor has peak force at peak current I_P (2...3 сек)
2. Air gap between forcer and magnets – 0,5 mm.
3. Max temperature of stator should be less than 70 °C.
4. The forcer has build-in threshold sensor for temperature 120°C.
5. (S/T) - motor phase connection: Star / Triangle
6. Max. input pressure of coolant - 1,1 bar
7. All data are subject to change without notice
8. All data tolerance $\pm 10\%$.

** - With protection of magnets by stainless steel

Linear Synchronous Motor series LSM-P-24-110x_

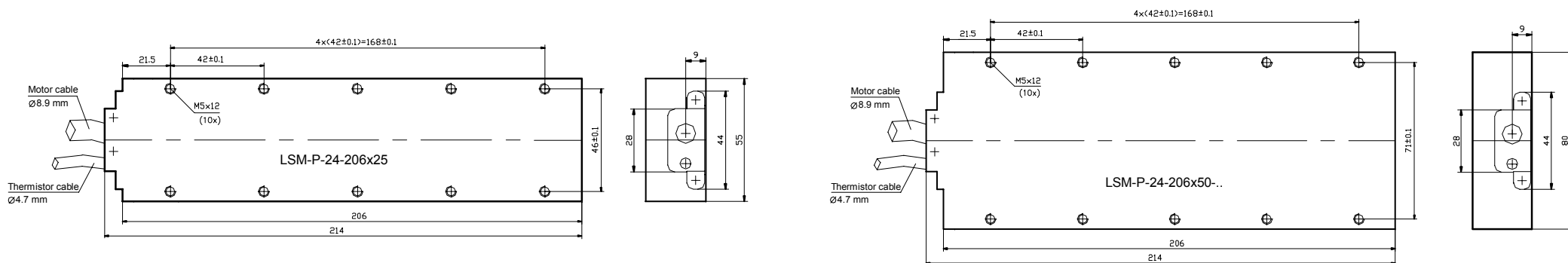


Overall and join dimensions

Parameter	Symbol	Unit	LSM-P-24-110-...			
			25-...		50-...	
			HS	HT	GS	GT
Peak force (coil at 20°C)	Fp	N	162		323	
Continuous force (coil at 120°C), water cooling ¹	Fw	N	98		192	
Continuous force (coil at 120°C), air cooling	Fa	N	61		113	
Detent force	Fd	N	0,8		1,6	
Attraction force of magnets	Fm	N	419		837	
Recommended supply voltage DC	Us	V	70		70	
Motor constant (coil at 20°C)	Ko	N/√W	11,6		18,1	
Peak power dissipation (coil at 20°C)	Pp	W	280	286	467	478
Continuous power dissipation (coil at 120°C), water cooling	Pw	W	100	105	161	171
Continuous power dissipation (coil at 120°C), air cooling	Pa	W	40	44	60	66
Coolant flow for temperature difference 5°C by power Pw	Cf	L/min	0,1	0,1	0,5	0,5
Maximum velocity at Fp and Us (Coil at 20°C)	Vp	m/s	0,9	1,9	1,2	2,3
Maximum velocity at Fw and Us (Coil at 20°C)	Vw	m/s	1,4	2,8	1,8	3,3
Maximum velocity at Fa and Us (Coil at 20°C)	Va	m/s	1,9	3,4	2,3	3,6
Peak current (RMS) at Fp and V=0	Ip	Arms	6,0	10,5	14,0	24,2
Continuos current at 120°C with water cooling at Fw and V=0	Iw	Arms	3,5	6,1	8,0	13,9
Continuos current at 120°C with air cooling at Fa and V=0	Ia	Arms	2,2	3,8	4,7	8,1
Efficiency at Fw and US (Coil at 20°C)	Ew	%	58,6	72,1	68,4	79,0
Back EMF constant (*) (peak phase-phase)	Ku	V/(m/s)	22,8	13,1	19,7	11,4
Electrical resistance at 20°C (*)	R	Ohm	3,82	1,27	1,18	0,39
Electrical inductance (*)	L	mH	20,4	6,8	7,6	2,5

* value «terminal-terminal»

Linear Synchronous Motor series LSM-P-24-206x_

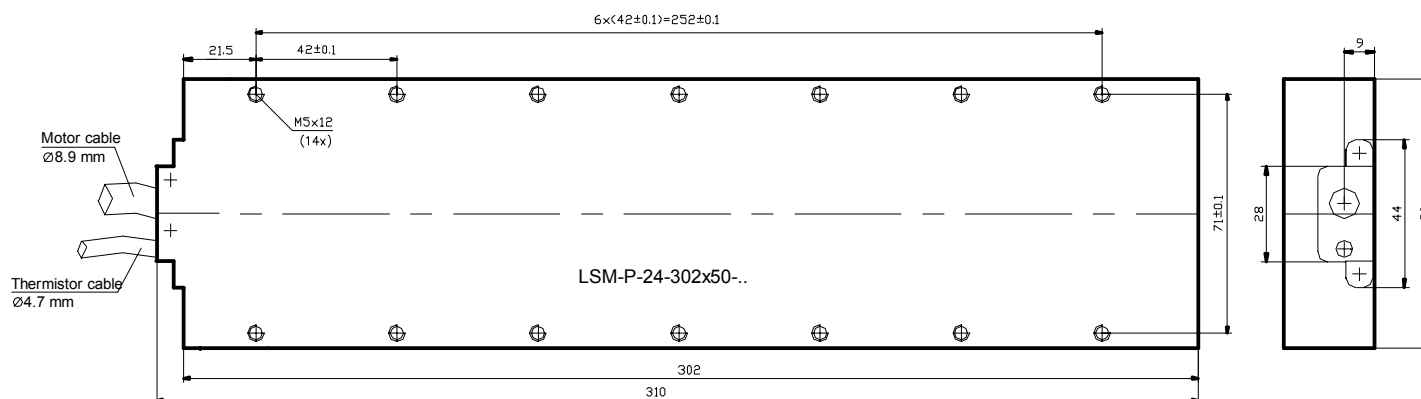


Overall and join dimensions

Parameter	Symbol	Unit	LSM-P-24-206-...					
			25-...		50-...			
			HS	HT	HS	HT	GS	GT
Peak force (coil at 20°C)	Fp	N	323		647			
Continuous force (coil at 120°C), water cooling ¹	Fw	N	196		385		384	
Continuous force (coil at 120°C), air cooling	Fa	N	115		227		226	
Detent force	Fd	N	1,6		3,2			
Attraction force of magnets	Fm	N	837		1674			
Recommended supply voltage DC	Us	V	155		540			
Motor constant (coil at 20°C)	Ko	N/√W	16,5		25,7		25,6	
Peak power dissipation (coil at 20°C)	Pp	W	562	575	952	990	1022	1107
Continuous power dissipation (coil at 120°C), water cooling	Pw	W	201	212	341	372	395	466
Continuous power dissipation (coil at 120°C), air cooling	Pa	W	74	82	132	156	174	232
Coolant flow for temperature difference 5°C by power Pw	Cf	L/min	0,6	0,6	0,8	0,9	0,9	1,0
Maximum velocity at Fp and Us (Coil at 20°C)	Vp	m/s	1,1	2,1	2,2	3,6	3,6	3,6
Maximum velocity at Fw and Us (Coil at 20°C)	Vw	m/s	1,6	3,1	3,2	3,6	3,6	3,6
Maximum velocity at Fa and Us (Coil at 20°C)	Va	m/s	2,2	3,6	3,6	3,6	3,6	3,6
Peak current (RMS) at Fp and V=0	Ip	Arms	6,0	10,5	6,0	10,5	14,0	24,2
Continuos current at 120°C with water cooling at Fw and V=0	Iw	Arms	3,5	6,1	3,5	6,0	8,0	13,9
Continuos current at 120°C with air cooling at Fa and V=0	Ia	Arms	2,1	3,6	2,0	3,5	4,7	8,1
Efficiency at Fw and US (Coil at 20°C)	Ew	%	61,5	74,1	78,4	85,4	88,0	91,2
Back EMF constant (*) (peak phase-phase)	Ku	V/(m/s)	45,5	26,3	91,1	52,6	39,4	22,8
Electrical resistance at 20°C (*)	R	Ohm	7,64	2,55	12,61	4,20	2,37	0,79
Electrical inductance (*)	L	mH	40,7	13,6	81,4	27,1	15,2	5,1

* value «terminal-terminal»

Linear Synchronous Motor series LSM-P-24-302x...



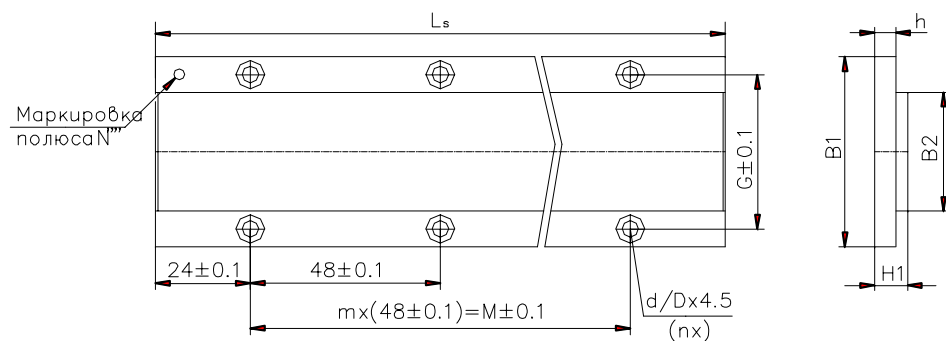
Overall and joint dimensions

Parameter	Symbol	Unit	LSM-P-24-302-25		LSM-P-24-302-50	
			GS	GT	GS	GT
Peak force (coil at 20°C)	Fp	N	485		970	
Continuous force (coil at 120°C), water cooling ¹	Fw	N	293		576	
Continuous force (coil at 120°C), air cooling	Fa	N	173		339	
Detent force	Fd	N	2,4		4,9	
Attraction force of magnets	Fm	N	1256		2511	
Recommended supply voltage DC	Us	V	310		310	
Motor constant (coil at 20°C)	Ko	N/√W	20,2		31,4	
Peak power dissipation (coil at 20°C)	Pp	W	902	962	1423	1473
Continuous power dissipation (coil at 120°C), water cooling	Pw	W	348	398	503	544
Continuous power dissipation (coil at 120°C), air cooling	Pa	W	145	185	192	223
Coolant flow for temperature difference 5°C by power Pw	Cf	L/min	0,9	0,9	1,6	1,6
Maximum velocity at Fp and Us (Coil at 20°C)	Vp	m/s	3,6	3,6	1,9	3,5
Maximum velocity at Fw and Us (Coil at 20°C)	Vw	m/s	3,6	3,6	2,8	3,6
Maximum velocity at Fa and Us (Coil at 20°C)	Va	m/s	3,6	3,6	3,5	3,6
Peak current (RMS) at Fp and V=0	Ip	Arms	14,0	24,2	14,0	24,2
Continuos current at 120°C with water cooling at Fw and V=0	Iw	Arms	8,2	14,2	8,0	13,9
Continuos current at 120°C with air cooling at Fa and V=0	Ia	Arms	4,8	8,3	4,7	8,1
Efficiency at Fw and US (Coil at 20°C)	Ew	%	82,7	87,7	76,4	84,1
Back EMF constant (*) (peak phase-phase)	Ku	V/(m/s)	29,6	17,1	59,1	34,1
Electrical resistance at 20°C (*)	R	Ohm	2,15	0,72	3,55	1,18
Electrical inductance (*)	L	mH	11,4	3,8	22,9	7,6

* value «terminal-terminal»

Magnetic road for synchronous motors LSM with protection of magnets, type A (mounting method - above)

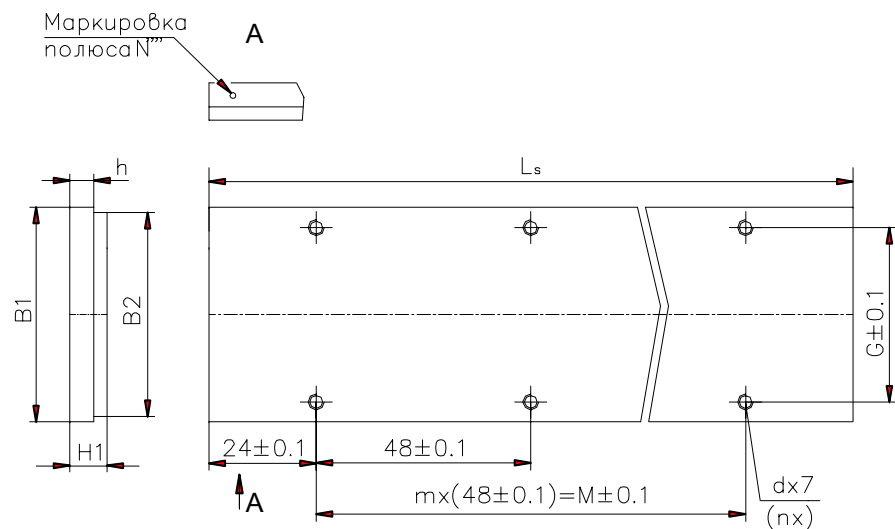
LSM - S - 24 - x*x-A



Overall and join dimensions

Name	B1,mm	B2,mm	G, mm	H1,mm	h,mm	d,mm	D,mm	m	M,mm	n	Ls,mm	Weight , kg
LSM-S-24-144x25-A	50	26	40	10,65	7,5	4,8	8	1	96	6	144	0,49
LSM-S-24-192x25-A								2	144	8	192	0,66
LSM-S-24-240x25-A								3	192	10	240	0,82
LSM-S-24-288x25-A								4	240	12	288	0,99
LSM-S-24-336x25-A								5	288	14	336	1,15
LSM-S-24-384x25-A								6	336	16	384	1,32
LSM-S-24-144x50-A	75	51	65	10,65	7,5	4,8	8	1	96	6	144	0,79
LSM-S-24-192x50-A								2	144	8	192	1,05
LSM-S-24-240x50-A								3	192	10	240	1,32
LSM-S-24-288x50-A								4	240	12	288	1,58
LSM-S-24-336x50-A								5	288	14	336	1,84
LSM-S-24-384x50-A								6	336	16	384	2,1

Magnetic road for synchronous motors LSM with protection of magnets, type B (mounting method - below)
 LSM - S - 24 - x*x-B



Overall and join dimensions

Name	B1,mm	B2,mm	G,mm	H1,mm	h,mm	d,mm	m	M,mm	n	Ls,mm	Weight, kg
LSM-S-24-144x25-B	29	26	17	10,65	7,5	M4-6H	1	96	6	144	0,32
LSM-S-24-192x25-B							2	144	8	192	0,43
LSM-S-24-240x25-B							3	192	10	240	0,54
LSM-S-24-288x25-B							4	240	12	288	0,65
LSM-S-24-336x25-B							5	288	14	336	0,76
LSM-S-24-384x25-B							6	336	16	384	0,86
LSM-S-24-144x50-B	54	51	32	10,65	7,5	M4-6H	1	96	6	144	0,6
LSM-S-24-192x50-B							2	144	8	192	0,81
LSM-S-24-240x50-B							3	192	10	240	1,01
LSM-S-24-288x50-B							4	240	12	288	1,21
LSM-S-24-336x50-B							5	288	14	336	1,41
LSM-S-24-384x50-B							6	336	16	384	1,61