

## AC-synchronous motors

### Series LSM-36. Catalogues



Motor →



← Magnet way



**Minsk 2011**  
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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 10m*
- *Peak effort (moment) up to 8000N*
- *Position accuracy up to 0,1mm*
- *Max. speed up to 10 m/s*
- *Max. acceleration up to 8g.*

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

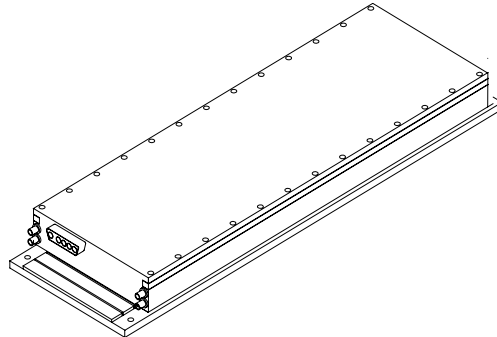
- High dynamics, rigidity, accuracy and reliability stipulated by absence of a mechanical transmission (of ballscrews transmissions, reduction gearboxes, gear belts).
- Low detent effort (torque) at the expense of an optimum licensed design of a magnet system, wide band of speed regulation.
- The high 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.

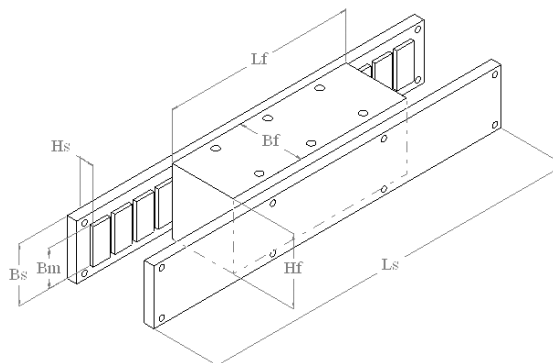
Applications: pick and place machines, waterjet, wirebonders, positioning and assembling robots, machinery construction, laser-cutting machines, transportation systems, gantry.



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.

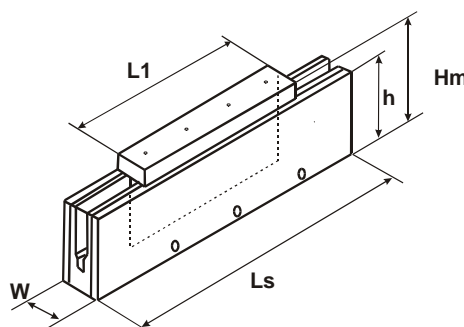
Applications: engineering industry, laser-cutting machines, measuring systems, transportation systems, different kind of systems where high dynamic and precision are required.



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

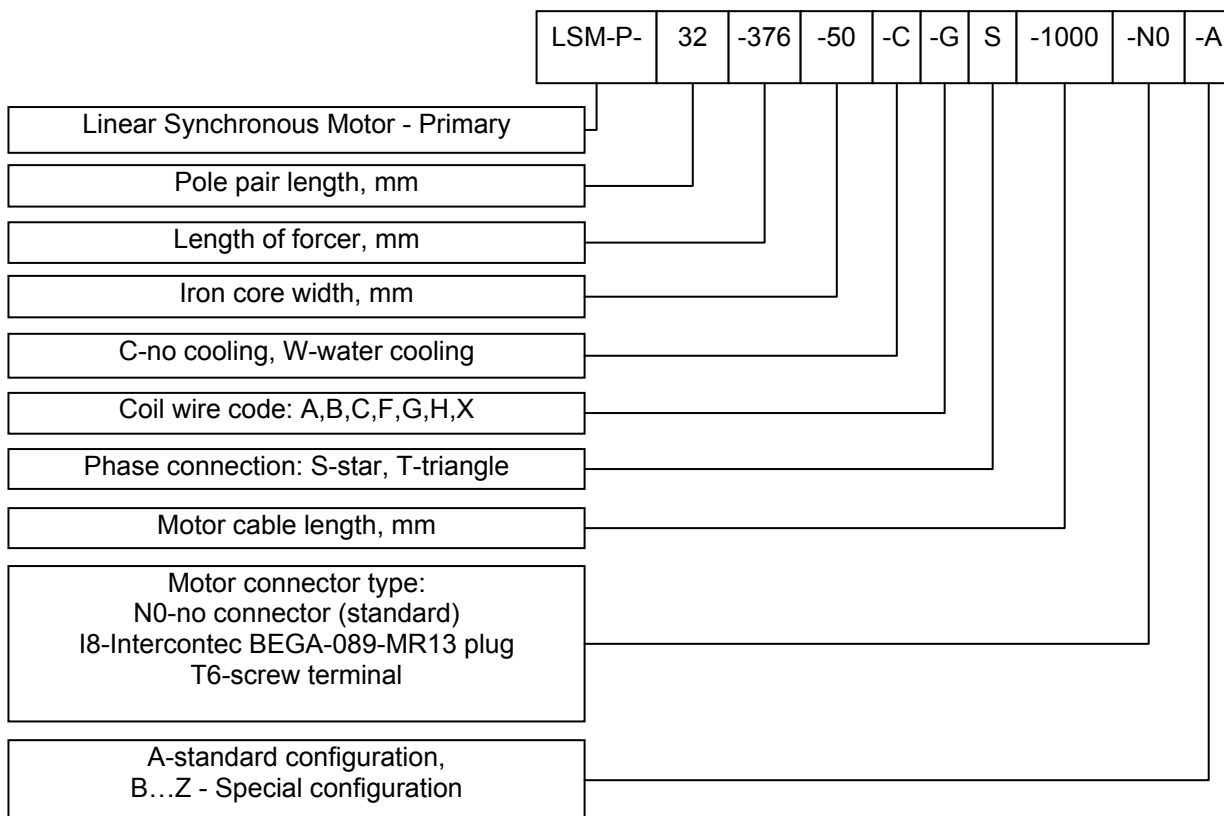
Features: motors within this series have not the iron magnetic core. This allows for the motors to have a very smooth motion with high dynamic, but no detent force.

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

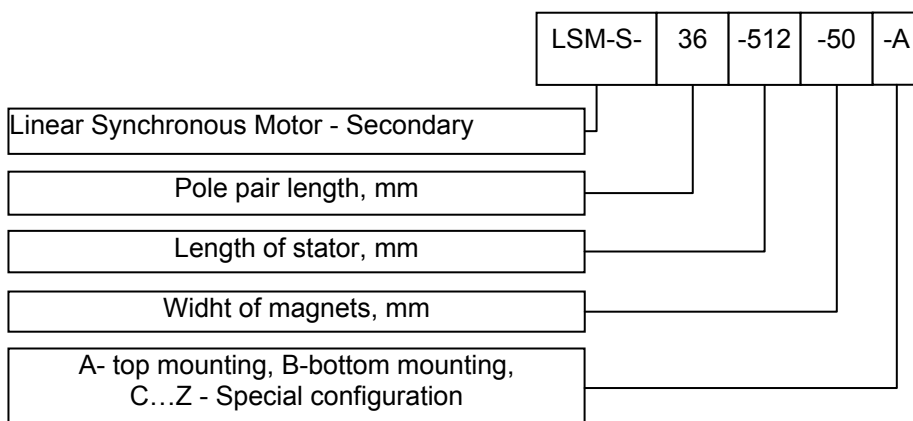


**Order key for linear synchronous motors**

Primary part (forcer with iron core, windings and cable):



Secondary part (stator, magnet way with permanent magnets):



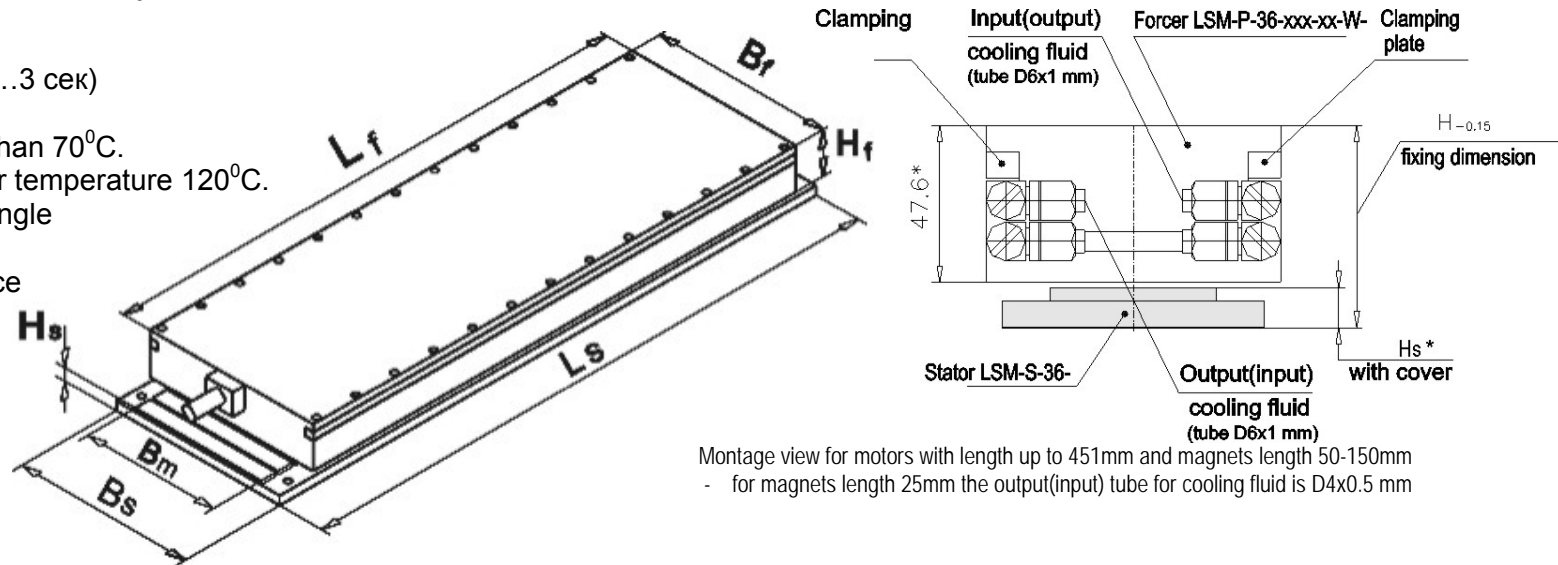
Order example: Linear synchronous motor forcer LSM-P-32-376-50-C-GS-1000-NO-A,  
Linear synchronous motor stator LSM-S-32-512-50-A

# Linear Synchronous Motor series LSM-36.

## Notes:

1. Motor has peak force at peak current  $I_P$  (2...3 сек)
2. Air split between rotor and stator – 0,9mm
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 liquid fluid - 1,1 bar
7. All data are subject to change without notice
8. All data tolerance  $\pm 10\%$ .

\* - dimensions for reference only



Montage view for motors with length up to 451mm and magnets length 50-150mm  
- for magnets length 25mm the output(input) tube for cooling fluid is D4x0.5 mm

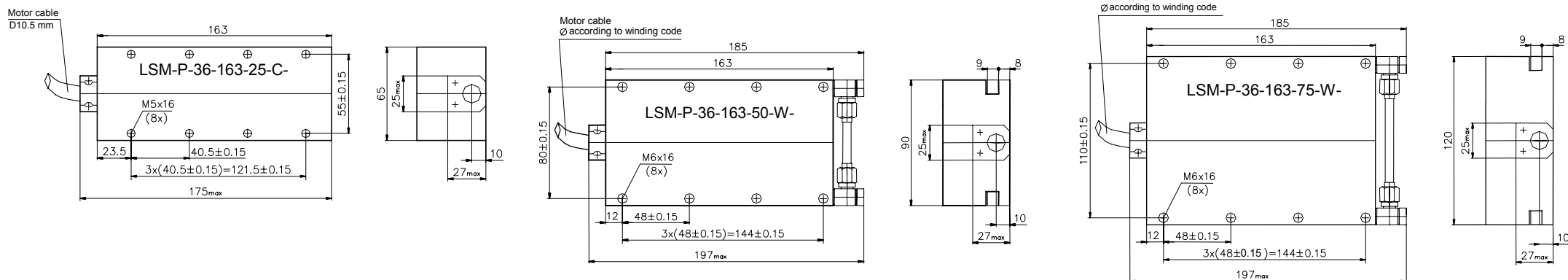
## Overview technical data

|                      | Peak force<br>(coil at 20C) | Continuous<br>force at water<br>cooling (coil at<br>120C). | Continuous force at<br>convection cooling<br>(coil at 120C). | Recommended<br>supply voltage<br>DC | Max. velocity at<br>Fa and Us<br>(coil at 20C) | Forcer<br>weighth | Forcer<br>length | Motor height | Forcer width | Magnet way<br>height ** |      |
|----------------------|-----------------------------|--|--|-------------------------------------|--|-------------------|------------------|--------------|--------------|-------------------------|------|
|                      | Fp, N                       | Fw, N  | Fa, N  | Us, V                               | Va, m/s [S/T]                                  | Mf, kg            | Lf, mm           | H, mm        | Bf, mm       | Hs, mm                  |      |
| LSM-P-36-163*25-...  | 254                         | 212  | 109  | 310                                 | 10,0/10,0                                      | 2,3               | 163              | 60.5         | 65           | 12,3                    |      |
| LSM-P-36-163*50-...  | 509                         | 418  | 214  |                                     | 6.9/10,0                                       | 3,2               |                  | 60.5         | 90           |                         |      |
| LSM-P-36-163*75-...  | 763                         | 617  | 316  |                                     | 4.6/8.1  | 4,3               |                  | 62.5         | 120          |                         | 14,3 |
| LSM-P-36-307*25-...  | 509                         | 424  | 218  | 310                                 | 6.8/10,0                                       | 4,4               | 307              | 60.5         | 65           | 12,3                    |      |
| LSM-P-36-307*50-...  | 1017                        | 836  | 429  |                                     | 3.4/6.0  | 6,1               |                  | 60.5         | 90           |                         |      |
| LSM-P-36-307*75-...  | 1526                        | 1234   | 633  |                                     | 4.0/7.0  | 8,1               |                  | 62.5         | 120          |                         | 14,3 |
| LSM-P-36-307*100     | 2035                        | 1559   | 796  | 540                                 | 6.5/10.0                                       | 9,8               |                  | 62.5         | 145          |                         |      |
| LSM-P-36-451*50-...  | 1526                        | 1253   | 643  | 540                                 | 4.0/7.0  | 9,0               | 451              | 60.5         | 90           | 12,3                    |      |
| LSM-P-36-451*75-...  | 2289                        | 1851   | 949  |                                     | 2.6/4,7  | 12,0              |                  | 62.5         | 120          |                         | 14,3 |
| LSM-P-36-451*100...  | 3052                        | 2339   | 1193   |                                     | 4.3/7,6  | 14,5              |                  | 62.5         | 145          |                         |      |
| LSM-P-36-451*150...  | 4579                        | 3394   | 1727   |                                     | 2.9/5,1  | 19,5              |                  | 64.5         | 195          |                         | 16,3 |
| LSM-P-36-595*75-...  | 3052                        | 2468   | 1265   | 540                                 | 1.9/3,5  | 15,8              | 595              | 62.5         | 120          | 14,3                    |      |
| LSM-P-36-595*100-... | 4070                        | 3119   | 1591   |                                     | 3.2/5,7  | 19,1              |                  | 62.5         | 145          |                         |      |
| LSM-P-36-595*150-... | 6105                        | 4526   | 2303   |                                     | 2.1/3,8  | 25,7              |                  | 64.5         | 195          |                         | 16,3 |
| LSM-P-36-739*150-... | 7631                        | 5657   | 2878   |                                     | 1.7/3,0  | 36,0              |                  | 64.5         | 195          |                         | 16,3 |

\*\* - With protection of magnets by a stainless steel



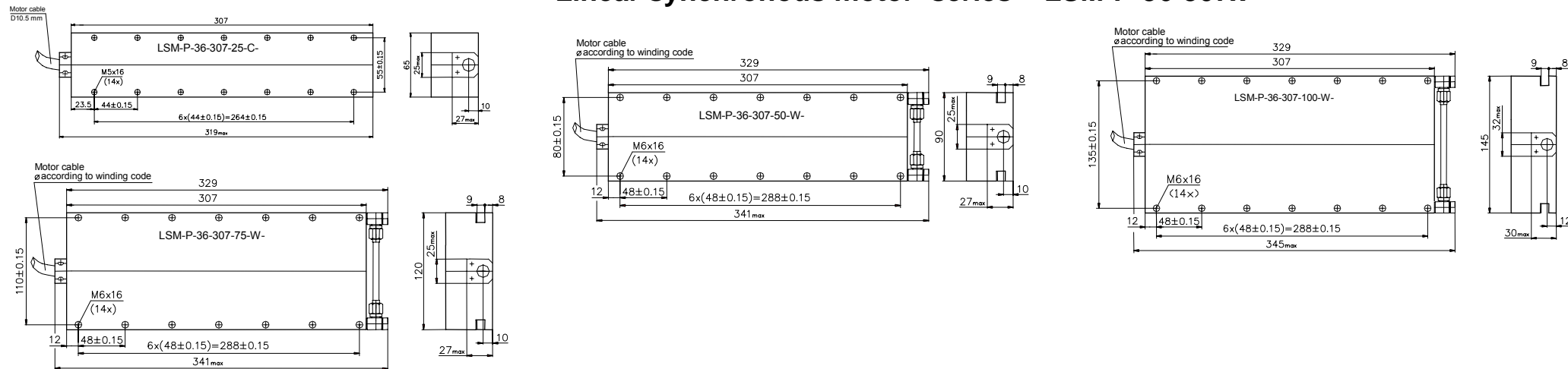
# Linear synchronous motor series LSM-P-36-163x ...



| Parameter  |    | Unit    | LSM-P-36-163-... |      |         |      |      |      |         |      |
|--|----|---------|------------------|------|---------|------|------|------|---------|------|
|  |    |         | -25-...          |      | -50-... |      |      |      | -75-... |      |
|  |    |         | FS               | FT   | HS      | HT   | FS   | FT   | FS      | FT   |
| Peak force (coil at 20°C)                                    | Fp | N       | 254              |      | 509     |      | 509  |      | 763     |      |
| Continuous force (coil at 120°C), water cooling              | Fw | N       | 212              |      | 365     |      | 418  |      | 617     |      |
| Continuous force (coil at 120°C), air cooling                | Fa | N       | 109              |      | 185     |      | 214  |      | 316     |      |
| Detent force   | Fd | N       | 3,1              |      | 6,1     |      | 6,1  |      | 9,2     |      |
| Attraction force of magnets                                  | Fm | N       | 650              |      | 1301    |      | 1301 |      | 1951    |      |
| Recommended supply voltage DC                                | Us | V       | 310              |      | 310     |      | 310  |      | 310     |      |
| Motor constant (coil at 20°C)                                | Ko | N/√W    | 17,3             |      | 25,9    |      | 27,9 |      | 36,0    |      |
| Peak power dissipation (coil at 20°C)                        | Pp | W       | 372              | 403  | 602     | 613  | 540  | 565  | 716     | 738  |
| Continuous power dissipation (coil at 120°C), water cooling  | Pw | W       | 255              | 284  | 288     | 297  | 363  | 374  | 477     | 467  |
| Continuous power dissipation (coil at 120°C), air cooling    | Pa | W       | 79               | 101  | 74      | 80   | 98   | 114  | 119     | 133  |
| Coolant flow for temperature difference 5°C by power Pw      | Cf | L/min   | 0,2              | 0,2  | 0,8     | 0,8  | 0,9  | 1,0  | 1,2     | 1,2  |
| Maximum velocity at Fp and Us (Coil at 20°C)                 | Vp | m/s     | 9,1              | 10,0 | 1,4     | 2,7  | 4,5  | 7,9  | 3,0     | 5,3  |
| Maximum velocity at Fw and Us (Coil at 20°C)                 | Vw | m/s     | 10,0             | 10,0 | 1,9     | 3,5  | 5,2  | 9,1  | 3,4     | 6,1  |
| Maximum velocity at Fa and Us (Coil at 20°C)                 | Va | m/s     | 10,0             | 10,0 | 2,5     | 4,5  | 6,9  | 10,0 | 4,6     | 8,1  |
| Peak current (RMS) at Fp and V=0                             | Ip | Arms    | 14,0             | 24,2 | 5,1     | 8,8  | 14,0 | 24,2 | 14,0    | 24,2 |
| Continuous current at 120°C with water cooling at Fw and V=0 | Iw | Arms    | 11,3             | 19,6 | 3,5     | 6,0  | 11,1 | 19,3 | 10,9    | 18,9 |
| Continuous current at 120°C with air cooling at Fa and V=0   | Ia | Arms    | 5,6              | 9,6  | 1,7     | 3,0  | 5,5  | 9,5  | 5,4     | 9,3  |
| Efficiency at Fw and US (Coil at 20°C)                       | Ew | %       | 89,5             | 92,9 | 70,4    | 81,0 | 85,6 | 91,0 | 81,6    | 89,0 |
| Back EMF constant (*) (peak phase-phase)                     | Ku | V/(m/s) | 16,0             | 9,2  | 88,2    | 50,9 | 32,0 | 18,5 | 48,1    | 27,8 |
| Electrical resistance at 20°C (*)                            | R  | Ohm     | 0,86             | 0,29 | 11,56   | 3,85 | 1,32 | 0,44 | 1,79    | 0,60 |
| Electrical inductance (*)                                    | L  | mH      | 7,4              | 2,5  | 112,3   | 37,4 | 14,9 | 5,0  | 22,3    | 7,4  |

\* - terminal-terminal; 1 – not available

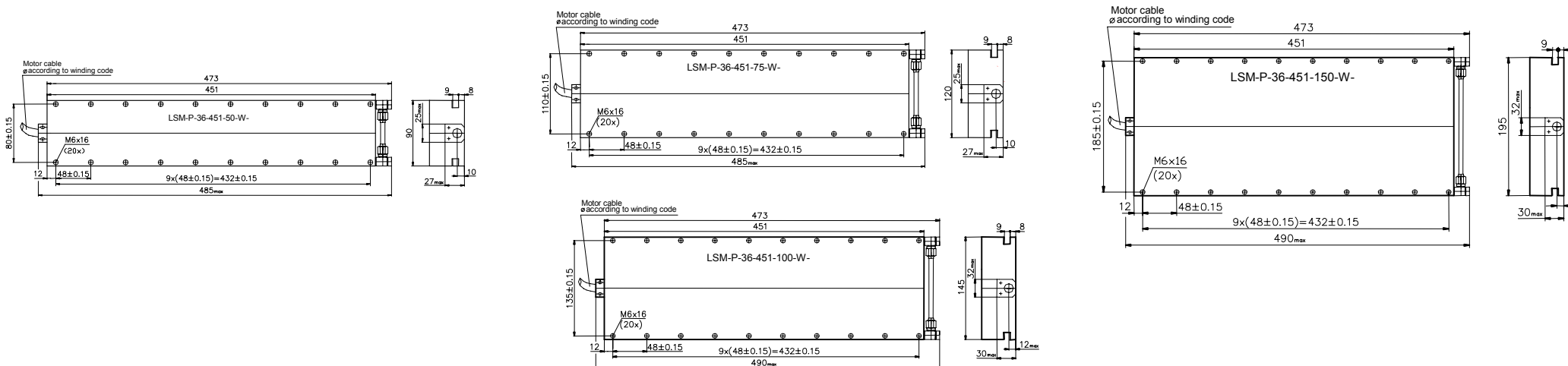
# Linear synchronous motor series LSM-P-36-307x



| Parameter  |    | Unit    | LSM-P-36-307-... |      |        |      |        |      |         |      |
|--|----|---------|------------------|------|--------|------|--------|------|---------|------|
|  |    |         | 25-...           |      | 50-... |      | 75-... |      | 100-... |      |
|  |    |         | FS               | FT   | FS     | FT   | FS     | FT   | BS      | BT   |
| Peak force (coil at 20°C)                                    | Fp | N       | 509              |      | 1017   |      | 1526   |      | 2035    |      |
| Continuous force (coil at 120°C), water cooling              | Fw | N       | 424              |      | 836    |      | 1234   |      | 1559    |      |
| Continuous force (coil at 120°C), air cooling                | Fa | N       | 218              |      | 429    |      | 633    |      | 796     |      |
| Detent force   | Fd | N       | 6,1              |      | 12,2   |      | 18,3   |      | 24,4    |      |
| Attraction force of magnets                                  | Fm | N       | 1301             |      | 2602   |      | 3903   |      | 5204    |      |
| Recommended supply voltage DC                                | Us | V       | 310              |      | 310    |      | 540    |      | 540     |      |
| Motor constant (coil at 20°C)                                | Ko | N/√W    | 24,5             |      | 39,4   |      | 50,9   |      | 59,2    |      |
| Peak power dissipation (coil at 20°C)                        | Pp | W       | 699              | 731  | 1047   | 1072 | 1423   | 1462 | 1913    | 1994 |
| Continuous power dissipation (coil at 120°C), water cooling  | Pw | W       | 470              | 499  | 695    | 695  | 946    | 921  | 1185    | 1146 |
| Continuous power dissipation (coil at 120°C), air cooling    | Pa | W       | 130              | 151  | 175    | 190  | 233    | 257  | 299     | 348  |
| Coolant flow for temperature difference 5°C by power Pw      | Cf | L/min   | 1,2              | 1,3  | 1,8    | 1,8  | 2,4    | 2,4  | 3,4     | 3,3  |
| Maximum velocity at Fp and Us (Coil at 20°C)                 | Vp | m/s     | 4,5              | 7,9  | 2,2    | 3,9  | 2,6    | 4,6  | 4,2     | 7,4  |
| Maximum velocity at Fw and Us (Coil at 20°C)                 | Vw | m/s     | 5,1              | 8,9  | 2,5    | 4,5  | 3,0    | 5,3  | 4,9     | 8,8  |
| Maximum velocity at Fa and Us (Coil at 20°C)                 | Va | m/s     | 6,8              | 10,0 | 3,4    | 6,0  | 4,0    | 7,0  | 6,5     | 10,0 |
| Peak current (RMS) at Fp and V=0                             | Ip | Arms    | 14,0             | 24,2 | 14,0   | 24,2 | 14,0   | 24,2 | 29,7    | 51,4 |
| Continuous current at 120°C with water cooling at Fw and V=0 | Iw | Arms    | 11,3             | 19,6 | 11,1   | 19,3 | 10,9   | 18,9 | 21,9    | 37,9 |
| Continuous current at 120°C with air cooling at Fa and V=0   | Ia | Arms    | 5,6              | 9,6  | 5,5    | 9,5  | 5,4    | 9,3  | 10,8    | 18,6 |
| Efficiency at Fw and US (Coil at 20°C)                       | Ew | %       | 82,2             | 88,3 | 74,9   | 84,4 | 79,4   | 87,7 | 86,6    | 92,3 |
| Back EMF constant (*) (peak phase-phase)                     | Ku | V/(m/s) | 32,0             | 18,5 | 64,1   | 37,0 | 96,1   | 55,5 | 60,4    | 34,9 |
| Electrical resistance at 20°C (*)                            | R  | Ohm     | 1,71             | 0,57 | 2,64   | 0,88 | 3,57   | 1,19 | 1,04    | 0,35 |
| Electrical inductance (*)                                    | L  | mH      | 14,9             | 5,0  | 29,8   | 9,9  | 44,7   | 14,9 | 13,2    | 4,4  |

\* - terminal-terminal

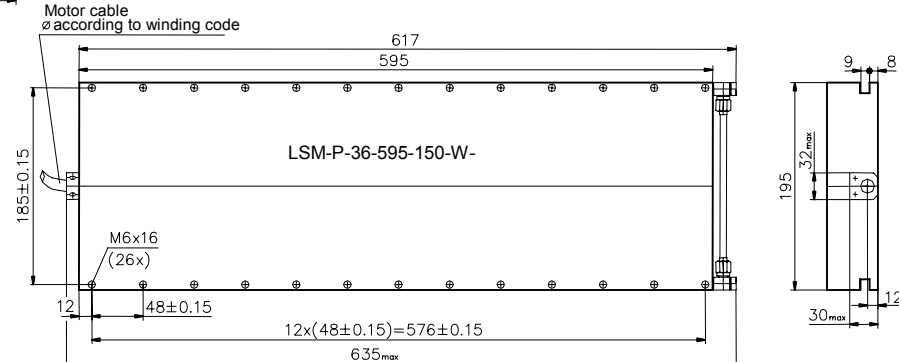
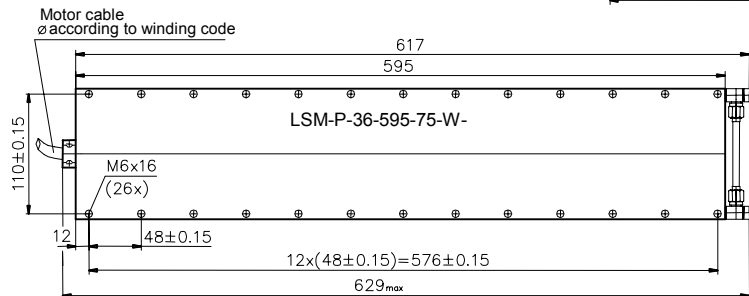
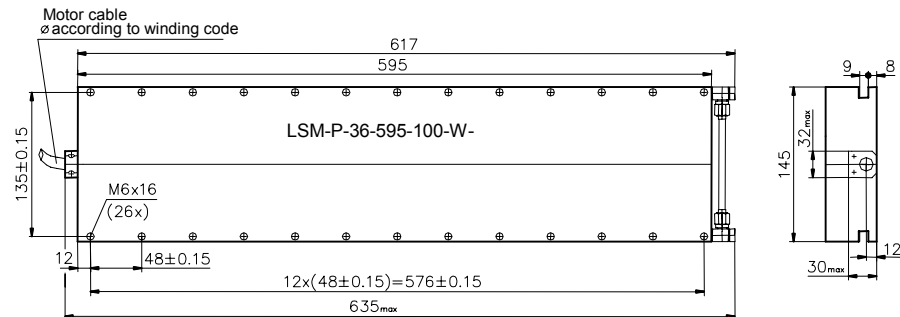
# Linear synchronous motor series LSM-P-36-451x ...



| Parameter  |    | Unit    | LSM-P-36-451-... |      |        |      |         |       |         |      |       |      |
|--|----|---------|------------------|------|--------|------|---------|-------|---------|------|-------|------|
|  |    |         | 50-...           |      | 75-... |      | 100-... |       | 150-... |      |       |      |
|  |    |         | FS               | FT   | FS     | FT   | FS      | FT    | BS      | BT   | BS    | BT   |
| Peak force (coil at 20°C)                                    | Fp | N       | 1526             | 2289 | 3052   | 3052 | 4579    |       |         |      |       |      |
| Continuous force (coil at 120°C), water cooling              | Fw | N       | 1253             | 1851 | 2429   | 2339 | 3394    |       |         |      |       |      |
| Continuous force (coil at 120°C), air cooling                | Fa | N       | 643              | 949  | 1244   | 1193 | 1727    |       |         |      |       |      |
| Detent force   | Fd | N       | 18,3             | 27,5 | 36,6   | 36,6 | 54,9    |       |         |      |       |      |
| Attraction force of magnets                                  | Fm | N       | 3903             | 5854 | 7806   | 7806 | 11709   |       |         |      |       |      |
| Recommended supply voltage DC                                | Us | V       | 540              | 540  | 540    | 540  | 540     |       |         |      |       |      |
| Motor constant (coil at 20°C)                                | Ko | N/√W    | 48,3             | 62,3 | 74,0   | 72,6 | 91,6    |       |         |      |       |      |
| Peak power dissipation (coil at 20°C)                        | Pp | W       | 1578             | 1622 | 2108   | 2147 | 2640    | 2678  | 2813    | 2895 | 3924  | 4001 |
| Continuous power dissipation (coil at 120°C), water cooling  | Pw | W       | 1049             | 1055 | 1395   | 1340 | 1743    | 1606  | 1727    | 1635 | 2393  | 2081 |
| Continuous power dissipation (coil at 120°C), air cooling    | Pa | W       | 267              | 294  | 334    | 358  | 398     | 419   | 416     | 464  | 522   | 565  |
| Coolant flow for temperature difference 5°C by power Pw      | Cf | L/min   | 2,7              | 2,8  | 3,6    | 3,5  | 4,4     | 4,1   | 4,9     | 4,7  | 6,9   | 6,0  |
| Maximum velocity at Fp and Us (Coil at 20°C)                 | Vp | m/s     | 2,6              | 4,6  | 1,6    | 3,0  | 1,2     | 2,2   | 2,8     | 4,9  | 1,8   | 3,2  |
| Maximum velocity at Fw and Us (Coil at 20°C)                 | Vw | m/s     | 2,9              | 5,3  | 1,9    | 3,5  | 1,4     | 2,6   | 3,2     | 5,9  | 2,1   | 3,9  |
| Maximum velocity at Fa and Us (Coil at 20°C)                 | Va | m/s     | 4,0              | 7,0  | 2,6    | 4,7  | 2,0     | 3,5   | 4,3     | 7,6  | 2,9   | 5,1  |
| Peak current (RMS) at Fp and V=0                             | Ip | Arms    | 14,0             | 24,2 | 14,0   | 24,2 | 14,0    | 24,2  | 29,7    | 51,4 | 29,7  | 51,4 |
| Continuous current at 120°C with water cooling at Fw and V=0 | Iw | Arms    | 11,1             | 19,3 | 10,9   | 18,9 | 10,7    | 18,6  | 21,9    | 37,9 | 21,1  | 36,5 |
| Continuous current at 120°C with air cooling at Fa and V=0   | Ia | Arms    | 5,5              | 9,5  | 5,4    | 9,3  | 5,3     | 9,1   | 10,8    | 18,6 | 10,4  | 18,0 |
| Efficiency at Fw and US (Coil at 20°C)                       | Ew | %       | 77,7             | 86,2 | 71,5   | 82,9 | 65,7    | 79,8  | 81,4    | 89,3 | 74,8  | 86,6 |
| Back EMF constant (*) (peak phase-phase)                     | Ku | V/(m/s) | 96,1             | 55,5 | 144,2  | 83,3 | 192,3   | 111,0 | 90,6    | 52,3 | 136,0 | 78,5 |
| Electrical resistance at 20°C (*)                            | R  | Ohm     | 3,96             | 1,32 | 5,36   | 1,79 | 6,75    | 2,25  | 1,56    | 0,52 | 2,20  | 0,73 |
| Electrical inductance (*)                                    | L  | mH      | 44,7             | 14,9 | 67,0   | 22,3 | 89,4    | 29,8  | 19,8    | 6,6  | 29,7  | 9,9  |

\* - terminal-terminal

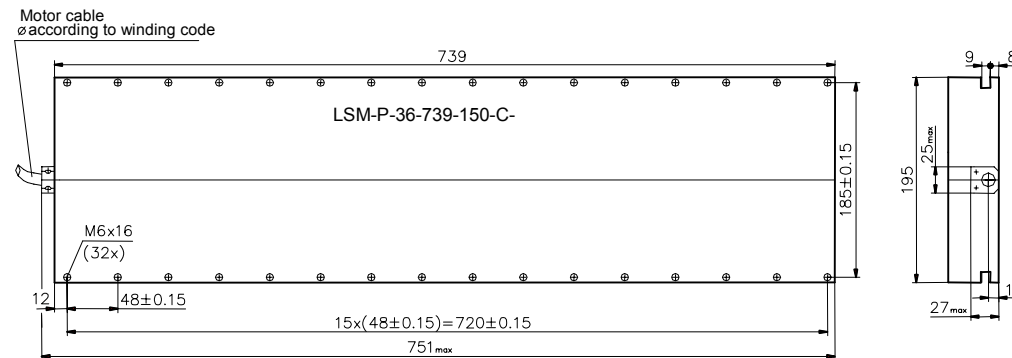
# Linear synchronous motor series LSM-P-36-595x ...



| Parameter  | Sym bol | Unit    | LSM-P-36-595-... |       |         |      |         |       |
|--|---------|---------|------------------|-------|---------|------|---------|-------|
|  |         |         | 75-...           |       | 100-... |      | 150-... |       |
|  |         |         | FS               | FT    | BS      | BT   | BS      | BT    |
| Peak force (coil at 20°C)                                    | Fp      | N       | 3052             |       | 4070    |      | 6105    |       |
| Continuous force (coil at 120°C), water cooling              | Fw      | N       | 2468             |       | 3119    |      | 4526    |       |
| Continuous force (coil at 120°C), air cooling                | Fa      | N       | 1265             |       | 1591    |      | 2303    |       |
| Detent force   | Fd      | N       | 36,6             |       | 48,8    |      | 73,3    |       |
| Attraction force of magnets                                  | Fm      | N       | 7806             |       | 10408   |      | 15611   |       |
| Recommended supply voltage DC                                | Us      | V       | 540              |       | 540     |      | 540     |       |
| Motor constant (coil at 20°C)                                | Ko      | N/√W    | 71,9             |       | 83,8    |      | 105,8   |       |
| Peak power dissipation (coil at 20°C)                        | Pp      | W       | 2793             | 2832  | 3714    | 3795 | 5196    | 5274  |
| Continuous power dissipation (coil at 120°C), water cooling  | Pw      | W       | 1843             | 1758  | 2269    | 2123 | 3159    | 2723  |
| Continuous power dissipation (coil at 120°C), air cooling    | Pa      | W       | 435              | 458   | 534     | 581  | 676     | 719   |
| Coolant flow for temperature difference 5°C by power Pw      | Cf      | L/min   | 4,7              | 4,5   | 6,5     | 6,1  | 9,0     | 7,8   |
| Maximum velocity at Fp and Us (Coil at 20°C)                 | Vp      | m/s     | 1,2              | 2,2   | 2,0     | 3,6  | 1,3     | 2,4   |
| Maximum velocity at Fw and Us (Coil at 20°C)                 | Vw      | m/s     | 1,4              | 2,6   | 2,4     | 4,4  | 1,5     | 2,9   |
| Maximum velocity at Fa and Us (Coil at 20°C)                 | Va      | m/s     | 1,9              | 3,5   | 3,2     | 5,7  | 2,1     | 3,8   |
| Peak current (RMS) at Fp and V=0                             | Ip      | Arms    | 14,0             | 24,2  | 29,7    | 51,4 | 29,7    | 51,4  |
| Continuous current at 120°C with water cooling at Fw and V=0 | Iw      | Arms    | 10,9             | 18,9  | 21,9    | 37,9 | 21,1    | 36,5  |
| Continuous current at 120°C with air cooling at Fa and V=0   | Ia      | Arms    | 5,4              | 9,3   | 10,8    | 18,6 | 10,4    | 18,0  |
| Efficiency at Fw and Us (Coil at 20°C)                       | Ew      | %       | 64,5             | 78,4  | 76,5    | 86,5 | 68,5    | 82,9  |
| Back EMF constant (*) (peak phase-phase)                     | Ku      | V/(m/s) | 192,3            | 111,0 | 120,8   | 69,7 | 181,3   | 104,7 |
| Electrical resistance at 20°C (*)                            | R       | Ohm     | 7,14             | 2,38  | 2,08    | 0,69 | 2,94    | 0,98  |
| Electrical inductance (*)                                    | L       | mH      | 89,4             | 29,8  | 26,4    | 8,8  | 39,6    | 13,2  |

\* - terminal-terminal

# Linear synchronous motor series LSM-P-36-739\*150



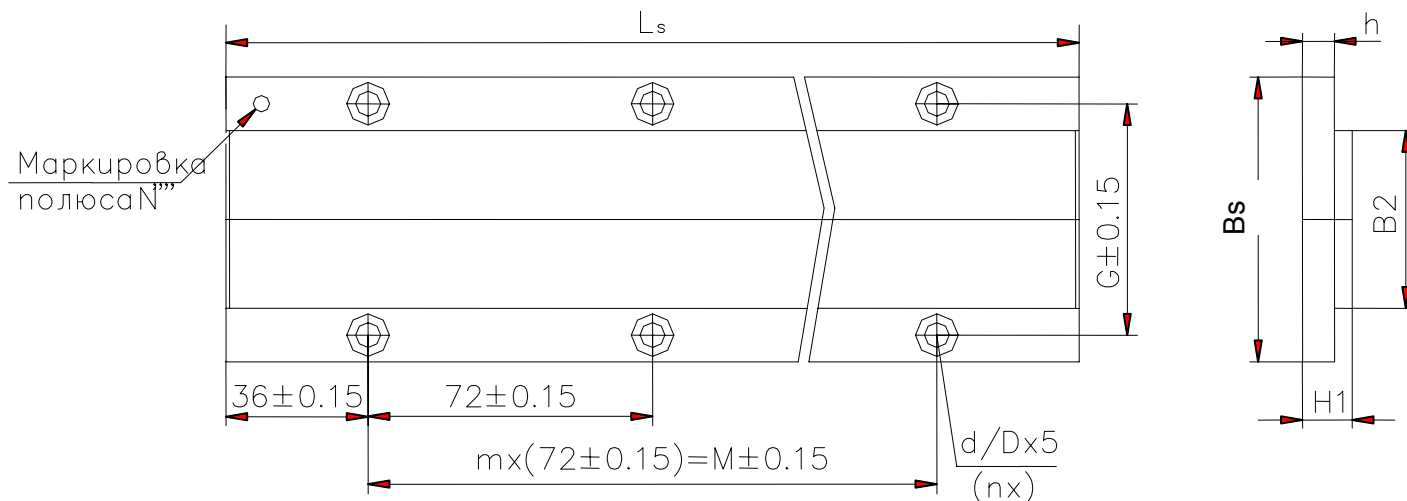
| Parameter  | Symbol | Unit    | LSM-P-36-739-... |       |
|--|--------|---------|------------------|-------|
|  |        |         | 150-...          |       |
|  |        |         | BS               | BT    |
| Peak force (coil at 20°C)                                    | Fp     | N       | 7631             |       |
| Continuous force (coil at 120°C), water cooling              | Fw     | N       | 5657             |       |
| Continuous force (coil at 120°C), air cooling                | Fa     | N       | 2878             |       |
| Detent force   | Fd     | N       | 91,6             |       |
| Attraction force of magnets                                  | Fm     | N       | 19514            |       |
| Recommended supply voltage DC                                | Us     | V       | 540              |       |
| Motor constant (coil at 20°C)                                | Ko     | N/√W    | 118,3            |       |
| Peak power dissipation (coil at 20°C)                        | Pp     | W       | 6468             | 6546  |
| Continuous power dissipation (coil at 120°C), water cooling  | Pw     | W       | 3925             | 3364  |
| Continuous power dissipation (coil at 120°C), air cooling    | Pa     | W       | 831              | 873   |
| Coolant flow for temperature difference 5°C by power Pw      | Cf     | L/min   | 11,2             | 9,6   |
| Maximum velocity at Fp and Us (Coil at 20°C)                 | Vp     | m/s     | 1,0              | 1,9   |
| Maximum velocity at Fw and Us (Coil at 20°C)                 | Vw     | m/s     | 1,2              | 2,3   |
| Maximum velocity at Fa and Us (Coil at 20°C)                 | Va     | m/s     | 1,7              | 3,0   |
| Peak current (RMS) at Fp and V=0                             | Ip     | Arms    | 29,7             | 51,4  |
| Continuous current at 120°C with water cooling at Fw and V=0 | Iw     | Arms    | 21,1             | 36,5  |
| Continuous current at 120°C with air cooling at Fa and V=0   | Ia     | Arms    | 10,4             | 18,0  |
| Efficiency at Fw and Us (Coil at 20°C)                       | Ew     | %       | 62,7             | 79,4  |
| Back EMF constant (*) (peak phase-phase)                     | Ku     | V/(m/s) | 226,7            | 130,9 |
| Electrical resistance at 20°C (*)                            | R      | Ohm     | 3,67             | 1,22  |
| Electrical inductance (*)                                    | L      | mH      | 49,5             | 16,5  |

\* - terminal-terminal



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

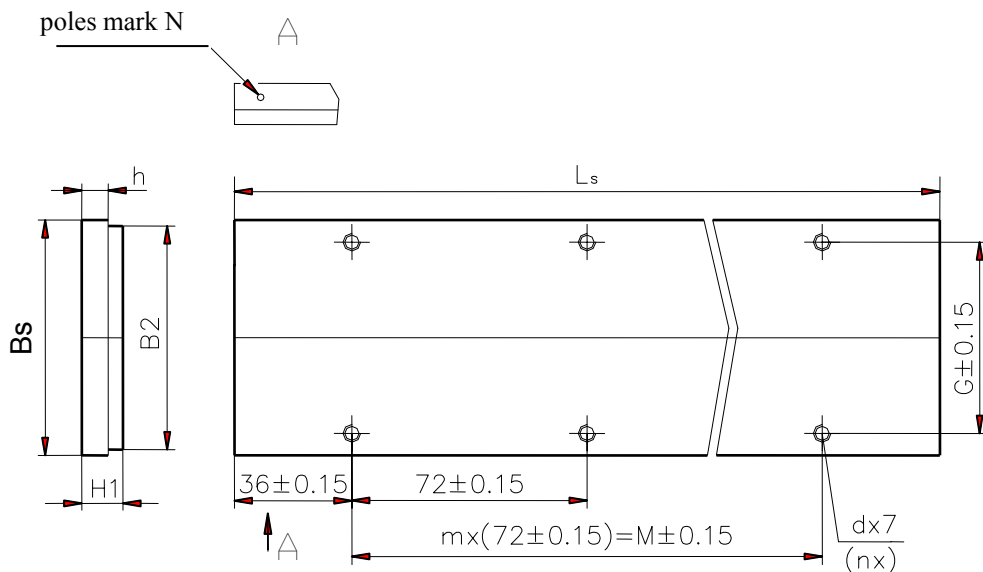
LSM(LSSM) - S - 36 - x\*x-A



| Name               | B2,mm | G, mm | Bs,mm | H1,mm | h,mm | d,mm | D,mm | m | M,mm | n  | Ls,m | weigh, kg |
|--------------------|-------|-------|-------|-------|------|------|------|---|------|----|------|-----------|
| LSM-S-36-144x25-A  | 26    | 40    | 55    | 12.3  | 8    | 5.8  | 10   | 1 | 72   | 4  | 144  | 0.68      |
| LSM-S-36-216x25-A  |       |       |       |       |      |      |      | 2 | 144  | 6  | 216  | 1.02      |
| LSM-S-36-288x25-A  |       |       |       |       |      |      |      | 3 | 216  | 8  | 288  | 1.36      |
| LSM-S-36-360x25-A  |       |       |       |       |      |      |      | 4 | 288  | 10 | 360  | 1.7       |
| LSM-S-36-432x25-A  |       |       |       |       |      |      |      | 5 | 360  | 12 | 432  | 2.04      |
| LSM-S-36-504x25-A  |       |       |       |       |      |      |      | 6 | 432  | 14 | 504  | 2.38      |
| LSM-S-36-576x25-A  |       |       |       |       |      |      |      | 7 | 504  | 16 | 576  | 2.72      |
| LSM-S-36-144x50-A  | 51    | 65    | 80    | 14.3  | 10   | 7    | 12   | 1 | 72   | 4  | 144  | 1.07      |
| LSM-S-36-216x50-A  |       |       |       |       |      |      |      | 2 | 144  | 6  | 216  | 1.6       |
| LSM-S-36-288x50-A  |       |       |       |       |      |      |      | 3 | 216  | 8  | 288  | 2.13      |
| LSM-S-36-360x50-A  |       |       |       |       |      |      |      | 4 | 288  | 10 | 360  | 2.66      |
| LSM-S-36-432x50-A  |       |       |       |       |      |      |      | 5 | 360  | 12 | 432  | 3.19      |
| LSM-S-36-504x50-A  |       |       |       |       |      |      |      | 6 | 432  | 14 | 504  | 3.72      |
| LSM-S-36-576x50-A  |       |       |       |       |      |      |      | 7 | 504  | 16 | 576  | 4.25      |
| LSM-S-36-144x75-A  | 76    | 90    | 105   | 14.3  | 10   | 7    | 12   | 1 | 72   | 4  | 144  | 1.45      |
| LSM-S-36-216x75-A  |       |       |       |       |      |      |      | 2 | 144  | 6  | 216  | 2.18      |
| LSM-S-36-288x75-A  |       |       |       |       |      |      |      | 3 | 216  | 8  | 288  | 2.91      |
| LSM-S-36-360x75-A  |       |       |       |       |      |      |      | 4 | 288  | 10 | 360  | 3.64      |
| LSM-S-36-432x75-A  |       |       |       |       |      |      |      | 5 | 360  | 12 | 432  | 4.37      |
| LSM-S-36-504x75-A  |       |       |       |       |      |      |      | 6 | 432  | 14 | 504  | 5.1       |
| LSM-S-36-576x75-A  |       |       |       |       |      |      |      | 7 | 504  | 16 | 576  | 5.83      |
| LSM-S-36-144x100-A | 101   | 115   | 130   | 16.3  | 12   | 7    | 12   | 1 | 72   | 4  | 144  | 1.84      |
| LSM-S-36-216x100-A |       |       |       |       |      |      |      | 2 | 144  | 6  | 216  | 2.76      |
| LSM-S-36-288x100-A |       |       |       |       |      |      |      | 3 | 216  | 8  | 288  | 3.68      |
| LSM-S-36-360x100-A |       |       |       |       |      |      |      | 4 | 288  | 10 | 360  | 4.6       |
| LSM-S-36-432x100-A |       |       |       |       |      |      |      | 5 | 360  | 12 | 432  | 5.52      |
| LSM-S-36-504x100-A |       |       |       |       |      |      |      | 6 | 432  | 14 | 504  | 6.44      |
| LSM-S-36-576x100-A |       |       |       |       |      |      |      | 7 | 504  | 16 | 576  | 7.36      |
| LSM-S-36-144x150-A | 151   | 165   | 180   | 16.3  | 12   | 7    | 12   | 1 | 72   | 4  | 144  | 3.01      |
| LSM-S-36-216x150-A |       |       |       |       |      |      |      | 2 | 144  | 6  | 216  | 4.52      |
| LSM-S-36-288x150-A |       |       |       |       |      |      |      | 3 | 216  | 8  | 288  | 6.03      |
| LSM-S-36-360x150-A |       |       |       |       |      |      |      | 4 | 288  | 10 | 360  | 7.54      |
| LSM-S-36-432x150-A |       |       |       |       |      |      |      | 5 | 360  | 12 | 432  | 9.05      |
| LSM-S-36-504x150-A |       |       |       |       |      |      |      | 6 | 432  | 14 | 504  | 10.56     |
| LSM-S-36-576x150-A |       |       |       |       |      |      |      | 7 | 504  | 16 | 576  | 12.07     |

Magnetic road for synchronous motors LSM, LSSM with protection of magnets, type B  
(mounting method - below)

LSM(LSSM) - S - 36 - x\*x-B



| Name               | B2,mm | G,mm | Bs,mm | H1,mm | h,mm | d,mm  | m | M,mm | n  | Ls,mm | mass, kg |
|--------------------|-------|------|-------|-------|------|-------|---|------|----|-------|----------|
| LSM-S-36 -144x25-B | 26    | 17   | 29    | 12.3  | 8    | M5-7H | 1 | 72   | 4  | 144   | 0.42     |
| LSM -S-36-216x25-B |       |      |       |       |      |       | 2 | 144  | 6  | 216   | 0.64     |
| LSM -S-36-288x25-B |       |      |       |       |      |       | 3 | 216  | 8  | 288   | 0.85     |
| LSM-S-36-360x25-B  |       |      |       |       |      |       | 4 | 288  | 10 | 360   | 1.07     |
| LSM-S-36-432x25-B  |       |      |       |       |      |       | 5 | 360  | 12 | 432   | 1.28     |
| LSM-S-36-504x25-B  |       |      |       |       |      |       | 6 | 432  | 14 | 504   | 1.5      |
| LSM-S-36-576x25-B  |       |      |       |       |      |       | 7 | 504  | 16 | 576   | 1.71     |
| LSM-S-36-144x50-B  | 51    | 32   | 54    | 14.3  | 10   | M6-7H | 1 | 72   | 4  | 144   | 0.8      |
| LSM-S-36-216x50-B  |       |      |       |       |      |       | 2 | 144  | 6  | 216   | 1.21     |
| LSM-S-36-288x50-B  |       |      |       |       |      |       | 3 | 216  | 8  | 288   | 1.62     |
| LSM-S-36-360x50-B  |       |      |       |       |      |       | 4 | 288  | 10 | 360   | 2.03     |
| LSM-S-36-432x50-B  |       |      |       |       |      |       | 5 | 360  | 12 | 432   | 2.43     |
| LSM-S-36-504x50-B  |       |      |       |       |      |       | 6 | 432  | 14 | 504   | 2.84     |
| LSM-S-36-576x50-B  |       |      |       |       |      |       | 7 | 504  | 16 | 576   | 3.25     |
| LSM-S-36-144x75-B  | 76    | 55   | 79    | 16.3  | 12   | M6-7H | 1 | 72   | 4  | 144   | 1.2      |
| LSM-S-36-216x75-B  |       |      |       |       |      |       | 2 | 144  | 6  | 216   | 1.8      |
| LSM-S-36-288x75-B  |       |      |       |       |      |       | 3 | 216  | 8  | 288   | 2.4      |
| LSM-S-36-360x75-B  |       |      |       |       |      |       | 4 | 288  | 10 | 360   | 3        |
| LSM-S-36-432x75-B  |       |      |       |       |      |       | 5 | 360  | 12 | 432   | 3.6      |
| LSM-S-36-504x75-B  |       |      |       |       |      |       | 6 | 432  | 14 | 504   | 4.2      |
| LSM-S-36-576x75-B  |       |      |       |       |      |       | 7 | 504  | 16 | 576   | 4.8      |
| LSM-S-36-144x100-B | 101   | 75   | 104   | 18.3  | 14   | M6-7H | 1 | 72   | 4  | 144   | 1.58     |
| LSM-S-36-216x100-B |       |      |       |       |      |       | 2 | 144  | 6  | 216   | 2.37     |
| LSM-S-36-288x100-B |       |      |       |       |      |       | 3 | 216  | 8  | 288   | 3.16     |
| LSM-S-36-360x100-B |       |      |       |       |      |       | 4 | 288  | 10 | 360   | 3.95     |
| LSM-S-36-432x100-B |       |      |       |       |      |       | 5 | 360  | 12 | 432   | 4.74     |
| LSM-S-36-504x100-B |       |      |       |       |      |       | 6 | 432  | 14 | 504   | 5.53     |
| LSM-S-36-576x100-B |       |      |       |       |      |       | 7 | 504  | 16 | 576   | 6.32     |
| LSM-S-36-144x150-B | 151   | 120  | 154   | 20.3  | 16   | M6-7H | 1 | 72   | 4  | 144   | 2.7      |
| LSM-S-36-216x150-B |       |      |       |       |      |       | 2 | 144  | 6  | 216   | 4.05     |
| LSM-S-36-288x150-B |       |      |       |       |      |       | 3 | 216  | 8  | 288   | 5.4      |
| LSM-S-36-360x150-B |       |      |       |       |      |       | 4 | 288  | 10 | 360   | 6.75     |
| LSM-S-36-432x150-B |       |      |       |       |      |       | 5 | 360  | 12 | 432   | 8.1      |
| LSM-S-36-504x150-B |       |      |       |       |      |       | 6 | 432  | 14 | 504   | 9.45     |
| LSM-S-36-576x150-B |       |      |       |       |      |       | 7 | 504  | 16 | 576   | 10.79    |