

## Synchronous linear motors of series L3S / L3SK

flat linear motors for dynamic drives

**Thrust forces** 30 - 16 000 N  
**Thrust speed** 0 - 20 ms<sup>-1</sup>  
**Cooling** Air (L3S)  
 Water (L3SK)



### Technical data:

#### Cooling of primary parts

Series L3S : IC40 (i.e. air cooling by motor surface)  
 Series L3SK : ICW37 (i.e. water cooling by integrated cooler)

#### Operating conditions

Linear motors are designed for being used in the environment protected against weather influences defined in ČSN EN 60721-3-3:

- ambient temperature +5 °C to +40 °C
  - relative humidity of air 5 % to 95 %;
  - altitude above sea level up to 1000 m;
- For water cooling**, there is necessary to use treated water without mechanical impurities. The recommended water hardness is max. 0,7 mmol/l. If necessary, water softeners are to be used. In order to prevent corrosion of aluminium, we recommend to use inhibitors. The ratio of the inhibitor to water should not exceed 25% to 75%. Otherwise, cooling performance may be reduced. The recommended cooling water acidity is 6,5 pH to 7,5 pH. The inlet water temperature is +5 °C to +25 °C. The maximum quantity of cooling water is 5 l/min at the pressure drop of 0,1 MPa. The cooling system is tested at the maximum pressure of 1 MPa. Minimal water flow or minimal pressure difference is given in data sheet of appropriate motor. Furthermore we recommend the usage of a detector for the water for the water-pressure and the rate of water flow in order to prevent the unlike event of an emergency shut down of the machine due to an overheated motor. The whole water cooling circuit should be examined whether there are materials which are in touch with the cooling liquid and 1) have a certain voltage drop according to the electro-chemical voltage order and 2) and electrically connected so that an electro galvanizing process can take place. In this case the worse metal will be destroyed and enriched at the better metal.

#### Cooling of the motors is described through thermal resistance:

**Air cooling IC40:** in technical data declared values of thermal resistance  $R_{TH(NC)}$  are corresponding to air cooling by the motor surface and additional cooling area by speed approx. 0,5 m/s - 1 m/s. The additional cooling area is represented by an aluminium plate with the thickness of 10 mm and the cooling surface area three times as large as mechanical interface of the primary part. This additional cooling plate serves for simulating heat removal into the surface of the driven equipment.

**Water cooling ICW37:** in technical data declared values of thermal resistance  $R_{TH(WC)}$  are corresponding to water cooling through the water with inlet temperature from +5 °C to +25 °C with rated water flow.

#### Other technical I data

**Degree of protection of the motor:** A high degree of protection against contact with live parts is reached by embedding the whole winding and the primary motor circuit into protective sealing compound. As the motors are usually delivered as built-in ones, protection against contact with moving parts cannot be ensured.

**Thermal insulation class F**, maximum temperature rise of the winding is 105K.

**The winding** of the standard motor design is three-phase one, star-connected, without neutral point led out.

**Thermal protection:** The winding of the standard motor design is protected by a thermal sensor (break contact) being located in end windings and reacting at the temperature of 125 °C.

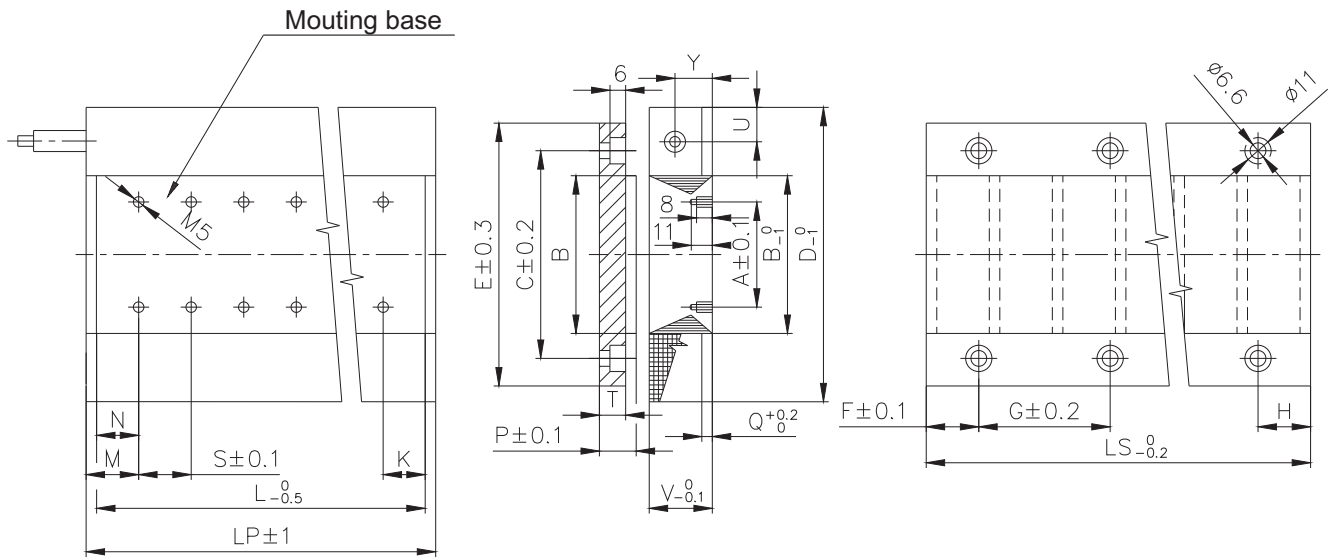
By request of the customer also PTC, KTY 83-110, KTY 84-130 or Pt100 thermal protection.

**Connection of the motor to the converter:** The winding outlet is made as a standard by flexible cable enabling also supply of the moving primary part. By request the motor winding can be led out to a connector determined by the customer.

**Surface protection:** Surface protection is made by black varnish paint. By request of the customer also a paint for food industry or another shade can be used.

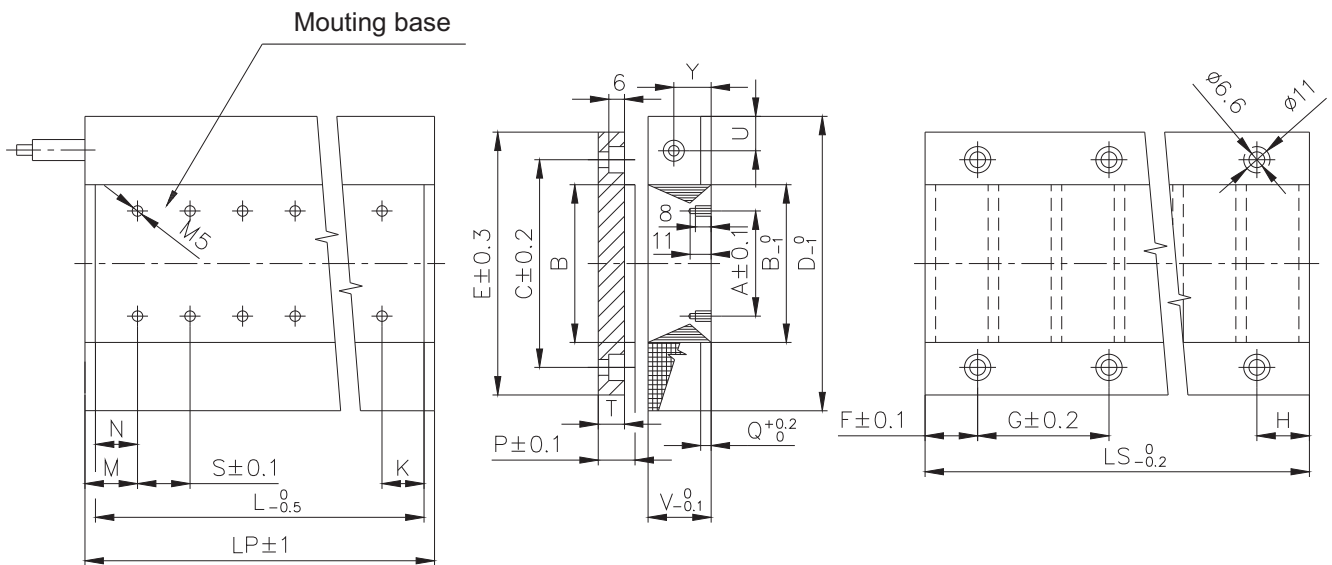
#### Rules for transport and storage

- Products in store rooms must be designated with a warning plate (ATTENTION! STRONG MAGNETS!).
- Products must never be stored without a cover, always a special non-magnetic packing with the electromagnetic gap of 25 mm must be used.
- Warning plates must be read and complied with.
- Store rooms must be kept dry.
- Products must not be stored at high temperatures.
- In the course of transporting the machines or their parts with built-in primary and secondary parts their mutual moving must be prevented.



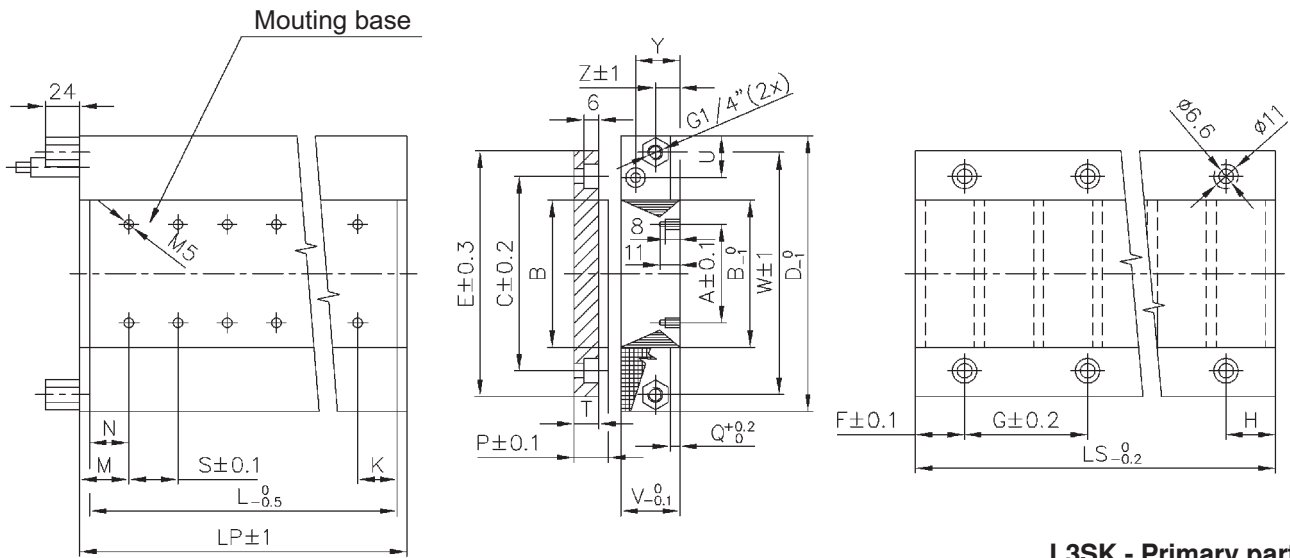
### L3S - Primary parts

| Type         | $F_{peak}$<br>[N] | A<br>[mm] | B<br>[mm] | D<br>[mm] | L<br>[mm] | $L_p$<br>[mm] | K<br>[mm] | M<br>[mm] | N<br>[mm] | Q<br>[mm] | S<br>[mm] | V<br>[mm] | $\delta_m/\delta_{el}$<br>[mm] | U<br>[mm] | Y<br>[mm] | m<br>[kg] |
|--------------|-------------------|-----------|-----------|-----------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|--------------------------------|-----------|-----------|-----------|
| L3S030P-1215 | 400               | 1x16      | 30        | 64        | 184,2     | 192           | 17,1      | 21        | 17,1      | 6         | 75        | 43,9      | 0,5/1,0                        | 9         | 29        | 2,5       |
| L3S030P-2415 | 800               |           |           |           | 360       | 368           | 30        | 34        | 30        |           |           |           |                                |           |           | 4,8       |
| L3S030P-3615 | 1200              |           |           |           | 535,8     | 544           | 42,9      | 47        | 42,9      |           |           |           |                                |           |           | 7,3       |
| L3S050P-1215 | 650               | 1x36      | 50        | 84        | 184,2     | 192           | 17,1      | 21        | 17,1      | 6         | 75        | 43,9      | 0,5/1,0                        | 9         | 29        | 3,6       |
| L3S050P-2415 | 1300              |           |           |           | 360       | 368           | 30        | 34        | 30        |           |           |           |                                |           |           | 6,9       |
| L3S050P-3615 | 1950              |           |           |           | 535,8     | 544           | 42,9      | 47        | 42,9      |           |           |           |                                |           |           | 10,4      |
| L3S050P-4815 | 2600              |           |           |           | 711,6     | 720           | 18,3      | 22,5      | 18,3      |           |           |           |                                |           |           | 13,9      |
| L3S075P-1215 | 1000              | 2x32      | 75        | 109       | 184,2     | 192           | 17,1      | 21        | 17,1      | 6         | 75        | 43,9      | 0,5/1,0                        | 9         | 29        | 5         |
| L3S075P-2415 | 2000              |           |           |           | 360       | 368           | 30        | 34        | 30        |           |           |           |                                |           |           | 9,6       |
| L3S075P-3615 | 3000              |           |           |           | 535,8     | 544           | 42,9      | 47        | 42,9      |           |           |           |                                |           |           | 14,4      |
| L3S075P-4815 | 4000              |           |           |           | 711,6     | 720           | 18,3      | 22,5      | 18,3      |           |           |           |                                |           |           | 19,2      |
| L3S075P-6015 | 5000              |           |           |           | 887,4     | 896           | 31,2      | 35,5      | 31,2      |           |           |           |                                |           |           | 23,9      |
| L3S100P-1215 | 1325              | 2x36      | 100       | 134       | 184,2     | 192           | 17,1      | 21        | 17,1      | 6         | 75        | 43,9      | 0,5/1,0                        | 9         | 29        | 6,5       |
| L3S100P-2415 | 2650              |           |           |           | 360       | 368           | 30        | 34        | 30        |           |           |           |                                |           |           | 12,5      |
| L3S100P-3615 | 3970              |           |           |           | 535,8     | 544           | 42,9      | 47        | 42,9      |           |           |           |                                |           |           | 18,9      |
| L3S100P-4815 | 5300              |           |           |           | 711,6     | 720           | 18,3      | 22,5      | 18,3      |           |           |           |                                |           |           | 25        |
| L3S100P-6015 | 6600              |           |           |           | 887,4     | 896           | 31,2      | 35,5      | 31,2      |           |           |           |                                |           |           | 31,2      |
| L3S150P-1215 | 2000              | 4x32      | 150       | 184       | 184,2     | 192           | 17,1      | 21        | 17,1      | 8         | 75        | 45,9      | 0,5/1,0                        | 10        | 31        | 9,5       |
| L3S150P-2415 | 3900              |           |           |           | 360       | 368           | 30        | 34        | 30        |           |           |           |                                |           |           | 18        |
| L3S150P-3615 | 5800              |           |           |           | 535,8     | 544           | 42,9      | 47        | 42,9      |           |           |           |                                |           |           | 27        |
| L3S150P-4815 | 7700              |           |           |           | 711,6     | 720           | 18,3      | 22,5      | 18,3      |           |           |           |                                |           |           | 36        |
| L3S150P-6015 | 9600              |           |           |           | 887,4     | 896           | 31,2      | 35,5      | 31,2      |           |           |           |                                |           |           | 45        |
| L3S200P-1215 | 2700              | 5x36      | 200       | 234       | 184,2     | 192           | 17,1      | 21        | 17,1      | 8         | 75        | 45,9      | 0,5/1,0                        | 10        | 31        | 12        |
| L3S200P-2415 | 5250              |           |           |           | 360       | 368           | 30        | 34        | 30        |           |           |           |                                |           |           | 23,5      |
| L3S200P-3615 | 7800              |           |           |           | 535,8     | 544           | 42,9      | 47        | 42,9      |           |           |           |                                |           |           | 35        |
| L3S200P-4815 | 10350             |           |           |           | 711,6     | 720           | 18,3      | 22,5      | 18,3      |           |           |           |                                |           |           | 47        |
| L3S200P-6015 | 12900             |           |           |           | 887,4     | 896           | 31,2      | 35,5      | 31,2      |           |           |           |                                |           |           | 58        |
| L3S250P-1215 | 3170              | 6x38      | 250       | 284       | 184,2     | 192           | 17,1      | 21        | 17,1      | 8         | 75        | 45,9      | 0,5/1,0                        | 10        | 31        | 15        |
| L3S250P-2415 | 6300              |           |           |           | 360       | 368           | 30        | 34        | 30        |           |           |           |                                |           |           | 29        |
| L3S250P-3615 | 9450              |           |           |           | 535,8     | 544           | 42,9      | 47        | 42,9      |           |           |           |                                |           |           | 43        |
| L3S250P-4815 | 12600             |           |           |           | 711,6     | 720           | 18,3      | 22,5      | 18,3      |           |           |           |                                |           |           | 58        |
| L3S250P-6015 | 15750             |           |           |           | 887,4     | 896           | 31,2      | 35,5      | 31,2      |           |           |           |                                |           |           | 72        |



L3S(K) - Secondary parts

| Type         | B [mm] | C [mm] | E [mm] | F [mm] | G [mm] | H [mm] | Ls [mm] | P [mm] | T [mm] | 2p | m [kg] |
|--------------|--------|--------|--------|--------|--------|--------|---------|--------|--------|----|--------|
| L3S030S-0416 | 30     | 45     | 60     | 32     | -      | 32     | 64      | 14     | 8,5    | 4  | 0,34   |
| L3S030S-0816 |        |        |        |        | 64     |        | 128     |        |        | 8  | 0,68   |
| L3S030S-1616 |        |        |        |        | 3x64   |        | 256     |        |        | 16 | 1,36   |
| L3S030S-3216 |        |        |        |        | 7x64   |        | 512     |        |        | 32 | 2,72   |
| L3S030S-6416 |        |        |        |        | 15x64  |        | 1024    |        |        | 64 | 5,43   |
| L3S050S-0416 | 50     | 65     | 80     | 32     | -      | 32     | 64      | 14     | 8,5    | 4  | 0,47   |
| L3S050S-0816 |        |        |        |        | 64     |        | 128     |        |        | 8  | 0,95   |
| L3S050S-1616 |        |        |        |        | 3x64   |        | 256     |        |        | 16 | 1,89   |
| L3S050S-3216 |        |        |        |        | 7x64   |        | 512     |        |        | 32 | 3,8    |
| L3S050S-6416 |        |        |        |        | 15x64  |        | 1024    |        |        | 64 | 7,58   |
| L3S075S-0416 | 75     | 90     | 105    | 32     | -      | 32     | 64      | 14     | 8,5    | 4  | 0,64   |
| L3S075S-0816 |        |        |        |        | 64     |        | 128     |        |        | 8  | 1,28   |
| L3S075S-1616 |        |        |        |        | 3x64   |        | 256     |        |        | 16 | 2,56   |
| L3S075S-3216 |        |        |        |        | 7x64   |        | 512     |        |        | 32 | 5,12   |
| L3S075S-6416 |        |        |        |        | 15x64  |        | 1024    |        |        | 64 | 10,24  |
| L3S100S-0416 | 100    | 115    | 130    | 32     | -      | 32     | 64      | 14     | 8,5    | 4  | 0,8    |
| L3S100S-0816 |        |        |        |        | 64     |        | 128     |        |        | 8  | 1,6    |
| L3S100S-1616 |        |        |        |        | 3x64   |        | 256     |        |        | 16 | 3,2    |
| L3S100S-3216 |        |        |        |        | 7x64   |        | 512     |        |        | 32 | 6,4    |
| L3S100S-6416 |        |        |        |        | 15x64  |        | 1024    |        |        | 64 | 12,8   |
| L3S150S-0416 | 150    | 165    | 180    | 32     | -      | 32     | 64      | 14     | 8,5    | 4  | 1,31   |
| L3S150S-0816 |        |        |        |        | 64     |        | 128     |        |        | 8  | 2,62   |
| L3S150S-1616 |        |        |        |        | 3x64   |        | 256     |        |        | 16 | 5,25   |
| L3S150S-3216 |        |        |        |        | 7x64   |        | 512     |        |        | 32 | 10,5   |
| L3S150S-6416 |        |        |        |        | 15x64  |        | 1024    |        |        | 64 | 21     |
| L3S200S-0416 | 200    | 215    | 230    | 32     | -      | 32     | 64      | 14     | 8,5    | 4  | 1,7    |
| L3S200S-0816 |        |        |        |        | 64     |        | 128     |        |        | 8  | 3,4    |
| L3S200S-1616 |        |        |        |        | 3x64   |        | 256     |        |        | 16 | 6,81   |
| L3S200S-3216 |        |        |        |        | 7x64   |        | 512     |        |        | 32 | 13,62  |
| L3S200S-6416 |        |        |        |        | 15x64  |        | 1024    |        |        | 64 | 27,24  |
| L3S250S-0416 | 250    | 270    | 285    | 32     | -      | 32     | 64      | 19     | 13,5   | 4  | 2,50   |
| L3S250S-0816 |        |        |        |        | 64     |        | 128     |        |        | 8  | 4,90   |
| L3S250S-1616 |        |        |        |        | 3x64   |        | 256     |        |        | 16 | 9,90   |
| L3S250S-3216 |        |        |        |        | 7x64   |        | 512     |        |        | 32 | 19,7   |



**L3SK - Primary parts**

| Type          | F <sub>peak</sub><br>[N] | A<br>[mm] | B<br>[mm] | D<br>[mm] | L<br>[mm] | L <sub>p</sub><br>[mm] | K<br>[mm] | M<br>[mm] | N<br>[mm] | Q<br>[mm] | S<br>[mm] | V<br>[mm] | δ <sub>m</sub> /δ <sub>e1</sub><br>[mm] | W<br>[mm] | Z<br>[mm] | U<br>[mm] | Y<br>[mm] | m<br>[kg] |
|---------------|--------------------------|-----------|-----------|-----------|-----------|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------------------------------------|-----------|-----------|-----------|-----------|-----------|
| L3SK030P-1215 | 400                      | 1x16      | 30        | 64        | 184,2     | 192                    | 17,1      | 21        | 17,1      | 0,5       | 75        | 43,9      | 0,5/1,0                                 | 45        | 13        | 9         | 34        | 2,5       |
| L3SK030P-2415 | 800                      |           |           |           | 360       | 368                    | 30        | 34        | 30        |           |           |           |                                         |           |           |           |           | 4,8       |
| L3SK030P-3615 | 1180                     |           |           |           | 535,8     | 544                    | 42,9      | 47        | 42,9      |           |           |           |                                         |           |           |           |           | 7,3       |
| L3SK050P-1215 | 650                      | 1x36      | 50        | 84        | 184,2     | 192                    | 17,1      | 21        | 17,1      | 0,5       | 75        | 43,9      | 0,5/1,0                                 | 65        | 13        | 9         | 34        | 3,6       |
| L3SK050P-2415 | 1300                     |           |           |           | 360       | 368                    | 30        | 34        | 30        |           |           |           |                                         |           |           |           |           | 6,9       |
| L3SK050P-3615 | 1950                     |           |           |           | 535,8     | 544                    | 42,9      | 47        | 42,9      |           |           |           |                                         |           |           |           |           | 10,4      |
| L3SK050P-4815 | 2600                     |           |           |           | 711,6     | 720                    | 18,3      | 22,5      | 18,3      |           |           |           |                                         |           |           |           |           | 13,9      |
| L3SK075P-1215 | 1000                     | 2x32      | 75        | 109       | 184,2     | 192                    | 17,1      | 21        | 17,1      | 0,5       | 75        | 43,9      | 0,5/1,0                                 | 90        | 13        | 9         | 34        | 5         |
| L3SK075P-2415 | 2000                     |           |           |           | 360       | 368                    | 30        | 34        | 30        |           |           |           |                                         |           |           |           |           | 9,6       |
| L3SK075P-3615 | 3000                     |           |           |           | 535,8     | 544                    | 42,9      | 47        | 42,9      |           |           |           |                                         |           |           |           |           | 14,4      |
| L3SK075P-4815 | 4000                     |           |           |           | 711,6     | 720                    | 18,3      | 22,5      | 18,3      |           |           |           |                                         |           |           |           |           | 19,2      |
| L3SK075P-6015 | 5000                     |           |           |           | 887,4     | 896                    | 31,2      | 35,5      | 31,2      |           |           |           |                                         |           |           |           |           | 23,9      |
| L3SK100P-1215 | 1325                     | 2x36      | 100       | 134       | 184,2     | 192                    | 17,1      | 21        | 17,1      | 0,5       | 75        | 43,9      | 0,5/1,0                                 | 115       | 13        | 9         | 34        | 6,5       |
| L3SK100P-2415 | 2650                     |           |           |           | 360       | 368                    | 30        | 34        | 30        |           |           |           |                                         |           |           |           |           | 12,5      |
| L3SK100P-3615 | 3970                     |           |           |           | 535,8     | 544                    | 42,9      | 47        | 42,9      |           |           |           |                                         |           |           |           |           | 18,9      |
| L3SK100P-4815 | 5300                     |           |           |           | 711,6     | 720                    | 18,3      | 22,5      | 18,3      |           |           |           |                                         |           |           |           |           | 25        |
| L3SK100P-6015 | 6600                     |           |           |           | 887,4     | 896                    | 31,2      | 35,5      | 31,2      |           |           |           |                                         |           |           |           |           | 31,2      |
| L3SK150P-1215 | 2000                     | 4x32      | 150       | 184       | 184,2     | 192                    | 17,1      | 21        | 17,1      | 0,5       | 75        | 45,9      | 0,5/1,0                                 | 165       | 15        | 9         | 36        | 9,5       |
| L3SK150P-2415 | 3900                     |           |           |           | 360       | 368                    | 30        | 34        | 30        |           |           |           |                                         |           |           |           |           | 18        |
| L3SK150P-3615 | 5800                     |           |           |           | 535,8     | 544                    | 42,9      | 47        | 42,9      |           |           |           |                                         |           |           |           |           | 27        |
| L3SK150P-4815 | 7700                     |           |           |           | 711,6     | 720                    | 18,3      | 22,5      | 18,3      |           |           |           |                                         |           |           |           |           | 36        |
| L3SK150P-6015 | 9600                     |           |           |           | 887,4     | 896                    | 31,2      | 35,5      | 31,2      |           |           |           |                                         |           |           |           |           | 45        |
| L3SK200P-1215 | 2700                     | 5x36      | 200       | 234       | 184,2     | 192                    | 17,1      | 21        | 17,1      | 0,5       | 75        | 45,9      | 0,5/1,0                                 | 215       | 15        | 9         | 36        | 12        |
| L3SK200P-2415 | 5250                     |           |           |           | 360       | 368                    | 30        | 34        | 30        |           |           |           |                                         |           |           |           |           | 23,5      |
| L3SK200P-3615 | 7800                     |           |           |           | 535,8     | 544                    | 42,9      | 47        | 42,9      |           |           |           |                                         |           |           |           |           | 35        |
| L3SK200P-4815 | 10350                    |           |           |           | 711,6     | 720                    | 18,3      | 22,5      | 18,3      |           |           |           |                                         |           |           |           |           | 47        |
| L3SK200P-6015 | 12900                    |           |           |           | 887,4     | 896                    | 31,2      | 35,5      | 31,2      |           |           |           |                                         |           |           |           |           | 58        |
| L3SK250P-1215 | 3170                     | 6x38      | 250       | 284       | 184,2     | 192                    | 17,1      | 21        | 17,1      | 0,5       | 75        | 45,9      | 0,5/1,0                                 | 265       | 15        | 9         | 36        | 15        |
| L3SK250P-2415 | 6300                     |           |           |           | 360       | 368                    | 30        | 34        | 30        |           |           |           |                                         |           |           |           |           | 29        |
| L3SK250P-3615 | 9450                     |           |           |           | 535,8     | 544                    | 42,9      | 47        | 42,9      |           |           |           |                                         |           |           |           |           | 43        |
| L3SK250P-4815 | 12600                    |           |           |           | 711,6     | 720                    | 18,3      | 22,5      | 18,3      |           |           |           |                                         |           |           |           |           | 58        |
| L3SK250P-6015 | 15750                    |           |           |           | 887,4     | 896                    | 31,2      | 35,5      | 31,2      |           |           |           |                                         |           |           |           |           | 72        |

**Technical data**  
**U<sub>dc</sub> = 560V**

| TYPE            | F <sub>peak</sub> | I <sub>peak</sub> | V <sub>0</sub> | F <sub>1</sub> | I <sub>1</sub> | V <sub>1</sub> | f <sub>1</sub> | ΔP <sub>1</sub> | F <sub>NC</sub> | I <sub>NC</sub> | V <sub>NC</sub> | ΔP <sub>NC</sub> | F <sub>A</sub> | I <sub>ULT</sub> | k <sub>F</sub> | k <sub>E</sub> | R <sub>UV</sub>   | L <sub>UV</sub> | τ <sub>el</sub> | R <sub>th1</sub> | R <sub>thNC</sub> |
|-----------------|-------------------|-------------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|------------------|----------------|------------------|----------------|----------------|-------------------|-----------------|-----------------|------------------|-------------------|
|                 | N                 | A                 | m/s            | N              | A              | m/s            | Hz             | W               | N               | A               | m/s             | W                | N              | N                | A              | N/A            | Vsm <sup>-1</sup> | Ohm             | mH              | ms               | K/W               |
| L3S030P-1215-HH | 400               | 8,0               | 8,6            | 300            | 5,8            | 7,1            | 200            | 370             | 150             | 2,6             | 7,8             | 78               | 900            | 10               | 60             | 34,6           | 5,6               | 31              | 6,4             | 0,284            | 1,346             |
| L3S030P-2415-HH | 800               | 16,0              | 8,6            | 600            | 11,5           | 7,1            | 200            | 737             | 300             | 5,2             | 7,8             | 153              | 1750           | 20               | 60             | 34,6           | 2,8               | 16              | 6,4             | 0,142            | 0,686             |
| L3S030P-3615-HH | 1200              | 25,0              | 8,6            | 900            | 17,3           | 7,1            | 200            | 1100            | 450             | 7,8             | 7,8             | 230              | 2580           | 30               | 60             | 34,6           | 1,9               | 11              | 6,4             | 0,095            | 0,457             |
| L3S050P-1215-JH | 650               | 7,8               | 5,1            | 500            | 5,7            | 4,2            | 118            | 498             | 280             | 2,9             | 4,6             | 130              | 1480           | 10               | 100            | 57,5           | 7,6               | 51              | 7,6             | 0,211            | 0,808             |
| L3S050P-2415-JH | 1300              | 15,6              | 5,1            | 1000           | 11,4           | 4,2            | 118            | 990             | 560             | 5,8             | 4,6             | 260              | 2880           | 20               | 100            | 57,5           | 3,8               | 26              | 7,6             | 0,106            | 0,404             |
| L3S050P-3615-JH | 1950              | 23,5              | 5,1            | 1500           | 17,2           | 4,2            | 118            | 1493            | 840             | 8,8             | 4,6             | 390              | 4300           | 30               | 100            | 57,5           | 2,5               | 17              | 7,6             | 0,070            | 0,269             |
| L3S050P-4815-JH | 2600              | 31,2              | 5,1            | 2000           | 22,9           | 4,2            | 118            | 1998            | 1120            | 11,5            | 4,6             | 520              | 5700           | 40               | 100            | 57,5           | 1,9               | 13              | 7,6             | 0,053            | 0,202             |
| L3S075P-1215-NH | 1000              | 8,0               | 5,1            | 750            | 5,7            | 2,8            | 79             | 660             | 440             | 3,1             | 3,7             | 189              | 2200           | 10               | 150            | 86,6           | 10                | 74              | 8,4             | 0,159            | 0,556             |
| L3S075P-2415-NH | 2000              | 16,0              | 5,1            | 1500           | 11,5           | 2,8            | 79             | 1320            | 880             | 6,2             | 3,7             | 380              | 4320           | 20               | 150            | 86,6           | 5,0               | 37              | 8,4             | 0,080            | 0,276             |
| L3S075P-3615-NH | 3000              | 24,0              | 5,1            | 2250           | 17,2           | 2,8            | 79             | 1980            | 1320            | 9,3             | 3,7             | 570              | 6430           | 30               | 150            | 86,6           | 3,3               | 25              | 8,4             | 0,053            | 0,184             |
| L3S075P-4815-NH | 4000              | 32,0              | 5,1            | 3000           | 23,0           | 2,8            | 79             | 2638            | 1760            | 12,3            | 3,7             | 755              | 8540           | 40               | 150            | 86,6           | 2,5               | 18              | 8,4             | 0,040            | 0,139             |
| L3S075P-6015-NH | 5000              | 41,0              | 5,1            | 3750           | 34,4           | 2,8            | 79             | 3320            | 2200            | 15,6            | 3,7             | 945              | 10650          | 50               | 150            | 86,6           | 2,0               | 15              | 8,4             | 0,032            | 0,111             |
| L3S100P-1215-PH | 1325              | 7,1               | 2,2            | 1000           | 5,1            | 1,9            | 53             | 820             | 600             | 2,8             | 2,0             | 245              | 2950           | 9                | 200            | 116            | 15,7              | 124             | 9,0             | 0,128            | 0,429             |
| L3S100P-2415-PH | 2650              | 14,2              | 2,2            | 2000           | 10,3           | 1,9            | 53             | 1640            | 1200            | 5,6             | 2,0             | 491              | 5760           | 18               | 200            | 116            | 7,9               | 62              | 9,0             | 0,064            | 0,214             |
| L3S100P-3615-PH | 3970              | 21,3              | 2,2            | 3000           | 15,4           | 1,9            | 53             | 2456            | 1800            | 8,4             | 2,0             | 735              | 8570           | 27               | 200            | 116            | 5,2               | 41              | 9,0             | 0,043            | 0,143             |
| L3S100P-4815-PH | 5300              | 28,4              | 2,2            | 4000           | 20,5           | 1,9            | 53             | 3277            | 2400            | 11,2            | 2,0             | 981              | 11380          | 35               | 200            | 116            | 3,9               | 31              | 9,0             | 0,032            | 0,107             |
| L3S100P-6015-PH | 6600              | 35,5              | 2,2            | 5000           | 25,7           | 1,9            | 53             | 4100            | 3000            | 14,0            | 2,0             | 1227             | 14200          | 45               | 200            | 116            | 3,1               | 25              | 9,0             | 0,026            | 0,086             |
| L3S150P-1215-SH | 2000              | 7,7               | 1,7            | 1500           | 5,7            | 1,4            | 39             | 1144            | 900             | 3,1             | 1,5             | 343              | 4420           | 10               | 300            | 173            | 17,5              | 145             | 9,6             | 0,092            | 0,306             |
| L3S150P-2415-SH | 3900              | 15,4              | 1,7            | 3000           | 11,5           | 1,4            | 39             | 2288            | 1800            | 6,3             | 1,5             | 686              | 8640           | 19               | 300            | 173            | 8,8               | 73              | 9,6             | 0,046            | 0,153             |
| L3S150P-3615-SH | 5800              | 23,1              | 1,7            | 4500           | 17,2           | 1,4            | 39             | 3432            | 2700            | 9,4             | 1,5             | 1029             | 12860          | 29               | 300            | 173            | 5,8               | 48              | 9,6             | 0,031            | 0,102             |
| L3S150P-4815-SH | 7700              | 30,8              | 1,7            | 6000           | 22,9           | 1,4            | 39             | 4576            | 3600            | 12,5            | 1,5             | 1372             | 17000          | 39               | 300            | 173            | 4,4               | 36              | 9,6             | 0,023            | 0,077             |
| L3S150P-6015-SH | 9600              | 38,5              | 1,7            | 7500           | 28,7           | 1,4            | 39             | 5720            | 4500            | 15,7            | 1,5             | 1715             | 21300          | 49               | 300            | 173            | 3,5               | 29              | 9,6             | 0,018            | 0,061             |
| L3S200P-1215-QH | 2700              | 8,1               | 1,3            | 2000           | 5,7            | 1,0            | 28             | 1468            | 1260            | 3,3             | 1,1             | 484              | 5900           | 10               | 400            | 231            | 22,5              | 193             | 9,9             | 0,072            | 0,217             |
| L3S200P-2415-QH | 5250              | 16,2              | 1,3            | 4000           | 11,4           | 1,0            | 28             | 2936            | 2520            | 6,6             | 1,1             | 968              | 11520          | 20               | 400            | 231            | 11,3              | 97              | 9,9             | 0,036            | 0,108             |
| L3S200P-3615-QH | 7800              | 24,3              | 1,3            | 6000           | 17,1           | 1,0            | 28             | 4404            | 3780            | 9,9             | 1,1             | 1452             | 17150          | 30               | 400            | 231            | 7,5               | 64              | 9,9             | 0,024            | 0,072             |
| L3S200P-4815-QH | 10350             | 32,4              | 1,3            | 8000           | 22,8           | 1,0            | 28             | 5872            | 5040            | 13,2            | 1,1             | 1936             | 22770          | 40               | 400            | 231            | 5,6               | 48              | 9,9             | 0,018            | 0,054             |
| L3S200P-6015-QH | 12900             | 40,5              | 1,3            | 10000          | 28,5           | 1,0            | 28             | 7340            | 6300            | 16,5            | 1,1             | 2420             | 28400          | 50               | 400            | 231            | 4,5               | 39              | 9,9             | 0,014            | 0,043             |
| L3S250P-1215-TH | 3170              | 7,6               | 1,0            | 2400           | 5,5            | 0,8            | 23             | 1650            | 1500            | 3,1             | 0,9             | 536              | 7370           | 9                | 500            | 289            | 27,3              | 302             | 10,1            | 0,064            | 0,196             |
| L3S250P-2415-TH | 6300              | 15,2              | 1,0            | 4800           | 11             | 0,8            | 23             | 3300            | 3000            | 6,3             | 0,9             | 1072             | 14400          | 19               | 500            | 289            | 13,7              | 151             | 10,1            | 0,032            | 0,098             |
| L3S250P-3615-TH | 9450              | 22,8              | 1,0            | 7200           | 16,5           | 0,8            | 23             | 4950            | 4500            | 9,4             | 0,9             | 1608             | 21430          | 28               | 500            | 289            | 9,1               | 101             | 10,1            | 0,021            | 0,065             |
| L3S250P-4815-TH | 12600             | 30,4              | 1,0            | 9600           | 22             | 0,8            | 23             | 6600            | 6000            | 12,5            | 0,9             | 2144             | 28450          | 37               | 500            | 289            | 6,8               | 76              | 10,1            | 0,016            | 0,049             |
| L3S250P-6015-TH | 15750             | 38,0              | 1,0            | 12000          | 27,5           | 0,8            | 23             | 8250            | 7500            | 15,7            | 0,9             | 2680             | 35500          | 47               | 500            | 289            | 5,5               | 60              | 10,1            | 0,013            | 0,039             |

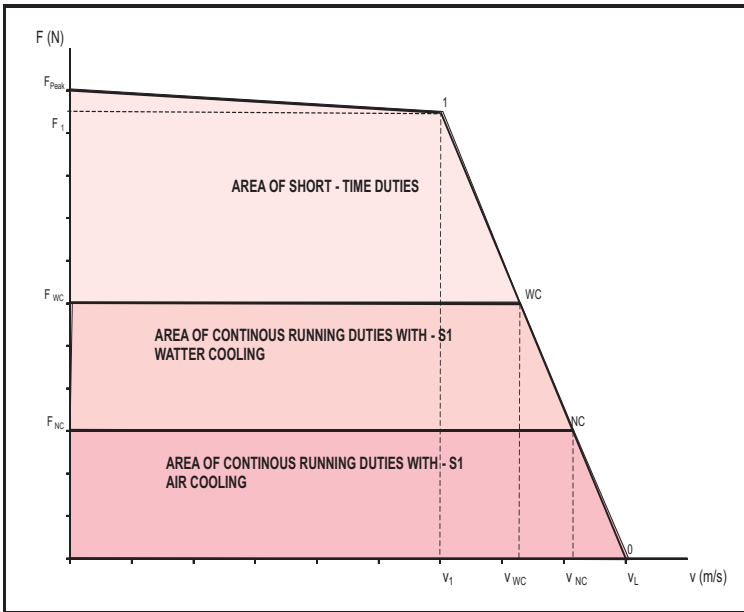
Note: Possibility choice of winding with other types of force constant kF according to type key (technical data on demande).  
Insulation system of winding for voltage of intermediate circuit 330VDC or 560VDC

**Technical data**  
**U<sub>bc</sub> = 560V**

| TYPE             | F <sub>peak</sub> | I <sub>peak</sub> | V <sub>0</sub> | F <sub>1</sub> | I <sub>1</sub> | V <sub>1</sub> | f <sub>1</sub> | ΔP <sub>1</sub> | F <sub>WC</sub> | I <sub>WC</sub> | V <sub>WC</sub> | ΔP <sub>WC</sub> | F <sub>A</sub> | I <sub>ULT</sub> | k <sub>F</sub> | k <sub>E</sub>    | R <sub>UV</sub> | L <sub>UV</sub> | τ <sub>el</sub> | R <sub>th1</sub> | R <sub>thWC</sub> |
|------------------|-------------------|-------------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|------------------|----------------|------------------|----------------|-------------------|-----------------|-----------------|-----------------|------------------|-------------------|
|                  | N                 | A                 | m/s            | N              | A              | m/s            | Hz             | W               | N               | A               | m/s             | W                | N              | A                | N/A            | Vsm <sup>-1</sup> | Ohm             | mH              | ms              | K/W              | K/W               |
| L3SK030P-1215-GH | 400               | 8.9               | 9.5            | 300            | 6.35           | 7.9            | 222            | 410             | 300             | 6.35            | 7.9             | 410              | 900            | 11               | 50             | 29                | 5.0             | 26              | 6.8             | 0.256            | 0.256             |
| L3SK030P-2415-GH | 800               | 17.7              | 9.5            | 600            | 12.7           | 7.9            | 222            | 820             | 600             | 12.7            | 7.9             | 820              | 1750           | 22               | 50             | 29                | 2.5             | 13              | 6.8             | 0.128            | 0.128             |
| L3SK030P-3615-GH | 1200              | 26.6              | 9.5            | 900            | 19.1           | 7.9            | 222            | 1230            | 900             | 19.1            | 7.9             | 1230             | 2580           | 33               | 50             | 29                | 1.7             | 9               | 6.8             | 0.085            | 0.085             |
| L3SK050P-1215-IH | 650               | 8.6               | 5.7            | 500            | 6.4            | 4.7            | 132            | 552             | 500             | 6.4             | 4.7             | 552              | 1480           | 11               | 90             | 52                | 6.9             | 41              | 6.9             | 0.190            | 0.190             |
| L3SK050P-2415-IH | 1300              | 17.2              | 5.7            | 1000           | 12.8           | 4.7            | 132            | 1104            | 1000            | 12.8            | 4.7             | 1104             | 2880           | 22               | 90             | 52                | 3.5             | 21              | 6.9             | 0.095            | 0.095             |
| L3SK050P-3615-IH | 1950              | 25.8              | 5.7            | 1500           | 19.2           | 4.7            | 132            | 1656            | 1500            | 19.2            | 4.7             | 1656             | 4300           | 33               | 90             | 52                | 2.3             | 14              | 6.9             | 0.063            | 0.063             |
| L3SK050P-4815-IH | 2600              | 34.4              | 5.7            | 2000           | 25.6           | 4.7            | 132            | 2208            | 2000            | 25.6            | 4.7             | 2208             | 5700           | 44               | 90             | 52                | 1.7             | 10              | 6.9             | 0.048            | 0.048             |
| L3SK075P-1215-LH | 1000              | 8.9               | 4.2            | 750            | 6.4            | 3.1            | 87             | 730             | 750             | 6.4             | 3.1             | 730              | 2200           | 11               | 120            | 69                | 9.2             | 60              | 7.7             | 0.144            | 0.144             |
| L3SK075P-2415-LH | 2000              | 17.7              | 4.2            | 1500           | 12.7           | 3.1            | 87             | 1460            | 1500            | 12.8            | 3.1             | 1460             | 4320           | 22               | 120            | 69                | 4.6             | 30              | 7.7             | 0.072            | 0.072             |
| L3SK075P-3615-LH | 3000              | 26.6              | 4.2            | 2250           | 19.1           | 3.1            | 87             | 2190            | 2250            | 19.2            | 3.1             | 2190             | 6430           | 33               | 120            | 69                | 3.1             | 20              | 7.7             | 0.048            | 0.048             |
| L3SK075P-4815-LH | 4000              | 35.4              | 4.2            | 3000           | 25.4           | 3.1            | 87             | 2920            | 3000            | 25.6            | 3.1             | 2920             | 8540           | 44               | 120            | 69                | 2.3             | 15              | 7.7             | 0.036            | 0.036             |
| L3SK075P-6015-LH | 5000              | 44.3              | 4.2            | 3750           | 31.8           | 3.1            | 87             | 3650            | 3750            | 32.0            | 3.1             | 3650             | 10650          | 55               | 120            | 69                | 1.8             | 12              | 7.7             | 0.029            | 0.029             |
| L3SK100P-1215-NH | 1325              | 8.8               | 2.8            | 1000           | 6.4            | 1.9            | 53             | 911             | 1000            | 6.4             | 1.9             | 911              | 2950           | 11               | 150            | 87                | 11.4            | 80              | 8.2             | 0.115            | 0.115             |
| L3SK100P-2415-NH | 2650              | 17.6              | 2.8            | 2000           | 12.8           | 1.9            | 53             | 1822            | 2000            | 12.8            | 1.9             | 1822             | 5760           | 22               | 150            | 87                | 5.7             | 40              | 8.2             | 0.058            | 0.058             |
| L3SK100P-3615-NH | 3970              | 26.4              | 2.8            | 3000           | 19.2           | 1.9            | 53             | 2733            | 3000            | 19.2            | 1.9             | 2733             | 8570           | 33               | 150            | 87                | 3.8             | 27              | 8.2             | 0.038            | 0.038             |
| L3SK100P-4815-NH | 5300              | 35.2              | 2.8            | 4000           | 25.6           | 1.9            | 53             | 3644            | 4000            | 25.6            | 1.9             | 3644             | 11380          | 44               | 150            | 87                | 2.9             | 20              | 8.2             | 0.029            | 0.029             |
| L3SK100P-6015-NH | 6600              | 44.0              | 2.8            | 5000           | 32.0           | 1.9            | 53             | 4555            | 5000            | 32.0            | 1.9             | 4555             | 14200          | 55               | 150            | 87                | 2.3             | 16              | 8.2             | 0.023            | 0.023             |
| L3SK150P-1215-RH | 2000              | 8.7               | 1.8            | 1500           | 6.4            | 1.5            | 42             | 1270            | 1500            | 6.4             | 1.5             | 1270             | 4420           | 11               | 250            | 144               | 15.8            | 120             | 8.8             | 0.083            | 0.083             |
| L3SK150P-2415-RH | 3900              | 17.3              | 1.8            | 3000           | 12.8           | 1.5            | 42             | 2540            | 3000            | 12.8            | 1.5             | 2540             | 8640           | 22               | 250            | 144               | 7.9             | 60              | 8.8             | 0.041            | 0.041             |
| L3SK150P-3615-RH | 5800              | 26.0              | 1.8            | 4500           | 19.2           | 1.5            | 42             | 3810            | 4500            | 19.2            | 1.5             | 3810             | 12860          | 33               | 250            | 144               | 5.3             | 40              | 8.8             | 0.028            | 0.028             |
| L3SK150P-4815-RH | 7700              | 34.6              | 1.8            | 6000           | 25.6           | 1.5            | 42             | 5080            | 6000            | 25.6            | 1.5             | 5080             | 17000          | 44               | 250            | 144               | 4.0             | 30              | 8.8             | 0.021            | 0.021             |
| L3SK150P-6015-RH | 9600              | 43.3              | 1.8            | 7500           | 32.0           | 1.5            | 42             | 6350            | 7500            | 32.0            | 1.5             | 6350             | 21300          | 55               | 250            | 144               | 3.2             | 24              | 8.8             | 0.017            | 0.017             |
| L3SK200P-1215-SH | 2700              | 9.0               | 1.4            | 2000           | 6.4            | 1.2            | 34             | 1628            | 2000            | 6.4             | 1.2             | 1628             | 5900           | 11               | 300            | 173               | 20.2            | 157             | 8.9             | 0.064            | 0.064             |
| L3SK200P-2415-SH | 5250              | 18.0              | 1.4            | 4000           | 12.8           | 1.2            | 34             | 3256            | 4000            | 12.8            | 1.2             | 3256             | 11520          | 22               | 300            | 173               | 10.1            | 79              | 8.9             | 0.032            | 0.032             |
| L3SK200P-3615-SH | 7800              | 27.0              | 1.4            | 6000           | 19.2           | 1.2            | 34             | 4884            | 6000            | 19.2            | 1.2             | 4884             | 17150          | 33               | 300            | 173               | 6.7             | 52              | 8.9             | 0.021            | 0.021             |
| L3SK200P-4815-SH | 10350             | 36.0              | 1.4            | 8000           | 25.6           | 1.2            | 34             | 6512            | 8000            | 25.6            | 1.2             | 6512             | 22770          | 44               | 300            | 173               | 5.1             | 39              | 8.9             | 0.016            | 0.016             |
| L3SK200P-6015-SH | 12900             | 45.0              | 1.4            | 10000          | 32.0           | 1.2            | 34             | 8140            | 10000           | 32.0            | 1.2             | 8140             | 28400          | 55               | 300            | 173               | 4.0             | 31              | 8.9             | 0.013            | 0.013             |
| L3SK250P-1215-QH | 3170              | 8.4               | 1.0            | 2400           | 6.1            | 0.9            | 25             | 1830            | 2400            | 6.1             | 0.9             | 1830             | 7370           | 10               | 400            | 231               | 24.6            | 195             | 9.1             | 0.057            | 0.057             |
| L3SK250P-2415-QH | 6300              | 16.8              | 1.0            | 4800           | 12.2           | 0.9            | 25             | 3660            | 4800            | 12.2            | 0.9             | 3660             | 14400          | 20               | 400            | 231               | 12.3            | 98              | 9.1             | 0.029            | 0.029             |
| L3SK250P-3615-QH | 9450              | 25.2              | 1.0            | 7200           | 18.3           | 0.9            | 25             | 5490            | 7200            | 18.3            | 0.9             | 5490             | 21430          | 30               | 400            | 231               | 8.2             | 65              | 9.1             | 0.019            | 0.019             |
| L3SK250P-4815-QH | 12600             | 33.6              | 1.0            | 9600           | 24.4           | 0.9            | 25             | 7320            | 9600            | 24.4            | 0.9             | 7320             | 28450          | 40               | 400            | 231               | 6.2             | 49              | 9.1             | 0.014            | 0.014             |
| L3SK250P-6015-QH | 15750             | 42.0              | 1.0            | 12000          | 30.5           | 0.9            | 25             | 9150            | 12000           | 30.5            | 0.9             | 9150             | 35500          | 50               | 400            | 231               | 4.9             | 39              | 9.1             | 0.011            | 0.011             |

Note: Possibility choice of winding with other types of force constant kF according to type key (technical data on demande).  
Insulation system of winding for voltage of intermediate circuit 330VDC or 560VDC

**DEFINITION PARAMETERS**



- $F_{peak}$  (N) highest force developed by the motor
- $I_{peak}$  (A) current corresponding to the force  $F_{peak}$
- $F_1$  (N) maximal force corresponding to current  $I_1$  and speed  $v_1$
- $v_1$  (m/s) speed of motor corresponding to current  $I_1$  and speed  $F_1$
- $I_1$  (A) max. short-time allowable current (RMS value) cor. to force  $F_1$
- $F_{NC}$  (N) force being developed by the motor continuously at the air cooling corresponding to  $R_{TH(NC)}$
- $F_{WC}$  (N) force being developed by the motor continuously at the water cooling corresponding to  $R_{TH(WC)}$
- $F_A$  (N) max. attractive force between the primary and secondary parts
- $I_{NC}$  current corresponding to force  $F_{NC}$
- $I_{WC}$  current corresponding to force  $F_{WC}$
- $v_L$  (m/s) max. short-time allowable current
- $R_{TH}$  (K/W) thermal resistance (according to norm IEN60034-20)
- $R_{TH1}$  (K/W) thermal resistance corresponding to designed point 1
- $I_{ULT}$  (A) supply current the exceeding of which brings about demagnetization of magnets
- $R_{UV}$  ( $\Omega$ ) resistance of winding at  $20^\circ\text{C}$
- $L_{UV}$  (mH) inductance of the winding
- $t_{el}$  (ms) electromagnetic time constant of the motor
- $U_{BUS}$  (V) voltage of intermediate circuit of converter
- $k_F$  (N/A) force constant of the motor
- $k_E$  (Vs/m) voltage constant of the motor
- $\Delta P_1$  (W) motor losses corresponding to force  $F_1$  by temperature of winding of  $130^\circ\text{C}$
- $\Delta P_{WC}$  (W) motor losses corresponding to force  $F_{WC}$  by temperature of winding of  $130^\circ\text{C}$
- $\Delta P_{NC}$  (W) motor losses corresponding to force  $F_{NC}$  by temperature of winding of  $130^\circ\text{C}$
- $m$  (kg) mass of the primary part
- $m_{SEC}$  (kg) mass of the secondary part
- $f_1$  (Hz) supply current frequency cor. to speed  $v_1$
- $v_0$  (m/s) theoretic no-load speed

**Power characteristic of the linear motor**

Linear motors are generally designed in the same way as servomotors rather for dynamic processes with a wide range of speed and with a variable load than for the continuous running duty S1 with constant load and constant speed. That is why these motors can be loaded with substantially higher forces (currents) than the rated ones, provided that their average r.m.s. value does not exceed the rated values for the continuous running duty S1. The utilizable working area from the point of view of the linear motor can be seen from the power characteristic.

**Type key for linear motors**

L 1 S K 050 P - 32 11 - F L - X 0 - 000

**Linear**

**Number of the series**

( 1 , 2 , 3 , 7 )

**Type of the motor**

|             |   |
|-------------|---|
| Synchronous | S |
| Induction   | A |
| Reluctance  | R |

**Integrated cooler**

**Active width**

**Part of the motor**

|                   |   |
|-------------------|---|
| Primary           | P |
| Secondary         | S |
| Additional cooler | K |

**Number of slots in primary part**

**Number of poles in secondary part**

**Slot pitch of primary part**

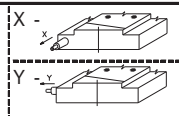
**Pole pitch of secondary part**


**Serial number of the variant**

**Version**

- 0 - Standard
- 1 - Dimensional deviations
- 2 - Electrical deviations
- 3 - Dimensional and electrical deviations

**Electrical supply**



- Z - 
- 0 - For secondary part and cooler
- S - Connector

**Type of the winding**

- N - Winding for  $U_{DC}=140\text{ V}_{DC}$
- L - Winding for  $U_{DC}=330\text{ V}_{DC}$
- H - Winding for  $U_{DC}=560\text{ V}_{DC}$
- 0 - For secondary part and cooler

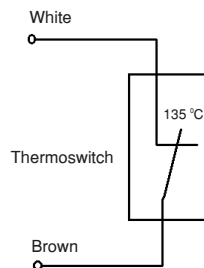
**Force constant**

|         |         |         |                                   |
|---------|---------|---------|-----------------------------------|
| B - 8,5 | H - 60  | O - 180 | 0 - For secondary part and cooler |
| C - 15  | K - 70  | P - 200 |                                   |
| D - 25  | I - 90  | R - 250 |                                   |
| E - 30  | J - 100 | S - 300 |                                   |
| F - 45  | L - 120 | U - 350 |                                   |
| G - 50  | N - 150 | Q - 400 |                                   |

### Standard cables

| Cable                    | 30°C* | 40°C*  | 60°C*  |
|--------------------------|-------|--------|--------|
| 4 x 0,75 + 1x (2 x 0,25) | 12 A  | 10,4 A | 7,8 A  |
| 4 x 1,5 + 1x (2 x 0,5)   | 18 A  | 15,5 A | 11,7 A |
| 4 x 2,5 + 1x (2 x 0,5)   | 26 A  | 24 A   | 16,8 A |
| 4 x 4 + 1x (2 x 0,5)     | 42 A  | 38,5 A | 27,5 A |

\*) Ambient temperature



### Connection

| Converter | Cable |
|-----------|-------|
| U         | 1     |
| V         | 2     |
| W         | 3     |
| PE        | YG*   |
| TS        | White |
| TS        | Brown |

TS Thermoswitch  
YG\* Yellow-green

### Assembly rules

- The secondary part package must be removed just before it is mounted into the equipment.
- The assembly must be always done by two workers.
- For the case of an accident at least two solid wedges made of non-magnetic material, e.g. of stainless steel (with the angle of 10° to 15°) and a hammer (approx. 3 kg) must be always at hand. It is necessary for the separation of ferromagnetic parts attracted by magnetic field to the secondary part, and possibly also for subsequent releasing of fingers, hands or feet.
- The secondary part of the linear motor must never be placed with its magnetically active surface directed at the ferromagnetic parts of the equipment.
- The primary part of the linear motor must never be placed directly against the secondary part.
- Before starting the assembly work on the equipment where the secondary part have been already installed this part must be provided with a non-magnetic cover with the electromagnetic gap of the width approx. 25 mm (e.g. a wooden plate of the thickness 25 mm).
- Any spontaneous movement (due to magnetic forces) of the primary and secondary parts of the linear motor that have not yet be built in must be prevented.
- Any spontaneous movement of the secondary part or primary part of the linear motor along its assembled track must be prevented.
- Special assembly facilities can be used, if necessary.

### Labour protection

Because of permanent magnets (Br 1,2 T) on the secondary part, both parts of the linear motor must be handled very carefully. High-energy magnetic fields and associated high magnetic attraction forces can result both in direct life endangering (e.g. people with pacemakers) and indirect one (high speed of moving parts of the machine).

As to the influence of magnetic field to human body, the latest medical reports confirmed that magnetic field with induction lower than 5 mT does not influence it in any way. In the distance of about 100 mm magnetic field induction is already lower than 5mT. Intensity of magnetic field induced by the poles of the secondary part of the linear motors is constant and independent of the operating conditions of the machine.

Because of a high attraction force, there is necessary to pay an increased attention in the vicinity of the secondary part. That is why heavy (> 1 kg) or big (> 1 dm<sup>3</sup>) parts made of steel or iron must not be handled by naked hands close to secondary parts. As magnetic forces are invisible, they are often underestimated. Attraction forces act suddenly and can reach values higher than 500 N (50 kg) very quickly because of ferromagnetic objects being in the vicinity. Injuries caused by attracting of individual parts due to magnetic forces are very painful and unpleasant, treatment and healing of the wounds is very difficult. It is necessary to comply with particular rules in handling them. The most important ones are given below.

### Main precautions

- Warning plates must be located on visible places (ATTENTION: STRONG MAGNETS IN LINEAR DRIVES OF THIS MACHINE!, STRONG MAGNETIC FIELD!, HIGH MAGNETIC ATTRACTION FORCES!).
- Watches and electronic data media being sensitive to magnetic field must not be put near secondary parts.
- Assembly or maintenance must be carried out always in gloves.
- Persons with pacemakers should not handle secondary parts.
- Heavy metal objects must not be placed near secondary parts of the linear motor.
- Assembly and maintenance must be carried out by trained operators.

For the case of an accident that could occur when working with linear motor at least two solid wedges made of non-magnetic material, e.g. of stainless steel (with the angle of 10° to 15°) and a hammer (approx. 3 kg) must be always at hand. It is necessary for the separation of ferromagnetic parts attracted by magnetic field to the secondary part, and possibly also for subsequent releasing of fingers, hands or feet.