Lenze

Global Drive

Servo motors
MDXK / MDFQA
synchronous / asynchronous
Servo motors

In the Global Drive System, asynchronous and synchronous motors perfectly match the controllers. Thanks to modular design and the planned options it is possible to select a suitable drive. Further assets of Global Drive servo motors are: small size, long life and high operational safety.

Comfortable system cables with plug-in connectors enable easy connection. Modern production processes ensure a good price/performance ratio. This catalogue describes all preference types which are available within 15 working days as well as all industry types which require a delivery time of 30 working days. We would like to present further options of this modular design personally.
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</tr>
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<td></td>
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<td>BS Brake and resolver</td>
</tr>
<tr>
<td></td>
<td>BW Brake, resolver and absolute value encoder</td>
</tr>
<tr>
<td></td>
<td>BX Brake, encoder prepared</td>
</tr>
<tr>
<td></td>
<td>GX No brake, encoder prepared</td>
</tr>
<tr>
<td></td>
<td>IG Incremental encoder</td>
</tr>
<tr>
<td></td>
<td>NN No brake, no encoder</td>
</tr>
<tr>
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No matter which drive solution you imagine - we make your dreams come true.

According to our maxim „one stop shopping“ we offer you a complete programme of electronic and mechanical drive systems which are distinguished by reliability and efficiency.

Our supply range includes frequency inverters, speed controllers, variable speed drives, gearboxes and motors as well as clutches and brakes.

Lenze is thus the competent partner for your application – not only as supplier for single components but also for complete drive systems including planning, execution and commissioning. Furthermore, a world-wide service and distribution network allows a qualified customer advisory service on site and a fast and extensive after sales service. Our quality assurance system for development, production, sales and service is certified to DIN ISO 9001. Our customers set the scale for measuring the quality of our products. Our task is to meet your requirements. Customer orientation as a Lenze principle means the highest quality.

See for yourself.
## List of abbreviations

**Abbreviations used in this catalogue**

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<th>Symbol</th>
<th>Unit</th>
<th>Description</th>
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<td>Axis height</td>
</tr>
<tr>
<td>(n_{\text{rated}})</td>
<td>[min(^{-1})]</td>
<td>Rated speed</td>
</tr>
<tr>
<td>(M_{\text{rated}})</td>
<td>[Nm]</td>
<td>Rated torque</td>
</tr>
<tr>
<td>(P_{\text{rated}})</td>
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<td>Rated power</td>
</tr>
<tr>
<td>(I_{\text{rated}})</td>
<td>[A]</td>
<td>Rated current</td>
</tr>
<tr>
<td>(I_0)</td>
<td>[A]</td>
<td>Continuous current at standstill</td>
</tr>
<tr>
<td>(f_{\text{rated}})</td>
<td>[Hz]</td>
<td>Rated frequency</td>
</tr>
<tr>
<td>(M_{\text{max}})</td>
<td>[Nm]</td>
<td>Maximum torque</td>
</tr>
<tr>
<td>(I_{\text{max}})</td>
<td>[A]</td>
<td>Maximum current</td>
</tr>
<tr>
<td>(n_{\text{max}})</td>
<td>[min(^{-1})]</td>
<td>Maximum speed</td>
</tr>
<tr>
<td>(J_{\text{load}})</td>
<td>[kgcm(^2)]</td>
<td>Moment of inertia load machine</td>
</tr>
<tr>
<td>(M_{\text{load}})</td>
<td>[Nm]</td>
<td>Torque load machine</td>
</tr>
<tr>
<td>(M_0)</td>
<td>[Nm]</td>
<td>Continuous torque at standstill</td>
</tr>
<tr>
<td>(M_{\text{cont}})</td>
<td>[Nm]</td>
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</tr>
<tr>
<td>(M_{\text{perm}})</td>
<td>[Nm]</td>
<td>Permissible torque</td>
</tr>
<tr>
<td>(\eta_{\text{gearbox}})</td>
<td></td>
<td>Gearbox efficiency</td>
</tr>
<tr>
<td>(J_{\text{mot}})</td>
<td>[kgcm(^2)]</td>
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<tr>
<td>m</td>
<td>[kg]</td>
<td>Mass</td>
</tr>
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<td>(\cos\omega_N)</td>
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<td>Power factor asynchronous motor</td>
</tr>
<tr>
<td>(U_{\text{rated}})</td>
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</tr>
<tr>
<td>(F_a)</td>
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<td>Permissible axial force</td>
</tr>
<tr>
<td>(F_{r1})</td>
<td>[N]</td>
<td>Permissible radial force at shaft middle</td>
</tr>
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<td>(F_{r2})</td>
<td>[N]</td>
<td>Permissible radial force at shaft end</td>
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<td>i</td>
<td></td>
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<td>(M_B)</td>
<td>[Nm]</td>
<td>Holding torque brake</td>
</tr>
<tr>
<td>(J_B)</td>
<td>[kgcm(^2)]</td>
<td>Moment of inertia brake</td>
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</table>

- **MDFQA**: Enclosed ventilated asynchronous servo motor, forced ventilated (MDFQA)
- **MDXKX**: Asynchronous or synchronous servo motor, self or forced ventilated (MDSKA/MDSKS or MDFKA/MDFKS)
- **MDSKX**: Asynchronous or synchronous servo motor self ventilated (MDSKA/MDFKA)
- **MDFKX**: Asynchronous servo motor, self ventilated or forced ventilated (MDSKA/MDFKA)
- **MDXKA**: Asynchronous servo motor, self ventilated or forced ventilated (MDSKA/MDFKA)
- **MDXKS**: Synchronous servo motor, self ventilated or forced ventilated (MDXKS/MDFKS)

- **AC**: AC voltage
- **DC**: DC voltage
- **DIN**: Deutsches Institut für Normung
- **EMC**: Electromagnetic compatibility
- **EN**: European Standard
- **IEC**: International Electrotechnical Commission
- **IP**: International Protection Code
- **NEMA**: National Electrical Manufacturers Association
- **VDE**: Verband deutscher Elektrotechniker
- **CE**: Communauté Européene
- **IM**: International Mounting Code
# Global Drive servo motors

## Product information

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<td>Asynchronous servo motor MDXKA 071</td>
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<tr>
<td>Asynchronous servo motor MDXKA 080</td>
</tr>
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<td>Asynchronous servo motor MDXKA 090</td>
</tr>
<tr>
<td>Asynchronous servo motor MDXKA 100</td>
</tr>
<tr>
<td>Asynchronous servo motor MDXKA 112</td>
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<td>SinCos absolute value encoder modules</td>
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<td>Incremental encoder modules</td>
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<th>Lenze worldwide</th>
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**Lenze**
Today, servo drive systems must fulfil highest demands. With Global Drive, Lenze succeeded in combining different drive components to form a perfectly matching system. The programme of servo motors for the power range up to 60.1 kW is completed by brushless synchronous servo motors for the lower power range from 0.25 to 4.2 kW. Compared with standard three-phase AC motors, these servo motors provide a very low moment of inertia, low weight, high maximum speed and a wide speed-setting range.

**High dynamic response and accuracy**
Servo motors provide a low moment of inertia and a high overloadability. Optimum temperature-independent control features are achieved by continuously measuring the temperature with an integrated temperature sensor. Together with servo inverters of series 9300, the motors ensure high speed accuracy, best concentricity and high angle acceleration.

**Long service life**
The high quality standard, Lenze sets for all components, meets the requirements of modern drive technology for operational safety and service life.
A reinforced isolation with thermal reserve (coated wire to thermal class H, class F temperature rise) ensures a long service life of the winding. Prestressed rolling bearings with high temperature resistant lubrication ensure a long service life.

**Operational safety**
Enclosure IP54 of MDXK motors ensures good protection against dust and water ingress. MDFQA motors up to 60.1 kW are protected by enclosure IP23.

**CE conformity**
Of course, Lenze servo motors MDXK and MDFQA comply with the EC Directives:
- CE conformity to the Low Voltage Directive
- CE conformity to the Electromagnetic Compatibility of a typical drive configuration with inverter.
The electromagnetic compatibility can be easily guaranteed by using predetermined system cables.

**No compromises with the output speed**
The wide ratio range of gearboxes combined with the small ratio step of 1.12 enables the exact selection of the output speed range required.

**Compact**
The high power density of the motors facilitates small drive units. Especially compact drives are formed by using geared servo motors with directly connected motors.

**Adaptability**
The modular motor design and the number of planned variants facilitate the selection of the motor for your application. Thanks to the variety of output designs of motors and geared motors, the drives fulfil many application requirements:
- Servo motors with cylindrical shaft end with or without key
- Servo motors with flanges provided with through hole bores for mounting position B5, with threaded bores for mounting position B14.
- Geared servo motors with solid shaft, hollow shaft or hollow shaft with shrink disc.
- Geared servo motors with or without flange, foot or centring
- Different integrated angle encoders ensure the accuracy required:
  - Resolver as standard solution, optimised characteristic because of internal improvement of the resolver accuracy. SinCos absolute value encoder as industry type for highest accuracy. Incremental encoder with 2048 pulses as preference type for MDFQA and as industry type for MDXK.

**Low noise**
High chopper frequency of the inverters (up to 16 kHz) result in a low noise generation. In addition, optimised toothing geometry and internally ribbed cast iron housings of Lenze Gearboxes reduce the noise generated.

**Reduced backlash**
The application of backlash-free permanent magnet holding brakes enables a defined holding of a position even when no voltage is applied. Compared with other gearboxes, backlash-free connection elements of Lenze Gearboxes and the high splining quality achieved by precise production ensure a low backlash at the output of geared servo motors.

**Special types**
Special applications require special motor designs. Possible options are e.g.:
- incremental encoder as feedback with 4096 pulses
- second feedback.

We are prepared to give more detailed information.
### General data

<table>
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<tr>
<th>Enclosure</th>
<th>Synchronous servo motors Series MDSKS, MDFKS</th>
<th>Asynchronous servo motors Series MDSKA, MDFKA</th>
<th>Asynchronous servo motors MDFQA</th>
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<tbody>
<tr>
<td>To thermal class F</td>
<td>To thermal class H</td>
<td></td>
<td>IP23</td>
</tr>
<tr>
<td>IP54/IP65</td>
<td>IP54/IP65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UL-conformity</td>
<td>UL listed material for coated wire, brush leads, insulation material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dielectric strength</td>
<td>Max. voltage amplitude V = 1.5 kV</td>
<td>Max. rate of voltage rise du/dt = 5 kV/µs</td>
<td></td>
</tr>
<tr>
<td>VIBRATIONAL SEVERITY</td>
<td>N</td>
<td>N frame sizes 056 and 071, R as of frame size 80</td>
<td>N frame sizes 056 and 071, R as of frame size 80</td>
</tr>
<tr>
<td>Concentricity, eccentricity, coaxiality (DIN 42955)</td>
<td>N</td>
<td>N frame sizes 056 and 071, R as of frame size 80</td>
<td>N frame sizes 056 and 071, R as of frame size 80</td>
</tr>
<tr>
<td>Mechanical tolerance</td>
<td>Diameter shaft end d Ø11 to Ø38: k6, d Ø55: m6</td>
<td>Diameter centring flange b1 : f 6</td>
<td></td>
</tr>
<tr>
<td>Connection</td>
<td>1 plug for each: Motor and brake Resolver and temperature sensor, separate fan (as of frame size 071) or terminal box</td>
<td>Motor connection as terminal box, encoder connection with plug</td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>-20 to + 40 °C without power derating (without brake, non-ventilated)</td>
<td>-10 to + 40 °C without power derating (with brake)</td>
<td>-15 to +40 °C without power derating (separately ventilated)</td>
</tr>
<tr>
<td>Surface temperature</td>
<td>Self ventilated motors (MDSK) up to 140 °C Forced ventilated motors (MDFK) up to 110 °C</td>
<td>to 110 °C</td>
<td></td>
</tr>
<tr>
<td>Installation height</td>
<td>up to 1000 m a. m. s. l. without power derating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demagnetising limit</td>
<td>&gt; 4 · I_{rated} with self ventilation &gt; 2.9 · I_{rated} with forced ventilation</td>
<td>Demagnetisation not possible</td>
<td></td>
</tr>
<tr>
<td>Maximum torque</td>
<td>&gt; 4 · M_{rated} with self ventilation &gt; 2.9 · M_{rated} with forced ventilation</td>
<td>&gt; 5 · M_{rated}</td>
<td></td>
</tr>
<tr>
<td>Rated speed</td>
<td>3000 min⁻¹ 1635-4160 min⁻¹ 550-2935 min⁻¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angle encoder</td>
<td>Resolver / Sin-Cos encoder Resolver / incremental encoder / Sin-Cos absolute value encoder</td>
<td>Resolver / incremental encoder / Sin-Cos absolute value encoder</td>
<td></td>
</tr>
<tr>
<td>Mounting position</td>
<td>B5 / B14</td>
<td>B5 / B35</td>
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<tr>
<td>Bearing</td>
<td>Deep groove ball bearing with high-temperature resistant grease, 2 seals Locating bearing at A-side at B-side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaft end</td>
<td>with / without key</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brake</td>
<td>with or without permanent magnet holding brake at A-side with and without spring-operated brake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan</td>
<td>Axial fan as of frame size 071 possible Radial fan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colour</td>
<td>Black, RAL 9005</td>
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## Preference and industry type of servo motors

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<th>MDFQA</th>
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<td></td>
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<td>Synchronous motors</td>
<td>Asynchronous motors</td>
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<td></td>
<td></td>
<td>MDSKSXX 036-13</td>
<td>MDSKSXX 036-23</td>
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<tr>
<td></td>
<td></td>
<td>MDSKSXX 056-23</td>
<td>MDSKSXX 056-33</td>
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<td></td>
<td>MDSKSXX 071-03</td>
<td>MDSKSXX 071-13</td>
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<td>MDXKAXX 056-22</td>
<td>MDXKAXX 056-22</td>
</tr>
<tr>
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<td>MDXKAXX 071-22</td>
<td>MDXKAXX 071-22</td>
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<td>MDXKAXX 100-22</td>
<td>MDXKAXX 100-22</td>
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<td>MDXKAXX 112-22</td>
<td>MDXKAXX 112-22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MDXKAXX 132-22</td>
<td>MDXKAXX 132-22</td>
</tr>
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### Technical data

- **Ventilation**
  - Self ventilation
  - Forced ventilated
- **Enclosure**
  - IP54
  - IP65 (only with self ventilation)
- **Frequency/speed**
  - >100 Hz, >2800 min⁻¹
  - <100 Hz, <2500 min⁻¹
- **Mounting position**
  - B14C105
  - B14C160
  - B5
  - B5A120
  - B5A160
  - B5A200
  - B5A250
  - B5A300
  - B5A400
  - B5A400
  - B35A250
  - B35A300
- **Shaft end**
  - 11 x 23 MP with key
  - 14 x 30 MP with key
  - 19 x 40 MP with key
  - 24 x 50 MP with key
  - 28 x 60 MP with key
  - 38 x 80 MP with key
  - 55 x 110 MP with key
  - 11 x 23 OP without key
  - 14 x 30 OP without key
  - 19 x 40 OP without key
  - 24 x 50 OP without key
  - 28 x 60 OP without key
  - 38 x 80 OP without key
  - 55 x 110 OP without key
- **Conical shaft (B9)**
- **Brake**
  - without brake
  - 24V
- **Encoder**
  - Resolver
  - SinCos multi turn AM512
  - SinCos single turn AS512
  - ITD21, 2048IMP, TTL
- **Connection**
  - Plug-in conn. (enc. a. power)
  - 2 x KK (encoder and power)
  - 1 x KK1 (power)
- **Temperature monitoring**
  - Thermostat KTY
  - Thermal encoder TKO

- **= preference type
- ○ = industrial type**
**Synchronous servo motors series MDSKS / MDFKS (surface cooled)**

| Motor type       | h [mm] | Torque with 3000 min\(^{-1}\) \(M_{\text{rated}} [\text{Nm}]\) | Speed \(n_{\text{rated}} [\text{min}^{-1}]\) | Torque \(P_{\text{rated}} [\text{kW}]\) | Power \(V_{\text{rated}} [\text{V}]\) | Current \(I_{\text{rated}} [\text{A}]\) | Maximum torque \(M_{\text{max}} [\text{Nm}]\) | Maximum power \(I_{\text{max}} [\text{A}]\) | Frequency \(f_{\text{rated}} [\text{Hz}]\) | Inertia \(J [\text{kgcm}^2]\) | Weight [kg] | Gearbox connection corresp. to stand. motor d x l \(^2\) |
|------------------|--------|------------------------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|------------------------------------------------|
| **without fan**  |        |                                                 |                                 |                                 |                                 |                                 |                                 |                                 |                                 |                                 |------------------------------------------------|
| MDSKS 036-13, 200 | 35     | 4000                                           | 0.6                             | 0.25                            | 0.245                           | 0.9                             | 0.65                            | 0.9                             | 3.1                             | 5.4                             | 200                              | 0.22                             | 1.5                              |
| MDSKS 036-23, 200 | 35     | 4000                                           | 1.3                             | 0.54                            | 0.345                           | 1.1                             | 1.5                             | 1.25                            | 7.2                             | 7.5                             | 200                              | 0.36                             | 2.1                              |
| MDSKS 056-23, 190 | 51     | 3800                                           | 2.8                             | 1.1                             | 0.330                           | 2.3                             | 3.2                             | 2.6                             | 11.6                            | 10                              | 190                              | 1.2                              | 5.3                              | 071, C105                       |
| MDSKS 056-33, 200 | 51     | 4000                                           | 4.2                             | 1.8                             | 0.325                           | 3.6                             | 4.7                             | 4.0                             | 17.2                            | 16                              | 200                              | 1.8                              | 6.3                              | 071, C105                       |
| MDSKS 071-03, 170 | 65     | 3400                                           | 5.7                             | 2.0                             | 0.330                           | 4.2                             | 6.7                             | 4.9                             | 23.6                            | 19                              | 170                              | 6.0                              | 8.9                              | 080, C160                       |
| MDSKS 071-13, 185 | 65     | 3700                                           | 8.3                             | 3.2                             | 0.325                           | 7.0                             | 10.0                            | 8.4                             | 35.2                            | 32                              | 185                              | 8.0                              | 10.9                            | 080, C160                       |
| MDSKS 071-33, 180 | 65     | 3600                                           | 12.3                            | 4.6                             | 0.325                           | 10.0                            | 14.7                            | 11.9                            | 52.0                            | 45                              | 180                              | 10.0                            | 13.0                            | 080, C160                       |
| **with separate fan** |        |                                                 |                                 |                                 |                                 |                                 |                                 |                                 |                                 |                                 |------------------------------------------------|
| MDFKS 071-03, 165 | 65     | 3300                                           | 7.5                             | 2.6                             | 0.330                           | 5.6                             | 8.8                             | 6.6                             | 23.6                            | 19                              | 165                              | 6.0                              | 10.2                            | 080, C160                       |
| MDFKS 071-13, 180 | 65     | 3600                                           | 11.0                            | 4.1                             | 0.325                           | 9.2                             | 13.3                            | 11.1                            | 35.2                            | 32                              | 180                              | 8.0                              | 12.2                            | 080, C160                       |
| MDFKS 071-33, 175 | 65     | 3500                                           | 16.2                            | 5.9                             | 0.325                           | 13.1                            | 19.3                            | 15.6                            | 52.0                            | 45                              | 175                              | 10.0                            | 14.3                            | 080, C160                       |

1) without fan, with resolver  
3) Frame size and flange of a standard motor with similar flange and shaft dimensions  
6) Magnetic / mechanical permissible torque
Asynchronous servo motors series MDSKA / MDFKA (surface ventilated)

| Motor type | h [mm] | \( n_{\text{rated}} \) [min\(^{-1}\)] | \( M_{\text{rated}} \) [Nm] | \( P_{\text{rated}} \) [kW] | \( V_{\text{rated}} \) [V] | \( I_{\text{rated}} \) [A] | \( M_{\text{max}} \) [Nm] | \( \cos \varphi \) | \( f_{\text{rated}} \) [Hz] | \( J_{1} \) [kg\( \cdot \)cm\(^2\)] | \( m_{1} \) [kg] | Gearbox connection | Corresponds to standard motor |
|------------|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| self cooled |        |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                   |
| MDSKA 056-22, 140 | 51     | 3950            | 2.0             | 0.8             | 390             | 2.4             | 2.3             | 2.55            | 10             | 8000            | 140             | 0.70             | 2.4             | 071, C105        |
| MDSKA 071-22, 140 | 65     | 4050            | 4.0             | 1.7             | 390             | 4.4             | 4.6             | 4.6             | 32             | 8000            | 140             | 0.76             | 8.3             | 080, C160        |
| MDSKA 080-22, 70   | 71     | 3100            | 6.7             | 1.4             | 390             | 3.3             | 8.0             | 3.85            | 60             | 8000            | 70              | 0.75             | 19.2            | 090, C160        |
| MDSKA 080-22, 140  | 107    | 3450            | 9.5             | 4.1             | 350             | 10.2            | 12.8            | 12.0            | 100            | 8000            | 80              | 0.81             | 36              | 090, C160        |
| MDSKA 090-22, 80   | 96     | 2340            | 16.3            | 4.0             | 390             | 8.2             | 22.5            | 9.85            | 180            | 8000            | 80              | 0.80             | 72              | 112, C160        |
| MDSKA 090-22, 140  | 107    | 2490            | 24.6            | 6.4             | 390             | 13.5            | 39              | 15.9            | 300            | 8000            | 85              | 0.83             | 180             | 132, A300        |
| MDSKA 100-22, 80   | 96     | 1680            | 21.5            | 3.8             | 390             | 8.5             | 23.9            | 9.05            | 100            | 8000            | 60              | 0.80             | 36              | 090, C160        |
| MDSKA 100-22, 140  | 107    | 3480            | 19.0            | 6.9             | 390             | 15.8            | 23.9            | 18.1            | 100            | 8000            | 120             | 0.80             | 72              | 112, C160        |
| MDSKA 100-22, 60   | 96     | 1700            | 36.3            | 6.4             | 390             | 13.9            | 15.4            | 8000            | 60             | 8000            | 60              | 0.83             | 36              | 090, C160        |
| MDSKA 100-22, 120  | 107    | 3510            | 36.0            | 13.2            | 390             | 28.7            | 40.0            | 30.8            | 180            | 8000            | 120             | 0.80             | 180             | 132, A300        |

1) without brake, with resolver
2) with 390 V, idle running \( M = 0 \)
3) frame size and flange of a standard motor with similar flange and shaft dimensions
5) when \( V_{\text{rated}} \) \( P = P_{\text{rated}} \) up to 2.3 \( n_{\text{rated}} \)
6) magnetic / mechanical permissible torque
### Asynchronous servo motors series MDFQA (enclosed ventilated)

<table>
<thead>
<tr>
<th>Motor type</th>
<th>Connection</th>
<th>h [mm]</th>
<th>( h_{\text{rated}} ) [min^{-1}]</th>
<th>( M_{\text{rated}} ) [Nm]</th>
<th>( P_{\text{rated}} ) [kW]</th>
<th>( V_{\text{rated}} ) [V]</th>
<th>( I_p ) [A]</th>
<th>( M_{\text{max}} ) [Nm]</th>
<th>( f ) [Hz]</th>
<th>( \eta )</th>
<th>( \cos )</th>
<th>( \eta_{\text{max}} ) [Nm]</th>
<th>( J_1 ) [kgcm²]</th>
<th>( m_{D1} ) [kg]</th>
<th>Gearbox connection corresponds to standard motor</th>
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<td>100</td>
<td>1420</td>
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<td>76</td>
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<td>0.76</td>
<td>0.84</td>
<td>5000</td>
<td>180 65 132 A300</td>
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<tr>
<td></td>
<td>( \Delta )</td>
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<td>1425</td>
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<td>20.1</td>
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<td>4500</td>
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<tr>
<td>MDFQA 100-22, 100</td>
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<td>50</td>
<td>0.90</td>
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<td>MDFQA 112-22, 50</td>
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<td>760</td>
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<td>1100</td>
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<td>1310 170 200 A400</td>
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<td></td>
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<td>2235</td>
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<td>76</td>
<td>0.88</td>
<td>0.80</td>
<td>4500</td>
<td>1310 170 200 A400</td>
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</table>

1) without brake, with resolver
2) with 390 V, idle running M = 0
3) frame size and flange of a standard motor with similar flange and shaft dimensions
5) when \( V_{\text{rated}} \), \( P_{\text{rated}} \) up to 2.3 \( \cdot h_{\text{rated}} \)
6) magnetic / mechanical permissible torque
Duty type: Continuous operation S6, 10 min load cycle with terminal box connection

Duty type: Continuous operation S6, 1 min load cycle with terminal box connection
Duty type: Short time operation S2 with terminal box connection

Selection

Torque-limit characteristics

![Graph showing torque-limit characteristics for different motor models.]
Motor-inverter combination:
Maximum and permanent torque synchronous servo motor MDSKS 036-13, 200 Hz without fan
Inverters 9321-9323

Motor-inverter combination:
Maximum and permanent torque synchronous servo motor MDSKS 036-23, 200 Hz without fan
Inverters 9321-9323
Motor-inverter combination:
Maximum and permanent torque synchronous servo motor MDSKS 056-23, 190 Hz without fan
Inverters 9321-9323

Motor-inverter combination:
Maximum and permanent torque synchronous servo motor MDSKS 056-33, 200 Hz without fan
Inverters 9322-9325
**Selection**

**Torque-limit characteristics**

Motor-inverter combination:
Maximum and permanent torque synchronous servo motor MDSKS 071-03, 170 Hz without fan
Inverters 9323-9325

![Torque-limit characteristics diagram for MDSKS 071-03 without fan](image1)

Motor-inverter combination:
Maximum and permanent torque synchronous servo motor MDFKS 071-03, 165 Hz with fan
Inverters 9323-9325

![Torque-limit characteristics diagram for MDFKS 071-03 with fan](image2)
Motor-inverter combination:
Maximum and permanent torque synchronous servo motor MDSKS 071-13, 185 Hz without fan
Inverters 9323-9327

Motor-inverter combination:
Maximum and permanent torque synchronous servo motor MDFKS 071-13, 180 Hz with fan
Inverters 9323-9327
Motor-inverter combination:
Maximum and permanent torque synchronous servo motor MDSKS 071-33, 180 Hz without fan
Inverters 9324-9327

Motor-inverter combination:
Maximum and permanent torque synchronous servo motor MDFKS 071-33, 175 Hz with fan
Inverters 9324-9327
Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDSKA 056, 140 Hz without fan
Inverters 9322-9324

Characteristics are valid for speed and temperature feedback as well as $V_{mains} = 400$ V
Selection

Torque-limit characteristics

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDSKA 071, 120 Hz without separate fan
Inverters 9324-9325

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFKA 071, 140 Hz with fan
Inverters 9324-9326
Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDSKA 080, 70 Hz without fan
Inverters 9323-9325

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFKA 080, 60 Hz with separate fan
Inverters 9324-9325
Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDSKA 080, 140 Hz without fan
Inverters 9324-9326

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFKA 080, 120 Hz with separate fan
Inverters 9325-9327
Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDSKA 090, 80 Hz without fan
Inverters 9324-9326

Characteristics are valid for speed and temperature feedback as well as mains V = 400 V.
At speeds below the derating limit the current is reduced depending on the inverter load.

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFKA 090, 60 Hz with separate fan
Inverters 9325-9327

Characteristics are valid for speed and temperature feedback as well as mains V = 400 V.
At speeds below the derating limit the current is reduced depending on the inverter load.
Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDSKA 090, 140 Hz without fan
Inverters 9325-9328

Characteristics are valid for speed and temperature feedback as well as V_mains = 400 V.
At speeds below the derating limit the current is reduced depending on the inverter load.

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFKA 090, 120 Hz with separate fan
Inverters 9326-9329

Characteristics are valid for speed and temperature feedback as well as V_mains = 400 V.
At speeds below the derating limit the current is reduced depending on the inverter load.
Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDSKA 100, 80 Hz without fan
Inverters 9325-9327

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFKA 100, 60 Hz with separate fan
Inverters 9325-9329
Selection

Torque-limit characteristics

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDSKA 100, 140 Hz without fan
Inverters 9325-9328

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFKA 100, 120 Hz with separate fan
Inverters 9326-9331

Characteristics are valid for speed and temperature feedback as well.
At speeds below the derating limit the current is reduced depending.
Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDSKA 112, 85 Hz without fan
Inverters 9325-9329

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFKA 112, 60 Hz with separate fan
Inverters 9326-9330
Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDSKA 112, 140 Hz without fan
Inverters 9326-9330

Characteristics are valid for speed and temperature feedback as well as V mains = 400 V.
At speeds below the derating limit the current is reduced depending on the inverter load.

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFKA 112, 120 Hz with separate fan
Inverters 9328-9332

Characteristics are valid for speed and temperature feedback as well as V mains = 400 V.
At speeds below the derating limit the current is reduced depending on the inverter load.
Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFQA 100-22, 50 Hz with separate fan in star connection
Inverters 9326-9330

Characteristics are valid for speed and temperature feedback as well as $V_{mains} = 400 \text{ V}$.
At speeds below the derating limit the current is reduced depending on the inverter load.

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFQA 100-22, 100 Hz with separate fan in star connection
Inverters 9328-9332

Characteristics are valid for speed and temperature feedback as well as $V_{mains} = 400 \text{ V}$.
At speeds below the derating limit the current is reduced depending on the inverter load.
Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFQA 112-22, 50 Hz with separate fan in star connection
Inverters 9327-9330

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFQA 112-22, 50 Hz with separate fan in delta connection
Inverters 9328-9331
Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFQA 112-22, 100 Hz with separate fan in star connection
Inverters 9328-9332

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFQA 112-22, 100 Hz with separate fan in delta connection
Inverters 9330-9332
Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFQA 132-32, 36 Hz with separate fan in star connection
Inverters 9328-9332

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFQA 132-32, 36 Hz with separate fan in delta connection
Inverters 9330-9332
Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFQA 132-32, 76 Hz with separate fan in star connection
Inverters 9330-9332

- Maximum torque with inverter 9332; 8kHz; 217.5A; maximum permanent torque 257 Nm
- Maximum torque with inverter 9331; 8kHz; 165A; maximum permanent torque 103 Nm

Continuous operation S1

Characteristics are valid for speed and temperature feedback as well as V mains = 400 V.
At speeds below the derating limit the current is reduced depending on the inverter load.

Motor-inverter combination:
Maximum and permanent torque asynchronous servo motor MDFQA 132-32, 76 Hz with separate fan in delta connection
Inverters 9330-9332

- Maximum torque with inverter 9332; 8kHz; maximum permanent torque 257 Nm
- Maximum torque with inverter 9331; 8kHz; maximum permanent torque 103 Nm

Continuous operation S1

Characteristics are valid for speed and temperature feedback as well as V mains = 400 V.
At speeds below the derating limit the current is reduced depending on the inverter load.
Influence of ambient temperature and installation height

Synchronous servo motors MDXKS, for motors with separate fan MDFKS maximum ambient temperature 40°C

![Graph showing the relationship between cooling air temperature and permissible torque for synchronous servo motors with various installation heights.](image)

Asynchronous servo motors MDXKA and MDFQA, for motors with separate fan MDFKA and MDFQA maximum ambient temperature 40°C

![Graph showing the relationship between cooling air temperature and permissible torque for asynchronous servo motors with various installation heights.](image)
Permissible shaft load

Series MDXX (surface ventilated)

<table>
<thead>
<tr>
<th>Motor type</th>
<th>d x l [mm]</th>
<th>F_a [N]</th>
<th>F_r1 [N]</th>
<th>F_r2 [N]</th>
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<tbody>
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<td>MDXXS 036</td>
<td>11 x 23</td>
<td>70</td>
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<td>180</td>
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<tr>
<td>MDXXS 056</td>
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<td>MDXXS 080</td>
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Series MDFQA (enclosed ventilated)

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<th>Motor type</th>
<th>d x l [mm]</th>
<th>F_a [N]</th>
<th>F_r1 [N]</th>
<th>F_r2 [N]</th>
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Calculation basis:
Bearing life: L_{h10} = 20.000 h, torque M = 2.5 M_{rated}
Linear interpolation between F_{r1} and F_{r2} possible.
### Fans

<table>
<thead>
<tr>
<th>Motor type</th>
<th>Fan type</th>
<th>$V_{\text{rated}}$ [V]</th>
<th>$f_{\text{rated}}$ [Hz]</th>
<th>$I_{\text{rated}}$ [A]</th>
<th>$P_{\text{rated}}$ [W]</th>
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<tbody>
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<td>0.11</td>
<td>60</td>
</tr>
<tr>
<td>MDFQA 100</td>
<td>G2D 140 with filter</td>
<td>380...460, 3~</td>
<td>50/60</td>
<td>0.25</td>
<td>150</td>
</tr>
<tr>
<td>MDFQA 100</td>
<td>DNG 3-4,5 with or without filter with large voltage range</td>
<td>350...540, 3~</td>
<td>50/60</td>
<td>0.25</td>
<td>100</td>
</tr>
<tr>
<td>MDFQA 112</td>
<td>G2D 160 with filter</td>
<td>380...460, 3~</td>
<td>50/60</td>
<td>0.5</td>
<td>320</td>
</tr>
<tr>
<td>MDFQA 112</td>
<td>DNG 5-12,5 with or without filter with large voltage range</td>
<td>350...540, 3~</td>
<td>50/60</td>
<td>0.75</td>
<td>390</td>
</tr>
<tr>
<td>MDFQA 132</td>
<td>G2D 180</td>
<td>380...460, 3~</td>
<td>50/60</td>
<td>0.66</td>
<td>415</td>
</tr>
<tr>
<td>MDFQA 132</td>
<td>DNG 8-12 with or without filter with large voltage range</td>
<td>350...540, 3~</td>
<td>50/60</td>
<td>1.4</td>
<td>660</td>
</tr>
</tbody>
</table>
Technical data

Attachments

Brake

The servo motors MDXXK can be equipped with integrated permanent magnet holding brakes for 24 V DC (industrial type 205 V). The enclosed ventilated asynchronous servo motors MDFQA can be equipped with a 205 V or 24 V spring operated brake.

The brakes are active after switching off the power supply (normally on principle). When using the brakes for holding applications only, the friction linings are virtually resistant to wear. If the permissible friction work is not exceeded, at least 150 emergency stop operations are possible.

<table>
<thead>
<tr>
<th>Motor type</th>
<th>( M_B ) [Nm]</th>
<th>( V_{\text{rated 24}} ) [V]</th>
<th>( I_{24} ) [A]</th>
<th>( V_{\text{rated 205}} ) [V]</th>
<th>( I_{205} ) [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSKXXBX 036</td>
<td>2.5</td>
<td>24 (+5%, -10%)</td>
<td>0.50</td>
<td>205 (+5%, -10%)</td>
<td>0.06</td>
</tr>
<tr>
<td>MDSKXXBX 056</td>
<td>5</td>
<td>24 (+5%, -10%)</td>
<td>0.50</td>
<td>205 (+5%, -10%)</td>
<td>0.06</td>
</tr>
<tr>
<td>with direct gearbox connection</td>
<td>2.5</td>
<td>24 (+5%, -10%)</td>
<td>0.67</td>
<td>205 (+5%, -10%)</td>
<td>0.08</td>
</tr>
<tr>
<td>MDSKXXBX 071</td>
<td>12</td>
<td>24 (+5%, -10%)</td>
<td>0.75</td>
<td>205 (+5%, -10%)</td>
<td>0.08</td>
</tr>
<tr>
<td>with direct gearbox connection</td>
<td>10</td>
<td>24 (+5%, -10%)</td>
<td>0.75</td>
<td>205 (+5%, -10%)</td>
<td>0.09</td>
</tr>
<tr>
<td>MDSKAXBX 080</td>
<td>20</td>
<td>24 (+5%, -10%)</td>
<td>0.75</td>
<td>205 (+5%, -10%)</td>
<td>0.09</td>
</tr>
<tr>
<td>with direct gearbox connection</td>
<td>12</td>
<td>24 (+5%, -10%)</td>
<td>1.00</td>
<td>205 (+5%, -10%)</td>
<td>0.12</td>
</tr>
<tr>
<td>MDSKAXBX 090</td>
<td>40</td>
<td>24 (+5%, -10%)</td>
<td>1.00</td>
<td>205 (+5%, -10%)</td>
<td>0.12</td>
</tr>
<tr>
<td>with direct gearbox connection</td>
<td>20</td>
<td>24 (+5%, -10%)</td>
<td>1.00</td>
<td>205 (+5%, -10%)</td>
<td>0.12</td>
</tr>
<tr>
<td>MDSKAXBX 100</td>
<td>80</td>
<td>24 (+5%, -10%)</td>
<td>1.46</td>
<td>205 (+5%, -10%)</td>
<td>0.18</td>
</tr>
<tr>
<td>with direct gearbox connection</td>
<td>80</td>
<td>24 (+5%, -10%)</td>
<td>1.46</td>
<td>205 (+5%, -10%)</td>
<td>0.18</td>
</tr>
<tr>
<td>MDFQABX 100</td>
<td>150</td>
<td>24 (+5%, -10%)</td>
<td>2.29</td>
<td>205 (+5%, -10%)</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>240</td>
<td>24 (+5%, -10%)</td>
<td>3.54</td>
<td>205 (+5%, -10%)</td>
<td>0.41</td>
</tr>
<tr>
<td>MDFQABX 112</td>
<td>360</td>
<td>24 (+5%, -10%)</td>
<td>4.17</td>
<td>205 (+5%, -10%)</td>
<td>0.49</td>
</tr>
</tbody>
</table>

The employed brakes are no safety brakes in the real sense of the word, i.e. in case of disruption by not influencable factors, like penetration of oil or failure of the A-side shaft seal, a reduction of torque may occur.
### Technical data

<table>
<thead>
<tr>
<th>Motor type</th>
<th>t₁, t₂ [ms]</th>
<th>t₃, t₄ [ms]</th>
<th>Qₑ [kΩ]</th>
<th>Sₜₘₜ [l/h]</th>
<th>Jₑ [kg cm²]</th>
<th>m [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSKXBX 036</td>
<td>8</td>
<td>18</td>
<td>3.2</td>
<td>31</td>
<td>0.38</td>
<td>0.85</td>
</tr>
<tr>
<td>MDSKXBX 056</td>
<td>8</td>
<td>18</td>
<td>3.2</td>
<td>31</td>
<td>0.38</td>
<td>0.85</td>
</tr>
<tr>
<td>with direct gearbox connection</td>
<td>13</td>
<td>22</td>
<td>6.5</td>
<td>23</td>
<td>1.06</td>
<td>0.75</td>
</tr>
<tr>
<td>MDSKXBX 071</td>
<td>20</td>
<td>29</td>
<td>6.5</td>
<td>23</td>
<td>1.06</td>
<td>0.83</td>
</tr>
<tr>
<td>with direct gearbox connection</td>
<td>24</td>
<td>30</td>
<td>12.0</td>
<td>17</td>
<td>3.60</td>
<td>1.38</td>
</tr>
<tr>
<td>MDSKXBX 080</td>
<td>24</td>
<td>30</td>
<td>12.0</td>
<td>17</td>
<td>3.60</td>
<td>1.45</td>
</tr>
<tr>
<td>with direct gearbox connection</td>
<td>28</td>
<td>55</td>
<td>25.0</td>
<td>12</td>
<td>3.60</td>
<td>1.45</td>
</tr>
<tr>
<td>MDSKXBX 090</td>
<td>25</td>
<td>50</td>
<td>12.0</td>
<td>17</td>
<td>3.60</td>
<td>1.54</td>
</tr>
<tr>
<td>with direct gearbox connection</td>
<td>28</td>
<td>55</td>
<td>25.0</td>
<td>12</td>
<td>9.50</td>
<td>2.42</td>
</tr>
<tr>
<td>MDSKXBX 100</td>
<td>28</td>
<td>73</td>
<td>25.0</td>
<td>12</td>
<td>9.50</td>
<td>2.72</td>
</tr>
<tr>
<td>with direct gearbox connection</td>
<td>40</td>
<td>100</td>
<td>50.0</td>
<td>9</td>
<td>31.80</td>
<td>4.79</td>
</tr>
<tr>
<td>MDSKXBX 112</td>
<td>53</td>
<td>97</td>
<td>50.0</td>
<td>9</td>
<td>31.80</td>
<td>4.98</td>
</tr>
<tr>
<td>with direct gearbox connection</td>
<td>53</td>
<td>97</td>
<td>50.0</td>
<td>9</td>
<td>31.80</td>
<td>4.98</td>
</tr>
<tr>
<td>MDFQABX 100</td>
<td>90</td>
<td>180</td>
<td>37</td>
<td>27</td>
<td>15.00</td>
<td>13.5</td>
</tr>
<tr>
<td></td>
<td>110</td>
<td>300</td>
<td>60</td>
<td>20</td>
<td>29.00</td>
<td>20.0</td>
</tr>
<tr>
<td>MDFQABX 112</td>
<td>110</td>
<td>300</td>
<td>60</td>
<td>20</td>
<td>29.00</td>
<td>21.5</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>400</td>
<td>80</td>
<td>19</td>
<td>73.00</td>
<td>31</td>
</tr>
<tr>
<td>MDFQABX 132</td>
<td>200</td>
<td>400</td>
<td>80</td>
<td>19</td>
<td>73.00</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>270</td>
<td>500</td>
<td>120</td>
<td>17</td>
<td>200.00</td>
<td>46</td>
</tr>
</tbody>
</table>

1) Engagement time for DC switching, for AC switching t₃ prolonged by approx. factor 4
2) Max. friction work per switching operation with n = 1500 min⁻¹
3) Transference operating frequency to VDI 2241 to detect the permissible operating frequency or friction work

With long motor cables and especially with 24V brakes, the ohmic voltage drop along the cable must be observed and compensated by a higher voltage input – otherwise, the voltage applied to the brake will not be high enough (24V or 205V).

For Lenze system cables the following applies:

\[ \Delta V_b = 0.08 \cdot I_{cable} [m] \cdot I_b [A] \]

If the voltage applied to the brake is not correct (too high, too low, wrong polarity), the brake is activated immediately and can be overheated and destroyed by the still rotating motor.

Shortest switching times of the brake can be reached by DC switching of the voltage. A spark suppresser avoids voltage peaks.
Technical data

Angle and speed encoder for servo motors MDXK and MDXQ

<table>
<thead>
<tr>
<th>Encoder</th>
<th>Resolver</th>
<th>Incremental encoder</th>
<th>Sin-Cosen encoder single turn</th>
<th>Sin-Cos encoder multi turn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available for</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synchronous servo motor MDXKS</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Asynchronous servo motor MDXKA (surface cooled)</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Asynchronous servo motor MDXQA (enclosed ventilated)</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Designation</td>
<td>RS</td>
<td>IT2048</td>
<td>AS512</td>
<td>AM512</td>
</tr>
<tr>
<td>Type</td>
<td></td>
<td>ITD21</td>
<td>SCS70</td>
<td>SCM70</td>
</tr>
<tr>
<td>Signals</td>
<td>2048 bars TTL signals</td>
<td>512 periods, sine signals 1 Vss asynchronous half-duplex interface RS485 for transmission of the absolute position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>0.8°</td>
<td>2.6°</td>
<td>0.4°</td>
<td>0.4°</td>
</tr>
<tr>
<td>Accuracy</td>
<td>+ 10° bzw. + 4° when entering the correction code</td>
<td>+ 2° depending on no. of bars</td>
<td>+ 0.8°</td>
<td>+ 0.8°</td>
</tr>
<tr>
<td>Absolute positioning</td>
<td>1 revolution</td>
<td>no</td>
<td>1 revolution</td>
<td>4096 rev.</td>
</tr>
<tr>
<td>Note</td>
<td>Standard solution for most applications</td>
<td>Incremental encoder instead of resolver</td>
<td>Sin-Cos encoder instead of resolver current position via interface of the 9300. Operation only possible after encoder selection at 9300 (encoder type and voltage supply), values saves, and unit switched off and on again.</td>
<td></td>
</tr>
</tbody>
</table>

Resolver (built-in encoder)

Stator-fed resolver with 2 stator windings turned by 90° and a rotor winding with transformer winding.

<table>
<thead>
<tr>
<th>Design</th>
<th>Brushless hollow shaft resolver in pancake-design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. speed (permanent)</td>
<td>8000 min⁻¹</td>
</tr>
<tr>
<td>Max. speed (short time)</td>
<td>10000 min⁻¹</td>
</tr>
<tr>
<td>Input voltage</td>
<td>10 V amplitude</td>
</tr>
<tr>
<td>Input frequency</td>
<td>4 kHz</td>
</tr>
<tr>
<td>Ratio stator / rotor</td>
<td>0.3 ± 5 %</td>
</tr>
<tr>
<td>Rotor impedance</td>
<td>Zro</td>
</tr>
<tr>
<td>Stator impedance</td>
<td>Zs0</td>
</tr>
<tr>
<td>Impedance</td>
<td>Zrs</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>&gt; 10 MΩ with 500 V DC</td>
</tr>
<tr>
<td>No. of pole pairs</td>
<td>1</td>
</tr>
<tr>
<td>Max. phase error</td>
<td>± 10 angular minutes</td>
</tr>
</tbody>
</table>
### Sin-Cos absolute value encoder (built-in encoder)

Absolute value encoder with 2 sine-wave signals displaced by 90° with 512 periods per revolution and serial interface RS 485 for the transmission of parameters and the absolute position within one or 4096 revolutions.

<table>
<thead>
<tr>
<th>Type</th>
<th>SCS 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>Brushless hollow shaft encoder</td>
</tr>
<tr>
<td>Maximum torque</td>
<td>12000 min⁻¹</td>
</tr>
<tr>
<td>No. of revolutions absolutely resolved</td>
<td>1 (single turn)</td>
</tr>
<tr>
<td>No. of periods</td>
<td>512 periods / rev.</td>
</tr>
<tr>
<td>Output signals</td>
<td>2 sine-wave signals displaced by 90° with 1 V_{ss}, serial interface RS 485, asynchronous, half duplex</td>
</tr>
<tr>
<td>Limit frequency</td>
<td>100 kHz</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>7 ... 12 V</td>
</tr>
<tr>
<td>Current consumption</td>
<td>100 ... 130 mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>SCM 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>Brushless hollow shaft encoder</td>
</tr>
<tr>
<td>Maximum torque</td>
<td>12000 min⁻¹</td>
</tr>
<tr>
<td>No. of revolutions absolutely resolved</td>
<td>4096 (multi turn)</td>
</tr>
<tr>
<td>No. of periods</td>
<td>512 periods / rev.</td>
</tr>
<tr>
<td>Output signals</td>
<td>2 sine-wave signals displaced by 90° with 1 V_{ss}, serial interface RS 485, asynchronous, half duplex</td>
</tr>
<tr>
<td>Limit frequency</td>
<td>100 kHz</td>
</tr>
<tr>
<td>Versorgung</td>
<td>7 ... 12 V</td>
</tr>
<tr>
<td>Current consumption</td>
<td>100 ... 130 mA</td>
</tr>
</tbody>
</table>

### Incremental encoder (built-in encoder)

Encoder with 2 TTL square-wave signals displaced by 90° with 2048 pulses per revolution and additional zero track. This encoder is optionally available as preference feedback to the resolver for motor series MDFQA.

<table>
<thead>
<tr>
<th>Type</th>
<th>ITD 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>Brushless hollow shaft encoder</td>
</tr>
<tr>
<td>Maximum torque</td>
<td>8000 min⁻¹</td>
</tr>
<tr>
<td>No. of pulses</td>
<td>2048 pulses / rev.</td>
</tr>
<tr>
<td>Output signals</td>
<td>2 square-wave signals displaced by 90°, zero pulse, complementary TTL signals, V_{low} ≤ 0.5 V, V_{high}, ≥ 2.5 V</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>5 V ± 5 %, protect against polarity reversal</td>
</tr>
<tr>
<td>Current consumption</td>
<td>≤ 150 mA</td>
</tr>
<tr>
<td>Limit frequency</td>
<td>300 kHz</td>
</tr>
</tbody>
</table>
Technical data

Temperature sensor KTY 83-110 (integrated)

The KTY temperature sensor continuously measures the motor temperature. It represents, though, no complete protection. The signals are fed back to the servo inverter 9300 via the system feedback cable. When feeding the encoder with a measuring current of 1 mA, temperature and resistance show the following characteristic:

Temperature switch - normally closed contact

As alternative to the continuous sensor KTY, with the MDFQA it is also possible to use a temperature contact to monitor the windings.

Asynchronous motors of the series MDFQA are equipped with both temperature monitoring.

Technical data

<table>
<thead>
<tr>
<th></th>
<th>AC connection</th>
<th>DC connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release temperature</td>
<td>150 °C ± 5 °C</td>
<td></td>
</tr>
<tr>
<td>Reset temperature</td>
<td>90...135 °C</td>
<td></td>
</tr>
<tr>
<td>Connection voltage</td>
<td>250 V =</td>
<td>60 V  48 V 24 V</td>
</tr>
<tr>
<td>Rated current [A]</td>
<td>2.5 A</td>
<td>1.0 A  1.25 A 1.6 A</td>
</tr>
</tbody>
</table>
Plug-in connectors for motor connection

Power connection, brake connection

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Terminal designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holding brake +UB</td>
<td>1 Y1</td>
</tr>
<tr>
<td>Holding brake -UB</td>
<td>2 Y2</td>
</tr>
<tr>
<td>Earth PE</td>
<td>-</td>
</tr>
<tr>
<td>Motor power phase U</td>
<td>4 1, U1</td>
</tr>
<tr>
<td>Motor power phase V</td>
<td>5 2, V1</td>
</tr>
<tr>
<td>Motor power phase W</td>
<td>6 3, W1</td>
</tr>
</tbody>
</table>

**Global Drive system cables**

<table>
<thead>
<tr>
<th>Standard cable</th>
<th>MDXK036...090</th>
</tr>
</thead>
<tbody>
<tr>
<td>EWLMxxxGM-015C</td>
<td>MDXK036...090</td>
</tr>
<tr>
<td>EWLMxxxGM-025</td>
<td>MDXK036...090</td>
</tr>
<tr>
<td>EWLMxxxGM-040</td>
<td>MDXKA100...112</td>
</tr>
<tr>
<td>EWLMxxxGM-100</td>
<td>MDXKA100...112</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trailing cable</th>
<th>MDXKA100...112</th>
</tr>
</thead>
<tbody>
<tr>
<td>EWLMxxxGM-025</td>
<td>MDXKA036...090</td>
</tr>
<tr>
<td>EWLMxxxGM-040</td>
<td>MDXKA036...090</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intermediate cable</th>
<th>MDXKA100...112</th>
</tr>
</thead>
<tbody>
<tr>
<td>EWLMxxxZM-015</td>
<td>MDXKA036...090</td>
</tr>
</tbody>
</table>

**Fan connection**

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Terminal designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth PE</td>
<td>2</td>
</tr>
<tr>
<td>Fan power L1</td>
<td>A U1</td>
</tr>
<tr>
<td>Fan power N</td>
<td>B U2</td>
</tr>
</tbody>
</table>

**Global Drive system cables**

<table>
<thead>
<tr>
<th>Standard cable</th>
<th>MDXK</th>
</tr>
</thead>
<tbody>
<tr>
<td>EWLLxxxGM</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trailing cable</th>
<th>MDXK</th>
</tr>
</thead>
<tbody>
<tr>
<td>EWLLxxxGMS</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intermediate cable</th>
<th>MDXK</th>
</tr>
</thead>
<tbody>
<tr>
<td>EWLLxxxZM</td>
<td></td>
</tr>
</tbody>
</table>
Plug-in connectors for motor connection

### Resolver connection

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Terminal designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Ref., transformer/reference winding</td>
</tr>
<tr>
<td>2</td>
<td>-Ref., transformer/reference winding</td>
</tr>
<tr>
<td>4</td>
<td>+Cos, stator winding</td>
</tr>
<tr>
<td>5</td>
<td>-Cos, stator winding</td>
</tr>
<tr>
<td>6</td>
<td>+Sin, stator winding</td>
</tr>
<tr>
<td>7</td>
<td>-Sin, stator winding</td>
</tr>
<tr>
<td>11</td>
<td>Temperature sensor +KTY</td>
</tr>
<tr>
<td>12</td>
<td>Temperature sensor -KTY</td>
</tr>
</tbody>
</table>

**Global Drive system cables**
- Standard cable: EWLxxxGM-T
- Intermediate cable for trailing: EWLxxxZMST
- Intermediate cable: EWLxxxZM-T

### Connection of Sin-Cos absolute value and incremental encoder

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Terminal designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Track +B / +SIN</td>
</tr>
<tr>
<td>2</td>
<td>Track -A / -COS</td>
</tr>
<tr>
<td>3</td>
<td>Track +A / +COS</td>
</tr>
<tr>
<td>4</td>
<td>Supply VCC</td>
</tr>
<tr>
<td>5</td>
<td>Mass GND</td>
</tr>
<tr>
<td>6</td>
<td>Track -0, -Z / -RS485</td>
</tr>
<tr>
<td>7</td>
<td>Track +0, +Z / +RS485</td>
</tr>
<tr>
<td>9</td>
<td>Track -B / -SIN</td>
</tr>
<tr>
<td>11</td>
<td>Temperature sensor +KTY</td>
</tr>
<tr>
<td>12</td>
<td>Temperature sensor -KTY</td>
</tr>
</tbody>
</table>

**Global Drive system cables**
- Standard cable: EWLExxxGM-T


**Technical data**

**Motor connection**

---

**Dimensions of plugs and sockets**

**Power plug size 036…090**

[Diagram of power plug size 036…090]

- Ø 27.2
- SW 24/26
- 76 x 3.4

**Right angle socket motor size 036…090**

[Diagram of right angle socket motor size 036…090]

- Ø 57.2
- 41.5
- Switch range 330°

**Power plug size 100…112**

[Diagram of power plug size 100…112]

- Ø 27.2
- SW 24/26
- 113

**Right angle socket motor size 100…112**

[Diagram of right angle socket motor size 100…112]

- Ø 57.2
- 41.5
- Switch range 330°

**Fan plug**

[Diagram of fan plug]

- Ø 27.2
- SW 24/26
- 76 x 3.4

**Right-angle socket fan**

[Diagram of right-angle socket fan]

- Ø 57.2
- 41.5
- Switch range 330°

**Encoder plug (resolver / Sin-Cos / incremental encoder)**

[Diagram of encoder plug]

- Ø 26
- 55
- SW21

**Right-angle socket encoder**

[Diagram of right-angle socket encoder]

- Ø 53.2
- 41.5
- 36
Terminal box

As alternative to plug-in connectors, servo motors MDXK can be equipped with terminal boxes for power connection and brake.

The power connection of servo motors MDFQA (enclosed ventilated) is always equipped with a terminal box.

### a) Motor MDXK

#### Connections

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Terminal designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake</td>
<td>5 Y1</td>
</tr>
<tr>
<td>Brake</td>
<td>6 Y2</td>
</tr>
<tr>
<td>Protective earth</td>
<td>PE PE</td>
</tr>
<tr>
<td>Motor phase</td>
<td>1 U</td>
</tr>
<tr>
<td>Motor phase</td>
<td>2 V</td>
</tr>
<tr>
<td>Motor phase</td>
<td>3 W</td>
</tr>
</tbody>
</table>

### b) Motor MDFQA

#### Connections

<table>
<thead>
<tr>
<th>Protective earth</th>
<th>PE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor phase</td>
<td>U</td>
</tr>
<tr>
<td>Motor phase</td>
<td>V</td>
</tr>
<tr>
<td>Motor phase</td>
<td>W</td>
</tr>
<tr>
<td>Thermostat, connection T1 with 9300</td>
<td>S1</td>
</tr>
<tr>
<td>Thermostat, connection T2 with 9300</td>
<td>S2</td>
</tr>
<tr>
<td>Temperature sensor*, KTY, con. through encoder</td>
<td>T1</td>
</tr>
<tr>
<td>Temperature sensor*, KTY, con. through encoder</td>
<td>T2</td>
</tr>
</tbody>
</table>

* Motors with feedback have the temperature sensor connected to the encoder plug.
Feedbacks and fans can be connected to a second terminal box.

The feedback of servo motors MDFQA (enclosed ventilated) is always equipped with plug-in connectors.

**Resolver as feedback**

**Connections**

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Terminal designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature sensor</td>
<td>T1 + KTY</td>
</tr>
<tr>
<td>Temperature sensor</td>
<td>T2 - KTY</td>
</tr>
<tr>
<td>Resolver</td>
<td>B1 + Ref</td>
</tr>
<tr>
<td>Resolver</td>
<td>B2 - Ref</td>
</tr>
<tr>
<td>Resolver</td>
<td>B3</td>
</tr>
<tr>
<td>Resolver</td>
<td>B4 + cos</td>
</tr>
<tr>
<td>Resolver</td>
<td>B5 - cos</td>
</tr>
<tr>
<td>Resolver</td>
<td>B6 + sin</td>
</tr>
<tr>
<td>Resolver</td>
<td>B7 - sin</td>
</tr>
<tr>
<td>Separate fan</td>
<td>U1 L1</td>
</tr>
<tr>
<td>Separate fan</td>
<td>U2 N</td>
</tr>
</tbody>
</table>

**Incremental encoder of SinCos-encoder as feedback**

**Connections**

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Terminal designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature sensor</td>
<td>T1 + KTY</td>
</tr>
<tr>
<td>Temperature sensor</td>
<td>T2 - KTY</td>
</tr>
<tr>
<td>Incremental encoder supply +</td>
<td>B1 + UB</td>
</tr>
<tr>
<td>Incremental encoder supply -</td>
<td>B2 ± ov</td>
</tr>
<tr>
<td>Incremental encoder track A</td>
<td>B3 A</td>
</tr>
<tr>
<td>Incremental encoder track A invers</td>
<td>B4 - A</td>
</tr>
<tr>
<td>Incremental encoder track B</td>
<td>B5 B</td>
</tr>
<tr>
<td>Incremental encoder track B invers</td>
<td>B6 - B</td>
</tr>
<tr>
<td>Inc. encoder track C (zero track)</td>
<td>B7 N</td>
</tr>
<tr>
<td>Inc. encoder track C (zero track invers)</td>
<td>B8 N</td>
</tr>
<tr>
<td>Incremental encoder mass / sensor</td>
<td>B9 ± ov</td>
</tr>
<tr>
<td>Incremental encoder screen</td>
<td>B10 Screen</td>
</tr>
<tr>
<td>Incremental encoder screen +</td>
<td>B11 + U sensor</td>
</tr>
<tr>
<td>Separate fan</td>
<td>U1 L1</td>
</tr>
<tr>
<td>Separate fan</td>
<td>U2 N</td>
</tr>
</tbody>
</table>

**PG glands and bolts**

<table>
<thead>
<tr>
<th>Motor type</th>
<th>Power connection</th>
<th>Encoders / fan connection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PG glands</td>
<td>Bolts</td>
</tr>
<tr>
<td>MDSK 056</td>
<td>1xPG13.5 + 1xPG11</td>
<td>M4 bzw. 0.08...2.5 mm²</td>
</tr>
<tr>
<td>MDKX 071</td>
<td>1xPG13.5 + 1xPG11</td>
<td>M4 bzw. 0.08...2.5 mm²</td>
</tr>
<tr>
<td>MDKX 080</td>
<td>1xPG13.5 + 1xPG11</td>
<td>M4 bzw. 0.08...2.5 mm²</td>
</tr>
<tr>
<td>MDSK 090</td>
<td>1xPG13.5 + 1xPG11</td>
<td>M4 bzw. 0.08...2.5 mm²</td>
</tr>
<tr>
<td>MDKX 100</td>
<td>2x PG16</td>
<td>M5</td>
</tr>
<tr>
<td>MDKX 112</td>
<td>1xPG21 + 1xPG16</td>
<td>M5</td>
</tr>
</tbody>
</table>

**Power connection**

<table>
<thead>
<tr>
<th>Motor type</th>
<th>Fan connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDFQ 100</td>
<td>2xPG29 + 1xPG9 *</td>
</tr>
<tr>
<td>MDFQ 112</td>
<td>2xPG36 + 2xPG9 *</td>
</tr>
<tr>
<td>MDFQ 132</td>
<td>4xPG29 + 2xPG9 *</td>
</tr>
</tbody>
</table>

*For connection of parallel screened cables, e.g. 3 St 4 x 35 mm² or 4 St 4 x 25 mm²*
Synchronous servo motors MDSKS 036, mounting position B5

Dimensions

Rotation of right-angle sockets possible

<table>
<thead>
<tr>
<th>Motor type</th>
<th>Motor type</th>
<th>k</th>
<th>without brake</th>
<th>with brake</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSKSXS036-13</td>
<td>MDSKSXS036-23</td>
<td>13</td>
<td>87</td>
<td>111</td>
</tr>
</tbody>
</table>
Synchronous servo motors MDSKS 056, mounting position B5/B14

<table>
<thead>
<tr>
<th>Motor type</th>
<th>k</th>
<th>without brake</th>
<th>with brake</th>
<th>X-variable rotation of right-angle sockets possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSKSXS056-23, 190</td>
<td>175</td>
<td>183.5</td>
<td>210</td>
<td></td>
</tr>
<tr>
<td>MDSKSXS056-33, 200</td>
<td>175</td>
<td>183.5</td>
<td>210</td>
<td></td>
</tr>
</tbody>
</table>
Synchronous servo motors MDKS, mounting position B5/B14

<table>
<thead>
<tr>
<th>Motor type</th>
<th>without brake</th>
<th>with brake</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSK XX071-03, 170</td>
<td>155.5</td>
<td>190.5</td>
</tr>
<tr>
<td>MDSK XX071-13, 185</td>
<td>190.5</td>
<td>225.5</td>
</tr>
<tr>
<td>MDSK XX071-33, 180</td>
<td>225.5</td>
<td>260.5</td>
</tr>
<tr>
<td>MDFK XX071-03, 165</td>
<td>155.5</td>
<td>190.5</td>
</tr>
<tr>
<td>MDFK XX071-13, 180</td>
<td>190.5</td>
<td>225.5</td>
</tr>
<tr>
<td>MDFK XX071-33, 175</td>
<td>225.5</td>
<td>260.5</td>
</tr>
</tbody>
</table>

( ) - without brake
X-variable
Rotation of right-angle sockets possible
Asynchronous servo motors MDSKA 056, mounting position B5/B14

Motor type k [without brake with brake]

<table>
<thead>
<tr>
<th>Motor type</th>
<th>k</th>
<th>X-variable right-angle sockets possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSKA220</td>
<td>220</td>
<td>Rotation of right-angle sockets possible</td>
</tr>
<tr>
<td>MDSKA140</td>
<td>140</td>
<td>Rotation of right-angle sockets possible</td>
</tr>
<tr>
<td>MDSKA110</td>
<td>110</td>
<td>X-variable right-angle sockets possible</td>
</tr>
</tbody>
</table>

Dimensions

Lenze
Asynchronous servo motors MDXKS 071, mounting position B5/B14

<table>
<thead>
<tr>
<th>Motor type</th>
<th>MDXK071-22, 140</th>
<th>MDXK071-22, 120</th>
</tr>
</thead>
<tbody>
<tr>
<td>without brake</td>
<td>207</td>
<td>207</td>
</tr>
<tr>
<td>with brake</td>
<td>242</td>
<td>242</td>
</tr>
</tbody>
</table>

X-variable Rotation of right-angle sockets possible
Asynchronous servo motors MDXKA 080, mounting position B5/B14

( ) - without brake
Rotation of right-angle sockets possible
Asynchronous servo motors MDXKA 090, mounting position B5/B14

()-without brake
Rotation of right-angle sockets possible
Asynchronous servo motors MDXKA 100, mounting position B5/B14
Asynchronous servo motors MDXKA 112, mounting position B5/B14

Without brake
Rotation of right-angle sockets possible
Asynchronous servo motors MDFQA 100...132, mounting position B5

**Dimensions**

**Motor type** | **Flange to DIN 42948** | **Flange to IEC 72** | **a1** | **b1** | **c** | **c1** | **e1** | **f** | **f1** | **g** | **g2** | **h** | **k2** | **m1** | **p** | **p1** | **p2** | **q**  
MDFQA 100-22 | A300 | FF265 | 300 | 230 | 14 | 12 | 265 | 196 | 4 | 212 | 163 | 100 | 452 | 25 | 243 | 282 | 220 | 181  
MDFQA 132-32 | A400 | FF350 | 400 | 300 | 18 | 20 | 350 | 260 | 5 | 275 | 238 | 132 | 673 | 25 | 315 | 353 | 320 | 257  

**Motor type** | **s2** | **x1** | **y1** | **d** | **l** | **t** | **u** | **f** | **h2** | **h3** | **h4** | **k1** | **k3** | **k4** | **p6** | **t1** | **t2** | **t3** | **Separate fan**  
MDFQA 100-22 | 14 | 134 | 131 | 38 | 80 | 41 | 10 | M12 | 180 | - | 94 | 480 | 386 | 304 | 385 | 82 | 111 | 124 | G2D 120  
 | 14 | 134 | 131 | 38 | 80 | 41 | 10 | M12 | 214 | 185 | 94 | 489 | 348 | 240 | 447 | 100 | 97 | 142 | G2D 140  
 | 14 | 134 | 131 | 38 | 80 | 41 | 10 | M12 | 204 | 187 | 110 | 487 | 367 | 275 | 421 | 52 | 158 | 64 | DNG 3-4.5  
MDFQA 132-32 | 18 | 261 | 160 | 55 | 110 | 59 | 16 | M20 | 250 | - | 94 | 730 | 572 | 450 | 553 | 92 | 113 | - | G2D 180  
 | 18 | 261 | 160 | 55 | 110 | 59 | 16 | M20 | 280 | 285 | 140 | 708 | 549 | 413 | 566 | 87 | 255 | 73 | DNG 8-12  

**Dimensions k**

**Motor type** | **Encoder** | **ITD 21**  
--- | --- | ---  
MDFQA 100-22 | without | 540 | 572 | 572  
 | Resolver | 790 | 822 | 822  
MDFQA 132-32 | Brake 14.450 | 666 | 666 | 666 | 696 | 696  
 | Resolver | 214 | 243 | 278 | 330 | 933 | 933  

* = Dimension g3 (outer brake diameter)

Terminal box at top (standard)
Shaft end fits to DIN 748T3

Key to DIN 6885, p. 1
Designations to DIN (a, b, ...), IEC (B, A, HA...)

---

**Dimensions**

**Motor type** | **Brake 14.450** | **ITD 21**  
--- | --- | ---  
MDFQA 100-22 | 666 | 666 | 696 | 696  
MDFQA 132-32 | 214 | 243 | 278 | 330 | 933 | 933 
MDFQA 100-132 | * | * | * | * | * | *
Asynchronous servo motors MDFQA 100...132, mounting position B35

<table>
<thead>
<tr>
<th>Motor type</th>
<th>Flange to DIN 42948</th>
<th>Flange to IEC 72</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
<th>h</th>
<th>i</th>
<th>k1</th>
<th>k2</th>
<th>m1</th>
<th>p</th>
<th>p1</th>
<th>p2</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDFQA 100-22</td>
<td>A250</td>
<td>FF215</td>
<td>295</td>
<td>250</td>
<td>160</td>
<td>180</td>
<td>14</td>
<td>12</td>
<td>382</td>
<td>215</td>
<td>196</td>
<td>4</td>
<td>212</td>
<td>163</td>
<td>100</td>
<td>143</td>
<td>452</td>
</tr>
<tr>
<td>MDFQA 112-22</td>
<td>A300</td>
<td>FF265</td>
<td>385</td>
<td>300</td>
<td>190</td>
<td>230</td>
<td>16</td>
<td>12</td>
<td>504</td>
<td>265</td>
<td>220</td>
<td>4</td>
<td>235</td>
<td>198</td>
<td>112</td>
<td>150</td>
<td>555</td>
</tr>
<tr>
<td>MDFQA 132-32</td>
<td>A300</td>
<td>FF265</td>
<td>460</td>
<td>300</td>
<td>215</td>
<td>230</td>
<td>18</td>
<td>12</td>
<td>604</td>
<td>265</td>
<td>260</td>
<td>4</td>
<td>275</td>
<td>238</td>
<td>132</td>
<td>199</td>
<td>673</td>
</tr>
</tbody>
</table>

| Motor type | q | s | S2 | S1 | y1 | y2 | d | E | t | GA | u | F | d4 | h2 | h3 | h4 | k1 | k2 | k3 | k4 | p6 | t1 | t2 | t3 | Separate fan |
|------------|---|---|----|----|----|----|---|---|---|----|---|---|----|---|---|----|----|----|----|----|----|----|----|----------------|
| MDFQA 100-22 | 181 | 12 | 14 | 134 | 131 | 38 | 80 | 41 | 10 | M12 | 180 | - | 94 | - | 386 | 304 | 375 | 82 | 111 | - | G2D 120 |
| 181 | 12 | 14 | 134 | 131 | 38 | 80 | 41 | 10 | M12 | 214 | 185 | 94 | 489 | 340 | 437 | 100 | 97 | 142 | - | G2D 140 filter |
| 181 | 12 | 14 | 134 | 131 | 38 | 80 | 41 | 10 | M12 | 204 | 187 | 110 | 487 | 367 | 275 | 411 | 52 | 158 | 64 | DNG 3-4.5 wide range |
| MDFQA 112-22 | 168 | 12 | 14 | 157 | 155 | 38 | 80 | 41 | 10 | M12 | 213 | 185 | 94 | 602 | 461 | 354 | 451 | 100 | 97 | 141 | - | G2D 160 |
| 168 | 12 | 14 | 157 | 155 | 38 | 80 | 41 | 10 | M12 | 224 | 237 | q123 | 590 | 430 | 322 | 466 | 87 | 234 | 96 | DNG 5-12.5 Filter and wide range |
| MDFQA 132-32 | 257 | 15 | 18 | 261 | 160 | 55 | 110 | 59 | 16 | M20 | 250 | - | 94 | 730 | 572 | 450 | 525 | 92 | 113 | - | - |
| 257 | 15 | 18 | 261 | 160 | 55 | 110 | 59 | 16 | M20 | 280 | 285 | 140 | 708 | 549 | 413 | 558 | 87 | 255 | 73 | DNG B 12 Filter and wide range |

**Dimensions k**

<table>
<thead>
<tr>
<th>Motor type</th>
<th>Encoder</th>
</tr>
</thead>
<tbody>
<tr>
<td>without</td>
<td>Resolver</td>
</tr>
<tr>
<td>MDFQA 100-22</td>
<td>540</td>
</tr>
<tr>
<td>MDFQA 112-22</td>
<td>660</td>
</tr>
<tr>
<td>MDFQA 132-32</td>
<td>790</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motor type</th>
<th>Brake 14.450</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>MDFQA 100-22</td>
<td>666</td>
</tr>
<tr>
<td>MDFQA 112-22</td>
<td>-</td>
</tr>
<tr>
<td>MDFQA 132-32</td>
<td>-</td>
</tr>
<tr>
<td>MDFQA 100-132 *</td>
<td>214</td>
</tr>
</tbody>
</table>

* = Dimension g3 (outer brake diameter)
Selection of a servo drive

Basic data

When installing a servo drive, normally a dynamic operation is required.

The essential data for the appropriate size of the motor are the following:

- Maximum torque $M_{\text{max}}$, Maximum speed $n_{\text{max}}$, efficient torque $M_{\text{eff}}$ and if necessary transmission $i$

a) Transmission: b) - for a good use while continuous operation

$$
\text{dynamic response: } i = \frac{\frac{1}{J_{\text{load}}}}{\frac{1}{J_{\text{motor}}}} \\
\text{for perfect dynamic response: } i = \frac{n_{\text{rated}}}{n_{\text{load}}}
$$

Efficient torque:

$$M_{\text{ms}} = \sqrt{\sum_{i} M_{i}^{2} t_{i}}$$

Maximum torque:

$$M_{\text{max}} = M_{\text{accel}} + \frac{1}{n_{\text{accel}}} M_{\text{load}}$$

$$M_{\text{accel}} = 2 \cdot \pi \frac{\Delta n}{\Delta t} \left( J_{\text{motor}} + \frac{1}{i} J_{\text{load}} \right)$$

Selection of the motor

After having detected the technical data one may choose between synchronous and asynchronous motors, on the one hand and, on the other hand, between self ventilated and forced ventilated motors. The main characteristics of the different motor types are listed below:

Select motor according to $M_{\text{rated}} > M_{\text{ms}}$ and $n_{\text{max}} > M_{\text{max}}$ and take into consideration:

- no stream of air allowed → Motor without fan MDSK
- fluffs or something similar, that might block the air channels → Motor without fan MDSK
- high enclosure required → Motor without fan MDSK
- high dynamic response required → Motor with fan MDFK, Synchr. servo motor MDXKS
- operation with constant power with high speed (operation with weak field) → Asynchr. servo motor MDXKA
- very high power density → Synchr. servo motor MDXKS, enclosed ventilated asynchr. motors MDFQA
- parallel operation of servo mot. with one single inverter → Asynchr. servo motor MDXKA, MDFQA
Operational mode: acceleration

Selecting the size of the drives according to the limit characteristics.

- Low noise → selection of 16 kHz chopp. fre.
- Check permanent current → especially with accelerating drive

\[ I_{\text{perm}} > I_{\text{medium}} = 1.5 \cdot I_{\text{rated motor}} \cdot \frac{M_i}{M_{\text{rated}}} \cdot t_i \]

In the case of the continuous operation, \( S6 \) and \( M_{\text{efficient}} < M_{\text{rated}} \), the current medium value \( I_{\text{medium}} \) is smaller than the permanent current of the installation.

The following data are important for the operational mode acceleration drive:

- Permanent current \( = 0.7 \cdot I_{\text{rated inverter}} \)
- Maximum current \( = 2 \cdot I_{\text{rated inverter}} \)

If you select the drive according to \( n_{\text{max}} \) and \( M_{\text{max}} \), the following has to be taken into account:

- Low noise
- Check permanent current
### Possible combinations with controllers

#### Motor-inverter combination servo motor - servo inverter series 9300, 16 kHz chopper frequency

<table>
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<tr>
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<table>
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<th>(I_{\text{rated}}) [A]</th>
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### Motor-inverter combination servo motor - servo inverter series 9300, 8 kHz  chopper frequency

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<th>( I_{\text{rated}} ) [A]</th>
<th>( I_{\text{max}} ) [A]</th>
<th>( f_{\text{rated}} ) [Hz]</th>
<th>( f_{\text{chopp}} ) [Hz]</th>
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Chopper frequency \( f_{\text{chopp}} \) = 8 kHz
## Possible combinations with controllers

### Motor-inverter combination servo motor - servo inverter series 9300, 16 kHz chopper frequency (low noise)

<table>
<thead>
<tr>
<th>Motor type</th>
<th>h [mm]</th>
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<th>( M_{\text{rated}} ) [Nm]</th>
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</table>
Motor-inverter combination servo motor - servo inverter series 9300, 16 kHz chopper frequency (low noise)

<table>
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<tr>
<th>Inverter type</th>
<th>Motor type ( [\text{mm}] )</th>
<th>( h ) ([\text{mm}])</th>
<th>( \M_{\text{rated}} ) ([^\text{Nm}])</th>
<th>( P_{\text{rated}} ) ([^\text{kW}])</th>
<th>( I_{\text{rated}} ) ([^\text{A}])</th>
<th>( f_{\text{rated}} ) ([^\text{Hz}])</th>
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<td>MDFKA 090-22, 80</td>
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<td>MDFKA 100-22, 120</td>
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<tr>
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<td>60</td>
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<tr>
<td>MDFKA 112-22, 120</td>
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<td>55.0</td>
<td>20.3</td>
<td>42.5</td>
<td>120</td>
<td>133.6</td>
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<td>Asynchronous servo motors, enclosed ventilated</td>
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<td>MDFQA 100-22, 50</td>
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<td>λ</td>
<td>71.3</td>
<td>10.6</td>
<td>26.5</td>
<td>50</td>
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<td>MDFQA 100-22, 100</td>
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<td>λ</td>
<td>66.2</td>
<td>20.3</td>
<td>46.9</td>
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<tr>
<td>MDFQA 112-22, 50</td>
<td>112</td>
<td>λ</td>
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<tr>
<td>MDFQA 112-22, 100</td>
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<td>λ</td>
<td>135</td>
<td>20.1</td>
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<td>MDFQA 112-22, 100</td>
<td>112</td>
<td>λ</td>
<td>130</td>
<td>22.7</td>
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<td>MDFQA 112-32, 36</td>
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<td>λ</td>
<td>296</td>
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<td>λ</td>
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<td>35.4</td>
<td>88.8</td>
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<td>MDFQA 112-32, 76</td>
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<td>λ</td>
<td>257</td>
<td>60.1</td>
<td>144.8</td>
<td>76</td>
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</table>
Application examples

Connection diagram

Lenze
EC-Declaration of Conformity '96
for the purpose of the
EC Low-Voltage Directive (73/23/EEC)
amended by: CE- mark directive (93/68/EEC)

The following products were developed, designed, and manufactured in compliance with the above-mentioned EC directive under the sole responsibility of Lenze GmbH & Co KG, Postfach 10 13 52, D-31763 Hameln

Product: Type:
DC motors MGFRK, MGFQU, MGFQK
MGFRK, MGFQU, MGEQK
MGSRK, MGSQU, MGSQK
13.12°, 13.53°, 13.55°
43.55°

Asynchronous motors 13.71°, 13.74°, 13.75°
13.81°, 13.84°, 13.85°
DFRA, DERA, DSRA
43.71°, 43.75°

Servo motors DFVA, DSVA, MDFQA
MDFKA, MDSKA
MDFKS, MDSKS

Three-phase AC winder motors o L12, o F12
o S8, o S6
o S4, o F4
o MF4, o SF4
o LF4

Standards:
EN 60204-1, IEC 204-1
EN 60034, VDE 0530, IEC 34

Declaration about EMC directive (89/336/EEC)
Asynchronous motors comply with the requirements of the EC directive „Electromagnetic Compatibility” 89/336/EEC under consideration of the standards EN 80081-1 and EN 50082-2 when connected to a sinusoidal AC mains voltage.

For inverter or DC-controller operation, the EMC notes of the manufacturers must be observed. When using screened motor cables, the screening is most effective with a conductive connection with as large an area as possible between the screen and the earth potential of the motor (e.g. metal cable gland).

Hameln, February 20, 1996

(i. V. Pankow)
Head of R & D Department
### Order form

**Recipient:** Lenze  
**Branch office/subsidiary:**  
**Fax:**

---

**Servo motors series MDXA/MDXKS - preference types**

**Expedit**  
**Company:**  
**Street/P.O. box:**  
**Postal Code/City:**  
**Delivery address:**

**Invoice addressee**

*Please fill out if not expedient*

---

<table>
<thead>
<tr>
<th>Motor model</th>
<th>Power</th>
<th>RPM 1</th>
<th>RPM 2</th>
<th>RPM 3</th>
<th>RPM 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSKAXX056-22</td>
<td>0.8 kW</td>
<td>390 V</td>
<td>140 Hz</td>
<td>0.8 kW</td>
<td>390 V</td>
</tr>
<tr>
<td>MDSKAXX071-22</td>
<td>1.7 kW</td>
<td>4050 RPM</td>
<td>140 Hz</td>
<td>1.7 kW</td>
<td>4050 RPM</td>
</tr>
<tr>
<td>MDSKAXX080-22</td>
<td>2.3 kW</td>
<td>4100 RPM</td>
<td>140 V</td>
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<td>4100 RPM</td>
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<td>MDSKAXX090-22</td>
<td>4.1 kW</td>
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<td>4110 RPM</td>
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<td>4150 RPM</td>
<td>140 Hz</td>
<td>5.2 kW</td>
<td>4150 RPM</td>
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<td>MDSKAXX112-22</td>
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<td>4160 RPM</td>
<td>140 Hz</td>
<td>1.4 kW</td>
<td>4160 RPM</td>
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*Self-ventilated motors*

<table>
<thead>
<tr>
<th>Motor model</th>
<th>Power</th>
<th>RPM 1</th>
<th>RPM 2</th>
<th>RPM 3</th>
<th>RPM 4</th>
</tr>
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<tbody>
<tr>
<td>MDFKAXX080-22</td>
<td>2.2 kW</td>
<td>3410 RPM</td>
<td>120 V</td>
<td>2.2 kW</td>
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<tr>
<td>MDFKAXX090-22</td>
<td>3.9 kW</td>
<td>3455 RPM</td>
<td>120 Hz</td>
<td>3.9 kW</td>
<td>3455 RPM</td>
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<tr>
<td>MDFKAXX100-22</td>
<td>6.9 kW</td>
<td>3480 RPM</td>
<td>120 Hz</td>
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<td>3480 RPM</td>
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<tr>
<td>MDFKAXX112-22</td>
<td>7.4 kW</td>
<td>3520 RPM</td>
<td>120 Hz</td>
<td>7.4 kW</td>
<td>3520 RPM</td>
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*Forced-ventilated motors*

<table>
<thead>
<tr>
<th>Motor model</th>
<th>Power</th>
<th>RPM 1</th>
<th>RPM 2</th>
<th>RPM 3</th>
<th>RPM 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSKSBXX036-13</td>
<td>0.25 kW</td>
<td>4000 RPM</td>
<td>120 Hz</td>
<td>0.25 kW</td>
<td>4000 RPM</td>
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<td>MDSKSBXX036-23</td>
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<td>200 Hz</td>
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<td>4000 RPM</td>
</tr>
<tr>
<td>MDSKSBXX056-23</td>
<td>1.1 kW</td>
<td>3800 RPM</td>
<td>190 Hz</td>
<td>1.1 kW</td>
<td>3800 RPM</td>
</tr>
<tr>
<td>MDSKSBXX056-33</td>
<td>1.8 kW</td>
<td>4000 RPM</td>
<td>200 Hz</td>
<td>1.8 kW</td>
<td>4000 RPM</td>
</tr>
<tr>
<td>MDSKSBXX071-03</td>
<td>2.0 kW</td>
<td>3900 RPM</td>
<td>170 Hz</td>
<td>2.0 kW</td>
<td>3900 RPM</td>
</tr>
<tr>
<td>MDSKSBXX071-13</td>
<td>3.2 kW</td>
<td>3700 RPM</td>
<td>185 Hz</td>
<td>3.2 kW</td>
<td>3700 RPM</td>
</tr>
<tr>
<td>MDSKSBXX071-33</td>
<td>4.6 kW</td>
<td>3600 RPM</td>
<td>180 Hz</td>
<td>4.6 kW</td>
<td>3600 RPM</td>
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</tbody>
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*Forced-ventilated motors*

<table>
<thead>
<tr>
<th>Motor model</th>
<th>Power</th>
<th>RPM 1</th>
<th>RPM 2</th>
<th>RPM 3</th>
<th>RPM 4</th>
</tr>
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<td>0.25 kW</td>
<td>3300 RPM</td>
<td>165 Hz</td>
<td>0.25 kW</td>
<td>3300 RPM</td>
</tr>
<tr>
<td>MDFKSBXX036-23</td>
<td>0.54 kW</td>
<td>3600 RPM</td>
<td>175 Hz</td>
<td>0.54 kW</td>
<td>3600 RPM</td>
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<tr>
<td>MDFKSBXX056-23</td>
<td>1.1 kW</td>
<td>3500 RPM</td>
<td>165 Hz</td>
<td>1.1 kW</td>
<td>3500 RPM</td>
</tr>
<tr>
<td>MDFKSBXX056-33</td>
<td>1.8 kW</td>
<td>3500 RPM</td>
<td>175 Hz</td>
<td>1.8 kW</td>
<td>3500 RPM</td>
</tr>
</tbody>
</table>

**Motor power connect**

- X Plug

**Mounting**

- B5 FF75 (only size 36)
- B5A120 (only size 56)
- B5A160 (only size 71)
- B5A200 (only size 80/90)
- B5A250 (only size 100/112)
- B5A300 (only size 112)

**A-side**

- X without key

**Temperature monitor**

- X KTY cont. temperature sensor

**Enclosure**

- X IP54

**Brake**

- X without brake
- with brake

**Brake voltage (if selected)**

- X 24V DC

**Encoder**

- X Resolver

**Gearbox mounting**

- X without gearbox

**Colour**

- X RAL 9005 black

**Price motor**

DM
## Servo motors series MDFKS/MDSKS - industrial types

<table>
<thead>
<tr>
<th>Model</th>
<th>Power Designation</th>
<th>RPM</th>
<th>Voltage</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>MDFKSXX056-23</td>
<td>1.1 kW</td>
<td>3800</td>
<td>330 V</td>
<td>190 Hz</td>
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<tr>
<td></td>
<td>1.8 kW</td>
<td>4000</td>
<td>345 V</td>
<td>200 Hz</td>
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<tr>
<td>MDFKSXX071-03</td>
<td>2.0 kW</td>
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<td>330 V</td>
<td>170 Hz</td>
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<td></td>
<td>3.2 kW</td>
<td>3700</td>
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<td>185 Hz</td>
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<tr>
<td>MDFKSXX071-03</td>
<td>4.1 kW</td>
<td>3600</td>
<td>325 V</td>
<td>185 Hz</td>
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### Self-ventilated motors

<table>
<thead>
<tr>
<th>Model</th>
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<th>Voltage</th>
<th>Frequency</th>
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<tr>
<td>MDFKSXX071-03</td>
<td>2.6 kW</td>
<td>3300</td>
<td>330 V</td>
<td>165 Hz</td>
</tr>
<tr>
<td></td>
<td>4.1 kW</td>
<td>3500</td>
<td>325 V</td>
<td>180 Hz</td>
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<tr>
<td></td>
<td>5.9 kW</td>
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<td>175 Hz</td>
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### Forced-ventilated motors

<table>
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<th>Voltage</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>MDFKSXX071-03</td>
<td>2.6 kW</td>
<td>3300</td>
<td>330 V</td>
<td>165 Hz</td>
</tr>
<tr>
<td></td>
<td>4.1 kW</td>
<td>3500</td>
<td>325 V</td>
<td>180 Hz</td>
</tr>
<tr>
<td></td>
<td>5.9 kW</td>
<td>3500</td>
<td>325 V</td>
<td>175 Hz</td>
</tr>
</tbody>
</table>

### Motor power connect
- Plug
- Terminal box

### Mounting
- B5A120 (only size 56)
- B5A160 (only size 71)

### B9 drive size
- B9 - 1C (only size 56)
- B9 - 1D (only size 71)

### A-side
- without key
- with key (not for B9 - direct mounting of gearbox!)

### Temperature monitor
- RTD (pt100)
- KTY (cont. temperature sensor)

### Enclosure
- IP54
- IP65

### Brake
- without brake
- with brake

### Brake voltage (if selected)
- 24V DC
- 205V DC

### Encoder
- SinCos.encoder
- SinCos.encoder
- SinCos.encoder
- ITD21 TTL (Multi Turn)
- 2048 pulses / rev.

### Gearbox mounting
- without gearbox
- with "old" gearbox
- with GNG gearbox
- KKL-1- (right)
- KKL-2- (top)
- KKL-3- (left)
- KKL-4- (bottom)
- KKL-5- (left)
- KKL-2- (top)
- KKL-3- (left)
- KKL-4- (bottom)

### Colour
- RAL 9005 black

Preference drives are written in bold and are underlined. One cross only for each range!
## Order Form

**Recipient:** Lenze

**Branch office/subsidiary:**

**Postal Code/city:**

**Fax:**

---

### Servo Motors Series MDFKA/MDSKA - Industrial Types

**Expedition**

- **Company:**
- **Street / P.O. box:**
- **Postal Code / City:**
- **Delivery address:**
- **Fax:**
- **Invoice addressee:**

*Please fill out if not expedient*

**Date of delivery**

**Signature**

---

#### Motor Power Connect

- **Plug**
- **Terminal box**

#### Motor Mounting

- **B5A120**
- **B5A160**
- **B5A200**
- **B5A250**
- **B5A300**
- **B14C105**
- **B14C160**
- **Only size 56**
- **Only size 71**
- **Only size 80/90**
- **Only size 100/112**

#### B9 Drive Size

- **B9 - 1C**
- **B9 - 1D**
- **B9 - 1E**
- **B9 - 1F**
- **B9 - 1G**
- **B9 - 1H**
- **Only size 56**
- **Only size 60**
- **Only size 80**
- **Only size 100**
- **Only size 112**

#### A-Side

- **Without key**
- **With key**

#### Temperature Monitor

- **KTY cont. temperature sensor**

#### Enclosure

- **IP54**
- **IP65**

#### Brake

- **Without brake**
- **With brake**

#### Brake Voltage (if selected)

- **24V DC**
- **305V DC**

#### Encoder

- **Resolver**
- **SinCos-encoder**
- **SinCos-encoder ITD21 TTL**

#### Gearbox Mounting

- **Without gearbox**
- **With "old" gearbox**
- **With GNG gearbox**
- **KGL-1- (right)**
- **KGL-2- (top)**
- **KGL-3- (left)**
- **KGL-4- (bottom)**

#### Colour

- **RAL 9005**
- **Black**

*Preference drives are written in bold and are underlined*

One cross only for each range!

---

**Price motor + gearbox:** 2.3 kW
**Order form**

Recipient: **Lenze**  
Branch office/subsidiary

Postal Code/city: 
Fax: 

**Servo motor MDFQA - preference type**

<table>
<thead>
<tr>
<th>Servo motor MDFQA</th>
<th>Preference type</th>
<th>Power</th>
<th>RPM</th>
<th>Voltage</th>
<th>Frequency</th>
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</thead>
<tbody>
<tr>
<td>MDFQA xx 100-22</td>
<td></td>
<td>10.6 kW</td>
<td>1420</td>
<td>360 V</td>
<td>50 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20.3 kW</td>
<td>2930</td>
<td>360 V</td>
<td>100 Hz</td>
</tr>
<tr>
<td>MDFQA xx 112-22</td>
<td></td>
<td>20.1/11.5 kW</td>
<td>1425</td>
<td>360 V</td>
<td>50/28 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22.7 kW</td>
<td>1670</td>
<td>360 V</td>
<td>100/58 Hz</td>
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<tr>
<td>MDFQA xx 132-32</td>
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<td>31.1/17.0 kW</td>
<td>1030</td>
<td>360 V</td>
<td>36/20 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>35.4 kW</td>
<td>550</td>
<td>360 V</td>
<td>76/40 Hz</td>
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**Operation mode**

<table>
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<tr>
<th>Operation mode</th>
<th>Continuous operation</th>
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</thead>
<tbody>
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**Mounting**

<table>
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<tr>
<th>Mounting</th>
<th>A-side</th>
<th>B-side</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>B3/B5</td>
<td>B6/B5</td>
</tr>
<tr>
<td>Flange combination</td>
<td>B8/B5</td>
<td>V1/V5</td>
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<tr>
<td>MDFQA100</td>
<td>B300</td>
<td>A300</td>
</tr>
<tr>
<td>MDFQA112</td>
<td>B300</td>
<td>A300</td>
</tr>
<tr>
<td>MDFQA132</td>
<td>B300</td>
<td>A400</td>
</tr>
</tbody>
</table>

**Flange combination mountings:** MDFQA100 = A250, MDFQA112 = A300, MDFQA112 = A300

**B5 V1 V3** are not possible with size 112.

**A-side with key**

**B-side Motor for encoder mounting**

**Motor for brake/encoder mounting**

**Temperature monitoring**

<table>
<thead>
<tr>
<th>Temperature monitoring</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal contact normally-closed + KTY contact sensor</td>
<td></td>
</tr>
</tbody>
</table>

**Terminal box position**

<table>
<thead>
<tr>
<th>Terminal box position</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referring to B3 mounting</td>
<td></td>
</tr>
<tr>
<td>Looking on motor drive-end</td>
<td></td>
</tr>
</tbody>
</table>

**Brakes without brake**

<table>
<thead>
<tr>
<th>Brakes</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.450.</td>
<td></td>
</tr>
</tbody>
</table>

**24V DC**

**Brakes with brake**

<table>
<thead>
<tr>
<th>Brakes</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>205V DC</td>
<td></td>
</tr>
<tr>
<td>230V AC incl rectifier</td>
<td></td>
</tr>
</tbody>
</table>

**Encoder without encoder**

**Resolver**

**only mounting device**

(all motors are suitable to mount A4 tachos (with hole)

**External fan for**

<table>
<thead>
<tr>
<th>External fan</th>
<th>380 ... 460 V</th>
<th>350 ... 540 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>without filter</td>
<td>G2D120</td>
<td>G2D140</td>
</tr>
<tr>
<td>with filter</td>
<td>G2D160</td>
<td>G2D180</td>
</tr>
</tbody>
</table>

**Fan position**

<table>
<thead>
<tr>
<th>Fan position</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2- on top</td>
<td></td>
</tr>
<tr>
<td>-1- right side</td>
<td></td>
</tr>
<tr>
<td>-3- left side</td>
<td></td>
</tr>
<tr>
<td>-4- bottom (only for gearbox mount)</td>
<td></td>
</tr>
</tbody>
</table>

**Fan housing position**

<table>
<thead>
<tr>
<th>Fan housing position</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>front-sided</td>
<td></td>
</tr>
<tr>
<td>back-sided</td>
<td></td>
</tr>
</tbody>
</table>

**Gearbox attachment**

<table>
<thead>
<tr>
<th>Gearbox attachment</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>without gearbox</td>
<td></td>
</tr>
<tr>
<td>with <em>old</em> gearbox</td>
<td></td>
</tr>
<tr>
<td>KKL-1- (right)</td>
<td></td>
</tr>
<tr>
<td>KKL-2- (top)</td>
<td></td>
</tr>
<tr>
<td>KKL-3- (left)</td>
<td></td>
</tr>
<tr>
<td>KKL-4- (bottom)</td>
<td></td>
</tr>
<tr>
<td>with Gnd gearbox</td>
<td></td>
</tr>
<tr>
<td>KKL-5- (right)</td>
<td></td>
</tr>
<tr>
<td>KKL-2- (top)</td>
<td></td>
</tr>
<tr>
<td>KKL-3- (left)</td>
<td></td>
</tr>
<tr>
<td>KKL-4- (bottom)</td>
<td></td>
</tr>
</tbody>
</table>

**Colour**

<table>
<thead>
<tr>
<th>Colour</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAL 9005</td>
<td></td>
</tr>
<tr>
<td>RAL 6011</td>
<td></td>
</tr>
<tr>
<td>RAL 2000</td>
<td></td>
</tr>
<tr>
<td>Rotated</td>
<td></td>
</tr>
<tr>
<td>RAL 9018</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>Reseda green</td>
<td></td>
</tr>
<tr>
<td>Yellow orange</td>
<td></td>
</tr>
<tr>
<td>Signal grey</td>
<td></td>
</tr>
<tr>
<td>Papyrus white</td>
<td></td>
</tr>
</tbody>
</table>

**2nd nameplate attached**

<table>
<thead>
<tr>
<th>2nd nameplate</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attached to termin</td>
<td></td>
</tr>
</tbody>
</table>

**Preference types are written in bold and are underlined**

**Price motor + gearbox**

DM

One cross only for each range!
**Servo motor MDFQA - industrial type**

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Voltage</th>
<th>Power</th>
<th>RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDFQA xx 100-22</td>
<td>10.6 KW 1420 RPM</td>
<td>360 V 50 Hz</td>
<td>10.6 KW 1420 RPM</td>
<td>360 V 50 Hz</td>
</tr>
<tr>
<td></td>
<td>20.3 KW 2930 RPM</td>
<td>360 V 100 Hz</td>
<td>20.3 KW 2930 RPM</td>
<td>360 V 100 Hz</td>
</tr>
<tr>
<td>MDFQA xx 112-22</td>
<td>20.1 / 11.5 KW 1425 / 760 RPM</td>
<td>360 V 50 / 28 Hz</td>
<td>20.1 / 11.5 KW 1425 / 760 RPM</td>
<td>360 V 50 / 28 Hz</td>
</tr>
<tr>
<td></td>
<td>38.4 / 22.7 KW 2935 / 1670 RPM</td>
<td>360 V 100 / 58 Hz</td>
<td>38.4 / 22.7 KW 2935 / 1670 RPM</td>
<td>360 V 100 / 58 Hz</td>
</tr>
<tr>
<td>MDFQA xx 132-32</td>
<td>31.1 / 17.0 KW 1030 / 550 RPM</td>
<td>360 V 36 / 20 Hz</td>
<td>31.1 / 17.0 KW 1030 / 550 RPM</td>
<td>360 V 36 / 20 Hz</td>
</tr>
<tr>
<td></td>
<td>60.1 / 35.4 KW 2235 / 1200 RPM</td>
<td>360 V 76 / 42 Hz</td>
<td>60.1 / 35.4 KW 2235 / 1200 RPM</td>
<td>360 V 76 / 42 Hz</td>
</tr>
</tbody>
</table>

**Operation modes:**
- S1 continuous operation

**Mounting:**
- B3/B5
- B7/B5
- B8/B5
- V1/V5
- V3/V6

**Flange combination mounting:**
- MDFQA100 = A250
- MDFQA112 = A300
- MDFQA132 = A300

B5, V1, V3 are not possible with size 112.

**A-side:**
- with key
- without key

**B-side:**
- Motor for encoder mounting
- Motor for brake/encoder mounting

**Temperature monitoring:**
- Thermal contact normally-closed + RTY contact sensor

**Enclosure:**
- IP23s

**Terminal box position:**
- X -2- (on top)
- * Looking on motor drive-end

**Brakes:**
- without brake
- 14.450._____

**Encoder:**
- without encoder
- Resolver
- IDT21 TTL
- 4096 pulses
- IDT21 TTL
- 2048 pulses
- SinCos encoder
- Single turn
- Multi turn

**External fan for:**
- without filter
- G2D120
- G2D140
- G2D160
- G2D180
- G2D140
- G2D120
- G2D160
- G2D180
- DNG 3 - 4.5
- DNG 5 - 12.5
- DNG 8 - 12
- 460 V
- 540 V
- 380 V

**Fan position:**
- -2- on top
- -1- right side
- -3- left side
- -4- bottom (only for gearbox mounting)

**Gearbox attachment:**
- without gearbox
- with "old" gearbox
- with GeG gearbox
- with KKL-1- (right)
- with KKL-2- (top)
- with KKL-3- (left)
- with KKL-4- (bottom)

**Colour:**
- RAL 9005 black
- RAL 6011 silver grey
- RAL 2000 yellow
- RAL 918 signal grey
- RAL 9016 papyrus white

**2nd nameplate:**
- attached to termin

**Preference types are written in bold and are underlined**

**Price motor + gearbox:**

DM

**One cross only for each range!**