Catalogs of the Motion Control Series

General Motion Control Catalog Part 1
SIMOVERT MASTERDRIVES MC
0.75 HP to 270 HP
Order No.: DRSP-02060

Catalog MC Part 2
High Performance Motors and Accessories
Order No.: DRSP-03062

General Motion Control Catalog Part 3
SIMODRIVE 611 universal
and POSMO A
Single-Motor and Multi-Motor Drives
1.5 HP to 160 HP
Order No.: DRSP-02080
Note
The technical data are intended for general information. Please observe the Operating Instructions and the references indicated on the products for installation, operation and maintenance.

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- The technical data, selection and ordering data (Order Nos.), accessories and availability are subject to alteration.
- All dimensions in this catalog are stated in inches and in (mm).
Servomotors

Overview

- Brief description
- Flow chart
- Selection procedure
- Overview of types and rated data
- Technical explanations
Servomotors Overview

**Brief description**

SIEMENS servomotors have been specially designed to satisfy the high requirements placed on variable-speed drives.

**Versions**
- Synchronous servomotors
- Asynchronous servomotors

**Principal characteristics**
- Compact design
- High power density and overload capability
- High maximum speeds
- Integral encoder system
- High dynamic response due to low rotor moment of inertia
- Excellent concentricity properties
- Rugged, almost maintenance-free design.

**Synchronous servomotors**

The special synchronous servomotors characteristics include:
- high overload capability,
- high dynamic response and
- high static torque.

**1FK6 and 1FK7 servomotors**

The 1FK6 servomotors satisfy the requirements in the lower power range from 0.7 HP to 7 HP (0.5 kW to 5.2 kW). Their optimized design means they are the most economical solution for many applications. The new 1FK7 servomotors are based on the experiences gained with the 1FK6 range, and are especially characterized by:
- an extremely high dynamic response (1FK7 HD, high dynamic),
- compact design (1FK7 CT, compact) and
- expanded range of performances and options.

**1FT6 servomotors – high performance**

The 1FT6 servomotors can be used for extreme requirements in a power range from 25 HP to 61 HP (0.2 kW to 45 kW). These motors are available with self-cooling in protection classes IP 64 to IP 68, with separate cooling, or with water cooling. The wide range of options means they are the optimum solution for many high-end applications.

**1FS6 servomotors – explosion-protected**

The 1FS6 servomotors are designed for use in Zone 1 hazardous areas. These motors conform to type of protection Ex de IIC T3.

**1PH7, 1PL6, 1PH4 asynchronous servomotors**

The compact asynchronous motors supplement the synchronous servomotors for applications in the upper power range (up to 630 kW).

**Versions:**
- Force-cooled 1PH7 motors in protection class IP 55
- Water-cooled 1PH4 motors in protection class IP 65
- Air-through and force-cooled 1PL6 motors in protection class IP 23.

**Synchronous AC linear motors – 1FN3**

The 1FN3 linear motors are especially characterized by:
- outstanding dynamic response
- very high traversing velocity
- excellent precision
- non-wearing drive components due to contactless drive power transmission.
Servomotors Overview

Asynchronous Servomotors

Synchronous Servomotors

Brief description

Optimal integration of drives into the world of automation
In order to select the correct drive and motor, the specific speed and load cycle of the drive application must be known.

**Step 1**

Specifying the degree of protection:
- IP 23, IP 55, IP 64, IP 65, IP 67, IP 68
  
  For details, see Part 1

**Step 2**

Specifying the supply voltage:
- 380 to 400 V; 460 to 480 V

**Step 3**

Specifying the type of construction:
- IM B 3 (foot-mounting), IM B 5 (flange-mounting), IM B 35 (foot/flange-mounting)
  
  For details, see Part 7

**Step 4**

Specifying the maximum torque from the load-cycle profile:

**Step 5**

Specifying the average (rms) torque:

**Step 6**

Specifying the motor type needed (synchronous/asynchronous servomotor):
- 1FK6, 1FK7, 1FT6, 1FS6, 1PH7, 1PL6, 1PH4, 1FN3
  
  See Overview in Part 1

1) For 1FN3 applications torque is replaced by force.
Servomotors

Overview

Flowchart

Selecting procedure

Step 7
Selecting the motor from the corresponding data page (Part 2 or 3) which satisfies the following criteria:

- Asynchronous servomotor: 
  \[ n_{\text{max}} \leq 1.1 \times n_n \]
  \[ \varepsilon_{\text{max}} \leq \varepsilon_\varepsilon \]
- Asynchronous servomotor: 
  \[ n_{\text{max}} \text{ must not be exceeded} \]
  \[ \varepsilon_{\text{max}} \text{ must not be exceeded} \]

The load points \((n, P)\) must be at least 30% below the stalling limit curve.

Step 8
Specifying the encoder system needed:

- Incremental encoder HTL, resolver, sin/cos incremental encoder 1 Vpp
- Absolute-value encoder

For details, see Part 4

Step 9
Complete motor order number with all the necessary options:

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>Order No. for motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FK6, 1FK7, 1FT6, 1FS6, 1PH7, 1PL6, 1FH4, 1FN3</td>
<td>For details, see Part 2 or 3</td>
</tr>
</tbody>
</table>

Order number for drive:

Step 10
Specifying the length and cross-section of the prefabricated power cable needed or specifying the plug size for customer fitting:

For details and order number structure, see Part 5

Order number for power cable:

Step 11
Specifying the prefabricated encoder cable needed or specifying the plug size for customer fitting:

For details, see Part 5

Order number for power cable:

Step 12
Selecting the converter/inverter for the selected motor in the selection and ordering data on the basis of the standard overload conditions:

The selection of converters/inverters in this catalog is based on the respective motor stall current or rated motor current.

- For 1FK6, 1FK7, 1FT6, 1FS6, see Part 2.
- For 1PH7, 1PL6, and 1FH4, see Part 3.

Order number for drive:

1) 160% for 30 s or 136% for 60 s during 300 s load cycle.

In the case of exceeding the standard overload:

- If higher overload times and overload components are necessary, see catalogs MC Part 1 (SIMOVERT MASTERDRIVES MC), Part 3 (SIMODRIVE 611 universal and POSMO) or use the software tool SIMOSIZE.
## Servomotors

### Overview of types and rated data

<table>
<thead>
<tr>
<th>Motor/Types</th>
<th>Designation/Method of functioning</th>
<th>Degree of protection</th>
<th>Cooling</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1FK6</strong></td>
<td>Servomotor Frameless permanent-magnet synchronous motor</td>
<td>IP 64 (IP 65 optional)</td>
<td>Natural cooling</td>
<td>36 to 100</td>
</tr>
<tr>
<td><strong>1FK7 CT</strong> (Compact)</td>
<td>Compact-servomotor (like 1FK6, but shorter)</td>
<td></td>
<td>Natural cooling</td>
<td>28 to 100</td>
</tr>
<tr>
<td><strong>1FK7 HD</strong> (High Dynamic)</td>
<td>High Dynamic-servomotor with extremely low rotor moment of inertia</td>
<td></td>
<td>Natural cooling</td>
<td>36 to 80</td>
</tr>
<tr>
<td><strong>1FT6</strong></td>
<td>Servomotor-High Performance Permanent-magnet synchronous motor</td>
<td>IP 64 (IP 65, IP 67, IP 68 optional)</td>
<td>Natural cooling</td>
<td>28 to 132</td>
</tr>
<tr>
<td></td>
<td>Permanent-magnet synchronous motor</td>
<td>Separate cooling</td>
<td>80 to 132</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water cooling</td>
<td>63 to 100</td>
<td></td>
</tr>
<tr>
<td><strong>1FS6</strong></td>
<td>Servomotor explosion-proof Permanent-magnet synchronous motor and EEx de II C T3 explosion protection</td>
<td>IP 64 (IP 65 optional)</td>
<td>Natural cooling</td>
<td>71 to 132</td>
</tr>
<tr>
<td><strong>1FN3</strong></td>
<td>Synchronous AC linear motor</td>
<td>IP 65</td>
<td>Water cooling</td>
<td>50 to 900</td>
</tr>
<tr>
<td><strong>1PH7</strong></td>
<td>Asynchronous servomotor Frameless three-phase squirrel-cage motor</td>
<td>IP 55</td>
<td>Separate cooling</td>
<td>100 to 280 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surface cooling</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1PL6</strong></td>
<td>Asynchronous servomotor Frameless three-phase squirrel-cage motor</td>
<td>IP 23</td>
<td>Separate cooling</td>
<td>180 to 280 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Axial ventilation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1PH4</strong></td>
<td>Asynchronous servomotor Liquid-cooled three-phase squirrel-cage motor</td>
<td>IP 65</td>
<td>Water cooling</td>
<td>100 to 160</td>
</tr>
</tbody>
</table>

1) Size 280 available as of third-quarter 2002.
### Servomotors Overview

#### Power range

<table>
<thead>
<tr>
<th>Power range</th>
<th>Rated torque</th>
<th>Selection and ordering data on pages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asynchronous Servomotors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.7 HP</td>
<td>0.5 kW</td>
<td>7 HP</td>
</tr>
<tr>
<td>0.5 HP</td>
<td>0.4 kW</td>
<td>7.2 HP</td>
</tr>
<tr>
<td>0.8 HP</td>
<td>0.6 kW</td>
<td>4.2 HP</td>
</tr>
<tr>
<td>0.25 HP</td>
<td>0.2 kW</td>
<td>20.7 HP</td>
</tr>
<tr>
<td>9.2 HP</td>
<td>6.9 kW</td>
<td>61 HP</td>
</tr>
<tr>
<td>4.3 HP</td>
<td>3.2 kW</td>
<td>37 HP</td>
</tr>
<tr>
<td>1.6 HP</td>
<td>1.2 kW</td>
<td>16.6 HP</td>
</tr>
<tr>
<td>10.6 HP</td>
<td>7.9 kW</td>
<td>281 HP</td>
</tr>
<tr>
<td>5 HP</td>
<td>3.7 kW</td>
<td>516 HP</td>
</tr>
<tr>
<td>27.5 HP</td>
<td>20.5 kW</td>
<td>844 HP</td>
</tr>
<tr>
<td>10 HP</td>
<td>7.5 kW</td>
<td>81 HP</td>
</tr>
</tbody>
</table>

#### Synchronous Servomotors

<table>
<thead>
<tr>
<th>Power range</th>
<th>Rated torque</th>
<th>Selection and ordering data on pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>516 HP</td>
<td>385 kW</td>
<td></td>
</tr>
<tr>
<td>844 HP</td>
<td>630 kW</td>
<td></td>
</tr>
<tr>
<td>81 HP</td>
<td>65 kW</td>
<td></td>
</tr>
</tbody>
</table>

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Siemens Catalog MC Part 2 · 2002/2003
Servomotors

Overview

Asynchronous Servomotors

Synchronous Servomotors

Specifications, standards, regulations

The motors comply with pertinent standards and specifications; please refer to the table.

As a result of the adaptation of national specifications to international recommendation IEC 60 034-1, already implemented in many countries, there are no longer any differences in coolant temperatures, temperature classes and temperature rise limits.

The motors listed below are UL-approved to Underwriters Laboratories Inc. including the Canadian specification with the identification URc: 1FK6, 1FK7, 1FT self-cooled, 1PH4 (without brake), 1PL6 and 1PH7.

<table>
<thead>
<tr>
<th>Title</th>
<th>DIN/VDE</th>
<th>EN</th>
<th>IEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>General regulations for electrical rotating machines</td>
<td>DIN VDE 0530 Part 1</td>
<td>EN 60 034-1</td>
<td>IEC 60 034-1</td>
</tr>
<tr>
<td>Terminal designations and direction of rotation for electrical machines</td>
<td>DIN VDE 0530 Part 8</td>
<td>EN 60 034-8</td>
<td>IEC 60 034-8</td>
</tr>
<tr>
<td>Types of electrical rotating machines</td>
<td>DIN VDE 0530 Part 7</td>
<td>EN 60 034-7</td>
<td>IEC 60 034-7</td>
</tr>
<tr>
<td>Cooling methods for electrical rotating machines</td>
<td>DIN VDE 0530 Part 6</td>
<td>EN 60 034-6</td>
<td>IEC 60 034-6</td>
</tr>
<tr>
<td>Degrees of protection for electrical rotating machines</td>
<td>DIN VDE 0530 Part 5</td>
<td>EN 60 034-5</td>
<td>IEC 60 034-5</td>
</tr>
<tr>
<td>Vibration severity of electrical rotating machines</td>
<td>DIN VDE 0530 Part 14</td>
<td>EN 60 034-14</td>
<td>IEC 60 034-14</td>
</tr>
<tr>
<td>Noise limits of electrical rotating machines</td>
<td>DIN VDE 0530 Part 9</td>
<td>EN 60 034-9</td>
<td>IEC 60 034-9</td>
</tr>
<tr>
<td>Cylindrical minis for electrical machines</td>
<td>DIN 748 Part 3</td>
<td>--</td>
<td>IEC 60 034-2</td>
</tr>
</tbody>
</table>

The most common degrees of protection of three-phase motors to IEC 60034-5

Depending on operating and environmental conditions, the choice of a suitable degree of protection is intended to prevent:

• continuous effect of water, dust and foreign matter
• contact with rotating parts within a motor
• contact with live parts.

The degrees of protection of electrical machines are indicated by a code consisting of two letters, two digits and, if applicable, an additional letter.

<table>
<thead>
<tr>
<th>Motor</th>
<th>Degree of protection</th>
<th>1st digit</th>
<th>2nd digit</th>
<th>Water protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open-</td>
<td>IP 23</td>
<td>Protection against contact with fingers</td>
<td>Water protection against harmful dust deposits</td>
<td></td>
</tr>
<tr>
<td>circuit-</td>
<td></td>
<td>Foreign matter protection</td>
<td>Protection against rain water at up to 60 degrees from the vertical</td>
<td></td>
</tr>
<tr>
<td>cooled</td>
<td></td>
<td>splash water from all directions</td>
<td>Water jets from all directions</td>
<td></td>
</tr>
<tr>
<td>Fan-</td>
<td>IP 54</td>
<td>Full protection against contact</td>
<td>Splash water from all directions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Foreign matter protection</td>
<td>Splash water from all directions</td>
<td></td>
</tr>
</tbody>
</table>
|       |                      | Protection against medium-sized solid foreign bodies of more than 12 mm dia.

The motors are supplied mainly in the following degrees of protection:

- Protection against contact
- Protection against harmful dust deposits
- Splash water from all directions

1) According to DIN VDE 0530 Part 5 or EN 60 034 Part 5, there are only five degrees of protection for the first digit, and eight degrees of protection for the second digit for electrical rotating machines. However, IP 6 is contained in DIN 40 050 which generally applies to electrical apparatus.

2) Approbation for size 280 is pending.
Servomotors
Overview

Radial eccentricity tolerance, shaft and flange accuracy (concentricity and axial eccentricity to IEC 60072)

Radial eccentricity tolerance of the shaft with respect to housing axis (referred to the cylindrical shaft ends)

<table>
<thead>
<tr>
<th>Frame size</th>
<th>Standard N in (mm)</th>
<th>Option R in (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>0.0014 (0.035)</td>
<td>0.0007 (0.018)</td>
</tr>
<tr>
<td>36</td>
<td>0.0016 (0.04)</td>
<td>0.0008 (0.021)</td>
</tr>
<tr>
<td>48</td>
<td>0.0016 (0.04)</td>
<td>0.0008 (0.021)</td>
</tr>
<tr>
<td>71</td>
<td>0.0016 (0.04)</td>
<td>0.0008 (0.021)</td>
</tr>
<tr>
<td>90</td>
<td>0.002 (0.05)</td>
<td>0.001 (0.025)</td>
</tr>
<tr>
<td>150</td>
<td>0.002 (0.05)</td>
<td>0.001 (0.025)</td>
</tr>
<tr>
<td>132</td>
<td>0.002 (0.05)</td>
<td>0.001 (0.025)</td>
</tr>
</tbody>
</table>

Concentricity and axial eccentricity of the flange surface with respect to the shaft axis (referred to the centering diameter of the mounting flange)

<table>
<thead>
<tr>
<th>Frame size</th>
<th>Standard N in (mm)</th>
<th>Option R in (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>0.0032 (0.08)</td>
<td>0.0016 (0.04)</td>
</tr>
<tr>
<td>36</td>
<td>0.0032 (0.08)</td>
<td>0.0016 (0.04)</td>
</tr>
<tr>
<td>48</td>
<td>0.0032 (0.08)</td>
<td>0.0016 (0.04)</td>
</tr>
<tr>
<td>71</td>
<td>0.0039 (0.1)</td>
<td>0.002 (0.05)</td>
</tr>
<tr>
<td>90</td>
<td>0.0039 (0.1)</td>
<td>0.002 (0.05)</td>
</tr>
<tr>
<td>150</td>
<td>0.0039 (0.1)</td>
<td>0.002 (0.05)</td>
</tr>
<tr>
<td>132</td>
<td>0.0049 (0.125)</td>
<td>0.0025 (0.063)</td>
</tr>
</tbody>
</table>

Vibration severity grades to IEC 60034-14

The vibration severity is the rms value of the vibration rate (frequency range from 10 to 1000 Hz). The vibration severity is measured with electrical measuring instruments to DIN 45 666. The specified values relate to the motor only. Installation-related system vibrations can lead to an increase in those values. Speeds of 1800 rpm and 3600 rpm and the corresponding limit values are specified according to IEC 60034-14. The speeds of 4500 rpm and 6000 rpm and the specified values have been stipulated by the motor manufacturer.

Limits of vibration severity grades for frame sizes 28 to 132. Limits of vibration severity grades for frame sizes 160 to 280.
### Servomotors

#### Overview

- **Servomotors**
- **Technical explanations**
- **Synchronous Servomotors**
- **Asynchronous Servomotors**

##### Balancing to DIN ISO 8821

**Requirements of the balancing process for fitted parts, particularly belt pulleys**

The vibration response of motors fitted with belt pulleys is decisively governed by the balance of the fitted part, in addition to the balance quality of the motor.

If the motor and the part to be fitted are balanced separately before assembly, the balancing process for the belt pulley must be adapted to the balancing method for the motor. A distinction must be made between the following balancing methods for motors 1PH4, 1PH7 and 1PL6:

- **Half-keyed balancing**
- **Full-keyed balancing**
- **Smooth shaft end**

For 1PH7 and 1PL6 motors, the balancing method is coded in the ordering designation. Motors with half-keyed and full-keyed balancing are identified by the abbreviation "H" (half-key) and "F" (full-key) at the shaft end face.

Motors 1FK6, 1FK7 and 1FT6 with a fitted key are always half-key balanced. The basic recommendation is for the highest demands for system balance quality. For motors with full-keyed balancing, belt pulleys with two opposite keyways are recommended, but only one key in the shaft end.

##### Vibration stress, induced vibration values

**Permanent-magnet synchronous motors 1FK6, 1FK7, 1FT6 and 1FS6**:

- **Maximum permissible limits for vibration stress at full reliability performance** apply only to motors without brake or with closed brake.

**Vibration acceleration**

- $10 \, \text{m/s}^2$ axial (20 Hz to 2 kHz)
- $30 \, \text{m/s}^2$ radial (20 Hz to 2 kHz)

**All induction motors 1PH7, 1PH4 and 1PL6**:

The limits apply for all vibration values induced in the motor from the exterior:

- **Vibration frequency**
- **Vibration values for**
- **Sizes**
  - 100 to 160
  - 180 to 280

<table>
<thead>
<tr>
<th>Vibration frequency</th>
<th>Vibration values for</th>
<th>Sizes</th>
<th>100 to 160</th>
<th>180 to 280</th>
</tr>
</thead>
<tbody>
<tr>
<td>$&lt;6.3 , \text{Hz}$</td>
<td>vibration acceleration</td>
<td>$a_{x}$</td>
<td>$\leq 0.16 , \text{mm}$</td>
<td>$\leq 0.25 , \text{mm}$</td>
</tr>
<tr>
<td>$6.3$ to $63 , \text{Hz}$</td>
<td>vibration acceleration</td>
<td>$a_{x}$</td>
<td>$\leq 4.5 , \text{mm/s}$</td>
<td>$\leq 7.1 , \text{mm/s}$</td>
</tr>
<tr>
<td>$&gt;63 , \text{Hz}$</td>
<td>vibration acceleration</td>
<td>$a_{x}$</td>
<td>$\leq 0.55 , \text{m/s}^2$</td>
<td>$\leq 0.8 , \text{m/s}^2$</td>
</tr>
</tbody>
</table>

**Coolant temperatue and installation altitude**

The rated power (rated torque) applies to continuous duty (S1 operation) to DIN EN 60034-1 at rated frequency, at a coolant temperature of 104 °F (40 °C) and at an installation altitude of up to 3280 ft (1000 m) above sea level.

The motors are all designed to temperature class F and are utilized according to temperature class F. In the event of different conditions, the permissible power (torque) must be determined according to the table.

**Non- and blower-ventilated motors**

<table>
<thead>
<tr>
<th>Installation altitude above sea level in ft (m)</th>
<th>Coolant (air) temperature in °F (°C)</th>
<th>86°F (30°C)</th>
<th>104°F (40°C)</th>
<th>122°F (50°C)</th>
<th>140°F (60°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$&lt;86$</td>
<td>1.07</td>
<td>1.00</td>
<td>0.96</td>
<td>0.92</td>
<td>0.87</td>
</tr>
<tr>
<td>$86$ to $104$</td>
<td>1.04</td>
<td>0.97</td>
<td>0.93</td>
<td>0.90</td>
<td>0.86</td>
</tr>
<tr>
<td>$104$ to $122$</td>
<td>1.00</td>
<td>0.94</td>
<td>0.90</td>
<td>0.86</td>
<td>0.82</td>
</tr>
<tr>
<td>$122$ to $140$</td>
<td>0.96</td>
<td>0.90</td>
<td>0.86</td>
<td>0.83</td>
<td>0.78</td>
</tr>
<tr>
<td>$140$ to $158$</td>
<td>0.92</td>
<td>0.86</td>
<td>0.82</td>
<td>0.79</td>
<td>0.75</td>
</tr>
<tr>
<td>$158$ to $164$</td>
<td>0.88</td>
<td>0.82</td>
<td>0.79</td>
<td>0.75</td>
<td>0.71</td>
</tr>
<tr>
<td>$164$</td>
<td>0.82</td>
<td>0.77</td>
<td>0.74</td>
<td>0.71</td>
<td>0.67</td>
</tr>
</tbody>
</table>

**Water-cooled motors**

When the cooling-medium temperature is increased the rated output $P_{n}$ is decreased as follows:

<table>
<thead>
<tr>
<th>Cooling-medium temperature</th>
<th>Reduction in the rated output</th>
</tr>
</thead>
<tbody>
<tr>
<td>$86° \text{F} (30°C)$</td>
<td>1.00</td>
</tr>
<tr>
<td>$104° \text{F} (40°C)$</td>
<td>0.95</td>
</tr>
<tr>
<td>$122° \text{F} (50°C)$</td>
<td>0.90</td>
</tr>
<tr>
<td>$140° \text{F} (60°C)$</td>
<td>0.85</td>
</tr>
</tbody>
</table>
**Servomotors**

**Overview**

Duty types S1 and S6 to EN 0530

**S1: Continuous operation**

Operation under constant load whose duration is sufficient to reach thermal equilibrium.

Identification: S1

Specification of power (torque)

- Temperature
- Frequency (Hz)

**S6: Continuous operation with intermittent loading**

Operation consisting of a sequence of cycles of the same type, each of which consists of a time with constant load and a no-load time.

There is no interval.

Identification: S6-40%, 114 HP (65 kW)

\[ t_f = \frac{t_B}{1 + \frac{t_L}{t_B}} \]

\[ t_s = 10 \text{ min} \]

**Rating plates**

Example from series 1FK7 (adhesive plate)

Example from series 1FT6 (metal plate)

Example from series 1PH7, shaft height 100 to 180 (adhesive plate)

Example from series 1PL8, shaft height 180 to 280 (metal plate)

---

**Technical explanations**

---
Servomotors

Overview

Technical explanations

**Rated power**

The motor power in the technical selection tables is calculated from the torque and speed values.

\[ P_n = \frac{9550 \cdot t_n}{\eta_n} \]

- \( P_n \): Rated power in HP
- \( \eta_n \): Rated speed in rpm
- \( t_n \): Rated torque in lb-ft

\[ P_n = \frac{9550 \cdot t_n}{\eta_n} \]

- \( P_n \): Rated power in kW
- \( \eta_n \): Rated speed in rpm
- \( t_n \): Rated torque in Nm

**DURIGNIT® IR2000 insulation**

The DURIGNIT IR2000 insulating material system comprises high-grade enameled wire and insulating sheet materials, combined with solvent-free impregnating resin. It guarantees great mechanical and electrical strength, as well as a high service value and long service life of the motors.

Utilization of the motors corresponds to temperature rise class F at rated power/rated torque.

**Motor protection**

Sensing of the motor temperature for converter operation takes place with the KTY 84-130 temperature sensor. This sensor is a semiconductor whose resistance varies according to temperature, following a defined curve. The Siemens converters determine the motor temperature by means of the resistance of the temperature sensor. They can be set to a desired temperature for warning and tripping.

The KTY 84-130 temperature sensor is fitted in the end winding of the motor like a PTC thermistor. The insulation extensively protects the winding from the effects of corrosive gases, vapors, dust, oil and increased humidity, and withstands the usual vibration stress. The insulation of the motors is tropic-proof, i.e. it is suitable for humidity up to 100%. All motors are in temperature class F.

Motor protection can be carried out using the external 3RS10 temperature monitoring relay.

Device examples:
- Control supply voltage: 24 V AC/DC
  - Order No.: 3RS1040-1GD50
- Control supply voltage: 24 - 240 V AC/DC
  - Order No.: 3RS1040-1GW50

In addition to the KTY 84 the 1FN3 motor includes three PTC elements connected in series which are located in each of the three-phase windings (U, V, W) of the primary section. Each PTC element has a quasi characteristic. The rated response temperature is 248 °F (120 °C) ± 41 °F (± 5 °C), which corresponds approximately to 1500 Ω.

**Coating**

The following motor coatings are possible:

- **No paint finish** (with impregnating resin coating) e.g. 1FK6
- **Primer** (as corrosion protection) e.g. 1PH7, 1PL6
- **Normal paint finish** (e.g. RAL 7016)
  - e.g. 1F76, 1F77, 1F78, 1F66, 1F56
- **Special paint finish** (e.g. RAL 7016)
  - e.g. 1F76, 1F77, 1F78, 1F66, 1F56

Paint finish

<table>
<thead>
<tr>
<th>Paint finish</th>
<th>Suitability of coating for climate group</th>
<th>Short-time</th>
<th>Continuous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal paint finish Moderate (extended)</td>
<td>for indoor and outdoor installation</td>
<td>up to 201 °F (99 °C)</td>
<td>up to 232 °F (117 °C)</td>
</tr>
<tr>
<td>Special paint finish Worldwide</td>
<td>for outdoor installation</td>
<td>up to 284 °F (140 °C)</td>
<td>up to 294 °F (145 °C)</td>
</tr>
</tbody>
</table>

All motors with exception of the 1FN3 can be painted using commercially available paints (max. 2 additional paint finishes).
### Synchronous Servomotors

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/2</td>
<td>Technical data</td>
</tr>
<tr>
<td>2/3</td>
<td>Selection and ordering example with SIMOVERT MASTERDRIVES compact units</td>
</tr>
<tr>
<td>2/3</td>
<td>Order No. suffix</td>
</tr>
<tr>
<td>2/4</td>
<td>1FK6 stock motors</td>
</tr>
</tbody>
</table>

### 1FK6 Servomotors

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/5</td>
<td>Technical data</td>
</tr>
<tr>
<td>2/6</td>
<td>Selection and ordering example with SIMOVERT MASTERDRIVES compact units</td>
</tr>
<tr>
<td>2/7</td>
<td>1FK7 High Dynamic servomotors Selection and ordering example with SIMOVERT MASTERDRIVES compact units</td>
</tr>
</tbody>
</table>

### 1FK7 Servomotors

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/8</td>
<td>Technical data</td>
</tr>
<tr>
<td>2/9</td>
<td>Selection and ordering example of 1FT6 Fast Mover (core-type) with SIMOVERT MASTERDRIVES compact units</td>
</tr>
<tr>
<td>2/10</td>
<td>Selection and ordering example of 1FT6 air-cooled with SIMOVERT MASTERDRIVES compact units</td>
</tr>
<tr>
<td>2/13</td>
<td>Selection and ordering example of 1FT6 water-cooled with SIMOVERT MASTERDRIVES converters</td>
</tr>
<tr>
<td>2/14</td>
<td>1FT6 stock motors</td>
</tr>
<tr>
<td>2/15</td>
<td>Order No. suffix</td>
</tr>
</tbody>
</table>

### 1FT6 Servomotors

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/16</td>
<td>Technical data</td>
</tr>
<tr>
<td>2/17</td>
<td>Selection and ordering example with SIMOVERT MASTERDRIVES compact units</td>
</tr>
</tbody>
</table>

### 1FS6 Servomotors

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/18</td>
<td>Technical data</td>
</tr>
<tr>
<td>2/20</td>
<td>Selection and ordering data for 1FN3 primary and secondary section</td>
</tr>
</tbody>
</table>
Synchronous Servomotors

1FK6 servomotors

Technical data

They are especially characterized by the following properties:
- High power density with low physical volume
- Winding insulation for temperature class F
- High short-time overload capability (250 ms) $t_{	ext{max}} = 3 \times t_{0} (100 \text{ K})$ for size 36
- Very good efficiency
- Torque ripple 3% (mean value
- High degree of protection
- Low maintenance requirements
- High concentricity and vibration quality
- High lateral-force withstand capability
- High mechanical stiffness
- Low weight
- Monitoring of motor temperature by KTY 84
- Integrated encoder system for detecting motor speed and rotor position
- Standard connector for encoder and power connections.

Application

Packaging machines, storage and retrieval units for high-bay warehouses, handling systems, wood processing, manipulators etc.

Stock motors 3)

To meet our customer’s logistical expectations, the 1FK6 motor is stocked in its most demanded configuration.

The technical features of these stock motors are:
- Naturally cooled motors with power connectors.
- Rotatable connector socket (270°)
- Integrated resolver
- Vibration severity class N
- Degree of protection IP 64
- Type of construction IM B5 (flange mounting).

For a complete listing of stock motors refer to table “Stock motors” on page 2/4.

---

Standard Options

<table>
<thead>
<tr>
<th>Type of construction</th>
<th>IM B 5 (IM V 1, IM V 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of protection</td>
<td>IP 64 IP 65 with radial shaft seal for six-light flange</td>
</tr>
<tr>
<td>Vibration severity</td>
<td>N –</td>
</tr>
<tr>
<td>Shaft and flange accuracy</td>
<td>N –</td>
</tr>
<tr>
<td>Power connection</td>
<td>Connector socket (rotatable approx. 270° by customer) –</td>
</tr>
<tr>
<td>Motor protection</td>
<td>PTC-thermistor KTY 84 in the stator winding –</td>
</tr>
<tr>
<td>Encoder system (plug connector, rotatable approx. 270° by customer)</td>
<td>2-pole resolver</td>
</tr>
<tr>
<td>Encoder system (plug connector, rotatable approx. 270° by customer)</td>
<td>sin/cos incremental encoder (EnDat) 2048 p/r (from size 48 on) 2)</td>
</tr>
<tr>
<td>Encoder system (plug connector, rotatable approx. 270° by customer)</td>
<td>Absolute-value encoder (EnDat) 32 p/r (from size 48 on) 2)</td>
</tr>
<tr>
<td>Encoder system (plug connector, rotatable approx. 270° by customer)</td>
<td>Multi-pole resolver</td>
</tr>
<tr>
<td>Paint finish</td>
<td>Without paint coating –</td>
</tr>
<tr>
<td>Bearings</td>
<td>Permanently lubricated deep-groove ball bearing (locating bearing on ND-end) –</td>
</tr>
<tr>
<td>Cooling</td>
<td>Natural cooling –</td>
</tr>
<tr>
<td>Brake</td>
<td>– Holding brake integrated in motor</td>
</tr>
<tr>
<td>Gearbox mounting 1)</td>
<td>– The following gears can be fitted: <em>Alpha planetary gear, LP series</em></td>
</tr>
</tbody>
</table>

1) To find out which gears can be used with which motors, see Chapter 4 “Built-on Accessories” (page 4/9).
2) If an absolute-value encoder is used, the rated torque must be reduced by 10%.
3) Stock quantities are subject to prior sale.
### Synchronous Servomotors

#### 1FK6 standard servomotors - Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control**

<table>
<thead>
<tr>
<th>Motor data for a 100 K temperature increase</th>
<th>Converter data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated speed</td>
<td>( n_n ) (rpm)</td>
</tr>
<tr>
<td>Size</td>
<td>Motor</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>2</td>
<td>1FK6042-6AF71-1...</td>
</tr>
<tr>
<td>50</td>
<td>1FK6060-6AF71-1...</td>
</tr>
<tr>
<td>100</td>
<td>1FK6080-6AF71-1...</td>
</tr>
<tr>
<td>150</td>
<td>1FK6100-6AF71-1...</td>
</tr>
<tr>
<td>200</td>
<td>1FK6121-6AF71-1...</td>
</tr>
<tr>
<td>300</td>
<td>1FK6150-6AF71-1...</td>
</tr>
<tr>
<td>400</td>
<td>1FK6200-6AF71-1...</td>
</tr>
</tbody>
</table>

#### Details:

1. For selection of SIMODRIVE 611 universal and SIMODRIVE POSMO units use stall current \( I_0 \) and refer to MC Catalog Part 3.
2. Typically stocked, see page 24 for available configurations.
3. If an absolute-value encoder is used, the rated torque must be reduced by \( 10\% \).
4. 8th position of 1FK6 motor number indicates number of motor poles.
5. For oil-tight flange or gearbox mounting.

** Listed Compact/Chassis units were selected for standard overload conditions (160% for 30 s at 300 s load cycle).

---

### Encoder

- Incremental encoder 1 Vpp: 12A
- Absolute-value encoder (EnDat) (2048 p/r from size 48 on): 15A
- Basic absolute-value encoder (EnDat) (32 p/r from size 48 on): 5A
- Resolver, multi-pole (resolver pole number equivalent to motor pole number): 5A
- Resolver, 2-pole: 5A

### Shaft extension

- Radial eccentricity tolerance: 5A
- Holding brake: 5A
- Smooth: 5A
- Without: 5A
- With featherkey: 5A

### Vibration severity

- Degree of protection: 5A
- N: 5A
- IP 45: 5A
- IP 65: 5A

---

** Siemens Catalog MC Part 2 - 2002/2003**
## Synchronous Servomotors

### 1FK6 servomotors

<table>
<thead>
<tr>
<th>Rated speed</th>
<th>Size</th>
<th>Motor</th>
<th>Order No. Smooth shaft end</th>
<th>Shaft end with key</th>
</tr>
</thead>
<tbody>
<tr>
<td>3000 rpm</td>
<td>48</td>
<td>1FK6042-6AF71-1TG0</td>
<td>1FK6042-6AF71-1TA0</td>
<td></td>
</tr>
<tr>
<td>6000 rpm</td>
<td>48</td>
<td>1FK6040-6AK71-1TG0</td>
<td>1FK6040-6AK71-1TA0</td>
<td></td>
</tr>
</tbody>
</table>

1) Stock quantities are subject to prior sale.
**Technical data**

**1FK7 CT (compact) servo-motors**

*Properties:*
- compact design (up to 25% smaller than 1FK6)
- improved torque ripple compared with 1FK6
- mechanically compatible with 1FK6 (shaft, flange and connector)
- wide range of performances and options.

**1FK7 HD (high dynamic) servo-motors**

*Properties:*
- extremely high dynamic response resulting from new rotor design (very low rotor moments of inertia)
- mechanically compatible with 1FK6 (shaft, flange and connector)
- high short-term overload capability (250 ms)
  \[ M_{\text{max}} = 3 \times M_0 \text{(100 K)} \]

**Area of application**

Machines for all industrial sectors.

---

**Standard Options**

<table>
<thead>
<tr>
<th>Type of construction</th>
<th>IM B 5 (IM V 1, IM V 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of protection</td>
<td>IP 64</td>
</tr>
<tr>
<td>Vibration severity</td>
<td>N</td>
</tr>
<tr>
<td>Shaft and flange accuracy</td>
<td>N</td>
</tr>
<tr>
<td>Shaft extension</td>
<td>Smooth shaft extension</td>
</tr>
<tr>
<td>Power connection</td>
<td>Connector socket (rotatable approx. 270° by customer)</td>
</tr>
<tr>
<td>Motor protection</td>
<td>PTC-thermostat KTY 84</td>
</tr>
<tr>
<td>Encoder system</td>
<td>2-pole resolver</td>
</tr>
<tr>
<td>Paint finish</td>
<td>Normal paint finish</td>
</tr>
<tr>
<td>Bearings</td>
<td>Permanently lubricated deep-groove ball bearing (locating bearing on ND-end)</td>
</tr>
<tr>
<td>Cooling</td>
<td>Natural cooling</td>
</tr>
<tr>
<td>Brake</td>
<td>Holding brake integrated in motor</td>
</tr>
<tr>
<td>Gearbox mounting*</td>
<td>The following gears can be fitted:</td>
</tr>
</tbody>
</table>

*To find out which gears can be used with which motors, see Chapter 4 “Built-in Accessories” (page 4/8).*

---

**Voltage limit curves for**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Torquelimit</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1</td>
<td>V2</td>
</tr>
<tr>
<td>400 V</td>
<td>460 V</td>
</tr>
</tbody>
</table>

---

1) To find out which gears can be used with which motors, see Chapter 4 “Built-in Accessories” (page 4/8).

2) If an absolute-value encoder is used, the rated torque must be reduced by 10%.

---

**2/4 Torque-speed characteristic**

---

**Siemens Catalog MC Part 2 · 2002/2003**
Synchronous Servomotors

1FK7 Compact servomotors

1FK7 CT (compact) servomotors - Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control

<table>
<thead>
<tr>
<th>Motor ratings for a 100 °C temperature increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Converter data</td>
</tr>
<tr>
<td>n [r/min]</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>230 V</td>
</tr>
<tr>
<td>400 V</td>
</tr>
<tr>
<td>480 V</td>
</tr>
<tr>
<td>500 V</td>
</tr>
<tr>
<td>690 V</td>
</tr>
<tr>
<td>800 V</td>
</tr>
</tbody>
</table>

Mains voltage 3 AC 400 to 480 V with SIMOVERT MASTERDRIVES Motion Control (Part 1)

Order No. suffix

Encoder
- Incremental encoder: 1-VEIY
- Absolute-value encoder (EnDat): 0.51 MHz or only as 28 and 36 (2048 pH from size 46 mm)
- Basic absolute-value encoder (EnDat): 0.51 MHz or only as 28 and 36 (2048 pH from size 46 mm)
- Resolver, multi-pole (resolver pole number equivalent to motor pole number)
- Resolver, 2-pole

Shaft extension
- Smooth: N with
- With materials: N without
- With materials: N without

Vibration severity
- Degree of protection/paint finish
- IP: without paint finish
- IP: without paint seal
- IP: with radial shaft seal
- IP: with radial shaft seal

1) For selection of SIMO/DRIV E11 universal and SIMODRIVE POSM0 units use shaft current \( i_{d} \) and refer to MC Catalog Part 3.
2) Available soon.
3) Rated data refer to \( n = 2,500 \) rpm.
4) Rated data refer to \( n = 4,000 \) rpm.
5) Rated data refer to \( n = 3,500 \) rpm.
6) Rated data refer to \( n = 5,000 \) rpm.
7) If an absolute-value encoder is used, the rated torque of the motor must be reduced by 10%.
8) For light flange or gearbox mounting.

* Listed Compact/Chassis units were selected for standard overload conditions (150% for 30 s at 360 s load cycle).
* For rated current below 37.5 A Compact Plus units can also be used.
### Synchronous Servomotors

1FK7 HD (High Dynamic) servomotors - Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control

<table>
<thead>
<tr>
<th>Motor data for 100 K temperature increase</th>
<th>Converter data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated speed</strong></td>
<td><strong>Rated torque</strong></td>
</tr>
<tr>
<td>$n_1$ (rpm)</td>
<td>$T_1$ (Nm)</td>
</tr>
<tr>
<td>3000</td>
<td>48</td>
</tr>
<tr>
<td>4500</td>
<td>48</td>
</tr>
<tr>
<td>6000</td>
<td>50</td>
</tr>
</tbody>
</table>

### Mains voltage 3 AC 400 to 480 V with SIMOVERT MASTERDRIVES Motion Control selection example

<table>
<thead>
<tr>
<th>Order No. suffix</th>
<th>Encoder</th>
<th>Shaft extension</th>
<th>Vibration severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FK7...-7A...</td>
<td>Incremental encoder 1/Vpp</td>
<td>Holding brake</td>
<td>Degree of protection/paint finish</td>
</tr>
<tr>
<td>1FK7...-7E...</td>
<td>Absolute-value encoder (EnDat) (512 ppr only size 36, 2048 ppr from size 48 on)</td>
<td>Holding brake</td>
<td>IP 64/without paint finish</td>
</tr>
<tr>
<td>1FK7...-7G...</td>
<td>Basic absolute-value encoder (EnDat) (32 ppr from size 48 on)</td>
<td>With featherkey</td>
<td>IP 65/without radial shaft seal</td>
</tr>
<tr>
<td>1FK7...-7H...</td>
<td>Resolver, multi-pole</td>
<td>Without featherkey</td>
<td>IP 64/RAL 7035</td>
</tr>
<tr>
<td>1FK7...-7A1...</td>
<td>Resolver, 2-pole</td>
<td>With featherkey</td>
<td>IP 64/RAL 7016</td>
</tr>
</tbody>
</table>

1) For selection of SIMODRIVE 611 universal and SIMODEV POSMO units use stall current $I_0$ and refer to MC Catalog Part 3.

2) Rated data refer to n = 2,500 rpm.

3) If an absolute-value encoder is used motor needs to be derated by 10%.

4) For oil-tight flange or gearbox mounting.

** For rated current below 37.5 A Compact Plus units can also be used.

Siemens Catalog MC Part 2 · 2002/2003
Technical data

- Monitoring of motor
- Low weight
- High mechanical stiffness
- High lateral-force withstand
- High concentricity and low maintenance
- High degree of protection
- Plug for encoder and power connection
- Low torque ripple (1%)

Technical and commercial features of the main 1FT6 types

- High-resolution optical sensor system (encoder or absolute-value encoder)
- Vibration severity grade N
- Degree of protection IP 65
- Holding brake option
- Motors with short delivery (delivery time: 20 working days)
- More favorable price than comparable motor

Area of application

Machines for all industrial sectors with high dynamic response, precision and flexibility demands, e.g., packaging machines, storage and retrieval systems for high-bay warehouses, conveyor and robotic systems, printing machines (sheet and rotary presses) as well as for machine tool applications.

Stock motors

To meet our customer’s logistical expectations, the 1FT6 motor is typically stocked in its most demanded configuration. The technical features of these stock motors are:

- Naturally cooled motors with power connectors
- Plug connection direction (plug from ND-end)
- Integrated high resolution optical sinus/cos encoder
- Vibration severity class N
- Degree of protection IP 65
- Type of construction IM B 5
- Degree of protection IP 65 (IP 54 in the case of separate cooling)
- Shaft flange accuracy N
- Shaft extension Smooth shaft extension
- Motor protection KTY 54 in the stator winding
- Encoder system (plug connector) 2-pole resolver
- Paint finish Anthracite RAL 7016
- Bearings permanently lubricated
- Coolant Natural cooling
- Brake Holding brake integrated in motor

1) To find out which gears can be used with which motors, see Chapter 4 “Bullion Accessories.”

2) Stock quantities are subject to prior sales.

3) If an absolute-value encoder is used, the rated torque must be reduced by 10%.

Siemens Catalog MC Part 2 2002/2003

Fig. 2/6

Synchronous Servomotors 1FT6 Servomotors

Technical Characteristics

The 1FT6 three-phase servomotors are permanent-magnet synchronous motors. The magnets are made of rare-earth materials.

The 1FT6 servomotors cannot be operated with SIMOVERT MASTERDRIVES Vector Control. They are especially characterized by:

- High power density with low physical volume
- Winding insulation for continuous load and overload
- High overload capability
- High thermal reserves for area of application

Technical data

Fig. 2/8

Voltage limit curves for

S1 operation

n (rpm)

Tmax

T(100 K)

Vnom

Vmax

Vnom

Vmax

Stock motors

The technical features of these stock motors are:

- Naturally cooled motors with power connectors
- Plug connection direction (plug from ND-end)
- Integrated high resolution optical sinus/cos encoder
- Vibration severity class N
- Degree of protection IP 65
- Type of construction IM B 5
- Degree of protection IP 65 (IP 54 in the case of separate cooling)
- Shaft flange accuracy N
- Shaft extension Smooth shaft extension
- Motor protection KTY 54 in the stator winding
- Encoder system (plug connector) 2-pole resolver
- Paint finish Anthracite RAL 7016
- Bearings permanently lubricated
- Coolant Natural cooling
- Brake Holding brake integrated in motor

1) To find out which gears can be used with which motors, see Chapter 4 “Bullion Accessories.”

2) Stock quantities are subject to prior sales.

3) If an absolute-value encoder is used, the rated torque must be reduced by 10%.
### 1FT6 Fast Mover (core-type) motors

Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control

1) For selection of SIMODRIVE 611 universal and SIMODRIVE POSMO units use the stall current \( I_0 \) and refer to MC Catalog Part 3.

2) If an absolute-value encoder is used, the rated torque must be reduced by 10%.

#### Mains voltage 3 AC 400 to 480 V with SIMOVERT MASTERDRIVES Motion Control selection example

<table>
<thead>
<tr>
<th>Motor data for 100 K temperature increase</th>
<th>Converter data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated speed</strong></td>
<td><strong>Order No.</strong></td>
</tr>
<tr>
<td>( n_1 )</td>
<td>( \eta_1 )</td>
</tr>
<tr>
<td>( \text{rpm} )</td>
<td>( \text{nm} )</td>
</tr>
<tr>
<td><strong>Rated torque</strong></td>
<td><strong>Rated current</strong></td>
</tr>
<tr>
<td>( t )</td>
<td>( I_0 )</td>
</tr>
<tr>
<td>( \text{Nm} )</td>
<td>( \text{A} )</td>
</tr>
<tr>
<td><strong>Rated power</strong></td>
<td><strong>Moment of inertia without brake</strong></td>
</tr>
<tr>
<td>( P_n )</td>
<td>( J )</td>
</tr>
<tr>
<td>( \text{HP} )</td>
<td>( \times 10^{-3} \text{kgm}^2 )</td>
</tr>
</tbody>
</table>

#### Plug direction

1. Transversely to the right (only sizes 80 and 100)
2. Transversely to the left (only sizes 80 and 100)
3. Axial ND-end
4. Axial D-end

#### Encoder

1. Sinus incremental encoder 1 Vpp
2. Absolute-value encoder (EnDat) 2048 p/r

#### Shaft extension

1. Radial eccentricity tolerance
2. Holding brake
3. Smooth N without
4. Smooth N with

#### List of Compact/Chassis units

- Listed Compact/Chassis units were selected for standard overload conditions (160% for 30 s at 300 s load cycle).
- For rated currents below 37.5 A Compact Plus units can also be used.
## 1FT6 Servomotors

### 1FT6 All-Cooled Servomotors - Selection and Ordering Example with SIMOVERT MASTERDRIVES Motion Control

Motor data for 100°C temperature increase

<table>
<thead>
<tr>
<th>Mains Voltage 3 AC 400 to 480 V with SIMOVERT MASTERDRIVES Motion Control Selection Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Order No.</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>6SE7022-7D00</td>
</tr>
<tr>
<td>6SE7022-7D01</td>
</tr>
<tr>
<td>6SE7022-7D02</td>
</tr>
<tr>
<td>6SE7022-7D03</td>
</tr>
</tbody>
</table>

Order No. suffix: see page 2/15.

---

1) For selection of SIMODRIVE 611 universal and SIMODEV DUO units use the stall current, and refer to MC Catalog Parts 3.

2) For rated current below 37.5 A Compact Plus units can also be used.
<table>
<thead>
<tr>
<th>Blower or Non-Blower</th>
<th>2000 rpm</th>
</tr>
</thead>
</table>

* Listed Compact/Chassis units were selected for standard overload conditions (160% for 30 s at 300 s load cycle). Units can also be used.

** Rating:

<table>
<thead>
<tr>
<th>Units</th>
<th>3 A C Servomotors</th>
<th>Order No.*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6SE7023-4TP50</td>
<td>6SE7021-8TP50</td>
</tr>
<tr>
<td></td>
<td>6SE7014-0TP50</td>
<td>6SE7014-0TP50</td>
</tr>
</tbody>
</table>

** Synchronous Servomotors:

<table>
<thead>
<tr>
<th>Units</th>
<th>3 A C Servomotors</th>
<th>Order No.**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6SE7023-4TP50</td>
<td>6SE7021-8TP50</td>
</tr>
<tr>
<td></td>
<td>6SE7014-0TP50</td>
<td>6SE7014-0TP50</td>
</tr>
</tbody>
</table>

---

* Listed Compact/Chassis units were selected for standard overload conditions (160% for 30 s at 300 s load cycle). Units can also be used.

** Synchronous Servomotors:

<table>
<thead>
<tr>
<th>Units</th>
<th>3 A C Servomotors</th>
<th>Order No.**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6SE7023-4TP50</td>
<td>6SE7021-8TP50</td>
</tr>
<tr>
<td></td>
<td>6SE7014-0TP50</td>
<td>6SE7014-0TP50</td>
</tr>
</tbody>
</table>
### 1FT6 all-cooled servomotors - Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control

#### Motor data for a 100°C temperature increase

<table>
<thead>
<tr>
<th>Motor data</th>
<th>Converter data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated speed (rpm)</td>
<td>Size</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>4500</td>
<td>63</td>
</tr>
<tr>
<td>63</td>
<td>32</td>
</tr>
<tr>
<td>63</td>
<td>42</td>
</tr>
<tr>
<td>80</td>
<td>5.1</td>
</tr>
<tr>
<td>100</td>
<td>76</td>
</tr>
<tr>
<td>120</td>
<td>137</td>
</tr>
<tr>
<td>150</td>
<td>156</td>
</tr>
</tbody>
</table>
| **Notes on the blower-ventilated design**

- **1FT6 servomotors**

- **1FT6 air-cooled servomotors** · Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control

- **Notes on the blower-ventilated design**

- **Mains voltage 3 AC 400 to 480 V with SIMOVERT MASTERDRIVES Motion Control selection example**

#### Frame sizes 80 and 100

- **Order No. suffix, see page 2/15.**

#### Notes on the blower-ventilated design

1) For selection of SIMODRIVE 611 universal and POSMO units, use the stall current Iₚ and refer to MC Catalog Part 3.

2) * Listed Compact/Chassis units were selected for standard overload conditions (160% for 30 s at 300°C load cycles).

3) ** For rated currents below 37.5 A Compact Plus units can also be used.
1FT6 water-cooled servomotors · Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control

Notes on the water-cooled version 1FT6

Order No. suffix, see page 2/15

Notes on the water-cooled version 1FT6

1) For selection of SIMODRIVE 611 universal and SIMOPLC PSC00 units use the stall current i₀ and refer to MC Catalog Part 3.

2) Motor type 1FT6106-6WF7— is only available in vibration severity grade N.

• Cooling-waterflow rate: 1.32 gpm (5 l/min).
• Cooling-water inlet temperature: 77 °F (25 °C).
• Cooling-medium: Water with up to a max. of 25% anti-corrosion agent,
• Cooling-water pressure at the inlet: max. 43.5 psi (3 bar).
• Cooling-water pressure between inlet and outlet: <1.45 psi (0.1 bar),
• Cooling-medium: Water with up to a max. of 25% anti-corrosion agent,
• Cooling-water inlet temperature: 77 °F (25 °C),
• Cooling-waterflow rate: 1.32 gpm (5 I/min).

Order No.*

** For rated currents below 37.5 A Compact Plus units can also be used.

1) Listed Compact/Chassis units were selected for standard overload conditions (160% for 30 s at 300 s load cycle).

** For rated currents below 37.5 A Compact Plus units can also be used.

Mains voltage 3 AC 400 to 480 V with SIMOVERT MASTERDRIVES Motion Control selection example

<table>
<thead>
<tr>
<th>Mains voltage</th>
<th>Motor</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 V</td>
<td>1FT6106-6WF7—</td>
<td>34</td>
</tr>
<tr>
<td>480 V</td>
<td>1FT6106-6WF7—</td>
<td>40</td>
</tr>
</tbody>
</table>

Motor data for a 100 K temperature increase

<table>
<thead>
<tr>
<th>Speed (rpm)</th>
<th>600</th>
<th>800</th>
<th>1000</th>
<th>1200</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FT6106-6WF7—</td>
<td>34</td>
<td>40</td>
<td>46</td>
<td>52</td>
</tr>
<tr>
<td>1FT6106-6WF7—</td>
<td>34</td>
<td>40</td>
<td>46</td>
<td>52</td>
</tr>
</tbody>
</table>

Motor data for a 100 K temperature increase

<table>
<thead>
<tr>
<th>Speed (rpm)</th>
<th>600</th>
<th>800</th>
<th>1000</th>
<th>1200</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FT6106-6WF7—</td>
<td>34</td>
<td>40</td>
<td>46</td>
<td>52</td>
</tr>
<tr>
<td>1FT6106-6WF7—</td>
<td>34</td>
<td>40</td>
<td>46</td>
<td>52</td>
</tr>
</tbody>
</table>
### Synchronous Servomotors

#### 1FT6 servomotors

<table>
<thead>
<tr>
<th>Rated speed</th>
<th>Size</th>
<th>Motor Order No.</th>
<th>Shaft end with key</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000 rpm</td>
<td>63</td>
<td>1FT6062-6AC71-3AG1</td>
<td>1FT6062-6AC71-3AA1</td>
</tr>
<tr>
<td></td>
<td>63</td>
<td>1FT6064-6AC71-3AG1</td>
<td>1FT6064-6AC71-3AA1</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>1FT6082-8AC71-3AG1</td>
<td>1FT6082-8AC71-3AA1</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>1FT6105-8AC71-3AG1</td>
<td>1FT6105-8AC71-3AA1</td>
</tr>
<tr>
<td>3000 rpm</td>
<td>48</td>
<td>1FT6041-4AF71-3AG1</td>
<td>1FT6041-4AF71-3AA1</td>
</tr>
<tr>
<td></td>
<td>48</td>
<td>1FT6044-4AF71-3AG1</td>
<td>1FT6044-4AF71-3AA1</td>
</tr>
<tr>
<td></td>
<td>63</td>
<td>1FT6064-6AF71-3AG1</td>
<td>1FT6064-6AF71-3AA1</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>1FT6082-8AF71-3AG1</td>
<td>1FT6082-8AF71-3AA1</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>1FT6105-8AF71-3AG1</td>
<td>1FT6105-8AF71-3AA1</td>
</tr>
</tbody>
</table>

#### Modification options on stock motors

<table>
<thead>
<tr>
<th>Encoder connection direction (looking at drive end)</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transversely to the right (not with sizes 36, 48 and 63)</td>
<td>1</td>
</tr>
<tr>
<td>Transversely to the left (not with sizes 36, 48 and 63)</td>
<td>2</td>
</tr>
<tr>
<td>Axial ND-end (not with size 132)</td>
<td>3</td>
</tr>
<tr>
<td>Axial D-end</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Encoder types</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolver, 2-pole</td>
<td>T</td>
</tr>
<tr>
<td>Resolver, multi-pole</td>
<td>S</td>
</tr>
<tr>
<td>Absolute-value encoder</td>
<td>E</td>
</tr>
</tbody>
</table>

1) Stock quantities are subject to prior sale.
2) Charges apply.
### 1FT6 Servomotors

#### Order No. suffix, does not apply to Fast Mover (core-type) motors

<table>
<thead>
<tr>
<th>Type of construction</th>
<th>IM B 5, IM V 1, IM V 3</th>
<th>IM B 14 (only sizes 63, 80 and 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plug connection direction (looking at drive end)</td>
<td>Transversely to the right (only sizes 80, 100 and 132)</td>
<td>Transversely to the right/ left (only sizes 40, 63, 80, 100 and 132)</td>
</tr>
<tr>
<td>Axial ND-end (not with size 132)</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Axial D-end</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>Terminal box, direction of cable entry (looking at D-end) (only at sizes 100 and 132)</td>
<td>Transversely to the right</td>
<td>Transversely to the right</td>
</tr>
<tr>
<td>Axial ND-end</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Axial D-end</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>Encoder</td>
<td>sin/cos incremental encoder (1 \text{Vpp})</td>
<td>Absolute-value encoder (EnDat) (152 p/r only size 28, 2048 p/r from size 36 on)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resolver, multi-pole (resolver pole number equivalent to motor pole number)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resolver, 2-pole</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shaft extension Radial eccentricity tolerance Holding brake</td>
</tr>
<tr>
<td>Smooth</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Smooth</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Smooth</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Smooth</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>With featherkey</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>With featherkey</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>With featherkey</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Vibration severity</td>
<td>(\text{N} \text{P} \text{d} 4)</td>
<td>(\text{N} \text{P} \text{d} 8)</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>(\text{N} \text{P} \text{d} 6)</td>
<td>(\text{N} \text{P} \text{d} 6)</td>
</tr>
<tr>
<td></td>
<td>(\text{N} \text{P} \text{d} 7)</td>
<td>(\text{N} \text{P} \text{d} 8)</td>
</tr>
<tr>
<td></td>
<td>(\text{R} \text{P} \text{d} 4)</td>
<td>(\text{R} \text{P} \text{d} 4)</td>
</tr>
<tr>
<td></td>
<td>(\text{R} \text{P} \text{d} 7)</td>
<td>(\text{R} \text{P} \text{d} 7)</td>
</tr>
<tr>
<td></td>
<td>(\text{R} \text{P} \text{d} 8)</td>
<td>(\text{R} \text{P} \text{d} 8)</td>
</tr>
</tbody>
</table>

1) Same flanges as with the IM B 5 type of construction but with threaded inserts in the four mounting holes.
2) If an absolute-value encoder is used, the rated torque must be reduced by 10%.
3) 8th position of 1FT6 motor part number indicates number of motor poles.
Synchronous Servomotors

1FS6 servomotors (explosion-proof)

Technical specifications

In addition to fulfilling the applicable standards and regulations for areas subject to explosion hazards, the motors also comply with the following European guidelines:

- EN 50014: General standards for electrical equipment for hazardous areas
- EN 50019: Standard for type of protection EEx e
- EN 50021: Standard for type of protection Ex nA
- PBS 5000-16: Standard for type of protection Ex N

Technical characteristics

- Winding insulation for temperature class H
- High lateral-force withstand capability
- Self-cooled motors with terminal box for power connection
- Additional terminal box for connection of encoder system
- Monitoring of motor temperature by KTY 84-130 and PTC thermistor (triggering device must be certified with mark of conformity PTB 3.53-PTC/A)

Note

The PTC thermistor triggering device is mandatory for operation of the motors in hazardous areas.

Area of application

Machines for all industrial sectors with applications in hazardous Zone 1 areas.

Options

- Type of construction IM B 5 (only frame sizes 71 and 90)
- IM B 35 (only frame sizes 112 and 132)
- Degree of protection IP 64 IP 65 with radial shaft seal
- Shaft and flange accuracy N R
- Shaft extension Smooth shaft extension With featherkey, half-key balancing
- Power connection Terminal box –
- Motor protection 3 x PTC thermistor + KTY 84 in the stator winding –
- Encoder system Sinus incremental encoder 1 Vpp Absolute-value encoder (EnDat) 2048 p/r
- Paint finish Normal paint finish anthracite RAL 7016 –
- Bearings Permanently lubricated deep-grove ball bearing –
- Cooling Natural cooling –

1) If an absolute-value encoder is used, the rated torque must be reduced by 10%.
2) UL/CSA approval is pending.

Fig. 2/7
1FS6 explosion-proof servomotor

Fig. 2/8
Torque-speed characteristic

Note

The PTC thermistor triggering device is mandatory for operation of the motors in hazardous areas.
Synchronous Servomotors

1FS6 natural-cooled servomotors - Selection and ordering example with SIMOVERT MASTERDRIVES Compact units

Motor data for a 100 K temperature increase

<table>
<thead>
<tr>
<th>Motor</th>
<th>Current</th>
<th>Torque</th>
<th>Power</th>
<th>Speed</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FS6</td>
<td>132</td>
<td>112</td>
<td>150</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>1FS6</td>
<td>132</td>
<td>112</td>
<td>150</td>
<td>4500</td>
<td></td>
</tr>
<tr>
<td>1FS6</td>
<td>132</td>
<td>112</td>
<td>150</td>
<td>6000</td>
<td></td>
</tr>
</tbody>
</table>

Converter data

<table>
<thead>
<tr>
<th>Inverter**</th>
<th>Order No.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FS6</td>
<td>1FS6</td>
</tr>
</tbody>
</table>

Mains voltage 3 AC 400 to 480 V with SIMOVERT MASTERDRIVES Motion Control selection example

1) Available soon.
2) If an absolute-value encoder is used, the rated torque must be reduced by 10%.

** Listed Compact/Chassis units were selected for standard overload conditions (160% for 30 s at 300 s load cycle).

** For rated currents below 37.5 A Compact Plus units can also be used.
Linear Motors

1FN3 AC linear motors

Technical data

Advantages of 1FN3 AC linear motors:
- Outstanding dynamic response and very high traversing velocity
- Excellent precision
- Simple installation
- Non-wearing drive components due to contactless drive power transmission

In combination with the SIMODRIVE 611 universal or the POSMID CD/CA converter, 1FN3 linear motors provide a linear drive system that is specially designed to meet high dynamic requirements. The motors consist of a primary section and a secondary section with rare-earth magnets. The primary section has fixed dimensions, while the secondary section is made up of individual elements to suit the traversing range. Through parallel operation of the motors, force and length can be scaled beyond the available spectrum.

Another important advantage of linear drive technology is that the effects of elasticity, play, and friction, as well as natural oscillation are virtually eliminated. If suitable measuring systems are used and the temperature conditions are appropriate, the motors can be positioned in the nanometer range (hundred billionths of an inch).

The simple mechanical construction without transmission elements such as leadscrew, coupling or belt, enhances the reliability and dynamic response of the drive components.

Heat loss occurs almost exclusively in the primary section and is dissipated via an integrated cooling system. The optional Thermosandwich dual-circuit cooling system permits both a thermal decoupling of the motor from the machine, and also a low-priced cooling design. The stainless metal encapsulation of the primary section provides the high mechanical robustness and resistance to soiling required for use in machine tools, as well as resistance to corrosive liquids. In addition, a large air gap makes minimal demands on the preparation of mounting surfaces. The mounting tolerances for the air gap are +/-0.3 mm (0.012 in).

Applications for 1FN3
- High dynamic and flexible machine construction
- Handling
- Pick & Place

Construction variants
1FN3 linear motors are available as single-comb or double-comb motors.

- Single-comb motors
  - Single-comb version consists of a primary section with standard winding that is mounted parallel to the associated secondary section.
- Double-comb motors
  - The secondary section of the double-comb version lies between two primary sections (each primary section with standard winding and complementary winding). The construction as double-comb motor is particularly suitable for applications with movable secondary section and small traversing paths (eccentric machining).

For information and order numbers regarding optional components (precision cooler, cooler profile, combination distributor and secondary section cover) refer to section 4 “Accessories.”
**Technical data**

The 1FN3 linear motors have an overload range available for acceleration processes. The maximum force $F_{MAX}$ can only be utilized up to a maximum speed; above this speed, only the rated force $F_N$ is available.

**Technical specifications**

- **Motor type**: AC linear motor (permanent-field synchronous motor)
- **Magnet material**: Rare-earth magnetic material
- **Insulation of stator winding according to EN (IEC) 60 032-1**: $+248 \, ^\circ F (+120 \, ^\circ C)$
- **Degree of protection according to EN 60 034-5 (IEC 60 034-5)**: IP 65
- **Overload ratio ($F_{MAX}/F_N$) up to**: 2.75
- **Build-on options**: Different gradations due to modular construction
- **Covering of secondary sections**: Consistent across all segments, exchangeable
- **Cooling method**: Water cooling
- **Water cooler connections**: 1/8" internal thread to all primary and secondary section coolers (when using appropriate adapters)
- **Temperature influence on surrounding construction for precision cooling, max.**: $+4 \, ^\circ K$
- **Max. permissible coolant inlet temperature**: $+95 \, ^\circ F (+35 \, ^\circ C)$ on reduction of rated motor power
- **Temperature monitoring method integrated in primary winding**: PTC thermistor
- **Connection method**: Terminal boxes with heavy-gauge thread
- **Recommended measuring systems**: See Section 4, "Accessories"
- **2nd rating plate**: Supplied separately packed

---

**Fig. 2/10**

Speed/force diagram
### Linear Motors

#### 1FN3 AC linear motors · Selection and ordering data for primary and secondary section

- **Force of feed**
- **Maximum velocity**
- **1FN3 AC linear motor**
- **water-cooled**
- **Weight**

<table>
<thead>
<tr>
<th>Primary section</th>
<th>Secondary section</th>
<th>Permanent attractive force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order No.</td>
<td>Order No.</td>
<td>Fmax (N)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fmax (kN)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>max. (mm/min)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>max. (mm/min)</td>
</tr>
</tbody>
</table>

#### Specifications

- **1FN3 100-2WC00-0AA1**
- **1FN3 100-2WE00-0AA1**
- **1FN3 100-4SA00-0AA0**
- **1FN3 100-4SB00-0AA1**
- **1FN3 100-4WB00-0AA1**
- **1FN3 100-4WB05-0AA1**
- **1FN3 100-5WH00-0AA1**
- **1FN3 150-2WC00-0AA1**
- **1FN3 150-2WE00-0AA1**
- **1FN3 150-4SA00-0AA0**
- **1FN3 150-4SB00-0AA1**
- **1FN3 150-4WB00-0AA1**
- **1FN3 150-4WB05-0AA1**
- **1FN3 150-5WH00-0AA1**
- **1FN3 200-2WC00-0AA1**
- **1FN3 200-2WE00-0AA1**
- **1FN3 200-4SA00-0AA0**
- **1FN3 200-4SB00-0AA1**
- **1FN3 200-4WB00-0AA1**
- **1FN3 200-4WB05-0AA1**
- **1FN3 200-5WH00-0AA1**
- **1FN3 300-2WC00-0AA1**
- **1FN3 300-2WE00-0AA1**
- **1FN3 300-4SA00-0AA0**
- **1FN3 300-4SB00-0AA1**
- **1FN3 300-4WB00-0AA1**
- **1FN3 300-4WB05-0AA1**
- **1FN3 300-5WH00-0AA1**
- **1FN3 450-2WC00-0AA1**
- **1FN3 450-2WE00-0AA1**
- **1FN3 450-4SA00-0AA0**
- **1FN3 450-4SB00-0AA1**
- **1FN3 450-4WB00-0AA1**
- **1FN3 450-4WB05-0AA1**
- **1FN3 450-5WH00-0AA1**
- **1FN3 600-2WC00-0AA1**
- **1FN3 600-2WE00-0AA1**
- **1FN3 600-4SA00-0AA0**
- **1FN3 600-4SB00-0AA1**
- **1FN3 600-4WB00-0AA1**
- **1FN3 600-4WB05-0AA1**
- **1FN3 600-5WH00-0AA1**

#### Additional Information

1) Speed values refer to a converter DC link voltage of 600 V DC.
2) Values for version with/without components for precision cooling of the primary and secondary section (see chapter 4).
3) For water cooling.
4) For connection via terminal box, length $< 4 \text{ft} = 1.2 \text{m}$ the following applies: $4 \times 16 \text{mm}^2 + 4 \times 0.5 \text{mm}^2$.

#### With one temperature-monitoring circuit: Temp-S

- **Order No. 0.9/1.1 (0.42/0.52)**
- **293 (133)**

#### With one temperature-monitoring circuit: Temp-F

- **Order No. 1.5/1.8 (0.7/0.8)**
- **596 (265)**
<table>
<thead>
<tr>
<th>HP (kW)</th>
<th>Pcalc</th>
<th>Rated PVN power loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1 (5340)</td>
<td>3.6 (2670)</td>
<td>3.9 (2940)</td>
</tr>
<tr>
<td>7.2 (5180)</td>
<td>3.9 (2940)</td>
<td>2.8 (2060)</td>
</tr>
<tr>
<td>58.7 (4300)</td>
<td>4.2 (3180)</td>
<td>4.3 (3450)</td>
</tr>
<tr>
<td>20.3 (1540)</td>
<td>2.4 (1820)</td>
<td>2.2 (1600)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HP (kW)</th>
<th>Pcalc</th>
<th>Rated PVN power loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>109.8 (81.9)</td>
<td>55 (41)</td>
<td>46.2 (34.5)</td>
</tr>
<tr>
<td>74.3 (55.4)</td>
<td>62.2 (46.4)</td>
<td>46.5 (34.7)</td>
</tr>
<tr>
<td>31.1 (23.2)</td>
<td>41.7 (31.1)</td>
<td>43.8 (32.7)</td>
</tr>
<tr>
<td>17.4 (13)</td>
<td>22.3 (16.6)</td>
<td>22.3 (16.6)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature of continuous operating conditions at an ambient air</th>
</tr>
</thead>
<tbody>
<tr>
<td>104 °F (+40 °C).</td>
</tr>
</tbody>
</table>
Asynchronous Servomotors

1PH7 Asynchronous servomotors
3/2 Technical data
3/5 Stock motors
3/6 Selection and ordering example with SIMOVERT MASTERDRIVES converters
3/16 Order No. suffix

1PL6 Asynchronous servomotors
3/19 Technical data
3/21 Selection and ordering example with SIMOVERT MASTERDRIVES converters
3/25 Order No. suffix

1PH4 Water-cooled asynchronous servomotors
3/27 Technical data
3/28 Selection and ordering example with SIMOVERT MASTERDRIVES converters
Asynchronous Servomotors

1PH7 Asynchronous servomotors

Technical data

Technical characteristics

- The 1PH7 three-phase servomotors are compact, separately-cooled asynchronous motors with squirrel-cage rotor. They are especially characterized by the following properties:
  - high power-density with low physical volume
  - high degree of protection
  - high speed ranges
  - speed to zero without reduction of torque
  - robustness
  - low maintenance requirements
  - high lateral-force withstand capability
  - high level of concentricity even at low speeds
  - integrated encoder system for detecting motor speed, connected by plug
  - terminal box for power cable connection
  - monitoring of the motor temperature by the KTY 84.

Application

- Hoisting equipment:
  - hoists and drives in storage and retrieval systems for high-bay warehouses

- Printing industry:
  - single and main drives for printing machines for printing units

Rubber, plastic, wire and glass:

- drives for extruders, calenders, rubber injection moulding, film machines, conveyor systems
- wire-drawing machines, cable stranding machines etc.

General applications such as winding and coiling machines.

Stock motors

To meet our customer’s logistical expectations, the 1PH7 motor is stocked in its most demanded configurations.

The technical features of these stock motors are:
- blower-ventilated. Air flow direction D to NDE
- terminal box with cable entry from the right (looking at D-end)
- integrated pulse encoder (1024 ppr)
- vibration severity class R
- degree of protection IP 55
- type of construction IM B 35 (flange/foot mounting).

For a complete listing of stock motors refer to table "Stock motors" on page 3/5. Minor modifications on the stock motors are possible for an additional charge. A listing of the possible changes is given on page 3/5. Allow an average of 5 working days to complete the modifications.

1) Stock quantities are subject to prior sale.
Asynchronous Servomotors

1PH7 Asynchronous servomotors

### Technical data

#### 1PH7 motors, frame sizes 100 to 160

<table>
<thead>
<tr>
<th>Standard</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of construction</td>
<td>IM B 3 IM B 5 (only for sizes 100, 132), IM B 35</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 55</td>
</tr>
<tr>
<td>Vibration severity</td>
<td>R S</td>
</tr>
<tr>
<td>Shaft and flange accuracy</td>
<td>R SR</td>
</tr>
<tr>
<td>Shaft extension</td>
<td>With featherkey, half-key balancing</td>
</tr>
<tr>
<td>Encoder system (plug connection)</td>
<td>Incremental encoder HPL (with SIMOVERT VC and MC)</td>
</tr>
<tr>
<td>Encoder system</td>
<td>Without encoder (for use with SIMOVERT VC, SIMODRIVE 611 universal and POSIKO)</td>
</tr>
<tr>
<td>Motor protection</td>
<td>KTY 84, in the stator winding</td>
</tr>
<tr>
<td>Motor protection</td>
<td>Without encoder (1 Vpp) (for use with SIMOVERT MC and SIMOCODE)</td>
</tr>
<tr>
<td>Motor protection</td>
<td>Absolute-value encoder (EnDat) 2048 p/r (for use with SIMOVERT MC and SIMODRIVE)</td>
</tr>
<tr>
<td>Motor protection</td>
<td>2-pole resolver (for use with SIMOVERT MC and SIMODRIVE)</td>
</tr>
<tr>
<td>Bit finish</td>
<td>Without paint coating</td>
</tr>
<tr>
<td>Cooling</td>
<td>Separate ventilation</td>
</tr>
<tr>
<td>Brake</td>
<td>Holding brake with emergency stop function, as a brake module on D-end</td>
</tr>
<tr>
<td>Gearbox mounting</td>
<td>The following gearboxes can be mounted:</td>
</tr>
<tr>
<td>Gearbox mounting</td>
<td>Two-gear gear-change units 2LG4</td>
</tr>
</tbody>
</table>

#### 1PH7 motors, frame sizes 180 to 225

<table>
<thead>
<tr>
<th>Standard</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of construction</td>
<td>IM B 3 IM B 35</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 55</td>
</tr>
<tr>
<td>Vibration severity</td>
<td>R S</td>
</tr>
<tr>
<td>Shaft and flange accuracy</td>
<td>N R</td>
</tr>
<tr>
<td>Shaft extension</td>
<td>With featherkey, half-key balancing</td>
</tr>
<tr>
<td>Encoder system (plug connection)</td>
<td>Incremental encoder HPL (with SIMOVERT VC and MC)</td>
</tr>
<tr>
<td>Encoder system</td>
<td>Without encoder (for use with SIMOVERT VC, SIMODRIVE 611 universal and POSIKO)</td>
</tr>
<tr>
<td>Motor protection</td>
<td>KTY 84, in the stator winding</td>
</tr>
<tr>
<td>Motor protection</td>
<td>Without encoder (1 Vpp) (for use with SIMOVERT MC and SIMOCODE)</td>
</tr>
<tr>
<td>Motor protection</td>
<td>Absolute-value encoder (EnDat) 2048 p/r (for use with SIMOVERT MC and SIMODRIVE 611 universal)</td>
</tr>
<tr>
<td>Motor protection</td>
<td>2-pole resolver (for use with SIMOVERT MC and SIMODRIVE 611 universal)</td>
</tr>
<tr>
<td>Paint finish</td>
<td>Normal paint coating</td>
</tr>
<tr>
<td>Bearings</td>
<td>Permanently lubricated deep-groove ball bearing for coupling and belt drive</td>
</tr>
<tr>
<td>Coolong</td>
<td>Separate ventilation</td>
</tr>
<tr>
<td>Brake</td>
<td>Holding brake with emergency stop function, as a brake module on D-end</td>
</tr>
<tr>
<td>Gearbox mounting</td>
<td>Prepared for fitting a ZF gear-change unit, see Chapter 4</td>
</tr>
<tr>
<td>Silencier</td>
<td>–</td>
</tr>
</tbody>
</table>

1) Motor is designed to allow mounting to a gearbox. For unsealed gearboxes make sure you use the shaft seal ring option.

Siemens Catalog MC Part 2 · 2002/2003
# Asynchronous Servomotors

## 1PH7 Asynchronous servomotors

### Technical data

<table>
<thead>
<tr>
<th>1PH7 motors, frame size 280</th>
<th></th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of construction</td>
<td>IM B 3</td>
<td>IM B 35</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 55</td>
<td>–</td>
</tr>
<tr>
<td>Vibration severity</td>
<td>N</td>
<td>R</td>
</tr>
<tr>
<td>Shaft and flange accuracy</td>
<td>N</td>
<td>R</td>
</tr>
<tr>
<td>Shaft extension</td>
<td>With featherkey, half-key balancing</td>
<td>Smooth shaft extension With featherkey, full-key balancing</td>
</tr>
<tr>
<td>Terminal box</td>
<td>On the right (ND-end), cable entry from below, encoder connector on D-end</td>
<td>On the left (ND-end), cable entry from below, encoder connector on D-end</td>
</tr>
<tr>
<td>Motor protection</td>
<td>KTY 84, on the stator winding</td>
<td>–</td>
</tr>
<tr>
<td>Encoder system</td>
<td>Incremental encoder ITL (with SIMOVERT VC)</td>
<td>Without encoder (MASTERDRIVES VC), other encoders on request</td>
</tr>
<tr>
<td>Paint finish</td>
<td>Normal coating anthracite RAL 7016</td>
<td>Primed Special paint finish, “worldwide” RAL 7016, other colors on request</td>
</tr>
<tr>
<td>Bearings</td>
<td>Bearing concept for coupling drive with relubricating device</td>
<td>Bearing concept for belt drive or increased lateral forces with relubricating device</td>
</tr>
<tr>
<td>Cooling</td>
<td>Separate ventilation, the fan is axially mounted on the ND-end, air flow ND-end to D-end</td>
<td>Without separate fan, for single pipe connection Fan ND-end left or right Fan radially mounted on the D-end (air flow from D-end to ND-end) on request</td>
</tr>
</tbody>
</table>

1) Available soon.
Asynchronous Servomotors

1PH7 stock motors¹)

<table>
<thead>
<tr>
<th>Rated speed²)</th>
<th>Size</th>
<th>Motor Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1150</td>
<td>100</td>
<td>1PH7101-2HD03-0BA3</td>
</tr>
<tr>
<td></td>
<td>132</td>
<td>1PH7132-2HD03-0BA3</td>
</tr>
<tr>
<td></td>
<td>160</td>
<td>1PH7167-2HD03-0BA3</td>
</tr>
<tr>
<td>1750</td>
<td>100</td>
<td>1PH7101-2HF03-0BA3</td>
</tr>
<tr>
<td></td>
<td>132</td>
<td>1PH7132-2HF03-0BA3</td>
</tr>
<tr>
<td></td>
<td>160</td>
<td>1PH7167-2HF03-0BA3</td>
</tr>
</tbody>
</table>

Modification option for stock motors³)

<table>
<thead>
<tr>
<th>Encoder Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute-value encoder</td>
<td>E</td>
</tr>
<tr>
<td>Pulse encoder (1024 p/r)</td>
<td>H</td>
</tr>
<tr>
<td>Pulse encoder (2048 p/r)</td>
<td>J</td>
</tr>
<tr>
<td>Sin/cos incremental encoder 1 Vpp (without C-track and D-track)</td>
<td>N</td>
</tr>
<tr>
<td>Sin/cos incremental encoder 1 Vpp (with code signals C-track and D-track)</td>
<td>M</td>
</tr>
<tr>
<td>Resolver</td>
<td>R</td>
</tr>
</tbody>
</table>

Direction of cable entry (terminal box on top, looking at D-end)
- From the right: 0
- From the left: 3

¹) Stock quantities are subject to prior sale.
²) Rated speed for SIMOVERT MASTERDRIVES Motion Control and SIMODRIVE 411 universal at 480 V mains voltage or for SIMOVERT MASTERDRIVES Vector Control at 400 V mains voltage. Rated speeds are increased for SIMOVERT MASTERDRIVES Vector Control at 480 V mains voltage (e.g. 1150 → 1350 and 1750 → 2000 rpm).
³) Modification charges apply.
### 1PH7 Asynchronous servomotors

**1PH7 Asynchronous servomotors · Selection and ordering example with SIMOVERT MASTERDRIVES Vector Control converters**

Order No. suffix: see pages 3/16 to 3/18.

#### Mains voltage 3 AC 400 V for SIMOVERT MASTERDRIVES Vector Control converters

| Order No. | Pn | Hp | fmax | fn | cosφ | cosψ | Jbn | mU | mUψ | fψ | mS | mW | Rated overload (%) | Rated current | Converter/Inverter |
|-----------|----|----|------|----|------|------|-----|-----|-----|-----|----|-----|-----|-------------------|---------------|------------------|
| 400       | 160 | 210| 274  | 1000| 14.3 | 0.96 | 386 | 252 | 174 | 227 | 72 | 130 | 37.5 | 14 | 0.82 | 6SE7023-4.C61  |
| 401       | 130 | 175| 234  | 1000| 14.3 | 0.96 | 386 | 252 | 174 | 227 | 72 | 130 | 37.5 | 14 | 0.82 | 6SE7023-4.C61  |
| 402       | 100 | 130| 200  | 1000| 14.3 | 0.96 | 386 | 252 | 174 | 227 | 72 | 130 | 37.5 | 14 | 0.82 | 6SE7023-4.C61  |
| 403       | 75  | 97.5| 170  | 1000| 14.3 | 0.96 | 386 | 252 | 174 | 227 | 72 | 130 | 37.5 | 14 | 0.82 | 6SE7023-4.C61  |
| 404       | 50  | 65  | 140  | 1000| 14.3 | 0.96 | 386 | 252 | 174 | 227 | 72 | 130 | 37.5 | 14 | 0.82 | 6SE7023-4.C61  |
| 405       | 30  | 37.5| 110  | 1000| 14.3 | 0.96 | 386 | 252 | 174 | 227 | 72 | 130 | 37.5 | 14 | 0.82 | 6SE7023-4.C61  |

---

1) \( n_1 \) motor speed at which, \( P = P_n \), there is still a power reserve of 30% below the rating limit is reached at or which the mechanical speed limit is reached at or which the speed is limited by the SIMOVERT MASTERDRIVES Vector Control converter due to \( \text{f}_{\text{max}} \leq f_{\text{nl}} \).

2) Warning! The maximum speed in field-weakening mode is sometimes limited to lower values due to \( \text{f}_{\text{max}} \leq f_{\text{nl}} \).

3) The 9th digit in the Order No. is to be completed with the suffixes indicated below the table.

4) Typically stocked, see page 85 for available configuration.

* Listed Compact/Chassis units were selected for standard overload conditions (740% for 30 s at 300 s load cycle).

** For rated currents below 37.5 A Compact Plus units can also be used.

---

#### Siemens Catalog MC Part 2 2002/03/03
Asynchronous Servomotors

1PH7 Asynchronous servomotors

### Selection and ordering example with SIMOVERT MASTERDRIVES Vector Control converters

**Motor data (utilization to temperature norm class F)***

<table>
<thead>
<tr>
<th>Motor data</th>
<th>Rated power</th>
<th>Rated torque</th>
<th>Rated current</th>
<th>Rated voltage</th>
<th>Efficiency</th>
<th>Rated frequency</th>
<th>Rated current</th>
<th>Final speed</th>
<th>Power factor</th>
<th>Moment of inertia</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPM</td>
<td>HP</td>
<td>Lb-ft</td>
<td>A</td>
<td>V</td>
<td>cos phi</td>
<td>Hz</td>
<td>HP</td>
<td>RPM</td>
<td></td>
<td>lb-ft/in^2</td>
</tr>
<tr>
<td>1750</td>
<td>0.75</td>
<td>2.55</td>
<td>0.21</td>
<td>440</td>
<td>0.85</td>
<td>60</td>
<td>0.15</td>
<td>310</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1800</td>
<td>0.75</td>
<td>2.55</td>
<td>0.21</td>
<td>440</td>
<td>0.85</td>
<td>60</td>
<td>0.15</td>
<td>310</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>0.75</td>
<td>2.55</td>
<td>0.21</td>
<td>440</td>
<td>0.85</td>
<td>60</td>
<td>0.15</td>
<td>310</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2500</td>
<td>0.75</td>
<td>2.55</td>
<td>0.21</td>
<td>440</td>
<td>0.85</td>
<td>60</td>
<td>0.15</td>
<td>310</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Converter data***

<table>
<thead>
<tr>
<th>Converter/ Inverter</th>
<th>Order No.</th>
<th>RPM</th>
<th>HP</th>
<th>Lb-ft</th>
<th>A</th>
<th>V</th>
<th>cos phi</th>
<th>Hz</th>
<th>RPM</th>
<th>lb-ft/in^2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Order No. suffix:** see pages 3/16 to 3/18.

---

1) \( \eta_n \): motor speed at which, when \( P = P_n \), there is still a power reserve of 30% before the stalling limit is reached or at which the mechanical speed limit is reached or at which the speed is limited by the SIMOVERT MASTERDRIVES Vector Control converter due to \( f_{max} \) ≤ 5 \( f_n \).

2) Warning: The maximum speed in field weakening mode is sometimes limited to lower values due to \( f_{max} \) ≤ 5 \( f_n \).

3) The 5th digit in the Order No. is to be completed with the suffix indicated below the table.

4) Typically stocked, see page 3/5 for available configuration.

---

* Listed Compact/Chassis units were selected for standard overload conditions (160% for 30 s at 300% load cycle).

** For rated currents below 37.5 A Compact Plus units can also be used.
## Asynchronous Servomotors

### 1PH7 Asynchronous Servomotors

#### Selection and ordering example with SIMOVERT MASTERDRIVES Vector Control converters

<table>
<thead>
<tr>
<th>Motor data (utilization to temperature rise class F)</th>
<th>Converter data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor speed</td>
<td>Power factor</td>
</tr>
<tr>
<td>rpm</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1800</td>
<td>0.8</td>
</tr>
<tr>
<td>2300</td>
<td>0.8</td>
</tr>
<tr>
<td>3000</td>
<td>0.8</td>
</tr>
</tbody>
</table>

- **Motor data**
  - **Rated speed (nn)**: 1800 rpm, 2300 rpm, 3000 rpm
  - **Rated power (Pn)**: 7.5 HP, 10 HP, 15 HP
  - **Rated torque (t)**: 32 ft-lb, 45 ft-lb, 56 ft-lb
  - **Motor voltage (Un)**: 400 V

- **Converter data**
  - **Converter/Inverter**

<table>
<thead>
<tr>
<th>Motor data</th>
<th>Converter data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order No.</td>
<td>Converter No.</td>
</tr>
<tr>
<td>------------</td>
<td>---------------</td>
</tr>
<tr>
<td>1PH7103-..G..-....</td>
<td>1PH7103-..G..-....</td>
</tr>
<tr>
<td>1PH7107-..G..-....</td>
<td>1PH7107-..G..-....</td>
</tr>
<tr>
<td>1PH7133-..G..-....</td>
<td>1PH7133-..G..-....</td>
</tr>
<tr>
<td>1PH7165-..G..-....</td>
<td>1PH7165-..G..-....</td>
</tr>
<tr>
<td>1PH7197-..G..-....</td>
<td>1PH7197-..G..-....</td>
</tr>
</tbody>
</table>

- **Order No. suffix**: see pages 3/16 to 3/17.
- **Converter**
  - **Order No.**
  - **Converter/Inverter**

---

1) \( n_1 \): motor speed at which, when \( P = P_n \), there is still a power reserve of 30% below the stall limit is reached or at which the mechanical speed limit is reached or at which the speed is limited by the SIMOVERT MASTERDRIVES Vector Control converter due to \( f_{max} \leq 5 \cdot f_n \).

2) Warning! The maximum speed in field-weakening mode is sometimes limited to lower values due to \( f_{max} \leq 5 \cdot f_n \).

3) The 9th digit in the Order No. is to be completed with the suffixes indicated below the table.

---

Examples:

- **Example 1**: 1PH7103-..G..-....
  - **Order No.**
  - **Converter/Inverter**

- **Example 2**: 1PH7107-..G..-....
  - **Order No.**
  - **Converter/Inverter**

---

* Listed Compact/Chassis units were selected for standard overload conditions (160% for 30 s at 300 s load cycle).

** For rated currents below 37.5 A Compact Plus units can also be used.
Asynchronous Servomotors

1PH7 Asynchronous Servomotors - Selection and ordering example with SIMOVERT MASTERDRIVES Vector Control converters

<table>
<thead>
<tr>
<th>Motor data (utilization to temperature class F)</th>
<th>Mains voltage 3 AC 480 V for SIMOVERT MASTERDRIVES Vector Control converters</th>
</tr>
</thead>
<tbody>
<tr>
<td>n1 [rpm]</td>
<td>Pn [kW]</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>30</td>
<td>16.1</td>
</tr>
<tr>
<td>30</td>
<td>21.4</td>
</tr>
<tr>
<td>51</td>
<td>27.5</td>
</tr>
<tr>
<td>51</td>
<td>35.5</td>
</tr>
<tr>
<td>67</td>
<td>35.5</td>
</tr>
<tr>
<td>67</td>
<td>49.9</td>
</tr>
<tr>
<td>112</td>
<td>68.8</td>
</tr>
<tr>
<td>112</td>
<td>89.8</td>
</tr>
<tr>
<td>144</td>
<td>127</td>
</tr>
</tbody>
</table>

Order No. suffix: see pages 3/16 to 3/18.

1) \(n_1\) motor speed at which, when \(P = P_n\), there is still a power reserve of 50% below the stalling torque. The speed limit is reached at which the speed is limited by the SIMOVERT MASTERDRIVES Vector Control converter due to \(\text{Rated speed} \leq 5 \cdot n_1\).

2) Warning! The maximum speed in field-weakening mode is sometimes limited to lower values due to \(f_{\text{max}} \leq 5 \cdot f_1\).

3) The 9th digit in the Order No. is to be completed with the suffixes indicated below the table.

4) Typically stocked, see page 3/5 for available configuration.
1PH7 Asynchronous servomotors

Motor data (utilization to temperature class F)

<table>
<thead>
<tr>
<th>Motor data</th>
<th>Value</th>
<th>Value</th>
<th>Value</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated power</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated torque</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated current</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1PH7 Asynchronous servomotors - Selection and ordering example with SIMOVERT MASTERDRIVES Vector Control converters

Order No. suffix: see pages 3/16 to 3/18.

1) $n_1$: motor speed at which, when $P = P_n$, there is still a power reserve of 50% below the standing limit is reached or at which the mechanical speed limit is reached or at which the speed is limited by the SIMOVERT MASTERDRIVES Vector Control converter due to $f_{max} \leq f_n$.

2) Warning! The maximum speed in field-weakening mode is sometimes limited to lower values due to $f_{max} \leq f_n$.

3) The 5th digit in the Order No. is to be completed with the suffix indicated before the table.

4) Typically stocked; see page 3/5 for available configuration.

Converter/ Inverter

Order No. suffix: see pages 3/16 to 3/18.

---

1) $n_1$: motor speed at which, when $P = P_n$, there is still a power reserve of 50% below the standing limit is reached or at which the mechanical speed limit is reached or at which the speed is limited by the SIMOVERT MASTERDRIVES Vector Control converter due to $f_{max} \leq f_n$.

2) Warning! The maximum speed in field-weakening mode is sometimes limited to lower values due to $f_{max} \leq f_n$.

3) The 5th digit in the Order No. is to be completed with the suffix indicated before the table.

4) Typically stocked; see page 3/5 for available configuration.

---

1PH7 Asynchronous servomotors

Motor data (utilization to temperature class F)

<table>
<thead>
<tr>
<th>Motor data</th>
<th>Value</th>
<th>Value</th>
<th>Value</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated power</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated torque</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated current</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1PH7 Asynchronous servomotors - Selection and ordering example with SIMOVERT MASTERDRIVES Vector Control converters

Order No. suffix: see pages 3/16 to 3/18.

1) $n_1$: motor speed at which, when $P = P_n$, there is still a power reserve of 50% below the standing limit is reached or at which the mechanical speed limit is reached or at which the speed is limited by the SIMOVERT MASTERDRIVES Vector Control converter due to $f_{max} \leq f_n$.

2) Warning! The maximum speed in field-weakening mode is sometimes limited to lower values due to $f_{max} \leq f_n$.

3) The 5th digit in the Order No. is to be completed with the suffix indicated before the table.

4) Typically stocked; see page 3/5 for available configuration.

Converter/ Inverter

Order No. suffix: see pages 3/16 to 3/18.

---

1) $n_1$: motor speed at which, when $P = P_n$, there is still a power reserve of 50% below the standing limit is reached or at which the mechanical speed limit is reached or at which the speed is limited by the SIMOVERT MASTERDRIVES Vector Control converter due to $f_{max} \leq f_n$.

2) Warning! The maximum speed in field-weakening mode is sometimes limited to lower values due to $f_{max} \leq f_n$.

3) The 5th digit in the Order No. is to be completed with the suffix indicated before the table.

4) Typically stocked; see page 3/5 for available configuration.

Converter/ Inverter

Order No. suffix: see pages 3/16 to 3/18.
Asynchronous Servomotors

### 1PH7 Asynchronous servomotors
Selection and ordering example with SIMOVERT MASTERDRIVES Vector Control converters

#### Motor data (utilization to temperature rise class F)

<table>
<thead>
<tr>
<th>Motor data</th>
<th>Converter data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nameplate</td>
<td>Order No.*</td>
</tr>
<tr>
<td>Rated speed</td>
<td>Un</td>
</tr>
<tr>
<td>n₀</td>
<td></td>
</tr>
<tr>
<td>Rated power</td>
<td>Pn</td>
</tr>
<tr>
<td>Pₑ₀</td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>U₀</td>
</tr>
<tr>
<td>Rated current</td>
<td>I₀</td>
</tr>
<tr>
<td>Efficiency</td>
<td>η₀</td>
</tr>
<tr>
<td>Speed during field-weakening1)</td>
<td>n₁</td>
</tr>
<tr>
<td>Moment of inertia</td>
<td>J</td>
</tr>
<tr>
<td>Power factor</td>
<td>cosα₀</td>
</tr>
<tr>
<td>Magnetizing current</td>
<td>I₀</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>f₀</td>
</tr>
<tr>
<td>Weight</td>
<td>m</td>
</tr>
<tr>
<td>Rated current</td>
<td>I₀U</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>U₀</td>
</tr>
</tbody>
</table>

#### Converter data

<table>
<thead>
<tr>
<th>Converter</th>
<th>Order No.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>E*</td>
<td></td>
</tr>
<tr>
<td>Inverter</td>
<td>T</td>
</tr>
</tbody>
</table>

#### Mains voltage 3 AC 480 V for SIMOVERT MASTERDRIVES Vector Control converters

<table>
<thead>
<tr>
<th>Size Motor</th>
<th>PH7</th>
<th>Order No.</th>
<th>1PH7103-G..-....</th>
<th>1PH7107-G..-....</th>
<th>1PH7133-G..-....</th>
<th>1PH7163-G..-....</th>
<th>1PH7186-L..-....</th>
<th>1PH7224-L..-....</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH7</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1PH710</td>
<td>2650</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>1PH7103-..G..-....</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.4</td>
<td>Pₑ₀</td>
<td>(47)</td>
<td>459</td>
<td>7500</td>
<td>10500</td>
<td>0.78</td>
<td>30.3</td>
<td>30.3</td>
</tr>
<tr>
<td>24.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1PH71</td>
<td>1050</td>
<td>24.5</td>
<td>400</td>
<td>7500</td>
<td>10500</td>
<td>0.78</td>
<td>12.0</td>
<td>30.2</td>
</tr>
<tr>
<td>24</td>
<td>1PH7107-..G..-....</td>
<td>240</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>17.4</td>
<td>Pₑ₀</td>
<td>(47)</td>
<td>459</td>
<td>7500</td>
<td>10500</td>
<td>0.78</td>
<td>30.3</td>
<td>30.3</td>
</tr>
<tr>
<td>24.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1PH7</td>
<td>1000</td>
<td>17.4</td>
<td>400</td>
<td>7500</td>
<td>10500</td>
<td>0.78</td>
<td>12.0</td>
<td>30.2</td>
</tr>
</tbody>
</table>

1) n₁: motor speed at which, when P = Pn, there is still a power reserve of 30% before the stalling limit is reached at which the magnetic speed limit is reached or at which the speed is limited by the SIMOVERT MASTERDRIVES Vector Control converter due to fmax ≤ 5 · fn.
2) Warning! The maximum speed in field-weakening mode is sometimes limited to lower values due to fmax ≤ 5 · fn.
3) The 9th digit in the Order No. is to be completed with the suffixes indicated below the table.

* Listed Compact/Chassis units were selected for standard overload conditions (160% for 30 s at 300 s load cycle).
** For rated currents below 37.5 A Compact Plus units can also be used.
Asynchronous Servomotors

1PH7 Asynchronous Servomotors - Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control converters

Motor data (utilization to temperature rise class F)

<table>
<thead>
<tr>
<th>Motor data</th>
<th>Rated speed</th>
<th>Rated power</th>
<th>Rated torque</th>
<th>Speed limit due to weakening mode</th>
<th>Power factor</th>
<th>Efficiency</th>
<th>Rated frequency</th>
<th>Moment of inertia</th>
<th>Weight</th>
<th>Rated current</th>
</tr>
</thead>
<tbody>
<tr>
<td>f_n</td>
<td>(rpm)</td>
<td>(Hp)</td>
<td>(Nm)</td>
<td>(rpm)</td>
<td>(A)</td>
<td>(%)</td>
<td>(Hz)</td>
<td>(kgm²)</td>
<td>(kg)</td>
<td>(A)</td>
</tr>
<tr>
<td>1PH7103-..D..-....</td>
<td>12.7</td>
<td>(38)</td>
<td>(28.8)</td>
<td>37</td>
<td>0.88</td>
<td>11.5</td>
<td>1.06</td>
<td>14.3</td>
<td>34</td>
<td>10.2</td>
</tr>
<tr>
<td>1PH7107-..D..-....</td>
<td>17.4</td>
<td>(13)</td>
<td>(310)</td>
<td>37</td>
<td>0.88</td>
<td>14</td>
<td>1.04</td>
<td>14.3</td>
<td>37.5</td>
<td>14.5</td>
</tr>
<tr>
<td>1PH7108-..B..-....</td>
<td>21.8</td>
<td>(25)</td>
<td>(305)</td>
<td>37</td>
<td>0.88</td>
<td>13</td>
<td>1.05</td>
<td>14.2</td>
<td>37</td>
<td>14.5</td>
</tr>
<tr>
<td>1PH7109-..B..-....</td>
<td>28.4</td>
<td>(163)</td>
<td>(305)</td>
<td>37</td>
<td>0.88</td>
<td>13</td>
<td>1.05</td>
<td>14.2</td>
<td>37</td>
<td>14.5</td>
</tr>
<tr>
<td>1PH7224-..B..-....</td>
<td>48.8</td>
<td>(36.4)</td>
<td>(725)</td>
<td>37</td>
<td>0.88</td>
<td>13</td>
<td>1.05</td>
<td>14.2</td>
<td>37</td>
<td>14.5</td>
</tr>
<tr>
<td>1PH7226-..B..-....</td>
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<td>(36.4)</td>
<td>(725)</td>
<td>37</td>
<td>0.88</td>
<td>13</td>
<td>1.05</td>
<td>14.2</td>
<td>37</td>
<td>14.5</td>
</tr>
<tr>
<td>1PH7228-..B..-....</td>
<td>64.3</td>
<td>(49)</td>
<td>(1146)</td>
<td>37</td>
<td>0.88</td>
<td>13</td>
<td>1.05</td>
<td>14.2</td>
<td>37</td>
<td>14.5</td>
</tr>
</tbody>
</table>

Mains voltage 3 AC 400 V for SIMOVERT MASTERDRIVES Motion Control converters and SIMORIVE 611 universal

1PH7 Asynchronous Servomotors - Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control converters and SIMORIVE 611 universal

<table>
<thead>
<tr>
<th>Converter data</th>
<th>Order No. 1)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>6SE7023-4.C51</td>
</tr>
<tr>
<td></td>
<td>6SE7023-2.D51</td>
</tr>
<tr>
<td></td>
<td>6SE7023-2.F50</td>
</tr>
<tr>
<td></td>
<td>6SE7023-2.G50</td>
</tr>
</tbody>
</table>

Order No. suffix: see pages 3/16 to 3/17.

1) n_1: motor speed at which, when P = P_n, there is a power reserve of 30% before the stalling age.

2) Warning: the maximum speed in field-weakening mode is sometimes limited to lower values due to f_max ≤ 2 f_n for SIMOVERT MASTERDRIVES Motion Control.

3) The 9th digit in the Order No. is to be completed with the suffixes indicated below the table.

4) Typically stocked, see page 3/5 for available configuration.

* Listed Compact/Chassis units were selected for standard overload conditions (160% for 30 s at 300% load cycle).

** For rated currents below 37.5 A Compact Plus units can also be used.
### 1PH7 Asynchronous servomotors

#### Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control converters

<table>
<thead>
<tr>
<th>Mains voltage 3 AC 400 V</th>
<th>SIMOVERT MASTERDRIVES Motion Control converters and SIMORDRIVE 611 universal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500</td>
<td>100 (1PH7101...F..-....) 2000</td>
</tr>
<tr>
<td></td>
<td>100 (1PH7101...F..-....) 2000</td>
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<tr>
<td></td>
<td>100 (1PH7101...F..-....) 2000</td>
</tr>
<tr>
<td></td>
<td>100 (1PH7101...F..-....) 2000</td>
</tr>
<tr>
<td></td>
<td>100 (1PH7133...F..-....) 2000</td>
</tr>
<tr>
<td></td>
<td>100 (1PH7135...F..-....) 2000</td>
</tr>
<tr>
<td></td>
<td>100 (1PH7137...F..-....) 2000</td>
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<td></td>
<td>100 (1PH7139...F..-....) 2000</td>
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<td></td>
<td>100 (1PH7141...F..-....) 2000</td>
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<td>100 (1PH7143...F..-....) 2000</td>
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<td>100 (1PH7147...F..-....) 2000</td>
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<td>100 (1PH7149...F..-....) 2000</td>
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<td>100 (1PH7151...F..-....) 2000</td>
</tr>
<tr>
<td></td>
<td>100 (1PH7153...F..-....) 2000</td>
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<td>100 (1PH7155...F..-....) 2000</td>
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<td>100 (1PH7157...F..-....) 2000</td>
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<tr>
<td></td>
<td>100 (1PH7159...F..-....) 2000</td>
</tr>
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<td></td>
<td>100 (1PH7161...F..-....) 2000</td>
</tr>
<tr>
<td></td>
<td>100 (1PH7163...F..-....) 2000</td>
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<td>100 (1PH7165...F..-....) 2000</td>
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<td>100 (1PH7171...F..-....) 2000</td>
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<td>100 (1PH7173...F..-....) 2000</td>
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<td>100 (1PH7187...F..-....) 2000</td>
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<td>100 (1PH7191...F..-....) 2000</td>
</tr>
<tr>
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<td>100 (1PH7193...F..-....) 2000</td>
</tr>
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<td>100 (1PH7197...F..-....) 2000</td>
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<tr>
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<td>100 (1PH7199...F..-....) 2000</td>
</tr>
</tbody>
</table>

#### Converters

<table>
<thead>
<tr>
<th>Order No. suffix: see pages 3/16 to 3/17.</th>
</tr>
</thead>
</table>

1) \( n_{\text{c}} \): motor speed at which, when \( P = P_{\text{in}} \), there is still a power reserve of 10% below the stalling speed. When the speed limit is reached or at which the speed is limited by the SIMOVERT MASTERDRIVES Motion Control converter due to \( \frac{P}{P_{\text{in}}} \leq 0.9 \), 2) Warning: The maximum speed in field-weakening mode is sometimes limited by lower torque. 3) The 9th digit in the Order No. is to be completed with the suffix indicated below in the table. 4) Typically stocked, see page 3/5 for available configuration. ** Listed Compact/Chassis units were selected for standard overload conditions (100% for 30 s at 350% of load cycle). ** For rated currents below 37.5 A Compact Plus units can also be used.
Asynchronous Servomotors

1PH7 Asynchronous Servomotors - Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control converters

<table>
<thead>
<tr>
<th>Motor data (utilization to temperature rise class F)</th>
<th>Converter data</th>
</tr>
</thead>
<tbody>
<tr>
<td>n1 (rpm)</td>
<td>Pn (kW)</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Mains voltage 3 AC 480 V for SIMOVERT MASTERDRIVES Motion converters and SIMMOVE 611 universal</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>160</td>
</tr>
<tr>
<td>160</td>
<td>1PH715X-...B..-....</td>
</tr>
<tr>
<td>160</td>
<td>1PH715X-...B..-....</td>
</tr>
<tr>
<td>160</td>
<td>1PH715X-...B..-....</td>
</tr>
</tbody>
</table>

1) \( n_1 \), motor speed at which, when \( P = P_n \), there is still a power reserve of 30% before the stalling power is reached or at which the mechanical speed limit is reached.

2) Warning! The maximum speed in field-weakening mode is sometimes limited to lower values due to \( \text{f}_{\text{max}} \) ≤ 2 \( \text{f}_{\text{nc}} \) for SIMOVERT MASTERDRIVES Motion Control.

3) The 9th digit in the Order No. is to be completed with the suffixes indicated below the table.

4) Typically stocked, see page 9/5 for available configuration.

Order No. suffix: see pages 3/16 to 3/17.

Converter data

- A: Converter
- B: Inverter

160 1PH715X-...B..-....
160 1PH7135-...D..-....
160 1PH722B-...D..-....
160 1PH722C-...D..-....
160 1PH722D-...D..-....
160 1PH722E-...D..-....
160 1PH722F-...D..-....

* Listed Compact/Chassis units were selected for standard overload conditions (165% for 30 s at 300% load cycle). ** For rated currents below 37.5 A Compact Plus units can also be used.
1PH7 Asynchronous Servomotors

Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control converters

<table>
<thead>
<tr>
<th>Motor data (utilization to temperature rise class F)</th>
<th>Power factor</th>
<th>Motor data (utilization to temperature rise class F)</th>
<th>Power factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power, cos θ</td>
<td>Power, cos θ</td>
<td>Power, cos θ</td>
<td>Power, cos θ</td>
</tr>
<tr>
<td>kW</td>
<td>kW</td>
<td>kW</td>
<td>kW</td>
</tr>
<tr>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
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<tr>
<td>22</td>
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<tr>
<td>50</td>
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<tr>
<td>60</td>
<td>60</td>
<td>60</td>
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</tr>
<tr>
<td>75</td>
<td>75</td>
<td>75</td>
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<tr>
<td>90</td>
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<tr>
<td>100</td>
<td>100</td>
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<tr>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>180</td>
<td>180</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
</tbody>
</table>

Mains voltage 3 AC 480 V for SIMOVERT MASTERDRIVES Motion Control converters and SIMORIVE 611 universal

<table>
<thead>
<tr>
<th>Motor data</th>
<th>Power factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>kW</td>
<td>kW</td>
</tr>
<tr>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td>15</td>
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<tr>
<td>22</td>
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<td>30</td>
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<td>40</td>
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<tr>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>200</td>
<td>200</td>
</tr>
</tbody>
</table>

1) Motor speed at which, when P = Pn, there is a power reserve of 10% before the stalling limit is reached or at which the mechanical speed limit is reached or at which the speed is limited by the SIMOVERT MASTERDRIVES Motion Control converter due to \( t_{x,x} \) ≥ 2 \( t_{f,n} \).

2) Warnings: The maximum speed in test-weakening mode is sometimes limited to lower values due to \( t_{x,x} \) ≥ 2 \( t_{f,n} \), for SIMOVERT MASTERDRIVES Motion Control.

3) The 9th digit in the Order No. is to be completed with the suffixes indicated below the table.

4) Typically stocked, see page 3/5 for available configuration.

Order No. suffix: see pages 3/6 to 3/7.

Sequence Catalog MC Part 2: 2002/2003
# Asynchronous Servomotors

## 1PH7 Asynchronous servomotors

### 1PH7 Asynchronous servomotors - Order No. suffix for sizes 100 to 160

<table>
<thead>
<tr>
<th>Browser</th>
<th>Encoder</th>
<th>Direction of cable entry</th>
<th>Holding brake with emergency-stop function</th>
<th>Type of construction</th>
<th>Type of drive</th>
<th>Air-flow direction</th>
<th>Paint finish</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>With or without mains supply voltage: 3 AC 400 V ± 10%, 50/60 Hz: 480 V ± 5% - 10%, 60 Hz</td>
<td>Without encoder</td>
<td>From the right</td>
<td>No brake</td>
<td>IM B 3, IM V 5, IM V 6</td>
<td>Shaft and flange accuracy</td>
<td>Shaft extension</td>
<td>Without, oil-tight flange with radial shaft seal ring</td>
<td>1) Version with brake: 12th data digit “2” or “3”, 14th data digit “K”, 15th data digit “A”, “B”, “J” or “K”, 16th data digit “D”, “3” or “6”.</td>
</tr>
<tr>
<td>Without or without mains supply voltage: 3 AC 400 V ± 10%, 50/60 Hz: 480 V ± 5% - 10%, 60 Hz</td>
<td>Absolute-value encoder (EnDat) (2048 p/r)</td>
<td>From ND-end</td>
<td>With brake: 12th data digit “2” or “3”, 14th data digit “E”, 15th data digit “B”, “J” or “K”, 16th data digit “G”, “3” or “6”. Only with smooth shaft (16th data digit “J” or “K”).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incremental encoder HIL (1024 p/r)</td>
<td>From the left</td>
<td>With brake</td>
<td>IM B 35; IM V 15, IM V 36</td>
<td>Vibration severity</td>
<td>No build-up of fluid permitted at the shaft exit. For notes on gearbox mounting, see Chapter 4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incremental encoder HIL (2048 p/r)</td>
<td></td>
<td>No brake</td>
<td>IM B 3; IM V 1; IM V 3 (only sizes 100 and 152)</td>
<td>Coupling and belt</td>
<td>Smooth</td>
<td>Anthracite, special coating (RAL 7016): oil-tight flange with radial shaft seal ring</td>
<td>2) Max. possible speed: [12th data digit “2” or “3”, 14th data digit “E”, 15th data digit “B”, “J” or “K”, 16th data digit “G”, “3” or “6”].</td>
</tr>
<tr>
<td></td>
<td>Sinus incremental encoder 1 Xrrg (without C-track and D-track)</td>
<td></td>
<td>With brake</td>
<td>IM B 3; IM V 1; IM V 3 (only sizes 100 and 152)</td>
<td>Coupling and belt</td>
<td>No build-up of fluid permitted at the shaft exit. For notes on gearbox mounting, see Chapter 4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sinus incremental encoder 1 Xrrg (with C-track and D-track)</td>
<td></td>
<td>No brake</td>
<td>IM B 3; IM V 1; IM V 3 (only sizes 100 and 152)</td>
<td>Coupling and belt</td>
<td>Smooth</td>
<td>Anthracite, special coating (RAL 7016): oil-tight flange with radial shaft seal ring</td>
<td>3) Version prepared for ZF gear-change unit mounting: 12th data digit “2” or “3”, 14th data digit “E”, 15th data digit “B”, “J” or “K”, 16th data digit “G”, “3” or “6”.</td>
</tr>
<tr>
<td></td>
<td>2-pole resolver</td>
<td></td>
<td>With brake</td>
<td>IM B 3; IM V 1; IM V 3 (only sizes 100 and 152)</td>
<td>Coupling and belt</td>
<td>Smooth</td>
<td>Anthracite, special coating (RAL 7016): oil-tight flange with radial shaft seal ring</td>
<td>For notes on gearbox mounting, see Chapter 4.</td>
</tr>
</tbody>
</table>
Asynchronous Servomotors

1PH7 Asynchronous servomotors · Order No. suffix for sizes 180 and 225

Blower
- With blower, mains supply voltage 3 AC 400 V ± 10%, 50 Hz; 480 V ± 5% –10%, 60 Hz
- Without blower, for pipe connection

Encoder
- Without encoder
- Absolute-value encoder (EnDat) (2048 p/r)
- Incremental encoder HTL (1024 p/r)
- Incremental encoder HTL (2048 p/r)
- Servo incremental encoder 1 V (without C-track and D-track)
- Servo incremental encoder 1 V (with C-track and D-track)
- 2-pole resolver

Direction of cable entry (terminal box on top, looking at D-end)
- From the right
- From D-end
- From ND-end
- From the left

Type of construction (see page 7/36)
- IM B 3
- IM B 8, IM B 7, IM B 6, IM V 5, IM V 6
- IM B 35 (only for 1PH7184 with flange A400)
- IM B 35 (only for 1PH7184 with flange A450)
- IM B 35 (for 1PH7186 with flange A400 and 1PH7188 with flange A550)
- IM V 36, IM V 15 (only for 1PH7184 with flange A400)
- IM V 36, IM V 15 (only for 1PH7184 with flange A450)
- IM V 36, IM V 15 (for 1PH7186 with flange A450 and 1PH722 with flange A550)
- Holding brake with emergency-stop function (suitable for coupling drive in IM B 3 type of construction)
- No brake
- With brake (brake with emergency release screws and microswitch)
- With brake (brake with manual release and microswitch)

Type of drive
- Coupling
- Coupling with featherkey, half-key balancing
- Coupling with featherkey, full-key balancing
- Coupling with featherkey, half-key balancing
- Shaft and flange accuracy
- Increased lateral forces
- Increased lateral forces
- Design for increased max. speed (°/s)

Air-flow direction
- Shaft extension
- Blow-out direction
- D-end → ND-end
- With featherkey, half-key balancing
- With featherkey, full-key balancing
- Smooth
- ND-end → D-end
- With featherkey, half-key balancing
- Axisial
- ND-end → D-end
- Smooth
- Axisial

Paint finish
- Primed
- Primed, prepared for ZF gear mounting
- Anthracite, normal coating (RAL 7016)
- Anthracite, special coating (RAL 7016), prepared for ZF gear mounting

1) Version with brake:
- 12th data digit “0”,
- 14th and 15th data digits “A” and “E”
- 16th data digit “0”, “3” or “6”.
2) Version prepared for ZF gear mounting:
- Only for types 1PH7184, 186 and 224.
- 12th data digit “D” or “C”.
- 13th data digit “0”.
- 14th data digit “B”, 15th data digit “C”.
- 16th data digit “0” or “3”.
- No build-up of fluid at shaft end permissible.
3) For size 180: nₘₐₓ = 7,000 rpm
   1PH7224: nₘₐₓ = 5,500 rpm
   For notes on gearbox mounting, see Chapter 4.
### Asynchronous Servomotors

#### 1PH7 Asynchronous servomotors

<table>
<thead>
<tr>
<th>1PH7 Asynchronous servomotors · Order No. suffix for size 280 (available soon)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blower, mains supply voltage</strong></td>
</tr>
<tr>
<td><strong>With separate blower, ND-end top, direction of air flow ND-end to D-end</strong></td>
</tr>
<tr>
<td><strong>With separate blower, ND-end right, direction of air flow ND-end to D-end</strong></td>
</tr>
<tr>
<td><strong>With separate blower, ND-end left, direction of air flow ND-end to D-end</strong></td>
</tr>
<tr>
<td><strong>Without separate blower, for single pipe connection to ND-end</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Encoder</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Without encoder</strong></td>
</tr>
<tr>
<td><strong>Incremental encoder HTL (1024 p/r)</strong></td>
</tr>
<tr>
<td><strong>Incremental encoder HTL (2048 p/r)</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Terminal box/direction of cable entry (looking at D-end)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Terminal box ND-end right / cable entry below/encoder connector on D-end</strong></td>
</tr>
<tr>
<td><strong>Terminal box ND-end left / cable entry below/encoder connector on D-end</strong></td>
</tr>
<tr>
<td><strong>Terminal box ND-end top / cable entry right/encoder connector on D-end</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Type of construction (see page 736)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IM B 3</strong></td>
</tr>
<tr>
<td><strong>IM B 6, IM B 7, IM B 8, IM V 5, IM V 6</strong></td>
</tr>
<tr>
<td><strong>IM B 35 (with flange A660)</strong></td>
</tr>
<tr>
<td><strong>IM V 36, IM V 15 (with flange A660)</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Type of drive</strong></th>
<th><strong>Vibration severity</strong></th>
<th><strong>Shaft and flange accuracy</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coupling</strong></td>
<td><strong>N</strong></td>
<td><strong>R</strong></td>
</tr>
<tr>
<td><strong>Belt, increased lateral forces</strong></td>
<td><strong>N</strong></td>
<td><strong>R</strong></td>
</tr>
<tr>
<td><strong>Shaft extension</strong></td>
<td><strong>N</strong></td>
<td><strong>R</strong></td>
</tr>
<tr>
<td><strong>Shaft extension</strong></td>
<td><strong>A</strong></td>
<td><strong>B</strong></td>
</tr>
<tr>
<td><strong>Smooth</strong></td>
<td><strong>C</strong></td>
<td><strong>D</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Paint finish</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primed</strong> 0</td>
</tr>
<tr>
<td><strong>Anthracite, normal coating (RAL 7016)</strong></td>
</tr>
<tr>
<td><strong>Anthracite, special coating (RAL 7016)</strong></td>
</tr>
</tbody>
</table>

1) Only possible for 8th data digit “0”, “2”, “6”.
2) Only possible for 8th data digit “0”, “1”, “6”.
3) Only possible for 8th data digit “1”, “2”, “6”.

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Siemens Catalog MC Part 2 · 2002/2003
Asynchronous Servomotors

3/19

### Technical data

#### Technical characteristics

The 1PL6 three-phase servomotors are compact, separately-cooled asynchronous motors with additional axial ventilation and with degree of protection IP 23.

They are especially characterized by the following properties:

- extremely high power density with low physical volume (50% more power compared to 1PH7 motors with degree of protection IP 55)
- speed down to zero without torque reduction
- robustness
- low maintenance requirements
- high lateral-force withstand capability
- high level of concentricity even at lowest speeds
- integrated encoder system for detecting motor speed
- terminal box for connecting the power cable
- KTY 84 motor temperature monitoring

#### IP 23 degree of protection

The three-phase induction motors of Series 1PL6 are rotor-cooled and stator-cooled by means of open-circuit cooling. A built-on separately-driven fan unit is implemented as standard for cooling.

The motors comply with the DIN standards and the IP 23 degree of protection according to EN 60034-5 (or IEC 60034-5). With this degree of protection, the motors are not suitable for operation in corrosive atmospheres or for installation outdoors.

---

### 1PL6 motors, frame sizes 180 and 225

<table>
<thead>
<tr>
<th>Standard Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of construction</strong></td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
</tr>
<tr>
<td><strong>Vibration severity</strong></td>
</tr>
<tr>
<td><strong>Shaft and flange accuracy</strong></td>
</tr>
<tr>
<td><strong>Shaft extension</strong></td>
</tr>
<tr>
<td><strong>Terminal box</strong></td>
</tr>
<tr>
<td><strong>Motor protection</strong></td>
</tr>
<tr>
<td><strong>Encoder system (plug connection)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Paint finish</strong></td>
</tr>
<tr>
<td><strong>Bearings</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Cooling</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Silencer</strong></td>
</tr>
</tbody>
</table>
Asynchronous Servomotors

1PL6 Asynchronous servomotors

Technical data

The newly developed asynchronous motors of size 280 expand the performance range of the compact asynchronous servomotors of Series 1PL6. The new size is characterized, in particular, by its compact construction despite enhanced performance and consistent emphasis on suitability for use in production machines.

- extremely high power/weight ratio for minimal overall volume (60% more power than 1PH7 to the IP 55 degree of protection)
- variable ventilation design; Standard: Fan unit at non-drive-end
- simple external ventilation by means of connected hose
- terminal box either above, left or right (non-drive-end) as required
- integrated encoder system for sensing the motor speed, connected with connector on terminal box
- monitoring the motor temperature by means of KTY 84; additional KTY 84 as spare part
- bearings with relubricating mechanism and insulated bearing as standard (non-drive-end)

Applications for 1PL6 motors

Installation in dry indoor locations (no aggressive atmosphere)

- Hoisting equipment:
  - hoists and closing gear for cranes

- Printing industry:
  - main drives for printing machines

- Rubber, plastic and wire:
  - drives for extrudes, calenders, rubber-spraying systems, film machines, conveyor systems
  - wire-drawing machines, cable stranding machines etc.

- General applications such as winding and coiling machines.

<table>
<thead>
<tr>
<th>1PL6 motors, frame size 280</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of construction</strong></td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
</tr>
<tr>
<td><strong>Vibration severity</strong></td>
</tr>
<tr>
<td><strong>Shaft and flange accuracy</strong></td>
</tr>
<tr>
<td><strong>Shaft extension</strong></td>
</tr>
<tr>
<td><strong>Terminal box</strong></td>
</tr>
<tr>
<td><strong>Motor protection</strong></td>
</tr>
<tr>
<td><strong>Encoder system (plug connection)</strong></td>
</tr>
<tr>
<td><strong>Paint finish</strong></td>
</tr>
<tr>
<td><strong>Bearings</strong></td>
</tr>
<tr>
<td><strong>Cooling</strong></td>
</tr>
</tbody>
</table>

1) Available soon.
### 1PL6 Asynchronous servomotors

#### Selection and ordering example with SIMOVERT MASTERDRIVES Vector Control converters

**Order No. suffix:** see pages 3/25 and 3/26.

1) $n_1$: Speed at which, for $P = P_n$, 30% reserve power is still available before reaching the stall limit.

2) Warning! The maximum speed in field-weakening mode is sometimes limited to lower values due to $(\text{cos} \varphi) < 0.5$.

3) The 9th digit in the Order No. is to be completed with the suffixes indicated below the table.

- **Converter**
- **Inverter**

####Converter data:

<table>
<thead>
<tr>
<th>Motor data (utilization to temperature rise class F)</th>
<th>Power factor $\varphi$</th>
<th>Magnetizing current $i_0$</th>
<th>Rated line current $I_1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P$ (kW)</td>
<td>$\varphi$</td>
<td>$i_0$ (A)</td>
<td>$I_1$ (A)</td>
</tr>
<tr>
<td>32.8 (24.5)</td>
<td>0.72</td>
<td>3.85</td>
<td>17.1</td>
</tr>
<tr>
<td>40.0 (35.0)</td>
<td>0.70</td>
<td>3.85</td>
<td>17.1</td>
</tr>
</tbody>
</table>

####Converter/Inverter data:

<table>
<thead>
<tr>
<th>Motor data (utilization to temperature rise class F)</th>
<th>Power factor $\varphi$</th>
<th>Magnetizing current $i_0$</th>
<th>Rated line current $I_1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P$ (kW)</td>
<td>$\varphi$</td>
<td>$i_0$ (A)</td>
<td>$I_1$ (A)</td>
</tr>
<tr>
<td>37.0 (27.0)</td>
<td>0.75</td>
<td>3.85</td>
<td>17.1</td>
</tr>
<tr>
<td>57.0 (43.5)</td>
<td>0.75</td>
<td>3.85</td>
<td>17.1</td>
</tr>
</tbody>
</table>

####Mains voltage 3 AC 400 V for SIMOVERT MASTERDRIVES Vector Control converters

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Motor data (utilization to temperature rise class F)</th>
<th>Power factor $\varphi$</th>
<th>Magnetizing current $i_0$</th>
<th>Rated line current $I_1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.8 (24.5)</td>
<td>0.72</td>
<td>3.85</td>
<td>17.1</td>
<td></td>
</tr>
<tr>
<td>40.0 (35.0)</td>
<td>0.70</td>
<td>3.85</td>
<td>17.1</td>
<td></td>
</tr>
</tbody>
</table>

####Motor data (utilization to temperature rise class F)

<table>
<thead>
<tr>
<th>Motor data (utilization to temperature rise class F)</th>
<th>Power factor $\varphi$</th>
<th>Magnetizing current $i_0$</th>
<th>Rated line current $I_1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P$ (kW)</td>
<td>$\varphi$</td>
<td>$i_0$ (A)</td>
<td>$I_1$ (A)</td>
</tr>
<tr>
<td>37.0 (27.0)</td>
<td>0.75</td>
<td>3.85</td>
<td>17.1</td>
</tr>
<tr>
<td>57.0 (43.5)</td>
<td>0.75</td>
<td>3.85</td>
<td>17.1</td>
</tr>
</tbody>
</table>

####Asynchronous Servomotors

1PL6 Asynchronous servomotors

- **Order No.**
- **Motor data**
- **Converter data**

####Order No.

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Motor data (utilization to temperature rise class F)</th>
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<tbody>
<tr>
<td>32.8 (24.5)</td>
<td>0.72</td>
<td>3.85</td>
<td>17.1</td>
<td></td>
</tr>
<tr>
<td>40.0 (35.0)</td>
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####Asynchronous Servomotors

1PL6 Asynchronous servomotors

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Asynchronous Servomotors

### 1P6 Asynchronous servomotors

#### Selection and ordering example with SIMOVERT MASTERDRIVES Vector Control converters

<table>
<thead>
<tr>
<th>Motor data (utilization to temperature rise class F)</th>
<th>Order No.</th>
<th>Inverter</th>
<th>Converter</th>
<th>Rated power (kW)</th>
<th>Rated torque (N.m)</th>
<th>Rated current (A)</th>
<th>Speed (rpm)</th>
<th>Max. operating speed (rpm)</th>
<th>Power factor</th>
<th>Efficiency class</th>
<th>Rated frequency (Hz)</th>
<th>Moment of inertia (Nm²)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains voltage 3 AC 480 V for SIMOVERT MASTERDRIVES Vector Control converters</td>
<td></td>
<td></td>
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<tr>
<td>500</td>
<td>1P6L164-B...-G...</td>
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<td>41 (764)</td>
<td>370</td>
<td>9</td>
<td>180</td>
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<td>60</td>
<td>60</td>
<td>1.7</td>
<td>0.95</td>
<td>0.65</td>
<td>89.5</td>
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<tr>
<td>200</td>
<td>1P6L234-B...-G...</td>
<td>73.7</td>
<td>114 (1020)</td>
<td>370</td>
<td>9</td>
<td>180</td>
<td>30</td>
<td>60</td>
<td>60</td>
<td>1.7</td>
<td>0.95</td>
<td>0.65</td>
<td>89.5</td>
</tr>
<tr>
<td>150</td>
<td>1P6L226-B...-G...</td>
<td>96.5</td>
<td>147 (1375)</td>
<td>375</td>
<td>15</td>
<td>180</td>
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<td>60</td>
<td>60</td>
<td>1.7</td>
<td>0.95</td>
<td>0.65</td>
<td>89.5</td>
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<tr>
<td>1350</td>
<td>1P6L228-B...-G...</td>
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<td>380</td>
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<td>180</td>
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<td>60</td>
<td>60</td>
<td>1.7</td>
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<td>0.65</td>
<td>89.5</td>
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<td>2000</td>
<td>1P6L184-F...-G...</td>
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<td>1.7</td>
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<td>89.5</td>
</tr>
<tr>
<td>1500</td>
<td>1P6L226-E...-G...</td>
<td>183.6</td>
<td>215 (2380)</td>
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<td>160</td>
<td>180</td>
<td>30</td>
<td>60</td>
<td>60</td>
<td>1.7</td>
<td>0.95</td>
<td>0.65</td>
<td>89.5</td>
</tr>
</tbody>
</table>

#### Converter data

- Converter: 6SE7027-2DE1
- Inverter: 6SE7031-0ES0
- Converter: 6SE7031-2FG0
- Inverter: 6SE7031-5FG0
- Converter: 6SE7031-8FG0
- Inverter: 6SE7031-8FG0

#### Motor data (utilization to temperature rise class F)

- Motor data (utilization to temperature rise class F)
- Order No. (26)
- Inverter (60)
- Converter (256)

#### Converter/Inverter

- Converter: 6SE7031-0FG0
- Inverter: 6SE7031-5FG0
- Converter: 6SE7031-8FG0
- Inverter: 6SE7031-8FG0

### 1P6 Asynchronous servomotors

1) Motor data (utilization to temperature rise class F)

2) Power factor

3) Efficiency class

4) Rated frequency

5) Moment of inertia

6) Weight

#### Conversion

- Converter: 6SE7027-2DE1
- Inverter: 6SE7031-0ES0


1) Motor data (utilization to temperature rise class F).

2) Power factor.

3) Efficiency class.

4) Rated frequency.

5) Moment of inertia.

6) Weight.

#### Footnotes

- * Listed Compact/Chassis units were selected for standard overheat conditions (140% for 30 s at 300% load cycle).

---

### Siemens Catalog MC Part 2: 2002/2003

3/22
### 1PL6 Asynchronous servomotors

#### 1PL6 Asynchronous servomotors - Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control converters

<table>
<thead>
<tr>
<th>Motor data</th>
<th>Size</th>
<th>Speed at which, for P = Pn, 30% reserve</th>
<th>Power factor</th>
<th>Efficiency</th>
<th>Converter data</th>
</tr>
</thead>
<tbody>
<tr>
<td>n1 (rpm)</td>
<td>P1</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
</tr>
<tr>
<td>( \phi )</td>
<td>( \text{HP (kW)} )</td>
<td>( \text{kW} )</td>
<td>( \text{V} )</td>
<td>( \phi )</td>
<td>( \text{A} )</td>
</tr>
<tr>
<td>n1 (rpm)</td>
<td>Order No.</td>
<td>( \phi )</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
<td>( \text{inverter} )</td>
</tr>
<tr>
<td>n1 (rpm)</td>
<td>( \phi )</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
</tr>
<tr>
<td>n1 (rpm)</td>
<td>( \phi )</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
</tr>
</tbody>
</table>

#### Order No. suffix: see page 3/25

1) \( \text{n} \): Speed at which, for \( P \leq P_n \), 30% reserve power is still available before reaching the stall limit.

2) Warning! The maximum speed in field weakening mode is sometimes limited to lower values due to \( r_{\text{max}} \geq 2 \), for SIMOVERT MASTERDRIVES Motion Control.

3) The 5th digit in the Order No. is to be completed with the suffixes indicated below the table.

4) Warning! The rated converter current is lower than the rated motor current.

---

* Listed Compact/Chassis units were selected for standard overload conditions (760% for 30 s at 300% load cycle).

---

### Order No.3)*

<table>
<thead>
<tr>
<th>Motor data</th>
<th>Size</th>
<th>Speed at which, for P = Pn, 30% reserve</th>
<th>Power factor</th>
<th>Efficiency</th>
<th>Converter data</th>
</tr>
</thead>
<tbody>
<tr>
<td>n1 (rpm)</td>
<td>P1</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
</tr>
<tr>
<td>( \phi )</td>
<td>( \text{HP (kW)} )</td>
<td>( \text{kW} )</td>
<td>( \text{V} )</td>
<td>( \phi )</td>
<td>( \text{A} )</td>
</tr>
<tr>
<td>n1 (rpm)</td>
<td>Order No.</td>
<td>( \phi )</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
<td>( \text{inverter} )</td>
</tr>
<tr>
<td>n1 (rpm)</td>
<td>( \phi )</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
</tr>
<tr>
<td>n1 (rpm)</td>
<td>( \phi )</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
<td>( \text{inverter} )</td>
<td>( \text{converter} )</td>
</tr>
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* Siemens Catalog MC Part 2 · 2002/2003
### 1PL6 Asynchronous Servomotors

#### Selection and ordering example with SIMOVERT MASTERDRIVES Motion Control converters

<table>
<thead>
<tr>
<th>Motor data</th>
<th>Rated speed Order No.</th>
<th>Rated power</th>
<th>Rated torque</th>
<th>Rated current</th>
<th>Rated voltage</th>
<th>Max. power factor</th>
<th>Max. weakening factor</th>
<th>Efficiency</th>
<th>Rated frequency</th>
<th>Moment of inertia</th>
<th>Weight</th>
<th>Rated current</th>
<th>Converter data</th>
<th>Order No. PN</th>
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<tbody>
<tr>
<td>n1 (rpm)</td>
<td>P1 (kW)</td>
<td>T1 (Nm)</td>
<td>IU (A)</td>
<td>Un (V)</td>
<td>(Un) 1.15 Un</td>
<td>Un (V)</td>
<td>Un (V)</td>
<td>Un (V)</td>
<td>(Un) 1.15 Un</td>
<td>m J</td>
<td>(kg)</td>
<td>(kg)</td>
<td>(kg)</td>
<td>(kg)</td>
</tr>
<tr>
<td>225</td>
<td>6SE7012-1.250</td>
<td>988</td>
<td>450</td>
<td>205</td>
<td>750</td>
<td>200</td>
<td>988</td>
<td>988</td>
<td>750</td>
<td>19.0</td>
<td>3.90</td>
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<td>750</td>
<td>200</td>
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<td>3.90</td>
<td>0.50</td>
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<td>1.50</td>
<td>3.90</td>
<td>0.50</td>
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<td>3.90</td>
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<td>3.90</td>
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<tr>
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<td>6SE7001-1.250</td>
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<td>205</td>
<td>750</td>
<td>200</td>
<td>988</td>
<td>988</td>
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<td>6SE7000-1.250</td>
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<td>750</td>
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<td>988</td>
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<td>3.90</td>
<td>0.50</td>
</tr>
</tbody>
</table>
### 1PL6 Asynchronous Servomotors

**Order No. suffix for sizes 180 and 225**

| Encoder          | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Blower supply voltage | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 3 AC 400 V ±10%, 50 Hz (for 1PL618.) | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | |
| 3 AC 480 V +5% –10%, 60 Hz (only for 1PL622.) | | | | | | | | | | | | | | | | | |
| Encoder | Without encoder | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Absolute-value encoder (EnDat) (2048 p/r) | | | | | | | | | | | | | | | | | |
| Incremental encoder HTL (1024 p/r) | | | | | | | | | | | | | | | | | |
| Incremental encoder HTL (2048 p/r) | | | | | | | | | | | | | | | | | |
| Sin/cos incremental encoder 1-Vpp (without C-track and D-track) | | | | | | | | | | | | | | | | | |
| Sin/cos incremental encoder 1-Vpp (with C-track and D-track) | | | | | | | | | | | | | | | | | |
| Direction of cable entry (terminal box on top) | | | | | | | | | | | | | | | | | |
| From the right | | | | | | | | | | | | | | | | | |
| From D-end | | | | | | | | | | | | | | | | | |
| From ND-end | | | | | | | | | | | | | | | | | |
| From the left | | | | | | | | | | | | | | | | | |
| Type of construction (see page 7/36) | | | | | | | | | | | | | | | | | |
| IM B 3 | Standard | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| IM B 6, IM B 7, IM B 8, IM V 5, IM V 6 | For vertical types of construction | | | | | | | | | | | | | | | | | |
| IM B 36 | Standard | | | | | | | | | | | | | | | | | |
| IM V 36, IM V 15 | For vertical types of construction | | | | | | | | | | | | | | | | | |
| Type of drive | Vibration severity | | | | | | | | | | | | | | | | | |
| Coupling | R | N | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Coupling | R | R | | | | | | | | | | | | | | | | |
| Coupling | SR | R | | | | | | | | | | | | | | | | |
| Belt | R | N | | | | | | | | | | | | | | | | |
| Belt | R | R | | | | | | | | | | | | | | | | |
| Increased lateral forces | R | N | | | | | | | | | | | | | | | | |
| Increased lateral forces | R | R | | | | | | | | | | | | | | | | |
| Air-flow direction | Shaft extension | | | | | | | | | | | | | | | | | |
| D-end | Smooth | | | | | | | | | | | | | | | | | |
| D-end | With featherkey, full-key balancing | | | | | | | | | | | | | | | | | |
| Paint finish | | | | | | | | | | | | | | | | | |
| Primed | | | | | | | | | | | | | | | | | |
| Anthracite, normal coating (RAL 7016) | | | | | | | | | | | | | | | | | |
| Anthracite, special coating (RAL 7016) | | | | | | | | | | | | | | | | | |
Asynchronous Servomotors

1PL6 Asynchronous Servomotors

<table>
<thead>
<tr>
<th>1PL6 Asynchronous servomotors · Order No. suffix for size 280 (available soon)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order No. suffix for size 280 (available soon)</td>
</tr>
</tbody>
</table>

- **BLOWER, MAIN SUPPLY VOLTAGE**
  - 3 AC 400 V +/-10%, 50/60 Hz; 480 V +/-10%, 60 Hz

- **With separate blower**
  - ND-end top; direction of air flow ND-end to D-end
  - ND-end right; direction of air flow ND-end to D-end
  - ND-end left; direction of air flow ND-end to D-end
  - Without separate blower; for single pipe connection to ND-end

- **ENCODER**
  - Without encoder
  - Incremental encoder HTL (1524 p/r)
  - Incremental encoder HTL (2048 p/r)

- **TERMINAL BOX**
  - Terminal box ND-end top / cable entry right / encoder connector on D-end
  - Terminal box ND-end left / cable entry below / encoder connector on D-end

- **TYPE OF CONSTRUCTION**
  - IM B 3
  - IM B 6, IM B 7, IM B 8, IM V 5, IM V 6
  - IM B 35 (with flange A660)
  - IM V 36 (IM V 15, with flange A660)

- **TYPE OF DRIVE**
  - Vibration severity
  - Shaft end flange accuracy

- **COUPLING**
  - R, R

- **BELT**
  - Increased lateral forces

- **SHAFT EXTENSION**
  - With featherkey; half-key balancing
  - With featherkey; full-key balancing

- **PAINT FINISH**
  - Primed
  - Anthracite, normal coating (RAL 7016)
  - Anthracite, special coating (RAL 7016)

1) Only possible for 8th data digit “0”, “2”, “6”.  
2) Only possible for 8th data digit “0”, “1”, “6”.  
3) Only possible for 8th data digit “1”, “2”, “6”.
Asynchronous Servomotors

Technical data

They are especially characterized by the following properties:
- high power density with low physical volume
- high degree of protection
- large speed range
- speeded down to zero without torque reduction
- robustness
- low maintenance requirements
- high level of concentricity even at lowest speeds
- integrated encoder system for detecting motor speed
- terminal box for power cable connection
- KTY 84 motor temperature monitoring.

Fig. 3/9
1PH4 three-phase motors, sizes 100 to 160

Technical characteristics

The 1PH4 three-phase motors are compact, water-cooled asynchronous motors with a squirrel-cage rotor.

Applications

- wherever extreme ambient conditions such as high temperature, dust, dirt or aggressive atmosphere prevent air cooling
- in processes where the environment must not be thermally influenced
- on special machines where cooling water is available from the process.

1PH4 motors, frame sizes 100 to 160

<table>
<thead>
<tr>
<th>Standard</th>
<th>Options</th>
<th>Option codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of construction</td>
<td>IM B 35 / IM V 15 / IM V 36</td>
<td>–</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 65</td>
<td>IP 65</td>
</tr>
<tr>
<td>Vibration severity</td>
<td>S (with double bearing)</td>
<td>S (with double bearing)</td>
</tr>
<tr>
<td>Shaft and flange accuracy</td>
<td>R (with single bearing)</td>
<td>R (with single bearing)</td>
</tr>
<tr>
<td>Shaft extension</td>
<td>SFR (with single bearing)</td>
<td>K18</td>
</tr>
<tr>
<td>Terminal box (looking at D-end)</td>
<td>On top, (can be rotated by 4 x 90°) cable entry from the right</td>
<td>K12</td>
</tr>
<tr>
<td>Motor protection</td>
<td>KTY 84, in the stator winding</td>
<td>–</td>
</tr>
<tr>
<td>Encoder system (plug connection)</td>
<td>Incremental encoder HTL (with SIMOVERT VC)</td>
<td>–</td>
</tr>
<tr>
<td>Paint finish</td>
<td>Anthracite RAL 7016</td>
<td>–</td>
</tr>
<tr>
<td>Bearings</td>
<td>Double bearing on D-end for belt drive (minimum lateral force necessary)</td>
<td>Single bearing on D-end for coupling drive and planetary gear (low lateral forces)</td>
</tr>
<tr>
<td>Cooling</td>
<td>Water cooling</td>
<td>Increased maximum speed</td>
</tr>
<tr>
<td>Gearbox mounting</td>
<td>Suitable for fitting a 2P gear-change gear unit</td>
<td>–</td>
</tr>
<tr>
<td>Other</td>
<td>Second rating plate supplied as a loose item</td>
<td>–</td>
</tr>
<tr>
<td>Holding brake</td>
<td>2P holding brake on D-end</td>
<td>–</td>
</tr>
</tbody>
</table>

1) Sound pressure level

| 100 | 69 dB(A) |
| 132 | 69 dB(A) |
| 160 | 71 dB(A) |

2) Cooling water rate, connection thread

| 100 | G 60° |
| 132 | G 35° |
| 160 | G 35° |

3) Max. possible speeds

| 100 | 12,000 rpm |
| 132 | 10,000 rpm |
| 160 | 8,000 rpm |

4) For notes on gearbox mounting, see Chapter 4.
## Asynchronous Servomotors

### 1PH4 Asynchronous servomotors

**Selection and ordering example with SIMOVERT MASTERDRIVES Vector Control converters**

<table>
<thead>
<tr>
<th>Motor data</th>
<th>Utilization to temperature rise class F</th>
<th>Asynchronous servomotors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor data</td>
<td>Utilization to temperature rise class F</td>
<td>Asynchronous servomotors</td>
</tr>
<tr>
<td>n1: Speed at which, for P = Pn, 30% reserve</td>
<td>1PH4 Water-cooled</td>
<td></td>
</tr>
</tbody>
</table>

### Mains voltage 3 AC 400 V for SIMOVERT MASTERDRIVES Vector Control converters

| 1PH4-4PF6 | 118 35 20.5 400 2600 7500 0.75 11.5 0.941 61.2 0.15 (0.017) 115 (52) 25.5 6SE7022-6.EC81-1AA0 |
|-----------|----------------------------------------|--------------------------|
| 1PH4-4PF6 | 17.2 52 28 400 2600 7500 0.78 13.5 0.954 67.3 0.212 (0.024) 148 (67) 37.5 6SE7023-4.EC81-1AA0 |
| 1PH4-4PF6 | 21.8 66 35.5 400 2600 7500 0.78 18 0.987 61.1 0.274 (0.031) 176 (80) 37.5 6SE7023-8.EC81-1AA0 |
| 1PH4-4PF6 | 25.3 71 35.5 400 2100 6700 0.82 12 0.987 60.2 0.407 (0.046) 198 (90) 37.5 6SE7023-8.EC81-1AA0 |
| 1PH4-4PF6 | 34.2 105 52 400 2500 6700 0.79 22 0.961 59.8 0.628 247 (112) 72 6SE7026-6.EC81-1AA0 |
| 1PH4-4PF6 | 42.2 127 63 400 2300 6700 0.81 23 0.905 59.9 0.752 287 (130) 72 6SE7027-2.EC81-1AA0 |
| 1PH4-4PF6 | 57.6 173 88 400 2800 5300 0.87 42 0.914 59.3 1.05 386 (170) 92 6SE7031-0.EC81-1AA0 |
| 1PH4-4PF6 | 72.4 216 107 400 2800 5300 0.8 44 0.92 59.4 1.23 463 (200) 124 6SE7031-2.EF01-1AA0 |
| 1PH4-4PF6 | 91.8 246 117 400 2900 5300 0.82 43 0.921 59.4 1.23 529 (240) 124 6SE7031-2.EF01-1AA0 |

### Mains voltage 3 AC 480 V for SIMOVERT MASTERDRIVES Vector Control converters

| 1PH4-4PF6 | 118 35 20.5 400 2600 7500 0.75 11.5 0.941 61.2 0.15 (0.017) 115 (52) 25.5 6SE7022-6.EC81-1AA0 |
|-----------|----------------------------------------|--------------------------|
| 1PH4-4PF6 | 17.2 52 28 400 2600 7500 0.78 13.5 0.954 67.3 0.212 (0.024) 148 (67) 37.5 6SE7023-4.EC81-1AA0 |
| 1PH4-4PF6 | 21.8 66 35.5 400 2600 7500 0.78 18 0.987 61.1 0.274 (0.031) 176 (80) 37.5 6SE7023-8.EC81-1AA0 |
| 1PH4-4PF6 | 25.3 71 35.5 400 2100 6700 0.82 12 0.987 60.2 0.407 (0.046) 198 (90) 37.5 6SE7023-8.EC81-1AA0 |
| 1PH4-4PF6 | 34.2 105 52 400 2500 6700 0.79 22 0.961 59.8 0.628 247 (112) 72 6SE7026-6.EC81-1AA0 |
| 1PH4-4PF6 | 42.2 127 63 400 2300 6700 0.81 23 0.905 59.9 0.752 287 (130) 72 6SE7027-2.EC81-1AA0 |
| 1PH4-4PF6 | 57.6 173 88 400 2800 5300 0.87 42 0.914 59.3 1.05 386 (170) 92 6SE7031-0.EC81-1AA0 |
| 1PH4-4PF6 | 72.4 216 107 400 2800 5300 0.8 44 0.92 59.4 1.23 463 (200) 124 6SE7031-2.EF01-1AA0 |
| 1PH4-4PF6 | 91.8 246 117 400 2900 5300 0.82 43 0.921 59.4 1.23 529 (240) 124 6SE7031-2.EF01-1AA0 |

### Specifications

1) n1: Speed at which, for P = Pn, 30% reserve power is still available before reaching the stall limit.

2) Warning! The maximum speed in field-weakening mode is sometimes limited to lower values due to \( f_{\text{max}} \times 5 \times \text{J} \) in case of Vector Control and \( f_{\text{max}} < 2 \times \text{J} \) in the case of Motion Control.

3) The 9th digit in the Order No. is to be completed with the suffixes indicated below the table. **For rated currents below 37.5 A Compact Plus units can also be used.**

---

**Order No.**

**Converter Type**

### Siemens Catalog MC Part 2 · 2002/2003

---

**Order No.3)**

Inverter E **

Converter J
Asynchronous Servomotors

### 1PH4 Asynchronous Servomotors

#### Selection and Ordering Example with SIMOVERT MASTERDRIVES Motion Control Converters

| Motor data (utilization to temperature rise class F) | Rated power P2 (kW) | Rated torque T2 (N·m) | Rated current I2 (A) | Rated voltage V2 (V) | Speed during field-weakening n2 | Max. operating speed nmax | Power factor cos ϕ | Efficiency η | Rated frequency fn | Rated moment of inertia Jn (kg·m²) | Weight W (kg) | Order No. | Conversion data | Inverter |
|---------------------------------------------------|---------------------|-----------------------|---------------------|---------------------|-------------------------------|-------------------------|-------------------------|----------------|----------------|----------------|-------------------|-----------|----------------|------------------|---------|
| Size 1PH4168-4.F56 | 10.1 (7.5) | 35 | 20.5 | 350 | 2400 | 7500 | 0.74 | 12 | 0.82 | 52.8 | 0.15 (0.017) | 115 (52) | 25.5 | ESE7022-6.C51 |        |
| Size 1PH4163-4.F56 | 14.7 (11) | 52 | 29 | 350 | 2100 | 7500 | 0.76 | 15.5 | 0.836 | 52.9 | 0.212 (0.024) | 148 (62) | 34 | ESE7023-6.C51 |        |
| Size 1PH4137-4.F56 | 10.8 (8.1) | 56 | 35.5 | 350 | 2400 | 7500 | 0.77 | 18.5 | 0.851 | 52.5 | 0.274 (0.031) | 186 (66) | 37.5 | ESE7023-6.D51 |        |
| Size 1PH4133-4.F56 | 20.1 (15) | 70 | 35 | 350 | 1800 | 6700 | 0.81 | 13 | 0.877 | 51.8 | 0.407 (0.046) | 198 (66) | 37.5 | ESE7023-6.D51 |        |
| Size 1PH4135-4.F56 | 29.5 (22) | 103 | 52 | 350 | 2100 | 6700 | 0.79 | 24 | 0.89 | 51.4 | 0.628 (0.08) | 247 (99) | 59 | ESE7026-6.D51 |        |
| Size 1PH4137-4.F56 | 36.2 (27) | 126 | 62 | 350 | 1900 | 6700 | 0.81 | 24 | 0.895 | 51.5 | 0.752 (0.1) | 287 (102) | 72 | ESE7027-2.D51 |        |
| Size 1PH4163-4.F56 | 49.6 (37) | 174 | 89 | 350 | 2400 | 5300 | 0.77 | 45 | 0.905 | 50.9 | 1.504 (0.157) | 288 (102) | 92 | ESE7051-2.E50 |        |
| Size 1PH4167-4.F56 | 61.7 (46) | 216 | 107 | 350 | 2000 | 5300 | 0.79 | 48 | 0.91 | 50.9 | 1.829 (0.208) | 493 (170) | 124 | ESE7051-2.F5Q |        |
| Size 1PH4168-4.F56 | 69.7 (52) | 244 | 117 | 350 | 2100 | 5300 | 0.81 | 46 | 0.913 | 51 | 1.948 (0.222) | 529 (180) | 124 | ESE7051-2.F5Q |        |

#### Mains voltage 3 AC-400 V for SIMOVERT MASTERDRIVES Motion Control Converters

| Motor data (utilization to temperature rise class F) | Rated power P2 (kW) | Rated torque T2 (N·m) | Rated current I2 (A) | Rated voltage V2 (V) | Speed during field-weakening n2 | Max. operating speed nmax | Power factor cos ϕ | Efficiency η | Rated frequency fn | Rated moment of inertia Jn (kg·m²) | Weight W (kg) | Order No. | Conversion data | Inverter |
|---------------------------------------------------|---------------------|-----------------------|---------------------|---------------------|-------------------------------|-------------------------|-------------------------|----------------|----------------|----------------|-------------------|-----------|----------------|------------------|---------|
| Size 1PH4103-4.F56 | 11.8 (8.6) | 25 | 20.5 | 400 | 2800 | 7500 | 0.75 | 11.5 | 0.841 | 61.2 | 0.15 (0.017) | 115 (52) | 25.5 | ESE7022-6.C51 |        |
| Size 1PH4105-4.F56 | 17.2 (12.8) | 53 | 29 | 400 | 2000 | 7500 | 0.78 | 13.5 | 0.854 | 61.3 | 0.212 (0.024) | 148 (62) | 34 | ESE7023-4.C51 |        |
| Size 1PH4135-4.F56 | 21.8 (16.3) | 68 | 35.5 | 400 | 2050 | 7500 | 0.78 | 18 | 0.867 | 61 | 0.274 (0.031) | 176 (62) | 37.5 | ESE7023-6.D51 |        |
| Size 1PH4133-4.F56 | 23.5 (17.5) | 71 | 35.5 | 400 | 2100 | 7500 | 0.82 | 12 | 0.86 | 60.2 | 0.407 (0.04) | 198 (66) | 37.5 | ESE7023-6.D51 |        |
| Size 1PH4135-4.F56 | 34.2 (25.5) | 103 | 52 | 400 | 2550 | 7500 | 0.79 | 22 | 0.901 | 58.9 | 0.628 (0.08) | 247 (99) | 59 | ESE7026-6.D51 |        |
| Size 1PH4137-4.F56 | 42.2 (31.5) | 127 | 63 | 400 | 2300 | 7500 | 0.81 | 23 | 0.905 | 59.9 | 0.752 (0.1) | 287 (102) | 72 | ESE7027-2.D51 |        |
| Size 1PH4163-4.F56 | 57.6 (43) | 173 | 88 | 400 | 2800 | 5300 | 0.76 | 42 | 0.914 | 59.3 | 1.504 (0.157) | 288 (102) | 92 | ESE7051-2.E50 |        |
| Size 1PH4167-4.F56 | 72.4 (54) | 218 | 107 | 400 | 2500 | 5300 | 0.8 | 44 | 0.918 | 58.4 | 1.823 (0.208) | 463 (170) | 124 | ESE7051-2.F5Q |        |
| Size 1PH4168-4.F56 | 81.9 (61) | 246 | 117 | 400 | 2400 | 5300 | 0.82 | 43 | 0.921 | 58.4 | 1.948 (0.222) | 529 (180) | 124 | ESE7051-2.F5Q |        |

1) n1: Speed at which for P2/P1, 30% reserve power is still available before heating the stall limit.
2) Warning! The maximum speed in field-weakening mode is sometimes limited to lower values due to Imin ≤ 1.5 in case of Vector Control and Iaux ≤ 2 in case of Motion Control.
3) The 9th digit in the Order No. is to be completed with the value 1111111111 below the table.

**Note:** For rated currents below 35.5 A Compact Plus units can also be used.

Siemens Catalog MC Part 2 - 2002/2003
Asynchronous Servomotors
Servomotors

Accessories

Encoder systems
- Incremental encoder HFL (1024 p/r and 2048 p/r)
- Resolver, 2-pole/multi-pole
- Sin/cos incremental encoder 1 Vpp
- Absolute-value encoder (EnDat)

Measuring Systems
- Measuring Systems for 1FN3 AC linear motors
- Hall-effect sensor box

Holding brakes
- Integrated holding brakes for 1FK. and 1FT6 motors
- Built-on holding brakes for 1PH7 motors
- Order No. code

Built-on gears
- Planetary gears, LP series (from alpha)
- Planetary gears, SPG series (from alpha)
- 2-gear units (from ZF)
- Planetary gears made by Bayside

Accessories for 1FN3 AC linear motors
- Optional coolers
- Precision coolers
- Cooling profiles (secondary section cooler)
- Secondary section end pieces
- Secondary section cover
Servomotors

Accessories

Encoder systems

Incremental encoder HTL (1024 p/r and 2048 p/r)

Method of functioning: photoelectric scanning

Focussing lens
Light source
Scanning plate
Photo element
Reference mark

Output signals

Signal period
A
B

Technical data

Supply voltage: +10 V to 30 V
Output signals: HTL, Track A, Track B, Zero pulse and inverted signals
Number of pulses per revolution: 1024 (optional 2048)
Accuracy:
= ± 0.017°
Resolution with SBR:
360° el.

Positioning accuracy:
1024 p/r (2048, 3072, 4096 p/r)

Frequency limit (-3 dB): 160 kHz
Use: 1PH7, 1PL6, 1PH4

Max. possible connecting cable length:
– without transfer of the inverted signals
492 ft (150 m)
– with transfer of the inverted signals
984 ft (300 m)

1) When using a multi-pole resolver, the number of poles corresponds to the number of poles of the motor.

2) Output signals:
   • 2-pole resolver: one sin/cos signal per revolution
   • 4-pole resolver: two sin/cos signals per revolution
   • 6-pole resolver: three sin/cos signals per revolution

3) Is the maximum position deviation within one signal period of the encoder. Decisive influence on the positioning accuracy, speed stability and power loss of the drive.

4) Is the (maximum) number of increments/periods per revolution. Evaluation electronics in the encoder board allows to interpolate between periods and therefore to increase the resolution.

5) In practice, achievable positioning accuracy is a factor 4 to 10 times worse than resolution.

 Resolver 2-pole/multi-pole

Method of functioning: inductive sampling, sine/cosine evaluation for rotor position

Transmitter ratio:

Width of angular error:
< 0.2° (0.167°, 0.067°, 0.067°)

Use:
1PH6, 1PH6, 1PH7, 1PH8

Max. possible connecting cable length:
492 ft (150 m)

Resolution with SBR:

Positioning accuracy:
1024 p/r (2048, 3072, 4096 p/r)

Fig. 4/1

Fig. 4/2

Fig. 4/3
Servomotors

Accessories

Asynchronous Servomotors

Synchronous Servomotors

Encoder systems

Note to the method of functioning graphics:
The functioning graphics for the incremental and absolute-value encoders were taken out of the catalog of Dr. JOHANNES HEIDENHAIN GmbH, Traunreut by the company’s kind permission.

### Technical data

#### Supply voltage:
+5 V ±5%

#### Incremental signals (sinusoidal):
- Voltage: 1 Vpp
- Number of pulses per revolution: 2048
- Accuracy: ±0.01°

#### Code signals:
- Voltage: 1 Vpp
- Type of signals (C and D tracks): 1 sine signal and 1 cosine signal per revolution

#### Use:
1FT6, 1FK6, 1FK7, 1FS6 synchronous servomotors
1PH7, 1PL6, 1PH4 asynchronous servomotors

#### Max. possible connecting cable length:
328 ft (100 m)

1) Absolute-value encoder (EnDat) with 2048 p/r for 1FT6, 1FK, 1FS6 motors from size 48 and all asynchronous motors.
Absolute-value encoder (EnDat) with 512 p/r for 1FK6 size 28 and 1FK motors from sizes 28 and 36.
Single absolute-value encoder (EnDat) with 32 p/r for 1FK motors from size 48.

2) Is the maximum position deviation within one signal period of the encoder. Decisive influence on the positioning accuracy, speed stability and power loss of the drive.

Method of functioning: photoelectric scanning

**Output signals**

- A1: Absolute position
- A2: Absolute position
- B: Incremental signals
- N: Zero pulse

Method of functioning: photoelectric scanning

**Output signals**

- A: Absolute position
- B: Absolute position
- C: Code signals
- D: Code signals

### Use:
1FT6, 1FK6, 1FK7, 1FS6 synchronous servomotors
1PH7, 1PL6, 1PH4 asynchronous servomotors

### Technical data

#### Supply voltage:
+5 V ±5%

#### Incremental signals (sinusoidal):
- Voltage: 1 Vpp
- Number of pulses per revolution: 2048
- Accuracy: ±0.01° / ±0.02° / ±0.1°

#### Code signals:
- Voltage: 1 Vpp
- Type of signals (C and D tracks): 1 sine signal and 1 cosine signal per revolution

#### Use:
1FT6, 1FK6, 1FK7, 1FS6 synchronous servomotors
1PH7, 1PL6, 1PH4 asynchronous servomotors

#### Max. possible connecting cable length:
328 ft (100 m)
Servomotors

Accessories

Measuring systems

Measuring systems for 1FN3 AC linear motors

The following linear encoders are recommended for use with 1FN linear motors and the SIMODRIVE 611 universal or SIMODRIVE POSMO CD/CA drive system.

Encapsulated (sealed) linear encoders are characterized by a high degree of protection and easy mounting. They are therefore ideal for application in typical production environments.

Exposed (open) linear encoders are characterized by higher accuracy grades, higher traversing speeds and contact-free scanning, i.e. without friction between the scanning head and scale.

Exposed linear encoders are suited for applications in clean environments, e.g. on measuring machines or production equipment in the semiconductor industry.

Recommended linear measuring systems for 1FN linear motors

<table>
<thead>
<tr>
<th>Heidenhain</th>
<th>Heidenhain</th>
<th>Heidenhain</th>
<th>Renishaw</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC 181</td>
<td>LC 481</td>
<td>LS 186</td>
<td>LS 486</td>
</tr>
<tr>
<td>Absolute encoder EnDat</td>
<td>Incremental encoder sin/cos 1 Vpp</td>
<td>Incremental encoder sin/cos 1 Vpp</td>
<td>Incremental encoder sin/cos 1 Vpp</td>
</tr>
<tr>
<td>encapsulated</td>
<td>encapsulated</td>
<td>encapsulated</td>
<td>exposed</td>
</tr>
</tbody>
</table>

| Signal cycle µm | 16 | 20 | 20 | 20 |
| Max. permissible acceleration in measuring direction (m/s²) | 164 (50) | 328 (100) | 164 (50) | 394 (130) |
| Max. permissible traversing velocity (mm/min) | 394 (120) | 394 (120) | 394 (120) | 394 (130) |
| Maximum measuring length (mm) | 119.69 (3040) | 119.69 (3040) | 80.31 (2040) | 1968.5 (50000) |
| Output signal/data output | EnDat/Vpp | 1 Vpp | 1 Vpp | 1 Vpp |

For more information contact the manufacturer directly at:

Heidenhain Corporation
333 E. State Parkway
Schaumburg, IL 60173-5337
Phone: (847) 490-1191
Fax: (847) 490-3931
http://www.heidenhain.com

Renishaw Inc.
5277 Trillium Blvd
Hoffman Estates, IL 60192
Phone: (847) 286-9953
Fax: (847) 645-9740
http://www.renishaw.com

1) Figure relates to measuring head.
Hall-effect sensor box

When using an incremental measuring scale, a Hall sensor is required for 1FN3 linear motors.

When the machine is powered-up, the Hall sensor provides the pole position in the motor for commutation during the reference point approach.

If an absolute measuring system is used, the Hall sensor box is not required as long as the pole position angle is measured using an oscilloscope or flux meter when the system is first commissioned or when a measuring scale is changed, and is permanently entered into the parameter list of the drive control.

<table>
<thead>
<tr>
<th>Linear motor type</th>
<th>Hall-effect sensor box</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FN3 050-2W</td>
<td>1FN02 002-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 100-2W</td>
<td>1FN02 002-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 150-2W</td>
<td>1FN02 002-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 300-2W</td>
<td>1FN02 003-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 450-2W</td>
<td>1FN02 003-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 600-2W</td>
<td>1FN02 003-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 900-2W</td>
<td>1FN02 003-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 100-3W</td>
<td>1FN02 005-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 150-3W</td>
<td>1FN02 005-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 300-3W</td>
<td>1FN02 006-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 450-3W</td>
<td>1FN02 006-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 600-3W</td>
<td>1FN02 006-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 900-3W</td>
<td>1FN02 006-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 100-4W</td>
<td>1FN02 002-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 150-4W</td>
<td>1FN02 002-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 300-4W</td>
<td>1FN02 003-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 450-4W</td>
<td>1FN02 003-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 600-4W</td>
<td>1FN02 003-0PH00-0AA0</td>
</tr>
<tr>
<td>1FN3 900-4W</td>
<td>1FN02 003-0PH00-0AA0</td>
</tr>
</tbody>
</table>
Motors may need a holding brake with an emergency-stop function for reasons relating to the process involved or for safety. There are two different ways of attaching a brake to the motor:

1. Brake integrated in the motor 1FK and 1FT6 (integrated holding brake).
2. Brake built onto the D-end of the 1PH7 motor (built-on holding brake).

### Integrated holding brakes for 1FK and 1FT6 motors

The permanent-magnet and spring-loaded single-face brakes used for these series of motors work on the closed-circuit current principle. The magnetic field of the permanent magnet exerts a pulling force on the brake’s armature plate, i.e. in a zero-current condition, the brake is closed, thus preventing the motor shaft from turning. When there is a rated voltage of 24 V DC applied to the brake, the current-carrying coil generates an opposing field which cancels out the force exerted by the permanent magnet and releases the brake or holds it open.

For “emergency stops” or on power failure, approximately 2000 braking operations can be carried out at maximum switching capacity without causing excessive wear on the holding brake (condition: the maximum external moment of inertia = the motor’s own moment of inertia and \( n_{\text{max}} \) in relation to the type). The holding brake is not designed as a stopping device during normal operations.

To avoid switching overshoots and any associated influence on the plant or system environment, the brake feeder must be connected externally to a varistor. It is connected using the power plug or a terminal box.

### Technical data of the integrated holding brakes (brake supply voltage: 24 V DC ± 10%)

<table>
<thead>
<tr>
<th>Size</th>
<th>Motor type</th>
<th>Brake type</th>
<th>Holding torque (lb f-in)</th>
<th>Opening time A (ms)</th>
<th>Closing time A (ms)</th>
<th>Holding torque (Nm)</th>
<th>Moment of inertia ( I_{\text{h}} ) (10^-4 kgm^2)</th>
<th>Maximum switching energy per braking operation when braking from ( n = 3000 ) rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>1FK7022</td>
<td>EBD 0.11 BN</td>
<td>0.8</td>
<td>0.3</td>
<td>25</td>
<td>15</td>
<td>0.00006 (0.07)</td>
<td>8</td>
</tr>
<tr>
<td>36</td>
<td>1FK7032</td>
<td>EBD 0.13 BN</td>
<td>1</td>
<td>0.4</td>
<td>45</td>
<td>25</td>
<td>0.00017 (0.18)</td>
<td>17</td>
</tr>
<tr>
<td>48</td>
<td>1FK704</td>
<td>EBD 0.3 BV</td>
<td>2.8</td>
<td>0.56</td>
<td>70</td>
<td>20</td>
<td>0.00034 (0.32)</td>
<td>74</td>
</tr>
<tr>
<td>63</td>
<td>1FK706</td>
<td>EBD 0.8 BK</td>
<td>8.7</td>
<td>0.8</td>
<td>90</td>
<td>20</td>
<td>0.00189 (2.05)</td>
<td>357</td>
</tr>
<tr>
<td>80</td>
<td>1FK7080</td>
<td>EBD 1.5 BN</td>
<td>7.4</td>
<td>0.71</td>
<td>90</td>
<td>20</td>
<td>0.00274 (3.1)</td>
<td>397</td>
</tr>
<tr>
<td>80</td>
<td>1FK7083</td>
<td>EBD 2 BV</td>
<td>16.2</td>
<td>0.93</td>
<td>125</td>
<td>145</td>
<td>0.00761 (9.4)</td>
<td>1417</td>
</tr>
<tr>
<td>100</td>
<td>1FK710</td>
<td>EBD 3.5 BV</td>
<td>30 (41)</td>
<td>0.93</td>
<td>140</td>
<td>100</td>
<td>0.0119 (13.5)</td>
<td>2083</td>
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</table>

For 1FK7 HD motors:

<table>
<thead>
<tr>
<th>Size</th>
<th>Motor type</th>
<th>Brake type</th>
<th>Holding torque (lb f-in)</th>
<th>Opening time A (ms)</th>
<th>Closing time A (ms)</th>
<th>Holding torque (Nm)</th>
<th>Moment of inertia ( I_{\text{h}} ) (10^-4 kgm^2)</th>
<th>Maximum switching energy per braking operation when braking from ( n = 3000 ) rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>1FK7033</td>
<td>1EB14</td>
<td>1.8</td>
<td>0.4</td>
<td>50</td>
<td>110</td>
<td>0.00012 (0.12)</td>
<td>17</td>
</tr>
<tr>
<td>48</td>
<td>1FK704</td>
<td>1EB20</td>
<td>4.4</td>
<td>0.65</td>
<td>50</td>
<td>110</td>
<td>0.00013 (0.143)</td>
<td>234</td>
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<tr>
<td>63</td>
<td>1FK706</td>
<td>1EB27</td>
<td>10.3</td>
<td>0.65</td>
<td>75</td>
<td>115</td>
<td>0.00037 (0.419)</td>
<td>542</td>
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<tr>
<td>80</td>
<td>1FK7082</td>
<td>1EB30</td>
<td>15.2</td>
<td>1</td>
<td>75</td>
<td>180</td>
<td>0.00077 (0.871)</td>
<td>1200</td>
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<tr>
<td>80</td>
<td>1FK7085</td>
<td>1EB35</td>
<td>20.6</td>
<td>1.2</td>
<td>115</td>
<td>190</td>
<td>0.00139 (1.574)</td>
<td>1500</td>
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</tbody>
</table>

The technical data are given in the table below (for dimension drawings, see Chapter 8).
### Integrated holding brakes for 1FK and 1FT6 motors

#### Technical data of the integrated holding brakes (brake supply voltage: 24 V DC ± 10%)

<table>
<thead>
<tr>
<th>Size</th>
<th>Motor type</th>
<th>Brake type</th>
<th>Holding torque</th>
<th>Direct current</th>
<th>Opening time with varistor</th>
<th>Closing time with varistor</th>
<th>Moment of inertia</th>
<th>Maximum switching energy per braking operation when braking from n = 3000 rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
<td>For 1FK6 motors</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>36</td>
<td>1FK6032</td>
<td>EBD 0.13 BS</td>
<td>0.8 (1.1)</td>
<td>0.4</td>
<td>30</td>
<td>10</td>
<td>0.00006</td>
<td>13</td>
</tr>
<tr>
<td>48</td>
<td>1FK604</td>
<td>EBD 0.3 B</td>
<td>2.4 (3.7)</td>
<td>0.6</td>
<td>35</td>
<td>10</td>
<td>0.00023</td>
<td>68</td>
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<tr>
<td>63</td>
<td>1FK609</td>
<td>EBD 0.8 B</td>
<td>7.4 (10)</td>
<td>0.7</td>
<td>55</td>
<td>15</td>
<td>0.00079</td>
<td>318</td>
</tr>
<tr>
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<td>1FK611</td>
<td>EBD 1.4 BV</td>
<td>13.3 (18)</td>
<td>0.9</td>
<td>150</td>
<td>30</td>
<td>0.00296</td>
<td>535</td>
</tr>
<tr>
<td>100</td>
<td>1FK6100</td>
<td>EBD 2 BY</td>
<td>14.8 (20)</td>
<td>0.9</td>
<td>100</td>
<td>30</td>
<td>0.00699</td>
<td>1135</td>
</tr>
<tr>
<td>100</td>
<td>1FK6101</td>
<td>EBD 3.8 B</td>
<td>26.6 (36)</td>
<td>0.9</td>
<td>180</td>
<td>25</td>
<td>0.01141</td>
<td>1233</td>
</tr>
<tr>
<td>100</td>
<td>1FK6103</td>
<td>EBD 3.8 B</td>
<td>26.6 (36)</td>
<td>0.9</td>
<td>180</td>
<td>25</td>
<td>0.01141</td>
<td>1233</td>
</tr>
<tr>
<td></td>
<td>For 1FT6 motors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>1FT602</td>
<td>EBD 0.11 B</td>
<td>0.9 (1.2)</td>
<td>0.3</td>
<td>20</td>
<td>10</td>
<td>0.00006</td>
<td>34</td>
</tr>
<tr>
<td>36</td>
<td>1FT603</td>
<td>EBD 0.15 B</td>
<td>1.5 (2)</td>
<td>0.4</td>
<td>30</td>
<td>15</td>
<td>0.0001</td>
<td>27</td>
</tr>
<tr>
<td>48</td>
<td>1FT604</td>
<td>EBD 0.4 BA</td>
<td>3.7 (5)</td>
<td>0.8</td>
<td>30</td>
<td>15</td>
<td>0.00029</td>
<td>126</td>
</tr>
<tr>
<td>63</td>
<td>1FT606</td>
<td>EBD 1.5 BN</td>
<td>16.2 (22)</td>
<td>0.7</td>
<td>130</td>
<td>20</td>
<td>0.00298</td>
<td>321</td>
</tr>
<tr>
<td>80</td>
<td>1FT608</td>
<td>EBD 1.2 B</td>
<td>6.9 (12)</td>
<td>0.6</td>
<td>70</td>
<td>35</td>
<td>0.00298</td>
<td>740</td>
</tr>
<tr>
<td>100</td>
<td>1FT6082</td>
<td>EBD 1.2 B</td>
<td>6.9 (12)</td>
<td>0.6</td>
<td>70</td>
<td>35</td>
<td>0.00298</td>
<td>740</td>
</tr>
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<td>80</td>
<td>1FT6084</td>
<td>EBD 3.5 BN</td>
<td>20.7 (28)</td>
<td>0.9</td>
<td>180</td>
<td>35</td>
<td>0.01133</td>
<td>1640</td>
</tr>
<tr>
<td>80</td>
<td>1FT6086</td>
<td>EBD 3.5 BN</td>
<td>20.7 (28)</td>
<td>0.9</td>
<td>180</td>
<td>35</td>
<td>0.01133</td>
<td>1640</td>
</tr>
<tr>
<td>100</td>
<td>1FT610</td>
<td>EBD 4 B</td>
<td>5.9 (9)</td>
<td>1.4</td>
<td>180</td>
<td>20</td>
<td>0.02833</td>
<td>2150</td>
</tr>
<tr>
<td>132</td>
<td>1FT613</td>
<td>EBD 8 B</td>
<td>10.3 (140)</td>
<td>1.7</td>
<td>260</td>
<td>70</td>
<td>0.06793</td>
<td>9870</td>
</tr>
</tbody>
</table>

Siemens Catalog MC Part 2 · 2002/2003
Built-on holding brakes for 1PH7 motors

A brake can be built onto the drive-end of 1PH7 motors frame sizes 100, 132, 160, 180 and 225. These brakes are electromagnetic brakes for dry-running. An electromagnetic field is used to cancel out the braking effect caused by a spring. The brakes function according to the closed-circuit current principle, i.e. the spring-applied brake brakes when no current is applied and prevents the motor from moving. When current flows again, the brake is released and the motor can rotate. During power failures and "emergency stops", the motor is braked from its current speed until it comes to a standstill. The respective holding torque and the number of emergency stops are given in the table on page 49.

The brakes are designed for connection to an AC voltage of 230 V AC, 50 to 60 Hz or DC 24 V (only up to size 160) which has to be provided on site. The rectifier is built into the terminal box of the brake. The degree of protection is IP 55.

In its basic design, the brake contains three emergency-release screws (only frame sizes 180 and 225) which are axially accessible from the front. The built-in or built-on microswitch can be incorporated as an NC contact or an NO contact in a higher-level control unit. The fast-switching rectifier is foreseen for overexcitation of the coil in order to release the brake and achieve short release times (release current = 2 × holding current). As an option, a manual release can be fitted to the brake module so that, in the event of power failure or motor stoppage, the brake can be released by hand. If the manual-release lever is released, it automatically returns to the braking-mode position. Another option is a built-in microswitch which can be incorporated in a higher-level control unit as an NC contact or an NO contact. The microswitch is connected by means of a separate cable.

The braking module complies with degree of protection IP 65. Motors with a built-on braking module are only available with vibration severity grade N and with shaft and flange accuracy N.

All the technical data such as holding torque, permissible speeds, number of emergency braking operations and braking current are given in the table on page 49. The operating instructions for built-on holding brakes are supplied together with the motor-brake unit.

Ordering example: 1PH7 10B-HFB0-2AA3, IM B 3 type of construction.

This holding brake contains a microswitch and an emergency release screw (for further ordering possibilities, see order number code on page 49).

Built-on holding brake for motors frame sizes 100 to 160

The holding brakes for motors frame sizes 100, 132 and 160 are braking modules (made by Binder) with their own bearings, flange and shaft extension. The dimensions of the flange and shaft extension of the braking module are identical with those of the motor. If a motor is to be equipped with a brake, the motor is supplied with a flange-type of construction and with a plain shaft (without heatkey). The shaft of the braking module is then hot-shrunk onto the motor shaft. It can be removed again by means of an oil impermeable fit. The braking module is then screwed onto the motor flange. The shaft extension of the braking module is fixed with a heatkey (with half-key balancing). Output is then possible by means of a coupling or belt pulley. The permissible lateral forces are indicated in the corresponding lateral-force diagrams.

The 1PH7 (frame sizes 100 and 132) motors can be supplied with an IM B 5 type of construction. In addition, frame sizes 100, 132 and 160 motors can be supplied with an IM B 35 type of construction (installation with IM B 3 foot mounting is therefore possible).

As an option, a manual release can be fitted to the brake module so that, in the event of power failure or motor stoppage, the brake can be released by hand. If the manual-release lever is released, it automatically returns to the braking-mode position. Another option is a built-in microswitch which can be incorporated in a higher-level control unit as an NC contact or an NO contact. The microswitch is connected by means of a separate cable.

The braking module complies with degree of protection IP 65. Motors with a built-on braking module are only available with vibration severity grade N and with shaft and flange accuracy N.

All the technical data such as holding torque, maximum braking energy, permissible speeds, lateral forces and braking currents are given in the table below. The shaft extension can be additionally secured axially by a pressure washer and a central screw (M 20). The holding brake does not have its own bearings. The output forces are therefore absorbed by the motor bearings. Belt pulleys cannot be filled for reasons of space and because of the high lateral forces. When a coupling is being selected for connection to the brake-motor combination, it should be noted that the diameter of the shaft extension is now larger than the diameter of the motor shaft extension.

The exact motor dimensions are given in the dimension drawings in Section 8.

With these motors, the brake (made by Stromag) is mounted on the drive-end bearing shield. To do this, the motor shaft is extended by means of a shrink-on shaft extension. The torque is transmitted by means of a heatkey to DIN 6885/1. The shaft extension can be additionally secured axially by a pressure washer and a central screw (M 20). The holding brake does not have its own bearings. The output forces are therefore absorbed by the motor bearings. Belt pulleys cannot be filled for reasons of space and because of the high lateral forces. When a coupling is being selected for connection to the brake-motor combination, it should be noted that the diameter of the shaft extension is now larger than the diameter of the motor shaft extension.

The exact motor dimensions are given in the dimension drawings in Section 8.

Ordering example: 1PH7 1327-HFB02-3AA3, IM B 5 type of construction (IM B 5, holding brake with manual release (for further ordering possibilities, see order number code on page 49).
Order No. code for 1PH7 motors, frame sizes 100, 132 and 160 for built-on holding brake with emergency-stop function

<table>
<thead>
<tr>
<th>Size</th>
<th>Motor type</th>
<th>Brake type</th>
<th>Holding torque (kN)</th>
<th>Speed ( \times \text{brake torque} \times 200 %)</th>
<th>Power ( \frac{\text{rpm}}{\text{rpm}} )</th>
<th>Life-time switching energy ( \frac{\text{MJ}}{\text{MJ}} )</th>
<th>Number of emergency stops until change of lining from max ( \frac{n_\text{max}}{\text{max}} )</th>
<th>Coil current ( \frac{\text{A}}{\text{A}} )</th>
<th>Flange dimension (in mm)</th>
<th>Shaft extension dimension (in mm)</th>
<th>Permissible lateral force ( \frac{\text{kN}}{\text{kN}} )</th>
<th>Weight ( \frac{\text{kg}}{\text{kg}} )</th>
<th>Opening time ( \frac{\text{s}}{\text{s}} )</th>
<th>Closing time ( \frac{\text{s}}{\text{s}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1PH710.</td>
<td>1PH710.</td>
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</tr>
<tr>
<td>132</td>
<td>1PH713.</td>
<td>1PH713.</td>
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<tr>
<td>160</td>
<td>1PH716.</td>
<td>1PH716.</td>
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</tbody>
</table>

Order No. code for 1PH7 motors, frame sizes 180 and 225 for built-on holding brake with emergency-stop function

<table>
<thead>
<tr>
<th>Size</th>
<th>Motor type</th>
<th>Brake type</th>
<th>Holding torque (kN)</th>
<th>Speed ( \times \text{brake torque} \times 200 %)</th>
<th>Power ( \frac{\text{rpm}}{\text{rpm}} )</th>
<th>Life-time switching energy ( \frac{\text{MJ}}{\text{MJ}} )</th>
<th>Number of emergency stops until change of lining from max ( \frac{n_\text{max}}{\text{max}} )</th>
<th>Coil current ( \frac{\text{A}}{\text{A}} )</th>
<th>Flange dimension (in mm)</th>
<th>Shaft extension dimension (in mm)</th>
<th>Permissible lateral force ( \frac{\text{kN}}{\text{kN}} )</th>
<th>Weight ( \frac{\text{kg}}{\text{kg}} )</th>
<th>Opening time ( \frac{\text{s}}{\text{s}} )</th>
<th>Closing time ( \frac{\text{s}}{\text{s}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>180</td>
<td>1PH7184.</td>
<td>1PH7184.</td>
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<td>225</td>
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<td>1PH7224.</td>
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<td></td>
</tr>
</tbody>
</table>

For 1PH7 brake supply voltage 230 V AC, 50 to 60 Hz/24 V DC

| 100  | 1PH710.   | 1PH710.   |                     |                                               |                                |                                |                                |                 |                 |                   |                 |                 |              |              |
| 132  | 1PH713.   | 1PH713.   |                     |                                               |                                |                                |                                |                 |                 |                   |                 |                 |              |              |
| 160  | 1PH716.   | 1PH716.   |                     |                                               |                                |                                |                                |                 |                 |                   |                 |                 |              |              |

For 1PH7 brake supply voltage 230 V AC, 50 to 60 Hz/24 V DC
Servomotors

Accessories

Built-on gears

**Planetary gears, LP series (from alpha)**

1FK6 and 1FK7 servomotors can easily be combined with planetary gear units of the LP series to form compact coaxial drive units. The gear units are flanged directly onto the drive end of the motors.

When selecting the gear units, ensure that the permissible speed of the gear unit is not exceeded by the maximum speed of the motor. In the case of high operating frequencies (more than 1000 start-stop events per hour), the additional dynamic loading must be taken into account. Please contact alpha gear drives for further information.

The gear units are only available in non-balanced design and with fitted key.

**Motors with built-on planetary gear units**

The gear units assigned to the individual motors and gear ratios available for these motor/gear combinations are listed in the selection table on the following pages. When making your selection, note the maximum permissible input speed of the gear unit which should be equal to the maximum motor speed.

The motor/gear combinations listed in the selection tables are mainly intended for use as positioning drives (S5 duty). Continuous operation (S1 duty) is permissible at the rated speed and rated torque of the gear unit. The gear unit temperature must not exceed +90 °C. The torsional rigidity specifications in the catalog of the company alpha refer to the rated torque of the gear. The rigidity decreases in the partial load range in accordance with the hysteresis characteristic.

**Technical features of the planetary gear units**

- High efficiency (>94 %)
- Power transmission from the central sun gear via planetary gears
- Torque play: single-stage <12 arc min
- No shaft deflections in the planetary gear set due to the symmetrical force distribution
- The enclosed gear units are attached to the shaft by means of an integral clamping hub. This requires a smooth motor shaft extension with rotational accuracy tolerance N according to DIN 42965. The motor flange is fitted by means of adapter plates.
- The gear units are suitable for all mounting positions.
- The gear units are filled with grease. They are lubricated and sealed for their complete service life (guide value for service life ca. 20,000 h).
- Degree of protection IP 64.
- Output shaft of gear unit exactly coaxial with motor
- Oil seal on motor side included in the gear unit
- Small dimensions
- Low weight

For queries relating to the gear units please contact:

**alpha gear drives**

1440 Howard St.
Elk Grove Village, IL 60007
Phone: +1 (847) 439-0700
Fax: +1 (847) 439-0765
http://www.alphagear.com
Synchronous Servomotors

**Order data:**
- **FKK000-DADP...+Z**
- Order No. of the motor (standard type) with identifier “Z” and short code for mounting the planetary gear assigned to the motor.
- G: Smooth shaft, without holding brake.
- H: Smooth shaft, with holding brake.

Smooth motor shaft end is prerequisite for LP gear mounting.

<table>
<thead>
<tr>
<th>Servomotor Self-cooled</th>
<th>Planetary gear (Single-stage)</th>
<th>Transmission ratios available</th>
<th>Max. permissible input speed (rpm)</th>
<th>Max. permissible output torque (in-lb)</th>
<th>Max. permissible drive shaft load (lb)</th>
<th>Moment of inertia (lb-ft-s^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Type</td>
<td>n_i</td>
<td>( n_1 )</td>
<td>( M_{\text{z=5}} )</td>
<td>( M_{\text{z=10}} )</td>
<td>( J_{\text{g}} )</td>
</tr>
<tr>
<td>032</td>
<td>LP-070-M01</td>
<td>4.1</td>
<td>3700</td>
<td>142</td>
<td>133</td>
<td>150</td>
</tr>
<tr>
<td>040</td>
<td>LP-090-M01</td>
<td>9</td>
<td>3400</td>
<td>254</td>
<td>259</td>
<td>250</td>
</tr>
<tr>
<td>060</td>
<td>LP-120-M01</td>
<td>19.8</td>
<td>2600</td>
<td>945</td>
<td>955</td>
<td>950</td>
</tr>
<tr>
<td>080</td>
<td>LP-155-M01</td>
<td>386</td>
<td>4800</td>
<td>3540</td>
<td>3596</td>
<td>3600</td>
</tr>
</tbody>
</table>

**Continuous operation S1**

Continuous operation is permissible in the case of rated speed and rated torque. The gears should not exceed a temperature of +90 °C (194 °F).

<table>
<thead>
<tr>
<th>Planetary gear (Single-stage)</th>
<th>Rated speed</th>
<th>Max. permissible initial torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque play in 12 arc min</td>
<td>( \eta_{\text{Rated}} )</td>
<td>( M_{\text{z=5}} )</td>
</tr>
<tr>
<td>Type</td>
<td>( \eta_{\text{Rated}} )</td>
<td>( M_{\text{z=5}} )</td>
</tr>
<tr>
<td>LP 070-M01</td>
<td>3700</td>
<td>142 (16)</td>
</tr>
<tr>
<td>LP 090-M01</td>
<td>3400</td>
<td>254 (40)</td>
</tr>
<tr>
<td>LP 120-M01</td>
<td>2600</td>
<td>945 (190)</td>
</tr>
<tr>
<td>LP 155-M01</td>
<td>2500</td>
<td>3540 (400)</td>
</tr>
</tbody>
</table>

1) Values for S5 positioning mode.
2) In relation to the midpoint of the output shaft at 100 rpm.
1FT6 AC servomotors can be combined with planetary gear units to form compact coaxial drive units. The gear units are flanged directly onto the drive end of the motors. When selecting the gear units, ensure that the permissible speed of the gear unit is not exceeded by the maximum speed of the motor. In the case of high operating frequencies (more than 1000 start-stop events per hour), the additional dynamic loading must be taken into account. Please contact alpha gear drives for further information. The frictional torque of the gear unit must always be taken into account in planning.

The gear units are only available in non-balanced design.

**Technical features of the planetary gear units**

- High efficiency (>94%, >97% single-stage, >94% two-stage)
- Power transmission from the central sun gear via planetary gears
- No shaft deflections in the planetary gear set due to the symmetrical force distribution
- Very low moment of inertia and hence short acceleration times of the motors

**Motors with built-on planetary gear units**

The gear units assigned to the individual motors and gear ratios available for these motor/gear combinations are listed in the selection tables on the following pages. When making your selection, note the maximum permissible input speed of the gear unit which should be equal to the maximum motor speed.

The motor/gear combinations listed in the selection tables are mainly intended for use as positioning drives (S5 duty). For applications involving continuous operation at high speed, please contact the gear unit manufacturer.

For queries relating to the gear units please contact:

alpha gear drives
1440 Howard St.
Elk Grove Village, IL 60007
Phone: +1 (847) 439-0700
Fax: +1 (847) 439-0755
http://www.alphagear.com
### Planetary gears, SPG series, single-stage (from alpha)

#### Order data:

<table>
<thead>
<tr>
<th>Servomotor Self-cooled</th>
<th>Planetary gear Single-stage (Toroidal play)</th>
<th>Transmission ratios available</th>
<th>Max. permissible input speed</th>
<th>Max. permissible output torque</th>
<th>Max. permissible drive shaft load</th>
<th>Moment of inertia of the gears</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FT6 024</td>
<td>SPG 060-MF1</td>
<td>4, 5, 7, 10</td>
<td>nG1 (rpm)</td>
<td>M20 (Nm)</td>
<td>JG i = 4 (10^4 kgm²)</td>
<td>JG i = 10 (10^4 kgm²)</td>
</tr>
<tr>
<td>1FT6 031</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>1FT6 034</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>1FT6 034</td>
<td>SPG 075-MF1</td>
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<td>1FT6 044</td>
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<tr>
<td>1FT6 044</td>
<td>SPG 100-MF1</td>
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<td>1FT6 052</td>
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<td>1FT6 054</td>
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<td>1FT6 081</td>
<td>SPG 140-MF1</td>
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<td>1FT6 084</td>
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<tr>
<td>1FT6 086</td>
<td>SPG 180-MF1</td>
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<td>1FT6 102</td>
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</tr>
<tr>
<td>1FT6 105</td>
<td>SPG 210-MF1</td>
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<td>1FT6 108</td>
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</tr>
<tr>
<td>1FT6 153</td>
<td>SPG 240-MF1</td>
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<tr>
<td>1FT6 154</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

#### Short code

| For gear shaft with featherkey | V02 | V03 | V05 | V09 |
| For gear shaft without featherkey | V22 | V23 | V25 | V29 |

1) With SPG 060 and SPG 075: ≤ 6 arc min.
2) Guide values for the maximum permissible load on the midpoint of the output shaft at a speed nG2 = 300 rpm. Axial load Fx ≤ 0.5 · F0 with SPG 060 to SPG 180.
Fx ≤ F0 with SPG 210 and SPG 240.

Siemens Catalog MC Part 2 · 2002/2003
### Servomotors

#### Accessories

#### Built-on gears

**Planetary gears, SPG series, 3-stage (from alpha)**

Order data:

1. Order No. of the motor (standard type) with identifier "-Z" and short code for mounting the planetary gear assigned to the motor.

<table>
<thead>
<tr>
<th>Servomotor</th>
<th>Planetary gear</th>
<th>Transmission ratios available</th>
<th>Max. permissible input speed</th>
<th>Max. permissible output torque</th>
<th>Max. permissible drive shaft load</th>
<th>Moment of inertia of the gears</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Type</td>
<td>16 20 28 40 50</td>
<td>( \Omega_1 )</td>
<td>( B_{in} )</td>
<td>( F_x )</td>
<td>( \Delta G )</td>
</tr>
<tr>
<td>1FT6 024</td>
<td>SPG 075-MF2</td>
<td>6.8 (3.1)</td>
<td>6000</td>
<td>985 (160)</td>
<td>954 (360)</td>
<td>0.00355 (0.32)</td>
</tr>
<tr>
<td>1FT6 023</td>
<td>SPG 034</td>
<td>15.7 (7.1)</td>
<td>4500</td>
<td>2322 (250)</td>
<td>1349 (600)</td>
<td>0.00155 (1.7)</td>
</tr>
<tr>
<td>1FT6 021</td>
<td>SPG 100-MF2</td>
<td>32 (14.5)</td>
<td>4000</td>
<td>4425 (500)</td>
<td>2223 (1000)</td>
<td>0.0039 (4.4)</td>
</tr>
<tr>
<td>1FT6 022</td>
<td>SPG 140-MF2</td>
<td>64 (3.9)</td>
<td>4000</td>
<td>9735 (1000)</td>
<td>3147 (15000)</td>
<td>0.0049 (5.1)</td>
</tr>
<tr>
<td>1FT6 020</td>
<td>SPG 180-MF2</td>
<td>64 (3.9)</td>
<td>3500</td>
<td>16816 (1800)</td>
<td>4047 (18500)</td>
<td>0.0305 (34.5)</td>
</tr>
<tr>
<td>1FT6 019</td>
<td>SPG 210-MF2</td>
<td>1064 (48)</td>
<td>3500</td>
<td>26294 (3400)</td>
<td>6270 (27000)</td>
<td>0.0381 (43.1)</td>
</tr>
<tr>
<td>1FT6 018</td>
<td>SPG 240-MF2</td>
<td>154 (7.1)</td>
<td>3500</td>
<td>36294 (3400)</td>
<td>6270 (27000)</td>
<td>0.0391 (44.2)</td>
</tr>
</tbody>
</table>

**Short code**

- For gear shaft with featherkey: V12, V13, V15, V16, V17
- For gear shaft without featherkey: V22, V33, V35, V36, V37

1. With SPG 080 and SPG 075: \( \leq 8 \) arc min.
2. Guide values for the maximum permissible load on the midpoint of the output shaft at a speed \( \Omega_2 = 300 \) rpm. Axial load \( F_x = 0.5 \cdot F_r \) with SPG 075 to SPG 140; \( F_x = F_r \) with SPG 210 and SPG 240.
2-gear units (from ZF)

Installation, mode of operation
The 2-speed gear units have a planetary design. The central sun gear distributes the power to several planetary wheels which revolve around it. The outstanding advantage of this design is its compactness. The gear-changing device, a toothed sleeve that moves axially, is of form-fit design.

Position 1:
Gear ratio \( i_1 = 4 \).

Position 2:
Gear ratio \( i_2 = 1 \).

The motor is flange-mounted onto the gear unit by means of a ring adapter. The AC motor must be suitably prepared for mounting.

At shaft heights of 160 mm and above, the type IM B 35 V 15 motor has to be supported at the non-drive end to prevent distortion.

Any cantilever forces imparted into the gear unit have to be borne by the gear unit and transmitted to the machine base.

Technical features of the 2-gear units
• Drive power up to 134 HP (100 kW)
• Constant power band at drive shaft up to 1:24
• Bi-directional
• Motor frame sizes SH 100 to SH 225
• Types IM B 35 and IM V 15 (IM V 36 on request)
• Gearing efficiency >95%

Instead of V belts, the power output can also be transmitted from the gear drive output shaft by a spur gear pinion (available on request) or coaxially by means of a flexible coupling.

The drive unit (i.e., the motor and gear unit) is supplied with vibration severity grade R according to EN 60 034-14 (IEC 60 034-14). This is also the case when the motor is ordered with grade S.

The belt pulley\(^1\) should be of the cup wheel type. For mounting the pulley, the output shaft on the gear unit has a flange with an external contouring spigot and tapped holes. This ensures easy fitting and removal of the pulley.

1) Not included in scope of supply.

Vertical mounting positions for the IM V 15 and IM V 36 require circulating oil lubrication of the gear unit.

The standard version of the gear units up to and including the 2K 300 has a maximum tangential play of 30 angular minutes (measured at the gear unit output). The play is almost identical whatever the ratio. Various different special versions are available on request:
• Reduced play with special features: max. 20'
• Reduced play for high performance: max. 15'

The motor for all 2K gear units must be full-key balanced with fitted key. Because the 2K 120, 2K 250 and 2K 300 gear units are enclosed, the motor flange is adequately sealed in the standard version.

Change-speed gear units increase the drive torque at low motor speeds and expand the band of constant power output available from the asynchronous servomotors.
Servomotors

Accessories

Built-on gears

2-gear units (from ZF)

For further technical data and planning instructions (such as on lubrication, temperature rise and typical applications), please refer to Catalog No. 4161 757 701D supplied by ZF (Zahnriadintrieb Friedrichshafen). The ratings of the motor and gear unit are the governing factor in the design of the complete power unit (that is the AC motor and gear unit).

In the case of motor 1PH4168 or 1PH7167-2, for example, the rated torque must be reduced to 300 Nm. In the case of the motors of frame size 132, it should be noted that with normal lubrication the speed of the 2K 240 gear unit is restricted to 6300 rpm. The use of a gear unit permits the constant power band to be greatly increased.

2-speed gear unit

For further information about the gear units, please contact the manufacturer directly:

ZF Group North American Operations · Headquarters Florence, KY 7310 Turfway Road, Suite 450 Florence, KY 41042 Phone: (859) 282-4300 Fax: (859) 282-4311 http://www.zf-group.com

ZF Maschinenantriebe GmbH
D-88038 Friedrichshafen Phone: +49 (0) 75 41-77-77-0 Fax: +49 (0) 75 41-77-90 00 http://www.zf-group.de/zh-en

1) Special versions such as gear units with different play, or other ratios (i = 3.17 or i = 5.5) are available on request.

2) Higher drives speeds are allowed for gear ratios in some instances with oil-cooled gear units (see ZF catalog).
**Servomotors**

**Accessories**

**Built-on gears**

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**Asynchronous Servomotors**

**Synchronous Servomotors**

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**Servomotors**

**Accessories**

**Built-on gears**

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**Planetary gears made by Bayside Motion**

The Bayside Motion Group offers planetary gearheads. The stealth helical planetary gears are well suited for use with the 1FK and 1FT6 servomotors. For technical and selection information as well as mounting charts please contact Bayside directly at the following address:

Bayside Motion Group
27 Seaview Boulevard
Port Washington, NY 11050
Phone: (516) 484-5353
Fax: (516) 484-5496
http://www.baysidemotion.com

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**Important notes**

If torque amplification elements are used such as gears, the increased mechanical stress must be borne by the gears and not by the motor.

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**Planetary gears and spur-gear units from other gear manufacturers**

You can, of course, contact other gear manufacturers in order to find a useful combination of SIEMENS servomotors and gear units.

**Planetary gears and spur-gear units from Heynau Antriebstechnik GmbH**

The 1FK, 1FT6, 1PH4 and 1PH7 motors can be combined with planetary gears of the EPR and FPR series to form compact, coaxial drive units. The EPR series with output shaft and the FPR series with output flange can be directly mounted onto the D-end of the motors. Spur-gear units of the GC series are also available for D-end mounting.

**Technical characteristics**

**Planetary gears**

Transmission ratio:
- Single-stage: $i = 4$ to 10
- 2-stage: $i = 16$ to 100

Max. permissible output torque: 45 to 3750 Nm

Torsional play:
- Single-stage: < 3 arc min
- 2-stage: < 5 arc min

Efficiency: single-stage: 96%

**Spur-gear units**

Transmission ratio:
- Single-stage: $i = 3$ to 7
- 2-stage: $i = 8$ to 30

Max. permissible output torque: 9 to 1500 Nm

Torsional play: < 10 arc min

Efficiency: 98% per stage

For planning and selecting gears in combination with SIEMENS servomotors, please contact:

Heynau Antriebstechnik GmbH
Herr Gunter Bever
Hofmark-Aich-Strasse 25
84030 Landshut
Federal Republic of Germany
Phone:+49-8717801-144
Fax: +49-8717801-140

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**Harmonic Drive gear units**

HD Systems, Inc.
89 Cabot Court
Hauppauge, New York, N.Y. 11788
USA
Phone: (631) 231-6630
Fax: (631) 231-6803
http://www.HDSystemsInc.com

Harmonic Drive Antriebstechnik GmbH
Hoembergstrasse 14
65555 Limburg
Federal Republic of Germany
Phone: +49-64315008-0
Fax: +49-64315008-18

Low-play planetary gear units

Umbach Servogatterbe GmbH & Co. KG
Herr Kübler
Hinter dem Schloss 16c
74906 Bad Rappenau
Federal Republic of Germany
Phone: +49-724191-351
Fax: +49-724191-4040
In spite of water cooling, temperatures of up to 248 °F (120 °C) occur inside the primary sections due to the high force densities of the motor. In order to prevent these temperatures having a negative impact on the machine precision, 1FN3 motors can be thermally and completely encapsulated against the environment using the thermo-sandwich® principle using the optional secondary section cooler and precision cooler. The inner cooling circuit (main cooler) dissipates the largest proportion of the power loss \( P_{VN} \) of the primary section and protects the primary section winding against overheating (refer to Section “Technical data”).

The main cooler of the primary section must be operated with water cooling in order to be able to utilize the rated force \( F_N \) of the motor, specified in the data sheets (without water cooling, and depending on the convection situation and machine construction, only approx. 50% of the rated force \( F_N \) acc. to the data sheet).

**Note**

For motors from frame size 600, secondary section cooling is mandatory to be able to use the rated force \( F_N \) (acc. to the data sheet). This is because the power loss cannot be adequately dissipated without water cooling.
**Precision cooler (optional)**

Supplementary cooler to cool the primary section according to the thermo sandwich concept. This is recommended for applications with high thermal requirements regarding the machine precision.

The precision cooler on the upper motor section shields the environment against the high motor temperatures. Thermal insulators at the glands and the intermediate air chambers reduce the heat transfer from the primary section.

The insulating function is provided by an air gap at the lower side of the primary section.

The lateral heat radiation sheets of the precision cooler also form air-filled intermediate spaces, which insulate the primary section sides from the machine itself. Thus, the primary section is encapsulated by a thermal insulation on all sides.

The precision cooler dissipates the residual heat, which is transferred due to thermal radiation and conduction. This means, that the mounting surface temperature and the outer surface of the primary section can be kept constant in a tolerance bandwidth of between 0 and 3 K (referred to the intake temperature) under all operating conditions.

<table>
<thead>
<tr>
<th>Linear motors Type</th>
<th>Optional components Precision cooler Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FN3 050-2W</td>
<td>1FN3 050-2PK00-0AA0</td>
</tr>
<tr>
<td>1FN3 100-2W</td>
<td>1FN3 100-2PK00-0AA0</td>
</tr>
<tr>
<td>1FN3 100-3W</td>
<td>1FN3 100-3PK00-0AA0</td>
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<tr>
<td>1FN3 200-4W</td>
<td>1FN3 200-4PK00-0AA0</td>
</tr>
<tr>
<td>1FN3 300-2W</td>
<td>1FN3 300-2PK00-0AA0</td>
</tr>
<tr>
<td>1FN3 300-3W</td>
<td>1FN3 300-3PK00-0AA0</td>
</tr>
<tr>
<td>1FN3 300-4W</td>
<td>1FN3 300-4PK00-0AA0</td>
</tr>
<tr>
<td>1FN3 450-2W</td>
<td>1FN3 450-2PK00-0AA0</td>
</tr>
<tr>
<td>1FN3 450-3W</td>
<td>1FN3 450-3PK00-0AA0</td>
</tr>
<tr>
<td>1FN3 450-4W</td>
<td>1FN3 450-4PK00-0AA0</td>
</tr>
<tr>
<td>1FN3 600-3W</td>
<td>1FN3 600-3PK00-0AA0</td>
</tr>
<tr>
<td>1FN3 900-2W</td>
<td>1FN3 900-2PK00-0AA0</td>
</tr>
<tr>
<td>1FN3 900-4W</td>
<td>1FN3 900-4PK00-0AA0</td>
</tr>
</tbody>
</table>
Cooling profiles with plug or hose connection (optional)

The total maximum heat transfer to the secondary section is less than 10% of the total power loss of the linear motor. The secondary section can be cooled and thermally insulated by using cooling profiles between the secondary section and machine according to the thermo sandwich® principle.

Aluminum profile rails with continuous cooling ducts. They are placed under the secondary sections if high thermal requirements are placed on the machine accuracy. The cooling profiles are part of the secondary section cooling together with the secondary section end pieces.

■ Cooling profiles with plug connection

The table shows the available cooling profiles with plug connection to a combination-distributor.

<table>
<thead>
<tr>
<th>Linear motor Type</th>
<th>Cooling profile with plug connection</th>
<th>Combination-distributor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FN3 050-...</td>
<td>1FN3 002-ETK04-1...</td>
<td>1FN2 050-0T.01-0AA0</td>
</tr>
<tr>
<td>1FN3 100-...</td>
<td>1FN3 003-ETK04-1...</td>
<td>1FN2 100-0T.01-0AA0</td>
</tr>
<tr>
<td>1FN3 150-...</td>
<td>1FN3 004-ETK04-1...</td>
<td>1FN2 150-0T.01-0AA0</td>
</tr>
<tr>
<td>1FN3 300-...</td>
<td>1FN3 005-ETK04-1...</td>
<td>1FN2 300-0T.01-0AA0</td>
</tr>
<tr>
<td>1FN3 450-...</td>
<td>1FN3 006-ETK04-1...</td>
<td>1FN2 450-0T.01-0AA0</td>
</tr>
<tr>
<td>1FN3 600-...</td>
<td>1FN3 007-ETK04-1...</td>
<td>1FN2 600-0T.01-0AA0</td>
</tr>
<tr>
<td>1FN3 900-...</td>
<td>1FN3 008-ETK04-1...</td>
<td>1FN2 900-0T.01-0AA0</td>
</tr>
</tbody>
</table>

Length code

When ordering a cooling profile you must match the length of it to the length of the secondary section. The length of the secondary section (permanent magnets) is determined by the motor size and the number of secondary sections used. That means when you select the cooling profile for your motor size you have to specify in the 14th and 15th digit of the part number the length of the cooling profile by indicating the numbers of secondary sections used. To indicate the length the following length code is used:

For all motor sizes (050 to 900)

<table>
<thead>
<tr>
<th>Number of secondary sections</th>
<th>Length code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AB</td>
</tr>
<tr>
<td>2</td>
<td>AC</td>
</tr>
<tr>
<td>3</td>
<td>AD</td>
</tr>
<tr>
<td>4</td>
<td>AE</td>
</tr>
<tr>
<td>5</td>
<td>AF</td>
</tr>
<tr>
<td>6</td>
<td>AG</td>
</tr>
<tr>
<td>7</td>
<td>AH</td>
</tr>
<tr>
<td>8</td>
<td>AJ</td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>BA</td>
</tr>
<tr>
<td>11</td>
<td>BB</td>
</tr>
<tr>
<td>12</td>
<td>BC</td>
</tr>
<tr>
<td>13</td>
<td>BD</td>
</tr>
<tr>
<td>14</td>
<td>BE</td>
</tr>
<tr>
<td>15</td>
<td>BF</td>
</tr>
<tr>
<td>16</td>
<td>BG</td>
</tr>
</tbody>
</table>

Only for motor sizes 050 to 150

<table>
<thead>
<tr>
<th>Number of secondary sections</th>
<th>Length code</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>BH</td>
</tr>
<tr>
<td>18</td>
<td>BJ</td>
</tr>
<tr>
<td>19</td>
<td>BK</td>
</tr>
<tr>
<td>20</td>
<td>CA</td>
</tr>
<tr>
<td>21</td>
<td>CB</td>
</tr>
<tr>
<td>22</td>
<td>CC</td>
</tr>
<tr>
<td>23</td>
<td>CD</td>
</tr>
<tr>
<td>24</td>
<td>CE</td>
</tr>
</tbody>
</table>

The maximum length of a single cooling profile is 9.84 ft (3 m), which corresponds to 16 secondary segments for motor sizes 300 to 900 and up to 24 segments for sizes 050 to 150. For lengths above 9.84 ft (3 m) the cooling profile has to be split.

Cooling profiles with plug connection

The table shows the available cooling profiles with plug connection to a combination-distributor.

### Selection of cooling profiles

Cooling profiles for secondary section cooling can be used with or without combination-distributors. For use together with a combination-distributor, it is necessary to have the cooling profile selected with plug connections to make the connection to the combination-distributor. If the cooling profile is used without combination-distributor, then the end pieces of the profile must have hose sleeve nipples to accommodate a direct hose connection.

### Warning

During linear motor operation, the secondary section may not exceed the maximum temperature of 140 °F (60 °C), as otherwise the permanent magnets could be demagnetized.

### Key Points

- The cooling profiles are thermally optimized. The contact surface to the secondary section absorbs the heat and transfers it to the cooling duct. On the other hand, the contact surface to the machine is low to minimize heat transfer to the machine itself.
- High power loss transfer to the secondary section at high continuous feed force for short traversing paths and high continuous velocities.
- 1FN3 motors from frame size 600 (necessary to use rated force F_0).

### Accessories for 1FN3 AC linear motors

- Cooling profiles with plug or hose connection (optional)
- Selection of cooling profiles

---

1) For the complete order number see length code below.
2) For the complete order number refer to the paragraph combination-distributor in this section.
Cooling profiles with plug connection

**Example 1**

A 1FN3 600-3WB00-0AA1 is used with 4 secondary sections. The part number for the two cooling profiles with plug connection to a combination-distributor is therefore 1FN3 004-0TK04-IAE0. The quantity necessary for this motor size is three of each cooling profile since they are placed underneath both sides and the middle of the secondary section (see Fig. 4/13).

![Fig. 4/13](image1)

Cooling profile with connector plugs (unconnected) and combination-distributor on each side. Total length >9.84 ft (3 m).

**Example 2**

A 1FN3 150-2WC00-0AA1 is used with 27 secondary sections. 27 sections exceed the length of 9.84 ft (3 m) or 24 segments for this motor size. Hence the cooling profile has to be split into 2 pieces with any length combination that adds up to the total of 27 secondary units. The part number for the two cooling profiles with plug connection to a combination-distributor could be for instance 1FN3 004-0TK04-IBD0 (13 unit lengths) and 1FN3 002-0TK04-IBE0 (14 unit lengths). For this motor size the quantity two of the specified cooling profile part numbers is necessary since the profiles go under each side of the secondary section (see Fig. 4/14).

![Fig. 4/14](image2)

Cooling profile with connector plugs (unconnected) and combination-distributor on each side. Total length <9.84 ft (3 m).
**Cooling profiles without combination-distributor (direct hose connection via hose sleeve nipples)**

For the connection of the cooling circuit via a hose directly to the cooling profiles, it is necessary to have the ends of the cooling profiles equipped with hose sleeve nipples for a direct hose connection. For this purpose, there are cooling profiles with hose sleeve nipples on both ends.

If the length of the required cooling profile exceeds 9.84 ft (3 m), the cooling profile needs to be split in two or more pieces. To allow an easy connection between these pieces, there are cooling profiles available with a hose sleeve nipple on one side and the plug connection on the other side. The cooling profile form for motors in size 050 to 450 makes it necessary to differentiate between cooling profiles with a hose sleeve nipple on the right (R) and on the left (L) side (see Fig. 4/15). Cooling profiles for size 600 and 900 motors do not have that restriction and can be used Right or Left (R/L) (see Fig. 4/16).

<table>
<thead>
<tr>
<th>Linear motor Type</th>
<th>Cooling profile with hose sleeve nipple on both ends</th>
<th>Cooling profile with hose sleeve nipple on Right (R)</th>
<th>Cooling profile with hose sleeve nipple on Left (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FN3 050-....</td>
<td>1FN3 002-0TK62-1..0</td>
<td>1FN3 002-0TK66-1AC0</td>
<td>1FN3 002-0TK67-1AC0</td>
</tr>
<tr>
<td>1FN3 100-....</td>
<td>1FN3 003-0TK62-1..0</td>
<td>1FN3 003-0TK66-1AC0</td>
<td>1FN3 003-0TK67-1AC0</td>
</tr>
<tr>
<td>1FN3 300-....</td>
<td>1FN3 004-0TK62-1..0</td>
<td>1FN3 004-0TK66-1AC0</td>
<td>1FN3 004-0TK67-1AC0</td>
</tr>
<tr>
<td>1FN3 450-....</td>
<td>1FN3 005-0TK62-1..0</td>
<td>1FN3 005-0TK66-1AC0</td>
<td>1FN3 005-0TK67-1AC0</td>
</tr>
<tr>
<td>1FN3 600-....</td>
<td>1FN3 006-0TK62-1..0</td>
<td>1FN3 006-0TK66-1AC0</td>
<td>1FN3 006-0TK67-1AC0</td>
</tr>
<tr>
<td>1FN3 900-....</td>
<td>1FN3 007-0TK62-1..0</td>
<td>1FN3 007-0TK66-1AC0</td>
<td>1FN3 007-0TK67-1AC0</td>
</tr>
</tbody>
</table>

**Length code**

1) For the complete order number see length code in “cooling profiles w/ plug connection” paragraph.
2) Cooling profiles with hose sleeve nipple have a fixed length of 2 secondary section lengths.
Secondary section end pieces (optional)

Secondary section end pieces are available in four versions: combination-distributor, combination-adapter, combination end piece, and cover end piece. They are equipped with plug connections to connect to the cooling profiles. The cover end piece is only used to hold down the optional secondary section cover.

Combination-distributor

For parallel water connection through the cooling profiles on all motor sizes (050 to 900). It has the following functions:
- Retains the secondary section cover at the beginning and at the end of the secondary section track.
- Connects and branches the cooling-medium to the two cooling profiles at the beginning of the secondary section track.
- Combines the cooling-medium flow and connects the cooling-medium discharge at the end of the secondary section track.

Combination-adapter

Provides connection for the cooling-medium intake and discharge for serial water connection through the cooling profiles for motor sizes 050 to 450. It has the following functions:
- Retains the secondary section cover
- Cooling-medium connection
- Cooling-medium routing

This pressure loss for this system is significantly higher than when cooling using the combination-distributors, and must therefore be carefully checked.

Combination end piece

The combination end piece is required to route the cooling-medium at the order end of the secondary section track when serial water connection is used (only in combination with a combination-adapter).

Cover end piece

For holding down the optional secondary section cover (only necessary if secondary section cover and no combination-distributor or adapter is used).

Motor sizes

<table>
<thead>
<tr>
<th>Secondary section end pieces</th>
<th>Motor sizes</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combination-distributor</td>
<td>050, 100, 150, 300, 450, 600, 900</td>
<td>1FN3...-0TJ01-0AA0</td>
</tr>
<tr>
<td>Combination-adapter</td>
<td>050, 100, 150, 300, 450</td>
<td>1FN3...-0TG01-0AA0</td>
</tr>
<tr>
<td>Combination end piece</td>
<td>050, 100, 150, 300, 450</td>
<td>1FN3...-0TF01-0AA0</td>
</tr>
<tr>
<td>Cover end piece</td>
<td>050, 100, 150, 300, 450, 600, 900</td>
<td>1FN3...-0TC01-0AA0</td>
</tr>
</tbody>
</table>
Servomotors

Accessories

Accessories for 1FN3 AC linear motors

Secondary section cover (optional)

Continuous protection for the permanent magnets of the secondary section, manufactured from semi-magnetic stainless steel plates. They attach themselves to the secondary section magnets so that when worn they can be changed without any other tools.

The cover is one continuous piece and matched to the length of the secondary section by indicating the numbers of secondary sections used in the 14th and 15th dig of the part number.

<table>
<thead>
<tr>
<th>Motor sizes</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary section cover</td>
<td>050, 100, 150, 300, 450, 600, 900</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motor sizes</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary section cover</td>
<td>050, 100, 150, 300, 450, 600, 900</td>
</tr>
</tbody>
</table>

The secondary section cover is also available as a segmented cover over 3, 4 or 5 secondary sections:

Page 4/25 gives a complete overview of the available optional components for 1FN3 linear motors.
## Optional components for 1FN3 AC linear motors

### Ordering and planning data (overview)

<table>
<thead>
<tr>
<th>Linear motor Type</th>
<th>Optional components</th>
<th>Secondary section end pieces</th>
<th>Cooling profile</th>
<th>Secondary side cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FN3 050-2W</td>
<td>Precision cooler</td>
<td>1FN3 050-0KT00-1AB0</td>
<td>1FN3 050-1BC0</td>
<td>1FN3 050-2BC0 1CD0</td>
</tr>
<tr>
<td>1FN3 100-2W</td>
<td></td>
<td>1FN3 100-0KT00-1AB0</td>
<td>1FN3 100-1BC0</td>
<td>1FN3 100-2BC0 1CD0</td>
</tr>
<tr>
<td>1FN3 100-4W</td>
<td></td>
<td>1FN3 100-4PK00-0AA0</td>
<td>1FN3 100-1BC0</td>
<td>1FN3 100-2BC0 1CD0</td>
</tr>
<tr>
<td>1FN3 150-2W</td>
<td></td>
<td>1FN3 150-0KT00-1AB0</td>
<td>1FN3 150-1BC0</td>
<td>1FN3 150-2BC0 1CD0</td>
</tr>
<tr>
<td>1FN3 150-3W</td>
<td></td>
<td>1FN3 150-3PK00-0AA0</td>
<td>1FN3 150-1BC0</td>
<td>1FN3 150-2BC0 1CD0</td>
</tr>
<tr>
<td>1FN3 300-2W</td>
<td></td>
<td>1FN3 300-0KT00-1AB0</td>
<td>1FN3 300-1BC0</td>
<td>1FN3 300-2BC0 1CD0</td>
</tr>
<tr>
<td>1FN3 300-4W</td>
<td></td>
<td>1FN3 300-4PK00-0AA0</td>
<td>1FN3 300-1BC0</td>
<td>1FN3 300-2BC0 1CD0</td>
</tr>
<tr>
<td>1FN3 450-2W</td>
<td></td>
<td>1FN3 450-0KT00-1AB0</td>
<td>1FN3 450-1BC0</td>
<td>1FN3 450-2BC0 1CD0</td>
</tr>
<tr>
<td>1FN3 450-3W</td>
<td></td>
<td>1FN3 450-3PK00-0AA0</td>
<td>1FN3 450-1BC0</td>
<td>1FN3 450-2BC0 1CD0</td>
</tr>
<tr>
<td>1FN3 600-2W</td>
<td></td>
<td>1FN3 600-0KT00-1AB0</td>
<td>1FN3 600-1BC0</td>
<td>1FN3 600-2BC0 1CD0</td>
</tr>
<tr>
<td>1FN3 600-4W</td>
<td></td>
<td>1FN3 600-4PK00-0AA0</td>
<td>1FN3 600-1BC0</td>
<td>1FN3 600-2BC0 1CD0</td>
</tr>
<tr>
<td>1FN3 900-2W</td>
<td></td>
<td>1FN3 900-0KT00-1AB0</td>
<td>1FN3 900-1BC0</td>
<td>1FN3 900-2BC0 1CD0</td>
</tr>
<tr>
<td>1FN3 900-4W</td>
<td></td>
<td>1FN3 900-4PK00-0AA0</td>
<td>1FN3 900-1BC0</td>
<td>1FN3 900-2BC0 1CD0</td>
</tr>
</tbody>
</table>

---

1) Frame sizes
- 1FN3 050 to 1FN3 450: 2 pieces per secondary section track
- 1FN3 600 to 1FN3 900: 3 pieces per secondary section track

The maximum length of a single-section cooling profile that can be supplied is 9.84 ft (3 m).

For the following frame sizes this corresponds to:
- 1FN3050-1FN3150 a maximum number of 24 secondary sections (AB to CS)
- 1FN3600 to 1FN3900 a maximum number of 16 secondary sections (AB to RS).
Servomotors

Accessories

Notes

Linear Motors
Servomotors
Connecting Systems

Power cables
MOTION-CONNECT® 500, 700 and 800
5/2
6FX5, 6FX8 and 6FX7, technical data
5/3
6FX5, 6FX8 and 6FX7, connection overview
5/6
• for 1FK, 1FT6, 1FS6, 1PH, 1PL6
5/7
• for 1P87, 1PL6 and 1PH4 induction motors
• Flange for signal plug

Encoder cables
5/8
• for connection to motors with an incremental encoder HTL
• for connection to motors with a resolver 2-pole / multi-pole
• for connection to motors with a sin/cos incremental encoder 1 Vpp
5/10
• for connection to motors with an absolute-value encoder (EnDat)
5/11
• for 1FN3 AC linear motors
5/14
• for SIMODRIVE 611 universal

Cables
5/15
• for SIMODRIVE POSMO CD/CA, SI

Siemens Catalog MC Part 2 · 2002/2003
### Servomotors

#### Connecting Systems

**Power cables** MOTION-CONNECT 500, 700 and 800

The new MOTION-CONNECT 500, 700 and 800 cables replace the former standard (6FX4) as well as performance cables (6FX6) and add the new 6FX7 power cables with 4 temperature leads especially designed for 1FN3 linear motor applications.

MOTION-CONNECT meets the DESINA color requirements, orange jacket for servo and frequency controlled drive power cables and green jacket for encoder cables.

#### Technical data

**Cables**

- **6FX5 00.--... type**
- **6FX6 00.--... type**
- **6FX7 00.--... type**

**Certifications**

- Power/signal cables:
  - VDE
  - UL/CSA File No.
  - c/UL or UL/CSA

**Electrical data acc. to DIN VDE 0472**

- Rated voltage:
  - power cable (supply cores): 450/750 V
  - signal cable: 24 V (VDE) 1000 V (UL/CSA)

- Test voltage:
  - power cable: 2 kVeff
  - signal cable: 1.5 kV eff

**Operating temperature on the surface**

- fixed cable: -4 °F to 176 °F (-20 °C to +80 °C)
- moving cable: 32 °F to 140 °F (0 °C to +60 °C)

**Mechanical data**

- Max. bending stress:
  - fixed cable: 7252 lb/in² (50 N/mm²)
  - moving cable: 7252 lb/in² (50 N/mm²)

- Smallest permissible bending radius:
  - fixed cable (power cable): 5 × Dcable
  - fixed cable (signal cable): 2.4 in (60 mm)
  - moving cable (power cable): 7.1 in (180 mm)
  - moving cable (signal cable): 3.9 in (100 mm)

- Torsional stress:
  - fixed cable: 30 °/m absolute
  - moving cable: 30 °/m absolute

**Chemical data**

- Insulation material:
  - CFC-free, silicone-free

**Degree of protection**

- for the customized power and signal cables and their extension cables: when closed and plugged: IP 67

---

1. The corresponding registration numbers are printed on the cable sheath.
2. The file no. of the respective manufacturers are printed on the cable sheath.
**6FX5, 6FX6 and 6FX7, connection overview**

**SIMOVERT MASTERDRIVES Motion Control**

- 1) Max. 492 ft (150 m) for HTL, supplementry board DTI essential for:
  - TTL encoders
  - requested electrical isolation
  - Length > 492 ft (150 m)
- 2) Track A, B, N and A*, B*, N*
- 3) Track A, B

**External HTL encoder**

- 6FX2 001–....

**Incremental encoder**

- 6FX2 001–3....

**Absolute-value encoder**

- 6FX2 001–5.S..

**Motor encoder**

- 6FX2 001–5.E..

**6FX7, 6FX8 and 6FX7, connection overview**

**SIMOVERT MASTERDRIVES Vector Control**

- 1) Max. 492 ft (150 m) for HTL, supplementry board DTI essential for:
  - TTL encoders
  - requested electrical isolation
  - Length > 492 ft (150 m)
- 2) Track A, B, N and A*, B*, N*
- 3) Track A, B

**External HTL encoder**

- 6FX2 001–....

**Incremental encoder**

- 6FX2 001–3....

**Absolute-value encoder**

- 6FX2 001–5.S..

**Motor encoder**

- 6FX2 001–5.E..

**Current carrying capacity (Iz) of PVC-insulated copper conductors acc. to IEC 60 204-1: 1997 + Corrigendum 1998 - Correction factors**

<table>
<thead>
<tr>
<th>Cross-section</th>
<th>Current carrying capacity Iz</th>
<th>Ambient air temperature</th>
<th>Correction factor</th>
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</thead>
<tbody>
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</tr>
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<td></td>
</tr>
<tr>
<td>120</td>
<td>221</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The correction factors are taken from IEC 60 364-5-523, table S2-D1.
Servomotors
Connecting Systems

Power cables

**MOTION-CONNECT 500 and 600**

Power cables for 1FK., 1FT6, 1FS6, 1PH., 1PL6

### 6FX8 002-5DA...

<table>
<thead>
<tr>
<th>Motor current (A)</th>
<th>No. of cables</th>
<th>Con-nect-er size</th>
<th>Prefabricated cables*</th>
<th>Cable by the meter</th>
<th>Weight¹</th>
<th>ØFSX</th>
<th>Smallest permissible bending radius ØFSX</th>
<th>ØFSX</th>
<th>ØFSX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>in (mm²)</td>
<td>in (mm)</td>
<td>in (mm)</td>
<td>(lbs)</td>
<td>(kg)</td>
<td>(lbs)</td>
<td>(kg)</td>
<td>(mm)</td>
</tr>
<tr>
<td>15.2</td>
<td>4 x 1.5 + 2 x 1.5</td>
<td>1</td>
<td>6FX8 002-5DA61-XXX</td>
<td>0.51</td>
<td>0.15</td>
<td>4.92</td>
<td>2.25 (100)</td>
<td>11.5</td>
<td>240</td>
</tr>
<tr>
<td>21</td>
<td>4 x 2.5 + 2 x 1.5</td>
<td>1</td>
<td>6FX8 002-5DA61-XXX</td>
<td>0.56</td>
<td>0.17</td>
<td>5.51</td>
<td>2.24 (100)</td>
<td>11.9</td>
<td>240</td>
</tr>
<tr>
<td>28</td>
<td>4 x 4 + 2 x 1.5</td>
<td>1.5</td>
<td>6FX8 002-5DA61-XXX</td>
<td>0.65</td>
<td>0.21</td>
<td>5.91</td>
<td>2.24 (150)</td>
<td>15.9</td>
<td>300</td>
</tr>
<tr>
<td>36</td>
<td>4 x 6 + 2 x 1.5</td>
<td>1.5</td>
<td>6FX8 002-5DA61-XXX</td>
<td>0.7</td>
<td>0.27</td>
<td>6.68</td>
<td>0.36 (150)</td>
<td>18.9</td>
<td>300</td>
</tr>
<tr>
<td>40</td>
<td>4 x 10 + 2 x 1.5</td>
<td>3</td>
<td>6FX8 002-5DA61-XXX</td>
<td>0.9</td>
<td>0.36</td>
<td>7.48</td>
<td>0.36 (300)</td>
<td>21.7</td>
<td>500</td>
</tr>
<tr>
<td>50</td>
<td>4 x 16 + 2 x 1.5</td>
<td>3</td>
<td>6FX8 002-5DA61-XXX</td>
<td>1.1</td>
<td>0.47</td>
<td>8.28</td>
<td>0.30 (300)</td>
<td>24.7</td>
<td>500</td>
</tr>
<tr>
<td>64</td>
<td>4 x 25 + 2 x 1.5</td>
<td>3</td>
<td>6FX8 002-5DA61-XXX</td>
<td>1.5</td>
<td>0.62</td>
<td>9.14</td>
<td>0.37 (500)</td>
<td>27.9</td>
<td>500</td>
</tr>
<tr>
<td>104</td>
<td>4 x 30 + 2 x 1.5</td>
<td>3</td>
<td>6FX8 002-5DA61-XXX</td>
<td>1.9</td>
<td>0.72</td>
<td>9.93</td>
<td>0.37 (500)</td>
<td>32.6</td>
<td>500</td>
</tr>
<tr>
<td>123</td>
<td>4 x 50 + 2 x 1.5</td>
<td>3</td>
<td>6FX8 002-5DA61-XXX</td>
<td>2.5</td>
<td>0.82</td>
<td>10.74</td>
<td>0.38 (100)</td>
<td>38</td>
<td>500</td>
</tr>
</tbody>
</table>

---

### 6FX8 005-18A...

<table>
<thead>
<tr>
<th>Motor current (A)</th>
<th>No. of cables</th>
<th>Con-nect-er size</th>
<th>Prefabricated cables*</th>
<th>Cable by the meter</th>
<th>Weight¹</th>
<th>ØFSX</th>
<th>Smallest permissible bending radius ØFSX</th>
<th>ØFSX</th>
<th>ØFSX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>in (mm²)</td>
<td>in (mm)</td>
<td>in (mm)</td>
<td>(lbs)</td>
<td>(kg)</td>
<td>(lbs)</td>
<td>(kg)</td>
<td>(mm)</td>
</tr>
<tr>
<td>6</td>
<td>4 x 1.5 + 2 x 1.5</td>
<td>1</td>
<td>6FX8 005-1BA61-XXX</td>
<td>0.51</td>
<td>0.15</td>
<td>4.92</td>
<td>2.25 (100)</td>
<td>11.5</td>
<td>240</td>
</tr>
<tr>
<td>8</td>
<td>4 x 2.5 + 2 x 1.5</td>
<td>1</td>
<td>6FX8 005-1BA61-XXX</td>
<td>0.56</td>
<td>0.17</td>
<td>5.51</td>
<td>2.24 (100)</td>
<td>11.9</td>
<td>240</td>
</tr>
<tr>
<td>12</td>
<td>4 x 4 + 2 x 1.5</td>
<td>1.5</td>
<td>6FX8 005-1BA61-XXX</td>
<td>0.65</td>
<td>0.21</td>
<td>5.91</td>
<td>2.24 (150)</td>
<td>15.9</td>
<td>300</td>
</tr>
<tr>
<td>16</td>
<td>4 x 6 + 2 x 1.5</td>
<td>1.5</td>
<td>6FX8 005-1BA61-XXX</td>
<td>0.7</td>
<td>0.27</td>
<td>6.68</td>
<td>0.36 (150)</td>
<td>18.9</td>
<td>300</td>
</tr>
<tr>
<td>20</td>
<td>4 x 10 + 2 x 1.5</td>
<td>3</td>
<td>6FX8 005-1BA61-XXX</td>
<td>0.9</td>
<td>0.36</td>
<td>7.48</td>
<td>0.36 (300)</td>
<td>21.7</td>
<td>500</td>
</tr>
<tr>
<td>25</td>
<td>4 x 16 + 2 x 1.5</td>
<td>3</td>
<td>6FX8 005-1BA61-XXX</td>
<td>1.1</td>
<td>0.47</td>
<td>8.28</td>
<td>0.30 (300)</td>
<td>24.7</td>
<td>500</td>
</tr>
<tr>
<td>32</td>
<td>4 x 25 + 2 x 1.5</td>
<td>3</td>
<td>6FX8 005-1BA61-XXX</td>
<td>1.5</td>
<td>0.62</td>
<td>9.14</td>
<td>0.37 (500)</td>
<td>27.9</td>
<td>500</td>
</tr>
<tr>
<td>50</td>
<td>4 x 30 + 2 x 1.5</td>
<td>3</td>
<td>6FX8 005-1BA61-XXX</td>
<td>1.9</td>
<td>0.72</td>
<td>9.93</td>
<td>0.37 (500)</td>
<td>32.6</td>
<td>500</td>
</tr>
<tr>
<td>63</td>
<td>4 x 50 + 2 x 1.5</td>
<td>3</td>
<td>6FX8 005-1BA61-XXX</td>
<td>2.5</td>
<td>0.82</td>
<td>10.74</td>
<td>0.38 (100)</td>
<td>38</td>
<td>500</td>
</tr>
</tbody>
</table>

---

### Form of delivery

- **MOTION-CONNECT 500**: 328 ft (100 m)
- **MOTION-CONNECT 800**: 656 ft (200 m)

### Length code:

- 3.3 ft (1 m)
- 22 ft (6 m)
- 656 ft (200 m)
- 10 ft (3 m)
- 328 ft (100 m)

### Deviations from form of delivery

- For power plug sizing 1.5 6FX2003-TCX100

---

### Flange for power connectors

- Plugs with union nut as well as with external thread which are mounted on prefabricated cables (ex-works) can be equipped with a flange for passing cable through an enclosure.
- The flange needs to be ordered separately.

---

1) Weight of cables sold by the meter excluding connector.
2) Prefabricated cables are typically stocked in 5 m increments, e.g. 5, 15, 20 m... Other lengths can be ordered separately. All quantities are subject to prior sale.

---

### Siemens Catalog MC Part 2 2002/2003
### Power cables for 1FK., 1FT6, 1FS6, 1PL., 1PL6

<table>
<thead>
<tr>
<th>Motor current</th>
<th>No. of conductors</th>
<th>Prefabricated cables</th>
<th>Cross section</th>
<th>Cable by the meter</th>
<th>Weight</th>
<th>Smallest permissible bending radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>A mm²</td>
<td>Order No.</td>
<td>in (mm)</td>
<td>in (mm)</td>
<td>Order No.</td>
<td>(kg/m)</td>
<td>(mm)</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------</td>
<td>----------------------</td>
<td>---------------</td>
<td>-------------------</td>
<td>--------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>15.2 4 x 1.5</td>
<td>6FX5 002-SCA1-CA0</td>
<td>0.41</td>
<td>0.4</td>
<td>6FX5 008-1BB11-CA0</td>
<td>0.11</td>
<td>0.12</td>
</tr>
<tr>
<td>21 4 x 2.5</td>
<td>6FX5 002-SCA1-CA0</td>
<td>0.49</td>
<td>0.49</td>
<td>6FX5 008-1BB21-CA0</td>
<td>0.16</td>
<td>0.16</td>
</tr>
<tr>
<td>48 4 x 4.5</td>
<td>6FX5 002-SCA1-CA0</td>
<td>0.52</td>
<td>0.52</td>
<td>6FX5 008-1BB31-CA0</td>
<td>0.31</td>
<td>0.32</td>
</tr>
<tr>
<td>36 4 x 6</td>
<td>6FX5 002-SCA1-CA0</td>
<td>0.51</td>
<td>0.51</td>
<td>6FX5 008-1BB41-CA0</td>
<td>0.39</td>
<td>0.40</td>
</tr>
<tr>
<td>50 4 x 10</td>
<td>6FX5 002-SCA1-CA0</td>
<td>0.79</td>
<td>0.79</td>
<td>6FX5 008-1BB51-CA0</td>
<td>0.44</td>
<td>0.45</td>
</tr>
<tr>
<td>60 4 x 16</td>
<td>6FX5 002-SCA2-CA0</td>
<td>0.30</td>
<td>0.36</td>
<td>6FX5 008-1BB61-CA0</td>
<td>0.56</td>
<td>0.57</td>
</tr>
<tr>
<td>84 4 x 25</td>
<td>–</td>
<td>1.1</td>
<td>–</td>
<td>6FX5 008-1BB25-CA0</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>104 4 x 35</td>
<td>–</td>
<td>1.24</td>
<td>–</td>
<td>6FX5 008-1BB35-CA0</td>
<td>1.72</td>
<td>1.73</td>
</tr>
<tr>
<td>123 4 x 50</td>
<td>–</td>
<td>1.5</td>
<td>–</td>
<td>6FX5 008-1BB50-CA0</td>
<td>2.38</td>
<td>2.39</td>
</tr>
<tr>
<td>155 4 x 70</td>
<td>–</td>
<td>1.69</td>
<td>–</td>
<td>6FX5 008-1BB70-CA0</td>
<td>3.24</td>
<td>3.25</td>
</tr>
<tr>
<td>192 4 x 95</td>
<td>–</td>
<td>2.04</td>
<td>–</td>
<td>6FX5 008-1BB90-CA0</td>
<td>4.20</td>
<td>4.21</td>
</tr>
<tr>
<td>221 4 x 120</td>
<td>–</td>
<td>2.48</td>
<td>–</td>
<td>6FX5 008-1BB120-CA0</td>
<td>5.24</td>
<td>5.25</td>
</tr>
<tr>
<td>254 4 x 150</td>
<td>–</td>
<td>2.92</td>
<td>–</td>
<td>6FX5 008-1BB150-CA0</td>
<td>6.38</td>
<td>6.39</td>
</tr>
<tr>
<td>287 4 x 185</td>
<td>–</td>
<td>3.41</td>
<td>–</td>
<td>6FX5 008-1BB180-CA0</td>
<td>7.58</td>
<td>7.59</td>
</tr>
</tbody>
</table>

**Deviations from form of delivery**

- 164 ft (50 m) (-1BA0)
- 328 ft (100 m) (-2AA0)

**Example:**

- 33 ft (10 m) = 1 A B O
- 26 ft (8 m) = 1 A O
- 18 ft (5.5 m) = 1 F O
- 12 ft (3.5 m) = 1 F X

**Length code:**

- 1B = 33 ft (10 m) = Disposable drum
- 1F = 164 ft (50 m) (not for cables > 10 mm²)
- 3A = 658 ft (200 m) (not for cables > 10 mm²)
- 5A = 1640 ft (500 m) (not for cables > 10 mm²)

**Form of delivery:**

- Disposable drum
- Disposable drum
- Disposable drum
- Disposable drum
- Disposable drum

The cross-sections 25, 50 and 50 mm² can also be ordered and delivered to the meter from 33 ft (10 m) to 161 ft (49 m) (according to the length code of the prefabricated cables) and in 33 ft (10 m) rings.

---

1) Weight of cables sold by the meter excluding connector.

2) From cable cross-section 50 mm² and 164 ft (50 m), 328 ft (100 m) and 656 ft (200 m) cable length, the form of delivery is on drums.

---

**Servomotors Connecting Systems**

**Power Cables**

- MOTION-CONNECT 500 and 800

---

**Siemens Catalog MC Part 2 · 2002/2003**

---

5/5
### 6FX7 power cables for 1FN3 linear motors, sold by the meter

<table>
<thead>
<tr>
<th>Motor current</th>
<th>Power cable cross-section</th>
<th>Order No.</th>
<th>Cable diameter</th>
<th>Cable weight</th>
<th>Smallest permissible bending radius</th>
<th>Moving installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I₀ A</td>
<td>mm² AWG</td>
<td>6FX7008-1BC11-@@@</td>
<td>0.55 (14)</td>
<td>3.84 (100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.2</td>
<td>4 × 1.5 + 4 × 0.5</td>
<td>16/20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>4 × 2.5 + 4 × 0.5</td>
<td>14/20</td>
<td>0.6 (15.2)</td>
<td>4.33 (110)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>4 × 4 + 4 × 0.5</td>
<td>12/20</td>
<td>0.65 (16.6)</td>
<td>4.72 (120)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>4 × 6 + 4 × 0.5</td>
<td>10/20</td>
<td>0.72 (18.3)</td>
<td>5.12 (130)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>4 × 10 + 4 × 0.5</td>
<td>8/20</td>
<td>0.93 (21.5)</td>
<td>6.5 (165)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>4 × 16 + 4 × 0.5</td>
<td>6/20</td>
<td>1.03 (26.1)</td>
<td>7.28 (185)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>4 × 25 + 4 × 0.5</td>
<td>4/20</td>
<td>1.2 (30.5)</td>
<td>8.46 (215)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 32.8 ft (10 m) Ring (only for 25 mm²)
- 164 ft (50 m) Ring (one-way drums for 25 mm²)
- 328 ft (100 m) Ring (one-way drums for 10, 16 and 25 mm²)
- 656 ft (200 m) Disposable drum (not for 10, 16 and 25 mm²)
Power cables for 1PH7, 1PL6 and 1PH4 induction motors

In modern converter systems, fast-switching IGBT transistors are used. High pulse frequencies with very short switching times in the nanosecond range associated with this technology lead to a high level of efficiency but can affect the surroundings due to interference in the form of electromagnetic fields. Any power cable that is designed for variable frequency drive operation and that meets the following requirements can be used:

- Minimum shield coverage of 80%
- Nominal voltage \( V_{0}/V = 600/1000 \) V
- "Max. operating voltage" rating: 1700 V
- Coupling resistance max. 250 \( \Omega \)/km

When using the PROTOFLEX-EMV or the TOPFLEX-EMV cable you can check with the table beside what the approximate cable size is for your application. For an exact determination of the required cable size please consult the cable supplier since factors like routing type and operating air temperature need to be considered.

<table>
<thead>
<tr>
<th>Power rating* with 3 loaded cores</th>
<th>No. of cores x cross section</th>
<th>Outer cable diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>A ( \text{mm}^2 )</td>
<td>( \text{in}^2 )</td>
<td>( \text{mm} )</td>
</tr>
<tr>
<td>15.2</td>
<td>4 x 1.5</td>
<td>0.43 (10.6)</td>
</tr>
<tr>
<td>21</td>
<td>4 x 2.5</td>
<td>0.48 (12.3)</td>
</tr>
<tr>
<td>28</td>
<td>4 x 4</td>
<td>0.57 (14.5)</td>
</tr>
<tr>
<td>36</td>
<td>4 x 6</td>
<td>0.64 (16.4)</td>
</tr>
<tr>
<td>50</td>
<td>4 x 10</td>
<td>0.79 (20.1)</td>
</tr>
<tr>
<td>66</td>
<td>4 x 16</td>
<td>0.92 (23.4)</td>
</tr>
<tr>
<td>84</td>
<td>4 x 25</td>
<td>1.06 (27.0)</td>
</tr>
<tr>
<td>104</td>
<td>4 x 35</td>
<td>1.21 (30.7)</td>
</tr>
<tr>
<td>123</td>
<td>4 x 50</td>
<td>1.42 (36.1)</td>
</tr>
<tr>
<td>156</td>
<td>4 x 70</td>
<td>1.66 (42.3)</td>
</tr>
<tr>
<td>192</td>
<td>4 x 95</td>
<td>1.88 (47.1)</td>
</tr>
<tr>
<td>221</td>
<td>4 x 120</td>
<td>2.04 (51.8)</td>
</tr>
<tr>
<td>294</td>
<td>4 x 150</td>
<td>2.36 (57.5)</td>
</tr>
<tr>
<td>297</td>
<td>4 x 185</td>
<td>2.41 (61.1)</td>
</tr>
</tbody>
</table>

* For permanent operation at ambient temperature of 104 °F (40 °C) and single routing.

Information about these cables can be obtained through:

**PROTOFLEX-EMV**

**TOPFLEX-EMV**

ANIXTER Hi-TECH Controls Inc.
Phone: (678) 377-3427
Phone: 1 800 677-8942
Fax: (303) 680-5344
http://www.anixter.com

Encoder cables

Flange for signal plug

Plugs with union nut as well as with external thread which are mounted on prefabricated cables (ex-works) can be equipped with a flange, for passing cable through an enclosure.

The flange needs to be ordered separately.

**Flange for signal plug**

6FX2003-7DX00
Servomotors Connecting Systems

Asynchronous Servomotors

Synchronous Servomotors

For connection to motors with an incremental encoder HTL (1024 p/r and 2048 p/r)\(^1\)

Cable design and pin assignment

Type 6FX. 002-2AH00 - .... base cable

<table>
<thead>
<tr>
<th>Converter side</th>
<th>Motion Control PIN</th>
<th>Vector Control PIN</th>
<th>Cable, sold by 6FX.008-1BD21 PIN</th>
<th>Measurement system side</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>30</td>
<td>KY84 +</td>
<td>White-red KY84 + 2</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>26</td>
<td>ZERO TRACK</td>
<td>Blue ZERO TRACK 3</td>
<td></td>
</tr>
<tr>
<td>73</td>
<td>2</td>
<td>ZERO TRACK</td>
<td>Violet ZERO TRACK 4</td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>24</td>
<td>A</td>
<td>Black A 5</td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>2</td>
<td>A</td>
<td>Brown A 6</td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>27</td>
<td>CTRL TACHO</td>
<td>Green CTRL TACHO 7</td>
<td></td>
</tr>
</tbody>
</table>

Cable end cut off

- Outer shield on plug housing: yes

Cable extension

Type 6FX. 002-2AH04 - .... base cable

Plug type: 6FX2 003-1CF12

PIN assignment of the cable extension corresponding to the base cable.

Selection and ordering data

<table>
<thead>
<tr>
<th>Cable</th>
<th>Length ft (m)</th>
<th>Order No.</th>
<th>Cable</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encoder cables for connection to motors with an incremental encoder HTL</td>
<td></td>
<td></td>
<td>Encoder cables for connection to motors with an incremental encoder HTL</td>
<td></td>
</tr>
<tr>
<td>Length code:</td>
<td>Outer diameter of cable for 6FX8: 0.37 in (9.3 mm)</td>
<td></td>
<td>Outer diameter of cable for 6FX5: 0.37 in (9.3 mm)</td>
<td></td>
</tr>
</tbody>
</table>

Example:

- 3.3 ft (1 m): 1 A G O
- 26.2 ft (8 m): 1 A J O
- 46.7 ft (15 m): 1 B F C
- 133.5 ft (40 m): 1 T K O
- 328 ft (100 m): 2 A A O

1) Cable length ≤ 492 ft (150 m) without transmission of the inverted signals and cable length 492 ft (150 m) to 984 ft (300 m) with transmission of the inverted signals and use of the DTI unit.
For connection to motors with a resolver 2-pole/multi-pole

Cable design and pin assignment

Type 6FX.002-2CF02-…. base cable

<table>
<thead>
<tr>
<th>Converter side</th>
<th>Cable, sold by the meter</th>
<th>Motor side</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN</td>
<td>Signal name</td>
<td>Color of cores</td>
</tr>
<tr>
<td>3</td>
<td>SIN</td>
<td>Yellow</td>
</tr>
<tr>
<td>4</td>
<td>SIN</td>
<td>Green</td>
</tr>
<tr>
<td>5</td>
<td>Inner shield</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>COS</td>
<td>Black</td>
</tr>
<tr>
<td>7</td>
<td>COS</td>
<td>Brown</td>
</tr>
<tr>
<td>13</td>
<td>+TEMP</td>
<td>Red</td>
</tr>
<tr>
<td>20</td>
<td>– TEMP</td>
<td>Orange</td>
</tr>
<tr>
<td>24</td>
<td>Inner shield</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>+ VPP</td>
<td>Brown-red</td>
</tr>
<tr>
<td>7</td>
<td>– VPP</td>
<td>Brown-blue</td>
</tr>
</tbody>
</table>

Cable extension

Type 6FX.002-2CF04-…. PIN assignment of the cable extension corresponding to the base cable.

Selection and ordering data

<table>
<thead>
<tr>
<th>Cable</th>
<th>Order No.</th>
<th>Length (ft)</th>
<th>Order No.</th>
<th>Length (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encoder cables for connection to motors which are fitted with a resolver (detection of rotor position and speed), prefabricated</td>
<td>6FX008-1BD41 –1FA0</td>
<td>164</td>
<td>6FX008-1BD41 –1FA0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6FX008-1BD41 –2AA0</td>
<td>328</td>
<td>6FX008-1BD41 –2AA0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6FX008-1BD41 –3AA0</td>
<td>656</td>
<td>6FX008-1BD41 –3AA0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(200)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6FX008-1BD41 –6AA0</td>
<td>1640</td>
<td>6FX008-1BD41 –6AA0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(500)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Outer diameter of cable for 6FX8: 0.36 in (9.2 mm)

Outer diameter of cable for 6FX5: 0.37 in (9.3 mm)

1) Maximum permissible length of the prefabricated cables for the resolver: 492 ft (150 m).

Example:

- 3.3 ft (1 m) ... – 1 A 0 C
- 26.2 ft (8 m) ... – 1 A 0 C
- 45.7 ft (15 m) ... – 1 B F
- 133.5 ft (40 m) ... – 1 F K 0
- 328 ft (100 m) ... – 2 A A C 0

 Siemens Catalog MC Part 2 · 2002/2003
Servomotors
Connecting Systems

Encoders Cables
MOTION-CONNECT 500 and 800

Asynchronous
Servomotors
Synchronous
Servomotors

For connection to motors with a sin/cos incremental encoder 1 Vpp

Cable design and pin assignment
Type 6FX.002-2CA31-...: base cable

<table>
<thead>
<tr>
<th>Converter side</th>
<th>Cable, sold by the meter</th>
<th>Measurement system/motor side</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN</td>
<td>Signal name</td>
<td>Color of cores</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>Yellow</td>
</tr>
<tr>
<td>4</td>
<td>* A</td>
<td>Green</td>
</tr>
<tr>
<td>5</td>
<td>Inner shield</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>* B</td>
<td>Brown</td>
</tr>
<tr>
<td>8</td>
<td>Inner shield</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>M</td>
<td>Black</td>
</tr>
<tr>
<td>18</td>
<td>* M</td>
<td>Orange</td>
</tr>
<tr>
<td>19</td>
<td>L</td>
<td>Blue</td>
</tr>
<tr>
<td>20</td>
<td>* U</td>
<td>Gray</td>
</tr>
<tr>
<td>21</td>
<td>U</td>
<td>White-black</td>
</tr>
<tr>
<td>22</td>
<td>* U</td>
<td>Brown-blue</td>
</tr>
<tr>
<td>23</td>
<td>Inner shield</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>R</td>
<td>Red</td>
</tr>
<tr>
<td>27</td>
<td>* R</td>
<td>Orange</td>
</tr>
<tr>
<td>28</td>
<td>0 V sense</td>
<td>Brown-yellow</td>
</tr>
<tr>
<td>29</td>
<td>+ TEMP</td>
<td>Green-black</td>
</tr>
<tr>
<td>30</td>
<td>– TEMP</td>
<td>Green-red</td>
</tr>
</tbody>
</table>

Cable extension
Type 6FX.002-2CA34-...

PIN assignment of the cable extension corresponding to the base cable.

Selection and ordering data

<table>
<thead>
<tr>
<th>Cable</th>
<th>Order No.</th>
<th>Length</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encoder cables for connection to motors which are fitted with a sin/cos incremental encoder 1 Vpp (detection of rotor position and speed). Number of cores × cross-section [mm²]: 3 × 2 × 0.14 + 4 × 0.14 + 2 × 0.5 + 4 × 0.23</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example: 3.3 ft (1 m) ... — 1 A 80
26.2 ft (8 m) ... — 1 A 80
45.7 ft (15 m) ... — 1 B 80
65.6 ft (20 m) ... — 1 B 80
89.3 ft (25 m) ... — 1 A 100
113.1 ft (30 m) ... — 1 B 100
136.8 ft (40 m) ... — 1 A 100
150.5 ft (45 m) ... — 1 B 100
164.2 ft (50 m) ... — 1 A 100
177.9 ft (55 m) ... — 1 B 100
191.6 ft (60 m) ... — 1 A 100
205.3 ft (65 m) ... — 1 B 100
219.0 ft (70 m) ... — 1 A 100
232.7 ft (75 m) ... — 1 B 100
246.4 ft (80 m) ... — 1 A 100
260.1 ft (85 m) ... — 1 B 100
273.8 ft (90 m) ... — 1 A 100
287.5 ft (95 m) ... — 1 B 100
301.2 ft (100 m) ... — 1 A 100
314.9 ft (105 m) ... — 1 B 100
328.6 ft (110 m) ... — 1 A 100
342.3 ft (115 m) ... — 1 B 100
356.0 ft (120 m) ... — 1 A 100
369.7 ft (125 m) ... — 1 B 100
383.4 ft (130 m) ... — 1 A 100
397.1 ft (135 m) ... — 1 B 100
410.8 ft (140 m) ... — 1 A 100
424.5 ft (145 m) ... — 1 B 100
438.2 ft (150 m) ... — 1 A 100
1) Maximum permissible length of the prefabricated cables for the sin/cos incremental encoder 1 Vpp: 328 ft (100 m).
### Servomotors Connecting Systems

#### Asynchronous Servomotors

- **Encoder cables**
  - **MOTION-CONNECT 500 and 800**

  **For connection to motors with an absolute-value encoder (EnDat)**

  **Cable design and pin assignment**

  **Type 6FX.002-2EQ10 — base cable**

  **Converter side**

<table>
<thead>
<tr>
<th>PIN</th>
<th>Signal name</th>
<th>Color of cores</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>A</td>
<td>Yellow</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
<td><em>Y</em></td>
</tr>
<tr>
<td>5</td>
<td>Inner shield</td>
<td><em>Y</em></td>
</tr>
<tr>
<td>6</td>
<td>B</td>
<td>Black</td>
</tr>
<tr>
<td>7</td>
<td>B</td>
<td>Brown</td>
</tr>
<tr>
<td>8</td>
<td>Inner shield</td>
<td>Brown</td>
</tr>
<tr>
<td>9</td>
<td>Cable</td>
<td>Black</td>
</tr>
<tr>
<td>10</td>
<td>Cable</td>
<td>Green</td>
</tr>
<tr>
<td>11</td>
<td>Cable</td>
<td>Black</td>
</tr>
<tr>
<td>12</td>
<td>Cable</td>
<td>Brown</td>
</tr>
<tr>
<td>13</td>
<td>Cable</td>
<td>Black</td>
</tr>
<tr>
<td>14</td>
<td>Cable</td>
<td>Brown</td>
</tr>
<tr>
<td>15</td>
<td>Data</td>
<td>Red</td>
</tr>
<tr>
<td>16</td>
<td>Data</td>
<td>Orange</td>
</tr>
<tr>
<td>17</td>
<td>Inner shield</td>
<td>Orange</td>
</tr>
<tr>
<td>18</td>
<td>Cable</td>
<td>Black</td>
</tr>
</tbody>
</table>

  **Measurement system side**

<table>
<thead>
<tr>
<th>PIN</th>
<th>Signal name</th>
<th>Color of cores</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A</td>
<td>Y</td>
<td>Yellow</td>
</tr>
<tr>
<td>4A</td>
<td><em>Y</em></td>
<td></td>
</tr>
<tr>
<td>5A</td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>6A</td>
<td>B</td>
<td>Black</td>
</tr>
<tr>
<td>7A</td>
<td>B</td>
<td>Brown</td>
</tr>
<tr>
<td>8A</td>
<td></td>
<td>Brown</td>
</tr>
<tr>
<td>9A</td>
<td>Cable</td>
<td>Black</td>
</tr>
<tr>
<td>10A</td>
<td>Cable</td>
<td>Green</td>
</tr>
<tr>
<td>11A</td>
<td>Cable</td>
<td>Black</td>
</tr>
<tr>
<td>12A</td>
<td>Cable</td>
<td>Brown</td>
</tr>
<tr>
<td>13A</td>
<td>Cable</td>
<td>Black</td>
</tr>
<tr>
<td>14A</td>
<td>Cable</td>
<td>Brown</td>
</tr>
<tr>
<td>15A</td>
<td>Data</td>
<td>Red</td>
</tr>
<tr>
<td>16A</td>
<td>Data</td>
<td>Orange</td>
</tr>
<tr>
<td>17A</td>
<td></td>
<td>Orange</td>
</tr>
<tr>
<td>18A</td>
<td>Cable</td>
<td>Black</td>
</tr>
</tbody>
</table>

**Cable extension**

**Type 6FX.002-2EQ14 — base cable**

**Plug type: 6FX2 003-0CE17**

**PIN assignment of the cable extension corresponding to the base cable.**

**Selection and ordering data**

<table>
<thead>
<tr>
<th>Cable</th>
<th>Order No.</th>
<th>Length</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable, sold by the meter</td>
<td>6FX.008-1BD01</td>
<td>164</td>
<td>6FX.008-1BD05-1FA0</td>
</tr>
<tr>
<td>Encoder cables for connection to motors which are fitted with an absolute-value encoder (EnDat) (detection of absolute position and speed)</td>
<td>6FX.002-2EQ16</td>
<td>328</td>
<td>6FX.008-1BD05-2AA0</td>
</tr>
<tr>
<td>Example:</td>
<td>328 ft (100 m)</td>
<td>656</td>
<td>6FX.008-1BD05-3AA0</td>
</tr>
<tr>
<td>Length code</td>
<td></td>
<td>1640</td>
<td>6FX.008-1BD05-6AA0</td>
</tr>
</tbody>
</table>

**Outer diameter of cable for 6FX8: 0.39 in (9.9 mm)**

**Outer diameter of cable for 6FX5: 0.39 in (9.9 mm)**

1. Maximum permissible length of the prefabricated cables for the absolute-value encoder (EnDat): 328 ft (100 m).
Servomotors Connecting Systems

Encoder cables for linear motors

1FN3 primary sections are equipped with the two temperature monitoring circuits, Temp-S and Temp-F, to protect the primary sections against inadmissibly high thermal stressing as well as to monitor the temperature during commissioning and operation.

Temp-S (shut-down) comprises three PTC thermistor elements connected in series located in each of the three phase windings of the primary section. Temp-S is primarily used to reliably protect the motor against overheating. If Temp-S responds, then the drive must be quickly powered-down in order to interrupt the primary section power supply from the drive converter, which can be done by using the Siemens thermistor motor protection unit 3RN1.

Temp-F supplies an analog signal which is proportional to the temperature, and for a symmetrical current load of the three-phase windings, provides information about the average motor temperature.

Termination technology, length measuring system

The termination technology required for the length measuring scales for 1FN3 AC linear motors, essentially depends on the measuring scale type (incremental vs. absolute). The list of available preassembled cables and connector box to connect the length measuring systems is shown in Figure 5/1 (incremental measuring system) and Figure 5/2 (absolute measuring system).

Note:
If the connector box 1FN1 910-0AA00-0AA0 is used, then unused connector sockets have to be closed with the provided dummy plug.

Fig. 5/1
Termination technology for incremental measuring system on 1FN3 motors

Fig. 5/2
Termination technology for absolute-value measuring system on 1FN3 motors
Encoder cables for 1FNC3 AC linear motors

The connector box is used to connect the Hall sensor when an incremental encoder is used. The connector boxes have an IP 65 degree of protection, and have on the opposite side of the rating plate two blind tapped holes for mounting to the machine or to the cabinet. Part number: 1FN1910-0AA00-0AA0

**Connector box**

- Connector type: 17-pin, plug
- Temperature sensor: 9-pin, socket
- Linear scale: 12-pin, socket
- Hall sensor box: 9-pin, socket with Y-coding

**Signals:**

- A+: 1
- A-: 2
- B+: 4
- B-: 6
- C+: 5
- C-: 6
- D+: 7
- D–: 8
- +5V: 10
- –5V: 12
- B+: 11
- B–: 12
- R+: 13
- R–: 1
- +Temp: 8
- –Temp: 7
- Inner shield: 17

**Dimensions:**

- Cable dimension in inches
- Dimension in mm

---

Siemens Catalog MC Part 2 · 2002/2003
Servomotors
Connecting Systems

Encoder cables for SIMODRIVE 611 universal

To connect the SIMODRIVE 611 universal with the connector box the same prefabricated encoder cable as with an sin/cos incremental 1 Vpp in case of an incremental measuring system is used. For dimensions and pin-out see from page 5/13.

Part number
For incremental measuring system:
Standard
6FX5002-2CA31-1000 1)
Performance
6FX8002-2CA31-1000 1)

From absolute measuring system (w/o connector box) to SIMODRIVE 611 universal

With an absolute measuring system a hall sensor box is not required. You can use the following cable which allows a direct connection to the SIMODRIVE 611 universal.

Part number
For absolute measuring system:
Standard
6FX5002-2CH00-1000 1)
Performance
6FX8002-2CH00-1000 1)

1) Maximum cable length 164 ft (50 m), for length code see page 5/4.
### Connection overview

<table>
<thead>
<tr>
<th>Connection Type</th>
<th>Order No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOT ENCODER (17-pole)</td>
<td>6FX2 001 - 4EA00 - 1BA0</td>
<td>2-core cut to length</td>
</tr>
<tr>
<td></td>
<td>6FX2 001 - 4EA00 - 1BA0</td>
<td>2-core with PG connection</td>
</tr>
<tr>
<td>PROFIBUS-DP</td>
<td>6FX1 830 - CD H10</td>
<td>2-core cut to length</td>
</tr>
<tr>
<td></td>
<td>6FX1 830 - CD H10</td>
<td>2-core cut to length</td>
</tr>
<tr>
<td></td>
<td>6ES7 194 - 1L170 - 0AA0</td>
<td>5-core not pre-assembled</td>
</tr>
</tbody>
</table>

1) 6XV1 830-DE10 not suitable for trailing. 6XV1 810-3E10 for trailing.

2) The total cable length in the DC link for all devices connected to an infeed must not exceed 100 m.
Servomotors
Connecting Systems

Connection overview

**Connection overview**

**SIMODRIVE POSMO CA**

- SUPPLY IN (4+2-pole)
  - Female angled: 6FX1 002 - SDA75 - 0
  - Supply system: U1, V1, W1

- SUPPLY OUT (4+2-pole)
  - Male angled: 6FX1 002 - SDA45 - 0
  - Female angled: SIMODRIVE POSMO CA
    - Supply IN (4+2-pole)

- MOT POWER (4+2-pole)
  - Female angled: 6FX1 002 - SDA02 - 1
  - Male angled: 6FX1 002 - SDA05 - 1
  - ≤ 5 m: (4 x 2.5 mm² + 2 x 1.5 mm²)

- DIR MEASUR (17-pole)
  - Female angled: 6FX1 002 - 2AA10 - 1
  - Male angled: 6FX1 002 - 2AA50 - 1
  - ≤ 15 m:

- MOT ENCODER (27-pole)
  - Female angled: 6FX1 002 - 2AA60 - 1
  - Male angled: 6FX1 002 - 2AA70 - 1
  - ≤ 5 m:

- PROFIBUS-DP IN
  - 6FX1 830 - 2C M10
  - 2-core cut to length

- PROFIBUS-DP OUT
  - 6FX1 002 - 4EA00 - 12AD
  - 2-core with PG connection

---

1) 6XV1 800-3EH10 not suitable for trailing.
  6XV1 810-3EH10 for trailing.

2) For length code see page 5/4.

---

Siemens Catalog MC Part 2 2002/2003
---

**Connection overview**

- **SIMODRIVE POSMO SI**
  - **SUPPLY IN (3+2-pole)**
    - Female straight: 6FX1 002 - 5DA5 - 1 D 2 B
    - Female angled: 6FX1 002 - 5DA6 - 1 D 2 B
  - Male straight: 6FX1 002 - 5DA8 - 1 D 2 B
  - Male angled: 6FX1 002 - 5DA9 - 1 D 2 B
  - SUPPLY OUT (3+2-pole)
    - Female straight: 6FX1 002 - 5DA1 - 1 D 2 B
    - Female angled: 6FX1 002 - 5DA2 - 1 D 2 B
  - PROFIBUS-DP IN
    - Female straight: 6FX1 002 - 5DA3 - 1 D 2 B
  - PROFIBUS-DP OUT
    - Female straight: 6FX1 002 - 5DA4 - 1 D 2 B

- **SIMODRIVE POSMO CD/CA, SI**
  - SUPPLY IN (3+2-pole)
    - Female straight: 6FX1 002 - 5DA5 - 1 D 2 B
    - Female angled: 6FX1 002 - 5DA6 - 1 D 2 B
  - Male straight: 6FX1 002 - 5DA8 - 1 D 2 B
  - Male angled: 6FX1 002 - 5DA9 - 1 D 2 B
  - PROFIBUS-DP IN
    - Female straight: 6FX1 002 - 5DA1 - 1 D 2 B
  - PROFIBUS-DP OUT
    - Female straight: 6FX1 002 - 5DA2 - 1 D 2 B

---

1. The total cable length in the DC link for all devices connected to an infeed must not exceed 100 m.
2. 6XV1 830-0EH10 not suitable for trailing, 6XV1 810-3EH10 for trailing.
3. For length code see page 5/4.
Servomotors
Connecting Systems

Notes

Synchronous Servomotors

Asynchronous Servomotors
Servomotors Documentation

6/2 Documentation CD-ROM
6/2 Sizing & selection tool
**Servomotors Documentation**

**Documentation CD-ROM - Sizing & selection tool**

The General Motion Control CD-ROM contains information about the SIMOVERT MASTERDRIVES MC, the SIMODRIVE 611 universal drive, the POSMOS and the High Performance Servomotors. For the motors in particular this includes:

- Operating instructions
- Dimension Drawings
- Torque-Speed curves
- Engineering Information
- Selection Tools (SimoSize)
- Etc.

The CD is available free of charge.

Order No.: DRMS-02055

**Sizing & selection tool**

SimoSize is a PC tool which allows the user to accelerate the motion Design cycle by providing all the necessary tools and products of a modern graphical interface format using Windows 95/98/NT/2000. SimoSize is available free of charge and may be copied and distributed anytime.

SimoSize offers the following range of functions:

1. **Axis Design** allows the quick selection of components like gearboxes, leadscrews, nip rolls, etc. just by clicking on the appropriate button and inputting the required data.

2. **Velocity Profile** allows specifying and refining the profile to your application needs.

3. **Report Generator** provides the results of all the calculation performed for speed, torque and inertia required to properly select a motor. This process is further simplified with the “Auto Select” button.

“Auto Select” will find the optimum choice for you automatically according to the selected parameters and motor requirements.
### General information

- **Speed-Torque curves**
  - 1FK6 servomotors
  - 1FT6 servomotors
  - 1PH7 servomotors
  - 1PL6 servomotors

- **Additional data for 1PH7 and 1PL6 motors**
  - Ventilation data and sound pressure level
  - Bearing design/type of drive and maximum speeds
  - Lateral-force diagrams
  - Terminal box assignment, max. cable cross-sections
  - Overview of possible types of construction
### General information

#### Engineering information when selecting the motor degree of protection

Often, there is no adequate protection against water, as generally oil-containing, penetrating and/or aggressive cooling-lubricating mediums are used. The following table will help you to select the required degree of protection. In addition to the theoretical DIN regulations, practical experience values have been taken into account. If in doubt, always select the next higher degree of protection.

<table>
<thead>
<tr>
<th>Effect</th>
<th>Liquids</th>
<th>General workshop environment</th>
<th>Water, general, cooling-lubricating mediums (95% H₂O; 5% oil)</th>
<th>Penetrating oil; petroleum; aggressive cooling-lubricating medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry</td>
<td>IP 23</td>
<td>IP 65</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>or IP 64</td>
<td>IP 65</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Environment where liquids and fluids are present</td>
<td>IP 55</td>
<td>IP 64</td>
<td>IP 67</td>
<td></td>
</tr>
<tr>
<td>Mist</td>
<td>IP 55</td>
<td>IP 65</td>
<td>IP 67</td>
<td>IP 68</td>
</tr>
<tr>
<td>Spray</td>
<td>–</td>
<td>IP 55</td>
<td>IP 65</td>
<td>IP 68</td>
</tr>
<tr>
<td>Jet</td>
<td>IP 55</td>
<td>IP 67</td>
<td>IP 68</td>
<td></td>
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<td></td>
<td></td>
<td>IP 67</td>
<td>IP 68</td>
<td></td>
</tr>
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</table>

**IP 1st code (0–6):**
- Degree of protection against contact and the ingress/penetration of foreign bodies

**IP 2nd code (0–8):**
- Degree of protection against the ingress of water (no protection against oil)

Permanent Magnet Servomotors with separately-driven fan fulfill, according to EN 60 529, degree of protection IP 64. The IP 65 or IP 67 option cannot be fulfilled if a separately-driven fan is used.
Servomotors
Configuration Aids
1FK6 servomotors

Speed-Torque curves for 1FK6

Rated speed \( n_r \), 3000 rpm
Servomotors
Configuration Aids
1FK6 servomotors
Synchronous Servomotors

Speed-Torque curves for 1FK6

**Rated speed \( n_r = 3000 \text{ rpm} \)**

**Rated speed \( n_r = 4000 \text{ rpm} \)**

Torque [Nm], Speed [rpm]

<table>
<thead>
<tr>
<th>Speed [rpm]</th>
<th>0</th>
<th>1000</th>
<th>2000</th>
<th>3000</th>
<th>4000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque [Nm]</td>
<td>0</td>
<td>100</td>
<td>150</td>
<td>200</td>
<td>300</td>
</tr>
</tbody>
</table>

Interruption Operating Region
Continuous Operating Region

**Interruption Operating Region**

**Continuous Operating Region**

1FK6101–8AF71–1...
1FK6103–8AF71–1...
1FK6043–7AH71–1...
1FK6044–7AH71–1...
1FK6061–7AH71–1...
1FK6064–7AH71–1...
Servomotors
Configuration Aids

### 1FK6 and 1FT6 servomotors

#### Speed-Torque curves for 1FK6

**Rated speed \( n_r = 6000 \text{ rpm} \)**

- **1FK6032–6AK71–1**
- **1FK6040–6AK71–1**
- **1FK6043–7AK71–1**

#### Speed-Torque curves for 1FT6

**Rated speed \( n_r = 1500 \text{ rpm, non-ventilated} \)**

- **1FT6102–8AB7.–...**
- **1FT6105–8AB7.–...**
- **1FT6108–8AB7.–...**

- **1FT6132–8AB7.–...**
- **1FT6134–8AB7.–...**
- **1FT6136–8AB7.–...**
Servomotors
Configuration Aids

1FT6 servomotors

Speed-Torque curves for 1FT6

Rated speed \( n \), 1500 rpm, blower-ventilated

- 1FT6105-8SB7
- 1FT6112-8AC7
- 1FT6132-6SB7
- 1FT6136-6SB7

Rated speed \( n \), 2000 rpm, non-ventilated

- 1FT6061-6AC7
- 1FT6062-6AC7
- 1FT6081-6AC7
Synchronous Servomotors

1FT6 servomotors

Speed-Torque curves for 1FT6

Rated speed \( n_r \), 2000 rpm, non-ventilated

- 1FT6064–6AC7...
- 1FT6082–8AC7...
- 1FT6084–8AC7...
- 1FT6086–8AC7...
- 1FT6102–8AC7...
- 1FT6105–8AC7...
- 1FT6132–6AC7...
- 1FT6134–6AC7...

Torque (Nm)

Intermittent Operating Region

Continuously Operating Region

Speed (rpm)

0 1500 2000

0 250 400

0 1000 2000

0 500 1000

0 100 200

0 50 25

0 10 5

0 2.5

0 0.5

0
Servomotors
Configuration Aids

1FT6 servomotors

Synchronous Servomotors

Speed-Torque curves for 1FT6

Rated speed $n_r$ 2000 rpm, non-ventilated

Rated speed $n_r$ 2000 rpm, blower-ventilated
Servomotors
Configuration Aids

1FT6 servomotors

Speed-Torque curves for 1FT6

Rated speed \( n_r \), 3000 rpm, non-ventilated

<table>
<thead>
<tr>
<th>Speed (rpm)</th>
<th>Torque (Nm)</th>
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<tbody>
<tr>
<td>500</td>
<td>100</td>
</tr>
<tr>
<td>750</td>
<td>150</td>
</tr>
<tr>
<td>1000</td>
<td>200</td>
</tr>
<tr>
<td>1250</td>
<td>250</td>
</tr>
<tr>
<td>1500</td>
<td>300</td>
</tr>
<tr>
<td>2000</td>
<td>400</td>
</tr>
<tr>
<td>2500</td>
<td>500</td>
</tr>
<tr>
<td>3000</td>
<td>600</td>
</tr>
</tbody>
</table>

Intermittent Operating Region
S1 (100K)
Continuous Operating Region

1FT6041–4AF7
1FT6061–6AF7
1FT6081–8AF7
1FT6044–4AF7
1FT6064–6AF7
1FT6084–8AF7
1FT6086–8AF7

1000 lb-in

Da65-5667b
Da65-5672b
Da65-5669b
Da65-5676b
Da65-5617b
Da65-5680b
Da65-5621b
Da65-5625b
Da65-5629b
Servomotors
Configuration Aids

1FT6 servomotors

Speed-Torque curves for 1FT6

Rated speed \( n_r \) 3000 rpm, non-ventilated

1FT6102–8AF7. – .... 1FT6105–8AF7. – .... 1FT6132–6AF7. – ....

Rated speed \( n_r \) 3000 rpm, blower-ventilated

1FT6084–8SF7. – . . . . 1FT6086–8SF7. – . . . . 1FT6105–8SF7. – . . . .

1FT6132–6SF7. – . . . . 1FT6134–6SF7. – . . . .
Speed-Torque curves for 1FT6

**Rated speed** $n_r$, 4500 rpm, non-ventilated

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<tr>
<th>Model</th>
<th>Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FT6061-6AH7</td>
<td>750</td>
</tr>
<tr>
<td>1FT6062-6AH7</td>
<td>750</td>
</tr>
<tr>
<td>1FT6081-8AH7</td>
<td>750</td>
</tr>
<tr>
<td>1FT6082-8AH7</td>
<td>750</td>
</tr>
<tr>
<td>1FT6084-8AH7</td>
<td>750</td>
</tr>
<tr>
<td>1FT6086-8AH7</td>
<td>750</td>
</tr>
<tr>
<td>1FT6102-8AH7</td>
<td>750</td>
</tr>
</tbody>
</table>

**Intermittent Operating Region**

- $S1 (100K)$

**Continuous Operating Region**
Servomotors
Configuration Aids

1FT6 servomotors

Speed-Torque curves for 1FT6

Rated speed \( n_n \), 4500 rpm, blower-ventilated

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<thead>
<tr>
<th>Speed (rpm)</th>
<th>Torque (lb-in)</th>
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<tbody>
<tr>
<td>400</td>
<td>300</td>
</tr>
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<td>500</td>
<td>200</td>
</tr>
<tr>
<td>600</td>
<td>150</td>
</tr>
<tr>
<td>750</td>
<td>100</td>
</tr>
<tr>
<td>2250</td>
<td>75</td>
</tr>
</tbody>
</table>

Rated speed \( n_n \), 6000 rpm, non-ventilated

<table>
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<tr>
<th>Speed (rpm)</th>
<th>Torque (lb-in)</th>
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</thead>
<tbody>
<tr>
<td>600</td>
<td>300</td>
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<td>700</td>
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<td>150</td>
</tr>
<tr>
<td>1000</td>
<td>100</td>
</tr>
<tr>
<td>2250</td>
<td>75</td>
</tr>
</tbody>
</table>

Intermittent Operating Region
S1 (100K)

Continuous Operating Region

1FT0604–8SH7.–.... 1FT0606–8SH7.–....

1FT0621–6AK7.–.... 1FT0624–6AK7.–.... 1FT0627–6AK7.–....

1FT0634–4AK7.–.... 1FT0637–4AK7.–.... 1FT0641–4AK7.–....
Servomotors
Configuration Aids

1FT6 servomotors

Speed-Torque curves for 1FT6

Rated speed $n_0$, 6000 rpm, non-ventilated

- 1FT6044-4AK7
- 1FT6081-8AK7
- 1FT6082-8AK7

Rated speed $n_0$, 6000 rpm, blower-ventilated

- 1FT6044-5SK7
- 1FT6086-6SK7
Servomotors
Configuration Aids

1FT6 servomotors

Speed-Torque curves for 1FT6

Rated speed \( n_1 \), 1500 rpm, water-cooled

Rated speed \( n_2 \), 2000 rpm, water-cooled

Rated speed \( n_3 \), 3000 rpm, water-cooled
# Speed-Torque curves for 1FT6

## Rated speed $n_r$, 4500 rpm, water-cooled

- **1FT6084–8WH7**: Speed: 0–3000 rpm, Torque: 700 lb-in, Nm: 700.
- **1FT6086–8WK7**: Speed: 0–4500 rpm, Torque: 800 lb-in, Nm: 800.

## Rated speed $n_r$, 6000 rpm, water-cooled

- **1FT6084–8WK7**: Speed: 0–2000 rpm, Torque: 600 lb-in, Nm: 600.
Asynchronous Servomotors

1PH7 servomotors

Speed-Torque curves for 1PH7-3 AC 480 V SIMOVERT MASTERDRIVES Vector Control converters

Rated speed \( n_r = 500 \text{ rpm} \)

<table>
<thead>
<tr>
<th>Model</th>
<th>Torque (lb-ft/ Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1PH7163-2. B. - .....</td>
<td>max. breakdown torque: 537 lb-ft/ 728 Nm</td>
</tr>
<tr>
<td>1PH7167-2. B. - .....</td>
<td>max. breakdown torque: 673 lb-ft/ 913 Nm</td>
</tr>
<tr>
<td>1PH7184-2. B. - .....</td>
<td>max. breakdown torque: 567 lb-ft/ 769 Nm</td>
</tr>
<tr>
<td>1PH7186-2. B. - .....</td>
<td>max. breakdown torque: 818 lb-ft/ 1109 Nm</td>
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<tr>
<td>1PH7224-2. B. - .....</td>
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<tr>
<td>1PH7226-2. B. - .....</td>
<td>max. breakdown torque: 1674 lb-ft/2269 Nm</td>
</tr>
<tr>
<td>1PH7228-2. B. - .....</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Torque (lb-ft/ Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1PH7166-2. B. - .....</td>
<td>max. breakdown torque: 818 lb-ft/1109 Nm</td>
</tr>
<tr>
<td>1PH7224-2. B. - .....</td>
<td>max. breakdown torque: 1116 lb-ft/1513 Nm</td>
</tr>
<tr>
<td>1PH7226-2. B. - .....</td>
<td>max. breakdown torque: 1674 lb-ft/2269 Nm</td>
</tr>
<tr>
<td>1PH7228-2. B. - .....</td>
<td>max. breakdown torque: 2054 lb-ft/2785 Nm</td>
</tr>
</tbody>
</table>
Speed-Torque curves for 1PH7 - 3 AC 480 V SIMOVERT MASTERDRIVES Vector Control converters

**Rated speed**

<table>
<thead>
<tr>
<th>Torque (lb-ft)</th>
<th>500</th>
<th>650</th>
<th>150</th>
<th>250</th>
<th>350</th>
<th>450</th>
<th>550</th>
</tr>
</thead>
</table>

| Torque (Nm)   | 100 | 200 | 300 | 400 | 500 | 600 | 700 |

**Breakdown torque**

- max. breakdown torque: 607 lb-ft / 823 Nm
- max. breakdown torque: 347 lb-ft / 471 Nm
- max. breakdown torque: 1383 lb-ft / 1875 Nm
- max. breakdown torque: 740 lb-ft / 1004 Nm
- max. breakdown torque: 858 lb-ft / 1163 Nm
- max. breakdown torque: 538 lb-ft / 730 Nm
- max. breakdown torque: 207 lb-ft / 282 Nm

**Configuration Aids**

1PH7 servomotors

### Asynchronous Servomotors

#### Speed-Torque curves for 1PH7 - 3 AC 480 V SIMOVERT MASTERDRIVES Vector Control converters

**Rated speed** $n_r = 1550$ rpm

- 1PH7103-2.D. - .... max. breakdown torque: 33 lb-ft/47 Nm
- 1PH7107-2.D. - .... max. breakdown torque: 100 lb-ft/135 Nm
- 1PH7133-2.D. - .... max. breakdown torque: 207 lb-ft/282 Nm
- 1PH7137-2.D. - .... max. breakdown torque: 347 lb-ft/471 Nm
- 1PH7163-2.D. - .... max. breakdown torque: 538 lb-ft/730 Nm
- 1PH7167-2.D. - .... max. breakdown torque: 740 lb-ft/1004 Nm
- 1PH7169-2.D. - .... max. breakdown torque: 858 lb-ft/1163 Nm
- 1PH7186-2.D. - .... max. breakdown torque: 1383 lb-ft/1875 Nm

**Servomotors**

- 1PH7 servomotors

**Configuration Aids**

- DA65-5571a
- DA65-5579a
- DA65-5587a
- DA65-5686a
- DA65-5750a
- DA65-5758a
- DA65-5805
- DA65-5806

**Technical Specifications**

- Asynchronous motors
- Servomotors
- Configuration Aids

**Technical Details**

- I = 88 A
- I = 116 A
- I = 160 A
- I = 200 A
- I = 250 A
- I = 300 A

**Configuration Details**

- S1 /
- S6-25% /
- S6-40% /
- S6-60% /

**Torque Details**

- 55 lb-ft / 75 Nm
- 100 lb-ft / 135 Nm
- 138 lb-ft / 187 Nm
- 207 lb-ft / 282 Nm
- 347 lb-ft / 471 Nm
- 538 lb-ft / 730 Nm
- 740 lb-ft / 1004 Nm
- 858 lb-ft / 1163 Nm
- 1383 lb-ft / 1875 Nm
1PH7 servomotors

Asynchronous Servomotors

Speed-Torque curves for 1PH7 - 3 AC 480 V SIMOVERT MASTERDRIVES Vector Control converters

### Rated speed \( n_1 = 1350 \text{ rpm} \)

![Graph showing speed-torque curves for 1PH7](image1.png)

#### 1PH7226–2. D. – ....
- Max. breakdown torque: 1733 lb-ft/2350 Nm

#### 1PH7228–2. D. – ....
- Max. breakdown torque: 2083 lb-ft/2824 Nm

### Rated speed \( n_1 = 2000 \text{ rpm} \)

![Graph showing speed-torque curves for 1PH7](image2.png)

#### 1PH7101–2. F. – ....
- Max. breakdown torque: 49.4 lb-ft/67 Nm

#### 1PH7103–2. F. – ....
- Max. breakdown torque: 49 lb-ft/66 Nm

#### 1PH7105–2. F. – ....
- Max. breakdown torque: 93 lb-ft/126 Nm

#### 1PH7107–2. F. – ....
- Max. breakdown torque: 113 lb-ft/154 Nm

#### 1PH7131–2. F. – ....
- Max. breakdown torque: 143 lb-ft/194 Nm

#### 1PH7133–2. F. – ....
- Max. breakdown torque: 197 lb-ft/267 Nm
Speed-Torque curves for 1PH7 3 AC 480 V SIMOVERT MASTERDRIVES Vector Control converters

Rated speed \( n_0 \), 2000 rpm

<table>
<thead>
<tr>
<th>Speed (rpm)</th>
<th>Torque (lb-ft)</th>
<th>Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>100</td>
<td>140</td>
</tr>
<tr>
<td>1100</td>
<td>200</td>
<td>280</td>
</tr>
<tr>
<td>1200</td>
<td>300</td>
<td>420</td>
</tr>
<tr>
<td>1300</td>
<td>400</td>
<td>560</td>
</tr>
<tr>
<td>1400</td>
<td>500</td>
<td>660</td>
</tr>
<tr>
<td>1500</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td>1600</td>
<td>700</td>
<td>940</td>
</tr>
<tr>
<td>1700</td>
<td>800</td>
<td>1080</td>
</tr>
<tr>
<td>1800</td>
<td>900</td>
<td>1220</td>
</tr>
<tr>
<td>1900</td>
<td>1000</td>
<td>1360</td>
</tr>
<tr>
<td>2000</td>
<td>1100</td>
<td>1500</td>
</tr>
</tbody>
</table>

Max. breakdown torque:
- 1PH7135–2. F. – ....: 275 lb-ft/373 Nm
- 1PH7137–2. F. – ....: 392 lb-ft/531 Nm
- 1PH7163–2. F. – ....: 542 lb-ft/735 Nm
- 1PH7167–2. F. – ....: 553 lb-ft/750 Nm
- 1PH7226–2. F. – ....: 1274 lb-ft/1727 Nm
- 1PH7228–2. F. – ....: 1845 lb-ft/2502 Nm

Configuration Aids

Asynchronous Servomotors

1PH7 servomotors
Servomotors
Configuration Aids

1PH7 servomotors

Asynchronous Servomotors

Speed-Torque curves for 1PH7-3 AC 480 V SIMOVERT MASTERDRIVES Vector Control converters

Rated speed \( n = 2650 \text{ rpm} \)

- 1PH7103-2. G. - - - -
  - max. breakdown torque: 61 lb-ft/83 Nm

- 1PH7133-2. G. - - - -
  - max. breakdown torque: 202 lb-ft/274 Nm

- 1PH7137-2. G. - - - -
  - max. breakdown torque: 287 lb-ft/390 Nm

- 1PH7163-2. G. - - - -
  - max. breakdown torque: 513 lb-ft/696 Nm

Rated speed \( n = 2900 \text{ rpm} \)

- 1PH7184-2. L. - - - -
  - max. breakdown torque: 780 lb-ft/1058 Nm

- 1PH7186-2. L. - - - -
  - max. breakdown torque: 1320 lb-ft/1790 Nm

- 1PH7224-2. L. - - - -
  - max. breakdown torque: 1516 lb-ft/2055 Nm

- 1PH7226-2. L. - - - -
  - max. breakdown torque: 1912 lb-ft/2620 Nm

Rated speed \( n = 3000 \text{ rpm} \)

- 1PH7188-2. L. - - - -
  - max. breakdown torque: 780 lb-ft/1058 Nm

- 1PH7190-2. L. - - - -
  - max. breakdown torque: 1320 lb-ft/1790 Nm

- 1PH7230-2. L. - - - -
  - max. breakdown torque: 1516 lb-ft/2055 Nm

- 1PH7232-2. L. - - - -
  - max. breakdown torque: 1912 lb-ft/2620 Nm

7

7/20 Siemens Catalog MC Part 2 · 2002/2003
Servomotors
Configuration Aids

Speed-Torque curves for 1PH7 · 3 AC 480 V SIMOVERT MASTERDRIVES Vector Control converters

**Rated speed** \( n = 2900 \text{ rpm} \)

- **1PH7226-2.L.**
  - Max. breakdown torque: 2168 lb-ft/2939 Nm

- **1PH7228-2.L.**
  - Max. breakdown torque: 2621 lb-ft/3553 Nm

Speed-Torque curves for 1PH7 · 3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters and 3 AC 400 V SIMOVERT MASTERDRIVES Vector Control converters

**Rated speed** \( n = 400 \text{ rpm} \)

- **1PH7163-2.B.**
  - Max. breakdown torque: 458 lb-ft/621 Nm

- **1PH7167-2.B.**
  - Max. breakdown torque: 587 lb-ft/796 Nm

- **1PH7184-2.B.**
  - Max. breakdown torque: 480 lb-ft/650 Nm

- **1PH7186-2.B.**
  - Max. breakdown torque: 779 lb-ft/1056 Nm

- **1PH7224-2.B.**
  - Max. breakdown torque: 1153 lb-ft/1563 Nm

- **1PH7226-2.B.**
  - Max. breakdown torque: 1661 lb-ft/2252 Nm
Servomotors
Configuration Aids

1PH7 servomotors

Asynchronous Servomotors

Speed-Torque curves for 1PH7 3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters and 3 AC 400 V SIMOVERT MASTERDRIVES Vector Control converters

<table>
<thead>
<tr>
<th>Model</th>
<th>Rated Speed</th>
<th>Max. Breakdown Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1PH7228-2.B.O.</td>
<td>400 rpm</td>
<td>2152 lb-ft/2917 Nm</td>
</tr>
<tr>
<td>1PH7103-2.D.O.</td>
<td>1150 rpm</td>
<td>51 lb-ft/69 Nm</td>
</tr>
<tr>
<td>1PH7107-2.D.O.</td>
<td>1150 rpm</td>
<td>96 lb-ft/130 Nm</td>
</tr>
<tr>
<td>1PH7133-2.D.O.</td>
<td>1150 rpm</td>
<td>200 lb-ft/271 Nm</td>
</tr>
<tr>
<td>1PH7137-2.D.O.</td>
<td>1150 rpm</td>
<td>335 lb-ft/454 Nm</td>
</tr>
<tr>
<td>1PH7163-2.D.O.</td>
<td>1150 rpm</td>
<td>525 lb-ft/712 Nm</td>
</tr>
<tr>
<td>1PH7167-2.D.O.</td>
<td>1150 rpm</td>
<td>724 lb-ft/981 Nm</td>
</tr>
</tbody>
</table>
Servomotors
Configuration Aids

1PH7 servomotors

Asynchronous Servomotors

Speed-Torque curves for 1PH7-3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters and 3 AC 400 V SIMOVERT MASTERDRIVES Vector Control converters

Rated speed \( n_1 \) 1150 rpm

- 1PH7184-2. D. – – –
  - max. breakdown torque: 593 lb-ft/804 Nm
- 1PH7186-2. D. – – –
  - max. breakdown torque: 829 lb-ft/1124 Nm
- 1PH7224-2. D. – – –
  - max. breakdown torque: 1371 lb-ft/1859 Nm
- 1PH7226-2. D. – – –
  - max. breakdown torque: 1619 lb-ft/2195 Nm
- 1PH7228-2. D. – – –
  - max. breakdown torque: 1899 lb-ft/2574 Nm

Rated speed \( n_2 \) 1750 rpm

- 1PH7101-2. F. – – –
  - max. breakdown torque: 45 lb-ft/61 Nm
- 1PH7103-2. F. – – –
  - max. breakdown torque: 46 lb-ft/63 Nm
- 1PH7105-2. F. – – –
  - max. breakdown torque: 55 lb-ft/71 Nm
- 1PH7107-2. F. – – –
  - max. breakdown torque: 65 lb-ft/95 Nm
### Speed-Torque curves for 1PH7 - 3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters and 1PH7 servomotors

**Configuration Aids**

#### max. breakdown torque:
- **1PH7167–2. F. . – ....** 703 lb-ft / 953 Nm
- **1PH7163–2. F. . – ....** 366 lb-ft / 496 Nm
- **1PH7133–2. F. . – ....** 184 lb-ft / 250 Nm

#### Rated speed:

<table>
<thead>
<tr>
<th>Speed (rpm)</th>
<th>Torque (lb-ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>30</td>
</tr>
<tr>
<td>2000</td>
<td>60</td>
</tr>
<tr>
<td>3000</td>
<td>90</td>
</tr>
</tbody>
</table>

**Servomotors**

**1PH7 servomotors**

**Asynchronous Servomotors**

**DA65-5755a**
- **S1 / I = 79 A**
- **2000 rpm**
- **S1 / I = 122 A**
- **6000 rpm**

**DA65-5751a**
- **S1 / I = 23 A**
- **2000 rpm**
- **S1 / I = 42 A**
- **6000 rpm**

**DA65-5759b**
- **S1 / I = 25 A**
- **2000 rpm**
- **S1 / I = 31 A**
- **6000 rpm**

**DA65-5747a**
- **S1 / I = 66 A**
- **2000 rpm**
- **S1 / I = 78 A**
- **6000 rpm**

**DA65-5588b**
- **S1 / I = 185 A**
- **2000 rpm**
- **S1 / I = 220 A**
- **6000 rpm**

**DA65-5580a**
- **S1 / I = 102 A**
- **2000 rpm**
- **S1 / I = 120 A**
- **6000 rpm**
Servomotors
Configuration Aids

Asynchronous Servomotors

7 PH7 servomotors

Speed-Torque curves for 1PH7 - 3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters and 3 AC 400 V SIMOVERT MASTERDRIVES Vector Control converters

Rated speed \( n_1 \), 1750 rpm

Rated speed \( n_2 \), 2300 rpm
Servomotors
Configuration Aids

1PH7 and 1PL6 servomotors

Speed-Torque curves for 1PH7 - 3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters and 3 AC 400 V SIMOVERT MASTERDRIVES Vector Control converters

Rated speed \( n_r \) 2000 rpm

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>Speed-Torque Curve</th>
<th>Maximum Breakdown Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1PH7184-2.L.</td>
<td>3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters</td>
<td>640 lb-ft/868 Nm</td>
</tr>
<tr>
<td>1PH7186-2.L.</td>
<td>3 AC 400 V SIMOVERT MASTERDRIVES Vector Control converters</td>
<td>968 lb-ft/1313 Nm</td>
</tr>
<tr>
<td>1PH7224-2.L.</td>
<td>3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters</td>
<td>1121 lb-ft/1520 Nm</td>
</tr>
</tbody>
</table>

Speed-Torque curves for 1PL6 - 3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters and 3 AC 400 V SIMOVERT MASTERDRIVES Vector Control converters

Rated speed \( n_r \) 400 rpm

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>Speed-Torque Curve</th>
<th>Maximum Breakdown Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1PL6184-4.B.</td>
<td>3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters</td>
<td>534 lb-ft/724 Nm</td>
</tr>
<tr>
<td>1PL6186-4.B.</td>
<td>3 AC 400 V SIMOVERT MASTERDRIVES Vector Control converters</td>
<td>833 lb-ft/1130 Nm</td>
</tr>
<tr>
<td>1PL6224-4.B.</td>
<td>3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters</td>
<td>1289 lb-ft/1748 Nm</td>
</tr>
</tbody>
</table>

600 rpm

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>Speed-Torque Curve</th>
<th>Maximum Breakdown Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1PH7186-2.L.</td>
<td>3 AC 400 V SIMOVERT MASTERDRIVES Vector Control converters</td>
<td>175 lb-ft/238 Nm</td>
</tr>
<tr>
<td>1PL6184-4.B.</td>
<td>3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters</td>
<td>218 lb-ft/295 Nm</td>
</tr>
<tr>
<td>1PL6224-4.B.</td>
<td>3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters</td>
<td>1773 lb-ft/2404 Nm</td>
</tr>
</tbody>
</table>

1PH7186-2.L. | 3 AC 400 V SIMOVERT MASTERDRIVES Vector Control converters | 2273 lb-ft/3082 Nm |
Asynchronous Servomotors

7/27

1PL6 servomotors

Speed-Torque curves for 1PL6 3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters and 3 AC 400 V SIMOVERT MASTERDRIVES Vector Control converters

Rated speed \( n_1 \), 1150 rpm

- **1PL6184-4. D.**
  - max. breakdown torque: 836 lb-ft/1158 Nm

- **1PL6186-4. D.**
  - max. breakdown torque: 871 lb-ft/1181 Nm

- **1PL6224-4. D.**
  - max. breakdown torque: 1532 lb-ft/2077 Nm

- **1PL6226-4. D.**
  - max. breakdown torque: 1848 lb-ft/2505 Nm

- **1PL6228-4. D.**
  - max. breakdown torque: 2127 lb-ft/2884 Nm

Rated speed \( n_1 \), 1750 rpm

- **1PL6184-4. F.**
  - max. breakdown torque: 730 lb-ft/989 Nm

- **1PL6186-4. F.**
  - max. breakdown torque: 1210 lb-ft/1640 Nm

- **1PL6224-4. F.**
  - max. breakdown torque: 1257 lb-ft/1704 Nm

- **1PL6228-4. F.**
  - max. breakdown torque: 2127 lb-ft/2884 Nm
### Servomotors

**Configuration Aids**

1PL6 servomotors

**Asynchronous Servomotors**

<table>
<thead>
<tr>
<th>Type</th>
<th>Speed (rpm)</th>
<th>Max. Breakdown Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1PL6226–4.F</td>
<td>1750</td>
<td>1850 lb-ft/2509 Nm</td>
</tr>
<tr>
<td>1PL6228–4.F</td>
<td>2630</td>
<td>3566 lb-ft/5106 Nm</td>
</tr>
<tr>
<td>1PL6184–4.L</td>
<td>2900</td>
<td>851 lb-ft/1154 Nm</td>
</tr>
<tr>
<td>1PL6186–4.L</td>
<td>2900</td>
<td>1258 lb-ft/1706 Nm</td>
</tr>
<tr>
<td>1PL6224–4.L</td>
<td>3000</td>
<td>1125 lb-ft/1526 Nm</td>
</tr>
<tr>
<td>1PL6226–4.L</td>
<td>3000</td>
<td>1635 lb-ft/2217 Nm</td>
</tr>
<tr>
<td>1PL6228–4.L</td>
<td>3000</td>
<td>1960 lb-ft/2658 Nm</td>
</tr>
</tbody>
</table>

1) Motor exceeds MC power range.

---

**Speed-Torque curves for 1PL6**

- **3 AC 480 V SIMOVERT MASTERDRIVES Motion Control converters**
- **3 AC 480 V SIMOVERT MASTERDRIVES Vector Control converters**

![Graphs showing speed-torque curves for 1PL6 servomotors](image-url)
**Asynchronous Servomotors**

### Speed-Torque curves for 1PL6 3 AC 480 V SIMOVERT MASTERDRIVES Vector Control converters

#### Rated speed \( n_r \), 500 rpm

<table>
<thead>
<tr>
<th>Model</th>
<th>Breakdown torque, ( \text{lbf}\cdot\text{ft} )</th>
<th>Breakdown torque, ( \text{N}\text{m} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1PL6184–4, B.</td>
<td>762</td>
<td>1033</td>
</tr>
<tr>
<td>1PL6186–4, B.</td>
<td>870</td>
<td>1179</td>
</tr>
<tr>
<td>1PL6224–4, B.</td>
<td>1295</td>
<td>1756</td>
</tr>
<tr>
<td>1PL6226–4, B.</td>
<td>1831</td>
<td>2483</td>
</tr>
<tr>
<td>1PL6228–4, B.</td>
<td>2177</td>
<td>2952</td>
</tr>
</tbody>
</table>
**Servomotors**

**Configuration Aids**

**1PL6 servomotors**

**Asynchronous Servomotors**

**Speed-Torque curves for 1PL6 - 3 AC 480 V SIMOVERT MASTERDRIVES Vector Control converters**

**Rated speed $n_1$: 1250 rpm**

- **1PL6184-4.D.**
  - Max. breakdown torque: 848 lb-ft/1267 Nm

- **1PL6186-4.D.**
  - Max. breakdown torque: 1108 lb-ft/1503 Nm

- **1PL6224-4.D.**
  - Max. breakdown torque: 2000 lb-ft/2688 Nm

- **1PL6226-4.D.**
  - Max. breakdown torque: 2350 lb-ft/3221 Nm

- **1PL6228-4.D.**
  - Max. breakdown torque: 2568 lb-ft/3564 Nm

**Rated speed $n_2$: 2000 rpm**

- **1PL6184-4.F.**
  - Max. breakdown torque: 755 lb-ft/1023 Nm

- **1PL6186-4.F.**
  - Max. breakdown torque: 1008 lb-ft/1360 Nm

- **1PL6224-4.F.**
  - Max. breakdown torque: 1750 lb-ft/2380 Nm

- **1PL6226-4.F.**
  - Max. breakdown torque: 2068 lb-ft/2804 Nm

- **1PL6228-4.F.**
  - Max. breakdown torque: 2280 lb-ft/3090 Nm
Servomotors
Configuration Aids

Asynchronous Servomotors

1PL6 servomotors

Speed-Torque curves for 1PL6 - 3 AC 480 V SIMOVERT MASTERDRIVES Vector Control converters

Rated speed \( n_2 \): 2000 rpm

<table>
<thead>
<tr>
<th>Model</th>
<th>Breakdown Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1PL6226–4.F</td>
<td>1928 lb-ft/2614 Nm</td>
</tr>
<tr>
<td>1PL6228–4.F</td>
<td>2646 lb-ft/3687 Nm</td>
</tr>
<tr>
<td>1PL6224–4.L</td>
<td>1490 lb-ft/2021 Nm</td>
</tr>
<tr>
<td>1PL6226–4.L</td>
<td>2156 lb-ft/2923 Nm</td>
</tr>
<tr>
<td>1PL6228–4.L</td>
<td>2578 lb-ft/3495 Nm</td>
</tr>
</tbody>
</table>

Rated speed \( n_2 \): 2900 rpm

<table>
<thead>
<tr>
<th>Model</th>
<th>Breakdown Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1PL6184–4.L</td>
<td>904 lb-ft/1226 Nm</td>
</tr>
<tr>
<td>1PL6186–4.L</td>
<td>1330 lb-ft/1803 Nm</td>
</tr>
<tr>
<td>1PL6224–4.L</td>
<td>1490 lb-ft/2021 Nm</td>
</tr>
<tr>
<td>1PL6226–4.L</td>
<td>2156 lb-ft/2923 Nm</td>
</tr>
<tr>
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<tbody>
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</tr>
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</tr>
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</tr>
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### Servomotors

#### Configuration Aids

**Additional data for 1PH7 and 1PL6 motors**

#### Ventilation data and sound pressure levels

<table>
<thead>
<tr>
<th>Size</th>
<th>Motor type</th>
<th>Bearing design/Type of drive</th>
<th>Maximum permissible lateral force (N)</th>
<th>Motor end</th>
<th>Bearing designation</th>
<th>Air-flow-direction Standard</th>
<th>Sound pressure level LpA</th>
<th>Air-flow rate at 50 Hz approx.</th>
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</thead>
<tbody>
<tr>
<td>1PH7 motors</td>
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</tr>
<tr>
<td>100</td>
<td>1PH7224</td>
<td>D-end 6210 C4 6216 C3</td>
<td>3500</td>
<td>4500</td>
<td>5000</td>
<td>7000</td>
<td>8000</td>
<td>10000</td>
</tr>
<tr>
<td>132</td>
<td>1PH7224</td>
<td>6216 C3</td>
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<td>3600</td>
<td>4000</td>
<td>4500</td>
<td>5000</td>
<td>6000</td>
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<td>D-end 6210 C4 6216 C3</td>
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<td>4500</td>
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<td>7000</td>
<td>8000</td>
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<tr>
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<td>180</td>
<td>1PH7224</td>
<td>D-end 6210 C4 6216 C3</td>
<td>3500</td>
<td>4500</td>
<td>5000</td>
<td>7000</td>
<td>8000</td>
<td>10000</td>
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<tr>
<td>225</td>
<td>1PH7224</td>
<td>D-end 6210 C4 6216 C3</td>
<td>3500</td>
<td>4500</td>
<td>5000</td>
<td>7000</td>
<td>8000</td>
<td>10000</td>
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#### Bearing design / type of drive and maximum speeds

<table>
<thead>
<tr>
<th>Size</th>
<th>Motor type</th>
<th>Bearing design/Type of drive</th>
<th>Type of bearings</th>
<th>Max. continuous speed (n_{\text{max}}) rpm</th>
<th>Max. limiting speed (n_{\text{lim}}) rpm</th>
<th>Max. permissible lateral force (F_{\text{max}}) N</th>
</tr>
</thead>
<tbody>
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<td>1PH7224</td>
<td>D-end 6210 C4 6216 C3</td>
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<td>4500</td>
<td>5000</td>
<td>7000</td>
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</tbody>
</table>

### Notes

1. All speeds of 3000 to 5000 rpm, LpA rises to a max. of 85 dB (A).
2. Max. permissible lateral force when \(X = 0.5\) shaft/extension length and \(n = 1000\) rpm. For further values, see lateral-force diagrams.
3. Values are valid for a version with silencer (can also be mounted at a later time).
4. In diagram mode (with 30% \(n_{\text{max}}\), 40% \(n_{\text{lim}}\), 15% standard) for a duration of 15 min.
5. For version for increased maximum speed, see order option in chapter 3 (only for 1PH7).
Lateral-force diagrams

**Additional data for 1PH7 and 1PL6 motors**

### Permissible lateral forces for 1PH7 motors, size 100
Bearings: D-end: 6308 C4
Bearings: ND-end: 6208 C4

- \( F_{1QAS} = 0.9 \times F_{QAS} \)
- \( F_{2QAS} = 1.1 \times F_{QAS} \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( F_{1QAS} )</th>
<th>( F_{2QAS} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.575 in (40 mm)</td>
<td>max. 450 lb (max. 2000 N)</td>
<td>max. 560 lb (max. 2500 N)</td>
</tr>
</tbody>
</table>

\( L_{h1}, L_{h2}, L_{h3} = \text{Estimated useful life under changing operating conditions} \)  
\( q = \text{Operating duration [%] under constant conditions} \)

### Permissible lateral forces for 1PH7 motors, size 132
Bearings: D-end: 6310 C4
Bearings: ND-end: 6210 C4

<table>
<thead>
<tr>
<th>( x )</th>
<th>( F_{1QAS} )</th>
<th>( F_{2QAS} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.17 in (55 mm)</td>
<td>max. 450 lb (max. 2000 N)</td>
<td>max. 560 lb (max. 2500 N)</td>
</tr>
</tbody>
</table>

\( L_{h1}, L_{h2}, L_{h3} = \text{Estimated useful life under changing operating conditions} \)  
\( q = \text{Operating duration [%] under constant conditions} \)

### Permissible lateral forces for 1PH7 motors, size 160
Bearings: D-end: 6312 C4
Bearings: ND-end: 6212 C4

<table>
<thead>
<tr>
<th>( x )</th>
<th>( F_{1QAS} )</th>
<th>( F_{2QAS} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.17 in (55 mm)</td>
<td>max. 450 lb (max. 2000 N)</td>
<td>max. 560 lb (max. 2500 N)</td>
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\( L_{h1}, L_{h2}, L_{h3} = \text{Estimated useful life under changing operating conditions} \)  
\( q = \text{Operating duration [%] under constant conditions} \)

### Permissible lateral forces for 1PH7 motors, size 180
Bearings: D-end: 6214 C3
Bearings: ND-end: 6214 C3

<table>
<thead>
<tr>
<th>( x )</th>
<th>( F_{1QAS} )</th>
<th>( F_{2QAS} )</th>
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<tbody>
<tr>
<td>2.17 in (55 mm)</td>
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\( L_{h1}, L_{h2}, L_{h3} = \text{Estimated useful life under changing operating conditions} \)  
\( q = \text{Operating duration [%] under constant conditions} \)

### Permissible lateral forces for 1PH7 motors, size 225
Bearings: D-end: 6216 C3
Bearings: ND-end: 6216 C3

<table>
<thead>
<tr>
<th>( x )</th>
<th>( F_{1QAS} )</th>
<th>( F_{2QAS} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.17 in (55 mm)</td>
<td>max. 450 lb (max. 2000 N)</td>
<td>max. 560 lb (max. 2500 N)</td>
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\( L_{h1}, L_{h2}, L_{h3} = \text{Estimated useful life under changing operating conditions} \)  
\( q = \text{Operating duration [%] under constant conditions} \)

### Permissible lateral forces for 1PH7 motors, size 280
Bearings: D-end: 6220 C3
Bearings: ND-end: 6220 C3

<table>
<thead>
<tr>
<th>( x )</th>
<th>( F_{1QAS} )</th>
<th>( F_{2QAS} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.17 in (55 mm)</td>
<td>max. 450 lb (max. 2000 N)</td>
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\( L_{h1}, L_{h2}, L_{h3} = \text{Estimated useful life under changing operating conditions} \)  
\( q = \text{Operating duration [%] under constant conditions} \)

If the roller bearings used here are operated without load, damage may occur to the bearings. Minimum lateral forces must be complied with!
Lateral-force diagrams

Permissible lateral forces for 1PH718. and 1PL6218. motors Size 180 for belt output
Bearings: D-end NU214+ E + 6214 C3 ND-end 6214 C3

Permissible lateral forces for 1PH722. and 1PL622. motors Size 225 for belt output
Bearings: D-end NU216+ E + 6216 C3 ND-end 6216 C3

Minimum lateral force 675 lb (3 kN) Minimum lateral force 900 lb (4 kN)

If the roller bearings used here are operated without load, damage may occur to the bearings. Minimum lateral forces must be complied with!

Minimum lateral force 900 lb (4 kN) Minimum lateral force 1125 lb (5 kN)

Minimum lateral force 1125 lb (5 kN)
### Terminal box assignment, max. cable cross-sections

#### 1PH7 motors, sizes 100 to 280

<table>
<thead>
<tr>
<th>Frame size</th>
<th>Motor type</th>
<th>Terminal box type</th>
<th>MAX. possible outer cable diameter in (mm)</th>
<th>Number of main terminals</th>
<th>Max. cable cross-section per terminal (mm²)</th>
<th>Max. possible current per terminal (incl. factor 0.75) A</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1PH710...2...</td>
<td>PG 29</td>
<td>1.1 (28)</td>
<td>6 x M 5</td>
<td>25</td>
<td>67</td>
</tr>
<tr>
<td>132</td>
<td>1PH713...2...</td>
<td>PG 36</td>
<td>1.34 (34)</td>
<td>6 x M 6</td>
<td>35</td>
<td>83</td>
</tr>
<tr>
<td>180</td>
<td>1PH718...2...</td>
<td>PG 42</td>
<td>1.57 (40)</td>
<td>3 x M 12</td>
<td>2 x 50</td>
<td>191</td>
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#### Notes on cable glands

Cable glands and EMC cable glands for shielded cables with PG thread or metric thread and adapter element between PG and metric thread can be obtained from the following companies:

- Siemens Catalog MC Part 2 · 2002/2003

#### Additional data for 1PH7 and 1PL6 motors

- Cable glands: up to PG 48
- Locking screws/filler plugs
- EMC cable glands with heavy-gauge conduit thread
- Metric cable glands
- Adapter elements
- Heavy-gauge conduit thread => metric

1) Frame sizes 100 to 160: reduction factor 0.75
2) Frame sizes 180 and 225: reduction factor 0.80.
### Overview of types of construction

The types of construction available for 1PH7 motors are IM B 3 (normal design), IM B 5, and IM B 35.

Other types of construction (IM V 15, IM V 36, IM B 6, IM B 7, IM B 8 etc.) are also possible. Depending on how and where the motor is installed, the motor (sizes 180 and 225) should be ordered so that the lifting eyebolts for the intended type of installation are suitably positioned on the motor by the supplying factory (12th data digit of the Order No. for the motor). For motor sizes 100 to 160, the screwed-in lifting eyebolts can be repositioned at a later date for different methods and types of installation.

**Note:** There are no condensation holes in the machine. An anti-condensation heater is not necessary.

#### Additional data for 1PH7 and 1PL6 motors

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<tr>
<th>Type of construction</th>
<th>Type of construction</th>
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<td>IM V 36(^\circ)</td>
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<td>IM B 35</td>
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1) Foot-mounting and flange-mounting necessary for size 160 and larger.
### Synchronous Servomotors

- 1FK6 motors, self-cooled
- 1FK7 (CT) motors, self-cooled
- 1FK7 (HD) motors, self-cooled, with planetary gear
- 1FK7 (CT) motors, self-cooled, with planetary gear
- 1FK7 (HD) motors, self-cooled, with planetary gear
- 1FT6 motors, self-cooled, with planetary gear
- 1FT6 motors, self-cooled, with planetary gear
- 1FT6 motors, blower-ventilated
- 1FT6 motors, self-cooled, with planetary gear
- 1FT6 motors, water-cooled
- 1FS6 motors, self-cooled
- 1FN3 AC linear motors

### Asynchronous Servomotors

- 1PH7 motors
- 1PH7 motors with brake module
- 1PH7 motors with pipe connection
- 1PL6 motors
- 1PH4 motors, water-cooled
- 1PH4 motors with 2-gear unit

### Notes

Siemens reserves the right to alter technical data without advanced notice. The dimensions in this catalog can become out of date. Current dimension drawings can be supplied free-of-charge on request.
### 1FK6 motors, self-cooled

**Synchronous Servomotors**

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<tr>
<th>Size</th>
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<th>Dimension in inches (mm)</th>
<th>Resolver</th>
<th>Incremental encoder</th>
<th>D-end of shaft</th>
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**For Motor Dimension in inches (mm)**

- **Type of Construction IM B 5**
  - Self-cooled, with angled plug, with/without brake

**Shaft with featherkey**

---

For more detailed information and specifications, please consult the Siemens Catalog MC Part 2 - 2002/2003.
### 1FK7 (CT) motors, self-cooled

#### Dimension Drawings

**Synchronous Servomotors**

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**Basic absolute-value encoder (EnDat)**

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**Absolute-value encoder (EnDat)**

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**Encoder**

- Without brake: 1 V
- With brake: 2 V

**Detailed Specifications**

- **Shaft** with featherkey
- **Dimension** in [mm]
**Dimension Drawings**

1FK7 (CT) motors, self-cooled

### Dimension Drawings

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**Notes:**
- All dimensions are in millimeters.
- Dimensions are subject to change without notice.
- Dimensions may vary based on specific model and configuration.
- Additional dimensions may be provided for specific applications.

**Additional Information:**
- This information is extracted from Siemens Catalog MC Part 2 · 2002/2003.
Servomotors
Dimension Drawings

1FK7 (HD) motors, self-cooled

For motor Dimension in inches (mm)

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Encoder:

- Incremental encoder
- sin/cos encoder
- absolute-value encoder (EnDat)
- shaft with featherkey

Shaft: 360.0/310.5

Siemens Catalog MC Part 2 · 2002/2003
## Dimension Drawings

### 1FK6 motors

**self-cooled, with planetary gear**

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<tr>
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<th>Type</th>
<th>Dimension in inches (mm)</th>
<th>Planetary gear single-stage</th>
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</tr>
</tbody>
</table>

|        |          |                          |                |          |          |                |          |          |                |          |          |                |
|        |          |                          |                |          |          |                |          |          |                |          |          |                |

### Type of construction IM B 5, self-cooled, with plug, with/without brake, with planetary gear (LP series), 1-stage

- **1FK6032**: 7.05 – 1.18 0.55 3.62 LP070-M01 2.76 2.05 0.63 2.44 M 5 1.1 0.2 0.31 0.39 0.71 0.2 2.76 4.96 10.59 –
- **1FK6040**: 8.10 1.07 0.75 3.72 LP090-M01 3.54 2.65 0.87 3.15 M 6 1.42 0.2 0.39 0.47 0.96 0.2 2.44 3.54 6.38 12.44 –
- **1FK6042**: 7.56 0.29 (102) (288) 11.97 13.7 (304) (348)
- **1FK6060**: 8.30 0.34 (200) (50) (24) (155) 13.99 14.68 (420)
- **1FK6063**: 7.97 0.97 0.94 6.1 LP120-M01 4.72 3.54 1.36 4.25 M 8 2.28 0.24 0.47 0.63 1.38 0.39 4.72 8.27 13.99 14.68 (340) (376)
- **1FK6083**: 9.64 11.34 (250) (289) 15.36 16.66 (420)
- **1FK6080**: 7.68 0.54 2.28 1.26 7.3 LP155-M01 6.1 4.72 1.57 5.51 M 10 3.29 0.31 0.59 0.79 1.69 0.47 5.91 10.43 14.29 16.14 (480)
- **1FK6081**: 10.63 12.48 (270) (317) 17.24 19.03 (438) (480)
- **1FK6082**: 10.63 12.48 (270) (317)
- **1FK6084**: 10.63 12.48 (270) (317)
- **1FK6085**: 10.63 12.48 (270) (317)
- **1FK6100**: 8.58 10.25 0.75 1.5 7.0 LP155-M01 6.1 4.72 1.57 5.51 M 10 3.29 0.31 0.59 0.79 1.69 0.47 5.91 10.43 14.29 16.14 (480)
- **1FK6101**: 9.61 11.46 (244) (281) 16.22 18.07 (412) (458)
- **1FK6103**: 10.63 12.48 (270) (317) 17.24 19.03 (438) (480)
| Size   | Type | Code     | Type D     | 8.25 | 6.18 | 7.07 | 12.6 | 13.35 | 14.84 | 272 | 13.43 | 7.03 | 140 | 5.51 | 108 | 13.62 | 120 | 15.08 | 15.04 | 14.61 | 275.5 | 275.5 | 8.76 | 214 | 8.43 | 10.85 | 272 | 187.5 | 214 | 8.43 | 10.85 |
|--------|------|----------|------------|------|------|------|------|-------|-------|------|-------|------|-----|------|-----|-------|-----|-------|------|-------|-------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----- |
| 1FK7080-5 LP155-M01 | Size | Type    | Code       | 8.25 | 6.18 | 7.07 | 12.6 | 13.35 | 14.84 | 272 | 13.43 | 7.03 | 140 | 5.51 | 108 | 13.62 | 120 | 15.08 | 15.04 | 14.61 | 275.5 | 275.5 | 8.76 | 214 | 8.43 | 10.85 | 272 | 187.5 | 214 | 8.43 | 10.85 |
| 1FK7060-5 LP120-M01 | Size | Type    | Code       | 8.25 | 6.18 | 7.07 | 12.6 | 13.35 | 14.84 | 272 | 13.43 | 7.03 | 140 | 5.51 | 108 | 13.62 | 120 | 15.08 | 15.04 | 14.61 | 275.5 | 275.5 | 8.76 | 214 | 8.43 | 10.85 | 272 | 187.5 | 214 | 8.43 | 10.85 |
| 1FK7040-5 LP090-M01 | Size | Type    | Code       | 8.25 | 6.18 | 7.07 | 12.6 | 13.35 | 14.84 | 272 | 13.43 | 7.03 | 140 | 5.51 | 108 | 13.62 | 120 | 15.08 | 15.04 | 14.61 | 275.5 | 275.5 | 8.76 | 214 | 8.43 | 10.85 | 272 | 187.5 | 214 | 8.43 | 10.85 |
Servomotors

**1FK7 (HD) motors - self-cooled, with planetary gear**

**Dimension Drawings**

### Type of construction IM B 5, self-cooled, with plug, with/without brake, with planetary gear (LP series), 1-stage

| DIN | IEC | Type | Type D | 1FK7033-7 | 8/8 | 8.70 | L7d | 11.71 | 7.56 | 12.54 | 7.74 | 12.7 | 8.66 | 13.52 | – | – | – | 1.18 | 0.55 | – | – | 11.8 | 0.55 | – | – | 10 | 8.70 | 0.55 | 5.62 | (207) | (192.5) | (318.5) | (322.5) | (217.5) | (343.5) |
|-----|-----|------|--------|-----------|-----|-----|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|
| 48  | 1FK7043-7 | 8/8 | 8.29 | L7d | 11.36 | 7.26 | 12.04 | 7.26 | 12.04 | 8.16 | 12.94 | 8.08 | 13.08 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| 1FK7044-7 | 1FK7044-7 | 8/8 | 8.52 | L7d | 14.74 | 9.67 | 15.69 | 9.33 | 15.55 | 10.47 | 16.69 | 9.87 | 15.89 | 10.91 | 17.03 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| 63  | 1FK7061-7 | 8/8 | 9.86 | L7d | 18.13 | 11.52 | 19.76 | 10.77 | 19.04 | 12.4 | 20.69 | 11.1 | 19.37 | 12.76 | 21.12 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| 80  | 1FK7082-7 | 8/8 | 10.26 | L7d | 20.67 | 11.93 | 22.34 | 11.16 | 21.57 | 12.83 | 23.25 | 11.5 | 21.91 | 13.17 | 23.58 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |

### Planetary gear single-stage

<table>
<thead>
<tr>
<th>Type</th>
<th>D1</th>
<th>D3</th>
<th>D5</th>
<th>D7</th>
<th>L2</th>
<th>L3</th>
<th>L5</th>
<th>L7</th>
<th>L10</th>
<th>L12</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>1FK7033-7</td>
<td>1FK7043-7</td>
<td>1FK7044-7</td>
<td>1FK7061-7</td>
<td>1FK7082-7</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>48</td>
<td>LP070-M01</td>
<td>LP090-M01</td>
<td>LP120-M01</td>
<td>LP155-M01</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>LP180-M01</td>
<td>LP220-M01</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Synchronous Servomotors

- **Resistor without brake**
- **Resolver without brake**
- **Absolute-value encoder (EnDat)**
- **Absolute-value encoder (EnDat)**

**Siemens Catalog MC Part 2 · 2002/2003**
Servomotors
Dimension Drawings

Synchronous Servomotors

For motor
Dimension in inches (mm)

Resolvers without brake with brake

Size Type DIN IEC A B P a b c f t g h i 1 2 1 2

Type of construction IM B 5, self-cooled, with plug, with/without brake

28 1FT6021 – 1.57 (40) 0.29 (10) 0.46 (12) 2.17 (55) 0.51 (13) 0.79 (20) – 1.36 (34.5) 4.8 (122) 8.58 (218) 5.79 (147)
1FT6024 8 0.78 (20) 0.68 (17) 4.8 (122) 8.58 (218) 5.79 (147)

36 1FT6031 3.62 (92) 0.31 (8) 0.12 (3) 2.03 (51) 0.79 (20) 0.24 (6) – 7.02 (180) 5.94 (151) 7.87 (197) 6.73 (171)
1FT6034 9.17 (233) 4.8 (122) 8.58 (218) 5.79 (147)

28 1FT6021 7.6 (193) 4.8 (122) 8.58 (218) 5.79 (147) 0.35 (9) M 3 0.79 (20) 0.4 (10.2) 0.12 (3)
1FT6024 9.17 (233) 4.8 (122) 8.58 (218) 5.79 (147)

36 1FT6031 8.66 (220) 7.52 (191) 9.45 (240) 8.31 (211) 0.55 (14) M 5 1.18 (30) 0.63 (16) 0.2 (5)
1FT6034 10.24 (260) 7.52 (191) 9.45 (240) 8.31 (211)

1) IM B 5. 2) IM B 14.
### Servomotors

#### Dimension Drawings

**1FT6 motors, self-cooled**

| Type of construction IM B 5, self-cooled, with plug, with/without brake |
|---|---|
| Size | Type | Dimension in inches [mm] |
| 48 | 1FT6041 | 4.72 | 3.15 | 2.59 | 1.03 | 1.03 | 0.12 | 3.19 | 1.89 | 0.57 | 0.28 |
| 1FT6044 | 9.33 | 6.15 | 3.83 | 0.53 |
| 63 | 1FT6061 | 5.71 | 3.33 | 0.39 | 1.12 | 1.03 | 0.24 | 3.58 | 0.35 | 0.14 | 0.28 |
| 1FT6062 | 8.90 | 5.67 | 4.04 | 0.64 |
| 1FT6064 | 10.75 | 6.72 | 4.97 |

**Type of construction IM B 14.**

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>Dimension in inches [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>1FT6041</td>
<td>8.98</td>
</tr>
<tr>
<td>1FT6044</td>
<td>13.10</td>
<td>8.00</td>
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<tr>
<td>63</td>
<td>1FT6061</td>
<td>9.96</td>
</tr>
<tr>
<td>1FT6062</td>
<td>11.18</td>
<td>6.77</td>
</tr>
<tr>
<td>1FT6064</td>
<td>12.90</td>
<td>8.20</td>
</tr>
</tbody>
</table>

**Encoder**

- Sine/Cos incremental encoder 1 Vpp
- Without brake with brake

**Shaft**

- With featherkey

---

1) IM B 5. 2) IM B 14.
Synchronous Servomotors

Dimension Drawings

Servomotors

1FT6 motors, self-cooled

Type of construction IM B 5, with plug, with/without brake

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>Dimension in inches (mm)</th>
<th>Resolver</th>
<th>without brake</th>
<th>with brake</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>1FT6001</td>
<td>7.04 (184)</td>
<td>5.12 (130)</td>
<td>5.07 (128)</td>
<td>6.0 (152)</td>
</tr>
<tr>
<td></td>
<td>1FT6002</td>
<td>8.7 (221)</td>
<td>5.43 (138)</td>
<td>10.75 (273)</td>
<td>6.5 (165)</td>
</tr>
<tr>
<td></td>
<td>1FT6004</td>
<td>11.65 (296)</td>
<td>7.4 (188)</td>
<td>13.46 (342)</td>
<td>9.21 (234)</td>
</tr>
<tr>
<td></td>
<td>1FT6006</td>
<td>13.62 (346)</td>
<td>9.37 (238)</td>
<td>15.43 (392)</td>
<td>11.18 (284)</td>
</tr>
</tbody>
</table>

Shaft with feather key

sin/cos incremental encoder 1 V

D-end of shaft

Type 1) IM B 5. 2) IM B 14.
# Servomotors

## Dimension Drawings

### Synchronous Servomotors

**1FT6 motors, self-cooled**

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>Type of construction</th>
<th>Dimension in inches [mm]</th>
<th>Resolver</th>
<th>without brake</th>
<th>with brake</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1FT6102</td>
<td>IM B 5, with plug, with/without brake</td>
<td></td>
<td>sin/cos incremental encoder 1 Vpp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>1FT6105</td>
<td>IM B 5, with plug, with/without brake</td>
<td></td>
<td>sin/cos incremental encoder 1 Vpp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>132</td>
<td>1FT6132</td>
<td>IM B 14, with plug, with/without brake</td>
<td></td>
<td>sin/cos incremental encoder 1 Vpp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>132</td>
<td>1FT6134</td>
<td>IM B 14, with plug, with/without brake</td>
<td></td>
<td>sin/cos incremental encoder 1 Vpp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>136</td>
<td>1FT6136</td>
<td>IM B 14, with plug, with/without brake</td>
<td></td>
<td>sin/cos incremental encoder 1 Vpp</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Diagrams

**1FT610**

Shaft with featherkey

**1FT613**

Shaft without brake with featherkey

---

1) IM B 5. 2) IM B 14.
### Synchronous Servomotors

For motor Dimension in inches (mm) Resolver

| Size | Type  | DIN | IEC | a1 | b1 | c1 | LA | M | A | B | H | l | H | l | P | CO | s | l | LB | o | LB | o |
|------|-------|-----|-----|----|----|----|----|---|--|--|--|--|--|--|--|--|---|--|--|---|--|--|---|
| 100  | 1FT6102 | 0.48 | 0.39 | 0.51 | 0.15 | 0.46 | 0.26 | 0.06 | 0.08 | 1.1 | 1.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |
|      | 1FT6105 | 0.5 | 0.39 | 0.51 | 0.15 | 0.46 | 0.26 | 0.06 | 0.08 | 1.1 | 1.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |
|      | 1FT6108 | 0.52 | 0.4 | 0.51 | 0.15 | 0.46 | 0.26 | 0.06 | 0.08 | 1.1 | 1.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |
|      | 1FT6112 | 0.64 | 0.5 | 0.51 | 0.15 | 0.46 | 0.26 | 0.06 | 0.08 | 1.1 | 1.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |
|      | 1FT6113 | 0.64 | 0.5 | 0.51 | 0.15 | 0.46 | 0.26 | 0.06 | 0.08 | 1.1 | 1.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |

#### Type of construction IM B 5, self-cooled, with terminal box, with/without brake

| Size | Type  | DIN | IEC | a1 | b1 | c1 | LA | M | A | B | H | l | H | l | P | CO | s | l | LB | o | LB | o |
|------|-------|-----|-----|----|----|----|----|---|--|--|--|--|--|--|--|--|---|--|--|---|--|--|---|
| 100  | 1FT6102 | 0.64 | 0.45 | 0.51 | 0.15 | 0.46 | 0.26 | 0.06 | 0.08 | 1.1 | 1.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |
|      | 1FT6105 | 0.66 | 0.45 | 0.51 | 0.15 | 0.46 | 0.26 | 0.06 | 0.08 | 1.1 | 1.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |
|      | 1FT6108 | 0.68 | 0.45 | 0.51 | 0.15 | 0.46 | 0.26 | 0.06 | 0.08 | 1.1 | 1.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |
|      | 1FT6112 | 0.72 | 0.5 | 0.51 | 0.15 | 0.46 | 0.26 | 0.06 | 0.08 | 1.1 | 1.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |
|      | 1FT6113 | 0.72 | 0.5 | 0.51 | 0.15 | 0.46 | 0.26 | 0.06 | 0.08 | 1.1 | 1.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |

### 1FT6 motors, self-cooled

#### Encoder type

- sin/cos incremental encoder \( X_{24} \)
- D-end of shaft

| Size | Type  | DIN | IEC | a1 | b1 | c1 | LA | M | A | B | H | l | H | l | P | CO | s | l | LB | o | LB | o |
|------|-------|-----|-----|----|----|----|----|---|--|--|--|--|--|--|--|--|---|--|--|---|--|--|---|
| 100  | 1FT6102 | 1.12 | 0.76 | 1.52 | 0.65 | 0.74 | 0.35 | 0.23 | 0.26 | 0.13 | 0.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |
|      | 1FT6105 | 1.16 | 0.8 | 1.52 | 0.65 | 0.74 | 0.35 | 0.23 | 0.26 | 0.13 | 0.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |
|      | 1FT6108 | 1.2 | 0.84 | 1.52 | 0.65 | 0.74 | 0.35 | 0.23 | 0.26 | 0.13 | 0.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |
|      | 1FT6112 | 1.26 | 0.88 | 1.52 | 0.65 | 0.74 | 0.35 | 0.23 | 0.26 | 0.13 | 0.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |
|      | 1FT6113 | 1.26 | 0.88 | 1.52 | 0.65 | 0.74 | 0.35 | 0.23 | 0.26 | 0.13 | 0.15 | 0.79 | 0.75 | 0.74 | 0.55 | 0.9 | 0.9 |

### Shaft with featherkey

1) IM B 5.  2) IM B 14.
## Servomotors

### Dimension Drawings

#### 1FT6 motors, blower-ventilated

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>Dimension in inches (mm)</th>
<th>Plug</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DIN IEC</td>
<td></td>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b1</td>
<td>a1</td>
<td>c1</td>
</tr>
<tr>
<td>80</td>
<td>1FT6084</td>
<td>7.64</td>
<td>5.12</td>
<td>0.47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(194)</td>
<td>(130)</td>
<td>(12)</td>
</tr>
<tr>
<td>100</td>
<td>1FT6105</td>
<td>9.45</td>
<td>7.08</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(242)</td>
<td>(180)</td>
<td>(13)</td>
</tr>
</tbody>
</table>

#### Type of construction IM B 5, blower-ventilated, with plug, with/without brake

- **IM B 5**: 1FT6 motors, blower-ventilated
- **IM B 14**: Suitable for special applications

**1FT6 motors, blower-ventilated**

- **Plug Sizes**
  - 1.5
  - 3

**Dimensions**

- **1FT6 motors, blower-ventilated**
  - **DIN IEC**
  - **IEC DIN**

**Specifications**

- **Encoder Options**
  - Resolver/sin/cos incremental encoder 1 Vpp

**Shaft Options**

- **Shaft with featherkey**

---

1) IM B 5. 2) IM B 14.
**Servomotors**

**Dimension Drawings**

1FT6 motors, blower-ventilated

**For motor**

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>Dimension in inches (mm)</th>
<th>Plug Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>132</td>
<td>1FC6132</td>
<td>– 9.84 (250) 0.71 (18) 11.81 (300) 10.24 (260) 0.2 (5) 7.34 (186.5) 5.2 (132) 3.23 (82) 9.65 (245) 0.71 (18) 2.6 (68)</td>
<td></td>
</tr>
<tr>
<td>1FC6134</td>
<td></td>
<td>– 13.31 (338) 15.28 (388) 1.89 (48) M 16 (82) 2.03 (51.5) 0.55 (14)</td>
<td></td>
</tr>
<tr>
<td>1FC6136</td>
<td></td>
<td>– 17.24 (438)</td>
<td></td>
</tr>
</tbody>
</table>

**Type of construction IM B 5, blower-ventilated, with plug, with/without brake**

1) IM B 5. 2) IM B 14.
### Servomotors Dimension Drawings

**1FT6 motors, blower-ventilated**

#### 1FT6 motors, blower-ventilated

<table>
<thead>
<tr>
<th>Type of construction IM B 5, blower-ventilated, with terminal box, with/without brake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
</tr>
<tr>
<td>100</td>
</tr>
<tr>
<td>132</td>
</tr>
<tr>
<td>1FT6134</td>
</tr>
<tr>
<td>1FT6136</td>
</tr>
</tbody>
</table>

#### Resolver/sin/cos incremental encoder 1 Vpp D-end of shaft

| Type | DIN | IEC | b1 | c1 | LA | f | e1 | M | f1 | T | g2 | – | g2 | h | H | i | 2 | p | HD | s | 2 | 1 | s | 2 | 2 | o | 1 | – | o | 2 | – |
| 100 | 1FT6105 | 16.82 | 14.21 | 0.29 | 20.43 | 12.09 | 1.5 | (53) | M 12 | 3.15 | (80) | 1.61 | (41) | 0.39 | (10) |
| 1FT6108 | 22.56 | 18.34 | 0.63 | 25.10 | 13.31 | 1.89 | (46) | M 16 | 3.23 | (80) | 2.03 | (51.5) | 0.55 | (14) |
| 132 | 1FT6132 | 21.3 | 19.23 | 0.31 | 23.27 | 15.28 | 2.03 | (46) | M 16 | 3.23 | (80) | 2.03 | (51.5) | 0.55 | (14) |
| 1FT6134 | 23.27 | 19.23 | 0.31 | 23.27 | 15.28 | 2.03 | (46) | M 16 | 3.23 | (80) | 2.03 | (51.5) | 0.55 | (14) |
| 1FT6136 | 25.24 | 21.31 | 0.44 | 25.24 | 15.28 | 2.03 | (46) | M 16 | 3.23 | (80) | 2.03 | (51.5) | 0.55 | (14) |

---

1) IM B 5. 2) IM B 14.
<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>With planetary gear-box</th>
<th>With without brake, planetary gear (SPG series), single-stage</th>
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<tr>
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</table>

**Type of construction IM B 5, self-cooled, with plug, with/without brake, with planetary gear (SPG series), single-stage**

- **1) Motors with encoder.**

---

**Dimensions in inches (mm)**

- **IEC**
  - 7.87 (200)
  - 7.08 (180)
  - 6.29 (160)
  - 5.12 (130)

- **LA**
  - 2.36 (60)
  - 2.68 (80)
  - 3.54 (90)
  - 2.75 (70)

- **DA**
  - 1.57 (40)
  - 1.49 (38)
  - 1.18 (30)

- **LB**
  - 0.66 (17)
  - 0.51 (13)
  - 0.43 (9)

---

**Servomotors Dimension Drawings**

- **For motor dimensions, see dimension drawings on pages 8/9 to 8/12**

---

**Note:**
- For motor dimensions, see dimension drawings on pages 8/9 to 8/12.
- 1) Motors with encoder.
## Servomotors

### Dimension Drawings

**1FT6 motors, self-cooled, with planetary gear**

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>Dimension in inches (mm)</th>
<th>D-end of shaft</th>
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<tbody>
<tr>
<td>28</td>
<td>1FT6024</td>
<td>SPG 075-MF2</td>
<td>2.75 (70) 0.79 (200) 3.34 (85) 2.99 (105) 14.37 (365) 15.16 (385) 0.25 (6) 0.86 (22) 1.41 (36)</td>
</tr>
<tr>
<td>36</td>
<td>1FT6031</td>
<td>SPG 075-MF2</td>
<td>2.75 (70) 0.79 (200) 3.34 (85) 2.99 (105) 13.66 (347) 16.45 (417) 0.25 (6) 0.86 (22) 1.41 (36)</td>
</tr>
<tr>
<td>48</td>
<td>1FT6041</td>
<td>SPG 100-MF2</td>
<td>3.54 (130) 1.16 (340) 4.72 (115) 3.97 (100) 16.02 (407) 16.81 (427) 0.35 (9) 1.25 (33) 2.28 (59)</td>
</tr>
<tr>
<td>63</td>
<td>1FT6051</td>
<td>SPG 100-MF2</td>
<td>3.54 (130) 1.16 (340) 4.72 (115) 3.97 (100) 14.76 (376) 16.14 (416) 0.35 (9) 1.25 (33) 2.28 (59)</td>
</tr>
<tr>
<td>80</td>
<td>1FT6061</td>
<td>SPG 100-MF2</td>
<td>3.54 (130) 1.16 (340) 4.72 (115) 3.97 (100) 13.66 (347) 15.16 (385) 0.25 (6) 0.86 (22) 1.41 (36)</td>
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**Type of construction IM B 5, self-cooled, with plug, without brake, with planetary gear (SPG series), 2-stage**

<table>
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<td>1FT6024</td>
<td>SPG 075-MF2</td>
<td>2.75 (70) 0.79 (200) 3.34 (85) 2.99 (105) 14.37 (365) 15.16 (385) 0.25 (6) 0.86 (22) 1.41 (36)</td>
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<td>SPG 075-MF2</td>
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</tr>
<tr>
<td>48</td>
<td>1FT6041</td>
<td>SPG 100-MF2</td>
<td>3.54 (130) 1.16 (340) 4.72 (115) 3.97 (100) 16.02 (407) 16.81 (427) 0.35 (9) 1.25 (33) 2.28 (59)</td>
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<tr>
<td>63</td>
<td>1FT6051</td>
<td>SPG 100-MF2</td>
<td>3.54 (130) 1.16 (340) 4.72 (115) 3.97 (100) 14.76 (376) 16.14 (416) 0.35 (9) 1.25 (33) 2.28 (59)</td>
</tr>
<tr>
<td>80</td>
<td>1FT6061</td>
<td>SPG 100-MF2</td>
<td>3.54 (130) 1.16 (340) 4.72 (115) 3.97 (100) 13.66 (347) 15.16 (385) 0.25 (6) 0.86 (22) 1.41 (36)</td>
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**Shaft with flange-hub**

1) Motors with encoder.
### Synchronous Servomotors

#### Dimension Drawings

**1FT6 motors, water-cooled**

<table>
<thead>
<tr>
<th>Size</th>
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<th>Dimension Drawings</th>
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<td><strong>1FT6062</strong></td>
<td>63</td>
<td><strong>1FT6064</strong></td>
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#### Type of construction IM B 5, water-cooled, with plug, with/without brake

<table>
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<th>Type</th>
<th>DIN</th>
<th>IEC</th>
<th>Dimensions</th>
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<td>4.33</td>
<td>0.39</td>
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<td>80</td>
<td>1FT6084</td>
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#### 1FT6 motors, water-cooled

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<th>IEC</th>
<th>Dimensions</th>
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<tr>
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<td>8.04</td>
<td>0.34</td>
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<td>80</td>
<td>1FT6084</td>
<td>11.65</td>
<td>9.21</td>
<td>–</td>
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</table>

#### Shaft with featherkey

1. IM B 5
2. IM B 14
## Servomotors
### Dimension Drawings

#### 1FT6 motors, water-cooled

| Type of construction IM B 5, water-cooled, with plug, with/without brake |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size | Type | Plug | DIN | ECE | B1 | P | N | M | AB | T | G1 | G2 | G3 | H | M | HD | S | S2 | S3 | H |
| 100 | 1FT6105 | 1.45 | 7.09 | 0.51 | 8.45 | 7.56 | 0.16 | – | 0.22 | 6.77 | (115) | 3.78 | (76) | 3.16 | 6.1 | (155) | 0.05 | (14) | M12 | 2.69 | (16) |
| 100 | 1FT6108 | 9.45 | (240) | 7.09 | (180) | 0.51 | (13) | 8.45 | (215) | 7.56 | (192) | 0.16 | (4) | – | 6.77 | (115) | 3.78 | (76) | 3.16 | 6.1 | (155) | 0.05 | (14) |

---

**Diagram:**

- Shaft with featherkey
- Water connection G38
- Water connection G39

---

1) IM B 5  2) IM B 14
### 1FS6 motors, self-cooled

#### Dimension Drawings

**Servomotors**

**Synchronous Servomotors**

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>Dimension in inches (mm)</th>
<th>Size of shaft</th>
</tr>
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<tbody>
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<tr>
<td>132</td>
<td>1FS8134</td>
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<td>46.97</td>
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**Type of construction IM B 5 (sizes 71, 90) IM B 35 (sizes 112, 132), self-cooled, with terminal box**

![Dimensions Diagram](image)

---

*Siemens Catalog MC Part 2 - 2002/2003*
### 1FN3 AC linear motors, water-cooled

<table>
<thead>
<tr>
<th>Primary section</th>
<th>Without precision cooling in (mm)</th>
<th>Without precision cooling</th>
<th>Length of primary side</th>
<th>Secondary section</th>
<th>Without precision cooling in (mm)</th>
<th>With precision cooling and cover</th>
<th>Length of secondary side</th>
<th>Type</th>
</tr>
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<tbody>
<tr>
<td>1FN3 050-2W</td>
<td>2.64 (67)</td>
<td>1.91 (48.5)</td>
<td>2.99 (76)</td>
<td>1FN3 050-4SA00-0AA0</td>
<td>2.28 (57)</td>
<td>1.9 (48.5)</td>
<td>2.99 (76)</td>
<td>4.72</td>
</tr>
<tr>
<td>1FN3 050-4W</td>
<td>3.78 (96)</td>
<td>1.91 (48.5)</td>
<td>2.99 (76)</td>
<td>1FN3 050-4SA00-0AA0</td>
<td>3.46 (88)</td>
<td>1.9 (48.5)</td>
<td>4.13 (105)</td>
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</tr>
<tr>
<td>1FN3 100-2W</td>
<td>3.78 (96)</td>
<td>1.91 (48.5)</td>
<td>4.13 (105)</td>
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<td>1.9 (48.5)</td>
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<tr>
<td>1FN3 100-4W</td>
<td>4.96 (126)</td>
<td>1.91 (48.5)</td>
<td>4.13 (105)</td>
<td>1FN3 100-4SA00-0AA0</td>
<td>5.06 (138)</td>
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<td>4.72</td>
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<td>1FN3 100-5W</td>
<td>4.96 (126)</td>
<td>1.91 (48.5)</td>
<td>4.13 (105)</td>
<td>1FN3 100-4SA00-0AA0</td>
<td>5.06 (138)</td>
<td>2.2 (56.9)</td>
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<td>4.72</td>
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<td>1FN3 150-2W</td>
<td>4.96 (126)</td>
<td>1.91 (48.5)</td>
<td>5.31 (135)</td>
<td>1FN3 150-4SA00-0AA0</td>
<td>6.46 (168)</td>
<td>1.9 (48.5)</td>
<td>7.09 (175)</td>
<td>4.72</td>
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<td>1FN3 150-3W</td>
<td>4.96 (126)</td>
<td>1.91 (48.5)</td>
<td>5.31 (135)</td>
<td>1FN3 150-4SA00-0AA0</td>
<td>6.46 (168)</td>
<td>2.2 (56.9)</td>
<td>7.09 (175)</td>
<td>4.72</td>
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<td>1FN3 150-4W</td>
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<td>1FN3 150-4SA00-0AA0</td>
<td>6.46 (168)</td>
<td>2.2 (56.9)</td>
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<td>6.46 (168)</td>
<td>2.2 (56.9)</td>
<td>7.09 (175)</td>
<td>4.72</td>
</tr>
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<td>5.55 (141)</td>
<td>2.52 (64.1)</td>
<td>5.94 (151)</td>
<td>1FN3 300-4SA00-0AA0</td>
<td>7.24 (184)</td>
<td>2.2 (56.9)</td>
<td>7.95 (200)</td>
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<tr>
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<td>5.55 (141)</td>
<td>2.52 (64.1)</td>
<td>5.94 (151)</td>
<td>1FN3 300-4SA00-0AA0</td>
<td>7.24 (184)</td>
<td>2.2 (56.9)</td>
<td>7.95 (200)</td>
<td>7.24</td>
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<tr>
<td>1FN3 300-4W</td>
<td>7.4 (188)</td>
<td>2.6 (66.1)</td>
<td>7.76 (197)</td>
<td>1FN3 300-4SA00-0AA0</td>
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<td>2.2 (56.9)</td>
<td>7.95 (200)</td>
<td>7.24</td>
</tr>
<tr>
<td>1FN3 300-5W</td>
<td>7.4 (188)</td>
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<td>7.76 (197)</td>
<td>1FN3 300-4SA00-0AA0</td>
<td>7.95 (200)</td>
<td>2.2 (56.9)</td>
<td>7.95 (200)</td>
<td>7.24</td>
</tr>
<tr>
<td>1FN3 450-2W</td>
<td>7.4 (188)</td>
<td>2.6 (66.1)</td>
<td>7.76 (197)</td>
<td>1FN3 450-4SA00-0AA0</td>
<td>9.46 (240)</td>
<td>2.2 (56.9)</td>
<td>9.72 (247)</td>
<td>7.24</td>
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<tr>
<td>1FN3 450-3W</td>
<td>7.4 (188)</td>
<td>2.6 (66.1)</td>
<td>7.76 (197)</td>
<td>1FN3 450-4SA00-0AA0</td>
<td>9.46 (240)</td>
<td>2.2 (56.9)</td>
<td>9.72 (247)</td>
<td>7.24</td>
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<tr>
<td>1FN3 450-4W</td>
<td>9.76 (248)</td>
<td>2.6 (66.1)</td>
<td>7.76 (197)</td>
<td>1FN3 450-4SA00-0AA0</td>
<td>9.46 (240)</td>
<td>2.2 (56.9)</td>
<td>9.72 (247)</td>
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</tr>
<tr>
<td>1FN3 450-5W</td>
<td>9.76 (248)</td>
<td>2.6 (66.1)</td>
<td>7.76 (197)</td>
<td>1FN3 450-4SA00-0AA0</td>
<td>9.46 (240)</td>
<td>2.2 (56.9)</td>
<td>9.72 (247)</td>
<td>7.24</td>
</tr>
<tr>
<td>1FN3 600-3W</td>
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<td>2.6 (66.1)</td>
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<td>1FN3 600-4SA00-0AA0</td>
<td>13.15 (318)</td>
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<td>13.43 (335)</td>
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<tr>
<td>1FN3 600-4W</td>
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<td>2.6 (66.1)</td>
<td>13.92 (351)</td>
<td>1FN3 600-4SA00-0AA0</td>
<td>13.15 (318)</td>
<td>2.2 (56.9)</td>
<td>13.43 (335)</td>
<td>7.24</td>
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</table>

Note: 4-row drilling plate for 1FN3 900 for primary section fitting.
## Servomotors
### Dimension Drawings

#### Asynchronous Servomotors

For motor Dimension in inches (mm) D-end of shaft

| Size | Type | DIN | a | b | c | e | f | h | k | k₀ | m | m₀ | n | p | q | s | w⁺ | w⁻ | C | d | d₀ | l | t | u |
| 80   | 1PH7101 | 7.97 | 6.2 | 0.43 | 10.35 | 7.7 | 3.9 | 16.16 | 17.09 | 2.04 | 2.51 | 1.06 | 1.53 | 8.6 | 0.47 | Pg 29 | 1.57 | 1.49 | M₁₃ | 3.14 | 1.61 | 0.39 |
|      | 1PH7103 | 11.71 | 2.09 | 0.59 | 19.92 | 20.83 |
| 100  | 1PH7105 | 14.29 | 5.86 |
|      | 1PH7107 | 19.92 | 20.83 |
| 150  | 1PH7131 | 10.45 | 9.5 | 0.55 | 15.42 | 10.2 | 5.1 | 21.16 | 22.09 | 2.45 | 2.96 | 1.29 | 1.94 | 10.8 | 0.47 | Pg 36 | 1.96 | 1.85 | M₅₆ | 4.93 | 1.77 | 0.47 |
|      | 1PH7133 | 15.79 | 16.77 | 24.53 | 25.43 |
|      | 1PH7135 | 17.77 | 4.28 | 6.25 | 6.46 |
| 160  | 1PH7163 | 13.64 | 10.86 | 17.24 | 12.3 | 9.2 | 25.2 | 26.1 | 3.07 | 3.16 | 1.65 | 2.44 | 12.9 | 0.47 | Pg 42 | 2.51 | 2.46 | M₂₀ | 4.93 | 2.32 | 0.62 |
|      | 1PH7167 | 15.86 | 16 | 4.98 | 7.02 | 7.23 |

![Diagram of Servomotor Dimensions](image_url)
## Servomotors
### Dimension Drawings

**1PH7 motors**

#### Asynchronous Servomotors

**8/24 Siemens Catalog MC Part 2 · 2002/2003**

**For motor Dimension in inches (mm)**

<table>
<thead>
<tr>
<th>Size Type</th>
<th>DIN</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>e</th>
<th>f</th>
<th>g</th>
<th>h</th>
<th>k</th>
<th>k1</th>
<th>l</th>
<th>m</th>
<th>m2</th>
<th>n</th>
<th>o</th>
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<td>10.5</td>
<td>305</td>
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<td>5</td>
<td>10.5</td>
<td>305</td>
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**Type of construction IM B 3, air flow from D-end to ND-end**

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1) Maximum dimensions. Depending on the electrical design (terminal box type) smaller dimensions are also possible.
### Asynchronous Servomotors

#### Dimension Drawings

**1PH7 motors**

**Type of construction IM B 3, air flow from ND-end to D-end**

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<th>b (mm)</th>
<th>c (mm)</th>
<th>e (mm)</th>
<th>f (mm)</th>
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1) Maximum dimensions. Depending on the electrical design (terminal box type) smaller dimensions are also possible.
Servomotors
Dimension Drawings

1PH7 motors

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D-end of shaft

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LE Air inlet
LA Air outlet
Asynchronous Servomotors

### 1PH7 motors Dimension Drawings

#### Type of construction IM B 5

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*Dimensions in inches (mm)*

- D-end of shaft
## Servomotors Dimension Drawings

### 1PH7 motors

#### Asynchronous Servomotors

**For motor Dimension in inches (mm)**

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<th>f</th>
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<th>h</th>
<th>j</th>
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**D-end of shaft**

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8/28 Siemens Catalog MC Part 2 · 2002/2003
**Servomotors**

**Dimension Drawings**

### Asynchronous Servomotors

For motor dimensions in inches (mm), see dimension drawings of 1PH718 and 1PH722 motors, type of construction IM B 3, on page R24.

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<td>11.8</td>
<td>0.59</td>
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<td>0.19</td>
<td>7.08</td>
<td>–</td>
<td>32.28</td>
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<td>(400)</td>
<td>17.71</td>
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<td>0.62</td>
<td>15.74</td>
<td>–</td>
<td>32.28</td>
<td>–</td>
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<td>0.31</td>
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<tr>
<td></td>
<td>1PH718K</td>
<td>(400)</td>
<td>33.55</td>
<td>16 (400)</td>
<td>30.65</td>
<td>35.83</td>
<td>39.6</td>
<td>22.25</td>
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<tr>
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<td>1PH7224</td>
<td>(550)</td>
<td>21.65</td>
<td>17.71</td>
<td>0.7</td>
<td>19.68</td>
<td>0.19</td>
<td>8.85</td>
<td>–</td>
<td>43.31</td>
<td>–</td>
<td>25.55</td>
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<td>22.5°</td>
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<td></td>
<td>1PH7226</td>
<td>(550)</td>
<td>21.65</td>
<td>17.71</td>
<td>0.7</td>
<td>19.68</td>
<td>0.19</td>
<td>8.85</td>
<td>8.87</td>
<td>(225)</td>
<td>47.24</td>
<td>–</td>
<td>25.55</td>
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<td>17.71</td>
<td>0.7</td>
<td>19.68</td>
<td>0.19</td>
<td>8.85</td>
<td>8.87</td>
<td>(225)</td>
<td>47.24</td>
<td>–</td>
<td>25.55</td>
<td>0.31</td>
<td>22.5°</td>
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Type of construction IM B 35, air flow from D-end to ND-end

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<th>b</th>
<th>c</th>
<th>e</th>
<th>f</th>
<th>h</th>
<th>k</th>
<th>L</th>
<th>M</th>
<th>T</th>
<th>H</th>
<th>p</th>
<th>z</th>
<th>er</th>
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<td>0.59</td>
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<td>0.2</td>
<td>7.09</td>
<td>–</td>
<td>33.76</td>
<td>–</td>
<td>19.69</td>
<td>0.16</td>
<td>45°</td>
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<td></td>
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<tr>
<td></td>
<td>1PH718K</td>
<td>(400)</td>
<td>17.72</td>
<td>13.78</td>
<td>0.63</td>
<td>15.75</td>
<td>0.2</td>
<td>7.09</td>
<td>–</td>
<td>33.76</td>
<td>–</td>
<td>19.69</td>
<td>0.31</td>
<td>22.5°</td>
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<td></td>
<td>1PH718K</td>
<td>(400)</td>
<td>33.55</td>
<td>16 (400)</td>
<td>30.65</td>
<td>35.83</td>
<td>39.6</td>
<td>22.25</td>
<td>(8)</td>
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<tr>
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<td>1PH7224</td>
<td>(550)</td>
<td>21.65</td>
<td>17.72</td>
<td>0.71</td>
<td>19.69</td>
<td>0.2</td>
<td>8.86</td>
<td>–</td>
<td>43.7</td>
<td>–</td>
<td>37.77</td>
<td>0.31</td>
<td>22.5°</td>
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<td>(550)</td>
<td>21.65</td>
<td>17.72</td>
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<td>19.69</td>
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<td>8.86</td>
<td>8.87</td>
<td>(225)</td>
<td>47.64</td>
<td>–</td>
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<td>17.72</td>
<td>0.71</td>
<td>19.69</td>
<td>0.2</td>
<td>8.86</td>
<td>8.87</td>
<td>(225)</td>
<td>47.64</td>
<td>–</td>
<td>37.77</td>
<td>0.31</td>
<td>22.5°</td>
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</tbody>
</table>

1) Maximum dimensions. Depending on the electrical design (terminal box type) smaller dimensions are also possible.

2) See Order No. suffix on page 3/17.

---

**LE** Air inlet

**LA** Air outlet

---

1PH7 motors

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Siemens Catalog MC Part 2 · 2002/2003
## 1PH7 motors

### Dimension Drawings

#### Asynchronous Servomotors

**Type of construction IM B 35**

For motor Dimension in inches (mm)

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
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<th>b1</th>
<th>c1</th>
<th>e1</th>
<th>f1</th>
<th>D</th>
<th>H</th>
<th>F</th>
<th>H1</th>
<th>–</th>
<th>LB</th>
<th>–</th>
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<td>280</td>
<td>1PH7284</td>
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<td>21.65 (550)</td>
<td>0.94 (24)</td>
<td>23.62 (600)</td>
<td>0.24 (6)</td>
<td>11.52 (290)</td>
<td>6.89 (170)</td>
<td>45.28 (1150)</td>
<td>19.39 (490)</td>
<td>41.02 (1042)</td>
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<td>1PH7285</td>
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<td>23.63 (600)</td>
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<td>28.74 (730)</td>
<td>23.62 (600)</td>
<td>28.74 (730)</td>
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**Type of construction IM B 5 with brake module**

For motor Dimension in inches (mm)

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<th>b1</th>
<th>c1</th>
<th>e1</th>
<th>f1</th>
<th>D</th>
<th>H</th>
<th>F</th>
<th>H1</th>
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<th>LB</th>
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<td>7.08 (180)</td>
<td>0.51 (13)</td>
<td>8.48 (215)</td>
<td>8.71 (215)</td>
<td>0.15 (4)</td>
<td>8.60 (220)</td>
<td>5.86 (140)</td>
<td>8.11 (204)</td>
<td>3.14 (80)</td>
<td>21.3 (541)</td>
<td>22.2 (564)</td>
<td>4.72 (120)</td>
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<td>25.04 (636)</td>
<td>25.94 (659)</td>
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<td>1PH7107</td>
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<td>31.81 (808)</td>
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For motor Dimension in inches (mm)

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<th>Size</th>
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<th>DIN</th>
<th>a1</th>
<th>b1</th>
<th>c1</th>
<th>e1</th>
<th>f1</th>
<th>D</th>
<th>H</th>
<th>F</th>
<th>H1</th>
<th>–</th>
<th>LB</th>
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<tbody>
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<td>1PH7131</td>
<td>9.84 (250)</td>
<td>0.7 (18)</td>
<td>11.81 (300)</td>
<td>0.19 (5)</td>
<td>10.34 (270)</td>
<td>6.85 (174)</td>
<td>10.59 (280)</td>
<td>4.32 (110)</td>
<td>27.56 (720)</td>
<td>26.46 (720)</td>
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<td>31.81 (808)</td>
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### Asynchronous Servomotors

#### Dimension Drawings

**1PH7 motors**

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<th>Size</th>
<th>Type</th>
<th>Dimension in inches (mm)</th>
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**Type of construction IM B 35, with brake module**

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<td>2.5</td>
</tr>
<tr>
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<td>2.5</td>
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<td>1PH7137</td>
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<td>1PH7163</td>
<td>3.1</td>
</tr>
<tr>
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**D-end of shaft**

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<th>Type</th>
<th>Dimension in inches (mm)</th>
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# Servomotors

## Dimension Drawings

### 1PH7 motors

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>Dimension in inches (mm)</th>
<th>D-end of shaft</th>
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### Asynchronous Servomotors

1) Maximum dimensions. Depending on the electrical design (terminal box type) smaller dimensions are also possible.
### Servomotors

#### Dimension Drawings

#### Asynchronous Servomotors

**1PH7 motors**

<p>| Type of construction IM B 3, with pipe connection at ND-end |
|---|---|---|---|---|---|---|---|---|---|---|---|---|</p>
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<th>b</th>
<th>c</th>
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<th>f</th>
<th>h</th>
<th>k</th>
<th>k₂</th>
<th>m₂</th>
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<td>6.3 (160)</td>
<td>0.4 (11)</td>
<td>10.3 (263)</td>
<td>7.7 (196)</td>
<td>3.9 (100)</td>
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<td>17.36 (441)</td>
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<td>2.5 (64)</td>
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<td>8.6 (220)</td>
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<td>10.4 (265.5)</td>
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<tr>
<td>160</td>
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</tr>
</tbody>
</table>

| D-end of shaft |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size | Type | DIN | a | b | c | e | f | h | k | m | m₂ | n | o | p | i |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 | 1PH7101 | 0.5 (12) | 0.4 (10.5) | 1.6 (40) | 1.5 (38) | M 12 | 3.1 | 1.6 | 0.4 (10) |
| 1PH7103 | 1PH7105 | 1PH7107 |
| 132 | 1PH7131 | 0.5 (12) | 0.7 (17) | 1.9 (50) | 1.6 (42) | M 16 | 4.3 | 1.7 | 0.5 (12) |
| 1PH7133 | 1PH7135 |
| 1PH7137 |
| 160 | 1PH7163 | 0.6 (14) | 0.7 (17) | 2.5 (64) | 2.2 (55) | M 20 | 4.3 | 2.2 | 0.6 (18) |
| 1PH7167 |
## Servomotors
### Dimension Drawings

#### 1PH7 motors

| Size | Type | DIN | IEC | a | b | c | e | f | g | h | k | l | m | n | p | s | m8 | d8 | i | l | u |
| 1PH7104 | (430) | (305) | 2 | 4.3 | (110) | (35) | (65) | 27.3 | (540) | (24.6) | 96.08 | (303) | (320) | 2 | 1.1 | 1.4 | 30.5 | 19.7 | 6.6 | 4.8 | 2.4 | 0.6 | 0.7 |
| 1PH7106 | (450) | (320) | 2.5 | 1.4 | 30.5 | (35) | (65) | 27.3 | (540) | (22.6) | 96.08 | (303) | (320) | 2 | 1.1 | 1.4 | 30.5 | 20.7 | 6.6 | 4.8 | 2.4 | 0.6 | 0.7 |
| 1PH7124 | (340) | (240) | 1.3 | 1.4 | (60) | (35) | (65) | 27.3 | (540) | (18.6) | 96.08 | (303) | (320) | 2 | 1.1 | 1.4 | 30.5 | 20.7 | 6.6 | 4.8 | 2.4 | 0.6 | 0.7 |
| 1PH7126 | (350) | (240) | 1.3 | 1.4 | (60) | (35) | (65) | 27.3 | (540) | (18.6) | 96.08 | (303) | (320) | 2 | 1.1 | 1.4 | 30.5 | 20.7 | 6.6 | 4.8 | 2.4 | 0.6 | 0.7 |
| 1PH7128 | (360) | (240) | 1.3 | 1.4 | (60) | (35) | (65) | 27.3 | (540) | (18.6) | 96.08 | (303) | (320) | 2 | 1.1 | 1.4 | 30.5 | 20.7 | 6.6 | 4.8 | 2.4 | 0.6 | 0.7 |

1) Maximum dimensions. Depending on the electrical design (terminal box type) smaller dimensions are also possible.
### Asynchronous Servomotors

#### Dimension Drawings

1PH7 motors

<table>
<thead>
<tr>
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<th>Dimension in inches (mm)</th>
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</tr>
<tr>
<td>132</td>
<td>1PH7131</td>
<td>a: 13.6 (346.5) b: 15.7 (400) c: 16.8 (406.5) d1: 11.8 (300) d1: 11.8 (300) f: 0.6 (17) g: 0.9 (22) h1: 13.8 (350) h2: 12.4 (314) k: 0.25 (5) m: 6.3 (160) n: 25.2 (640) o: 28.54 (734) p: 3.1 (78) q: 3.2 (81) r: 1.6 (42) s2: 160</td>
</tr>
<tr>
<td>160</td>
<td>1PH7163</td>
<td>a: 2.4 (62) b: 9.9 (253) c: 12.9 (330) d: 0.6 (14) e1: 0.7 (18) f1: 0 (4) g: 2.7 (68) h: 2.5 (64) i: 2.2 (58) j: 2.2 (58) k: 2.2 (58) l: 2.2 (58) m: 2.2 (58) n: 2.2 (58) o: 2.2 (58) p: 2.2 (58) q: 2.2 (58) r: 2.2 (58) s2: 160</td>
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#### D-end of shaft

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<td>a: 1.5 (39) b: 6.3 (161) c: 8.7 (220) d: 0.5 (12) e: 0.6 (14) f: 0.4 (10) g: 1.5 (38) h: 1.6 (40) i: 1.5 (38) j: 1.6 (40) k: 1.5 (38) l: 1.6 (40) m: 1.5 (38) n: 1.6 (40) o: 1.5 (38) p: 1.6 (40) q: 1.5 (38) r: 1.6 (40) s2: 160</td>
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</tr>
<tr>
<td>160</td>
<td>1PH7163</td>
<td>a: 2.4 (62) b: 9.9 (253) c: 12.9 (330) d: 0.6 (14) e: 0.7 (18) f: 0.7 (17) g: 2.5 (64) h: 2.2 (58) i: 2.2 (58) j: 2.2 (58) k: 2.2 (58) l: 2.2 (58) m: 2.2 (58) n: 2.2 (58) o: 2.2 (58) p: 2.2 (58) q: 2.2 (58) r: 2.2 (58) s2: 160</td>
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Siemens Catalog MC Part 2 - 2002/2003
### 1PH7 motors

#### Type of construction IM B 5, with pipe connection at ND-end

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<th>f</th>
<th>k</th>
<th>h</th>
<th>S</th>
<th>D</th>
<th>T</th>
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1) Maximum dimensions. Depending on the electrical design (terminal box type) smaller dimensions are also possible.

### 1PL6 motors

#### Type of construction IM B 3

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1) Maximum dimensions. Depending on the electrical design (terminal box type) smaller dimensions are also possible.
### Asynchronous Servomotors

#### 1PL6 motors

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<th>Size Type</th>
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<td>1PL6286</td>
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<td>1PL6288</td>
<td>38.19 (970)</td>
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</table>

#### Dimension Drawings

**Type of construction IM B 3**

<table>
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<tr>
<th>Size Type</th>
<th>DIN</th>
<th>IEC</th>
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<td>280</td>
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<td>1PL6286</td>
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<td>38.19 (970)</td>
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</table>

#### D-end of shaft

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</table>

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**For motor Dimension in inches (mm)**

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**LE Air inlet**

**LA Air outlet**
### Servomotors

#### Dimension Drawings

**1PL6 motors**

For motor Dimension in inches (mm) For dimensions for foot mounting, shaft and terminal box, see dimension drawing of 1PL618 and 1PL622 motors, type of construction IM B 3, at page 8/36.

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**For dimensions for foot mounting, shaft and terminal box, see dimension drawing of 1PL628 motors, type of construction IM B 3, at page 8/37.**

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**Asynchronous Servomotors**

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Servomotors
Dimension Drawings

Asynchronous Servomotors

Type of construction IM B 35, water-cooled

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For motor Dimension in inches (mm)

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Water connection
G 1/4 by 1PH410.
G 3/8 by 1PH413.
## Servomotors

### Dimension Drawings

#### 1PH7 motors with 2-gear units

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Dimensions for 1PH7184, 1PH7186 and 1PH7224 on request.
1PH7 motors with 2-gear units

Switching unit (lifting solenoid 24 V DC, 5 A).
Ventilation valve.
Oil filling bolt.
Oil level inspection window or oil return for counterclockwise rotation and greasing around the circumference.
Oil level inspection window or oil return for clockwise rotation and greasing around the circumference.
Oil drain bolt for type IM B 35.
Oil inlet for clockwise rotation and greasing around the circumference.
Oil inlet for anticlockwise rotation and greasing around the circumference.
Oil inlet for type IM V 15 (must be connected).
Oil inlet for type IM V 36.
Connector, manufacture: Harting, type HAN 8 U.
### Servomotors
### Dimension Drawings

#### 1PH4 motors with 2-gear units

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#### 1PH4 motors, type of construction IM B 35, with 2-gear units

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Asynchronous Servomotors

1PH4 motors with 2-gear units

1. Switching unit (lifting solenoid 24 V DC, 5 A).
2. Ventilation valve.
3. Oil-filling bolt.
4. Oil level inspection window or oil return for counterclockwise rotation and greasing around the circumference.
5. Oil filling bolt.
6. Oil inlet for clockwise rotation and greasing around the circumference.
7. Oil level inspection window or oil return for clockwise rotation and greasing around the circumference.
8. Oil drain bolt for type IM B 35.
9. Oil inlet for clockwise rotation and greasing around the circumference.
10. Oil inlet for anticlockwise rotation and greasing around the circumference.
11. Oil inlet for type IM V 15 (must be connected).
12. Oil inlet for type IM V 36.
13. Connector, manufacture: Harting, type HAN 8 U.
### Servomotors

#### Dimension Drawings

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<th>Asynchronous Servomotors</th>
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8
Servomotors
Appendix

A/2  Environment, resources and recycling, EC declaration of manufacture
A/4  Index
A/5  Order number index
A/6  Customer service
A/10 Conversion tables
A/12  Standard terms and conditions of sale
Siemens AG is very much aware of the fact that it has an important role to play in protecting the environment and conserving valuable natural resources. This applies to both manufacturing and the products we sell.

As early as the development phase, the possible impact of future products/systems on the environment is taken into consideration. Our aim is to prevent environmental pollution or, at least, reduce it to a minimum and, in doing so, look beyond existing regulations and legislation.

Below are some of the most important environment-related factors which are taken into account:

- The use of dangerous substances (such as arsenic, asbestos, beryllium, cadmium, CFC, halogens and many more) is avoided as early as the development phase.
- Easy to disconnect connections have been designed and materials are selected carefully with preference being given to recyclable materials or materials which can be disposed without causing problems.
- Materials for manufacturing purposes are identified in accordance with their recyclability. This applies, in particular, to components which contain unavoidable, dangerous materials. These components are installed or mounted in such a way that they can be easily separated, thus facilitating disposal in an environmentally-friendly manner. Wherever possible, recycled components are used.
- Environmentally-compatible packaging materials (pressed board and PE foils) are used for shipping and storage; we also try to keep the amount of packaging material used to a minimum.
- If possible, we pack our products in reusable packaging.
- We have already made preparations to enable the converters to be disposed of after use in accordance with the regulations governing the disposal of electronic equipment (not yet in force).
- This catalog is printed on chlorine-free bleached paper.

On the back of the German EC of conformity declarations there are English, French, Spanish, Italian and Swedish translations.

Example for EC declaration of manufacture
Appendix

Servomotors

Index

Page

2-gear units from 2F 4/15

A
Absoliotude-value encoders 4/9
Additional data for 1PH7 and 1PL6 motors 7
Asynchronous servomotors 3
Asynchronous servomotors, 1PH4 3/27
Asynchronous servomotors, 1PH7 3/2
Asynchronous servomotors, 1PH6 3/19

Balancing 1/10
Bearing design 7/22
Built-in accessories 4
Built-in gears 4/10 to 4/17
Built-on holding brakes 4/8

C
Cable cross-sections, max. connectable sizes 7/35
Cables 5
Cables for SIMODRIVE POSMO CD/CA, SI 5/15
Cable structure and pin assignment
for encoder cables 5/8 to 5/16
Cable structure and pin assignment
for 6FX5 and 6FX8 power cables 5/4 to 5/7
Change-speed gear unit 4/15

Coating 1/12
Combination adapter 4/23
Combination end piece 4/23
Compact servomotors 2/5
Configuration notes 7
Connecting systems 5
Conversion table A/10, A/11
Cooling profiles 4/20
Customer service A/6 to A/9

D
Declaration of conformity A/2
Degree of protection 7/2
Dimension drawings 8
Dimension drawings for
1FK6 motors 8/2
1FT6 motors 8/3 to 8/7
1PH7 motors 8/8 to 8/14, 8/17 to 8/20
1PH4 motors 8/11, 8/16
Documentation 6
Documentation CD-ROM 6/2
Drive type 7/22
Duty types 1/11

E
Encoder cables 5/2 to 5/16
Encoder cables for 1PH3 AC linear motors 5/12
Encoder cables for SIMODRIVE 611 universal 5/14
Encoder cables for connection to motors with an absolute-value encoder 5/11
Encoder cables for connection to motors with an incremental encoder 5/1
Encoder cables for connection to motors with an incremental encoder 1PH6 5/10
Encoder cables for connection to motors with a resolver 5/9
Encoders 4/3
Encoder systems 4/2, 4/3
Environment A/2
EC declaration of conformity A/2
Explosion-proof motors 7/16

F
Flow diagram for selection process 1/4
Gear installation 4/7 to 4/16
Gearbox information 4/7 to 4/16
Degrees of protection 7/2

H
Hall-effect sensor box 4/5
High dynamics servomotors 4/5
Holding brakes 4/6 to 4/9
Holding brakes for 1PH and 1FT6 motors 4/8

I
Incremental encoder 4/2

L
Lateral-force diagrams 7/33, 7/34
Linear motors 4/4, 4/15

M
Maximum speeds 7/32
Measuring systems 4/9
MOTION-CONNECT 8
Motor protection 1/12

N
Noise pressure level 7/32

O
Optional cooler 4/18
Order No. codes for 1PH7 motors 4/9
 Brief description 1/10, 1/13
Overview 1
Overview of possible types of construction 7/36
Overview of types 1/6, 1/7
Overview of types and ratings 1/6, 1/7

P
Planetary gears from alpha 4/70 to 4/14
Planetary gears from Bayside Motion 4/7
Planetary gears from other manufacturers 4/7
Planetary gears from ZF Friedrichshagen 4/15
Power cables 6FX5, 6FX8 5/4
Power cables 6FX7 5/6
Power cables connection overview 5/3
PROTOFLEX-EMV power cables, sold by the metre 5/7

R
Radial eccentricity tolerance 1/9
Ratings 1/6, 1/7
Recycling 4/2
Resistors 4/2
Resources 4/2
Rotary pulse encoder 4/2

S
Secondary section cover 4/24
Secondary section end pieces 4/23
Selection and ordering data
1FK6 2/2 to 2/4
1PH6 2/2 to 2/4
1PH7 2/3 to 2/7
1FT6 2/3 to 2/7
1FT6 2/3 to 2/7
1F7 2/9 to 2/15
1FT6 2/9 to 2/15
1PH4 3/24, 3/28
1PTL 3/24, 3/28
6FX5 and 6FX8 power cables 5/4 to 5/6
6FX7 power cables 5/6 to 5/8
PROTOFLEX-EMV power cables 5/7
SimoSize 6/2
anisotropic incremental encoder 4/3
Sizing and selection tool 6/2
Sound pressure level 7/32
Speed-Torque curves
1FK6 7/3, 7/4
1FT6 7/5 to 7/15
1F7 7/5 to 7/15
1FT6 7/5 to 7/15
1PH6 7/26 to 7/31
1F7 7/26 to 7/31
Standard terms and conditions of sale A/12
Synchronous servomotors A/9
Synchronous servomotors, 1FT6 2/5 to 2/10

T
Technical data
1PH4 asynchronous servomotors 3/5 to 3/6
1PH4 synchronous servomotors 3/5 to 3/6
1PL4 asynchronous servomotors 3/5 to 3/6
1PL4 synchronous servomotors 4/2
Encoder 4/2
Encoder cables 4/2
Holding brake 4/4, 4/7
6FX5 and 6FX8 power cables 5/2
PROTOFLEX-EMV power cables 5/7
Resolver 4/2
Synchronous servomotors 2
Synchronous servomotors, 1FT6 2/5 to 2/10

V
Vibration severity 1/9
Vibration stress 1/9
Vibration stress 1/9

W
Water-cooled 1PH4 asynchronous servomotors 3/19, 3/20
## Servomotors
### Appendix
#### Asynchronous Servomotors
- 1FK
  - 1FK6
    - 1FK63. 2/3
    - 1FK603. 2/3, 4/8
    - 1FK606. 2/3, 4/8
  - 1FK7
    - 1FK701. 2/3
    - 1FK702. 2/3, 4/8
    - 1FK704. 2/3, 4/8
    - 1FK706. 2/3, 4/8
    - 1FK708. 2/3, 4/8
  - 1FK710. 2/3, 4/8
- 1FN
  - 1FN3
    - 1FN3 002 4/5, 4/20, 4/22
    - 1FN3 003 4/5, 4/20, 4/22
    - 1FN3 004 4/5, 4/20, 4/22
    - 1FN3 005 4/5, 4/20, 4/20
    - 1FN3 010 4/5, 4/20, 4/20
    - 1FN3 050 4/5, 4/20, 4/20
    - 1FN3 150 4/5, 4/20, 4/20
    - 1FN3 250 4/5, 4/20, 4/20
    - 1FN3 450 4/5, 4/20, 4/20
    - 1FN3 650 4/5, 4/20, 4/20
    - 1FN3 900 4/5, 4/20, 4/20
  - 1FS
    - 1FS6
      - 1FS6074 2/17
      - 1FS6096 2/17
      - 1FS6115 2/17
      - 1FS6134 2/17
  - 1FT
    - 1FT6
      - 1FT604. 2/9
      - 1FT606. 2/9
      - 1FT608. 2/9
      - 1FT610. 2/9
      - 1FT613. 2/9
    - 1FT615. 2/9
  - 1PH
    - 1PH4
      - 1PH410. 3/28
      - 1PH411. 3/28
      - 1PH412. 3/28
    - 1PH7
      - 1PH710. 3/5, 4/6
      - 1PH711. 3/5
      - 1PH712. 3/5, 4/6
      - 1PH713. 3/5
      - 1PH714. 3/5
      - 1PH715. 3/5
      - 1PH716. 3/5
      - 1PH717. 3/5
      - 1PH718. 3/5
      - 1PH719. 3/5
      - 1PH720. 3/5

#### Synchronous Servomotors

<table>
<thead>
<tr>
<th>Servomotors</th>
<th>Order number index</th>
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Siemens Catalog MC Part 2 · 2002/2003 A/S
Servomotors

Appendix

Customer service

Welcome to Siemens US

If you are a new Siemens Drive Products customer, we thank you for doing business with us. We will work hard to earn your trust and serve your company as if it were our own! If you are currently doing business with us, we thank you for the opportunity to grow with you.

Your primary contact point in the United States for the servomotors and all other Siemens drive products are the Regional Sales Offices in the following locations:

Atlanta
5495 Metric Place
Suite 100
Norcross, GA 30097
Phone: 770-452-3400
Fax: 678-297-8409

Dallas
501 Fountain Parkway
2nd Floor
Grand Prairie, TX 75050
Phone: 817-640-4939
Fax: 817-640-9640

Chicago
1901 N. Roselle Road
Suite 210
Schaumburg, IL 60195
Phone: 847-333-7732
Fax: 847-333-8206

Houston
13105 NW Freeway
Suite 950
Houston, TX 77040
Phone: 713-690-3000
Fax: 713-690-1210

Kansas City
6201 College Blvd
Suite 300
Overland Park, KS 66211
Phone: 913-496-4200
Fax: 913-496-4240

Los Angeles
10655 Business Center Dr
Suite C1
Cypress, CA 90630
Phone: 714-252-3000
Fax: 714-527-7230

Philadelphia
332 Norristown Road
Suite 210
Ambler, PA 19002
Phone: 215-388-8267
Fax: 215-283-4702

Siemens policies/protocols

Minimum order

SEAA will assess a $25 handling fee on all orders valued at less than $400.

Freight

All of our original product shipments are F.O.B. point of shipment. For standard product orders greater than $1000 shipping from SEAA distribution centers, charges are freight allowed via method selected by SEAA. For orders less than $1000, motors, and non-standard product freight charges are pre-paid and added to the invoice. All air freight charges are the responsibility of the customer. Also, a customer account number is required for third party billing of freight charges.

Emergency/Expedite fees

When customers require urgent delivery, several methods of expedited delivery are available. Each is noted below along with the associated charges:

NEXT FLIGHT OUT – This service provides same day service where possible. In all cases, the expedited surcharge is $300. The customer is responsible for the associated freight charges.

AFTER HOUR SERVICE – Orders placed for same day shipment after 5:00 pm eastern time and weekends/holidays are subject to a $300 surcharge. The customer is responsible for the associated freight charges.
Siemens return goods policy

A Return Goods Request Authorization (RGA) is required to accompany all products returned to Siemens Energy & Automation, Inc. (Siemens). This ensures that the returned product is properly identified and credited to your account. Unauthorized returns will be refused and returned to the customer with no liability to Siemens.

To provide our customers maximum opportunity for inventory control, we have established three classes of product returns:

- Accommodation return
- Siemens error return
- Non-Conforming product warranty return

Product built to a customer’s specifications cannot be returned for credit or exchange, subject to return only when material in Siemens’ opinion has express economic value for potential resale. If returned product is a result of error(s) on the part of Siemens, a full credit to your account will be allowed including freight charges. All other returns, freight and handling will be prepaid by customer.

In all cases except when accompanied by product liability is involved, your account will be credited and a credit memo will be issued within 15 working days from our receipt of material based on results of a physical inspection of the product.

All claims for loss, damage or delays in transit are to be processed by the consignee directly with the carrier. Thi issuance of this RETURN GOODS AUTHORIZATION shall not be construed as an acceptance of any responsibility or liability on the part of the Company or as a waiver of any right to make a determination as to the Company’s responsibility.

Return goods authorizations will be automatically cancelled and have no further effect unless the returned goods are received by Siemens within 60 days after the date of issuance.

Accommodation return

Accommodation returns provide the customer the opportunity to return product ordered in error or in excessive quantities. Products eligible for return must be of current design and revision level, unused, unopened, undamaged, in the original “as-shipped” package and securely packed to be received by Siemens without damage. Software may only be returned when the seal has not been broken. Customized, engineered and/or energized products may not be returned without prior approval and in Siemens’ opinion have express economic value for potential resale.

Accommodation returns are subject to a 10% restocking charge. If cleaning or repackaging is necessary, an additional 15% per item repackaging charge will be deducted from any credit issued. After inspection of the returned product, your account will be credited for the full invoice value of the merchandise, less applicable charges.

Customer should not deduct credit for products returned from payments. Credit will be processed within 15 days of receipt of material. The customer is responsible for costs, including freight and handling, for returned product to Siemens.

Siemens error return

Siemens error returns provide the customer the opportunity to return material within 60 days of shipment in the event of a Siemens error or shipment error. Original purchase order, invoice number and date must be referenced. Products must be unopened, unused, undamaged. In the original “as-shipped” package or in static protection, and securely packed to be received by Siemens without damage. Software may only be returned when the seal has not been broken.

A return goods authorization (RGA) number will be issued as authorization to return the product(s) to Siemens. After receipt and inspection of the returned product, a credit will be issued for the full invoice value of the merchandise, or a replacement part provided. If the returned product(s) packaging is deemed not saleable, a 15% per item charge will be deducted from the credit issued.

Non-Conforming product warranty return

Non-Conforming product warranty returns enable Siemens customers to return product to the factory for replacement, exchange or credit if found to be non-conforming in accordance with the conditions of the Company’s warranty.

It is at Siemens’ discretion whether to replace, repair or issue a credit for non-conforming products. The warranty at no cost is conditional, and will be determined by a technical validation of the warranty once the non-conforming item is received in our repair department or authorized service center. Please note, if you should fail to return the non-conforming part within 10 days upon instructions from Siemens, you will be invoiced in full for the replacement part.

Product should be returned collected by a Siemens approved freight carrier or freight charges may be assessed. Freight charges will be credited if the entire shipment is returned due to Siemens error.

Customer service

Appendix
Customer service

Siemens return goods process – Accommodation

A. Return Goods Request/Authorization (RGA) is required to accompany all products returned to Siemens. If the returned product is properly identified and credit is issued to your account. Unauthorized returns will be refused and returned to the customer with no liability to Siemens.

B. Siemens will process your request and a return goods authorization (RGA) number will be issued as authorization to return the product(s) to Siemens.

C. If the return is an emergency, a 15-day hold is in effect, and the warranty can be validated commercially. For approved product categories Siemens will ship a replacement part to you at no charge. If you should fail to return the non-conforming part within 10 days upon instructions from Siemens, you will be invoiced in full for the replacement part.

D. A copy of your approved RGA and shipping instructions will be faxed to you.

E. Customer ships product to designated Siemens location. A Return Goods Request/Authorization (RGA) is required to accompany all material returned to Siemens.

F. Material should be returned following the Routing/Preferred Carrier Instructions located on the shipping instructions. If these instructions are not followed freight charges may be assessed.

G. Customers should not take a deduction for material returned to Siemens. Returns not complying with this policy will be returned to their sending location.

H. For all material returned in conformance with this policy, a credit will be issued to Siemens after an evaluation of the received material or a replacement part provided.

I. Customers should not take a deduction for material returned to Siemens. A material error return (Drives) Non-Conforming product return (Drives)

J. Siemens error return

Siemens error returns provide the customer with the opportunity to return material within 60 days of shipment in the event of a Siemens order or shipment error.

Procedures

A. Customer contacts Customer Service or inside salesperson to initiate return of material. Original purchase order number or invoice number must be available for reference.

B. Products must be unopened, unused, undamaged in the original as-shipped package or in static protection, and securely packed to be received by Siemens without damage. Software may only be returned when seal has not been broken.

C. Siemens Energy & Automation will process your request and a return goods authorization (RGA) number will be issued as authorization to return the product(s) to Siemens.

D. A copy of your approved RGA and shipping instructions will be faxed to you.

E. Customer ships product to designated Siemens location. A Return Goods Request/Authorization (RGA) is required to accompany all material returned to Siemens.

F. The customer is responsible for costs, including freight and handling, for returned product to Siemens.

G. For all material returned in conformance with this policy, a credit will be issued promptly by Siemens within 15 days of receipt of material.

H. Customers should not take a deduction for material returned until Siemens has issued the above mentioned credit.

I. All returned materials are subject to inspection by Siemens. Returns not complying with this policy will be returned to their sending location.

J. Stock products are subject to a 10% restocking charge. Customized and engineered products are subject to a negotiated restocking charge.

K. An additional 15% re-packaging charge will be applied for returned material not suitable for resale, or returned in broken inner cartons requiring inspection and re-packaging. No re-packaging charge of any kind will be applied when material is returned in undamaged, original inner/outer cartons suitable for resale.

L. Siemens return goods process – Siemens error

Siemens error returns provide the customer with the opportunity to return material within 60 days of shipment in the event of a Siemens order or shipment error.

Procedures

A. Customer contacts Customer Service or inside salesperson to initiate return of material. Original purchase order number or invoice number must be available for reference.

B. Products must be unopened, unused, undamaged in the original as-shipped package or in static protection, and securely packed to be received by Siemens without damage. Software may only be returned when seal has not been broken.

C. Siemens Energy & Automation will process your request and a return goods authorization (RGA) number will be issued as authorization to return the product(s) to Siemens.

D. A copy of your approved RGA and shipping instructions will be faxed to you.

E. Customer ships product to designated Siemens location. A Return Goods Request/Authorization (RGA) is required to accompany all material returned to Siemens.

F. Material should be returned following the Routing/Preferred Carrier Instructions located on the shipping instructions. If these instructions are not followed freight charges may be assessed.

G. Conforming products will be shipped back to the customer.

H. For all material returned in conformance with this policy, a credit will be issued to Siemens after an evaluation of the received material or a replacement part provided.

I. Customers should not take a deduction for material returned to Siemens.

J. All returned materials are subject to inspection by Siemens. Returns not complying with this policy will be returned to their sending location.

K. Siemens return goods process – Non-Conforming (Warranty)

A. Return Goods Request/Authorization (RAG) is required to accompany all products returned to Siemens. This insures that the returned product is properly identified and credited to your account. Unauthorized returns will be refused and returned to the customer with no liability to Siemens.

B. Siemens will ship a replacement part to you at no charge. If you should fail to return the non-conforming part within 10 days upon instructions from Siemens, you will be invoiced in full for the replacement part.

C. A Return Goods Request/Authorization (RGA) is required to accompany all material returned to Siemens.

D. A Return Goods Request/Authorization (RAG) is required to accompany all products returned to Siemens. This insures that the returned product is properly identified and credited to your account. Unauthorized returns will be refused and returned to the customer with no liability to Siemens.

E. Siemens error returns provide the customer with the opportunity to return material within 60 days of shipment in the event of a Siemens order or shipment error.

F. An additional 15% re-packaging charge will be applied for returned material not suitable for resale, or returned in broken inner cartons requiring inspection and re-packaging. No re-packaging charge of any kind will be applied when material is returned in undamaged, original inner/outer cartons suitable for resale.

G. Siemens return goods process – Siemens error

Siemens error returns provide the customer with the opportunity to return material within 60 days of shipment in the event of a Siemens order or shipment error.

Procedures

A. Customer contacts Customer Service or inside salesperson to initiate return of material. Original purchase order number or invoice number must be available for reference.

B. Products must be unopened, unused, undamaged in the original as-shipped package or in static protection, and securely packed to be received by Siemens without damage. Software may only be returned when seal has not been broken.

C. Siemens Energy & Automation will process your request and a return goods authorization (RGA) number will be issued as authorization to return the product(s) to Siemens.

D. A copy of your approved RGA and shipping instructions will be faxed to you.

E. Customer ships product to designated Siemens location. A Return Goods Request/Authorization (RGA) is required to accompany all material returned to Siemens.

F. Material should be returned following the Routing/Preferred Carrier Instructions located on the shipping instructions. If these instructions are not followed freight charges may be assessed.

G. Conforming products will be shipped back to the customer.

H. For all material returned in conformance with this policy, a credit will be issued to Siemens after an evaluation of the received material or a replacement part provided.

I. Customers should not take a deduction for material returned to Siemens.

J. All returned materials are subject to inspection by Siemens. Returns not complying with this policy will be returned to their sending location.
Optional warranties
Repair, replacement, and warranty service

All claims for warranty repair or replacement must initially be made to Drives Technical Service at 1-800-333-7421. Should the problem not be solved over the phone, an RGA will be issued to return the defective part. If the warranty can be validated commercially (ship date falls within warranty period) a replacement part can be shipped if available. SE&A will pay for best way freight on such replacements. The customer is responsible for expedited freight delivery.

Once the defective product has been returned, a technical evaluation will be performed to validate the warranty. Should the unit be found to not meet warranty requirements, and purchase order will be requested from the customer.

If your warranty has expired, you may still want to take advantage of our excellent repair and replacement service. Highly trained technicians perform incoming tests to determine the exact failure, repair the equipment, and fully test prior to shipment back to the customer. However, if you elect to send us the reconditioned part for 60% of the list price of a new part less your applicable discount on an exchange basis. Remanufactured parts carry a ninety (90) day warranty. Your Sales or Customer Service Representative can tell you which parts are included in our repair and replacement program. Should you take advantage of this program, please note that the original part must be returned to SE&A within ten (10) days, or an invoice will be issued for the additional 40%.

Replacement warranty
Should a remanufactured replacement of a defective item be the solution to a warranty claim, the remanufactured part shall be under warranty for the duration of the warranty of the original item or ninety (90) days, whichever is longer. A remanufactured part (otherwise original warranty replacement) carries a ninety (90) day warranty.

Extended warranty
Drive products offer an extended warranty for all products sold. An extended warranty of 12 months is offered with a surcharge of 5% of the net price of the product. This extended warranty offer is only available if ordered prior to time of original shipment from Siemens.

Deferred warranty
Siemens also offers a deferred warranty for all products sold. Commissioning must also be purchased to inspect the condition of the drive and supervise the start-up. This deferred warranty offer is only available if ordered prior to time of original shipment from Siemens. The deferred warranty offer is only available for those applications that will have a delayed installation period, but require a 12 month warranty from the date of commissioning. The chart below is a listing of the warranty periods and fees for the deferred warranty and the extended warranty programs.

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Siemens emergency access
The Drive Products Business Unit has an emergency spare part depot at Atlanta Hartsfield International Airport. Same day delivery requirements are often serviced out of this Depot as well as after hour shipments including weekends and holidays. This has allowed us to expedite emergency shipments, saving several hours in the process.

To activate our Emergency/After Hours Service, simply dial 1-800-333-7421 and ask for Drives Technical Service and the call will be automatically transferred to our message service, who will in turn page the On-Call Representative.

Tell the operator there is an emergency and you would like to contact after hour’s personnel for spare parts or technical service, and we will return your call immediately.

Siemens technical services
The Technical Service Group is responsible for technical service support for customers, field service, and sales engineers. Requests for spare parts, equipment commissioning, emergency service, or routine maintenance are coordinated and scheduled through this group.

Service coordination and technical support for a wide variety of drive products, including both domestic and international supplied units, are available from this team. Interfacing with the Siemens Service Organization, other Siemens Divisions, and supplier service facilities, this group is the single point of contact in effectively providing remote technical and field service support.

Over the past year, an internal survey showed that greater than 95% of the problems called in were resolved over the telephone. This level of technical expertise has significantly reduced the number of on-site service calls.

The Drive Products Business Unit has an emergency spare part depot at Atlanta Hartsfield International Airport. Same day delivery requirements are often serviced out of this Depot as well as after hour shipments including weekends and holidays. This has allowed us to expedite emergency shipments, saving several hours in the process.

To activate our Emergency/After Hours Service, simply dial 1-800-333-7421 and ask for Drives Technical Service and the call will be automatically transferred to our message service, who will in turn page the On-Call Representative.

Tell the operator there is an emergency and you would like to contact after hour’s personnel for spare parts or technical service, and we will return your call immediately.

Siemens emergency access
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Appendix

### Conversion tables

#### Rotary Inertia (to convert from A to B, multiply by entry in table)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>ft-lbf</th>
<th>lb-ft</th>
<th>in-lbf</th>
<th>slug-ft</th>
<th>Kg-cm</th>
<th>Kg-cm²</th>
<th>gm-cm²</th>
<th>gm-cm²</th>
<th>oz-in</th>
<th>oz-in²</th>
</tr>
</thead>
<tbody>
<tr>
<td>lb-ft²</td>
<td>1</td>
<td>6.94 × 10⁻³</td>
<td>2.59 × 10⁻³</td>
<td>2.15 × 10⁻³</td>
<td>2.926</td>
<td>2.98 × 10⁻⁷</td>
<td>2.32 × 10⁻³</td>
<td>2.386</td>
<td>16</td>
<td>4.14 × 10⁻³</td>
<td></td>
</tr>
<tr>
<td>lb-in²</td>
<td>1</td>
<td>6.679</td>
<td>0.0319</td>
<td>0.0260</td>
<td>0.394</td>
<td>0.4140</td>
<td>0.429</td>
<td>0.437</td>
<td>0</td>
<td>0.0260</td>
<td></td>
</tr>
<tr>
<td>ft-lb²</td>
<td>1</td>
<td>386.08</td>
<td>2.681</td>
<td>1.833</td>
<td>1.129</td>
<td>1.129</td>
<td>1.152</td>
<td>1.152</td>
<td>1</td>
<td>1.177 × 10⁻²</td>
<td></td>
</tr>
<tr>
<td>°C</td>
<td>K</td>
<td>0</td>
<td>1</td>
<td>0.1</td>
<td>0.1</td>
<td>1.09</td>
<td>1.09</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>lb</td>
<td>1</td>
<td>1.355</td>
<td>13.825</td>
<td>1.385</td>
<td>1</td>
<td>1.152</td>
<td>1.152</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>gm</td>
<td>1</td>
<td>1.019</td>
<td>10.00</td>
<td>1.019</td>
<td>1</td>
<td>1.019</td>
<td>1.019</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>oz</td>
<td>1</td>
<td>0.981</td>
<td>9.806</td>
<td>0.981</td>
<td>1</td>
<td>0.981</td>
<td>0.981</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>slug</td>
<td>1</td>
<td>1.355</td>
<td>13.825</td>
<td>1.385</td>
<td>1</td>
<td>1.152</td>
<td>1.152</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>K</td>
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<td>13.825</td>
<td>1.385</td>
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<td>1.152</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
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<tr>
<td>slug-ft</td>
<td>1</td>
<td>386.08</td>
<td>2.681</td>
<td>1.833</td>
<td>1.129</td>
<td>1.129</td>
<td>1.152</td>
<td>1.152</td>
<td>1</td>
<td>1.177 × 10⁻²</td>
<td></td>
</tr>
<tr>
<td>rpm</td>
<td>1</td>
<td>1</td>
<td>0.105</td>
<td>0.105</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

#### Torque (to convert from A to B, multiply by entry in table)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>lb-in</th>
<th>lb-ft</th>
<th>in-lbf</th>
<th>oz-in</th>
<th>oz-in²</th>
<th>Kg-cm</th>
<th>Kg-cm²</th>
<th>gm-cm²</th>
<th>gm-cm²</th>
<th>dyn-cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>lb-in</td>
<td>1</td>
<td>8.333 × 10⁻²</td>
<td>16</td>
<td>0.113</td>
<td>1</td>
<td>1.52</td>
<td>1.52</td>
<td>1</td>
<td>1</td>
<td>1.129</td>
<td>10</td>
</tr>
<tr>
<td>lb-ft</td>
<td>1</td>
<td>12</td>
<td>1</td>
<td>1</td>
<td>192</td>
<td>1.355</td>
<td>13.825</td>
<td>1.385</td>
<td>1</td>
<td>1.350</td>
<td>1000</td>
</tr>
<tr>
<td>in-lbf</td>
<td>1</td>
<td>6.25 × 10⁻⁵</td>
<td>5.208 × 10⁻⁵</td>
<td>1</td>
<td>7.061 × 10⁻⁵</td>
<td>7.200 × 10⁻⁵</td>
<td>7.700 × 10⁻⁵</td>
<td>7.720 × 10⁻⁵</td>
<td>1</td>
<td>1.129</td>
<td>10</td>
</tr>
<tr>
<td>oz-in</td>
<td>1</td>
<td>6.25 × 10⁻⁵</td>
<td>5.208 × 10⁻⁵</td>
<td>1</td>
<td>7.061 × 10⁻⁵</td>
<td>7.200 × 10⁻⁵</td>
<td>7.700 × 10⁻⁵</td>
<td>7.720 × 10⁻⁵</td>
<td>1</td>
<td>1.129</td>
<td>10</td>
</tr>
<tr>
<td>N-m</td>
<td>1</td>
<td>8.850</td>
<td>0.737</td>
<td>141.612</td>
<td>1</td>
<td>10.187</td>
<td>0.102</td>
<td>1</td>
<td>1.019</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Kg-cm</td>
<td>1</td>
<td>0.8679</td>
<td>7.233</td>
<td>13.877</td>
<td>13.877</td>
<td>9.806</td>
<td>1</td>
<td>1000</td>
<td>9.806</td>
<td>1</td>
<td>1000</td>
</tr>
<tr>
<td>Kg-m</td>
<td>1</td>
<td>6.879</td>
<td>7.233</td>
<td>1.368</td>
<td>1.368</td>
<td>9.806</td>
<td>1</td>
<td>1000</td>
<td>9.806</td>
<td>1</td>
<td>1000</td>
</tr>
<tr>
<td>dyn-cm</td>
<td>1</td>
<td>8.850 × 10⁻⁵</td>
<td>7.375 × 10⁻⁵</td>
<td>1.416</td>
<td>1.416</td>
<td>10⁻⁵</td>
<td>10⁻⁵</td>
<td>10⁻⁵</td>
<td>1</td>
<td>1.129</td>
<td>10</td>
</tr>
</tbody>
</table>

#### Length (to convert from A to B, multiply by entry in table)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>inches</th>
<th>feet</th>
<th>cm</th>
<th>yd</th>
<th>m</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>1</td>
<td>0.0383</td>
<td>5.4</td>
<td>0.0383</td>
<td>0.0254</td>
<td>0.0254</td>
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<tr>
<td>feet</td>
<td>1</td>
<td>12</td>
<td>10.00</td>
<td>30.48</td>
<td>0.333</td>
<td>1.019</td>
</tr>
<tr>
<td>cm</td>
<td>1</td>
<td>0.0357</td>
<td>0.0357</td>
<td>0.357</td>
<td>0.0357</td>
<td>1</td>
</tr>
<tr>
<td>m</td>
<td>1</td>
<td>0.0914</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5.4</td>
</tr>
</tbody>
</table>

#### Power (to convert from A to B, multiply by entry in table)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>H.P.</th>
<th>Watt</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.P. (English</td>
<td>1</td>
<td>745.7</td>
<td></td>
</tr>
<tr>
<td>(lb-ft)(RPM)</td>
<td>1</td>
<td>1.346</td>
<td>1.346</td>
</tr>
<tr>
<td>(lb-ft)(deg./sec)</td>
<td>1</td>
<td>0.105</td>
<td>0.105</td>
</tr>
<tr>
<td>RPM</td>
<td>1</td>
<td>0.105</td>
<td>0.105</td>
</tr>
</tbody>
</table>

#### Temperature conversion

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-17.8</td>
<td>32</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>50</td>
<td>10</td>
<td>90</td>
<td>32.0</td>
<td>86</td>
</tr>
<tr>
<td>90</td>
<td>20</td>
<td>180</td>
<td>36.0</td>
<td>86</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-17.8</td>
<td>18</td>
<td>2.348</td>
</tr>
<tr>
<td>50</td>
<td>10</td>
<td>90</td>
<td>3.890</td>
</tr>
<tr>
<td>90</td>
<td>20</td>
<td>180</td>
<td>3.890</td>
</tr>
</tbody>
</table>

#### Mass (to convert from A to B, multiply by entry in table)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>lb</th>
<th>oz</th>
</tr>
</thead>
<tbody>
<tr>
<td>oz</td>
<td>1</td>
<td>0.0311</td>
<td>493.6</td>
</tr>
<tr>
<td>gm</td>
<td>1</td>
<td>0.0357</td>
<td>32.17</td>
</tr>
<tr>
<td>slug</td>
<td>1</td>
<td>1.499</td>
<td>1000</td>
</tr>
</tbody>
</table>

#### Rotation (to convert from A to B, multiply by entry in table)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>RPM</th>
<th>degrees/sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPM</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>degrees/sec</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Force (to convert from A to B, multiply by entry in table)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>lb</th>
<th>oz</th>
<th>gm</th>
</tr>
</thead>
<tbody>
<tr>
<td>oz</td>
<td>1</td>
<td>444.8</td>
<td>444.8</td>
<td>444.8</td>
</tr>
<tr>
<td>gm</td>
<td>1</td>
<td>3.890</td>
<td>3.890</td>
<td>3.890</td>
</tr>
</tbody>
</table>

| gm | 1 | 2.348 | 2.348 | 2.348 |
| N | 1 | 22.48 | 22.48 | 22.48 |

A Siemens Catalog MK Part 2 2002/2003
Servomotors

Appendix

Mechanism Efficiencies

<table>
<thead>
<tr>
<th>Mechanism Type</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acme-screw with brass nut</td>
<td>~0.35–0.65</td>
</tr>
<tr>
<td>Acme-screw with plastic nut</td>
<td>~0.50–0.85</td>
</tr>
<tr>
<td>Ball-screw</td>
<td>~0.85–0.95</td>
</tr>
<tr>
<td>Cham-fillet screw</td>
<td>~0.85–0.98</td>
</tr>
<tr>
<td>Preloaded Ball-screw</td>
<td>~0.75–0.85</td>
</tr>
<tr>
<td>Spur or Bevel-gears</td>
<td>~0.90</td>
</tr>
<tr>
<td>Timing Belts</td>
<td>~0.90–0.98</td>
</tr>
<tr>
<td>Worm Gear</td>
<td>~0.45–0.85</td>
</tr>
<tr>
<td>Helical Gear (1 reduction)</td>
<td>~0.92</td>
</tr>
</tbody>
</table>

Friction Coefficients

<table>
<thead>
<tr>
<th>Material</th>
<th>µ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel on Steel (greased)</td>
<td>~0.15</td>
</tr>
<tr>
<td>Plastic on Steel</td>
<td>~0.15–0.25</td>
</tr>
<tr>
<td>Copper on Steel</td>
<td>~0.30</td>
</tr>
<tr>
<td>Brass on Steel</td>
<td>~0.35</td>
</tr>
<tr>
<td>Aluminium on Steel</td>
<td>~0.45</td>
</tr>
<tr>
<td>Steel on Steel</td>
<td>~0.58</td>
</tr>
<tr>
<td>Ball Bushings</td>
<td>~0.001</td>
</tr>
<tr>
<td>Linear Bearings</td>
<td>~0.001</td>
</tr>
<tr>
<td>Dovetail Joints</td>
<td>~0.2+</td>
</tr>
<tr>
<td>Glib Ways</td>
<td>~0.5+</td>
</tr>
</tbody>
</table>

Material Densities

<table>
<thead>
<tr>
<th>Material</th>
<th>lb-in³</th>
<th>gm-cm³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium</td>
<td>0.096</td>
<td>2.66</td>
</tr>
<tr>
<td>Brass</td>
<td>0.299</td>
<td>8.30</td>
</tr>
<tr>
<td>Bronze</td>
<td>0.296</td>
<td>8.17</td>
</tr>
<tr>
<td>Copper</td>
<td>0.322</td>
<td>8.91</td>
</tr>
<tr>
<td>Hard Wood</td>
<td>0.029</td>
<td>0.90</td>
</tr>
<tr>
<td>Soft Wood</td>
<td>0.018</td>
<td>0.48</td>
</tr>
<tr>
<td>Plastic</td>
<td>0.040</td>
<td>1.11</td>
</tr>
<tr>
<td>Glass</td>
<td>0.079–0.090</td>
<td>2.2–2.5</td>
</tr>
<tr>
<td>Titanium</td>
<td>0.183</td>
<td>4.51</td>
</tr>
<tr>
<td>Paper</td>
<td>0.026–0.043</td>
<td>0.7–1.2</td>
</tr>
<tr>
<td>Polypropylene</td>
<td>0.047–0.050</td>
<td>1.3–1.4</td>
</tr>
<tr>
<td>Rubber</td>
<td>0.030–0.036</td>
<td>0.82–0.99</td>
</tr>
<tr>
<td>Silicone rubber, without filler</td>
<td>0.043</td>
<td>1.2</td>
</tr>
<tr>
<td>Cast iron, grey</td>
<td>0.274</td>
<td>7.6</td>
</tr>
<tr>
<td>Steel</td>
<td>0.280</td>
<td>7.75</td>
</tr>
</tbody>
</table>
TERMS OF PAYMENT
5.
4.
PERFORMANCE; DELAYS
5. PATENTS

(c) If any time in Seller's judgment Buyer is unable or unwilling to meet the terms added to the price and invoiced separately (unless an acceptable exemption certificate is furnished). Any applicable duties or sales, use, excise, value-added or similar taxes will be responsible for shipment during transit and for filing any damage or loss claims when needed, all required technical information and data, including drawing approvals, and all required commercial documentation. If Seller suffers delay in application hereunder with respect to claims, suits or proceedings, resulting from or in enforcing any of its rights hereunder. Seller may have hereunder and shall be given full force and effect whether or not any or all such remedies shall be deemed to have failed of their essential purpose.

GOVERNING LAW AND ASSIGNMENT
10. The laws of the State of Georgia shall govern the validity, interpretation and enforcement of this contract, without regard to its conflicts of law principles. The Sale of Goods shall be excluded. Assignment may be made only with written consent of both parties; provided, however, Seller may assign to its affiliates without out Buyer's consent.

ATTORNEY FEES
11. Buyer shall be liable to Seller for any attorney fees and costs incurred by Seller enforcing any of its rights hereunder.

DISPUTES
12. Either party may give the other party written notice of any dispute arising out of or relating to this contract and not resolved in the normal course of business. The parties shall attempt in good faith to resolve such dispute promptly by negotiations between executives who have not been released within 60 days of the notice, either party may initiate non-binding mediation of the dispute.

LIMITATION OF LIABILITY
13. To the extent permitted by applicable law, any breach of breach of contract, including breach of warranty, arising out of the transactions covered by this contract.

PRICES
14. In the event of a price increase or decrease, the price of goods on order will be adjusted to reflect such increase or decrease. This does not apply to shipments held by request of Buyer. Goods already shipped are not subject to price increase or decrease. Orders on data, including drawing approvals, and all required commercial documentation. If Seller suffers delay in enforcing any of its rights hereunder. Seller shall be liable to Buyer for nonconformities from any cause.

GOVERNMENTAL LAW
15. Sale of Goods shall be excluded. Assignment may be made only with written consent of both parties; provided, however, Seller may assign to its affiliates without out Buyer's consent.

ATTORNEY FEES
11. Buyer shall be liable to Seller for any attorney fees and costs incurred by Seller enforcing any of its rights hereunder.

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PRICES
14. In the event of a price increase or decrease, the price of goods on order will be adjusted to reflect such increase or decrease. This does not apply to shipments held by request of Buyer. Goods already shipped are not subject to price increase or decrease. Orders on data, including drawing approvals, and all required commercial documentation. If Seller suffers delay in enforcing any of its rights hereunder. Seller shall be liable to Buyer for nonconformities from any cause.

GOVERNMENTAL LAW
15. Sale of Goods shall be excluded. Assignment may be made only with written consent of both parties; provided, however, Seller may assign to its affiliates without out Buyer's consent.

ATTORNEY FEES
11. Buyer shall be liable to Seller for any attorney fees and costs incurred by Seller enforcing any of its rights hereunder.

DISPUTES
12. Either party may give the other party written notice of any dispute arising out of or relating to this contract and not resolved in the normal course of business. The parties shall attempt in good faith to resolve such dispute promptly by negotiations between executives who have not been released within 60 days of the notice, either party may initiate non-binding mediation of the dispute.

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