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</tbody>
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# SINUMERIK 808
Equipment for Machine Tools

## Catalog NC 81.1 · 2017

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**Overview of functions**
SINUMERIK 808D family

**SINUMERIK 808D system**
SINUMERIK 808D Turning/808D Milling
Operator components
Feed axis solutions
MOTION-CONNECT connection systems
Example packages

**SINUMERIK 808D ADVANCED system**
SINUMERIK 808D ADVANCED T/ADVANCED M
Operator components
Feed axis solutions
Spindle solutions
MOTION-CONNECT connection systems
Example packages

**Accessories**
Operator components
Supplementary components
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**Services and training**
Services
Training
Documentation

**Appendix**
Approvals
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Conditions of sale and delivery
Export regulations

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The products and systems described in this catalog are distributed under application of a certified quality management system in accordance with DIN EN ISO 9001 (Certified Registration No. 001258 UM). The certificate is recognized by all IQNet countries.

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Efficient automation starts with efficient engineering.

Totally Integrated Automation: Efficiency driving productivity.

Efficient engineering is the first step toward better production that is faster, more flexible, and more intelligent. With all components interacting efficiently, Totally Integrated Automation (TIA) delivers enormous time savings right from the engineering phase. The result is lower costs, faster time-to-market, and greater flexibility.
Making things right with Totally Integrated Automation

Totally Integrated Automation, industrial automation from Siemens, stands for the efficient interoperability of all automation components. The open system architecture covers the entire production process and is based on end-to-end shared characteristics: consistent data management, global standards, and uniform hardware and software interfaces.

Totally Integrated Automation lays the foundation for comprehensive optimization of the production process:
- Time and cost savings due to efficient engineering
- Minimized downtime due to integrated diagnostic functions
- Simplified implementation of automation solutions due to global standards
- Better performance due to interoperability of system-tested components

A unique complete approach for all industries

As one of the world’s leading automation suppliers, Siemens provides an integrated, comprehensive portfolio for all requirements in process and manufacturing industries. All components are mutually compatible and system-tested. This ensures that they reliably perform their tasks in industrial use and interact efficiently, and that each automation solution can be implemented with little time and effort based on standard products. The integration of many separate individual engineering tasks into a single engineering environment, for example, provides enormous time and cost savings.

With its comprehensive technology and industry-specific expertise, Siemens is continuously driving progress in manufacturing industries – and Totally Integrated Automation plays a key role.

Totally Integrated Automation creates real value added in all automation tasks, especially for:

- **Integrated engineering**
  Consistent, comprehensive engineering throughout the entire product development and production process
- **Industrial data management**
  Access to all important data occurring in productive operation – along the entire value chain and across all levels
- **Industrial communication**
  Integrated communication based on international cross-vendor standards that are mutually compatible
- **Industrial security**
  Systematic minimization of the risk of an internal or external attack on plants and networks
- **Safety Integrated**
  Reliable protection of personnel, machinery, and the environment thanks to seamless integration of safety technologies into the standard automation
Introduction
# Introduction

How to use this catalog

## Overview

### Quick overview of the CNC/drive/motor system

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<th>SINUMERIK 808D ADVANCED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview of CNC functions</td>
<td>Overview of CNC functions</td>
</tr>
<tr>
<td>Selection and ordering data of CNC</td>
<td>Selection and ordering data of CNC</td>
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</table>

### Feed drive solution SINAMICS V60/ SIMOTICS S-1FL5

<table>
<thead>
<tr>
<th>Technical specifications of drive modules, motors and cables</th>
<th>Technical specifications of drive modules, motors and cables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection and ordering data of drive modules, motors and cables</td>
<td>Selection and ordering data of drive modules, motors and cables</td>
</tr>
<tr>
<td>Dimensional drawings of drive modules, motors and cables</td>
<td>Dimensional drawings of drive modules, motors and cables</td>
</tr>
</tbody>
</table>

### Feed and spindle drive solution SINAMICS V70/ SIMOTICS S-1FL6/SIMOTICS M-1PH1

<table>
<thead>
<tr>
<th>Technical specifications of drive modules, motors and cables</th>
<th>Technical specifications of drive modules, motors and cables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection and ordering data of drive modules, motors and cables</td>
<td>Selection and ordering data of drive modules, motors and cables</td>
</tr>
<tr>
<td>Dimensional drawings of drive modules, motors and cables</td>
<td>Dimensional drawings of drive modules, motors and cables</td>
</tr>
</tbody>
</table>

### Example packages to cross-check my order list

#### SINUMERIK 808D

- CNC accessories (MCP, handwheels, PLC I/O, power supply, direct spindle encoder)
  - Technical specifications of CNC accessories
  - Selection and ordering data of CNC accessories
  - Dimensional drawings of CNC accessories

#### SINUMERIK 808D ADVANCED

- Services and training
  - Material warranty and on-site service
  - System documentation
  - Training portfolio
  - SINUMERIK 808D on PC (training and offline programming system for PC)

### Spindle solution

- Example packages to cross-check my order list

---

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Introduction
The system

Overview

SINUMERIK 808D system

SINUMERIK 808D ADVANCED system

1) Only used for milling version
Introduction
SINUMERIK 808D/808D ADVANCED

Overview

Small, robust, easy, simply smart

The operator-panel-based CNCs SINUMERIK 808D and SINUMERIK 808D ADVANCED are extremely compact, rugged and very easy to maintain. SINUMERIK 808D is suitable for machines needed for economic CNC solutions. With variable software options and high-dynamic servo drive systems, the SINUMERIK 808D ADVANCED system is offering the latest CNC solution for high-performance basic machines.

Preconfigured for basic standard turning machines...

The SINUMERIK 808D Turning/SINUMERIK 808D ADVANCED T CNC is perfectly preconfigured to meet the requirements of modern standard turning machines. Intelligent CNC features such as full servo controlled rigid tapping or the flying switch-over between spindle and C axis enable most precise and fastest turning operation.

Perfectly preconfigured for:
- SINUMERIK 808D Turning:
  Up to 4 axes/spindles in one machining channel;
- SINUMERIK 808D ADVANCED T:
  Up to 5 axes/spindles in one machining channel with/without a driven tool
- Preconfigured system software for inclined bed fully automated lathes and flat bed semi-automatic lathes

... and basic standard milling machines

The SINUMERIK 808D Milling/SINUMERIK 808D ADVANCED M CNC is perfectly tailored to meet the requirements of modern standard milling machines.
- SINUMERIK 808D Milling:
  Up to 4 axes/spindles in one machining channel
- SINUMERIK 808D ADVANCED M:
  Up to 5 axes/spindles in one machining channel
- Preconfigured system software for vertical machining centers
**Introduction**

Feed and spindle drive solutions

---

**Overview**

**SINAMICS V60 and SIMOTICS S-1FL5**

SINAMICS V60 servo drives and SIMOTICS S-1FL5 feed motors are the perfect partners as an economic solution to achieve maximum dynamics and accuracy for feed axes in standard turning and milling machine tool applications with SINUMERIK 808D.

With its closed-loop speed and current control, SINAMICS V60 is perfectly tailored for economic but powerful feed axes and guarantees easiest commissioning without any PC tools.

With a robust design, SINAMICS V60 together with SIMOTICS S-1FL5 feed motors are perfectly prepared for maximum availability even in harsh environments.

---

**SINAMICS V70, SIMOTICS S-1FL6 and SIMOTICS M-1PH1**

SINAMICS V70 servo drives, SIMOTICS S-1FL6 feed motors and SIMOTICS M-1PH1 main motors are designed for the maximum cutting performance for the basic turning and milling machine tool applications. The bus communication with the SINUMERIK 808D ADVANCED CNC system, threefold overload capacity and the 20 bit high-resolution absolute encoder installed in SIMOTICS S-1FL6 feed motors allow to increase the precision and efficiency of the machines.

With a robust design, SINAMICS V70 together with SIMOTICS S-1FL6 feed motors and SIMOTICS M-1PH1 main motors are perfectly prepared for maximum availability even in harsh environments.

---

**Up to 36 months material warranty and on-site service**

Siemens offers a standard material warranty and free on-site service period of 24 months for the SINUMERIK 808D, SINUMERIK 808D ADVANCED and the associated components. Warranty can be easily extended up to 36 months by end user registration.

Moreover, Siemens ensures elimination of any defects on the components free of cost on site during the warranty period.

Further information about the conditions and the scope of the warranty and the on-site service can be found at:

www.siemens.com/automation/oss
Introduction
MOTION-CONNECT connection systems

Overview

Connection system MOTION-CONNECT 300

The MOTION-CONNECT 300 cables in this catalog are suitable for the use with standard turning and milling machines.

The use of pre-assembled MOTION-CONNECT 300 cables ensures high quality and system-tested, problem-free operation.

Degree of protection of pre-assembled power and signal cables and their extensions is IP65 when closed and connected unless otherwise stated.

MOTION-CONNECT 300 cables are not suitable for outdoor use.

MOTION-CONNECT cables are approved for a maximum horizontal travel distance of 5 m without support.

To maximize the service life of the cable carrier and cables, cables in the carrier made from different materials must be separated in the cable carrier using spacers. The spacers must be filled evenly to ensure that the position of the cables does not change during operation. The cables should be distributed as symmetrically as possible according to their weights and dimensions. Cables with different outer diameters should be separated by spacers as well.

When inserting pre-assembled cables into the cable carrier, do not pull at the connector, as this may damage the strain relief or cable clamping.

The cables must not be fixed in the cable carrier. They must be freely movable.

The cables must be unwound without twisting.

The cables must be able to be moved without applying force, specifically in the bending radii of the carrier. The specified minimum bending radii must be adhered to.

The cable fixings must be attached at both ends at an appropriate distance from the end points of the moving parts in a dead zone.

Cables must be installed in accordance with the instructions supplied by the cable carrier manufacturer.

In case of vibration load and with horizontal or vertical cable entries, we recommend that the cable is additionally fixed if between the cable strain relief on the cable carrier and the terminal at the motor part of the cable is hanging loose or is not routed. To prevent machine vibrations being transmitted to the connectors, the cable should be fixed at the moving part where the motor is mounted.

Derating factors for power and signal cables

<table>
<thead>
<tr>
<th>Ambient air temperature °C (°F)</th>
<th>Derating factor according to EN 60204-1 Table D.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 (86)</td>
<td>1.15</td>
</tr>
<tr>
<td>35 (95)</td>
<td>1.08</td>
</tr>
<tr>
<td>40 (104)</td>
<td>1.00</td>
</tr>
<tr>
<td>45 (113)</td>
<td>0.91</td>
</tr>
<tr>
<td>50 (122)</td>
<td>0.82</td>
</tr>
<tr>
<td>55 (131)</td>
<td>0.71</td>
</tr>
<tr>
<td>60 (140)</td>
<td>0.58</td>
</tr>
</tbody>
</table>
The functionality of the SINUMERIK 808D family (SINUMERIK 808D, SINUMERIK 808D ADVANCED) complies with the export list restrictions. Accordingly, these CNC controls do not require official approval in accordance with EU or German law.

The information in the overview of functions of SINUMERIK 808D and SINUMERIK 808D ADVANCED controls is based on the following software version:

<table>
<thead>
<tr>
<th>Control system</th>
<th>Software version</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINUMERIK 808D PPU 141.1</td>
<td>4.4 SP2</td>
</tr>
<tr>
<td>SINUMERIK 808D ADVANCED</td>
<td>4.7 SP4</td>
</tr>
<tr>
<td>PPU 160.3/PPU161.3</td>
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</tr>
</tbody>
</table>
## Overview of functions

### SINUMERIK 808D family

### Control structure and configuration/Drives/Connectable measuring systems

<table>
<thead>
<tr>
<th>Article No.</th>
<th>SINUMERIK 808D PPU 141.1</th>
<th>SINUMERIK 808D ADVANCED PPU 160.3/PPU 161.3</th>
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</thead>
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<tr>
<td>Turning</td>
<td>Turning</td>
<td>Turning</td>
</tr>
<tr>
<td>Milling</td>
<td>Milling</td>
<td>Milling</td>
</tr>
</tbody>
</table>

#### Control structure and configuration

Panel-based control system comprising:
- Compact operator panel
- CNC/PLC Control Unit
- Onboard digital PLC inputs/outputs
- CF card with system software Export version

**SINUMERIK operator panel CNC:**
- Operator panel layout:
  - Horizontal/vertical
- Color display:
  - 7.5”
- Display resolution:
  - 640 x 480
- Integrated CNC keyboard with hard keys
- Specific CNC keyboard layout
- Operator panel with Simplified Chinese layout
- Operator panel with English layout

**SINUMERIK Operate BASIC**

- Quantity of pulse/direction interfaces for feed axis converter:
  - 3
- Quantity of bus interfaces for axis converter:
  - 1
- Quantity of analog ±10 V interfaces for spindle converter:
  - 1

**Channels/mode groups MG:**
- Maximum configuration:
  - 1

CNC user memory (buffered) for CNC part programs:
- The 1.25 MB memory is for storing and editing the user program. There is another 500 MB memory for NC program storage.

**Axes/spindles:**
- Basic quantity of axes/spindles:
  - 3
- Maximum configuration axes/spindles:
  - 4
- Axis/spindle, each additional:
  - 6FC5800-0AK70-0YB0

#### Drives

**Feed drives:**
- SINAMICS V60 via pulse/direction interface
- SINAMICS V70 via bus interface
- 3rd-party feed axis converter via pulse/direction interface

**Spindles:**
- Analog Drive Interface
- SINAMICS V70 spindle via bus interface

#### Connectable measuring systems

Number of measuring systems per axis, max.:
- 1

Incremental encoder installed in SIMOTICS S-1FL5 feed motors:
- O

Incremental encoder installed in SIMOTICS S-1FL6 feed motors:
- –

Absolute encoder installed in SIMOTICS S-1FL6 feed motors:
- –

Incremental encoder installed in SIMOTICS M-1PH1 main motors:
- –

RS422 (TTL) direct incremental spindle encoder:
- 6FX2001-2EB02

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### Overview of functions

#### SINUMERIK 808D family

**Connectable CNC accessories/Axis functions**

<table>
<thead>
<tr>
<th>Connectable CNC accessories</th>
<th>Article No.</th>
<th>SINUMERIK 808D PPU 141.1 Turning</th>
<th>SINUMERIK 808D ADVANCED PPU 160.3/PPU 161.3 Turning</th>
<th>Milling</th>
<th>Milling</th>
</tr>
</thead>
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<tr>
<td><strong>Machine Control Panel:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• SINUMERIK 808D MCP horizontal:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- English layout</td>
<td>6FC5303-0AF35-0AA0</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>- Simplified Chinese layout</td>
<td>6FC5303-0AF35-0CA0</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>• SINUMERIK 808D MCP vertical:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- English layout</td>
<td>6FC5303-0AF35-2AA0</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>- Simplified Chinese layout</td>
<td>6FC5303-0AF35-2CA0</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>• SINUMERIK 808D MCP vertical: with handwheel slot</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- English layout</td>
<td>6FC5303-0AF35-3AA0</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>- Simplified Chinese layout</td>
<td>6FC5303-0AF35-3CA0</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>• 3rd-party MCP via onboard digital PLC inputs/outputs</td>
<td></td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Number of digital tool probes, max.</td>
<td></td>
<td>–</td>
<td>1</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>Number of electronic handwheels RS422 5 V DC, max.</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Electronic handwheels 5 V DC:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• With 120 mm × 120 mm front panel</td>
<td>6FC9320-5DB01</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>• With 76.2 mm × 76.2 mm front panel</td>
<td>6FC9320-5DC01</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>• Without front panel, without setting wheel</td>
<td>6FC9320-5DF01</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>• Without front panel, with setting wheel</td>
<td>6FC9320-5DM00</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Axis functions</th>
<th>Feedrate override</th>
<th>0 ... 200 %</th>
<th>0 ... 200 %</th>
<th>0 ... 200 %</th>
<th>0 ... 200 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedrate override axis-specific</td>
<td>0 ... 200 %</td>
<td>0 ... 200 %</td>
<td>0 ... 200 %</td>
<td>0 ... 200 %</td>
<td></td>
</tr>
<tr>
<td>Traversing range decades</td>
<td>± 9</td>
<td>± 9</td>
<td>± 9</td>
<td>± 9</td>
<td></td>
</tr>
<tr>
<td>Rotary axis, turning endlessly</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Velocity, max.</td>
<td></td>
<td>300 m/s</td>
<td>300 m/s</td>
<td>300 m/s</td>
<td>300 m/s</td>
</tr>
<tr>
<td>Acceleration with jerk limitation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Programmable acceleration</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Feedrate interpolation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Separate path feed for corners and chamfers</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Velocity-dependent feed forward control</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Friction compensation</td>
<td>–</td>
<td>–</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Auto Servo Tuning AST</td>
<td>–</td>
<td>–</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Direct Servo Control DSC</td>
<td>–</td>
<td>–</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>TRANSMIT/TRACYL Transformation without Y axis</td>
<td>6FC5800-0AS50-0YB0</td>
<td>–</td>
<td>–</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Pair of synchronized axes (gantry axes), basic</td>
<td>6FC5800-0AS51-0YB0</td>
<td>–</td>
<td>–</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Contour handwheel</td>
<td>6FC5800-0AM08-0YB0</td>
<td>–</td>
<td>–</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
## Overview of functions
### SINUMERIK 808D family

### Spindle functions/Interpolations/Measuring functions/Motion-synchronous actions

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<th>SINUMERIK 808D PPU 141.1 Turning</th>
<th>Milling</th>
<th>SINUMERIK 808D ADVANCED PPU 160.3/PPU 161.3 Turning</th>
<th>Milling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spindle functions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle speed, analog</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Spindle speed, max. programmable value range (display ± 999999999.9999)</td>
<td>10⁶ ... 10⁻⁴</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Spindle override</td>
<td>0 ... 200 %</td>
<td>0 ... 200 %</td>
<td>0 ... 200 %</td>
<td>0 ... 200 %</td>
</tr>
<tr>
<td>Gear stages</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Intermediate gear</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Automatic gear stage selection</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Oriented spindle stop</td>
<td>Requires direct spindle encoder.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Spindle speed limitation min./max.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Constant cutting rate</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Spindle control via PLC (positioning, oscillation)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Changeover to axis mode</td>
<td>Requires servo spindle and direct encoder.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Axis synchronization on-the-fly</td>
<td>Requires servo spindle and direct encoder.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Thread run-in and run-out programmable</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Thread cutting with constant or variable pitch</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tapping with compensating chuck/rigid tapping</td>
<td>Requires servo spindle and direct encoder.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Interpolations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear interpolation axes, max.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Circle via center point and end point</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Circle via interpolation point</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Helical interpolation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Continuous-path mode with programmable rounding clearance</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Advanced Surface look ahead; velocity control and CNC block compression</td>
<td>–</td>
<td>✓</td>
<td>–</td>
<td>✓</td>
</tr>
<tr>
<td>High-speed setting cycle CYCLE832</td>
<td>–</td>
<td>✓</td>
<td>–</td>
<td>✓</td>
</tr>
<tr>
<td>Look ahead (number of blocks)</td>
<td>1</td>
<td>50</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td><strong>Measuring functions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring in JOG:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of probes (switching) with/without deletion of distance-to-go</td>
<td>–</td>
<td>1</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td><strong>Motion-synchronous actions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CNC inputs/outputs, high-speed:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital inputs CNC onboard</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>- Digital inputs cycle time</td>
<td>0.2 ms</td>
<td>0.2 ms</td>
<td>0.2 ms</td>
<td>0.2 ms</td>
</tr>
<tr>
<td>Digital outputs CNC onboard</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>- Digital outputs cycle time</td>
<td>0.3 ms</td>
<td>0.3 ms</td>
<td>0.3 ms</td>
<td>0.3 ms</td>
</tr>
<tr>
<td>Synchronized actions and high-speed auxiliary function output incl. 3 synchronous functions</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Positioning axes and spindles via synchronized actions (command axes)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
### Open Architecture/CNC programming

#### Overview of functions

**SINUMERIK 808D family**

<table>
<thead>
<tr>
<th>Feature</th>
<th>SINUMERIK 808D</th>
<th>SINUMERIK 808D ADVANCED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article No.</td>
<td>PPU 141.1</td>
<td>PPU 160.3/PPU 161.3</td>
</tr>
<tr>
<td>Note</td>
<td>Turning</td>
<td>Turning</td>
</tr>
<tr>
<td></td>
<td>Milling</td>
<td>Milling</td>
</tr>
</tbody>
</table>

#### Open Architecture

- **Customizable HMI:**
  - Customizable screens in the HMI
  - Input screens for customized user cycles

#### CNC programming

- **Programming methods:**
  - SINUMERIK style programming language (DIN 66025 and high-level language expansion)
  - ISO code

- **Main program call from main program and subroutine:**

- **Subprogram levels, max.:** 11

- **Number of subprogram passes:** ≤ 9999

- **Number of levels for skip blocks:** 1

- **Polar coordinates:**

- **Dimensions metric/inch, changeover:**
  - Manually
  - Via program

- **Inverse-time feedrate:**

- **Auxiliary function output:**
  - Via M word, max. programmable value range
  - Via H word, max. programmable value range: REAL ± 3.4028 ex 38 (display ± 999999999.9999)

- **Basic frames, max. number:** 1

- **Settable offsets, max. number:** 6

- **Global and local user data:**

- **Global program user data:**

- **SINUMERIK high-level CNC language with:**
  - Frame concept
  - User variables, configurable
  - Predefined user variables (arithmetic parameters)
  - Predefined user variables (arithmetic parameters), configurable
  - Read/write system variables
  - Indirect programming
  - Program jumps and branches
  - Arithmetic and trigonometric functions
  - Compare operations and logic combinations
  - Macro techniques
  - Control structures IF-ELSE-ENDIF
  - Control structures WHILE, FOR, REPEAT, LOOP
  - STRING functions
## Overview of functions

### SINUMERIK 808D family

#### Technology cycles/Canned cycles

<table>
<thead>
<tr>
<th>Technology cycles</th>
<th>Article No.</th>
<th>SINUMERIK 808D</th>
<th>SINUMERIK 808D ADVANCED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Turning</td>
<td>Milling</td>
</tr>
<tr>
<td>Basic version</td>
<td>Option</td>
<td>Not available</td>
<td></td>
</tr>
</tbody>
</table>

### Technology cycles

Technology cycles for SINUMERIK style programming language:

- Drilling, centering – CYCLE81
- Drilling, counterboring – CYCLE82
- Deep-hole drilling – CYCLE83
- Rigid tapping – CYCLE84
- Tapping with compensating chuck – CYCLE840
- Reaming 1 – CYCLE85
- Boring – CYCLE86
- Position pattern: Row of holes – HOLES1
- Position pattern: Circle of holes – HOLES2
- Cutoff – CYCLE92
- Groove – CYCLE93
- Undercut (forms E and F according to DIN) – CYCLE94
- Contour cutting with relief cut – CYCLE95
- Thread undercut – CYCLE96
- Thread chaining – CYCLE98
- Thread cutting – CYCLE99
- Face milling – CYCLE71
- Contour milling – CYCLE72
- Milling a rectangular spigot – CYCLE76
- Milling a circular spigot – CYCLE77
- Long holes located on a circle – LONGHOLE
- Slots on a circle – SLOT1
- Circumferential slot – SLOT2
- Milling a rectangular pocket – POCKET3
- Milling a circular pocket – POCKET4
- Thread milling – CYCLE90
- High-speed settings – CYCLE832

### Canned cycles

Canned cycles for ISO code milling:

- High-speed deep hole drilling cycle with chip breakage (G73)
- Drilling a left-hand thread without any compensating chuck cycle (G74)
- Fine drilling cycle (G76)
- Deselection of a fixed cycle (G80)
- Drilling cycle, counterboring (G81)
- Countersink drilling cycle (G82)
- Deep hole drilling cycle with chip removal (G83)
- Drilling a right-hand thread without any compensating chuck cycle (G84)
- Boring cycle (G85)
- Boring cycle, retraction with G00 (G86)
- Boring cycle, reverse countersinking (G87)
- Boring cycle, retraction with machining feedrate (G89)
<table>
<thead>
<tr>
<th>Canned cycles (continued)</th>
<th>Article No.</th>
<th>SINUMERIK 808D PPU 141.1</th>
<th></th>
<th>SINUMERIK 808D ADVANCED PPU 160.3/PPU 161.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canned cycles for ISO code turning (G code system A):</td>
<td></td>
<td>Turning</td>
<td>Milling</td>
<td>Turning</td>
</tr>
<tr>
<td>• Thread cutting with constant lead (G32)</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>• Thread cutting with variable lead (G34)</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>• Finishing cycle (G70)</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>• Stock removal cycle longitudinal axis (G71)</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>• Stock removal cycle transverse axis (G72)</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>• Closed cutting cycle (G73)</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>• Multiple repetitive grooving cycles in the longitudinal axis (G74)</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>• Deep hole drilling and recessing in facing axis (G75)</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>• Multiple thread cutting (G76)</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>• Axial cutting (G90)</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>• Thread cutting (G92)</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>• Radial cutting (G94)</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Program and workpiece management</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Part programs on PPU, max. number</td>
<td>255</td>
<td>255</td>
<td>255</td>
<td>255</td>
</tr>
<tr>
<td>Readable part program names</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Sub-folders for part programs with readable names</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Programming support</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Background editing</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Program editor:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Full screen CNC editor with cut, copy and paste functionality</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• Programming support programGUIDE BASIC for SINUMERIK technology cycles</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• Contour computer with programming graphics/free contour input (contour calculator)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Simulation</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>2D simulation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Real-time simulation of current machining operation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
## Overview of functions
### SINUMERIK 808D family

### Operating modes/Tools

<table>
<thead>
<tr>
<th>Operating modes</th>
<th>Article No.</th>
<th>SINUMERIK 808D PPU 141.1</th>
<th>SINUMERIK 808D ADVANCED PPU 160.3/PPU 161.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Machine plus for manual controlled semi-CNC lathes</td>
<td>6FC5800-0AP07-0YB0</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

**JOG:**
- T, S, M screen for quick activation of machine functions
- Face milling cycle for workpiece preparation
- Handwheel selection
- Switchover: inch/metric
- Manual measurement of work offset
- Manual measurement of tool offset
- Semi-automatic tool measurement with tool probe

**MDI:**
- Input in text editor

**Automatic:**
- Execution from memory stick connected to USB interface on operator panel front
- Program control (dry-run feed, block skip etc.)
- Program editing
- Block search with/without calculation
- Repos (repositioning on the contour):
  - With operator command/semi-automatically
  - Program-controlled
- Preset:
  - Set actual value

**Tools**
- Tools/cutting edges, max. 64/128
  - Tool types:
    - Turning
    - Drilling
    - Milling
  - Tool radius compensations in plane:
    - With approach and retract strategies
    - With transition circle/ellipse on outer edges
  - Tool offset selection via T and D numbers
  - Look-ahead detection of contour violations

### Options
<table>
<thead>
<tr>
<th>Option</th>
<th>Not available</th>
</tr>
</thead>
</table>
## Communication and data management

USB interface on panel front for memory stick and USB PC keyboard:

- Transfer of:
  - Machine and setting data
  - PLC data
  - Compensation data
  - Tool and work offset data
  - R parameter
  - HMI data
  - User cycles
  - Part programs
  - PLC program (*.pte)
- Execute part program

Serial interface RS232C:

- Part program send/receive
- PLC program upload/download
- PLC status monitoring

Ethernet interface:

- Transfer of:
  - Machine and setting data
  - PLC data
  - Compensation data
  - Tool and work offset data
  - R parameter
  - HMI data
  - User cycles
  - Part programs
  - Execute part program
  - Part program send/receive
  - PLC program upload/download
  - PLC status monitoring

### Basic version

<table>
<thead>
<tr>
<th>Article No.</th>
<th>Turning</th>
<th>Milling</th>
<th>Turning</th>
<th>Milling</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINUMERIK 808D PPU 141.1</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

### Option

- Not available

Note

Turning: Milling

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## Overview of functions
### SINUMERIK 808D family

### HMI functions/Monitoring functions/Compensations

<table>
<thead>
<tr>
<th>HMI functions</th>
<th>Article No.</th>
<th>PPU 141.1</th>
<th>PPU 160.3/PPU 161.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>• CNC lock function</td>
<td>6FC5800-0AS71-0YB0</td>
<td>–</td>
<td>O</td>
</tr>
<tr>
<td>• SINUMERIK 808D startGUIDE:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Startup assistant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Built-in graphical interactive assistant for 1st commissioning of machines with SINUMERIK 808D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Series startup assistant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Built-in graphical interactive assistant for the series production of machines with SINUMERIK 808D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sales assistant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Built-in viewer for bitmaps with sales arguments for SINUMERIK 808D, extendable by customer-specific sales arguments for the machine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Online help for programming, alarms and machine data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CNC program messages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Screen saver</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Access protection level support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Chinese input method editor for part program names, sub-directory names and CNC comments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Operating software languages:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Chinese Simplified, Czech, English, French, German, Italian, Korean, Polish, Portuguese, Russian, Spanish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Language switchover online</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring functions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Working area limitation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Limit switch monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Software and hardware limit switches</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• Position monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Standstill (zero-speed) monitoring</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• Clamping monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Contour monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Axis limitation from the PLC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Spindle speed limitation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compensations</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>• Backlash compensation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Leadscrew error compensation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Bidirectional leadscrew error compensation</td>
<td>6FC5800-0AM54-0YB0</td>
<td>–</td>
<td>O</td>
</tr>
</tbody>
</table>

### Note

- Turning
- Milling
- Not available
## Overview of functions
### SINUMERIK 808D family

#### PLC area

<table>
<thead>
<tr>
<th>Feature</th>
<th>SINUMERIK 808D</th>
<th>Turning</th>
<th>Milling</th>
<th>SINUMERIK 808D ADVANCED</th>
<th>Turning</th>
<th>Milling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic version</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Option</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- <strong>Not available</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td><strong>Integrated PLC</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Style of PLC program:</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>- Prepared and ready to run PLC program on board</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>- Fully customized PLC programs by offline PLC programming tool</td>
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<td>✓</td>
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<td>12 ms</td>
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<td><strong>Maximum number of ladder steps</strong></td>
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<td>6000</td>
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<td>6000</td>
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<td><strong>PLC programming language:</strong></td>
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<td>- LAD ladder diagram</td>
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<tr>
<td><strong>Offline PLC programming tool</strong></td>
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<tr>
<td>On toolbox DVD-ROM</td>
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<td><strong>PLC Ladder Viewer on PPU</strong></td>
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<td><strong>PLC I/O:</strong></td>
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<tr>
<td>- On-board digital PLC:</td>
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<td></td>
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<tr>
<td>- Inputs 24 V</td>
<td>24</td>
<td>24</td>
<td>24</td>
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<tr>
<td>- Outputs 24 V, 0.2 A</td>
<td>16</td>
<td>16</td>
<td>16</td>
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<tr>
<td>- Inputs 24 V</td>
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<tr>
<td>- Outputs 24 V, 0.2 A</td>
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<td>Connection via 50-pole ribbon cable connector to PPU:</td>
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<td>- Terminal strip converter</td>
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<td>O</td>
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<td>O</td>
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<td>- Cable set</td>
<td>6EP5306-5BG00</td>
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<td>O</td>
<td>O</td>
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<td>O</td>
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<td><strong>PLC alarms/messages, max. number</strong></td>
<td>128</td>
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<td><strong>Bit memories, number</strong></td>
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<td>256 bytes</td>
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<td><strong>Timers, number</strong></td>
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<td><strong>Counters, number</strong></td>
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<td><strong>Subroutines</strong></td>
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<td><strong>User machine data for configuring the PLC user program</strong></td>
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<td>✓</td>
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<td>✓</td>
<td>✓</td>
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</table>

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# Overview of functions

## SINUMERIK 808D family

### Commissioning and serial production/Diagnostic functions/Service and maintenance/Training and offline programming

<table>
<thead>
<tr>
<th>Feature</th>
<th>SINUMERIK 808D</th>
<th>SINUMERIK 808D ADVANCED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic version</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Option</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Not available</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Commissioning and serial production</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SINUMERIK 808D startGUIDE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Startup assistant</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>1st commissioning of machines with SINUMERIK 808D family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Series startup assistant</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Built-in graphical interactive assistant for the series production of machines with SINUMERIK 808D family</td>
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<td></td>
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<tr>
<td>Backup/restore of system software via USB memory stick</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Cloning of serial startup files for serial production via USB memory stick</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>SINUMERIK 808D family toolbox with:</td>
<td></td>
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<tr>
<td>6FC5811-0CY00-0YA8</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>On toolbox DVD-ROM.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Offline PLC programming tool</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>• Sample PLC program</td>
<td>O</td>
<td>O</td>
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<tr>
<td>• MCP strip template</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>• MCP icon library</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>• User manuals</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>• Access My Machine AMM</td>
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<td>✓</td>
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<tr>
<td><strong>Diagnostic functions</strong></td>
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<tr>
<td>Alarms and messages</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Action log can be activated for diagnostic purposes</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>PLC status</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>LAD display</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td><strong>Service and maintenance</strong></td>
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<td></td>
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<tr>
<td>Integrated service planner for monitoring of service intervals</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>One touch system backup</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>(Ctrl + S)</td>
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<td></td>
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<tr>
<td>CNC memory buffering via battery</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td><strong>Training and offline programming</strong></td>
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<td></td>
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<tr>
<td>SINUMERIK 808D on PC</td>
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<tr>
<td>6FC5548-0YC20-0YA0</td>
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<td>O</td>
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<tr>
<td>Free download of trial version from:</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.cnc4you.com">www.cnc4you.com</a></td>
<td></td>
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</tbody>
</table>
### CNC control
- SINUMERIK 808D Turning
- SINUMERIK 808D Milling

### Operator components
- SINUMERIK 808D MCP

### Feed axis solutions
- SINAMICS V60 servo drive
- SIMOTICS S-1FL5 feed motor

### MOTION-CONNECT connection systems
- MOTION-CONNECT cables for SINUMERIK 808D
- MOTION-CONNECT cables for SINAMICS V60 servo drive

### Example packages
- Example package for Turning
- Example package for Milling
SINUMERIK 808D system
CNC control

SINUMERIK 808D Turning

■ Overview

The SINUMERIK 808D Turning is an operator-panel-based CNC, tailored for use in modern basic standard turning machines.

■ Benefits

- Compact, rugged, and maintenance-friendly operator-panel CNC with dedicated system software for turning technologies
- Intelligent clamp mounting without drilling holes into the cabinet
- Minimum commissioning efforts due to plug and play machine control panel connected via USB interface
- Maximum performance and accuracy due to most modern CNC features
- SINUMERIK 808D startGUIDE: assists all process steps of the machine – from engineering to production, from sales to operation and programming at the push of a button
- SINUMERIK Operate BASIC: maximum operator convenience similar to SINUMERIK 828D and 840D sl
- SINUMERIK programGUIDE BASIC: wide range of technology cycles for turning and drilling with graphical input screens
- Manual Machine plus: easy semi-automatic machining with handwheel controlled flat-bed lathes
- Easy data transmission via USB stick

■ Function

- IP65 protection for CNC front panel and machine control panel
- Integrated CNC keyboard with mechanical keys
- English panel layout
- 7.5" color LCD display
- USB user interface on the operator panel front
- Pulse/direction interface for feed drives
- Analog ±10 V interface for spindle drive
- Data buffering with battery (> 3 years)
- Pre-configured system software for turning technologies
- 1 machining channel/mode group
- Up to 4 axes/spindles
- Graphically guided SINUMERIK CNC programming and standard ISO-code programming with canned cycles
- Graphical CNC simulation
- Integrated contour computer
- Integrated PLC based on the SIMATIC S7-200 command set with ladder logic programming
- Integrated/distributed PLC I/O concept with 72 digital PLC inputs and 48 digital PLC outputs
- CNC options subject to license
- Configurable user screens
- Machine maintenance tasks are accomplished by integrated service planner.

■ Integration

The following components can be connected to the SINUMERIK 808D Turning:

- Up to 2 electronic handwheels
- Up to 72 digital PLC inputs and 48 digital PLC outputs
- 1 TTL direct spindle encoder
- SINUMERIK 808D MCP via USB interface
- SINAMICS V60 drive system for feed axes
- Spindle drives via ±10 V analog output
- PC via RS232C interface
## Technical specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>Article No.</td>
<td>6FC5370-1AT00-0AA0</td>
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<tr>
<td>Product name</td>
<td>SINUMERIK 808D Turning</td>
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<tr>
<td>PPU 141.1 horizontal</td>
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</tr>
<tr>
<td>Input voltage</td>
<td>24 V DC + 20 % +/- 15 %</td>
</tr>
<tr>
<td>Power consumption, max.</td>
<td>50 W</td>
</tr>
<tr>
<td>Mains buffering time</td>
<td>3 ms (20 ms with SITOP smart)</td>
</tr>
<tr>
<td>Degree of protection according to EN 60529 (IEC 60529)</td>
<td></td>
</tr>
<tr>
<td>- Operator panel front, with closed front cover</td>
<td>IP65</td>
</tr>
<tr>
<td>- PPU, rear</td>
<td>IP20</td>
</tr>
<tr>
<td>Relative humidity</td>
<td></td>
</tr>
<tr>
<td>- Storage</td>
<td>5 … 95 % at 25 °C</td>
</tr>
<tr>
<td>- Transport</td>
<td>5 … 95 % at 25 °C</td>
</tr>
<tr>
<td>- Operation</td>
<td>5 … 90 % at 25 °C (no condensation)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
</tr>
<tr>
<td>- Storage</td>
<td>-20 … +60 °C</td>
</tr>
<tr>
<td>- Transport</td>
<td>-20 … +60 °C</td>
</tr>
<tr>
<td>- Operation</td>
<td>0 … 45 °C</td>
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<tr>
<td>- Rear</td>
<td>0 … 50 °C</td>
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<td>Dimensions</td>
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<td>- Width</td>
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<tr>
<td>- Height</td>
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<tr>
<td>- Depth</td>
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<tr>
<td>Panel cutout</td>
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<tr>
<td>- Width</td>
<td>406 mm</td>
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<tr>
<td>- Height</td>
<td>186 mm</td>
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<tr>
<td>- Tolerance</td>
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<td>Weight, approx.</td>
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<td>Certificate of suitability</td>
<td>CE, EAC</td>
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## Selection and ordering data

### Hardware components

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<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
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</thead>
<tbody>
<tr>
<td>SINUMERIK 808D Turning</td>
<td>6FC5370-1AT00-0AA0</td>
</tr>
<tr>
<td>PPU 141.1 horizontal</td>
<td></td>
</tr>
<tr>
<td>English layout</td>
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</tr>
</tbody>
</table>

### Software components

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINUMERIK 808D T/M toolbox</td>
<td>6FC5811-0CY00-0YA8</td>
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### Spare parts

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINUMERIK/SIMOTION battery</td>
<td>6FC5247-0AA18-0AA0</td>
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## Options

<table>
<thead>
<tr>
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<th>Article No.</th>
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</thead>
<tbody>
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<td>Additional NC axis</td>
<td>6FC5800-0AK70-0YB0</td>
</tr>
<tr>
<td>Manual Machine plus (MM+)</td>
<td>6FC5800-0AP07-0YB0</td>
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</tbody>
</table>
SINUMERIK 808D system
CNC control

SINUMERIK 808D Turning

Dimensional drawings

SINUMERIK 808D Turning/Milling PPU 141.1 horizontal
Overview

The SINUMERIK 808D Milling is an operator-panel-based CNC, tailored for use in modern basic standard milling machines.

Benefits

- Compact, rugged, and maintenance-friendly operator-panel CNC with dedicated system software for milling technologies
- Intelligent clamp mounting without drilling holes into the cabinet
- Minimum commissioning efforts due to plug & play machine control panel connected via USB interface
- Maximum performance and accuracy due to most modern CNC features
- SINUMERIK 808D startGUIDE: learn, explore and simplify most modern CNC techniques by the push of a button
- SINUMERIK Operate BASIC: maximum operator convenience similar to SINUMERIK 828D and 840D sl
- SINUMERIK programGUIDE BASIC: wide range of technology cycles for milling and drilling with graphical input screens
- Advanced Surface: perfectly prepared for mold & die applications
- Easy data transmission via USB stick

Function

- IP65 protection for CNC front panel and machine control panel
- Integrated CNC keyboard with mechanical keys
- English panel layout
- 7.5” color LCD display
- USB user interface on the operator panel front
- Pulse/direction interface for feed drives
- Analog ±10 V interface for spindle drive
- Data buffering with battery (> 3 years)
- Pre-configured system software for milling technologies
- 1 machining channel/mode group
- 4 axes/spindles
- Graphically guided SINUMERIK CNC programming and standard ISO-code programming with canned cycles
- Graphical CNC simulation
- Integrated contour computer
- Integrated PLC based on the SIMATIC S7-200 command set with ladder logic programming
- Integrated/distributed PLC I/O concept with 72 digital PLC inputs and 48 digital PLC outputs
- Configurable user screens
- Machine maintenance tasks are accomplished by integrated service planner.

Integration

The following components can be connected to the SINUMERIK 808D Milling:

- Up to 2 electronic handwheels
- 1 digital tool probe
- Up to 72 digital PLC inputs and 48 digital PLC outputs
- 1 TTL direct spindle encoder
- SINUMERIK 808D MCP via USB interface
- SINAMICS V60 drive system for feed axes
- Spindle drives via ±10 V analog output
- PC via RS232C interface
# SINUMERIK 808D system
## CNC control

### SINUMERIK 808D Milling

#### Technical specifications

<table>
<thead>
<tr>
<th>Article No.</th>
<th>6FC5370-1AM00-0AA0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product name</td>
<td>SINUMERIK 808D Milling PPU 141.1 horizontal</td>
</tr>
</tbody>
</table>

**Input voltage**
24 V DC + 20 %- -15 %

**Power consumption, max.**
50 W

**Mains buffering time**
3 ms (20 ms with SITOP smart)

**Degree of protection according to EN 60529 (IEC 60529)**
- Operator panel front, with closed front cover: IP65
- PPU, rear: IP20

**Relative humidity**
- Storage: 5 … 95 % at 25 °C
- Transport: 5 … 95 % at 25 °C
- Operation: 5 … 90 % at 25 °C (no condensation)

**Ambient temperature**
- Storage: -20 … +60 °C
- Transport: -20 … +60 °C
- Operation:
  - Front: 0 … 45 °C
  - Rear: 0 … 50 °C

**Dimensions**
- Width: 420 mm
- Height: 200 mm
- Depth: 104 mm

**Panel cutout**
- Width: 406 mm
- Height: 186 mm
- Tolerance: + 1 mm

**Weight, approx.**
3.06 kg

**Certificate of suitability**
CE, EAC

---

#### Selection and ordering data

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware components</strong></td>
<td></td>
</tr>
<tr>
<td>SINUMERIK 808D Milling PPU 141.1 horizontal</td>
<td>6FC5370-1AM00-0AA0</td>
</tr>
<tr>
<td>English layout</td>
<td></td>
</tr>
<tr>
<td><strong>Software components</strong></td>
<td></td>
</tr>
<tr>
<td>SINUMERIK 808D T/M toolbox</td>
<td>6FC5811-0CY00-0YA8</td>
</tr>
<tr>
<td><strong>Spare parts</strong></td>
<td></td>
</tr>
<tr>
<td>SINUMERIK/SIMOTION battery</td>
<td>6FC5247-0AA18-0AA0</td>
</tr>
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</table>
Dimensional drawings

SINUMERIK 808D Turning/Milling PPU 141.1 horizontal
**SINUMERIK 808D system**
Operator components

### SINUMERIK 808D MCP

**Overview**

SINUMERIK 808D MCP

The SINUMERIK 808D MCP machine control panel with mechanical keys is designed to permit user-friendly, well-structured operation of the machine functions. It is suitable for machine level operation of milling and turning machines. Customized keys can be individually labeled using slide-in strips.

The machine control panel can be mounted from the rear using special clamps without drilling holes into the cabinet.

**Design**

**Operator controls:**
- Mode and function keys
  - 39 keys, of which 30 keys with LEDs
  - Direction keys for machines with rapid traverse override (MCP is pre-assembled with turning slide-in strips. Milling slide-in strips are supplied in the included accessories pack)
  - Pre-defined MCP keys for common functions, such as handwheel selection, tool change, coolant control or program test
- Spindle control with spindle override (rotary switch with 15 positions)
- Feedrate control with feedrate/rapid traverse override (rotary switch with 18 positions)
- 7-segment display for tool number

**Layout:**
- English or Chinese Simplified

**Key type:**
- Mechanical keys with protection foil

**Interface to CNC:**
- USB

**Expansion options:**
- 1 slot for emergency stop button (d = 22 mm)
- 3 slots for control devices (d = 16 mm)

**Integration**

The SINUMERIK 808D MCP machine control panel can be used for:
- SINUMERIK 808D
- SINUMERIK 808D ADVANCED

---

**Technical specifications**

<table>
<thead>
<tr>
<th>Article No.</th>
<th>Product name</th>
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<tbody>
<tr>
<td>6FC5303-0AF35-0.A0</td>
<td>SINUMERIK 808D MCP machine control panel</td>
</tr>
</tbody>
</table>

**Input voltage**
- 5 V DC provided by PPU 141.1 via USB interface

**Power consumption, max.**
- 5 W

**Degree of protection according to EN 60529 (IEC 60529):**
- Front: IP65
- Rear: IP20

**Humidity rating based on EN 60721-3-3:**
- Class 3K5 condensation and icing excluded. Low air temperature 0 °C.

**Relative humidity**
- Storage: 5 … 95 % at 25 °C
- Transport: 5 … 95 % at 25 °C
- Operation: 5 … 90 % at 25 °C

**Ambient temperature**
- Storage: -20 … +60 °C
- Transport: -20 … +60 °C
- Operation: - Front 0 … +45 °C
  - Rear 0 … +50 °C

**Distance**
- 0.5 m

**Dimensions**
- Width: 420 mm
- Height: 120 mm
- Depth: 58 mm

**Panel cutout**
- Width: 406 mm
- Height: 106 mm
- Tolerance: ± 1 mm

**Weight, approx.**
- 0.86 kg

**Certificate of suitability**
- CE, EAC

---

**Selection and ordering data**

**Description**

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINUMERIK 808D MCP machine control panel</td>
<td>6FC5303-0AF35-0.A0</td>
</tr>
<tr>
<td>With USB cable</td>
<td>6FC5303-0AF35-0CA0</td>
</tr>
<tr>
<td>English layout</td>
<td></td>
</tr>
<tr>
<td>Simplified Chinese layout</td>
<td></td>
</tr>
</tbody>
</table>

**Accessories**

**Actuating element, 22 mm**
- Latching mushroom pushbutton, red and non-illuminated with 40 mm protection against lifting and tilting, incl. holder

**Contact block with 2 contacts**
- 1 NO + 1 NC, 2-pole screw terminal

The scope of supply of the SINUMERIK 808D MCP includes:
- USB cable 0.5 m
- Mounting clamps
- Slide-in strips for turning application (already inserted)
- Slide-in strips for milling application
- Blank slide-in strip for individual labeling

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Dimensional drawings

SINUMERIK 808D MCP

Dimensions:
- Width: 420 mm
- Height: 120 mm
- Depth: 105 mm
- Length: 405 mm
- Thickness: 30 mm
- Width: 38 mm
SINUMERIK 808D system
Feed axis solutions

SINAMICS V60 servo drive

Overview
The SINAMICS V60 servo drive is specially designed to control the feed axes in standard machine tool applications. The system is designed primarily for applications where cost effectiveness is the primary consideration. The key performance data of the drive are aligned to perfectly fit to the solution provided by the SINUMERIK 808D.

Benefits
- Compact module with integrated infeed, inverter and closed-loop position control for one feed axis
- No cooling fans needed thanks to large heat sink made of die-cast aluminum
- Coated electronic modules
- Commissioning and configuring without PC-based tools
- Very simple commissioning using keys/7-segment display
- Faster commissioning thanks to pre-configured motor data stored in the drive.
- CE certified

Function
- 4 versions with output currents of 4 A, 6 A, 7 A and 10 A
- Supply voltage 220 V to 240 V 3 AC
- 200 % overload capability
- Pulse/direction interface (5 V difference signals) to the SINUMERIK 808D
- Integrated motor brake switch
- Alarm relay contact

Integration
The following components can be connected to the SINAMICS V60:
- SINUMERIK 808D Turning PPU 141.1 horizontal
- SINUMERIK 808D Milling PPU 141.1 horizontal
- SIMOTICS S-1FL5 feed motor
- TTL encoder in SIMOTICS S-1FL5 feed motor
- Brake in SIMOTICS S-1FL5 feed motor

Selection and ordering data

<table>
<thead>
<tr>
<th>SINAMICS V60 servo drive</th>
<th>SIMOTICS S-1FL5 feed motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated output current I^\text{rated} A</td>
<td>Article No.</td>
</tr>
<tr>
<td>4</td>
<td>6SL3210-5CC14-0UA0</td>
</tr>
<tr>
<td>6</td>
<td>6SL3210-5CC16-0UA0</td>
</tr>
<tr>
<td>7</td>
<td>6SL3210-5CC17-0UA0</td>
</tr>
<tr>
<td>10</td>
<td>6SL3210-5CC21-0UA0</td>
</tr>
<tr>
<td>Technical specifications</td>
<td>SINAMICS V60 servo drive</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Article No.</td>
<td>6SL3210-5CC14-0UA0</td>
</tr>
<tr>
<td>Product name</td>
<td>SINAMICS V60 servo drive</td>
</tr>
<tr>
<td>Input voltage</td>
<td>220 ... 240 V 3 AC - 15 %/+ 10 %</td>
</tr>
<tr>
<td>Input frequency</td>
<td>50 ... 60 Hz ± 10 %</td>
</tr>
<tr>
<td>Infeed</td>
<td>Non-stabilized</td>
</tr>
<tr>
<td>Electronics power supply</td>
<td>24 V DC - 15 %/+ 20 %</td>
</tr>
<tr>
<td>24 V DC supply</td>
<td>0.8 A (1.4 A) combined with motors without brake (with brake)</td>
</tr>
<tr>
<td>Input voltage Pulse/direction interface</td>
<td></td>
</tr>
<tr>
<td>• Rated value</td>
<td>5 V DC</td>
</tr>
<tr>
<td>• Frequency range</td>
<td>≤ 333 kHz</td>
</tr>
<tr>
<td>Cooling</td>
<td>Natural cooling</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
</tr>
<tr>
<td>• Storage</td>
<td>-20 ... +80 °C</td>
</tr>
<tr>
<td>• Transport</td>
<td>-20 ... +80 °C</td>
</tr>
<tr>
<td>• Operation</td>
<td>0 ... 45 °C without derating, &gt; 45 ... 55 °C derating to 70 %</td>
</tr>
<tr>
<td>Air humidity</td>
<td>&lt; 95 %</td>
</tr>
<tr>
<td>Site altitude</td>
<td>Up ... 1000 m without derating, &gt; 1000 ... 2000 m derating to 80 %</td>
</tr>
<tr>
<td>Conductor cross-section, max.</td>
<td>2.5 mm²</td>
</tr>
<tr>
<td>Connectable motors</td>
<td>SIMOTICS S-1FL5</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP20</td>
</tr>
<tr>
<td>Encoder evaluation</td>
<td>TTL encoder with 2500 S/R (13 bit resolution through electronic multiplication)</td>
</tr>
<tr>
<td>Output current</td>
<td></td>
</tr>
<tr>
<td>• Rated current $I_{\text{rated}}$</td>
<td>4 A, 6 A, 7 A, 10 A</td>
</tr>
<tr>
<td>• Peak current $I_{\text{max}}$</td>
<td>8 A, 12 A, 14 A, 20 A</td>
</tr>
<tr>
<td>Rated power $P_{\text{rated}}$</td>
<td>0.8 kW, 1.2 kW, 1.4 kW, 2 kW</td>
</tr>
<tr>
<td>Power loss</td>
<td>36 W, 47 W, 54 W, 70 W</td>
</tr>
<tr>
<td>Cooling air required</td>
<td>0.005 m³/s, 0.005 m³/s, 0.005 m³/s, 0.005 m³/s</td>
</tr>
<tr>
<td>Sound pressure level $L_{pA}$ (1 m)</td>
<td>&lt; 45 dB, &lt; 45 dB, &lt; 45 dB, &lt; 45 dB</td>
</tr>
<tr>
<td>Dimensions$^1$</td>
<td></td>
</tr>
<tr>
<td>• Width</td>
<td>106 mm, 106 mm, 106 mm, 123 mm</td>
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<tr>
<td>• Height</td>
<td>226 mm, 226 mm, 226 mm, 226 mm</td>
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<tr>
<td>• Depth</td>
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<tr>
<td>Weight</td>
<td>2.63 kg, 2.63 kg, 2.63 kg, 3.44 kg</td>
</tr>
<tr>
<td>Certificate of suitability</td>
<td>CE</td>
</tr>
</tbody>
</table>

$^1$ Minimum distances: 25 mm between drive modules, 100 mm from other control cabinet components.
SINUMERIK 808D system
Feed axis solutions

SINAMICS V60 servo drive

Dimensional drawings

SINAMICS V60 4 A/6 A/7 A

SINAMICS V60 10 A

Inner wall

Mounting clearance
Overview

The SIMOTICS S-1FL5 feed motor is optimized for operation with the SINAMICS V60 servo drive and provides the dynamic performance required by machine tools.

Benefits

- High performance rare earth magnet material
- Rugged design with IP54 degree of protection and military style connectors
- Maximum flexibility due to variants with/without brake and plain shaft/feather key

Function

- 4 motor types with 4 Nm, 6 Nm, 7.7 Nm and 10 Nm
- Rated speed of 2000 rpm
- Integrated TTL encoder with 2500 S/R (13 bit resolution through electronic multiplication of the CPM60.1 module)
- Degree of protection IP54, natural cooling
- Optional holding brake
- With plain shaft or feather key, half-key balancing
## Technical specifications

<table>
<thead>
<tr>
<th>Article No.</th>
<th>1FL5060-…</th>
<th>1FL5062-…</th>
<th>1FL5064-…</th>
<th>1FL5066-…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product brand name</td>
<td>SIMOTICS</td>
<td>SIMOTICS</td>
<td>SIMOTICS</td>
<td>SIMOTICS</td>
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<tr>
<td>Product type designation</td>
<td>S-1FL5</td>
<td>S-1FL5</td>
<td>S-1FL5</td>
<td>S-1FL5</td>
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<td>Product designation</td>
<td>Feed motors</td>
<td>Feed motors</td>
<td>Feed motors</td>
<td>Feed motors</td>
</tr>
<tr>
<td>Type of motor</td>
<td>Synchronous motor</td>
<td>Synchronous motor</td>
<td>Synchronous motor</td>
<td>Synchronous motor</td>
</tr>
<tr>
<td>Encoder</td>
<td>TTL encoder with 2500 S/R</td>
<td>TTL encoder with 2500 S/R</td>
<td>TTL encoder with 2500 S/R</td>
<td>TTL encoder with 2500 S/R</td>
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<tr>
<td>Infeed</td>
<td>Non-stabilized</td>
<td>Non-stabilized</td>
<td>Non-stabilized</td>
<td>Non-stabilized</td>
</tr>
<tr>
<td>Type of construction in accordance with EN 60034-7 (IEC 60034-7)</td>
<td>IM B5 (IM V1, IM V3)</td>
<td>IM B5 (IM V1, IM V3)</td>
<td>IM B5 (IM V1, IM V3)</td>
<td>IM B5 (IM V1, IM V3)</td>
</tr>
<tr>
<td>Degree of protection in accordance with EN 60034-5 (IEC 60034-5)</td>
<td>IP54</td>
<td>IP54</td>
<td>IP54</td>
<td>IP54</td>
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<tr>
<td>Cooling</td>
<td>Natural cooling</td>
<td>Natural cooling</td>
<td>Natural cooling</td>
<td>Natural cooling</td>
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<tr>
<td>Shaft end in accordance with DIN 748-3 (IEC 60072-1)</td>
<td>Plain shaft/Shaft key (C type)</td>
<td>Plain shaft/Shaft key (C type)</td>
<td>Plain shaft/Shaft key (C type)</td>
<td>Plain shaft/Shaft key (C type)</td>
</tr>
<tr>
<td>Paint finish</td>
<td>Black</td>
<td>Black</td>
<td>Black</td>
<td>Black</td>
</tr>
<tr>
<td>Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)</td>
<td>Temperature class 130 (B)</td>
<td>Temperature class 130 (B)</td>
<td>Temperature class 130 (B)</td>
<td>Temperature class 130 (B)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Storage</td>
<td>-20 ... +80 °C</td>
<td>-20 ... +80 °C</td>
<td>-20 ... +80 °C</td>
<td>-20 ... +80 °C</td>
</tr>
<tr>
<td>• Transport</td>
<td>-20 ... +80 °C</td>
<td>-20 ... +80 °C</td>
<td>-20 ... +80 °C</td>
<td>-20 ... +80 °C</td>
</tr>
<tr>
<td>• Operation</td>
<td>0 ... 45 °C without derating, &gt; 45 ... 55 °C derating to 70 %</td>
<td>0 ... 45 °C without derating, &gt; 45 ... 55 °C derating to 70 %</td>
<td>0 ... 45 °C without derating, &gt; 45 ... 55 °C derating to 70 %</td>
<td>0 ... 45 °C without derating, &gt; 45 ... 55 °C derating to 70 %</td>
</tr>
<tr>
<td>Torque</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Static torque $M_{\text{rated}}$</td>
<td>4 Nm</td>
<td>6 Nm</td>
<td>7.7 Nm</td>
<td>10 Nm</td>
</tr>
<tr>
<td>• Torque, max. $M_{\text{max}}$ (converter)</td>
<td>8 Nm</td>
<td>12 Nm</td>
<td>15.4 Nm</td>
<td>20 Nm</td>
</tr>
<tr>
<td>Rated power</td>
<td>0.8 kW</td>
<td>1.2 kW</td>
<td>1.5 kW</td>
<td>2 kW</td>
</tr>
<tr>
<td>Static current</td>
<td>4 A</td>
<td>6 A</td>
<td>7 A</td>
<td>10 A</td>
</tr>
<tr>
<td>Efficiency $\eta$</td>
<td>91.1 %</td>
<td>93.3 %</td>
<td>92.0 %</td>
<td>93.7 %</td>
</tr>
<tr>
<td>Moment of inertia without brake</td>
<td>11.01 x 10$^{-4}$ kgm$^2$</td>
<td>15.44 x 10$^{-4}$ kgm$^2$</td>
<td>20.17 x 10$^{-4}$ kgm$^2$</td>
<td>25.95 x 10$^{-4}$ kgm$^2$</td>
</tr>
<tr>
<td>Moment of inertia with brake</td>
<td>12.68 x 10$^{-4}$ kgm$^2$</td>
<td>17.11 x 10$^{-4}$ kgm$^2$</td>
<td>21.84 x 10$^{-4}$ kgm$^2$</td>
<td>27.62 x 10$^{-4}$ kgm$^2$</td>
</tr>
<tr>
<td>Shaft height</td>
<td>65 mm</td>
<td>65 mm</td>
<td>65 mm</td>
<td>65 mm</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Edge dimension</td>
<td>130 mm</td>
<td>130 mm</td>
<td>130 mm</td>
<td>130 mm</td>
</tr>
<tr>
<td>• Length</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Without brake</td>
<td>221 mm</td>
<td>239 mm</td>
<td>253 mm</td>
<td>277 mm</td>
</tr>
<tr>
<td>- With brake</td>
<td>263 mm</td>
<td>281 mm</td>
<td>295 mm</td>
<td>319 mm</td>
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<tr>
<td>Weight</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Without brake</td>
<td>6 kg</td>
<td>7.6 kg</td>
<td>8.6 kg</td>
<td>10.6 kg</td>
</tr>
<tr>
<td>• With brake</td>
<td>8.6 kg</td>
<td>10.2 kg</td>
<td>11.2 kg</td>
<td>13.2 kg</td>
</tr>
<tr>
<td>Certificate of suitability</td>
<td>CE</td>
<td>CE</td>
<td>CE</td>
<td>CE</td>
</tr>
</tbody>
</table>

S/R = Signals/Revolution
## Selection and ordering data

### SIMOTICS S-1FL5 feed motors

<table>
<thead>
<tr>
<th>Static torque $M_0$ at $\Delta T = 100 K$ Nm</th>
<th>Rated speed $n_{\text{rated}}$ rpm</th>
<th>Article No.</th>
<th>SINAMICS V60 servo drive Rated output current $I_{\text{rated}}$ A</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2000</td>
<td>1FL5060-0AC21-0A 0 4</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>2000</td>
<td>1FL5062-0AC21-0A 0 6</td>
<td>7</td>
</tr>
<tr>
<td>7.7</td>
<td>2000</td>
<td>1FL5064-0AC21-0A 0 7</td>
<td>10</td>
</tr>
</tbody>
</table>

### Shaft extension:
- Feather key and keyway (half-key balancing)
- Plain shaft

### Holding brake:
- Without
- With

### Dimensions in mm

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>Dimensions in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A without brake</td>
</tr>
<tr>
<td>1FL5060</td>
<td>163</td>
</tr>
<tr>
<td>1FL5062</td>
<td>181</td>
</tr>
<tr>
<td>1FL5064</td>
<td>195</td>
</tr>
<tr>
<td>1FL5066</td>
<td>219</td>
</tr>
</tbody>
</table>
### SINUMERIK 808D system

MOTION-CONNECT connection systems

### MOTION-CONNECT cables for SINUMERIK 808D

#### Integration

<table>
<thead>
<tr>
<th>SINUMERIK 808D Turning/Milling PPU 141.1</th>
<th>Article No.</th>
<th>Pre-assembled cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>6FX8002-1AA01-...</td>
<td>Power supply 24 V DC</td>
</tr>
<tr>
<td>X2</td>
<td>6FC5548-0BA00-...</td>
<td>RS32C</td>
</tr>
<tr>
<td>X51/52/53</td>
<td>6FC5548-0BA05-...</td>
<td>SINAMICS V60 servo drive</td>
</tr>
<tr>
<td>X54</td>
<td>6FC8002-2CD01-...</td>
<td>Spindle drive</td>
</tr>
<tr>
<td>X60</td>
<td>6FC8002-2BB01-...</td>
<td>Incremental encoder for spindle (TTL) RS422 6FX2001-2...</td>
</tr>
<tr>
<td>X10</td>
<td>≤ 6 m (20 ft)</td>
<td>Handwheels (max. 2)</td>
</tr>
<tr>
<td>X30</td>
<td>≤ 6 m (20 ft)</td>
<td>USB cable</td>
</tr>
<tr>
<td>X10/X101/X102</td>
<td>≤ 6 m (20 ft)</td>
<td>SINUMERIK 808D MCP</td>
</tr>
<tr>
<td>X200/X201</td>
<td>≤ 6 m (20 ft)</td>
<td>24 digital inputs 24 V DC</td>
</tr>
<tr>
<td>X301</td>
<td>≤ 6 m (20 ft)</td>
<td>24 DI / 16 DO, 24 V DC</td>
</tr>
<tr>
<td>X302</td>
<td>≤ 6 m (20 ft)</td>
<td>Terminal strip converter</td>
</tr>
<tr>
<td>X21</td>
<td>Wire (0.14 ... 1.5 mm²)</td>
<td>NC Ready, CW, CCW, 3 fast inputs (e.g. BERO signals), 1 fast output 24 V DC</td>
</tr>
</tbody>
</table>

Connection overview of SINUMERIK 808D Turning/SINUMERIK 808D Milling PPU 141.1

- Connector with pin contacts
- Connector with socket contacts
- Exposed core ends
- Cable is not included in the scope of delivery. It must be provided by the customer.
## Technical specifications

<table>
<thead>
<tr>
<th>Article No.</th>
<th>Product name</th>
<th>6FC5548-0BA00-….</th>
<th>6FC5548-0BA05-….</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Setpoint cable PPU 141.1 - SINAMICS V60 servo drive</td>
<td>Setpoint cable PPU 141.1 - analog spindle drive</td>
</tr>
<tr>
<td>No. of cores</td>
<td></td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>Certificate of suitability</td>
<td>cURus or UR/CSA</td>
<td>UL20276 Yes</td>
<td>UL2576 Yes</td>
</tr>
<tr>
<td></td>
<td>RoHS conformity</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Rated voltage</td>
<td></td>
<td>30 V</td>
<td>30 V</td>
</tr>
<tr>
<td>Test voltage, rms</td>
<td></td>
<td>500 V</td>
<td>500 V</td>
</tr>
<tr>
<td>Operating temperature on the surface</td>
<td>Fixed installation</td>
<td>-20 … +80 °C 0 … 60 °C</td>
<td>-20 … +80 °C 0 … 60 °C</td>
</tr>
<tr>
<td></td>
<td>Flexible installation</td>
<td>100 mm 200 mm</td>
<td>60 mm 120 mm</td>
</tr>
<tr>
<td>Insulation material, incl. jacket</td>
<td>PVC</td>
<td>PVC</td>
<td></td>
</tr>
<tr>
<td>Oil resistance</td>
<td></td>
<td>70 °C X 4hr</td>
<td>70 °C X 4hr</td>
</tr>
<tr>
<td>Outer jacket</td>
<td></td>
<td>PVC Gray</td>
<td>PVC Gray</td>
</tr>
<tr>
<td>Flame-retardant</td>
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<td>VW-1</td>
<td>VW-1</td>
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<table>
<thead>
<tr>
<th>Article No.</th>
<th>Product name</th>
<th>6FX8002-2CD01-….</th>
<th>6FX8002-2BB01-….</th>
<th>6FX8002-1AA01-….</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Signal cable PPU 141.1 - incremental encoder for spindle (TTL)</td>
<td>Signal cable PPU 141.1 - handwheel</td>
<td>RS232C data cable PPU 141.1 - personal computer</td>
</tr>
<tr>
<td>Certificate of suitability</td>
<td>cURus or UR/CSA</td>
<td>UL758-CSA-C22.2-N.210.2-M90 Yes</td>
<td>UL758-CSA-C22.2-N.210.2-M90 Yes</td>
<td>UL758-CSA-C22.2-N.210.2-M90 Yes</td>
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<tr>
<td></td>
<td>RoHS conformity</td>
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<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Rated voltage</td>
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<td>30 V</td>
<td>30 V</td>
<td>30 V</td>
</tr>
<tr>
<td>Test voltage, rms</td>
<td></td>
<td>500 V</td>
<td>500 V</td>
<td>500 V</td>
</tr>
<tr>
<td>Operating temperature on the surface</td>
<td>Fixed installation</td>
<td>-50 … +80 °C -20 … +60 °C</td>
<td>-50 … +80 °C -20 … +60 °C</td>
<td>-50 … +80 °C -20 … +60 °C</td>
</tr>
<tr>
<td></td>
<td>Flexible installation</td>
<td>50 N/mm² 20 N/mm²</td>
<td>50 N/mm² 20 N/mm²</td>
<td>50 N/mm² 20 N/mm²</td>
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<tr>
<td>Torsional stress, max.</td>
<td>Fixed installation</td>
<td>35 mm 70 mm</td>
<td>35 mm 70 mm</td>
<td>35 mm 70 mm</td>
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<td></td>
<td>Flexible installation</td>
<td>10 million</td>
<td>10 million</td>
<td>10 million</td>
</tr>
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<td>Traversing velocity</td>
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<td>300 m/min</td>
<td>300 m/min</td>
<td>300 m/min</td>
</tr>
<tr>
<td>Acceleration</td>
<td></td>
<td>5 m/s²</td>
<td>5 m/s²</td>
<td>5 m/s²</td>
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<tr>
<td>Insulation material, incl. Jacket</td>
<td>CFC/silicone-free IEC 60754-1/DIN VDE 0472-815</td>
<td>CFC/silicone-free IEC 60754-1/DIN VDE 0472-815</td>
<td>CFC/silicone-free IEC 60754-1/DIN VDE 0472-815</td>
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</tr>
<tr>
<td>Oil resistance</td>
<td></td>
<td>EN 60811-2-1</td>
<td>EN 60811-2-1</td>
<td>EN 60811-2-1</td>
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<tr>
<td>Outer jacket</td>
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<td>PVC DESINA color green RAL 6018</td>
<td>PVC DESINA color green RAL 6018</td>
<td>PVC DESINA color green RAL 6018</td>
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<tr>
<td>Flame-retardant</td>
<td></td>
<td>EN 60332-1-1 to 1-3</td>
<td>EN 60332-1-1 to 1-3</td>
<td>EN 60332-1-1 to 1-3</td>
</tr>
</tbody>
</table>

For general information about MOTION-CONNECT please refer to Introduction.

---

1) The respective registration number is printed on the cable jacket.
SINUMERIK 808D system
MOTION-CONNECT connection systems

MOTION-CONNECT cables for SINUMERIK 808D

Selection and ordering data

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-assembled setpoint cable PPU 141.1 - SINAMICS V60</td>
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</tr>
<tr>
<td>Length</td>
<td>Article No.</td>
</tr>
<tr>
<td>• 5 m</td>
<td>6FC5548-0BA00-1AF0</td>
</tr>
<tr>
<td>• 7 m</td>
<td>6FC5548-0BA00-1AH0</td>
</tr>
<tr>
<td>• 10 m</td>
<td>6FC5548-0BA00-1BA0</td>
</tr>
<tr>
<td>Pre-assembled setpoint cable PPU 141.1 - analog spindle drive</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>Article No.</td>
</tr>
<tr>
<td>• 5 m</td>
<td>6FC5548-0BA05-1AF0</td>
</tr>
<tr>
<td>• 7 m</td>
<td>6FC5548-0BA05-1AH0</td>
</tr>
<tr>
<td>• 10 m</td>
<td>6FC5548-0BA05-1BA0</td>
</tr>
<tr>
<td>Pre-assembled signal cable PPU 141.1 - incremental encoder for spindle (TTL)</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>Article No.</td>
</tr>
<tr>
<td>• 5 m</td>
<td>6FX8002-2CD01-1AF0</td>
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<tr>
<td>• 7 m</td>
<td>6FX8002-2CD01-1AH0</td>
</tr>
<tr>
<td>• 10 m</td>
<td>6FX8002-2CD01-1BA0</td>
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Pre-assembled signal cable PPU 141.1 - handwheel

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Article No.</td>
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<td>• 1 m</td>
<td>6FX8002-2BB01-1AB0</td>
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<td>• 7 m</td>
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<tr>
<td>• 10 m</td>
<td>6FX8002-2BB01-1BA0</td>
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Pre-assembled RS232C data cable - personal computer

<table>
<thead>
<tr>
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<th>Article No.</th>
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<tbody>
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<tr>
<td>• 10 m</td>
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MOTION-CONNECT cables for SINAMICS V60 servo drive

Integration

<table>
<thead>
<tr>
<th>SINAMICS V60 servo drive</th>
<th>Article No.</th>
</tr>
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<tbody>
<tr>
<td>Pre-assembled cable</td>
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<tr>
<td>X5</td>
<td>6FC5548-0BA00-…</td>
</tr>
<tr>
<td>3 m/5 m/7 m/10 m (9.8 ft/16 ft/23 ft/32 ft)</td>
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<tr>
<td>X7</td>
<td>6FX6002-2LE01-…</td>
</tr>
<tr>
<td>3 m/5 m/7 m/10 m (9.8 ft/16 ft/23 ft/32 ft)</td>
<td></td>
</tr>
<tr>
<td>U / V / W</td>
<td>6FX6002-5LE00-…</td>
</tr>
<tr>
<td>3 m/5 m/7 m/10 m (9.8 ft/16 ft/23 ft/32 ft)</td>
<td></td>
</tr>
<tr>
<td>X3</td>
<td>6FX6002-2BR00-…</td>
</tr>
<tr>
<td>3 m/5 m/7 m/10 m (9.8 ft/16 ft/23 ft/32 ft)</td>
<td></td>
</tr>
<tr>
<td>X4</td>
<td>24 V DC power supply</td>
</tr>
<tr>
<td>L1 / L2 / L3</td>
<td>230 V AC main supply</td>
</tr>
<tr>
<td>X6</td>
<td>e.g. enable pulses, alarm relay, zero marks</td>
</tr>
</tbody>
</table>

Connection overview of SINAMICS V60 servo drive

- Connector with pin contacts
- Connector with socket contacts
- Exposed core ends
- - - - Cable is not included in the scope of delivery. It must be provided by the customer.
### Technical specifications

<table>
<thead>
<tr>
<th>Article No.</th>
<th>Product name</th>
<th>Degree of protection (when closed and connected)</th>
<th>Certificate of suitability / RoHS conformity</th>
<th>Rated voltage U0/U</th>
<th>Test voltage, rms</th>
<th>Operating temperature on the surface</th>
<th>Tensile stress, max.</th>
<th>Smallest bending radius</th>
<th>Torsional stress</th>
<th>Bending</th>
<th>Insulation material, incl. Jacket</th>
<th>Oil resistance</th>
<th>Outer jacket</th>
<th>Flame-retardant</th>
</tr>
</thead>
<tbody>
<tr>
<td>6FX6002-2LE00-…</td>
<td>Encoder cable SINAMICS V60 - TTL encoder in SIMOTICS S-1FL5 feed motor</td>
<td>IP54</td>
<td>Yes / RoHS</td>
<td>30 V/30 V</td>
<td>500 V</td>
<td>-20 ... +80 °C</td>
<td>50 N/mm²</td>
<td>40 mm</td>
<td>30°/m</td>
<td>100000</td>
<td>PVC</td>
<td>EN 60811-2-1 (mineral oil only)</td>
<td>FT1</td>
<td></td>
</tr>
<tr>
<td>6FX6002-5LE00-…</td>
<td>Power cable SINAMICS V60 - SIMOTICS S-1FL5 feed motor</td>
<td>IP54</td>
<td>Yes / RoHS</td>
<td>300 V/500 V</td>
<td>2 kV</td>
<td>-20 ... +80 °C</td>
<td>50 N/mm²</td>
<td>50 mm</td>
<td>30°/m</td>
<td>100000</td>
<td>PVC</td>
<td>EN 60811-2-1 (mineral oil only)</td>
<td>FT1</td>
<td></td>
</tr>
<tr>
<td>6FX6002-2BR00-…</td>
<td>Brake cable SINAMICS V60 - brake in SIMOTICS S-1FL5 feed motor</td>
<td>IP54</td>
<td>Yes / RoHS</td>
<td>30 V/30 V</td>
<td>500 V</td>
<td>-20 ... +80 °C</td>
<td>50 N/mm²</td>
<td>25 mm</td>
<td>30°/m</td>
<td>100000</td>
<td>PVC</td>
<td>EN 60811-2-1 (mineral oil only)</td>
<td>FT1</td>
<td></td>
</tr>
</tbody>
</table>

For general information about MOTION-CONNECT please refer to Introduction.

### Selection and ordering data

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-assembled encoder cable SINAMICS V60 - TTL encoder in SIMOTICS S-1FL5 feed motor</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>Article No.</td>
</tr>
<tr>
<td>• 3 m</td>
<td>6FX6002-2LE00-1AD0</td>
</tr>
<tr>
<td>• 5 m</td>
<td>6FX6002-2LE00-1AF0</td>
</tr>
<tr>
<td>• 7 m</td>
<td>6FX6002-2LE00-1AH0</td>
</tr>
<tr>
<td>• 10 m</td>
<td>6FX6002-2LE00-1BA0</td>
</tr>
<tr>
<td>Pre-assembled power cable SINAMICS V60 - SIMOTICS S-1FL5 feed motor</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>Article No.</td>
</tr>
<tr>
<td>• 3 m</td>
<td>6FX6002-5LE00-1AD0</td>
</tr>
<tr>
<td>• 5 m</td>
<td>6FX6002-5LE00-1AF0</td>
</tr>
<tr>
<td>• 7 m</td>
<td>6FX6002-5LE00-1AH0</td>
</tr>
<tr>
<td>• 10 m</td>
<td>6FX6002-5LE00-1BA0</td>
</tr>
<tr>
<td>Pre-assembled brake cable SINAMICS V60 - brake in SIMOTICS S-1FL5 feed motor</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>Article No.</td>
</tr>
<tr>
<td>• 3 m</td>
<td>6FX6002-2BR00-1AD0</td>
</tr>
<tr>
<td>• 5 m</td>
<td>6FX6002-2BR00-1AF0</td>
</tr>
<tr>
<td>• 7 m</td>
<td>6FX6002-2BR00-1AH0</td>
</tr>
<tr>
<td>• 10 m</td>
<td>6FX6002-2BR00-1BA0</td>
</tr>
</tbody>
</table>

1) The respective registration number is printed on the cable jacket.
## Overview

The following composition of an equipment package is an example of an inclined bed lathe with:

- 2 machining axes (X, Z)
- 1 main spindle with direct spindle encoder
- 24 digital PLC input signals and 16 digital PLC output signals

<table>
<thead>
<tr>
<th>Designation</th>
<th>Quantity</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINUMERIK 808D Turning PPU 141.1 horizontal, English layout</td>
<td>1</td>
<td>6FC5370-1AT00-0AA0</td>
</tr>
<tr>
<td>SINUMERIK 808D MCP, English layout</td>
<td>1</td>
<td>6FC5303-0AF35-0AA0</td>
</tr>
<tr>
<td>Actuating element, 22 mm, latching mushroom pushbutton, red</td>
<td>1</td>
<td>3SB3000-1HA20</td>
</tr>
<tr>
<td>Contact block with 2 contacts, 1 NO + 1 NC, 2-pole screw terminal</td>
<td>1</td>
<td>3SB3400-0A</td>
</tr>
<tr>
<td>Electronic handwheel with front panel 120 mm × 120 mm, with setting wheel 5 V DC, RS422</td>
<td>1</td>
<td>6FC9320-5DB01</td>
</tr>
<tr>
<td>Stabilized power supply, SITOP PSU200M 24 V, 5 A</td>
<td>1</td>
<td>6EP1333-3BA10</td>
</tr>
<tr>
<td>RS422 (TTL) incremental encoder, 1024 S/R</td>
<td>1</td>
<td>6FX2001-2EB02</td>
</tr>
<tr>
<td>Spring disk coupling, shaft diameter 6 mm/6 mm</td>
<td>1</td>
<td>6FX2001-7KF10</td>
</tr>
<tr>
<td>Clamp strap (1 unit), for encoders with Synchro flange</td>
<td>3</td>
<td>6FX2001-7KP01</td>
</tr>
<tr>
<td>Pre-assembled setpoint cable PPU 141.1 - SINAMICS V60, length 5 m</td>
<td>2</td>
<td>6FC5548-0BA00-1AF0</td>
</tr>
<tr>
<td>Pre-assembled setpoint cable PPU 141.1 - analog spindle drive, length 5 m</td>
<td>1</td>
<td>6FC5548-0BA05-1AF0</td>
</tr>
<tr>
<td>Pre-assembled signal cable PPU 141.1 - handwheel, length 1 m</td>
<td>1</td>
<td>6FX8002-2BB01-1A80</td>
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<tr>
<td>Pre-assembled signal cable PPU 141.1 - incremental spindle encoder (TTL), length 5 m</td>
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<tr>
<td>SINAMICS V60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SINAMICS V60, ( I_{\text{rated}} ) 4 A</td>
<td>1</td>
<td>6SL3210-5CC14-0UA0</td>
</tr>
<tr>
<td>SINAMICS V60, ( I_{\text{rated}} ) 6 A</td>
<td>1</td>
<td>6SL3210-5CC16-0UA0</td>
</tr>
<tr>
<td>SIMOTICS S-1FL5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIMOTICS S-1FL5 feed motor, 4 Nm, 2000 rpm, plain shaft, without holding brake</td>
<td>1</td>
<td>1FL5060-0AC21-0AG0</td>
</tr>
<tr>
<td>SIMOTICS S-1FL5 feed motor, 6 Nm, 2000 rpm, plain shaft, with holding brake</td>
<td>1</td>
<td>1FL5062-0AC21-0AH0</td>
</tr>
<tr>
<td>Pre-assembled encoder cable SINAMICS V60 - TTL encoder in SIMOTICS S-1FL5 feed motor, length 5 m</td>
<td>2</td>
<td>6FX6002-2LE00-1AF0</td>
</tr>
<tr>
<td>Pre-assembled power cable SINAMICS V60 - SIMOTICS S-1FL5 feed motor, length 5 m</td>
<td>2</td>
<td>6FX6002-5LE00-1AF0</td>
</tr>
<tr>
<td>Pre-assembled brake cable SINAMICS V60 - brake in SIMOTICS S-1FL5 feed motor, length 5 m</td>
<td>1</td>
<td>6FX6002-2BR00-1AF0</td>
</tr>
</tbody>
</table>
Overview

The following composition of an equipment package is an example of a vertical machining center with:

- 3 machining axes (X, Y, Z)
- 1 main spindle with direct spindle encoder
- 35 digital PLC input signals and 22 digital PLC outputs signal

<table>
<thead>
<tr>
<th>Designation</th>
<th>Quantity</th>
<th>Article No.</th>
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<tbody>
<tr>
<td>SINUMERIK 808D Milling PPU 141.1 horizontal, English layout</td>
<td>1</td>
<td>6FC5370-1AM00-0AA0</td>
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<tr>
<td>SINUMERIK 808D MCP, English layout</td>
<td>1</td>
<td>6FC5303-0AF35-0AA0</td>
</tr>
<tr>
<td>Actuating element, 22 mm, latching mushroom pushbutton, red</td>
<td>1</td>
<td>3SB3000-1HA20</td>
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<tr>
<td>Contact block with 2 contacts, 1 NO + 1 NC, 2-pole screw terminal</td>
<td>1</td>
<td>3SB3400-0A</td>
</tr>
<tr>
<td>Electronic handwheel with front panel 120 mm x 120 mm, with setting wheel 5 V DC, RS422</td>
<td>1</td>
<td>6FC9320-5DB01</td>
</tr>
<tr>
<td>Terminal strip converter 50-pole</td>
<td>1</td>
<td>6EP5406-5A00</td>
</tr>
<tr>
<td>Cable set ribbon cable, 50-pole, with connectors, 50-pole</td>
<td>1</td>
<td>6EP5306-5BG00</td>
</tr>
<tr>
<td>Stabilized power supply, SITOP PSU200M 24 V, 5 A</td>
<td>1</td>
<td>6EP1333-3BA10</td>
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<tr>
<td>RS422 (TTL) incremental encoder, 1024 S/R</td>
<td>1</td>
<td>6FX2001-2EB02</td>
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<tr>
<td>Spring disk coupling, shaft diameter 6 mm/6 mm</td>
<td>1</td>
<td>6FX2001-7KF10</td>
</tr>
<tr>
<td>Clamp strap (1 unit), for encoders with Synchro flange</td>
<td>3</td>
<td>6FX2001-7KP01</td>
</tr>
<tr>
<td>Pre-assembled setpoint cable PPU 141.1 - SINAMICS V60, length 5 m</td>
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<td>6FC5548-0BA00-1AF0</td>
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<td>Pre-assembled setpoint cable PPU 141.1 - analog spindle drive, length 5 m</td>
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<td>6FC5548-0BA05-1AF0</td>
</tr>
<tr>
<td>Pre-assembled signal cable PPU 141.1 - handwheel, length 1 m</td>
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<tr>
<td>Pre-assembled signal cable PPU 141.1 - incremental spindle encoder (TTL), length 7 m</td>
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<tr>
<td>SINAMICS V60</td>
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</tr>
<tr>
<td>SINAMICS V60, ( I_{\text{rated}} ) 7 A</td>
<td>2</td>
<td>6SL3210-5CC17-0UA0</td>
</tr>
<tr>
<td>SINAMICS V60, ( I_{\text{rated}} ) 10 A</td>
<td>1</td>
<td>6SL3210-5CC21-0UA0</td>
</tr>
<tr>
<td>SIMOTICS S-1FL5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIMOTICS S-1FL5 feed motor, 7.7 Nm, 2000 rpm, plain shaft, without holding brake</td>
<td>2</td>
<td>1FL5064-0AC21-0AG0</td>
</tr>
<tr>
<td>SIMOTICS S-1FL5 feed motor, 10 Nm, 2000 rpm, plain shaft, with holding brake</td>
<td>1</td>
<td>1FL5066-0AC21-0AH0</td>
</tr>
<tr>
<td>Pre-assembled encoder cable SINAMICS V60 - TTL encoder in SIMOTICS S-1FL5 feed motor, length 10 m</td>
<td>3</td>
<td>6FX6002-2LE00-1BA0</td>
</tr>
<tr>
<td>Pre-assembled power cable SINAMICS V60 - SIMOTICS S-1FL5 feed motor, length 10 m</td>
<td>3</td>
<td>6FX6002-5LE00-1BA0</td>
</tr>
<tr>
<td>Pre-assembled brake cable SINAMICS V60 - brake in SIMOTICS S-1FL5 feed motor, length 10 m</td>
<td>1</td>
<td>6FX6002-2BR00-1BA0</td>
</tr>
<tr>
<td>Page</td>
<td>Section</td>
<td>Details</td>
</tr>
<tr>
<td>------</td>
<td>--------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4/2</td>
<td>CNC control</td>
<td>SINUMERIK 808D ADVANCED T</td>
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<td>SINUMERIK 808D ADVANCED M</td>
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<td>Operator components</td>
<td>SINUMERIK 808D MCP</td>
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<td>horizontal/vertical</td>
</tr>
<tr>
<td>4/11</td>
<td>Feed axis solutions</td>
<td>SINAMICS V70 servo drive</td>
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<td>SIMOTICS S-1FL6 feed motor</td>
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<tr>
<td>4/19</td>
<td>Spindle solutions</td>
<td>SINAMICS V70 spindle drive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIMOTICS M-1PH1 main motor</td>
</tr>
<tr>
<td>4/29</td>
<td>MOTION-CONNECT connection systems</td>
<td>MOTION-CONNECT cables for SINUMERIK 808D ADVANCED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MOTION-CONNECT cables for SINAMICS V70 servo drive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MOTION-CONNECT cables for SINAMICS V70 spindle drive</td>
</tr>
<tr>
<td>4/36</td>
<td>Example packages</td>
<td>Example package for Turning with SINUMERIK 808D ADVANCED T</td>
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<tr>
<td></td>
<td></td>
<td>Example package for Milling with SINUMERIK 808D ADVANCED M</td>
</tr>
</tbody>
</table>
SINUMERIK 808D ADVANCED system
CNC control

SINUMERIK 808D ADVANCED T

Overview

The SINUMERIK 808D ADVANCED T is an operator-panel-based CNC, preconfigured for use in modern basic standard turning machines.

Benefits

- Compact, rugged, and maintenance-friendly operator-panel CNC with dedicated system software for turning technologies
- Actual position feedback to CNC
- Intelligent clamp mounting without drilling holes into the cabinet
- Minimum commissioning efforts due to plug and play machine control panel connected via USB interface, direct commissioning on HMI for feed drives and automatic servo tuning (AST)
- Maximum performance and accuracy due to most modern CNC features
- SINUMERIK 808D startGUIDE: assists all process steps of the machine – from engineering to production, from sales to operation and programming at the push of a button
- SINUMERIK Operate BASIC: maximum operator convenience similar to SINUMERIK 828D and SINUMERIK 840D sl
- SINUMERIK programGUIDE BASIC: wide range of technology cycles for turning and drilling with graphical input screens
- Manual Machine plus: easy semi-automatic machining with handwheel controlled flat-bed lathes
- Fast data transmission via USB stick and high-speed Ethernet interface
- More software options can cover more applications and enhance the machine performance

Function

- 2 operator panel variants for horizontal and vertical operator panel housings
- IP65 protection for CNC front panel and machine control panel
- Integrated CNC keyboard with mechanical keys
- Simplified Chinese or English panel layout
- 8.4” color LCD display
- USB user interface on the operator panel front
- Drive bus interface for feed drives and spindle
- Analog ±10 V interface for spindle drive
- Data buffering without battery
- Pre-configured system software for turning technologies
- Up to 5 axes/spindles
- 1 machining channel/mode group
- Automatic servo tuning AST
- Ethernet interface for commissioning and data transfer
- Graphically guided SINUMERIK CNC programming and standard ISO-code programming with canned cycles
- Graphical CNC simulation
- Integrated contour computer
- Integrated PLC based on the SIMATIC S7-200 command set with ladder logic programming
- Integrated/distributed PLC I/O concept with 72 digital PLC inputs and 48 digital PLC outputs
- CNC options subject to license
- Configurable user screens
- Machine maintenance tasks are accomplished by integrated service planner.
Integration

The following components can be connected to the SINUMERIK 808D ADVANCED T:

- Up to 2 electronic handwheels
- Up to 72 digital PLC inputs and 48 digital PLC outputs
- 1 TTL direct spindle encoder
- SINUMERIK 808D MCP via USB interface
- SINAMICS V70 drive system for feed axes
- Spindle drives via ±10 V analog output
- PC via Ethernet interface

Technical specifications

<table>
<thead>
<tr>
<th>Article No.</th>
<th>Product name</th>
</tr>
</thead>
<tbody>
<tr>
<td>6FC5370-2BT03-0.A0</td>
<td>SINUMERIK 808D ADVANCED T PPU 160.3 vertical</td>
</tr>
<tr>
<td>6FC5370-2AT03-0.A0</td>
<td>SINUMERIK 808D ADVANCED T PPU 161.3 horizontal</td>
</tr>
</tbody>
</table>

- Input voltage: 24 V DC + 20 %/- 15 %
- Power consumption, max.: 50 W
- Mains buffering time: 3 ms (20 ms with SITOP smart)
- Degree of protection according to EN 60529 (IEC 60529)
  - Operator panel front, with closed front cover: IP65
  - PPU, rear: IP20
- Relative humidity
  - Storage: 5 % ... 95 % at 25 °C
  - Transport: 5 % ... 95 % at 25 °C
  - Operation: 5 % ... 90 % at 25 °C (no condensation)
- Ambient temperature
  - Storage: -20 ... +60 °C
  - Transport: -20 ... +60 °C
  - Operation:
    - Front: 0 ... 45 °C
    - Rear: 0 ... 50 °C
- Dimensions
  - Width: 265 mm
  - Height: 330 mm
  - Depth: 104 mm
- Panel cutout
  - Width: 244.1 mm
  - Height: 307.1 mm
  - Tolerance: + 1 mm
- Weight, approx.: 2.9 kg
- Certificate of suitability: CE, EAC, KC

Selection and ordering data

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware components</td>
<td></td>
</tr>
<tr>
<td>SINUMERIK 808D ADVANCED T</td>
<td>6FC5370-2BT03-0AA0</td>
</tr>
<tr>
<td>PPU 160.3 vertical</td>
<td>6FC5370-2BT03-0CA0</td>
</tr>
<tr>
<td>• English layout</td>
<td></td>
</tr>
<tr>
<td>• Simplified Chinese layout</td>
<td></td>
</tr>
<tr>
<td>SINUMERIK 808D ADVANCED T</td>
<td>6FC5370-2AT03-0AA0</td>
</tr>
<tr>
<td>PPU 161.3 horizontal</td>
<td>6FC5370-2AT03-0CA0</td>
</tr>
<tr>
<td>• English layout</td>
<td></td>
</tr>
<tr>
<td>• Simplified Chinese layout</td>
<td></td>
</tr>
<tr>
<td>Software components</td>
<td></td>
</tr>
<tr>
<td>SINUMERIK 808D T/M toolbox</td>
<td>6FC5811-0CY00-0YA8</td>
</tr>
<tr>
<td>On DVD-ROM</td>
<td></td>
</tr>
</tbody>
</table>

Options

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
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</thead>
<tbody>
<tr>
<td>Additional NC axis</td>
<td>6FC5800-0AK70-0YB0</td>
</tr>
<tr>
<td>Manual Machine plus (MM+)</td>
<td>6FC5800-0AP07-0YB0</td>
</tr>
<tr>
<td>TRANSMIT/TRACYL Transformation without Y axis</td>
<td>6FC5800-0AS50-0YB0</td>
</tr>
<tr>
<td>Pair of synchronized axes (gantry axes), basic</td>
<td>6FC5800-0AS51-0YB0</td>
</tr>
<tr>
<td>Bidirectional leadscrew error compensation</td>
<td>6FC5800-0AM54-0YB0</td>
</tr>
<tr>
<td>Contour handwheel</td>
<td>6FC5800-0AM08-0YB0</td>
</tr>
</tbody>
</table>
SINUMERIK 808D ADVANCED system
CNC control

SINUMERIK 808D ADVANCED T

Dimensional drawings

SINUMERIK 808D ADVANCED T/M PPU 161.3 horizontal

SINUMERIK 808D ADVANCED T/M PPU 160.3 vertical
Overview

SINUMERIK 808D ADVANCED M PPU 161.3 horizontal

The SINUMERIK 808D ADVANCED M is an operator-panel-based CNC, preconfigured for use in modern basic standard milling machines.

Benefits

- Compact, rugged, and maintenance-friendly operator-panel CNC with dedicated system software for Milling technologies
- Actual position feedback to CNC
- Intelligent clamp mounting without drilling holes into the cabinet
- Minimum commissioning efforts due to plug and play machine control panel connected via USB interface
- Direct commissioning on HMI for feed drives and automatic servo tuning AST
- Maximum performance and accuracy due to the Advanced Surface function
- SINUMERIK 808D startGUIDE: assists all process steps of the machine – from engineering to production, from sales to operation and programming at the push of a button
- SINUMERIK Operate BASIC: maximum operator convenience similar to SINUMERIK 828D and SINUMERIK 840D sl
- SINUMERIK programGUIDE BASIC: wide range of technology cycles for turning and drilling with graphical input screens
- Advanced Surface: perfectly prepared for mold and die applications
- Fast data transmission via USB stick and high speed Ethernet interface
- More software options can cover more applications and enhance the machine performance

Function

- 2 operator panel variants for horizontal and vertical operator panel housings
- IP65 protection for CNC front panel and machine control panel
- Integrated CNC keyboard with mechanical keys
- Simplified Chinese or English panel layout
- 8.4” color LCD display
- USB user interface on the operator panel front
- Drive bus interface for feed drives and spindle
- Analog ±10 V interface for spindle drive
- Data buffering without battery
- Pre-configured system software for milling technologies
- Up to 5 axes/spindles
- 1 machining channel/mode group
- Automatic servo tuning AST
- Ethernet interface for commissioning and data transfer
- Advanced Surface function
- Graphically guided SINUMERIK CNC programming and standard ISO-code programming with canned cycles
- Graphical CNC simulation
- Integrated contour computer
- Integrated PLC based on the SIMATIC S7-200 command set with ladder logic programming
- Integrated/distributed PLC I/O concept with 72 digital PLC inputs and 48 digital PLC outputs
- CNC options subject to license
- Configurable user screens
- Machine maintenance tasks are accomplished by integrated service planner.
Integration

The following components can be connected to the SINUMERIK 808D ADVANCED M:

- Up to 2 electronic handwheels
- 1 digital tool probe
- Up to 72 digital PLC inputs and 48 digital PLC outputs
- 1 TTL direct spindle encoder
- SINUMERIK 808D MCP via USB interface
- SINAMICS V70 drive system for feed axes
- Spindle drives via ±10 V analog output
- PC via Ethernet interface

Technical specifications

<table>
<thead>
<tr>
<th>Article No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6FC5370-2BM03-0.A0</td>
<td>SINUMERIK 808D ADVANCED M PPU 160.3 vertical</td>
</tr>
<tr>
<td>6FC5370-2AM03-0.A0</td>
<td>SINUMERIK 808D ADVANCED M PPU 161.3 horizontal</td>
</tr>
</tbody>
</table>

- Input voltage: 24 V DC +20%/-15%
- Power consumption, max.: 50 W
- Mains buffering time: 3 ms (20 ms with SITOP smart)
- Degree of protection according to EN 60529 (IEC 60529):
  - Operator panel front, with closed front cover: IP65
  - PPU, rear: IP20
- Relative humidity:
  - Storage: 5...95% at 25 °C
  - Transport: 5...95% at 25 °C
  - Operation: 5...90% at 25 °C (no condensation)
- Ambient temperature:
  - Storage: -20...+60 °C
  - Transport: -20...+60 °C
  - Operation:
    - Front: 0...45 °C
    - Rear: 0...50 °C
- Dimensions:
  - Width: 265 mm / 420 mm
  - Height: 330 mm / 200 mm
  - Depth: 104 mm / 104 mm
- Panel cutout:
  - Width: 244.1 mm / 406 mm
  - Height: 307.1 mm / 186 mm
  - Tolerance: ±1 mm / ±1 mm
- Weight, approx.: 2.9 kg / 3.0 kg
- Certificate of suitability: CE, EAC, KC

Selection and ordering data

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware components</strong></td>
<td></td>
</tr>
</tbody>
</table>
| SINUMERIK 808D ADVANCED M PPU 160.3 vertical
  - English layout
  - Simplified Chinese layout | 6FC5370-2BM03-0AA0 |
| SINAMICS V70 drive system for feed axes | |
| SINUMERIK 808D ADVANCED M PPU 161.3 horizontal
  - English layout
  - Simplified Chinese layout | 6FC5370-2AM03-0AA0 |
| SINUMERIK 808D MCP via USB interface | |
| SINUMERIK 808D MCP via USB interface | |
| SINAMICS V70 drive system for feed axes | |
| Spindle drives via ±10 V analog output | |
| PC via Ethernet interface | |
| Software components | |
| SINUMERIK 808D T/M toolbox
  On DVD-ROM | 6FC5811-0CY00-0YA8 |
Dimensional drawings

SINUMERIK 808D ADVANCED T/M PPU 161.3 horizontal

SINUMERIK 808D ADVANCED T/M PPU 160.3 vertical
**Overview**

The SINUMERIK 808D MCP machine control panel with mechanical keys is designed to permit user-friendly, well-structured operation of the machine functions. It is suitable for machine level operation of milling and turning machines. Customized keys can be individually labeled using slide-in strips.

The machine control panel is available as vertical and horizontal version for different machine designs. Depending on the design of the machine, the SINUMERIK 808D MCP can also be ordered with a handwheel slot.

The machine control panel is mounted from the rear using special clamps without drilling holes into the cabinet.

**Design**

**Operator controls:**
- Mode and function keys
  - 39 keys (horizontal version: 30 keys with LEDs, vertical version: 39 keys with LEDs)
  - Direction keys for machines with rapid traverse override (MCP is pre-assembled with turning slide-in strips. Milling slide-in strips are supplied in the included accessories pack)
  - Pre-defined MCP keys for common functions, such as handwheel selection, turret skip, coolant control or program test
- Horizontal version and vertical version without handwheel slot: Spindle control with spindle override (rotary switch with 15 positions)
- Feedrate control with feedrate/rapid traverse override (rotary switch with 18 positions)
- 7-segment display for tool number

**Layout:**
- English or Chinese Simplified

**Key type:**
- Mechanical keys with protection foil

**Interface to CNC:**
- USB

**Expansion options:**
- 1 slot for emergency stop button \(d = 22 \text{ mm}\)
- Horizontal version: 3 slots for control devices \(d = 16 \text{ mm}\)
- Vertical version: 4 slots for control devices \(d = 16 \text{ mm}\)
- 1 slot for handwheel \(d = 44 \text{ mm}\), only for the vertical version with handwheel slot. The handwheel with a diameter of 44 mm must be ordered separately.

**Selection and ordering data**

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINUMERIK 808D MCP</td>
<td></td>
</tr>
<tr>
<td>machine control panel, horizontal</td>
<td>6FC5303-0AF35-0AA0</td>
</tr>
<tr>
<td>With USB cable</td>
<td>6FC5303-0AF35-0CA0</td>
</tr>
<tr>
<td>• English layout</td>
<td></td>
</tr>
<tr>
<td>• Simplified Chinese layout</td>
<td></td>
</tr>
<tr>
<td>SINUMERIK 808D MCP</td>
<td></td>
</tr>
<tr>
<td>machine control panel, vertical</td>
<td>6FC5303-0AF35-2AA0</td>
</tr>
<tr>
<td>with rotary switch for spindle override</td>
<td>6FC5303-0AF35-2CA0</td>
</tr>
<tr>
<td>With USB cable</td>
<td></td>
</tr>
<tr>
<td>• English layout</td>
<td></td>
</tr>
<tr>
<td>• Simplified Chinese layout</td>
<td></td>
</tr>
<tr>
<td>SINUMERIK 808D MCP</td>
<td></td>
</tr>
<tr>
<td>machine control panel, vertical</td>
<td>6FC5303-0AF35-3AA0</td>
</tr>
<tr>
<td>with handwheel slot</td>
<td>6FC5303-0AF35-3CA0</td>
</tr>
<tr>
<td>With USB cable</td>
<td></td>
</tr>
<tr>
<td>• English layout</td>
<td></td>
</tr>
<tr>
<td>• Simplified Chinese layout</td>
<td></td>
</tr>
</tbody>
</table>

**Accessories**

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuating element, 22 mm</td>
<td>3SB3000-1HA20</td>
</tr>
<tr>
<td>Latching mushroom pushbutton, red and non-illuminated with 40 mm protection against lifting and tilting, incl. holder</td>
<td></td>
</tr>
<tr>
<td>Contact block with 2 contacts</td>
<td>3SB3400-0A</td>
</tr>
<tr>
<td>1 NO + 1 NC, 2-pole screw terminal</td>
<td></td>
</tr>
</tbody>
</table>

The scope of supply of the SINUMERIK 808D MCP includes:
- USB cable 0.5 m
- Mounting clamps
- Slide-in strips for turning application (already inserted)
- Slide-in strips for milling application
- Blank slide-in strip for individual labeling
## Integration

The SINUMERIK 808D MCP machine control panel can be used for:

- SINUMERIK 808D Turning
- SINUMERIK 808D Milling
- SINUMERIK 808D ADVANCED T
- SINUMERIK 808D ADVANCED M

## Technical specifications

<table>
<thead>
<tr>
<th>Article No.</th>
<th>Product name</th>
</tr>
</thead>
<tbody>
<tr>
<td>6FC5303-0AF35-0.A0</td>
<td>SINUMERIK 808D MCP machine control panel horizontal version</td>
</tr>
<tr>
<td>6FC5303-0AF35...A0</td>
<td>SINUMERIK 808D MCP machine control panel vertical version</td>
</tr>
</tbody>
</table>

**Input voltage**

5 V DC provided by PPU via USB interface

**Power consumption, max.**

5 W

Degree of protection according to EN 60529 (IEC 60529)

- Front: IP65
- Rear: IP20

Humidity rating based on EN 60721-3-3

- Storage: 5 … 95 % at 25 °C
- Transport: 5 … 95 % at 25 °C
- Operation: 5 … 90 % at 25 °C

**Ambient temperature**

- Storage: -20 … +60 °C
- Transport: -20 … +60 °C
- Operation:
  - Front: 0 … 45 °C
  - Rear: 0 … 50 °C

**Distance**

0.5 m

**Dimensions**

- Width: 420 mm, 265 mm
- Height: 120 mm, 230 mm
- Depth: 58 mm, 58 mm

**Panel cutout**

- Width: 406 mm, 245 mm
- Height: 106 mm, 211 mm
- Tolerance: ± 1 mm, ± 1 mm

**Weight, approx.**

- With handwheel slot: 0.86 kg, –
- With rotary switch: 0.79 kg, 0.93 kg

**Certificate of suitability**

CE, EAC
**SINUMERIK 808D ADVANCED system**
Operator components

**SINUMERIK 808D MCP horizontal/vertical**

**Dimensional drawings**

**SINUMERIK 808D MCP horizontal**

**SINUMERIK 808D MCP vertical with handwheel slot/without handwheel slot**
Overview

The SINAMICS V70 servo drive is specially designed to control the feed axes in standard machine tool applications. The system is designed essentially for applications where cost effectiveness is the primary consideration. The key performance data of the drive are aligned to perfectly fit to the solution provided by the SINUMERIK 808D ADVANCED.

Benefits

- Compact module with integrated infeed, inverter and closed-loop position control for one feed axis
- Coated electronic modules
- Commissioning on CNC directly
- Faster commissioning thanks to pre-configured motor data stored in the drive.
- CE certified

Function

- 7 versions cover power range from 0.4 kW to 7 kW
- Supply voltage 380 V to 480 V 3 AC
- 300 % overload capability
- Drive bus communication to the SINUMERIK 808D ADVANCED
- Integrated motor brake switch
- Safe Torque Off (STO)

Integration

The following components can be connected to the SINAMICS V70:

- SINUMERIK 808D ADVANCED T PPU 161.3 horizontal
- SINUMERIK 808D ADVANCED T PPU 160.3 vertical
- SINUMERIK 808D ADVANCED M PPU 161.3 horizontal
- SINUMERIK 808D ADVANCED M PPU 160.3 vertical
- SIMOTICS S-1FL6 feed motor
- Encoder in SIMOTICS S-1FL6 feed motor
- Brake in SIMOTICS S-1FL6 feed motor

Selection and ordering data

<table>
<thead>
<tr>
<th>Rated output current A</th>
<th>Frame size</th>
<th>Article No.</th>
</tr>
</thead>
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<tr>
<td>1.2</td>
<td>FSA</td>
<td>6SL3210-5DE12-4UA0</td>
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<tr>
<td>3.0</td>
<td>FSA</td>
<td>6SL3210-5DE13-5UA0</td>
</tr>
<tr>
<td>4.6</td>
<td>FSB</td>
<td>6SL3210-5DE16-0UA0</td>
</tr>
<tr>
<td>5.3</td>
<td>FSB</td>
<td>6SL3210-5DE17-8UA0</td>
</tr>
<tr>
<td>7.8</td>
<td>FSB</td>
<td>6SL3210-5DE21-0UA0</td>
</tr>
<tr>
<td>11</td>
<td>FSC</td>
<td>6SL3210-5DE21-4UA0</td>
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<tr>
<td>13.2</td>
<td>FSC</td>
<td>6SL3210-5DE21-8UA0</td>
</tr>
</tbody>
</table>

Description | Article No.

Spare parts

- SINAMICS V70/V90 fan kits
  - Frame size FSB 6SL3200-0WF00-0AA0
  - Frame size FSC 6SL3200-0WF01-0AA0

SINAMICS V70 drive bus terminator 6FC5548-0BA21-0AA0
## Technical specifications

| Article No. | Product name | Frame size | Input voltage | Input frequency | Infeed | Electronics power supply | 24 V DC supply | Cooling | Ambient temperature | Air humidity | Installation conditions | Connectable motors | Degree of protection | Encoder evaluation | Output current | Power loss | Cooling air required | Conductor cross-section, max. | Dimensions | Weight, approx. | Certificate of suitability |
|-------------|--------------|------------|---------------|----------------|--------|--------------------------|----------------|---------|---------------------|--------------|------------------------|------------------|---------------------|-------------------|---------------|------------|----------------------|---------------------|-------------|-------------------|
| 6SL3210-5DE12-0UA0 | SINAMICS V70 servo drive | FSA | 380 ... 480 V 3 AC -15 %/+10 % | 50 ... 60 Hz ± 10 % | Non-stabilized | 24 V DC ± 10 % | 2.0 A (4.0 A) combined with motors without brake (with brake) | Natural cooling | -40 ... +70 °C | 90 % (non-condensing) | Indoor (without sunshine), without corrosive gas, combustible gas, oil gas, nor dust | SIMOTICS S-1FL6 | IP20 | Absolute encoder 2 bit/incremental encoder with 2500 S/R (13 bit resolution through electronic multiplication) |
| 6SL3210-5DE13-5UA0 | | FSB | | | | | | 0 ... 45 °C without derating, > 45 ... 55 °C with derating (derating by 0 % at 45 °C up to 20 % at 55 °C) | 0 % | < 90 % (non-condensing) |
| 6SL3210-5DE16-0UA0 | | FSC | | | | | | | |
| 6SL3210-5DE17-8UA0 | | | | | | | | | |
| 6SL3210-5DE21-0UA0 | | | | | | | | | |
| 6SL3210-5DE21-4UA0 | | | | | | | | | |
| 6SL3210-5DE21-8UA0 | | | | | | | | | |

### Output current

- Rated current $I_{\text{rated}}$
  - 1.2 A
  - 3.0 A
  - 4.6 A
  - 5.3 A
  - 7.8 A
  - 11.0 A
  - 13.2 A
- Peak current $I_{\text{max}}$
  - 3.6 A
  - 9.0 A
  - 13.8 A
  - 15.9 A
  - 23.4 A
  - 33.0 A
  - 39.6 A

### Rated output power $P_{\text{rated}}$

- 0.4 kW
- 1 kW
- 1.5 kW
- 1.75 kW
- 2.5 kW
- 3.5 kW
- 7 kW

### Power loss

- 36 W
- 47 W
- 54 W
- 70 W
- 47 W
- 54 W
- 70 W

### Conductor cross-section, max.

- 1.5 mm²
- 2.5 mm²

### Dimensions

- Width: 80 mm
- Height: 100 mm
- Depth: 200 mm

### Weight, approx.

- 1.85 kg
- 2.45 kg
- 5.65 kg

### Certificate of suitability

- CE, EAC

---

1) Minimum distance between drive modules: 10 mm.
**Dimensional drawings**

**SINAMICS V70, frame size FSA**

- Dimensions:
  - Width: 168 mm
  - Height: 80 mm
  - Depth: 200 mm

**SINAMICS V70, frame size FSB**

- Dimensions:
  - Width: 168 mm
  - Height: 82 mm
  - Depth: 220 mm
Dimensional drawings (continued)

SINAMICS V70, frame size FSC

Mounting clearance
Overview

SIMOTICS S-1FL6 motors

SIMOTICS S-1FL6 motors are permanent-magnet synchronous motors and designed for operation without external cooling. The heat is dissipated through the motor surface. Thanks to the quick-lock connectors, quick and easy mounting of the motors is possible. Together with the SINAMICS V70, the SIMOTICS S-1FL6 feed motors provide a highly dynamic solution for the machine tool application.

Benefits

- High-performance magnet material
- Rugged design with IP65 degree of protection for complete motor including connectors
- Smooth running quality thanks to low torque ripple
- High rated speed for some variants
- High acceleration due to the 300 % overload capacity
- Rotatable and fast-release connectors
- Maximum flexibility due to variants with incremental encoder/20 bit absolute encoder, with/without brake and plain shaft/feather key, half-key balancing

Function

- 3 motor shaft heights: SH 45, SH 65 and SH 90
- Rated speed of 2000 rpm/3000 rpm
- Max. speed up to 4000 rpm
- 300 % overload capacity
- Integrated 20 bit absolute encoder or incremental encoder with 2500 S/R (13 bit resolution through electronic multiplication of the V70 drive)
- Degree of protection IP65, natural cooling
- Optional holding brake
- With plain shaft or feather key, half-key balancing

Technical specifications

<table>
<thead>
<tr>
<th>Article No.</th>
<th>1FL6...</th>
</tr>
</thead>
<tbody>
<tr>
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<td>SIMOTICS</td>
</tr>
<tr>
<td>Product type designation</td>
<td>S-1FL6</td>
</tr>
<tr>
<td>Product designation</td>
<td>Feed motor</td>
</tr>
<tr>
<td>Type of motor</td>
<td>Synchronous motor</td>
</tr>
<tr>
<td>Type of motor</td>
<td>Permanent-magnet synchronous motor</td>
</tr>
<tr>
<td>Magnet material</td>
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</tr>
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<td>Cooling</td>
<td>Natural cooling</td>
</tr>
<tr>
<td>Insulation of the stator winding</td>
<td>Temperature class 130 (B)</td>
</tr>
<tr>
<td>Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)</td>
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<tr>
<td>Thermal class</td>
<td>B</td>
</tr>
<tr>
<td>Type of construction in accordance with EN 60034-7 (IEC 60034-7)</td>
<td>IM B5 (IM V1, IM V3)</td>
</tr>
<tr>
<td>Degree of protection in accordance with EN 60034-5 (IEC 60034-5)</td>
<td>IP65, with oil seal</td>
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<tr>
<td>Shaft extension in accordance with IEC 60072-1</td>
<td>Plain shaft/feather key (C type, motors with a keyway are balanced with a half-fitted key by the manufacturer)</td>
</tr>
<tr>
<td>Sound pressure level, max.</td>
<td></td>
</tr>
<tr>
<td>• 1FL604</td>
<td>65 dB</td>
</tr>
<tr>
<td>• 1FL606</td>
<td>70 dB</td>
</tr>
<tr>
<td>• 1FL609</td>
<td>70 dB</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
</tr>
<tr>
<td>• Storage/transport</td>
<td>-15 … +65 °C</td>
</tr>
<tr>
<td>• Operation</td>
<td>0 … 40 °C without derating</td>
</tr>
<tr>
<td>Humidity</td>
<td></td>
</tr>
<tr>
<td>• Storage/transport</td>
<td>90 % at 30 °C</td>
</tr>
<tr>
<td>• Operation</td>
<td>90 % at 30 °C</td>
</tr>
<tr>
<td>Installation altitude</td>
<td></td>
</tr>
<tr>
<td>Up to 1000 m above sea level without derating</td>
<td></td>
</tr>
<tr>
<td>&gt; 1000 m … 5000 m with derating</td>
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</tr>
<tr>
<td>Paint finish</td>
<td>Anthracite</td>
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<tr>
<td>Certificate of suitability</td>
<td>CE, EAC</td>
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## Selection and ordering data

<table>
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<tr>
<th>n&lt;sub&gt;rated&lt;/sub&gt; (rpm)</th>
<th>n&lt;sub&gt;max.&lt;/sub&gt; (rpm)</th>
<th>P&lt;sub&gt;rated&lt;/sub&gt; (kW)</th>
<th>M&lt;sub&gt;0&lt;/sub&gt; at ΔT = 100 K (Nm)</th>
<th>Article No.</th>
<th>J&lt;sub&gt;without brake&lt;/sub&gt; (10&lt;sup&gt;-4&lt;/sup&gt; kgm&lt;sup&gt;2&lt;/sup&gt;)</th>
<th>J&lt;sub&gt;with brake&lt;/sub&gt; (10&lt;sup&gt;-4&lt;/sup&gt; kgm&lt;sup&gt;2&lt;/sup&gt;)</th>
<th>m&lt;sub&gt;without brake&lt;/sub&gt; (kg)</th>
<th>m&lt;sub&gt;with brake&lt;/sub&gt; (kg)</th>
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<td>4000</td>
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<td>2.8</td>
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<td>3.1</td>
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<td>11</td>
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<td>24.4</td>
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<td>30</td>
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**Encoder type**
- Incremental encoder 2500 S/R
- Absolute encoder 20 bit

**Shaft extension**
- Plain shaft

**Holding brake**
- Without
- With
## Dimensional drawings

### SIMOTICS S-1FL6 feed motor with incremental encoder

For motor | Dimensions in mm
--- | ---

<table>
<thead>
<tr>
<th>DE shaft extension</th>
<th>Encoder system: Incremental encoder 2500 S/R</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>without brake</td>
</tr>
</tbody>
</table>

| Shaft height | Type | LC | LA | LZ | N | LR | T | LG | D | DB | E | QK | GA | F | LB | KB1 | KB2 | LB | KB1 | KB2 | KL1 | KL2 | KL3 | KL4 |
| 45 | 1FL6042 | 90 | 100 | 7 | 80 | 35 | 10 | 19 | M6 x 16 | 30 | 25 | 21.5 | 6 | 154.5 | 93.5 | – | 201 | 140 | 31.5 | 136 | 92 | – | – |
|  | 1FL6044 | 201.5 | 140.5 | – | 248 | 187 |
| 65 | 1FL6061 | 130 | 145 | 9 | 110 | 58 | 12 | 22 | M8 x 16 | 50 | 44 | 25 | 8 | 148 | 85.5 | – | 202.5 | 140 | 39.5 | 158 | 115 | 23 | 22 |
|  | 1FL6062 | 181 | 118.5 | – | 235.5 | 173 |
|  | 1FL6064 | 181 | 118.5 | – | 235.5 | 173 |
|  | 1FL6066 | 214 | 151.5 | – | 268.5 | 206 |
|  | 1FL6067 | 247 | 184.5 | – | 301.5 | 239 |
| 90 | 1FL6090 | 180 | 200 | 13.5 | 114.3 | 80 | 3 | 18 | 35 | M12 x 25 | 75 | 60 | 38 | 10 | 189.5 | 140 | – | 255 | 206 | 44.5 | 184 | 149 | 34 | 34 |
|  | 1FL6092 | 211.5 | 162 | – | 281 | 232 |
|  | 1FL6094 | 237.5 | 188 | – | 307 | 258 |
|  | 1FL6096 | 289.5 | 240 | – | 359 | 310 |
SIMOTICS S-1FL6 feed motor

**For motor**

<table>
<thead>
<tr>
<th>Shaft height</th>
<th>Type</th>
<th>Dimensions in mm</th>
<th>DE shaft extension</th>
<th>Encoder system: Absolute encoder 20 bit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Without brake</strong></td>
<td><strong>With brake</strong></td>
<td><strong>Without brake</strong></td>
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<tr>
<td></td>
<td><strong>LC</strong></td>
<td><strong>LA</strong></td>
<td><strong>LZ</strong></td>
<td><strong>N</strong></td>
</tr>
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<td></td>
<td>1FL6094</td>
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<td>–</td>
</tr>
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<td></td>
<td>1FL6096</td>
<td>301</td>
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</table>
Overview

The SINAMICS V70 spindle drive controls the spindle in standard machine tool applications. The system is designed essentially for applications where cost effectiveness is the primary consideration. The key performance data of the drive are aligned to perfectly fit to the solution provided by the SINUMERIK 808D ADVANCED.

Benefits

- Compact module with integrated infeed, inverter and closed-loop for spindle
- Coated electronic modules
- Commissioning on CNC directly
- Faster commissioning thanks to pre-configured motor data stored in the drive
- CE certified

Function

- Power range from 3.7 kW to 15 kW
- Supply voltage 380 V to 480 V 3 AC
- Drive bus communication to the SINUMERIK 808D ADVANCED
- Safe Torque Off (STO)

Integration

The following components can be connected to the SINAMICS V70 spindle drive:

- SINUMERIK 808D ADVANCED T PPU 161.3 horizontal
- SINUMERIK 808D ADVANCED T PPU 160.3 vertical
- SINUMERIK 808D ADVANCED M PPU 161.3 horizontal
- SINUMERIK 808D ADVANCED M PPU 160.3 vertical
- SIMOTICS M-1PH1 main motor
- Encoder in SIMOTICS M-1PH1 main motor

Technical specifications

<table>
<thead>
<tr>
<th>Article No.</th>
<th>6SL3210-5DE21-1UA0</th>
<th>6SL3210-5DE21-3UA0</th>
<th>6SL3210-5DE22-0UA0</th>
<th>6SL3210-5DE23-0UA0</th>
<th>6SL3210-5DE24-0UA0</th>
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<td>V70</td>
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<td>Frame size</td>
<td>FSB</td>
<td>FSC</td>
<td>FSD</td>
<td>FSB</td>
<td>FSC</td>
</tr>
<tr>
<td>Rated output current</td>
<td>10.5 A</td>
<td>12.9 A</td>
<td>19.6 A</td>
<td>29.8 A</td>
<td>37.6 A</td>
</tr>
<tr>
<td>Max. output current</td>
<td>21 A</td>
<td>24.6 A</td>
<td>39.2 A</td>
<td>59.6 A</td>
<td>75.2 A</td>
</tr>
<tr>
<td>Max. supported motor power</td>
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<td>3.7 kW</td>
<td>7.5 kW</td>
<td>11 kW</td>
<td>15 kW</td>
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<td>Output frequency</td>
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<td>0 Hz to 400 Hz</td>
<td>0 Hz to 400 Hz</td>
<td>0 Hz to 400 Hz</td>
<td>0 Hz to 400 Hz</td>
</tr>
<tr>
<td>Power supply</td>
<td>Voltage/frequency</td>
<td>380 V ... 480 V 3 AC, 50/60 Hz</td>
<td>380 V ... 480 V 3 AC, 50/60 Hz</td>
<td>380 V ... 480 V 3 AC, 50/60 Hz</td>
<td>380 V ... 480 V 3 AC, 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>Permissible voltage fluctuation</td>
<td>-15 % ... +10 %</td>
<td>-15 % ... +10 %</td>
<td>-15 % ... +10 %</td>
<td>-15 % ... +10 %</td>
</tr>
<tr>
<td></td>
<td>Permissible frequency fluctuation</td>
<td>-10 % ... +10 %</td>
<td>-10 % ... +10 %</td>
<td>-10 % ... +10 %</td>
<td>-10 % ... +10 %</td>
</tr>
<tr>
<td></td>
<td>Rated input current</td>
<td>13.2 A</td>
<td>16.2 A</td>
<td>24.5 A</td>
<td>37.3 A</td>
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<td>Power supply capacity</td>
<td>8.7 kVA</td>
<td>10.7 kVA</td>
<td>16.1 kVA</td>
<td>24.5 kVA</td>
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<td>Inrush current</td>
<td>4 A</td>
<td>2.5 A</td>
<td>2.5 A</td>
<td>2.5 A</td>
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<td>24 V DC power supply</td>
<td>Voltage</td>
<td>24 V (-15 % ... +20 %)</td>
<td>24 V (-15 % ... +20 %)</td>
<td>24 V (-15 % ... +20 %)</td>
<td>24 V (-15 % ... +20 %)</td>
</tr>
<tr>
<td></td>
<td>Maximum current</td>
<td>3 A</td>
<td>3 A</td>
<td>3 A</td>
<td>3 A</td>
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<td>Overload capability</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control system</td>
<td>Servo control</td>
<td>Servo control</td>
<td>Servo control</td>
<td>Servo control</td>
<td>Servo control</td>
</tr>
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<td>Braking resistor</td>
<td>Braking resistor is not included in the standard system package. Choose an external braking resistor according to the technical specifications as listed below from Siemens product portfolio or from 3rd party.</td>
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</tr>
<tr>
<td></td>
<td>Resistance</td>
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<td>18 Ω</td>
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<td>1185 W</td>
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<td>Max. energy</td>
<td>18.3 kJ</td>
<td>189.6 kJ</td>
<td>299.2 kJ</td>
<td>299.2 kJ</td>
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<td>Protective functions</td>
<td>Earthing fault protection</td>
<td>Output short-cut protection</td>
<td>Overvoltage/undervoltage protection</td>
<td>I2t detection</td>
<td>IGBT overtemperature protection</td>
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## Technical specifications (continued)

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<thead>
<tr>
<th>Article No.</th>
<th>Product type designation</th>
<th>Product designation</th>
<th>Cooling method</th>
<th>Degree of protection</th>
<th>Degree of pollution</th>
<th>Operating environment</th>
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<tbody>
<tr>
<td>6SL3210-5DE21-1UA0</td>
<td>SINAMICS V70</td>
<td>Spindle drive</td>
<td>Fan-cooled</td>
<td>IP20</td>
<td>Class 2</td>
<td>Indoor (without direct sunlight), free from corrosive gas, combustible gas, oil gas, or dust</td>
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<td>6SL3210-5DE22-0UA0</td>
<td>SINAMICS V70</td>
<td>Spindle drive</td>
<td>Fan-cooled</td>
<td>IP20</td>
<td>Class 2</td>
<td>Indoor (without direct sunlight), free from corrosive gas, combustible gas, oil gas, or dust</td>
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<tr>
<td>6SL3210-5DE23-0UA0</td>
<td>SINAMICS V70</td>
<td>Spindle drive</td>
<td>Fan-cooled</td>
<td>IP20</td>
<td>Class 2</td>
<td>Indoor (without direct sunlight), free from corrosive gas, combustible gas, oil gas, or dust</td>
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<tr>
<td>6SL3210-5DE24-0UA0</td>
<td>SINAMICS V70</td>
<td>Spindle drive</td>
<td>Fan-cooled</td>
<td>IP20</td>
<td>Class 2</td>
<td>Indoor (without direct sunlight), free from corrosive gas, combustible gas, oil gas, or dust</td>
</tr>
</tbody>
</table>

**Relative humidity, during**<br>- Storage: 90 % (non-condensing)<br>- Operation: < 90 % (non-condensing)

**Ambient temperature, during**<br>- Storage: -40 °C ... +70 °C<br>- Operation: 0 °C ... 45 °C without power derating<br>- 45 °C ... 55 °C with power derating

**Installation altitude**<br>- < 1000 m above sea level (without derating)

**Vibration**<br>- Transport and storage: 5 Hz ... 9 Hz: 3.5 mm deflection<br>- 9 Hz ... 200 Hz: 1 g vibration<br>- Ambient Classification: 1M2

**Shock**<br>- Transport and storage: Covered by vibration test<br>- Operation: Operational area II/3M2<br>- Ambient classification: 3M2<br>- Peak acceleration: 5 g + 15 g<br>- Duration: 30 ms + 11 ms<br>- Quantity of shocks: 3<br>- Summed shocks: 18<br>- Cycle time: 1 s

**Width**<br>- FSB: 100 mm<br>- FSC: 140 mm<br>- FSD: 140 mm<br>- 190 mm<br>- 190 mm

**Height**<br>- FSB: 180 mm<br>- FSC: 260 mm<br>- FSD: 260 mm<br>- 350 mm<br>- 350 mm

**Depth**<br>- FSB: 220 mm<br>- FSC: 240 mm<br>- FSD: 240 mm<br>- 185 mm<br>- 185 mm

**Net weight**<br>- FSB: 2.35 kg<br>- FSC: 5.05 kg<br>- FSD: 5.05 kg<br>- 8.05 kg<br>- 8.3 kg

**Certificate of suitability**<br>- CE, EAC, RCM

## Selection and ordering data

### Motor output power

<table>
<thead>
<tr>
<th>Motor output power kW</th>
<th>Frame size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.7</td>
<td>FSB</td>
<td>SINAMICS V70 spindle drive 6SL3210-5DE21-1UA0</td>
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<tr>
<td>3.7</td>
<td>FSC</td>
<td>SINAMICS V70 spindle drive 6SL3210-5DE21-3UA0</td>
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<td>7.5</td>
<td>FSC</td>
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<td>11</td>
<td>FSD</td>
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<td>15</td>
<td>FSD</td>
<td>SINAMICS V70 spindle drive 6SL3210-5DE24-0UA0</td>
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</tbody>
</table>

**Line voltage 380 V ... 480 V 3 AC**

### Accessories

A shield plate can be ordered as an option for FSD devices.

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shield plate for V70 spindle drive Frame size FSD</td>
<td>6SL3266-1ED00-0VA0</td>
</tr>
</tbody>
</table>
Dimensional drawings

SINAMICS V70 spindle drive, frame size FSB

SINAMICS V70 spindle drive, frame size FSC
SINUMERIK 808D ADVANCED system
Spindle solutions

SINAMICS V70 spindle drive

Dimensional drawings (continued)

SINAMICS V70 spindle drive, frame size FSD
Overview

SIMOTICS M-1PH1 main motor

1PH1 main motors have been especially designed for use as main drives in machine tools. These motors are available as asynchronous version with forced fan cooling. Together with the SINAMICS V70 spindle drive, a dynamic and powerful main drive system with high performance is created.

Benefits

- High productivity
  - Short ramp up and ramp down time
  - High overload capability
  - Low moment of motor inertia
- Better cutting performance
  - High vibration resistance (R/S)
  - Low torque ripple
- Compact design
- Easy commissioning together with drive
  - Easy wiring via drive bus communication
  - Easy parameter setting and monitor servo status in HMI
- Easy service
  - Fan design optimized for easy replacement
- High robustness
  - Optimized bearing concept for high transverse force

Function

- Robust, cost optimized design
- Shaft height: SH 100/SH 132
- Rated speed: 1000 rpm/1500 rpm
- Max. speed: up to 10000 rpm
- Rated output: 3.7 kW to 15 kW
- Rated torque 24 Nm to 95.5 Nm
- 2 times overload capability for high dynamic response
- Foot mounting and flange mounting available
- Degree of protection IP54
- Incremental encoder TTL 2500 S/R
- Plain shaft or with key

Technical specifications

<table>
<thead>
<tr>
<th>Article No.</th>
<th>1PH1...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product brand name</td>
<td>SIMOTICS</td>
</tr>
<tr>
<td>Product type designation</td>
<td>M-1PH1</td>
</tr>
<tr>
<td>Product designation</td>
<td>Main motor</td>
</tr>
<tr>
<td>Type of motor</td>
<td>Squirrel-cage asynchronous motor</td>
</tr>
<tr>
<td>Cooling</td>
<td>Forced ventilation</td>
</tr>
<tr>
<td>Ambient temperature, admissible</td>
<td></td>
</tr>
<tr>
<td>- Storage</td>
<td>-20 ... +65 °C</td>
</tr>
<tr>
<td>- Operation</td>
<td>-15 ... +40 °C</td>
</tr>
<tr>
<td>- without power derating</td>
<td></td>
</tr>
<tr>
<td>Relative humidity, during</td>
<td></td>
</tr>
<tr>
<td>- Storage</td>
<td>≤ 95 %</td>
</tr>
<tr>
<td>- Operation</td>
<td>≤ 90 %</td>
</tr>
<tr>
<td>Installation altitude</td>
<td>Up to 1000 m above sea level</td>
</tr>
<tr>
<td>- without power derating</td>
<td></td>
</tr>
<tr>
<td>Maximum noise level</td>
<td>72 dB</td>
</tr>
<tr>
<td>Thermal class</td>
<td>F</td>
</tr>
<tr>
<td>Vibration severity grade</td>
<td></td>
</tr>
<tr>
<td>- 1PH11..-1.F</td>
<td>Grade B is maintained up to 1800 rpm</td>
</tr>
<tr>
<td></td>
<td>Grade S is maintained from 1800 rpm to 10000 rpm</td>
</tr>
<tr>
<td></td>
<td>Grade B is maintained up to 1800 rpm</td>
</tr>
<tr>
<td></td>
<td>Grade R is maintained from 1800 rpm to 6000 rpm</td>
</tr>
<tr>
<td>Shock resistance</td>
<td>2.25 m/s² (continuous in axial direction); 10 m/s² (continuous in radial direction)</td>
</tr>
<tr>
<td>Static bearing lifetime</td>
<td>&gt; 20000 h¹</td>
</tr>
<tr>
<td>Oil seal lifetime</td>
<td>&gt; 20000 h</td>
</tr>
<tr>
<td>Encoder lifetime</td>
<td>&gt; 20000 h</td>
</tr>
<tr>
<td>Motor lifetime</td>
<td>20000 h</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP54 (dust-tight and splash-proof during motor operation)</td>
</tr>
<tr>
<td>Type of construction</td>
<td>IM B5, IM B3, IM V1, and IM V5</td>
</tr>
<tr>
<td>Paint finish</td>
<td>Anthracite</td>
</tr>
<tr>
<td>Certificate of suitability</td>
<td>CE, EAC</td>
</tr>
</tbody>
</table>

¹ This lifetime is only for reference. When a motor keeps running at rated speed under rated load, replace its bearing after 20000 hours to 30000 hours of service time. Even if the time is not reached, the bearing must be replaced when unusual noise, vibration, or faults are found.
## SIMOTICS M-1PH1 main motor

### Selection and ordering data

<table>
<thead>
<tr>
<th>rpm</th>
<th>n&lt;sub&gt;rated&lt;/sub&gt;</th>
<th>n&lt;sub&gt;max&lt;/sub&gt;</th>
<th>SH</th>
<th>P&lt;sub&gt;rated&lt;/sub&gt;</th>
<th>M&lt;sub&gt;rated&lt;/sub&gt;</th>
<th>Article No.</th>
<th>L&lt;sub&gt;rated&lt;/sub&gt;</th>
<th>F&lt;sub&gt;rated&lt;/sub&gt;</th>
<th>Frame size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>6000</td>
<td>100</td>
<td>3.7</td>
<td>35</td>
<td></td>
<td>1PH1103-1 D 1</td>
<td>12.9</td>
<td>5DE21-3UA0</td>
<td>FSC</td>
</tr>
<tr>
<td></td>
<td>6000</td>
<td>5.5</td>
<td>53</td>
<td></td>
<td></td>
<td>1PH1105-1 D 1</td>
<td>18.8</td>
<td>5DE22-0UA0</td>
<td>FSC</td>
</tr>
<tr>
<td>1500</td>
<td>10000</td>
<td>100</td>
<td>3.7</td>
<td>24</td>
<td></td>
<td>1PH1101-1 F 1</td>
<td>10.3</td>
<td>5DE21-1UA0</td>
<td>FSB</td>
</tr>
<tr>
<td></td>
<td>10000</td>
<td>5.5</td>
<td>35</td>
<td></td>
<td></td>
<td>1PH1103-1 F 1</td>
<td>16.9</td>
<td>5DE22-0UA0</td>
<td>FSC</td>
</tr>
<tr>
<td></td>
<td>10000</td>
<td>7.5</td>
<td>48</td>
<td></td>
<td></td>
<td>1PH1105-1 F 1</td>
<td>19.6</td>
<td>5DE22-0UA0</td>
<td>FSC</td>
</tr>
<tr>
<td>1000</td>
<td>6000</td>
<td>132</td>
<td>7.5</td>
<td>72</td>
<td></td>
<td>1PH1131-1 D 1</td>
<td>26.6</td>
<td>5DE23-0UA0</td>
<td>FSD</td>
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<tr>
<td></td>
<td>6000</td>
<td>11</td>
<td>105</td>
<td></td>
<td></td>
<td>1PH1133-1 D 1</td>
<td>28.3</td>
<td>5DE23-0UA0</td>
<td>FSD</td>
</tr>
<tr>
<td>1500</td>
<td>8000</td>
<td>132</td>
<td>11</td>
<td>70</td>
<td></td>
<td>1PH1131-1 F 1</td>
<td>28.8</td>
<td>5DE23-0UA0</td>
<td>FSD</td>
</tr>
<tr>
<td></td>
<td>8000</td>
<td>15</td>
<td>96</td>
<td></td>
<td></td>
<td>1PH1133-1 F 1</td>
<td>36.7</td>
<td>5DE24-0UA0</td>
<td>FSD</td>
</tr>
</tbody>
</table>

### Encoder type

- Incremental encoder, TTL 2500 S/R (13 bit)

### Type of construction

- IM B3/IM V5, foot mounting
- IM B5/IM V1, flange mounting

### Shaft extension DE

- Plain shaft
- Feather key
- Feather key

### Balancing

- Full-key
- Half-key
**Dimensional drawings**

**Mounting position**

The SIMOTICS M-1PH1 main motor supports flange mounting and foot mounting as shown below:

<table>
<thead>
<tr>
<th>Mounting method</th>
<th>Standard type of construction</th>
<th>Rotated type of construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foot mounting</td>
<td>IM B3</td>
<td>IM V5</td>
</tr>
<tr>
<td>Flange mounting</td>
<td>IM B5</td>
<td>IM V1</td>
</tr>
</tbody>
</table>

**Minimum clearance between a fan and parts/components mounted by the customer**

The minimum clearance between a fan and parts/components mounted by the customer or the air discharge opening, and the minimum clearance S between the air intake/air discharge opening and adjacent components must be maintained.

<table>
<thead>
<tr>
<th>Shaft height</th>
<th>Fan mounting</th>
<th>Minimum clearance between a fan and parts/components</th>
<th>Minimum clearance S</th>
</tr>
</thead>
<tbody>
<tr>
<td>SH 100</td>
<td>Non-drive end axial, can be rotated through 180°</td>
<td>30 mm</td>
<td>30 mm</td>
</tr>
</tbody>
</table>

**For motor**

Dimensions in mm

<table>
<thead>
<tr>
<th>Shaft height</th>
<th>Type</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1PH1101-1.F12-.GA0</td>
<td>419</td>
</tr>
<tr>
<td></td>
<td>1PH1103-1.D12-.GA0</td>
<td>449</td>
</tr>
<tr>
<td></td>
<td>1PH1105-1.F12-.GA0</td>
<td>499</td>
</tr>
<tr>
<td></td>
<td>1PH1105-1.D12-.GA0</td>
<td>499</td>
</tr>
</tbody>
</table>

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### SIMOTICS M-1PH1 main motor

**Dimensional drawings (continued)**

#### For motor

<table>
<thead>
<tr>
<th>Shaft height</th>
<th>Type</th>
<th>Dimensions in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1PH1101-1.F10.-GA0</td>
<td>419  183</td>
</tr>
<tr>
<td></td>
<td>1PH1103-1.F10.-GA0</td>
<td>449  213</td>
</tr>
<tr>
<td></td>
<td>1PH1103-1.D10.-GA0</td>
<td>449  213</td>
</tr>
<tr>
<td></td>
<td>1PH1105-1.F10.-GA0</td>
<td>499  263</td>
</tr>
<tr>
<td></td>
<td>1PH1105-1.D10.-GA0</td>
<td>499  263</td>
</tr>
</tbody>
</table>

- **Center hole C-type, M12×30**
- **key, GB/T1096**

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Dimensional drawings (continued)

For motor dimensions in mm

<table>
<thead>
<tr>
<th>Shaft height</th>
<th>Type</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>132</td>
<td>1PH1131-1.F12-.GA0</td>
<td>475</td>
</tr>
<tr>
<td></td>
<td>1PH1131-1.D12-.GA0</td>
<td>465</td>
</tr>
<tr>
<td></td>
<td>1PH1133-1.F12-.GA0</td>
<td>525</td>
</tr>
<tr>
<td></td>
<td>1PH1133-1.D12-.GA0</td>
<td>525</td>
</tr>
<tr>
<td>Shaft height</td>
<td>Type</td>
<td>Dimensions in mm</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>132</td>
<td>1PH1131-1.F10-.GA0</td>
<td>L 475, L1 251.8</td>
</tr>
<tr>
<td></td>
<td>1PH1131-1.D10-.GA0</td>
<td>L 465, L1 241.8</td>
</tr>
<tr>
<td></td>
<td>1PH1133-1.F10-.GA0</td>
<td>L 525, L1 301.8</td>
</tr>
<tr>
<td></td>
<td>1PH1133-1.D10-.GA0</td>
<td>L 525, L1 301.8</td>
</tr>
</tbody>
</table>

For motor dimensions:
- Center hole: C-type, M16×40, key, GB/T1096
- Key size: Ø48h6
- Center hole size: Ø9.5
- Center hole height: 90.3
- Total flatness of the four feet: 0.2
<table>
<thead>
<tr>
<th>SINUMERIK 808D ADVANCED T/M</th>
<th>Article No.</th>
<th>Pre-assembled cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X126</td>
<td>6FC5548-0BA20-....</td>
<td>Power supply 24 V DC</td>
</tr>
<tr>
<td>X54</td>
<td></td>
<td>SINAMICS V70</td>
</tr>
<tr>
<td>X60</td>
<td>6FX8002-2CD01-....</td>
<td>Spindle drive</td>
</tr>
<tr>
<td>X10</td>
<td>6FX8002-2BB01-....</td>
<td>Incremental encoder for spindle (TTL) RS422</td>
</tr>
<tr>
<td></td>
<td>≤ 25 m (82 ft) for handwheel signals</td>
<td>6FX2001-2....</td>
</tr>
<tr>
<td>X30</td>
<td>≤ 0.5 m (1.6 ft) (included in scope of delivery of MCP)</td>
<td>Handwheels (max. 2)</td>
</tr>
<tr>
<td>X100/X101/X102</td>
<td></td>
<td>SINUMERIK 808D MCP</td>
</tr>
<tr>
<td>X200/X201</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X301</td>
<td>6EP5306-5BG00</td>
<td>≤ 6 m (20 ft)</td>
</tr>
<tr>
<td>X302</td>
<td>6EP5306-5BG00</td>
<td>24 DI / 16 DO, 24 V DC</td>
</tr>
<tr>
<td>X21</td>
<td>Wire (0.14 ... 1.5 mm²)</td>
<td>Terminal strip converter</td>
</tr>
</tbody>
</table>

Connection overview of SINUMERIK 808D ADVANCED T/SINUMERIK 808D ADVANCED M PPU 161.3/PPU 160.3

- Connector with pin contacts
- Connector with socket contacts
- Exposed core ends
- Cable is not included in the scope of delivery. It must be provided by the customer.
<table>
<thead>
<tr>
<th>Technical specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article No.</td>
</tr>
</tbody>
</table>
| 6FC5548-0BA20-… | Drive bus cable  
PPU 16x.3 – SINAMICS V70  
SINAMICS V70 – SINAMICS V70 | 6FC5548-0BA05-… | Setpoint cable  
PPU 16x.3 – spindle drive |
| No. of cores | 2 | 4 |
| Certificate of suitability | • cURus or UR/CSA¹  
UL1581 | Yes  
UL2576 | Yes |
| Operating voltage | 100 V | 30 V |
| Test voltage, rms | 3600 V | 500 V |
| Operating temperature |  \(-40 \ldots +80 ^\circ C\)  
\(-40 \ldots +60 ^\circ C\) |  \(-20 \ldots +80 ^\circ C\)  
0 \ldots 60 ^\circ C |
| Smallest bending radius | 75 mm  
150 mm | 60 mm  
120 mm |
| Insulation material, incl. jacket | PVC | PVC |
| Oil resistance | Limited mineral oil and fats resistance  
70 ^\circ C \times 4 h |
| Outer jacket | PVC  
Gray | PVC  
Gray |
| Flame-retardant | IEC 60332–3–24 | VW-1 |
| Article No. | Product name | Article No. | Product name |
| 6FX8002-2CD01-… | Signal cable  
PPU 16x.3 – Incremental encoder for spindle (TTL) | 6FX8002-2BB01-… | Signal cable  
PPU 16x.3 – handwheel |
| Certificate of suitability | • cURus or UR/CSA¹  
UL758-CSA-C22.2-N.210.2-M90 | Yes  
UL758-CSA-C22.2-N.210.2-M90 | Yes |
| Rated voltage | 30 V | 30 V |
| Test voltage, rms | 500 V | 500 V |
| Operating temperature |  \(-50 \ldots +80 ^\circ C\)  
\(-20 \ldots +60 ^\circ C\) |  \(-50 \ldots +80 ^\circ C\)  
\(-20 \ldots +60 ^\circ C\) |
| Tensile stress, max. | 50 N/mm²  
20 N/mm² | 50 N/mm²  
20 N/mm² |
| Smallest bending radius | 35 mm  
70 mm | 35 mm  
70 mm |
| Torsional stress | Absolute 30°/m | Absolute 30°/m |
| Bending | 10 million | 10 million |
| Traversing velocity | 300 m/min | 300 m/min |
| Acceleration | 5 m/s² | 5 m/s² |
| Insulation material, incl. jacket | CFC/silicone-free  
IEC 60754-1/DIN VDE 0472-815 | CFC/silicone-free  
IEC 60754-1/DIN VDE 0472-815 |
| Oil resistance | EN 60811-2-1 | EN 60811-2-1 |
| Outer jacket | PVC  
DESINA color green RAL 6018 | PVC  
DESINA color green RAL 6018 |
| Flame-retardant | EN 60332-1-1 to 3-3 | EN 60332-1-1 to 3-3 |

For general information about MOTION-CONNECT please refer to Introduction.

¹ The respective registration number is printed on the cable jacket.
### Selection and ordering data

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-assembled bus cable</strong></td>
<td></td>
</tr>
<tr>
<td>PPU 16x.3 – SINAMICS V70 and SINAMICS V70</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td></td>
</tr>
<tr>
<td>• 0.25 m</td>
<td>6FC5548-0BA20-1AA2</td>
</tr>
<tr>
<td>• 0.35 m</td>
<td>6FC5548-0BA20-1AA3</td>
</tr>
<tr>
<td>• 1 m</td>
<td>6FC5548-0BA20-1AB0</td>
</tr>
<tr>
<td>• 3 m</td>
<td>6FC5548-0BA20-1AD0</td>
</tr>
<tr>
<td>• 5 m</td>
<td>6FC5548-0BA20-1AF0</td>
</tr>
<tr>
<td>• 7 m</td>
<td>6FC5548-0BA20-1AH0</td>
</tr>
<tr>
<td>• 10 m</td>
<td>6FC5548-0BA20-1BA0</td>
</tr>
<tr>
<td>• 15 m</td>
<td>6FC5548-0BA20-1BF0</td>
</tr>
<tr>
<td>• 20 m</td>
<td>6FC5548-0BA20-1CA0</td>
</tr>
<tr>
<td><strong>Pre-assembled setpoint cable</strong></td>
<td></td>
</tr>
<tr>
<td>PPU 16x.3 – spindle drive</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td></td>
</tr>
<tr>
<td>• 3 m</td>
<td>6FC5548-0BA05-1AD0</td>
</tr>
<tr>
<td>• 5 m</td>
<td>6FC5548-0BA05-1AF0</td>
</tr>
<tr>
<td>• 7 m</td>
<td>6FC5548-0BA05-1AH0</td>
</tr>
<tr>
<td>• 10 m</td>
<td>6FC5548-0BA05-1BA0</td>
</tr>
<tr>
<td>• 15 m</td>
<td>6FC5548-0BA05-1BF0</td>
</tr>
<tr>
<td>• 20 m</td>
<td>6FC5548-0BA05-1CA0</td>
</tr>
<tr>
<td><strong>Pre-assembled signal cable</strong></td>
<td></td>
</tr>
<tr>
<td>PPU 16x.3 – incremental encoder for spindle (TTL)</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td></td>
</tr>
<tr>
<td>• 5 m</td>
<td>6FX8002-2CD01-1AF0</td>
</tr>
<tr>
<td>• 7 m</td>
<td>6FX8002-2CD01-1AH0</td>
</tr>
<tr>
<td>• 10 m</td>
<td>6FX8002-2CD01-1BA0</td>
</tr>
<tr>
<td><strong>Pre-assembled signal cable</strong></td>
<td></td>
</tr>
<tr>
<td>PPU 16x.3 – handwheel</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td></td>
</tr>
<tr>
<td>• 1 m</td>
<td>6FX8002-2BB01-1AB0</td>
</tr>
<tr>
<td>• 5 m</td>
<td>6FX8002-2BB01-1AF0</td>
</tr>
<tr>
<td>• 7 m</td>
<td>6FX8002-2BB01-1AH0</td>
</tr>
<tr>
<td>• 10 m</td>
<td>6FX8002-2BB01-1BA0</td>
</tr>
</tbody>
</table>
SINUMERIK 808D ADVANCED system
MOTION-CONNECT connection systems

MOTION-CONNECT cables for SINAMICS V70 servo drive

Integration

<table>
<thead>
<tr>
<th>SINAMICS V70 servo drive</th>
<th>Article No. Pre-assembled cables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X10</td>
<td>6FC5548-0BA20-1AD0</td>
<td>SINUMERIK 808D PPU 161.3/PPU 160.3 (setpoint)</td>
</tr>
<tr>
<td></td>
<td>3/5/7/10/15/20 m (9.8/16/23/32/49/64 ft)</td>
<td></td>
</tr>
<tr>
<td>X11</td>
<td>6FC5548-0BA20-1AF0</td>
<td>SINAMICS V70 X10</td>
</tr>
<tr>
<td></td>
<td>0.25/0.35/1 m (0.82/1.1/3 ft)</td>
<td></td>
</tr>
<tr>
<td>X9</td>
<td>6FX3002-2CT10-1AD0</td>
<td>TTL encoder in SIMOTICS S-1FL6 feed motor</td>
</tr>
<tr>
<td></td>
<td>3/5/7/10/15/20 m (9.8/16/23/32/49/64 ft)</td>
<td></td>
</tr>
<tr>
<td>X9</td>
<td>6FX3002-2CT10-1AF0</td>
<td>SIMOTICS S-1FL6 feed motor</td>
</tr>
<tr>
<td></td>
<td>3/5/7/10/15/20 m (9.8/16/23/32/49/64 ft)</td>
<td></td>
</tr>
<tr>
<td>X7</td>
<td>6FX3002-5CL01-1AD0</td>
<td>Brake in SIMOTICS S-1FL6 feed motor</td>
</tr>
<tr>
<td></td>
<td>3/5/7/10/15/20 m (9.8/16/23/32/49/64 ft)</td>
<td></td>
</tr>
<tr>
<td>X6</td>
<td>6FX3002-5CL01-1AF0</td>
<td>24 V DC power supply</td>
</tr>
<tr>
<td></td>
<td>3/5/7/10/15/20 m (9.8/16/23/32/49/64 ft)</td>
<td></td>
</tr>
<tr>
<td>L1 / L2 / L3</td>
<td>6FX3002-5BL02-1AD0</td>
<td>380 V 3 AC main supply</td>
</tr>
<tr>
<td></td>
<td>0.25/0.35/1 m (0.82/1.1/3 ft)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3/5/7/10/15/20 m (9.8/16/23/32/49/64 ft)</td>
<td></td>
</tr>
</tbody>
</table>

Connection overview of SINAMICS V70 servo drive

- Connector with pin contacts
- Connector with socket contacts
- Exposed core ends
- Cable is not included in the scope of delivery. It must be provided by the customer.

Selection and ordering data

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-assembled signal cable</td>
<td></td>
</tr>
<tr>
<td>SINUMERIK 808D – SIMOTICS S-1FL6 feed motor with absolute encoder</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>6FX3002-2DB10-1AD0</td>
</tr>
<tr>
<td>3 m</td>
<td>6FX3002-2DB10-1AF0</td>
</tr>
<tr>
<td>5 m</td>
<td>6FX3002-2DB10-1BA0</td>
</tr>
<tr>
<td>7 m</td>
<td>6FX3002-2DB10-1BF0</td>
</tr>
<tr>
<td>10 m</td>
<td>6FX3002-2DB10-1CA0</td>
</tr>
<tr>
<td>15 m</td>
<td>6FX3002-2DB10-1DA0</td>
</tr>
<tr>
<td>20 m</td>
<td>6FX3002-2DB10-1EA0</td>
</tr>
</tbody>
</table>

Pre-assembled signal cable
SINUMERIK 808D – SIMOTICS S-1FL6 feed motor with incremental encoder

<table>
<thead>
<tr>
<th>Length</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 m</td>
<td>6FX3002-2CT10-1AD0</td>
</tr>
<tr>
<td>5 m</td>
<td>6FX3002-2CT10-1AF0</td>
</tr>
<tr>
<td>7 m</td>
<td>6FX3002-2CT10-1BA0</td>
</tr>
<tr>
<td>10 m</td>
<td>6FX3002-2CT10-1BF0</td>
</tr>
<tr>
<td>15 m</td>
<td>6FX3002-2CT10-1CF0</td>
</tr>
<tr>
<td>20 m</td>
<td>6FX3002-2CT10-1CA0</td>
</tr>
</tbody>
</table>

Pre-assembled power cable
4 x 1.5 mm² SINUMERIK 808D – SIMOTICS S-1FL6 feed motor

<table>
<thead>
<tr>
<th>Length</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 m</td>
<td>6FX3002-5CL01-1AD0</td>
</tr>
<tr>
<td>5 m</td>
<td>6FX3002-5CL01-1AF0</td>
</tr>
<tr>
<td>7 m</td>
<td>6FX3002-5CL01-1AH0</td>
</tr>
<tr>
<td>10 m</td>
<td>6FX3002-5CL01-1BA0</td>
</tr>
<tr>
<td>15 m</td>
<td>6FX3002-5CL01-1BF0</td>
</tr>
<tr>
<td>20 m</td>
<td>6FX3002-5CL01-1CA0</td>
</tr>
</tbody>
</table>

Pre-assembled power cable
4 x 2.5 mm² SINUMERIK 808D – SIMOTICS S-1FL6 feed motor

<table>
<thead>
<tr>
<th>Length</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 m</td>
<td>6FX3002-5CL11-1AD0</td>
</tr>
<tr>
<td>5 m</td>
<td>6FX3002-5CL11-1AF0</td>
</tr>
<tr>
<td>7 m</td>
<td>6FX3002-5CL11-1AH0</td>
</tr>
<tr>
<td>10 m</td>
<td>6FX3002-5CL11-1BA0</td>
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<tr>
<td>15 m</td>
<td>6FX3002-5CL11-1BF0</td>
</tr>
<tr>
<td>20 m</td>
<td>6FX3002-5CL11-1CA0</td>
</tr>
</tbody>
</table>

Pre-assembled brake cable
SINUMERIK 808D – SIMOTICS S-1FL6 feed motor with brake

<table>
<thead>
<tr>
<th>Length</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 m</td>
<td>6FX3002-5BL02-1AD0</td>
</tr>
<tr>
<td>5 m</td>
<td>6FX3002-5BL02-1AF0</td>
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<tr>
<td>7 m</td>
<td>6FX3002-5BL02-1AH0</td>
</tr>
<tr>
<td>10 m</td>
<td>6FX3002-5BL02-1BA0</td>
</tr>
<tr>
<td>15 m</td>
<td>6FX3002-5BL02-1BF0</td>
</tr>
<tr>
<td>20 m</td>
<td>6FX3002-5BL02-1CA0</td>
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</table>
## Technical specifications

<table>
<thead>
<tr>
<th>Article No.</th>
<th>Product name</th>
<th>No. of cores</th>
<th>Degree of protection (when closed and connected)</th>
<th>Certificate of suitability</th>
<th>Rated voltage $U_0/U$</th>
<th>Test voltage, rms</th>
<th>Operating temperature on the surface</th>
<th>Tensile stress, max.</th>
<th>Smallest bending radius</th>
<th>Torsional stress</th>
<th>Bending</th>
<th>Insulation material, incl. jacket</th>
<th>Oil resistance</th>
<th>Outer jacket</th>
<th>Flame-retardant</th>
</tr>
</thead>
</table>
# Integration

<table>
<thead>
<tr>
<th>SINAMICS V70 spindle drive</th>
<th>Article No.</th>
<th>Pre-assembled cables</th>
</tr>
</thead>
<tbody>
<tr>
<td>X10</td>
<td>6FC5548-0BA20-....</td>
<td>SINUMERIK 808D PPU 161.3/PPU 160.3 (setpoint)</td>
</tr>
<tr>
<td></td>
<td>3/5/7/10/15/20 m (9.8/16/23/32/49/64 ft)</td>
<td></td>
</tr>
<tr>
<td>X11</td>
<td>6FC5548-0BA20-....</td>
<td>SINAMICS V70 X10</td>
</tr>
<tr>
<td></td>
<td>0.25/0.35/1 m (0.82/1.1/3 ft)</td>
<td></td>
</tr>
<tr>
<td>X9</td>
<td>6FX3002-2CT30-....</td>
<td>TTL encoder in SIMOTICS M-1PH1 motor</td>
</tr>
<tr>
<td></td>
<td>3/5/7/10/15/20 m (9.8/16/23/32/49/64 ft)</td>
<td></td>
</tr>
<tr>
<td>U / V / W</td>
<td>6FX5008-1BB21-1DA0</td>
<td>SIMOTICS M-1PH1 motor</td>
</tr>
<tr>
<td></td>
<td>30 m (98 ft)</td>
<td></td>
</tr>
<tr>
<td>X6</td>
<td>24 V DC</td>
<td>power supply</td>
</tr>
<tr>
<td>L1 / L2 / L3</td>
<td>380 V 3 AC</td>
<td>main supply</td>
</tr>
</tbody>
</table>

Connection overview for SINAMICS V70 spindle drive:

- Connector with pin contacts
- Connector with socket contacts
- Exposed core ends

- Cable is not included in the scope of delivery. It must be provided by the customer.
## Technical specifications

<table>
<thead>
<tr>
<th>Article No.</th>
<th>Product name</th>
<th>No. of cores</th>
<th>Degree of protection</th>
<th>Certificate of suitability</th>
<th>Rated voltage</th>
<th>Operating temperature on the surface</th>
<th>Smallest bending radius</th>
<th>Bending</th>
<th>Shielding</th>
<th>Oil resistance</th>
<th>Outer jacket</th>
<th>Flame-retardant</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6FX5008-1BB21-1DA0</td>
<td>MOTION-CONNECT 500 power cable</td>
<td>4</td>
<td>–</td>
<td>Yes</td>
<td>1000 V</td>
<td>-20 … +80 °C</td>
<td>5 × outer diameter</td>
<td>100000</td>
<td>Yes (coverage ≥ 80 %)</td>
<td>DIN VDE 472-803 Part B</td>
<td>PVC</td>
<td>IEC 332.1</td>
<td>Article No.</td>
</tr>
<tr>
<td>6FX5008-1BB31-1DA0</td>
<td>MOTION-CONNECT 500 power cable</td>
<td>4</td>
<td>–</td>
<td>Yes</td>
<td>30 V</td>
<td>-30 … +90 °C</td>
<td>5 × outer diameter</td>
<td>100000</td>
<td>Yes</td>
<td>EN 60811-2-1</td>
<td>PVC</td>
<td>EN 60332-1-1 to 1-3</td>
<td>Article No.</td>
</tr>
<tr>
<td>6FX5008-1BB51-1DA0</td>
<td>MOTION-CONNECT 500 power cable</td>
<td>10</td>
<td>IP20</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>Article No.</td>
</tr>
<tr>
<td>6FX5008-1BB61-1DA0</td>
<td>MOTION-CONNECT 500 power cable</td>
<td>10</td>
<td>IP20</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>Article No.</td>
</tr>
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</table>

For general information about MOTION-CONNECT please refer to Introduction.

## Selection and ordering data

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOTION-CONNECT 500 power cable 4 × 2.5 mm², sold by the meter, for SIMOTICS M-1PH1 motor 3.7 kW</td>
<td>6FX5008-1BB21-1DA0</td>
</tr>
<tr>
<td>Length 30 m</td>
<td></td>
</tr>
<tr>
<td>MOTION-CONNECT 500 power cable 4 × 4 mm², sold by the meter, for SIMOTICS M-1PH1 motor 5.5 kW to 7.5 kW</td>
<td>6FX5008-1BB31-1DA0</td>
</tr>
<tr>
<td>Length 30 m</td>
<td></td>
</tr>
<tr>
<td>MOTION-CONNECT 500 power cable 4 × 10 mm², sold by the meter, for SIMOTICS M-1PH1131-1.F... motor</td>
<td>6FX5008-1BB51-1DA0</td>
</tr>
<tr>
<td>Length 30 m</td>
<td></td>
</tr>
<tr>
<td>MOTION-CONNECT 500 power cable 4 × 16 mm², sold by the meter, for SIMOTICS M-1PH1133-1.D... motor and for SIMOTICS M-1PH1133-1.F... motor</td>
<td>6FX5008-1BB61-1DA0</td>
</tr>
<tr>
<td>Length 30 m</td>
<td></td>
</tr>
<tr>
<td>MOTION-CONNECT 300 pre-assembled signal cable SINAMICS V70 spindle drive – SIMOTICS M-1PH1 motor with incremental encoder</td>
<td>6FX3002-2CT30-1AD0</td>
</tr>
<tr>
<td>Length 3 m</td>
<td></td>
</tr>
<tr>
<td>5 m</td>
<td></td>
</tr>
<tr>
<td>7 m</td>
<td></td>
</tr>
<tr>
<td>10 m</td>
<td></td>
</tr>
<tr>
<td>15 m</td>
<td></td>
</tr>
<tr>
<td>20 m</td>
<td></td>
</tr>
</tbody>
</table>
Example package for Turning with SINUMERIK 808D ADVANCED T

### Overview

The following composition of an equipment package is an example of an inclined bed lathe with:

- 2 machining axes (X, Z)
- 1 digital spindle with direct spindle encoder
- 24 digital PLC input signals and 16 digital PLC output signals

### Designation

<table>
<thead>
<tr>
<th>Designation</th>
<th>Quantity</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINUMERIK CNC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SINUMERIK 808D ADVANCED T PPU 160.3 vertical, English layout</td>
<td>1</td>
<td>6FC5370-2BT03-0AA0</td>
</tr>
<tr>
<td>SINUMERIK 808D MCP vertical, with handwheel slot, English layout</td>
<td>1</td>
<td>6FC5303-0AF35-3AA0</td>
</tr>
<tr>
<td>Actuating element, 22 mm, latching mushroom pushbutton, red</td>
<td>1</td>
<td>3SB3000-1HA20</td>
</tr>
<tr>
<td>Contact block with 2 contacts, 1 NO + 1 NC, 2-pole screw terminal</td>
<td>1</td>
<td>3SB3400-0A</td>
</tr>
<tr>
<td>Stabilized power supply, SITOP PSU200M 24 V, 5 A</td>
<td>1</td>
<td>6EP1333-3BA10</td>
</tr>
<tr>
<td>RS422 (TTL) incremental encoder, 1024 S/R</td>
<td>1</td>
<td>6FX2001-2EB02</td>
</tr>
<tr>
<td>Spring disk coupling, shaft diameter 6 mm/6 mm</td>
<td>1</td>
<td>6FX2001-7KF10</td>
</tr>
<tr>
<td>Clamp strap for encoders with Synchro flange</td>
<td>3</td>
<td>6FX2001-7KP01</td>
</tr>
<tr>
<td>Pre-assembled bus cable PPU 160.3 – SINAMICS V70, length 5 m</td>
<td>1</td>
<td>6FC5548-0BA20-1AF0</td>
</tr>
<tr>
<td>Pre-assembled bus cable SINAMICS V70 – SINAMICS V70, length 0.25 m</td>
<td>2</td>
<td>6FC5548-0BA20-1AA2</td>
</tr>
<tr>
<td>Pre-assembled signal cable PPU 160.3 – handwheel, length 1 m</td>
<td>1</td>
<td>6FX8002-2BB01-1AB0</td>
</tr>
<tr>
<td>Pre-assembled signal cable PPU 160.3 – incremental spindle encoder (TTL), length 5 m</td>
<td>1</td>
<td>6FX8002-2CD01-1AF0</td>
</tr>
</tbody>
</table>

### SINAMICS V70

| SINAMICS V70 | | |
| SINAMICS V70, \(I_{\text{rated}}\) 3.0 A | 1 | 6SL3210-5DE13-5UA0 |
| SINAMICS V70, \(I_{\text{rated}}\) 5.3 A | 1 | 6SL3210-5DE17-8UA0 |
| SINAMICS V70 spindle \(^1\), \(I_{\text{rated}}\) 19.6 A | 1 | 6SL3210-5DE22-0UA0 |

\(^1\) For braking resistor selection, please refer to page 4/19.

### Power cables

<table>
<thead>
<tr>
<th>Power cable</th>
<th>Seller</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 × 1.5 mm(^2), sold by the meter</td>
<td>(optional)</td>
<td>30 m</td>
</tr>
</tbody>
</table>

\(^2\) The 30 m power cables (raw cables) listed above could be selected for use with 1PH1 motors. You must assemble the power cable with connectors by yourself. You could also select the third party power cable by yourselves according to the system configuration.

### SIMOTICS motors

| SIMOTICS motors | | |
| SIMOTICS S-1FL6 feed motor, 4 Nm, 2000 rpm, absolute encoder, plain shaft, without holding brake | 1 | 1FL6061-1AC61-0LG1 |
| SIMOTICS S-1FL6 feed motor, 11 Nm, 2000 rpm, absolute encoder, plain shaft, with holding brake | 1 | 1FL6066-1AC61-0HL1 |
| SIMOTICS M-1PH1 main motor, 53 Nm, 1000 rpm, incremental encoder, plain shaft | 1 | 1PH1105-1LD10-0GA0 |
Overview

The following composition of an equipment package is an example of a vertical machining center with:

- 3 machining axes (X, Y, Z)
- 1 digital spindle without direct spindle encoder
- 35 digital PLC input signals and 22 digital PLC output signals

### Designation | Quantity | Article No.
--- | --- | ---
**SINUMERIK CNC** |  |  
SINUMERIK 808D ADVANCED M PPU 161.3 horizontal, English layout | 1 | 6FC5370-2AM03-0AA0  
SINUMERIK 808D MCP, English layout | 1 | 6FC5303-0AF35-0AA0  
Actuating element, 22 mm, latching mushroom pushbutton, red | 1 | 3SB3000-1HA20  
Contact block with 2 contacts, 1 NO + 1 NC, 2-pole screw terminal | 1 | 3SB3400-0A  
Electronic handwheel with front panel 120 mm × 120 mm, with setting wheel 5 V DC, RS422 | 1 | 6FC0320-5DB01  
Terminal strip converter 50-pole | 1 | 6EP5406-5AA00  
Cable set, 50-pole ribbon cable, with insulation displacement connectors, 50-pole | 1 | 6EP5306-5BG00  
Stabilized power supply, SITOP PSU200M 24 V, 5 A | 1 | 6EP1333-3BA10  
Pre-assembled bus cable PPU 161.3 – SINAMICS V70, length 5 m | 1 | 6FC5548-0BA20-1AF0  
Pre-assembled bus cable SINAMICS V70 – SINAMICS V70, length 0.25 m | 2 | 6FC5548-0BA20-1AA2  
Pre-assembled signal cable PPU 161.3 – handwheel, length 1 m | 1 | 6FC5548-0BA20-1AB0  
Pre-assembled signal cable PPU 161.3 – incremental spindle encoder (TTL), length 7 m | 1 | 6FX8002-2CD01-1AB0  
**SINAMICS V70** |  |  
SINAMICS V70, \(i_{\text{rated}}\) 4.6 A | 2 | 6SL3210-5DE16-0UA0  
SINAMICS V70, \(i_{\text{rated}}\) 7.8 A | 1 | 6SL3210-5DE21-0UA0  
SINAMICS V70 spindle1), \(i_{\text{rated}}\) 19.6 A | 1 | 6SL3210-5DE22-0UA0  
Pre-assembled signal cable SINAMICS V70 – incremental encoder in SIMOTICS S-1FL6 feed motor, length 10 m | 3 | 6FX3002-2CT10-1BA0  
Pre-assembled power cable 4 × 2.5 mm² SINAMICS V70 – SIMOTICS S-1FL6 feed motor, length 10 m | 3 | 6FX3002-5CL11-1BA0  
Pre-assembled brake cable SINAMICS V70 – brake in SIMOTICS S-1FL6 feed motor, length 10 m | 1 | 6FX3002-5BL02-1BA0  
Pre-assembled signal cable SINAMICS V70 – incremental encoder for spindle, length 10 m | 1 | 6FX3002-2CT30-1BA0  
Power cable 4 × 4 mm², sold by the meter, (optional)2) SINAMICS V70 – SIMOTICS M-1PH1 main motor, length 30 m | 1 | 6FX5008-1BB31-1DA0  
**SIMOTICS motors** |  |  
SIMOTICS S-1FL6 feed motor, 8 Nm, 2000 rpm, incremental encoder, plain shaft, without holding brake | 2 | 1FL6064-1AC61-0AG1  
SIMOTICS S-1FL6 feed motor, 15 Nm, 2000 rpm, incremental encoder, plain shaft, with holding brake | 1 | 1FL6067-1AC61-0AH1  
SIMOTICS M-1PH1 main motor, 48 Nm, 1500 rpm, incremental encoder, plain shaft | 1 | 1PH1105-1LF12-0GA0

1) For braking resistor selection, please refer to page 4/19.  
2) The 30 m power cables (raw cables) listed above could be selected for use with 1PH1 motors. You must assemble the power cable with connectors by yourself. You could also select the third party power cable by yourselves according to the system configuration.
Accessories

- **Operator components**
  - Electronic handwheel

- **Supplementary components**
  - Terminal strip converter
  - SITOP power supply

- **Direct spindle encoder**
# Electronic handwheel

## Overview

Electronic handwheel

This handwheel generates signals which correspond to the movements of the handwheel as it is turned. The axis selected via the control can be positioned. The handwheels are equipped with a magnetic latching mechanism that supports traversing with incremental accuracy. The front panel can be removed.

## Technical specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic handwheel</td>
<td>6FC9320-5DB01</td>
</tr>
<tr>
<td>With front panel</td>
<td>6FC9320-5DC01</td>
</tr>
<tr>
<td>120 mm × 120 mm, with setting wheel</td>
<td>6FC9320-5DM00</td>
</tr>
<tr>
<td>With front panel</td>
<td>6FC9320-5DF01</td>
</tr>
<tr>
<td>76.2 mm × 76.2 mm, with setting wheel</td>
<td>6FC9320-5DN00</td>
</tr>
<tr>
<td>Without front panel, with small setting wheel</td>
<td>6FC9320-5DN00</td>
</tr>
<tr>
<td>Without front panel, without setting wheel, for installation</td>
<td></td>
</tr>
</tbody>
</table>

### Selection and ordering data

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapter set</td>
<td>6FC9320-5DN00</td>
</tr>
<tr>
<td>For installation in front panel with 3-hole fixing</td>
<td></td>
</tr>
</tbody>
</table>

### Technical specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article No.</td>
<td>6FC9320-5DB01</td>
</tr>
<tr>
<td>Rated name</td>
<td>Electronic handwheel</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>5 V DC ± 5 %</td>
</tr>
<tr>
<td>Rated current, max.</td>
<td>60 mA</td>
</tr>
<tr>
<td>Interface</td>
<td>RS422 (TTL)</td>
</tr>
<tr>
<td>Phase angle of pulse sequence A to B</td>
<td>90° electrical</td>
</tr>
<tr>
<td>Pulses</td>
<td>2 × 100 S/R</td>
</tr>
<tr>
<td>Actuating force</td>
<td>8 N cm</td>
</tr>
<tr>
<td>Output frequency, max.</td>
<td>2 kHz</td>
</tr>
<tr>
<td>Distance to PPU, max.</td>
<td>25 m</td>
</tr>
<tr>
<td>Degree of protection according to EN 60529 (IEC 60529)</td>
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</tr>
<tr>
<td>Front</td>
<td>IP65</td>
</tr>
<tr>
<td>Rear</td>
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<tr>
<td>Relative humidity</td>
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</tr>
<tr>
<td>Storage</td>
<td>10 ... 95 % at 25 °C</td>
</tr>
<tr>
<td>Transport</td>
<td>10 ... 95 % at 25 °C</td>
</tr>
<tr>
<td>Operation</td>
<td>5 ... 80 % at 25 °C</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td>-40 ... +85 °C</td>
</tr>
<tr>
<td>Transport</td>
<td>-40 ... +85 °C</td>
</tr>
<tr>
<td>Operation</td>
<td>0 ... 70 °C</td>
</tr>
<tr>
<td>Weight, approx.</td>
<td>0.6 kg</td>
</tr>
<tr>
<td>Approvals, according to cULus</td>
<td></td>
</tr>
<tr>
<td>S/R = Signals/Revolution</td>
<td></td>
</tr>
</tbody>
</table>
Electronic handwheel

Dimensional drawings

Electronic handwheel without front panel without setting wheel

Electronic handwheel with front panel 76.2 mm × 76.2 mm
**Electronic handwheel**

### Dimensional drawings (continued)

1. Electronic handwheel with front panel 120 mm × 120 mm

2. Electronic handwheel without front panel with small setting wheel

---

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Overview

Terminal strip converter

The SINUMERIK 808D PPU 141.1/SINUMERIK 808D ADVANCED PPU 16x.3 feature 24 digital PLC inputs and 16 digital PLC outputs which can be connected directly using screw-clamps on the PPU.

In addition, the PPU 141.1/PPU 16x.3 feature 48 digital PLC inputs and 32 digital PLC outputs which can be connected via 2 terminal strip converters.

This allows the connection of process signals directly in the cabinet with significantly reduced wiring efforts.

Design

Connection of PLC process signals
- Screw-clamps
  - 24 digital inputs
  - 16 digital outputs

Connection to PPU
- Ribbon cable, 50-pole
- Insulation displacement connectors

Cabinet mounting
- Standard mounting rails

Selection and ordering data

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal strip converter</td>
<td>6EP5406-5AA00</td>
</tr>
<tr>
<td>50-pole</td>
<td></td>
</tr>
<tr>
<td>Cable set</td>
<td>6EP5306-5BG00</td>
</tr>
<tr>
<td>Ribbon cable, 50-pole,</td>
<td></td>
</tr>
<tr>
<td>length: 6 m</td>
<td></td>
</tr>
<tr>
<td>8 insulation displacement connectors, 50-pole</td>
<td></td>
</tr>
</tbody>
</table>

Dimensional drawings

Terminal strip converter
SITOP smart power supply units

The 24 V power supply units from the SITOP range are optimized for industrial use and operate on the switched-mode principle. Due to the precisely regulated output voltage, the devices are even suitable for the connection of sensitive sensors.

**SITOP smart**

Slimline dimensions, strong performance. SITOP smart requires little space on the mounting rail and offers high performance at a reasonable price. With its tolerant overload response, even loads with a high inrush current can be smoothly switched on. If required, 50 % extra power is made available for 5 seconds.

**Benefits**

- High efficiency
- Low space requirements and easy installation
- Exact output voltage and low residual ripple
- Integrated short-circuit protection and safe electrical separation
- National and international approvals
- No release of silicone

---

**Selection and ordering data**

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stabilized power supply SITOP smart</td>
<td>6EP1333-3BA10</td>
</tr>
<tr>
<td>SITOP PSU200M 24 V/5 A</td>
<td></td>
</tr>
<tr>
<td>Input voltage:</td>
<td></td>
</tr>
<tr>
<td>120 V/230 V AC</td>
<td></td>
</tr>
<tr>
<td>(85 ... 264 V/176 ... 550 V AC)</td>
<td></td>
</tr>
<tr>
<td>Output voltage:</td>
<td></td>
</tr>
<tr>
<td>24 V DC ± 3 %</td>
<td></td>
</tr>
<tr>
<td>Approvals: cULus, CSA</td>
<td></td>
</tr>
<tr>
<td>Stabilized power supply SITOP smart</td>
<td>6EP1334-2BA20</td>
</tr>
<tr>
<td>PSU100S 24 V/10 A</td>
<td></td>
</tr>
<tr>
<td>Input voltage:</td>
<td></td>
</tr>
<tr>
<td>120 V/230 V AC</td>
<td></td>
</tr>
<tr>
<td>(85 ... 132 V/170 ... 264 V AC)</td>
<td></td>
</tr>
<tr>
<td>Output voltage:</td>
<td></td>
</tr>
<tr>
<td>24 V DC ± 3 %</td>
<td></td>
</tr>
<tr>
<td>Approvals: cULus, CSA</td>
<td></td>
</tr>
</tbody>
</table>

---

**More information**

You can find additional information in Catalog KT 10.1 or on the Internet at:

- www.siemens.com/sitop
- www.siemens.com/industrymall

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**Dimensional drawings**

Stabilized power supply SITOP smart 5 A

Stabilized power supply SITOP smart 10 A
**Application**

RS422 (TTL) incremental encoder

The optoelectronic incremental TTL encoders are tailored for the use as direct spindle encoders in conjunction with the SINUMERIK 808D CNCs.

**Design**

The direct incremental spindle encoder features a Synchro flange and can be attached to the machine with 3 clamp straps and a spring disk coupling.

The encoder supply voltage of 5 V DC is provided by the SINUMERIK 808D CNC.

The direct incremental spindle encoder delivers 1024 pulses per revolution which are multiplied by the factor of 4 internally to reach the precision level suitable for standard lathes and milling machines.

Incremental encoders operate on the principle of optoelectronic scanning of dividing disks with the transmitted light principle. With an appropriate arrangement of the line pattern on the dividing disk connected to the shaft and the fixed aperture, the optoelectronic elements provide two trace signals A and B at 90° to one another, as well as a reference signal R. The encoder electronics amplify these signals and convert them into different output levels.
## Direct spindle encoder

### Technical specifications

<table>
<thead>
<tr>
<th>Article No.</th>
<th>Product name</th>
<th>6FX2001-2EB02</th>
<th>RS422 (TTL) incremental encoder for spindle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage $U_p$ on encoder</td>
<td>5 V DC ± 10 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scanning frequency, max.</td>
<td>300 kHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No-load current consumption, max.</td>
<td>150 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signal level</td>
<td>RS422 (TTL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outputs protected against short-circuit to 0 V</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching time (10 ... 90 %) (1 m cable and recommended input circuit)</td>
<td>Rise/fall time $t_+ / t_- \leq 50$ ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase angle, signal A to B</td>
<td>90°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edge spacing, min. $\leq 0.45 \mu$s</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable length to downstream electronics, max.</td>
<td>100 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED failure monitoring</td>
<td>High-resistance driver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution, max.</td>
<td>1024 S/R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy (in angular seconds)</td>
<td>± 18 mech. x 3600/number of signals/revolution $z$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed, max.</td>
<td>12000 rpm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starting torque (at 20 °C)</td>
<td>≤ 0.01 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaft loading capacity</td>
<td>40 N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Axial</td>
<td>60 N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Radial at shaft extension</td>
<td>10 N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Axial</td>
<td>20 N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaft diameter</td>
<td>6 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaft length</td>
<td>10 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angular acceleration, max.</td>
<td>10° rad/s²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moment of inertia of rotor</td>
<td>$2.9 \times 10^{-6}$ kgm²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration (55 ... 2000 Hz) to EN 60068-2-6</td>
<td>≤ 300 m/s²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock to EN 60068-2-27</td>
<td>≤ 2000 m/s²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree of protection to EN 60529 (IEC 60529)</td>
<td>IP67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- At housing</td>
<td>IP64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- At $U_p = 5$ V ± 10 %</td>
<td>-40 ... +100 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight, approx.</td>
<td>0.3 kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMC</td>
<td>EMC guideline 2004/108/EG and regulations of the EMC guidelines (generic standards)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certificate of suitability</td>
<td>CE, CSA, UL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S/R = Signals/Revolution</td>
<td></td>
<td></td>
<td></td>
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### Technical specifications (continued)

<table>
<thead>
<tr>
<th>Article No.</th>
<th>Product name</th>
<th>6FX2001-7KF10</th>
<th>Spring disk coupling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transferable torque, max.</td>
<td>0.8 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaft diameter</td>
<td>6 mm both ends</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Center offset of shafts, max.</td>
<td>0.4 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axial displacement</td>
<td>± 0.4 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angular displacement of shafts, max.</td>
<td>3°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torsional rigidity</td>
<td>150 Nm/rad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral spring stiffness</td>
<td>6 N/mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moment of inertia</td>
<td>19 gcm²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed, max.</td>
<td>12000 rpm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Operation</td>
<td>12000 rpm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight, approx.</td>
<td>16 g</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Selection and ordering data

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS422 (TTL) incremental encoder</td>
<td>6FX2001-2EB02</td>
</tr>
<tr>
<td>Synchro flange</td>
<td></td>
</tr>
<tr>
<td>5 V DC supply voltage</td>
<td></td>
</tr>
<tr>
<td>Radial flange outlet 1024 S/R</td>
<td></td>
</tr>
<tr>
<td>Spring disk coupling</td>
<td>6FX2001-7KF10</td>
</tr>
<tr>
<td>For shaft diameter 6 mm/6 mm</td>
<td></td>
</tr>
<tr>
<td>Clamp strap (1 unit)</td>
<td>6FX2001-7KP01</td>
</tr>
<tr>
<td>For encoders with Synchro flange (3 units are required)</td>
<td></td>
</tr>
<tr>
<td>S/R = Signals/Revolution</td>
<td></td>
</tr>
</tbody>
</table>

---

1) With recommended cable and input circuitry of the downstream electronics, observe max. permissible cable length of module to be evaluated.
RS422 (TTL) incremental encoder

Spring disk coupling, \( d_1 = d_2 = 6 \text{ mm} \)
Services and training

6/2 Services
   6/2 Material warranty and on-site service

6/3 Training
   6/3 Training services
   6/4 SINUMERIK 808D on PC

6/5 Siemens Automation Cooperates with Education
   6/5 Simplify your education in automation

6/7 Documentation
   6/7 Specific documentation for SINUMERIK 808D
   6/8 Specific documentation for SINUMERIK 808D ADVANCED
Services and training

Services

Material warranty and on-site service

Overview

Equipment package SINUMERIK 808D ADVANCED T, PPU 161.3, horizontal with MCP - SINAMICS V70 FSA ... FSD, 400 V 3 AC – SIMOTICS S-1FL6 servomotors - SIMOTICS M-1PH1 main motor – MOTION-CONNECT 300 cables

For the SINUMERIK 808D/SINUMERIK 808D ADVANCED and the associated components¹ by Siemens DF & PD you will receive a material warranty and free on-site service of up to 36 months².

More information

For the material warranty and on-site support the same scope as for Repair Service Contracts applies. Further information can be found at:

www.siemens.com/automation/oss

¹) Not applicable to complete motor spindles.
²) Standard warranty period: 24 months from 1st delivery of equipment package from Siemens factory. Extended warranty period: 36 months from 1st delivery of equipment package from Siemens factory. When registration completed within standard warranty period.
Overview

Siemens offers training directly from the manufacturer and thus first-hand know-how. The training courses comprise Siemens’ entire product and system range in the area of automation and drive technology as well as further training regarding branch and system solutions.

Benefits

- Training centers in more than 60 countries.
- Standardized or individual training courses.
- Teaching of basic knowledge, advanced and special knowledge.
- Training makes optimum use and adjustment of products and systems possible.

More information

You can find additional information on the Internet at:

Overview

SINUMERIK 808D on PC is a PC-based CNC training/CNC programming software package. SINUMERIK 808D on PC enables completely identical CNC operation and CNC programming as on the SINUMERIK 808D or SINUMERIK 808D ADVANCED. SINUMERIK 808D on PC can be used for the following applications:

- Self-study or professional training of SINUMERIK 808D/SINUMERIK 808D ADVANCED operation and CNC programming
- Offline CNC program creation and simulation
- Professional presentation of SINUMERIK 808D/SINUMERIK 808D ADVANCED operation and CNC programming

Benefits

- User-friendly, control-identical simulation of operation and CNC programming of SINUMERIK controls on the PC
- Maximum compatibility thanks to integrated original SINUMERIK CNC software
- Accurate simulation of machine operation with inexpensive virtual machine control panel
- Optimum training software for the most common CNC programming styles – ISO code and SINUMERIK style CNC programming
- Easy CNC program exchange via PC and CNC of machine via USB memory stick
- The full version of SINUMERIK 808D on PC can be downloaded free of charge

Function

Technologies and machine types

SINUMERIK 808D on PC can be used for the following most common machine types:

- Vertical machining centers or milling machines with geometry axes X, Y, Z and a main spindle
- Turning machines with geometry axes X, Z and a main spindle

If the SINUMERIK 808D/SINUMERIK 808D ADVANCED of the target machine has been configured with the standard parameters, CNC programs created with SINUMERIK 808D on PC can be executed on the machine without any program adaptations.

Accurate simulation of real operator control on the machine

With its fully-fledged virtual machine control panel, SINUMERIK 808D on PC offers functions such as CNC Start, CNC Stop, feedrate and spindle override or direction keys and can therefore be operated just like a real machine.

Online help

Like a SINUMERIK 808D/SINUMERIK 808D ADVANCED, SINUMERIK 808D on PC also offers a context-based online help.

Languages

The following languages are available:

- English
- Chinese Simplified
- Russian
- Portuguese

Free download

SINUMERIK 808D on PC can be downloaded free of charge at:

www.cnc4you.siemens.com

Integration

SINUMERIK 808D on PC can be used for:

- SINUMERIK 808D Turning
- SINUMERIK 808D Milling
- SINUMERIK 808D ADVANCED T
- SINUMERIK 808D ADVANCED M

Preconditions

Hardware

- PC with 1.5 GHz processor (single core)
- RAM: 1 GB
- Hard disk: 2 GB of free memory space
- DVD drive for installation from DVD
- Graphics card: Minimum resolution 640 x 480 pixels
- USB interface
- Mouse, keyboard

Software

- Operating system Windows XP SP3 32 bit Professional/Home Edition
- Operating system Windows 7 32 bit/64 bit
- Adobe Acrobat Reader

Selection and ordering data

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINUMERIK 808D on PC on DVD-ROM</td>
<td>6FC5548-0YC20-0YA0</td>
</tr>
</tbody>
</table>

1) Coming soon.
Unique support for educators and students in educational institutions

Siemens Automation Cooperates with Education (SCE)

SCE offers a global system for sustained support of technical skills. SCE supports educational institutions in their teaching assignment in the industrial automation sector and offers added value in the form of partnerships, technical expertise, and know-how. As the technological leader, our comprehensive range of services can support you in the knowledge transfer for Industry 4.0.

Our services at a glance
- Training curriculums for your lessons
- Trainer packages for hands-on learning
- Courses convey up-to-date, specialist knowledge
- Support for your projects/textbooks
- Complete didactic solutions from our partners for your lessons
- Personal contact for individual support

Training curriculums for your lessons

Use our profound industrial know-how for practice-oriented and individual design of your course. We offer you more than 100 didactically prepared training curriculums on the topics of automation and drives technology free of charge. These materials are perfectly matched to your curricula and syllabuses, and optimally suited for use with our trainer packages. This takes into account all aspects of a modern industrial solution: installation, configuration, programming, and commissioning. All documents, including projects, can be individually matched to your specific requirements.

Particular highlights:
- The new SIMATIC PCS 7 curriculums and trainer packages. Using plant simulation, you can pass on basic, practice-oriented PCS 7 knowledge at universities within about 60 hours (= 1 semester).
- The new TIA Portal training materials for SIMATIC S7-1500/ S7-1200/S7-300 are available in English, German, French, Italian, Spanish, Portuguese and Chinese for download.

www.siemens.com/sce/curriculums

Trainer packages for hands-on learning

Our SCE trainer packages offer a specific combination of original industrial components which are perfectly matched to your requirements and can be conveniently used in your course. These price-reduced bundles available exclusively to schools include innovative and flexible hardware and software packages.

SCE currently offers more than 80 SCE trainer packages including related equipment e.g. Micro Memory. These cover both the factory and process automation sectors. You can use them to impart the complete course contents on industrial automation at a very low cost.

Trainer packages are available for:
- Introduction to automation technology with LOGO! logic module
- PLC engineering with SIMATIC S7 hardware and STEP 7 software (S7-1500/S7-1200/S7-300 and TIA Portal)
- Operator control and monitoring with SIMATIC HMI
- Industrial networking over bus systems with SIMATIC NET (PROFINET, PROFIBUS, IO-Link)
- Sensor systems with VISION, RFID and SIWAREX
- Process automation with SIMATIC PCS 7
- Networked drive and motion technologies with SINAMICS/SIMOTION
- Power Monitoring Devices SENTRON PAC4200
- Motor Management SIMOCODE
- CNC programming with SinuTrain

Important ordering notes:
Only the following institutions are authorized to obtain trainer packages: vocational schools, Colleges and Universities, in-house vocational training departments, non commercial research institutions and non commercial training departments.

To purchase a trainer package, you require a specific end-use certificate, which you can obtain from your regional sales office.

www.siemens.com/sce/tp
Services and training
Siemens Automation Cooperates with Education

Simplify your education in automation

Unique support for educators and students in educational institutions (continued)

Courses convey up-to-date specialist knowledge
As a particular service, SCE supports technical authors with our know-how as well as with intensive technical consulting. Siemens library of special textbooks covering the industrial automation sector provides an additional resource for you and your students. These can be found at the SCE web site.
www.siemens.com/sce/contact
www.siemens.com/sce/books

Profit from our excellent know-how as the leader in industrial technologies. We offer you specific courses for automation and drive technology worldwide. These support you in the practice-oriented transferring of product and system know-how, are in conformance with curriculums, and derived from the training fields. Compact technical courses especially for use at universities are also available.

Our range of courses comprises a wide variety of training modules based on the principle of Totally Integrated Automation (TIA). The focus is on the same subject areas as with the SCE trainer packages.

Every PLC and drive course is oriented on state-of-the-art technology. Your graduates can thus be prepared optimally for their future professional life.

In some countries we are offering classes based on our training curriculums. Please inquire with your SCE contact partner.
www.siemens.com/sce/courses

Support for your projects/textbooks

Automation and drive technology is characterized by continuous and rapid developments. Service and Support therefore play an important role.

We can provide you with consulting for selected projects and support from your personal SCE contact as well as our web-based and regional Customer Support.

Our partners for learning systems offer a wide range of training systems and solutions for use in your courses or laboratory.

These models have been designed based on our trainer packages and thus save you the time and cost of self-construction of individual components. The Partner systems provide you with simple and effective help in the fulfillment of your teaching assignment.
www.siemens.com/sce/partner

Contact for individual support
You can find your personal SCE contact on our Internet site. Your local SCE Promoter will answer all your questions concerning the complete SCE offering, and provide you with timely and competent information about innovations. When you encounter challenges, you can profit from our global team of excellence.

If a direct SCE contact is not listed for your country, please contact your local Siemens office.
www.siemens.com/sce/contact

SCE Support Finder for your Internet request
You are an educator and need support on the topic of industry automation? Send us your request:
www.siemens.com/sce/supportfinder
Overview

Comprehensive documentation is available for the SINUMERIK 808D and SINUMERIK 808D ADVANCED CNC controls, including the SINAMICS V60 and SINAMICS V70 drive system. This documentation includes Operator’s Guides, Programming Guides or Configuration Guides, as well as Installation Guides.

Information is available in the following formats:
- Paper version, printed copy
- PDF file available for download on the Internet at: www.siemens.com/automation/support

You will find further information on the Internet at: www.siemens.com/motioncontrol/docu

<table>
<thead>
<tr>
<th>Description</th>
<th>Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific documentation for SINUMERIK 808D for machine tool manufacturers</td>
<td></td>
</tr>
<tr>
<td>SINUMERIK 808D Operating Instructions¹</td>
<td>6FC5397-2EP10-0BA0 6FC5397-2EP10-0RA0</td>
</tr>
<tr>
<td>Specific documentation for SINUMERIK 808D for users</td>
<td></td>
</tr>
<tr>
<td>SINUMERIK 808D Diagnostics Manual</td>
<td>6FC5398-6DP10-0BA0 6FC5398-6DP10-0RA0</td>
</tr>
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<td>SINUMERIK 808D Turning Programming and Operating Manual</td>
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¹ Includes:
- Mechanical Installation Manual
- Electrical Installation Manual
- Function Manual
- Parameter List Manual
- Diagnostics Manual
- PLC subroutines
### Selection and ordering data

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## Overview

Many of the products in this Catalog fulfill requirements, e.g. for UL, CSA or FM and are labeled with the corresponding approval designation.

All of the certificates of suitability, approvals, certificates, declarations of conformity, test certificates, e.g. CE, UL, Safety Integrated etc. have been performed with the associated system components as they are described in the Configuration Manuals.

The certificates are only valid if the products are used with the described system components, are installed according to the Installation Guidelines and used for their intended purpose.

In other cases, the vendor of these products is responsible for arranging for the issue of new certificates.

<table>
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<th>Test symbol</th>
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<th>Device series/ component</th>
<th>Test standard</th>
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**TUV: TUV Rheinland of North America Inc.**
Independent public testing body in North America, Nationally Recognized Testing Laboratory (NRTL)

**TÜV: TÜV Süd Product Service**
Independent public testing body in Germany, Nationally Recognized Testing Laboratory (NRTL) for North America
### Overview (continued)

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| **CSA: Canadian Standards Association**  
Independent public testing body in Canada |  | SINUMERIK | Standard CSA C22.2 No. 142 | 2252-01 : LR 102527 |
| **FMRC: Factory Mutual Research Corporation**  
Independent public testing body in North America |  | SINUMERIK | Standard FMRC 3620, FMRC 3611, FMRC 3810, ANSI/ISA S82.02.1 |  |
| **EAC: Ivanovo-Certificate**  
Independent public testing body in the Russian Federation |  | SINAMICS, SINUMERIK, SIMOTION | Standard IEC 61800-5-1/-2, IEC 61800-3 |  |
| **RCM: Australian Communications and Media Authority**  
Independent public testing body in Australia |  | SINAMICS, SINUMERIK, SIMOTION | Standard IEC AS 61800-3, EN 61800-3 |  |
| **KC: National Radio Research Agency**  
Independent public testing body in South Korea |  | SINAMICS, SINUMERIK, SIMOTION | Standard KN 11 |  |
| **BIA**  
Federal Institute for Occupational Safety |  | SINAMICS, SINUMERIK, SIMOTION | Standard EN 61800-5-2 |  |
| **TÜV SÜD Rail** |  | SINAMICS, SINUMERIK, SIMOTION | Standard EN 61800-5-2 |  |

More information about certificates can be found online at:  
https://support.industry.siemens.com/cs/ww/en/pb/cert
At Siemens we are resolutely pursuing the same goal: long-term improvement of your competitive ability. We are committed to this goal. Thanks to our commitment, we continue to set new standards in automation and drive technology. In all industries – worldwide.

At your service locally, around the globe for consulting, sales, training, service, support, spare parts ... on the entire Industry Automation and Drive Technologies range.

Your personal contact can be found in our Contacts Database at: www.siemens.com/automation-contact

You start by selecting
- the required competence,
- products and branches,
- a country,
- a city
  or by a
- location search or
- person search.
Overview

Siemens Solution and Approved Partners

Highest competence in automation and drive technology as well as power distribution

Siemens works closely together with selected partner companies around the world in order to ensure that customer requirements for all aspects of automation and drives, as well as power distribution, are fulfilled as best as possible – wherever you are, and whatever the time. It is for this reason that we systematically train and keep our partners well prepared, in addition to certifying them in specific technologies. It is our declared intention and goal to train and prepare our partners to the same standards as our own employees.

This approach is based on contractually agreed quality criteria as well as optimum support for our partners by providing clearly-defined processes. This ensures that they possess all the qualities to meet customer requirements optimally. The partner emblem is the guarantee and indicator of proven quality.

Solution Partners and Approved Partners

The Siemens Partner Program distinguishes between Solution Partners and Approved Partners.

At present we are working with more than 1,400 Solution Partners worldwide. They represent countless tailored and future-proof automation and drive solutions in the most diverse industries.

With their extensive technical product knowledge, Siemens Approved Partners offer a combination of goods and services that include specialist technologies, customized modifications and the provision of high-quality system and product packages. They also provide qualified technical support and assistance.

Partner Finder

In the Siemens global Solution Partner program, customers are certain to find the optimum partner for their specific requirements - with no great effort. The Partner Finder is basically a comprehensive database that showcases the profiles of all our solution partners.

Easy selection:
Set filters in the search screen form according to the criteria that are relevant to you. You can also directly enter the name of an existing partner.

Skills at a glance:
Gain a quick insight into the specific competencies of any particular partner with the reference reports.

Direct contact option:
Use our electronic query form:
www.siemens.com/partnerfinder

Additional information on the Siemens Solution Partner Program is available online at:
www.siemens.com/partner-program
Appendix
Online Services

Information and Ordering Options on the Internet and DVD

The Future of Manufacturing on the Internet

Detailed knowledge of the range of products and services available is essential when planning and engineering automation systems. It goes without saying that this information must always be as up-to-date as possible.

Industry is on the threshold of the fourth industrial revolution as digitization now follows after the automation of production. The goals are to increase productivity and efficiency, speed, and quality. In this way, companies can remain competitive on the path to the future of industry.

You will find everything you need to know about products, systems and services on the internet at:

www.siemens.com/industry

Product Selection Using the Interactive CA 01 Automation and Drives Catalog

Detailed information together with user-friendly interactive functions:

The CA 01 interactive catalog covers more than 100,000 products, thus providing a comprehensive overview of the product range provided by Siemens.

You will find everything you need here for solving tasks in the fields of automation, switching, installation and drives. All information is provided over a user interface that is both user-friendly and intuitive.

You can order the CA 01 product catalog from your Siemens sales contact or in the Information and Download Center:

www.siemens.com/industry/infocenter

Information about the CA 01 interactive catalog can be found on the Internet at:

www.siemens.com/automation/ca01

or on DVD.

Easy Shopping with the Industry Mall

The Industry Mall is the electronic ordering platform of Siemens AG on the Internet. Here you have online access to a huge range of products presented in an informative and attractive way.

Data transfer via EDIFACT allows the whole procedure, from selection through ordering to tracking and tracing, to be carried out online. Availability checks, customer-specific discounts and bid creation are also possible.

Numerous additional functions are provided for your support. For example, powerful search functions make it easy to select the required products. Configurators enable you to configure complex product and system components quickly and easily. CAx data types are also provided here.

You can find the Industry Mall on the Internet at:

www.siemens.com/industrymall
### Downloading Catalogs

In addition to numerous other useful documents, you can also find the catalogs listed on the back inside cover of this catalog in the Information and Download Center. You can download these catalogs in PDF format without having to register.

The filter dialog above the first catalog displayed makes it possible to carry out targeted searches. If you enter "MD 3" for example, you will find both the MD 30.1 and MD 31.1 catalogs. If you enter "IC 10", both the IC 10 catalog and the associated news or add-ons are displayed.

Visit us at:

[www.siemens.com/industry/infocenter](http://www.siemens.com/industry/infocenter)

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### Social and Mobile Media

Connect with Siemens through social media: visit our social networking sites for a wealth of useful information, demos on products and services, the opportunity to provide feedback, to exchange information and ideas with customers and other Siemens employees, and much, much more. Stay in the know and follow us on the ever-expanding global network of social media.

To find out more about Siemens' current social media activities, visit us at:

[www.siemens.com/socialmedia](http://www.siemens.com/socialmedia)

Or via our product pages at:


Connect with Siemens Industry at our central access point to read all the news on the future of manufacturing, watch current videos and inform yourself about all the latest industry developments:


Discover the world of Siemens.

We are also constantly expanding our offering of cross-platform apps for smartphones and tablets. You will find the current Siemens apps at the App Store (iOS) or at Google Play (Android):


https://play.google.com/store/search?q=siemens

The Siemens app, for example, tells you all about the history, latest developments and future plans of the company – with informative pictures, fascinating reports and the most recent press releases.
Appendix
Notes on software

Software licenses

■ Overview

Software types
Software requiring a license is categorized into types. The following software types have been defined:
- Engineering software
- Runtime software

Engineering software
This includes all software products for creating (engineering) user software, e.g. for configuring, programming, parameterizing, testing, commissioning or servicing.
Data generated with engineering software and executable programs can be duplicated for your own use or for use by third-parties free-of-charge.

Runtime software
This includes all software products required for plant/machine operation, e.g. operating system, basic system, system expansions, drivers, etc.
The duplication of the runtime software and executable programs created with the runtime software for your own use or for use by third-parties is subject to a charge.
You can find information about license fees according to use in the ordering data (e.g. in the catalog). Examples of categories of use include per CPU, per installation, per channel, per instance, per axis, per control loop, per variable, etc.
Information about extended rights of use for parameterization/configuration tools supplied as integral components of the scope of delivery can be found in the readme file supplied with the relevant product(s).

License types
- Floating license
- Single license
- Rental license
- Rental floating license
- Trial license
- Demo license
- Demo floating license

Floating license
The software may be installed for internal use on any number of devices by the licensee. Only the concurrent user is licensed. The concurrent user is the person using the program. Use begins when the software is started. A license is required for each concurrent user.

Single license
Unlike the floating license, a single license permits only one installation of the software per license. The type of use licensed is specified in the ordering data and in the Certificate of License (CoL). Types of use include for example per instance, per axis, per channel, etc.
One single license is required for each type of use defined.

Rental license
A rental license supports the sporadic use of engineering software. Once the license key has been installed, the software can be used for a specific period of time (the operating hours do not have to be consecutive).
One license is required for each installation of the software.

Rental floating license
The rental floating license corresponds to the rental license, except that a license is not required for each installation of the software. Rather, one license is required per each installation of the software, (for example, user or device).

Trial license
A trial license supports short-term use of the software in a non-productive context, e.g. for testing and evaluation purposes. It can be transferred to another license.

Demo license
The demo license support the sporadic use of engineering software in a non-productive context, for example, use for testing and evaluation purposes. It can be transferred to another license. After the installation of the license key, the software can be operated for a specific period of time, whereby usage can be interrupted as often as required.
One license is required per installation of the software.

Demo floating license
The demo floating license corresponds to the demo license, except that a license is not required for each installation of the software. Rather, one license is required per object (for example, user or device).

Certificate of License (CoL)
The CoL is the licensee’s proof that the use of the software has been licensed by Siemens. A CoL is required for every type of use and must be kept in a safe place.

Downgrading
The licensee is permitted to use the software or an earlier version/release of the software, provided that the licensee owns such a version/release and its use is technically feasible.

Delivery versions
Software is constantly being updated. The following delivery versions
- PowerPack
- Upgrade
can be used to access updates. Existing bug fixes are supplied with the ServicePack version.

PowerPack
PowerPacks can be used to upgrade to more powerful software. The licensee receives a new license agreement and CoL (Certificate of License) with the PowerPack. This CoL, together with the CoL for the original product, proves that the new software is licensed.
A separate PowerPack must be purchased for each original license of the software to be replaced.
Appendix
Notes on software

Software licenses

### Overview

**Upgrade**

An upgrade permits the use of a new version of the software on the condition that a license for a previous version of the product is already held. The licensee receives a new license agreement and CoL with the upgrade. This CoL, together with the CoL for the previous product, proves that the new version is licensed. A separate upgrade must be purchased for each original license of the software to be upgraded.

**ServicePack**

ServicePacks are used to debug existing products. ServicePacks may be duplicated for use as prescribed according to the number of existing original licenses.

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**License key**

Software products with and without license keys are supplied. The license key serves as an electronic license stamp and is also the switch for activating the software (floating license, rental license, etc.). The complete installation of software products requiring license keys includes the program to be licensed (the software) and the license key (which represents the license).

**Software Update Service (SUS)**

As part of the SUS contract, all software updates for the respective product are made available to you free of charge for a period of one year from the invoice date. The contract will automatically be extended for one year if it is not canceled three months before it expires.

The possession of the current version of the respective software is a basic condition for entering into an SUS contract.

You can download explanations concerning license conditions from:

Appendix

Notes on software

Setup texts and software update services

Overview

For supplies and deliveries of software products see also Conditions of sale and delivery.

Legal notes during setup for new software products

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<td>6FX2001-7KF10</td>
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<td>6FX2001-7KF01</td>
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<td>6FX3002-2CT10-1AD0</td>
<td>4/32</td>
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<tr>
<td>6FX3002-2CT10-1AF0</td>
<td>4/32</td>
</tr>
<tr>
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<td>6FX3002-2CT10-1BA0</td>
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<tr>
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<td>4/32</td>
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<td>6FX3002-2CT10-1CA0</td>
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<tr>
<td>6FX3002-2DB10-1AF0</td>
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<td>4/32</td>
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<tr>
<td>6FX3002-2DB10-1BF0</td>
<td>4/32</td>
</tr>
<tr>
<td>6FX3002-2DB10-1CA0</td>
<td>4/32</td>
</tr>
<tr>
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<td>4/32</td>
</tr>
<tr>
<td>6FX3002-5LE00-1AH0</td>
<td>4/32</td>
</tr>
<tr>
<td>6FX3002-5LE00-1BA0</td>
<td>4/32</td>
</tr>
<tr>
<td>6FX3002-5LE00-1BF0</td>
<td>4/32</td>
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<tr>
<td>6FX3002-5LE00-1AA0</td>
<td>4/32</td>
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<td>6FX3002-2CT30-1AD0</td>
<td>4/35</td>
</tr>
<tr>
<td>6FX3002-2CT30-1AH0</td>
<td>4/35</td>
</tr>
<tr>
<td>6FX3002-2CT30-1BF0</td>
<td>4/35</td>
</tr>
<tr>
<td>6FX3002-2CT30-1AA0</td>
<td>4/35</td>
</tr>
<tr>
<td>6FX3002-2CT30-1AD0</td>
<td>4/35</td>
</tr>
<tr>
<td>6FX3002-2CT30-1AH0</td>
<td>4/35</td>
</tr>
<tr>
<td>6FX3002-2CT30-1BF0</td>
<td>4/35</td>
</tr>
</tbody>
</table>

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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>lb-in²</th>
<th>lb-ft²</th>
<th>lb-in-s²</th>
<th>lb-ft-s²</th>
<th>kg-cm²</th>
<th>kg-cm-s²</th>
<th>gm-cm²</th>
<th>gm-cm-s²</th>
<th>oz-in²</th>
<th>oz-in-s²</th>
</tr>
</thead>
<tbody>
<tr>
<td>lb-in²</td>
<td>1</td>
<td>6.94 × 10⁻³</td>
<td>2.59 × 10⁻³</td>
<td>2.15 × 10⁻⁴</td>
<td>2.926</td>
<td>2.98 × 10⁻³</td>
<td>2.92 × 10⁻³</td>
<td>2.984</td>
<td>16</td>
<td>4.14 × 10⁻²</td>
<td></td>
</tr>
<tr>
<td>lb-ft²</td>
<td>144</td>
<td>0.3729</td>
<td>2.10 × 10⁻⁴</td>
<td>1.73 × 10⁻⁵</td>
<td>0.2497</td>
<td>4.42 × 10⁻⁴</td>
<td>4.21 × 10⁻⁴</td>
<td>429.71</td>
<td>2304</td>
<td>9.67</td>
<td></td>
</tr>
<tr>
<td>lb-in-s²</td>
<td>386.08</td>
<td>2.681</td>
<td>1</td>
<td>8.33 × 10⁻⁵</td>
<td>1.129 × 10⁻⁴</td>
<td>1.152</td>
<td>1.129 × 10⁻⁴</td>
<td>1.152 × 10⁻⁴</td>
<td>6.177 × 10⁻²</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>lb-ft-s²</td>
<td>4.63 × 10⁻³</td>
<td>32.17</td>
<td>12</td>
<td>3.17</td>
<td>1.35 × 10⁻⁴</td>
<td>13.825</td>
<td>1.356 × 10⁻⁴</td>
<td>1.38 × 10⁻⁴</td>
<td>7.41 × 10⁻³</td>
<td>192</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>oz-in</th>
<th>N-m</th>
<th>kg-cm</th>
<th>kg-m</th>
<th>gm-cm</th>
<th>dyne-cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>lb-in</td>
<td>1</td>
<td>8.333 × 10⁻²</td>
<td>1</td>
<td>192</td>
<td>1.355</td>
<td>13.825</td>
<td>0.138</td>
<td>1.382 × 10⁵</td>
<td>1.355 × 10⁻²</td>
</tr>
<tr>
<td>lb-ft</td>
<td>12</td>
<td>0.0833</td>
<td>1</td>
<td>25.4</td>
<td>0.028</td>
<td>30.48</td>
<td>0.0328</td>
<td>304.8</td>
<td>0.0304</td>
</tr>
<tr>
<td>oz-in</td>
<td>6.25 × 10⁻²</td>
<td>5.208 × 10⁻³</td>
<td>1</td>
<td>7.061 × 10⁻³</td>
<td>7.200 × 10⁻²</td>
<td>7.200 × 10⁻³</td>
<td>7.200 × 10⁻⁴</td>
<td>7.200</td>
<td>7.061 × 10⁻⁴</td>
</tr>
<tr>
<td>N-m</td>
<td>8.500</td>
<td>0.737</td>
<td>141.612</td>
<td>1</td>
<td>10.197</td>
<td>0.102</td>
<td>1.019 × 10⁻¹</td>
<td>1.019 × 10⁻²</td>
<td></td>
</tr>
<tr>
<td>kg-cm</td>
<td>0.8679</td>
<td>7.233 × 10⁻²</td>
<td>13.877</td>
<td>9.806 × 10⁻²</td>
<td>1</td>
<td>10⁻²</td>
<td>9.806</td>
<td>10⁻⁵</td>
<td>9.806</td>
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<tr>
<td>kg-m</td>
<td>86.96</td>
<td>7.233</td>
<td>1.388 × 10⁻³</td>
<td>9.806</td>
<td>100</td>
<td>1</td>
<td>10⁻⁵</td>
<td>9.806</td>
<td>10⁻⁴</td>
</tr>
<tr>
<td>gm-cm</td>
<td>8.679 × 10⁻⁴</td>
<td>7.233 × 10⁻³</td>
<td>1.388 × 10⁻²</td>
<td>9.806 × 10⁻³</td>
<td>1</td>
<td>10⁻³</td>
<td>9.806</td>
<td>10⁻⁶</td>
<td>980.665</td>
</tr>
<tr>
<td>dyne-cm</td>
<td>8.850 × 10⁻⁴</td>
<td>7.375 × 10⁻⁶</td>
<td>1.416 × 10⁻³</td>
<td>10⁻⁶</td>
<td>1</td>
<td>10⁻³</td>
<td>1</td>
<td>10⁻⁶</td>
<td>1</td>
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**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>mm</th>
<th>m</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>1</td>
<td>0.0833</td>
<td>2.54</td>
<td>0.028</td>
<td>25.4</td>
<td>0.0254</td>
<td>25.4</td>
</tr>
<tr>
<td>feet</td>
<td>12</td>
<td>0.0328</td>
<td>0.3048</td>
<td>0.0333</td>
<td>0.3048</td>
<td>0.0304</td>
<td>0.3048</td>
</tr>
<tr>
<td>cm</td>
<td>0.03937</td>
<td>0.03281</td>
<td>0.019</td>
<td>0.00833</td>
<td>0.0254</td>
<td>0.0028</td>
<td>0.028</td>
</tr>
<tr>
<td>yd</td>
<td>36</td>
<td>91.44</td>
<td>1</td>
<td>914.4</td>
<td>1</td>
<td>914.4</td>
<td>1</td>
</tr>
<tr>
<td>mm</td>
<td>0.03937</td>
<td>0.0328</td>
<td>0.1</td>
<td>0.09</td>
<td>1</td>
<td>0.09</td>
<td>1</td>
</tr>
<tr>
<td>m</td>
<td>39.37</td>
<td>3.281</td>
<td>1</td>
<td>1.09</td>
<td>1</td>
<td>1.09</td>
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</table>

**Power** (to convert from A to B, multiply by entry in table)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>hp (English)</th>
<th>Watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>hp (English)</td>
<td>1</td>
<td>745.7</td>
<td>1</td>
</tr>
<tr>
<td>lb-in (deg/s)</td>
<td>2.645 × 10⁻⁶</td>
<td>1972 × 10⁻⁷</td>
<td>1</td>
</tr>
<tr>
<td>lb-ft (deg/s)</td>
<td>1.587 × 10⁻⁵</td>
<td>1183 × 10⁻⁸</td>
<td>1</td>
</tr>
<tr>
<td>lb-in (rpm)</td>
<td>3.173 × 10⁻⁵</td>
<td>2.666 × 10⁻⁸</td>
<td>1</td>
</tr>
<tr>
<td>lb-ft (rpm)</td>
<td>1.904 × 10⁻⁴</td>
<td>0.1420</td>
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</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>
<th>kg</th>
<th>slug</th>
</tr>
</thead>
<tbody>
<tr>
<td>lb</td>
<td>1</td>
<td>16</td>
<td>453.6</td>
<td>4.448</td>
<td>4.4482</td>
<td></td>
</tr>
<tr>
<td>oz</td>
<td>0.0625</td>
<td>1</td>
<td>28.35</td>
<td>2.780</td>
<td>0.27801</td>
<td></td>
</tr>
<tr>
<td>gm</td>
<td>2.205 × 10⁻⁵</td>
<td>0.03527</td>
<td>1</td>
<td>1.023</td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
<td>dyne</td>
<td>2.248 × 10⁻⁸</td>
<td>3.59 × 10⁻⁹</td>
<td>980.7</td>
<td>1</td>
<td>0.00001</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>0.22481</td>
<td>3.5967</td>
<td>N.A.</td>
<td>100000</td>
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**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>
<th>gm</th>
<th>kg</th>
<th>slug</th>
</tr>
</thead>
<tbody>
<tr>
<td>lb</td>
<td>1</td>
<td>16</td>
<td>453.6</td>
<td>0.4536</td>
<td>0.0311</td>
<td></td>
</tr>
<tr>
<td>oz</td>
<td>6.25 × 10⁻⁴</td>
<td>1</td>
<td>28.35</td>
<td>0.02835</td>
<td>1.93 × 10⁻⁵</td>
<td></td>
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<tr>
<td>gm</td>
<td>2.205 × 10⁻⁴</td>
<td>3.527 × 10⁻⁵</td>
<td>1</td>
<td>10⁻⁵</td>
<td>6.852 × 10⁻³</td>
<td></td>
</tr>
<tr>
<td>kg</td>
<td>2.205</td>
<td>35.27</td>
<td>10³</td>
<td>1</td>
<td>6.852</td>
<td>10⁻²</td>
</tr>
<tr>
<td>slug</td>
<td>32.17</td>
<td>514.8</td>
<td>1459</td>
<td>10⁵</td>
<td>1459</td>
<td>10⁴</td>
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</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>rad/s</th>
<th>degrees/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>rpm</td>
<td>1</td>
<td>0.105</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>rad/s</td>
<td>9.55</td>
<td>1</td>
<td>57.30</td>
<td></td>
</tr>
<tr>
<td>degrees/s</td>
<td>0.167</td>
<td>1</td>
<td>1.745 × 10⁻²</td>
<td>1</td>
</tr>
</tbody>
</table>

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Appendix
Conversion tables

Temperature Conversion

<table>
<thead>
<tr>
<th>°F</th>
<th>°C</th>
<th>°C</th>
<th>°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-17.8</td>
<td>-10</td>
<td>14</td>
</tr>
<tr>
<td>32</td>
<td>0</td>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td>60</td>
<td>10</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>70</td>
<td>21.1</td>
<td>20</td>
<td>68</td>
</tr>
<tr>
<td>90</td>
<td>32.2</td>
<td>30</td>
<td>86</td>
</tr>
<tr>
<td>98.4</td>
<td>37</td>
<td>37</td>
<td>98.4</td>
</tr>
<tr>
<td>212</td>
<td>100</td>
<td>100</td>
<td>212</td>
</tr>
</tbody>
</table>

1) The table shows approximate SWG/AWG sizes nearest to standard metric sizes; the cross-sections do not match exactly.

Mechanism Efficiencies

<table>
<thead>
<tr>
<th>Material</th>
<th>μ</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>Chain and sprocket</td>
<td>-0.95–0.98</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>-0.96–0.98</td>
</tr>
<tr>
<td>Worm gears</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>Materials</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>Aluminum on steel</td>
<td>-0.45</td>
</tr>
<tr>
<td>Steel on steel</td>
<td>-0.55</td>
</tr>
<tr>
<td>Mechanism</td>
<td>μ</td>
</tr>
<tr>
<td>Ball bushings</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Linear bearings</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Dove-tail slides</td>
<td>-0.2++</td>
</tr>
<tr>
<td>Gibb 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>Aluminum</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>0.295</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>0.80</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>0.163</td>
<td>4.51</td>
</tr>
<tr>
<td>Paper</td>
<td>0.025–0.043</td>
<td>0.7–1.2</td>
</tr>
<tr>
<td>Polyvinyl chloride</td>
<td>0.047–0.050</td>
<td>1.3–1.4</td>
</tr>
<tr>
<td>Rubber</td>
<td>0.033–0.036</td>
<td>0.92–0.99</td>
</tr>
<tr>
<td>Silicone rubber, without filler</td>
<td>0.043</td>
<td>1.2</td>
</tr>
<tr>
<td>Cast iron, gray</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>

Wire Gauges

<table>
<thead>
<tr>
<th>Cross-section mm²</th>
<th>Standard Wire Gauge (SWG)</th>
<th>American Wire Gauge (AWG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>0.3</td>
<td>23</td>
<td>22</td>
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<td>0.75</td>
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<td>19</td>
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<tr>
<td>1.0</td>
<td>19</td>
<td>18</td>
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<td>1.5</td>
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<td>16</td>
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<tr>
<td>2.5</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>13</td>
<td>11</td>
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<td>12</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>16</td>
<td>7</td>
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</tr>
<tr>
<td>25</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>35</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>50</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>70</td>
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<td>20</td>
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<tr>
<td>95</td>
<td>00000</td>
<td>30</td>
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<td>120</td>
<td>00000000</td>
<td>40</td>
</tr>
<tr>
<td>150</td>
<td>–</td>
<td>60</td>
</tr>
<tr>
<td>185</td>
<td>–</td>
<td>70</td>
</tr>
</tbody>
</table>

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Appendix

Metal surcharges

Explanation of the raw material/metal surcharges

Surcharge calculation

To compensate for variations in the price of the raw materials silver, copper, aluminum, lead, gold, dysprosium and/or neodym, surcharges are calculated on a daily basis using the so-called metal factor for products containing these raw materials. A surcharge for the respective raw material is calculated as a supplement to the price of a product if the basic official price of the raw material in question is exceeded.

The surcharges are calculated in accordance with the following criteria:

- Basic official price of the raw material
  - Basic official price from the day prior to receipt of the order or prior to release order (daily price) for silver (sales price, processed)
  - Gold (sales price, processed)
  - Copper (lower DEL notation + 1 %)
  - Aluminum (aluminum in cables)
  - Lead (lead in cables)

- Metal factor of the products
  Certain products are displayed with a metal factor. The metal factor determines the official price (for those raw materials concerned) as of which the metal surcharges are applied and the calculation method used (weight or percentage method). An exact explanation is given below.

Structure of the metal factor

The metal factor consists of several digits; the first digit indicates whether the percentage method of calculation refers to the list price or a possible discounted price (customer net price) (L = list price / N = customer net price).

The remaining digits indicate the method of calculation used for the respective raw material. If no surcharge is added for a raw material, a “-” is used.

<table>
<thead>
<tr>
<th>1st digit</th>
<th>2nd digit</th>
<th>3rd digit</th>
<th>4th digit</th>
<th>5th digit</th>
<th>6th digit</th>
<th>7th digit</th>
<th>8th digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>List or customer net price using the percentage method</td>
<td>for silver (AG)</td>
<td>for copper (CU)</td>
<td>for aluminum (AL)</td>
<td>for lead (PB)</td>
<td>for gold (AU)</td>
<td>for dysprosium (Dy)</td>
<td>for neodym (Nd)</td>
</tr>
</tbody>
</table>

Weight method

The weight method uses the basic official price, the daily price and the raw material weight. In order to calculate the surcharge, the basic official price must be subtracted from the daily price. The difference is then multiplied by the raw material weight.

The basic official price can be found in the table below using the number (1 to 9) of the respective digit of the metal factor. The raw material weight can be found in the respective product descriptions.

Percentage method

Use of the percentage method is indicated by the letters A-Z at the respective digit of the metal factor.

The surcharge is increased - dependent on the deviation of the daily price compared with the basic official price - using the percentage method in "steps" and consequently offers surcharges that remain constant within the framework of this "step range". A higher percentage rate is charged for each new step. The respective percentage level can be found in the table below.

Metal factor examples

<table>
<thead>
<tr>
<th>L E A</th>
<th>Basis for % surcharge: List price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver Basis 150 €, Step 50 €, 0.5 %</td>
<td></td>
</tr>
<tr>
<td>Copper Basis 150 €, Step 50 €, 0.1 %</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N – A 6</th>
<th>Basis for % surcharge: Customer net price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum acc. to weight, basic offic. price 225 €</td>
<td></td>
</tr>
</tbody>
</table>

1) Refer to the separate explanation on the next page regarding the raw materials dysprosium and neodym (= rare earths).
2) For a different method of calculation, refer to the separate explanation for these raw materials on the next page.
Explanation of the raw material/metal surcharges for dysprosium and neodym (rare earths)

Surcharge calculation

To compensate for variations in the price of the raw materials silver\(^1\), copper\(^1\), aluminum\(^1\), lead\(^1\), gold\(^1\), dysprosium and/or neodym, surcharges are calculated on a daily basis using the so-called metal factor for products containing these raw materials. The surcharge for dysprosium and neodym is calculated as a supplement to the price of a product if the basic official price of the raw material in question is exceeded. The surcharge is calculated in accordance with the following criteria:

- **Basic official price of the raw material\(^2\)**
  Three-month basic average price (see below) in the period before the quarter in which the order was received or the release order took place (= average official price) for:
  - dysprosium (Dy metal, 99 % min. FOB China; USD/kg)
  - neodym (Nd metal, 99 % min. FOB China; USD/kg)

- **Metal factor of the products**
  Certain products are displayed with a metal factor. The metal factor indicates (for those raw materials concerned) the basic official price as of which the surcharges for dysprosium and neodym are calculated using the weight method. An exact explanation of the metal factor is given below.

Three-month average price

The prices of rare earths vary according to the foreign currency, and there is no freely accessible stock exchange listing. This makes it more difficult for all parties involved to monitor changes in price. In order to avoid continuous adjustment of the surcharges, but to still ensure fair, transparent pricing, an average price is calculated over a three-month period using the average monthly foreign exchange rate from USD to EUR (source: European Central Bank). Since not all facts are immediately available at the start of each month, a one-month buffer is allowed before the new average price applies.

Examples of calculation of the average official price:

<table>
<thead>
<tr>
<th>Period for calculation of the average price</th>
<th>Period during which the order/release order is effected and the average price applies.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep 2016 - Nov 2016</td>
<td>Q1 in 2017 (Jan - Mar)</td>
</tr>
<tr>
<td>Dec 2016 - Feb 2017</td>
<td>Q2 in 2017 (Apr - Jun)</td>
</tr>
<tr>
<td>Mar 2017 - May 2017</td>
<td>Q3 in 2017 (Jul - Sep)</td>
</tr>
<tr>
<td>Jun 2017 - Aug 2017</td>
<td>Q4 in 2017 (Oct - Dec)</td>
</tr>
</tbody>
</table>

Structure of the metal factor

The metal factor consists of several digits; the first digit is not relevant to the calculation of dysprosium and neodym.

The remaining digits indicate the method of calculation used for the respective raw material. If no surcharge is added for a raw material, a “.” is used.

<table>
<thead>
<tr>
<th>1st digit</th>
<th>2nd digit</th>
<th>3rd digit</th>
<th>4th digit</th>
<th>5th digit</th>
<th>6th digit</th>
<th>7th digit</th>
<th>8th digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>List or customer net price using the percentage method</td>
<td>for silver (AG)(^1)</td>
<td>for copper (CU)(^1)</td>
<td>for aluminum (AL)(^1)</td>
<td>for lead (PB)(^1)</td>
<td>for gold (AU)(^1)</td>
<td>for dysprosium (Dy)</td>
<td>for neodym (Nd)</td>
</tr>
</tbody>
</table>

Weight method

The weight method uses the basic official price, the average price and the raw material weight. In order to calculate the surcharge, the basic official price must be subtracted from the average price. The difference is then multiplied by the raw material weight.

The basic official price can be found in the table below using the number (1 to 9) of the respective digit of the metal factor. Your Sales contact can inform you of the raw material weight.

Metal factor examples

- No basis necessary
- No surcharge for silver
- No surcharge for copper
- No surcharge for aluminum
- No surcharge for lead
- No surcharge for gold
- Dysprosium acc. to weight, basic official price 300 €
- Neodym acc. to weight, basic official price 50 €

\(^1\) For a different method of calculation, refer to the separate explanation for these raw materials on the previous page.

\(^2\) Source: Asian Metal Ltd (www.asianmetal.com)
## Appendix

### Metal surcharges

#### Values of the metal factor

<table>
<thead>
<tr>
<th>Percentage method</th>
<th>Basic official price in €</th>
<th>Step range in €</th>
<th>% surcharge 1st step</th>
<th>% surcharge 2nd step</th>
<th>% surcharge 3rd step</th>
<th>% surcharge 4th step</th>
<th>% surcharge per additional step</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Price in €</td>
<td>Price in €</td>
<td>Price in €</td>
<td>Price in €</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>150.01 - 200.00</td>
<td>200.01 - 250.00</td>
<td>250.01 - 300.00</td>
<td>300.01 - 350.00</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>150</td>
<td>50</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
<td>0.1</td>
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<td>0.8</td>
<td>0.2</td>
</tr>
<tr>
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<td>150</td>
<td>50</td>
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<td>0.6</td>
<td>0.9</td>
<td>1.2</td>
<td>0.3</td>
</tr>
<tr>
<td>D</td>
<td>150</td>
<td>50</td>
<td>0.4</td>
<td>0.8</td>
<td>1.2</td>
<td>1.6</td>
<td>0.4</td>
</tr>
<tr>
<td>E</td>
<td>150</td>
<td>50</td>
<td>0.5</td>
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<td>1.5</td>
<td>2.0</td>
<td>0.5</td>
</tr>
<tr>
<td>F</td>
<td>150</td>
<td>50</td>
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<td>1.2</td>
<td>1.8</td>
<td>2.4</td>
<td>0.6</td>
</tr>
<tr>
<td>G</td>
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<td>1.0</td>
<td>2.0</td>
<td>3.0</td>
<td>4.0</td>
<td>1.0</td>
</tr>
<tr>
<td>H</td>
<td>150</td>
<td>50</td>
<td>1.2</td>
<td>2.4</td>
<td>3.6</td>
<td>4.8</td>
<td>1.2</td>
</tr>
<tr>
<td>I</td>
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<td>50</td>
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<td>3.2</td>
<td>4.8</td>
<td>6.4</td>
<td>1.6</td>
</tr>
<tr>
<td>J</td>
<td>150</td>
<td>50</td>
<td>1.8</td>
<td>3.6</td>
<td>5.4</td>
<td>7.2</td>
<td>1.8</td>
</tr>
<tr>
<td>O</td>
<td>175</td>
<td>50</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>P</td>
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</tr>
<tr>
<td>S</td>
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<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
<td>0.2</td>
</tr>
<tr>
<td>U</td>
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<td>2.0</td>
<td>3.0</td>
<td>4.0</td>
<td>1.0</td>
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<tr>
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<td>3.0</td>
<td>1.0</td>
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<td>4.5</td>
<td>1.0</td>
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<tr>
<td>Y</td>
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<td>1.2</td>
<td>0.3</td>
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<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
<td>0.1</td>
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#### Price basis (1st digit)

<table>
<thead>
<tr>
<th>L</th>
<th>Calculation based on the list price</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Calculation based on the customer net price (discounted list price)</td>
</tr>
</tbody>
</table>

#### Weight method

<table>
<thead>
<tr>
<th>Basic official price in €</th>
<th>Calculation based on raw material weight</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>150</td>
</tr>
<tr>
<td>4</td>
<td>175</td>
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<td>5</td>
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<td>6</td>
<td>225</td>
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</tr>
<tr>
<td>8</td>
<td>400</td>
</tr>
<tr>
<td>9</td>
<td>555</td>
</tr>
</tbody>
</table>

#### Miscellaneous

| No metal surcharge |

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The metal factor of a product indicates the basic official price (for those raw materials concerned) as of which the surcharges on the price of the product are applied, and with what method of calculation.

You will find a detailed explanation of the metal factor on the page headed "Metal surcharges".

To calculate the surcharge (except in the cases of dysprosium and neodym), the official price from the day prior to that on which the order was received or the release order was effected is used.

To calculate the surcharge applicable to dysprosium and neodym ("rare earths"), the corresponding three-month basic average price in the quarter prior to that in which the order was received or the release order was effected is used with a one-month buffer (details on the calculation can be found in the explanation of the metal factor).

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Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens’ products and solutions only form one element of such a concept.

Customer is responsible to prevent unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

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Siemens’ products and solutions undergo continuous development to make them more secure. Siemens strongly recommends to apply product updates as soon as available and to always use the latest product versions. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer’s exposure to cyber threats.

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