Overview

SINAMICS V90 servo drive system

The performance-optimized, user-friendly servo drive system comprises a SINAMICS V90 servo drive and a SIMOTICS S-1FL6 servomotor. There are eight different servo drive frame sizes and seven motor shaft heights for operation on single and three-phase line supplies with power ratings ranging from 0.05 to 7.0 kW, to realize a wide range of applications, with the focus on dynamic motion and processing - for example positioning, transporting and winding.

In addition to operation in the TIA Portal V14 with the new SIMATIC 1500 T-CPU Advanced Controller, the servo drive system is also suitable for use with the SIMATIC S7-1500 Advanced Controller and the SIMATIC S7-1200 Basic Controller.

Benefits

Cost-effective - many integrated functions to reduce machine costs

Integrated control modes

Pulse train input position control mode (PTI), internal position control mode (IPos) with traversing block or Modbus, speed control mode and torque control are all integrated in the SINAMICS V90.

The drive has various integrated control modes to address a wide range of applications.

Integrated PROFINET – the industrial Ethernet standard for automation

SINAMICS V90 PROFINET version features PROFINET, enabling real-time transmission of user/process data and diagnostic data with a single cable.

This solution offers wide-ranging functions with reduced complexity.

Integrated positioning function

- Positioning function is integrated in the drive. Target positions and respective speeds can be stored in the drive during commissioning or changed via communication.
- Absolute or relative positioning
- Rotary or linear axes
- Referencing in the drive

Point-to-point positioning possible using a PLC without positioning functionality.

Integrated braking resistor for all frame sizes and max. motor power ≥ 0.2 kW

All frame sizes with max. motor power ≥ 0.2 kW have an integrated braking resistor to dissipate the regenerative power for fast braking.

Most applications can be realized without an additional braking resistor.

Integrated holding brake switch (SINAMICS V90, 400 V version)

Integrated holding brake switch - the brake can be directly connected to the drive if a motor with holding brake is used.

Holding brake can be connected without requiring an external relay (only for SINAMICS V90, 400 V version).

Easy to use - Simple tuning and quick commissioning

Easy servo tuning and machine optimization

The system can be automatically optimized using the auto tuning function and automatic suppression of machine resonances.

Simply plug & play, no in-depth servo know-how required.

Easy commissioning using the SINAMICS V-ASSISTANT engineering tool

Graphic user interface guides the user when setting application-specific parameters; intuitive drive and motor status check; integrated trace and measuring functionality.

SINAMICS V-ASSISTANT makes commissioning and diagnostics quick and easy.

www.siemens.com/sinamics-v-assistant

Simple connection to a control system

- Two-channel pulse train for position setpoint, one exclusively for 5 V differential (RS422 standard), one for 24 V single ended signal (for pulse train version)
- Standard RS485 interface supports USS and Modbus RTU (pulse train version)
- Industrial Ethernet standard PROFINET with PROFIdrive (PROFINET version)

Standard interface makes it easy to connect the drive with PLCs and motion controller.

Easy, all from a single source

- Predefined drive/motor bundles and accessories, easy to select
- Tested with SIMATIC PLC/HMI and ready-to-run application examples for connecting a SINAMICS V90 drive to a controller
- Different application examples can be downloaded free of charge from the Online Support Portal

Parameter cloning

SINAMICS V90 servo drives are equipped with a standard SD card slot (400 V version) and a Micro SD card slot (200 V version), so that parameter settings can be easily transferred between drive devices.

Efficient commissioning of machine series.
## System overview

### SINAMICS V90 basic servo drive system

#### Benefits

**Extended warranty**

Siemens offers for SINAMICS V90 an extended warranty up to 7½ years:

- 24 months of standard warranty
- Optional extension via Service Protect
  - 6 months free of charge after product registration at: [https://myregistration.siemens.com](https://myregistration.siemens.com)
  - chargeable for additional 3 or 5 years


#### Application

**Application examples**

<table>
<thead>
<tr>
<th>SINAMICS V90 servo drive system</th>
<th>200 V ... 240 V 1 AC/3 AC</th>
<th>380 V ... 480 V 3 AC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low Inertia</strong> for high dynamic performance</td>
<td>• Pick and place machine</td>
<td>Metal forming machinery, for example</td>
</tr>
<tr>
<td></td>
<td>• Stencil cutting machine</td>
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<td></td>
<td>• PCB assembly machine</td>
<td></td>
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<td></td>
<td>• IC handling machine</td>
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<td></td>
<td>• Chip sorting machine</td>
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<td></td>
<td>• Bonding machine</td>
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<tr>
<td><strong>Converting/printing industry, for example</strong></td>
<td>• Labeling machine</td>
<td>• Punching machine</td>
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<tr>
<td></td>
<td>• Slitter machine</td>
<td>• Engraving machine</td>
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<tr>
<td></td>
<td>• Laminating/coating machine</td>
<td>• Edging press</td>
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<td></td>
<td>• Screen printing machine</td>
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<tr>
<td><strong>Packaging industry, for example</strong></td>
<td>• Filling and sealing machine</td>
<td>• Winders</td>
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<td></td>
<td>• Blister machine (pharmaceutical packaging)</td>
<td>• Slitter machine</td>
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<tr>
<td></td>
<td>• Bag packing machine</td>
<td>• Laminating/coating machine</td>
</tr>
<tr>
<td><strong>Material handling machinery, for example</strong></td>
<td>• Automatic palletizers</td>
<td>• Screen printing machine</td>
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<tr>
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<td>• Bag packing machine</td>
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<tr>
<td></td>
<td></td>
<td>• Storage and warehouse systems</td>
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<tr>
<td></td>
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<td>• Conveyor systems</td>
</tr>
</tbody>
</table>
Design

System topology

- SIMATIC Panel
- SIMATIC PLC
- PC
- SINAMICS V90
- SINAMICS V20
- SIMOTICS S-1FL6
- USS Modbus RTU
- Ethernet/PROFINET
- PROFINET
- Pulse/Analog

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**System overview**

**SINAMICS V90 basic servo drive system**

### Function

**Optimized servo performance - quick, smooth and precise positioning**

Advanced one-button tuning and real-time auto tuning.

Control loop parameters are optimized automatically. One-button tuning can be used when commissioning. This allows machines to achieve a high dynamic performance and smooth operation in a wide range of applications.

**Automatic suppression of machine resonances**

When this function is activated the drive identifies mechanical resonance frequencies and automatically suppresses these using a filter. Vibration and noise during operation are reduced. This ensures a high dynamic response of the machine while decreasing machine vibration levels.

**Sufficient encoder resolution and high data transfer rates**

The encoder is available up to 21-bit resolution (approx. 2.1 billion pulses per motor rotation).

Fast data transfer:
- Signaling rate up to 1 MHz (pulse train version)
- 100 Mbit/s transfer rate (PROFINET version)

This allows machines to achieve a high positioning accuracy with low speed ripple.

**Optimized system performance**

Fast acceleration and braking while maintaining smooth operation to ensure high machine productivity.
- 300 % overload capability of drive and motor
- Low motor torque ripple
- Motor and drive are perfectly harmonized

### Reliable operation - Robust design and safe choice

**Suitable for harsh environments**

- Wide range of line voltages
  - 200 V ... 240 V 1 AC/3 AC (-15 %/+10 %)
  - 380 V ... 480 V 3 AC, (-15 %/+10 %)
- Coated PCB increases robustness of the drive to cope with harsh environments
- Motor is equipped with high-quality bearings

**High degree of motor protection**

- SIMOTICS S-1FL6 servomotors have degree of protection IP65 as standard
- Oil seal at shaft end as standard
- High-quality metal motor connector
  (SIMOTICS S-1FL6 High Inertia servomotors)

**Integrated safety function STO (safe torque off)**

The STO function is a standard feature of all SINAMICS V90 servo drives. This function prevents the motor from moving unexpectedly and complies with safety standard SIL 2 according to EN 61508 resp. PL d, Cat 3 according to EN ISO 13849. This safety functionality can be realized without additional components (activation only via terminals of SINAMICS V90, not supported via PROFINET/PROFIsafe).

**Complete motion control solutions from Siemens**

SINAMICS V90 System and SIMATIC – Siemens offers comprehensive solutions from a single source for general motion control applications with different SINAMICS application examples.

Siemens application examples comprise the following:
- Ready-to-run application examples including wiring diagram and parameter description
- Sample configuration to connect SINAMICS V90 drives to the appropriate SIMATIC controller – this includes hardware and software, a corresponding wiring example, installation instructions for the S7 project provided, drive parameterization and an HMI sample project

**Benefits for the customer:**
- An operational project is configured properly
- A motor is quickly made operational
- Basis for a customer-specific configuration
- TIA advantages are optimally leveraged

Can be downloaded free of charge via the Online Support Portal:

www.siemens.com/sinamics-applications
**System overview**

**SINAMICS V90 basic servo drive system**

**Configuration**

The following electronic configuring aids and engineering tools are available for the SINAMICS V90 basic servo drive system:

**Drive Technology Configurator (DT Configurator)**

The Drive Technology Configurator (DT Configurator) helps you to configure the optimum drive technology products for a number of applications – starting with gear units, motors, converters as well as the associated options and components and ending with controllers, software licenses and connection systems.

The DT Configurator can be used on the internet without requiring any installation. The DT Configurator can be found in the Siemens Industry Mall at the following address:

www.siemens.com/dt-configurator

**SINAMICS V-ASSISTANT – Easy-to-use engineering tool for commissioning and diagnostics**

A PC with installed SINAMICS V-ASSISTANT software tool can be connected to SINAMICS V90 via standard USB port or from V1.07.00 via PROFINET port (for SINAMICS V90 PROFINET version only). It is used for setting parameters, test operation, troubleshooting – and has powerful monitoring functions.

SINAMICS V-ASSISTANT can be downloaded free of charge from the SINAMICS V90 internet page:

www.siemens.com/sinamics-v90

You can find further information about the SINAMICS V-ASSISTANT in the Engineering tools section.

**Technical specifications**

**General technical specifications**

<table>
<thead>
<tr>
<th>SINAMICS V90 servo drive system 200 V ... 240 V 1 AC/3 AC Low Inertia for high dynamic performance</th>
<th>SINAMICS V90 servo drive system 380 V ... 480 V 3 AC High Inertia for smooth operational performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SINAMICS V90 servo drive</strong></td>
<td><strong>Line supply and power</strong> 380 V ... 480 V 3 AC (–15 % / +10 %), 0.4 kW ... 7 kW</td>
</tr>
<tr>
<td><strong>Line supply and power</strong></td>
<td><strong>Control mode</strong> Positioning with pulse train, internal positioning, speed, torque, fast PTI</td>
</tr>
<tr>
<td>200 V ... 240 V 1 AC (–15 % / +10 %), 0.05 kW ... 0.75 kW</td>
<td><strong>Control mode</strong> Speed control, basic positioner control (EPos)</td>
</tr>
<tr>
<td>200 V ... 240 V 3 AC (–15 % / +10 %), 0.05 kW ... 2 kW</td>
<td><strong>Degree of protection</strong> IP20</td>
</tr>
<tr>
<td><strong>Control mode</strong> Positioning with pulse train, internal positioning, speed, torque, fast PTI</td>
<td><strong>SIMOTICS S-1FL6 servomotors</strong></td>
</tr>
<tr>
<td><strong>Pulse train (PTI) version</strong></td>
<td><strong>Shaft height</strong> 45, 65, 90</td>
</tr>
<tr>
<td><strong>Control mode</strong> Speed control, basic positioner control (EPos)</td>
<td><strong>Rated torque</strong> 1.27 ... 33.40 Nm</td>
</tr>
<tr>
<td><strong>PROFINET (PN) version</strong></td>
<td><strong>Rated speed</strong> 2000 rpm / 3000 rpm</td>
</tr>
<tr>
<td><strong>Degree of protection</strong> IP20</td>
<td><strong>Max. speed</strong> 4000 rpm</td>
</tr>
<tr>
<td><strong>SIMOTICS S-1FL6 servomotors</strong></td>
<td><strong>Encoder</strong> Incremental encoder TTL 2500 S/R; Absolute encoder 20-bit single-turn + 12-bit multi-turn</td>
</tr>
<tr>
<td><strong>Shaft height</strong> 20, 30, 40, 50</td>
<td><strong>Degree of protection</strong> IP65, natural cooling</td>
</tr>
<tr>
<td><strong>Rated torque</strong> 0.16 ... 6.37 Nm</td>
<td><strong>Rated speed</strong> 3000 rpm</td>
</tr>
<tr>
<td><strong>Max. speed</strong> 5000 rpm</td>
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<td><strong>Encoder</strong> Incremental encoder TTL 2500 S/R; Absolute encoder 20-bit single-turn + 12-bit multi-turn</td>
<td><strong>Degree of protection</strong> IP65, natural cooling</td>
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**More information**

Detailed information on SINAMICS V90, the latest technical documentation (brochures, dimension drawings, certificates, manuals and operating instructions) is available on the internet at:

www.siemens.com/sinamics-v90

In addition, the Drive Technology Configurator (DT Configurator) can be used on the internet. The DT Configurator can be found in the Siemens Industry Mall at the following address:

www.siemens.com/dt-configurator

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1) For very low speed, high accuracy or high dynamic application TTL encoder is not recommended.
**System overview**

**SINAMICS V90 basic servo drive system**

### Integration

**Pulse train version (PTI)**
- RS485 interface for Modbus RTU/USS to communicate with a PLC

**PROFINET version (PN)**
- 2 RJ45 connectors for PROFINET communication with a PLC

**Status indicator**
- RDY indicates servo ready/alarm state
- COM indicates communication with PC

**Integrated operator panel**
- 6 digits, 7-segment LED
- 5 buttons

**High-quality connectors**

**Braking resistor**
- If the internal braking resistor is not sufficient, disconnect DCP and R2, then connect DCP and R1 with an external braking resistor

**Shield plate**
- Easy shield connection to cables and improved EMC behavior

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1) Motor holding brake signal (only SINAMICS V90, 200 V version). The SINAMICS V90, 200 V version requires an external relay to connect the motor holding brake.

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**SIMOTICS S-1FL6, High Inertia**
- High-quality metal connector
- IP65 degree of protection standard for all motors
- High-quality bearings
- High-wear-resistant oil seal material
- Shaft sleeve protection

**SIMOTICS S-1FL6, Low Inertia**
- Compact cable connection
- IP65 degree of protection standard for all motors
- High-quality bearings
- High-wear-resistant oil seal material
System overview

SINAMICS V90 basic servo drive system

Integration (continued)

System connection diagram for SINAMICS V90 pulse train version

1) Brake cable connection shown here is for SINAMICS V90 400 V version only. The SINAMICS V90 200 V version requires an external relay to connect the motor brake cable. The relay has to be connected via the setpoint cable for the SINAMICS V90 pulse train version. For more information, refer to the SINAMICS V90 operating instructions.

2) SIMOTICS S-1FL6 Low Inertia servomotors in shaft heights 20/30/40 use outlet connection concept with pre-mounted cable end and plastic connection plug-in system.
System connection diagram for SINAMICS V90 PROFINET version

1) Brake cable connection shown here is for SINAMICS V90 400 V version only. The SINAMICS V90 200 V version requires an external relay to connect the motor brake cable. The relay has to be connected via I/O cable for the SINAMICS V90 PROFINET version. For more information, refer to the SINAMICS V90 operating instructions.

2) SIMOTICS S-1FL6 Low Inertia servomotors in shaft heights 20/30/40 use outlet connection concept with pre-mounted cable end and plastic connection plug-in system.

1. Power connector (motor side)
2. Encoder connector (motor side)
3. Brake connector (motor side)
4. Encoder connector (drive side)
5. I/O connector