

SIEMENS



SINAMICS V90

The performance-optimized and easy-to-use servo drive system

[siemens.com/sinamics-v90](https://www.siemens.com/sinamics-v90)

SINAMICS V90 and SIMOTICS S-1FL6

Optimized servo drive solution for motion control applications



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SINAMICS V90 is the latest member of the SINAMICS drive family, SIMOTICS S-1FL6 – is also a new member of the SIMOTICS motor family. SINAMICS V90 and SIMOTICS S-1FL6 together form an optimized servo drive system for positioning, speed and torque control. Easy to commission, the SINAMICS V90 system is also easy to set up – essentially just plug & play. Quickly integrated into SIMATIC PLC control systems, it offers superb servo performance along with a high degree of reliability. Together, the SINAMICS V90 servo drive and SIMOTICS S-1FL6 servomotor form a seamless drive system.



SINAMICS V90 features internal positioning, positioning with pulse train as well as speed and torque control modes. With integrated real-time auto tuning and automatic suppression of machine resonances, the system automatically optimizes itself to achieve high dynamic performance and smooth operation.

SIMOTICS S-1FL6 servomotors are naturally cooled, permanent-magnet synchronous motors where the heat is dissipated through the motor surface. The motors can be simply and quickly installed using the full thread and quick-release connectors. The different motor shaft heights and flange dimensions address the requirements of the Asian market. They have a 300 percent overload capability and can be combined with SINAMICS V90 converter to create a powerful servo system with a high degree of functionality.

Highlights of the SINAMICS V90 and SIMOTICS S-1FL6 servo drive system:

Optimized servo performance

- Advanced one button tuning and real time auto tuning enables machines to achieve a high dynamic performance
- Automatic suppression of machine resonances
- 1 MHz high-frequency pulse train input
- Multi-turn absolute encoder with 20-bit resolution

Cost effective

- Integrated control modes: Pulse train positioning, internal positioning with traversing block or Modbus, speed and torque control modes
- Integrated internal positioning function
- Integrated braking resistor in all frame sizes
- Integrated holding brake switch (at 400-V version), no external relay necessary

Easy to use

- Simple connection to a control system
- Easy, all from a single source
- Easy servo tuning and machine optimization
- Easy commissioning with SINAMICS V-ASSISTANT
- Parameter cloning
- The different motor shaft heights and flange dimensions are perfectly dimensioned for the Asian market

Reliable operation

- Wide voltage range 200 V ... 240 V –15% / +10% (230-V version) and 380 V ... 480 V –15% / +10% (400-V version)
- High-quality motor bearings
- All motors have IP65 degree of protection and are equipped with oil seal
- Integrated Safe Torque Off (STO)
- Reliable drive and motor combination

Power, performance, typical applications

1 SINAMICS V90 servo drive system 1AC/3AC 200 V... 240 V Low Inertia for high dynamic performance		2 SINAMICS V90 servo drive system 3AC 380 V... 480 V High Inertia for smooth operational performance	
SINAMICS V90 converter		SINAMICS V90 converter	
Line supply and power:	1AC 200 V ... 240 V (–15%/+10%), 0.05 kW ... 0.75 kW 3AC 200 V ... 240 V (–15%/+10%), 0.05 kW ... 2 kW	Line supply and power:	3AC 380 V ... 480 V (–15%/+10%), 0.4 kW ... 7 kW
Control mode:	Pulse train positioning, internal positioning, speed, torque	Control mode:	Pulse train positioning, internal positioning, speed, torque
Degree of protection:	IP20	Degree of protection:	IP20
SIMOTICS S-1FL6 motor		SIMOTICS S-1FL6 motor	
4 shaft heights*:	20 mm, 30 mm, 40 mm, 50 mm	3 shaft heights*:	45 mm, 65 mm, 95 mm
Rated torque:	0.16 Nm up to 6.37 Nm	Rated torque:	1.27 Nm up to 33.40 Nm
Rated/max. speed:	3000 rpm / 5000 rpm	Rated/max. speed:	2000 rpm / 3000 rpm
Encoder:	Incremental TTL 2500 S/R (13-bit)	Encoder:	Incremental TTL 2500 S/R (13-bit) Absolute encoder 20-bit single-turn and 12-bit multi-turn
Degree of protection:	IP65, natural cooling	Degree of protection:	IP65, natural cooling
Additional advantages:		Additional advantages:	
<p>High dynamic performance: High acceleration for shorter cycle times as a result of the very low moment of inertia</p> <p>High speed: Maximum speed up to 5000 rpm can increase machine productivity</p> <p>Compact size: The reduced motor length/height compared to High Inertia variants and compact drive size can address critical mounting requirements</p>		<p>Smooth operation: Higher torque accuracy and low speed ripple as a result of the higher moment of inertia ensures a better product quality</p> <p>Robust design: High-quality metal connector and standard motor oil seal can withstand harsh environment</p> <p>Sufficient torque output: Wide range of rated torques up to 33.4 Nm</p>	
Application examples		Application examples	
Electronic assembly industry, for example	<ul style="list-style-type: none"> • Pick and place machine • Stencil cutting machine • PCB assembly machine • IC handling machine • Chip sorting machine • Bonding machine 	Metal forming machinery, for example	<ul style="list-style-type: none"> • Punching machine • Engraving machine • Edging press
Converting/printing industry, for example	<ul style="list-style-type: none"> • Labeling machine • Slitter machine • Laminating/coating machine • Screen printing machine 	Converting/printing industry, for example	<ul style="list-style-type: none"> • Winders • Slitter machine • Laminating/coating machine • Screen printing machine • Wire drawing machine
Packaging industry, for example	<ul style="list-style-type: none"> • Filling and sealing machine • Blister machine (pharmaceutical packaging) • Bag packing machine 	Packaging industry, for example	<ul style="list-style-type: none"> • Filling machine • Blister machine (pharmaceutical packaging) • Bag packing machine
Material handling machinery, for example	<ul style="list-style-type: none"> • Automatic palletizers 	Material handling machinery, for example	<ul style="list-style-type: none"> • Storage and warehouse systems • Conveyor systems

4 * The different motor shaft heights and flange dimensions are perfectly dimensioned for the Asian market.

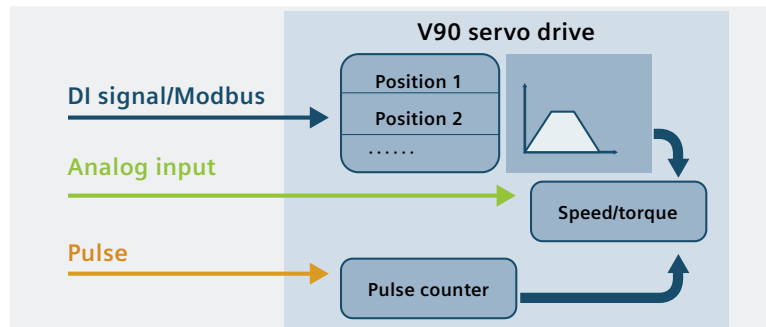
Cost-effective

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.

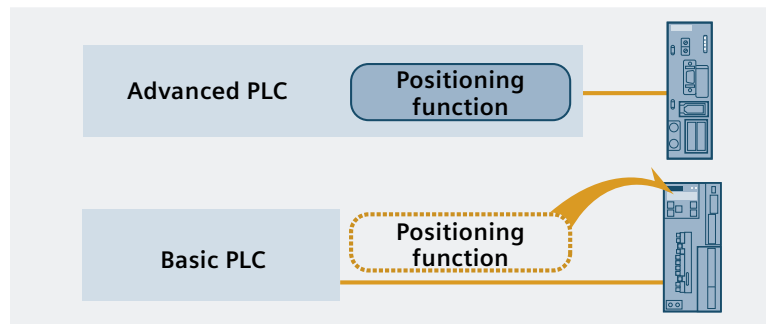
The drive has various integrated control modes to address a wide range of applications.



Integrated positioning function

- Position, speed and acceleration setpoints can be entered
- Integrated referencing function
- Feed forward and feed backward – or a combination of digital inputs to select position
- Positioning step enabled from external digital input
- Absolute and relative positioning

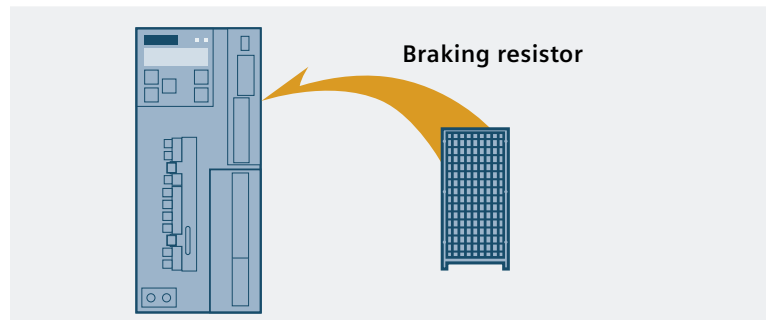
Point-to-point positioning possible using a PLC without positioning functionality.



Integrated braking resistor for all frame sizes

All frame sizes have an integrated braking resistor to dissipate the regenerative power for fast braking.

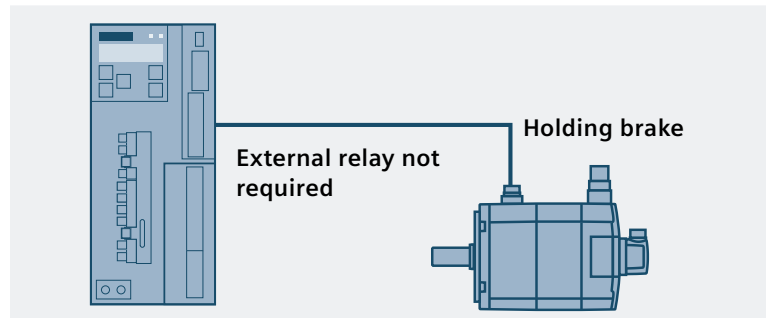
Most applications can be realized without an additional braking resistor.



Integrated holding brake switch (V90 in 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.



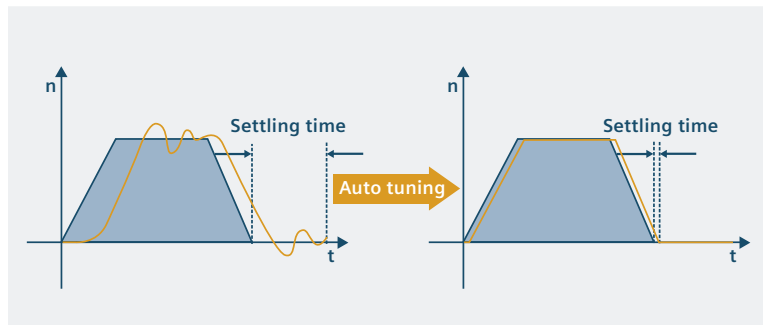
Optimized servo performance

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.

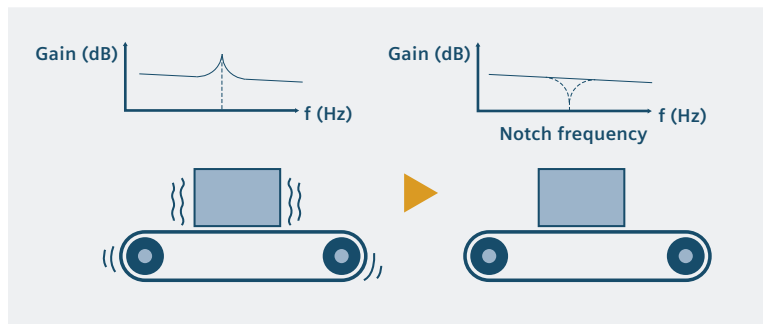
This allows machines to achieve a high dynamic performance and smooth operation in a wide range of applications.



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.

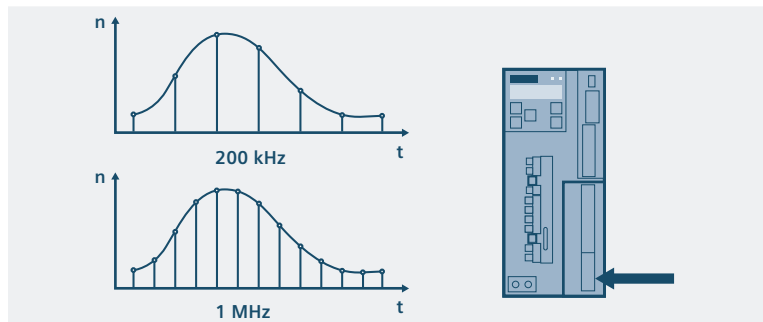
This ensures a high dynamic response of the machine while decreasing machine vibration.



1 MHz pulse train setpoint and 20-bit encoder resolution

The command pulse train input operates at high frequencies up to 1 MHz and the absolute encoder is available with a 20-bit resolution.

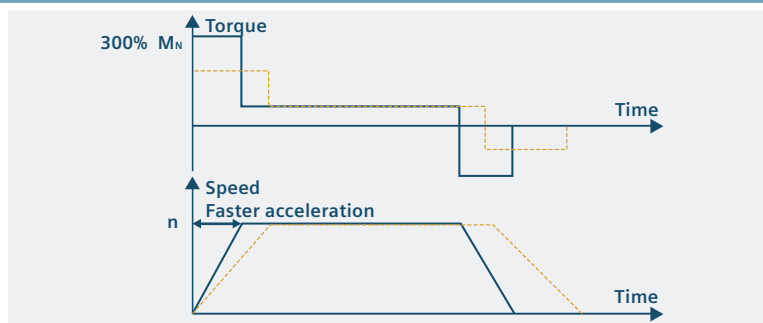
Allows machines to achieve a high positioning accuracy with low speed ripple.



Optimized system performance

- 300% overload capability of drive and motor
- Low motor torque ripple
- Motor and drive are perfectly coordinated with one another

Fast acceleration and braking while maintaining smooth operation to ensure high machine productivity.



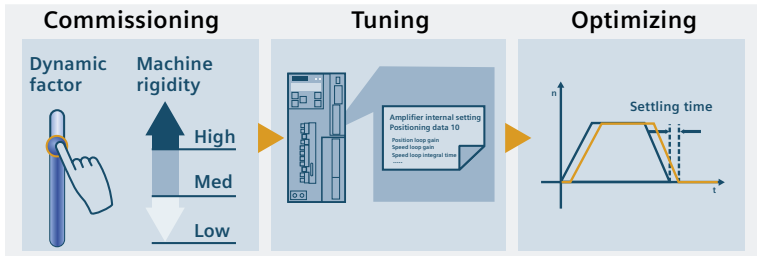
Easy to use

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.

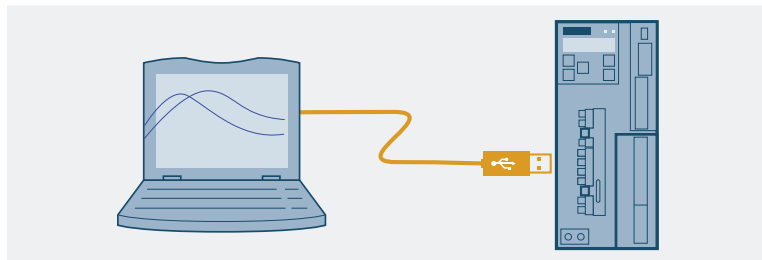


Easy commissioning using the SINAMICS V-ASSISTANT engineering tool

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.

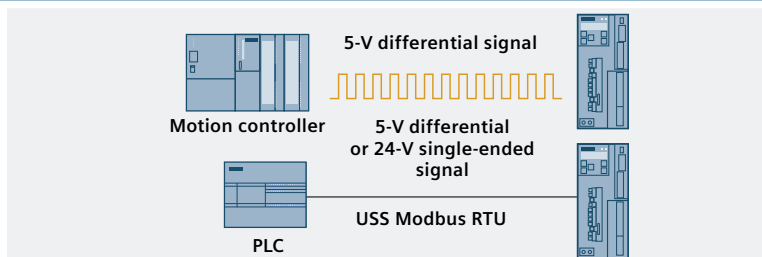
www.siemens.com/sinamics-v-assistant



Simple connection to a control system

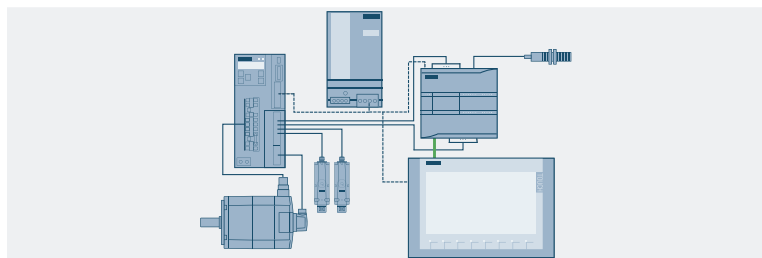
- Two-channel pulse train for position set-point, one exclusively for 5-V differential (RS422 standard), one for 24-V single-ended signal.
- Standard interface RS485 support USS / Modbus RTU

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



Easy, all from a single source

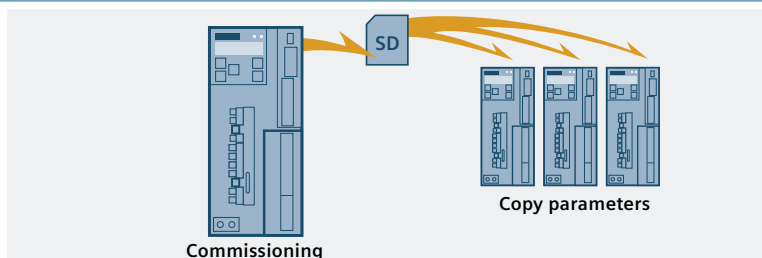
- Predefined drive/motor bundles and accessories, easy to select
- Together with SIMATIC PLC/HMI tested and ready-to-run application examples to connect a V90 drive to a controller
- Different application examples can be downloaded free of charge from the Online Support Portal (see also at page 11).



Parameter cloning

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

Efficient commissioning of serial machines.

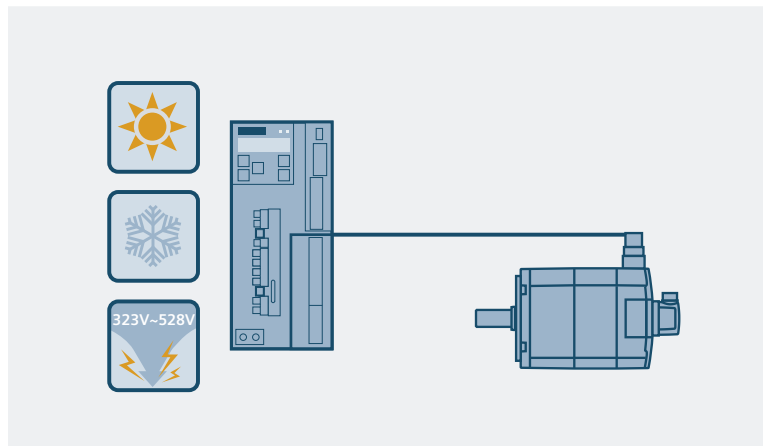


Reliable operation

Robust design and safe choice

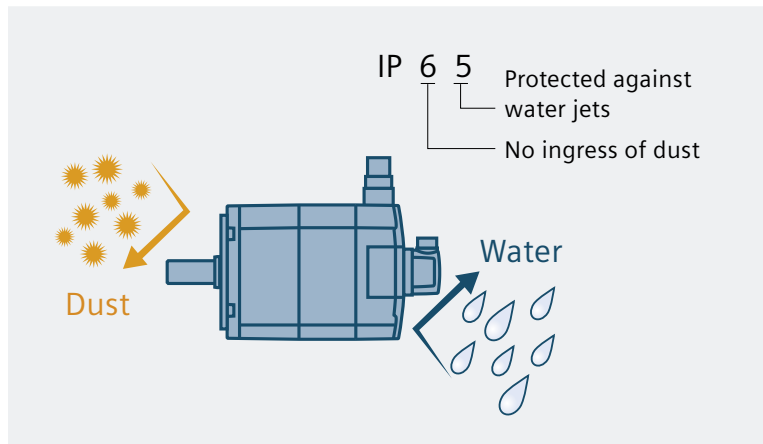
Can withstand harsh environments

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



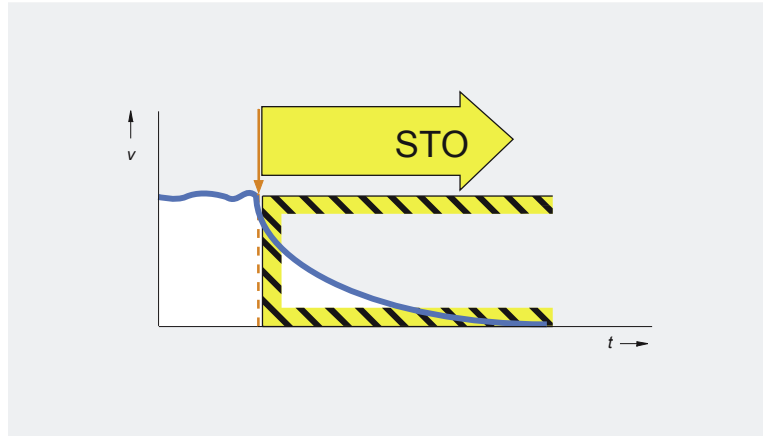
High degree of motor protection

- SIMOTICS S-1FL6 motors have degree of protection IP65 as standard – this includes the connectors on the motor side
- Oil seal at shaft end as standard
- High-quality metal motor connector



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.





Integrated and innovative

Support when selecting, commissioning and operating: powerful software tools

DT Configurator Fast product selection and ordering



The DT Configurator supports you with:

- Selecting the drive based on the application
- The subsequent ordering process

DT Configurator supplies you with:

- A drive that is optimally tailored to your requirements
- 2D/3D models
- Operating instructions
- Data sheets

You can directly order the selected components through the Industry Mall – the Siemens e-commerce website – and without having to duplicate entries. In order to avoid making ordering mistakes, the order number is checked to ensure that it is correct.

Link to Internet page

[siemens.com/dt-configurator](https://www.siemens.com/dt-configurator)

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



User task-centric design for prompted machine commissioning

A PC with installed SINAMICS V-ASSISTANT software tool can be connected to SINAMICS V90 via a standard USB port. It is used for setting parameters, test operation, troubleshooting – and has powerful monitoring functions.

SINAMICS V-ASSISTANT can be downloaded from the SINAMICS V90 Internet page.

Link to Internet page

[siemens.com/sinamics-v90](https://www.siemens.com/sinamics-v90)

Complete motion control solutions from Siemens

SINAMICS V90 System and SIMATIC – Siemens is offering comprehensive solutions from a single source for general motion control applications. We can provide you with highly efficient systems, especially through the optimum interaction between SIMATIC control technology and SINAMICS drive technology with our “SINAMICS Application Examples.”

Siemens application examples comprise the following	Benefits for the customer
<ul style="list-style-type: none"> • Ready to run application example including wiring diagram, parameter description • Sample configuration to connect SINAMICS to SIMATIC, this includes a hardware and software, wiring example, installation instructions for the S7 project supplied, drive parameterization, HMI sample project 	<ul style="list-style-type: none"> • An operational project is correctly configured • 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: siemens.com/sinamics-applications

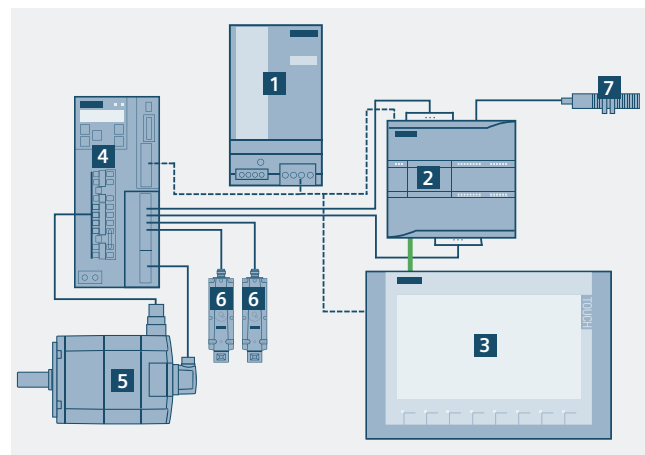
Example: Positioning a SINAMICS V90 with SIMATIC S7-1200 via the pulse/direction interface with HMI

Task

A SINAMICS V90 servo drive is to control a SIMOTICS S-1FL6 servomotor. A SIMATIC S7-1200 is to be used to select the following functions via a touch panel.

Solution

The SINAMICS V90 is controlled via the pulse/direction interface (PTO) of the SIMATIC S7-1200. Technology objects are employed along with the PLCopen motion control standard to control the axis. The move commands are communicated via a SIMATIC Basic Panel, which communicates with the SIMATIC controller via Ethernet.



Link to Internet page

[▶ siemens.com/sinamics-applications](http://siemens.com/sinamics-applications)

1	Power supply SITOP PSU100L
2	SIMATIC S7-1200, CPU 1217C
3	KTP700 Basic
4	SINAMICS V90
5	SIMOTICS S-1FL6 servomotor
6	Mechanical limit switch
7	Inductive reference cam

SINAMICS V90

Technical data

Converter

Line supply		200 ... 240 V 1AC/3AC						
Article No.	6SL3210-5F	B10-1UA0	B10-2UA0	B10-4UA1	B10-8UA0	B11-0UA1	B11-5UA0	B12-0UA0
Max. motor power (kW)		0.1	0.2	0.4	0.75	1	1.5	2
Rated output current (A)		1.2	1.4	2.6	4.7	6.3	10.6	11.6
Max. output current (A)		3.6	4.2	7.8	14.1	18.9	31.8	34.8
Line supply	Voltage	1/3AC 200 V ... 240 V (-15%/+10%)				3AC 200 V ... 240 V (-15%/+10%)		
	Frequency	50 Hz/60 Hz, (-10%/+10%)						
	Capacity (kVA) (1AC)	0.5	0.7	1.2	2	-	-	-
	Capacity (kVA) (3AC)	0.5	0.7	1.1	1.9	2.7	4.2	4.6
Cooling		Natural cooling				Fan cooling		
Frame size		FSA		FSB	FSC	FSD		
Dimensions WxHxD (mm)		45x170x170		55x170x170	80x170x195	95x170x195		
Weight approx. (kg)		1.07		1.20	1.94	2.49		

Line supply		380 ... 480 V 3 AC							
Article No.	6SL3210-5F	E10-4UA0	E10-8UA0	E11-0UA0	E111-5UA0	E12-0UA0	E13-5UA0	E15-0UA0	E17-0UA0
Max. motor power (kW)		0.4	0.75	1	1.5	2	3.5	5	7
Rated output current (A)		1.2	2.1	3	5.3	7.8	11	12.6	13.2
Max. output current (A)		3.6	6.3	9	15.9	23.4	33	37.8	39.6
Line supply	Voltage	3AC 380 V ... 480 V (-15%/+10%)							
	Frequency	50 Hz/60 Hz, (-10%/+10%)							
	Capacity (kVA)	1.7	3	4.3	6.6	11.1	15.7	18	18.9
Cooling		Natural cooling				Fan cooling			
Frame size		FSAA	FSA		FSB		FSC		
Dimensions WxHxD (mm)		60x180x20	80x180x200		100x180x220		140x260x240		
Weight approx. (kg)		1.45	2.09		2.73		5.95		

Control power supply	Voltage*	24 V DC (-15% / +20%),	
	Current	1.6 A (without a holding brake) 3.6 A (with a holding brake)	
Line supply types	TN, TT, IT, TT grounded line supply		
Overload capacity	300% x rated current for 300 ms every 10 s		
Control system	Servo control		
Braking resistor	Integrated		
Ambient temperature	Operation	0 °C to 45 °C: without power derating; 45 °C to 55 °C: with power derating	
	Storage	-40 °C to +70 °C	
Ambient humidity	Operation	<90% (no condensation)	
	Storage	90% (no condensation)	
Pollution class	2		
Shock load	Operation	Peak acceleration: 5 g (g=9.81 m/s ²) 30 ms, 15 g (g=9.81 m/s ²) 11 ms Number of shocks: 3 per direction x 6 direction Duration of shock: 1 s	
	Vibratory load	Operation	10 Hz to 58 Hz: 0.075 mm deflection 58 Hz to 200 Hz: 1 g (g=9.81 m/s ²) vibration
	Transport	2 Hz to 9 Hz: 7.5 mm deflection 9 Hz to 200 Hz: 2 g (g=9.81 m/s ²) vibration	
	Storage	2 Hz to 9 Hz: 3.5 mm deflection 9 Hz to 200 Hz: 1 g (g=9.81 m/s ²) vibration	
Degree of protection	IP20		
Altitude	≤ 1000 m (without power derating); > 1000 m and up to 5000 m (with power derating)		
Standards	CE, KC, EAC, cULus, C-tick		
Interface			
USB	Mini USB		
Pulse train input	2 channels, one exclusively for 5-V differential signal, one for 24-V single-end signal		
Pulse train encoder output	5-V differential signal, A, B, Z phase		
Digital inputs/outputs	10 inputs, NPN/PNP; 6 outputs, NPN		
Analog outputs	2 analog outputs, output voltage range ±10 V, 10 bits		
Communication	RS485		
Safety functions	Safe Torque Off (STO) via terminal, SIL 2		

* When SINAMICS V90 controls a motor equipped with brake, the tolerance of the 24 V DC power supply must be -10% to +10% to comply with the voltage required by the brake.

SINAMICS V90

Control features

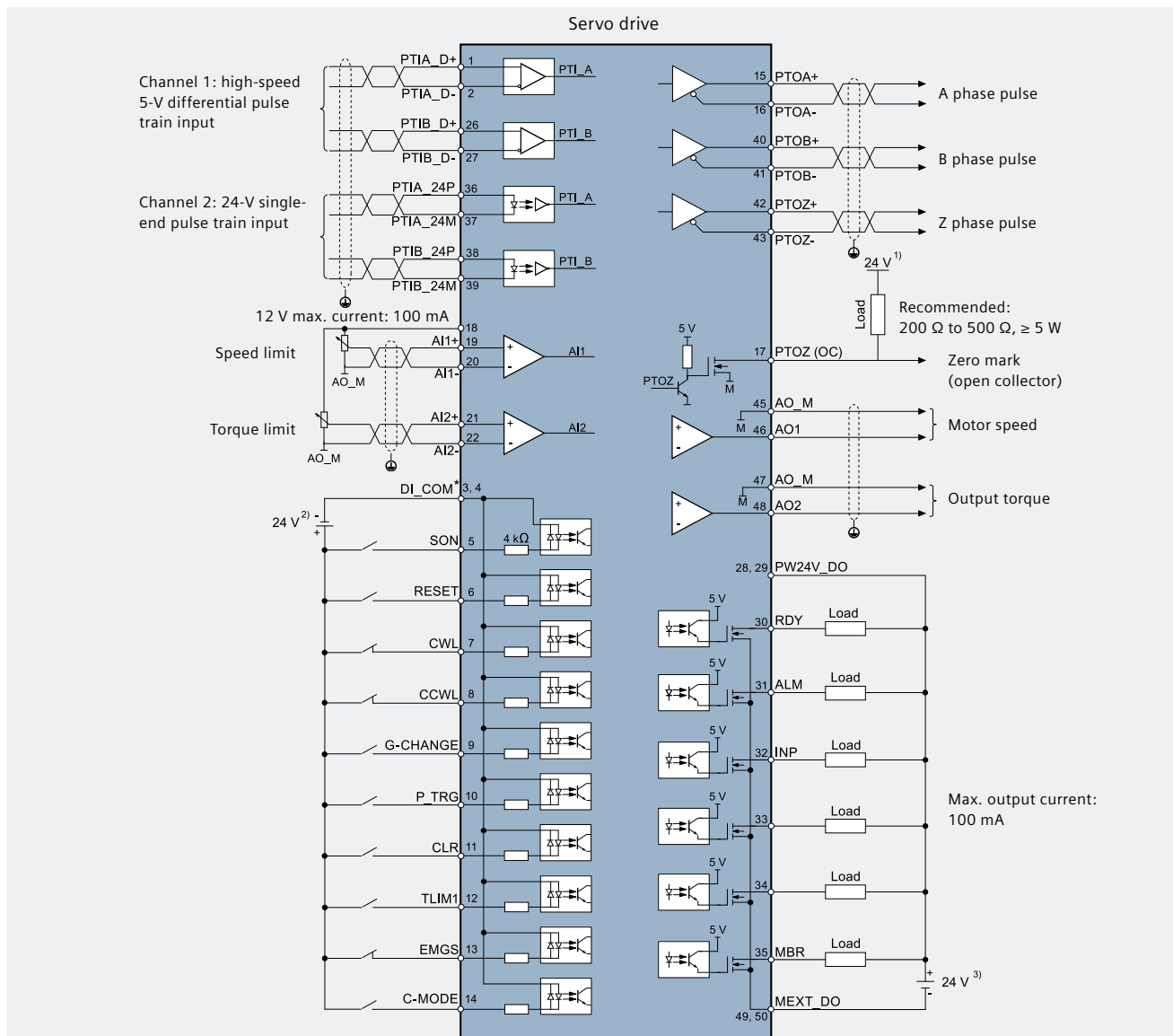
Converter

Control features		
Control modes	<ul style="list-style-type: none"> • Pulse train input position control (PTI), with torque and speed limit • Internal position control (IPos), setpoints selected using a combination of digital inputs (traversing blocks) or Modbus/US\$ • Speed control (S), via analog input or fixed internal speed setpoint, with torque limit • Torque control (T), via analog input or fixed internal torque setpoint, with speed and torque limits • Control mode switchover, e.g. switchover on-the-fly from position control to speed control via digital input • Jog using buttons on the integrated operator panel (BOP) 	
Speed control mode	Speed control range	Analog speed command: 1:2000 Internal speed command: 1:5000
	Analog speed input	-10 V DC to +10 V DC / rated speed
	Torque limit	Set through a parameter or the analog input command (0 V to +10 V DC/max. torque)
Pulse train input position control	Max. input pulse frequency	High-speed differential line driver (5 V), 1MHz Optical coupler (24 V), 200 kHz
	Multiplying factor	Electronic gear ratio (A/B), A:1-65535, B:1-65535, 1/50<A/B<200
	In-position range	0 to ±1000 pulse (command pulse unit)
	Torque limit	Set using a parameter or analog input command
Torque control	Analog torque input	-10 V DC to +10 V DC/max. torque (input impedance > 25 kΩ)
	Speed limit	Set using a parameter or an analog input command
Control functions	Real time auto tuning	Estimates the machine characteristic and sets the closed loop control parameters (gain, integral, etc.) continuously in real time without any user intervention
	Resonance suppression	Suppresses the mechanical resonance, such as workpiece and foundation vibration
	One button auto tuning	Estimates the machine load inertia and mechanical characteristics with internal motion command (pre-configured in the V90). The process can be initiated using the engineering tool SINAMICS V-ASSISTANT
	Gain switch	Switches between gains using an ext. signal or int. operating conditions to reduce noise, shorten positioning time and improve the operational stability of a servo system
	PI/P control switch	Switches from PI control to P control with an external signal or internal operating conditions
	Speed and torque limit	Limits motor speed using an external analog speed limit command (0 to ±10 V DC) or internal speed limit commands (up to three groups)
	DI/DO parameterization	Freely assigns the control signals to 8 digital inputs and 6 digital outputs
	External braking resistor	An external braking resistor can be used when the internal braking resistor is not capable of handling the regenerative energy
	Position smoothing	Transforms position characteristics from the pulse train input setpoint into an S-curve profile with a parameterized time constant
	Measure machine	The machine frequency characteristics are analyzed using SINAMICS V-ASSISTANT
	Zero speed clamp	Stops motor and locks motor axis when motor speed setpoint is below a parameterized threshold level
Parameter cloning and Firmware update		Standard SD card for the 400 V version, Micro SD card for the 200 V version
Safety functions		Safe Torque Off (STO) via terminal, complies with safety standard SIL 2 according to EN 61508 resp. PL d, Cat 3 according to EN ISO 13849
Basic Operator Panel (BOP)		Integrated, 6-digit / 7-segment display, 5 buttons
PC engineering tool		SINAMICS V-ASSISTANT engineering tool exclusively for SINAMICS V90

SINAMICS V90

Connection diagram

Standard wiring for pulse train input (PTI) position control mode (detailed information and connection diagram for other control modes, please refer to the operating instructions). The diagram shown is provided as a reference for selecting the drive type. When using the selected servo drive system, establish the wiring connections according to the connection diagram and the instructions provided in the user's manual.



Shielded cable
Twisted-pair wires

Only one of the pulse train input channels can be used.

Other control signals can be assigned to digital inputs and 6 digital outputs, please refer to the operating instructions.

* Digital inputs, supporting both PNP and NPN types.

The 24-V power supplies in the connection diagram are as follows:

¹⁾ 24-V power supply for SINAMICS V90. All the PTO signals must be connected to the controller with the same 24-V power supply as SINAMICS V90.

²⁾ Isolated digital input power supply. The controller power supply can be used.

³⁾ Isolated digital output power supply. The controller power supply can be used.

System at glance

SINAMICS V90 servo drive system
1/3AC 200 ... 240 V Low Inertia (LI) for high dynamic performance



Frame size A



Frame size B



Frame size C



Frame size D



Control/setpoint cable



SH 20



SH 30



SH 40



SH 50



Power cable

Encoder cable

SINAMICS V90 servo drive system
3AC 380 ... 480 V High Inertia (HI) for smooth operational performance



Frame size AA



Frame size A



Frame size B



Frame size C



Control/setpoint cable



SH 45



SH 65



SH 90



Power cable

Encoder cable

SINAMICS V90 converter

Status indicator

- RDY indicates the servo ready/alarm
- COM indicates communication with PC

Integrated Operator Panel

- 6 digits, 7-segment LED
- 5 buttons

High-quality safety connectors

Braking resistor

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

Shield plate

- Easy-to-attach cables and better EMC quality

MODBUS RTU/USS (RS485 interface)

- To communicate with a PLC

Standard mini USB socket

- To connect a PC with engineering tool

SD card slot

- to copy parameters
- Standard SD card slot (for the 400 V version)
- Micro SD card slot (for the 200 V version)

Safe Torque Off

Motor holding brake (only for the 400 V version)

Control/status interface

- 50 pins
- Pulse train input
- Encoder emulation pulse output
- DI/DO, AI/AO
- Motor holding brake signal (V90, 200 V only). The V90, 200 V requires an external relay to connect the motor holding brake.

Small encoder connector

SIMOTICS S-1FL6, High Inertia motor

High-quality metal connector

Quick-release connector

IP65 as standard for all motors

High-quality bearings

Shaft sleeve protection

High-wear-resistant oil seal material

SIMOTICS S-1FL6, Low Inertia motor

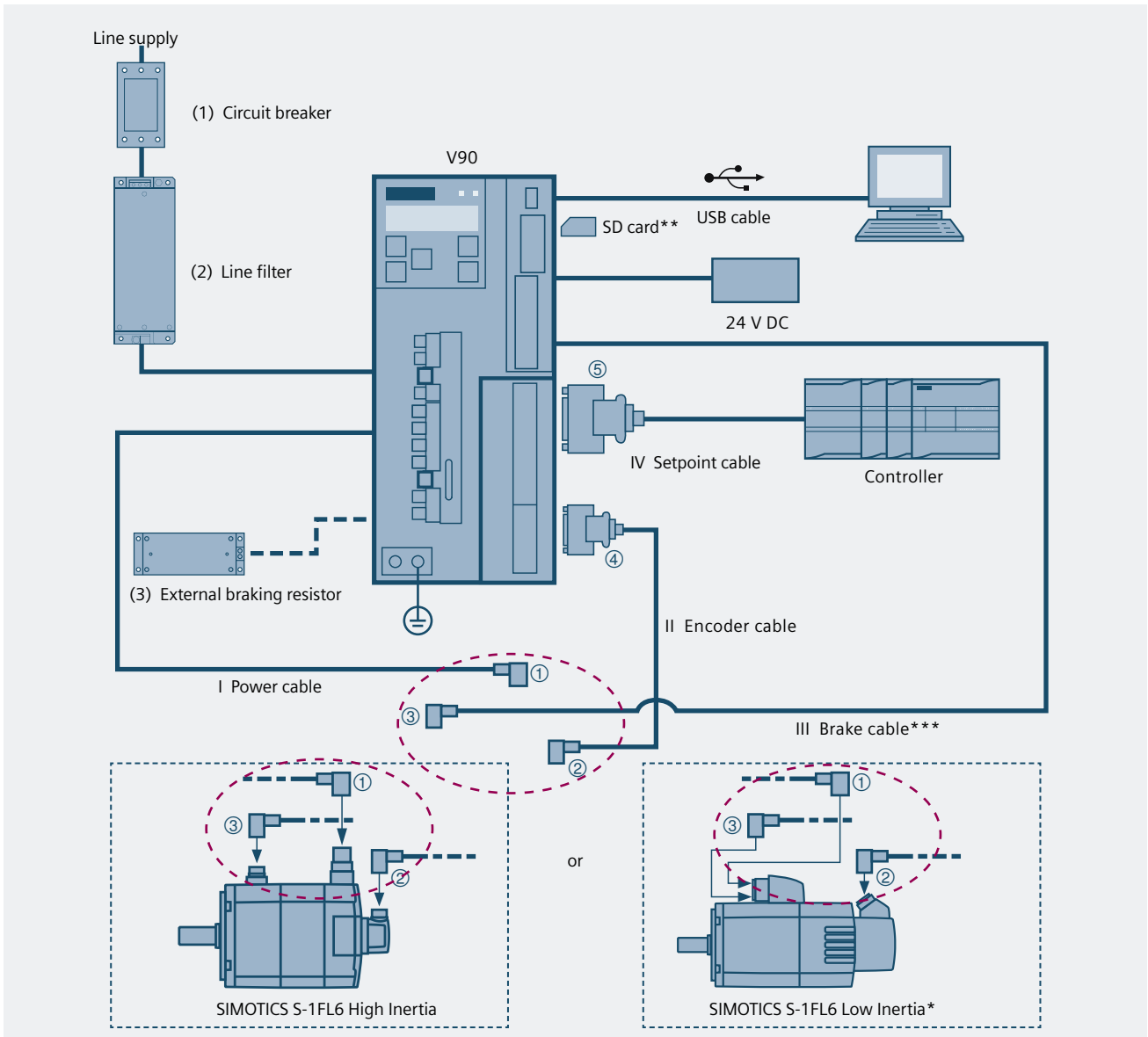
Cost-efficient, compact cable

IP65 as standard for all motors

High-quality bearings

High-wear-resistant oil seal material

System connection diagram



(1)	Circuit breaker
(2)	Line filter
(3)	External braking resistor
I	Power cable
II	Encoder cable
III	Brake cable
IV	Setpoint cable

①	Power connector (motor side)
②	Encoder connector (motor side)
③	Brake connector (motor side)
④	Encoder connector (converter side)
⑤	Setpoint connector


* 1FL6 Low Inertia motor SH20, SH30, SH40 use the outlet connection concept.

** Standard SD card for the SINAMICS V90, 400 V Version. Micro SD card for SINAMICS V90, 200 V version.

*** Brake cable connection shown here is for the SINAMICS V90, 400 V version only. The 200 V version requires an external relay to connect the holding brake. The relay is connected via the 50-pin cable of the control/status interface.

SIMOTICS S-1FL6 Low Inertia for high dynamic performance

Motor

Technical data								
Article number 1FL6	022-2AF	024-2AF	032-2AF	034-2AF	042-2AF	044-2AF	052-2AF	054-2AF
Shaft height (SH) ³⁾	20		30		40		50	
Rated power (kW) ¹⁾	0.05	0.10	0.20	0.40	0.75	1.00	1.50	2.00
Horsepower (HP)	0.07	0.14	0.27	0.54	1.02	1.36	2.04	2.72
Rated torque (Nm)	0.16	0.32	0.64	1.27	2.39	3.18	4.78	6.37
Rated speed (rpm)	3000							
Maximum torque (Nm)	0.48	0.96	1.91	3.82	7.2	9.54	14.3	19.1
Maximum speed (r/min)	5000							
Rated current (A)	1.2	1.2	1.4	2.6	4.7	6.3	10.6	11.6
Maximum current (A)	3.6	3.6	4.2	7.8	14.2	18.9	31.8	34.8
Torque constant (Nm/A)	0.14	0.29	0.48	0.49	0.51	0.51	0.46	0.55
Moment of inertia (10 ⁻⁴ kg·m ²) (with brake)	0.031 (0.038)	0.052 (0.059)	0.214 (0.245)	0.351 (0.381)	0.897 (1.06)	1.15 (1.31)	2.04 (2.24)	2.62 (2.82)
Thermal class	B (130 °C)							
Degree of protection	IP65							
Recommended load to motor inertia ratio	Max. 30x				Max.20x		Max.15x	
Encoder types	Incremental encoder TTL 2500S/R							
Type of construction	IM B5 (IM V1 and IM V3)							
Weight (kg) (with brake)	0.47 (0.70)	0.63 (0.86)	1.02 (1.48)	1.46 (1.92)	2.8 (3.68)	3.39 (4.20)	5.35 (6.76)	6.56 (8.00)
Operating temperature	0 ~ 40 °C (without any restrictions)						0 ~ 30 °C (without any restrictions)	
Operating humidity	90 % RH maximum (no condensation at 30 °C)							
Vibration severity grade	Grade A							
Radial runout tolerance	Class N							
Installation altitude	≤ 1000 m (without power derating); > 1000 m and up to 5000 m (with power derating)							
Standards								
Holding brake data ²⁾								
Holding torque (Nm)	0.32 Nm		1.27 Nm		3.18 Nm		6.37 Nm	
Rated voltage (V)	24 V DC ± 10%							
Opening time (ms)	35		75		105		90	
Closing time (ms)	10		10		15		35	
Rated current (A)	0.25		0.3		0.35		0.57	

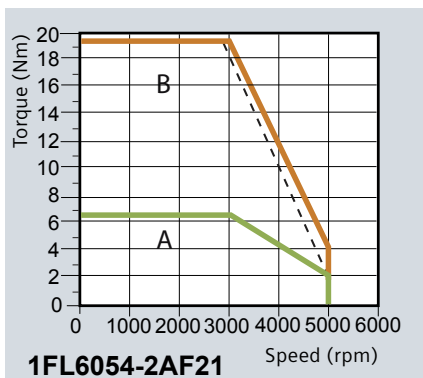
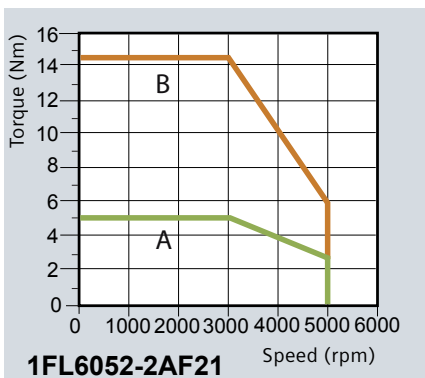
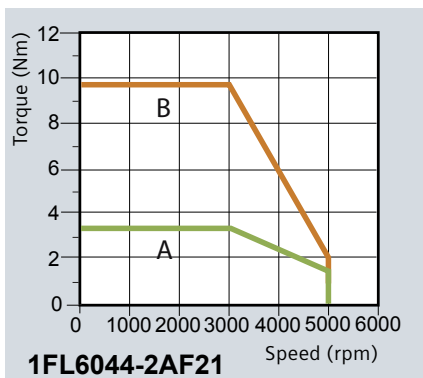
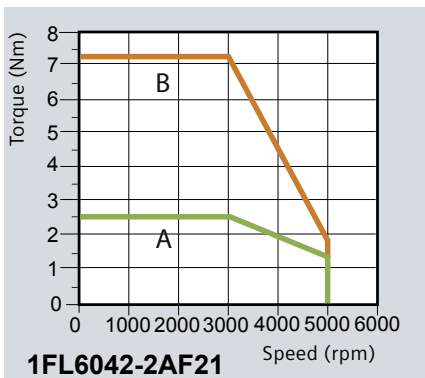
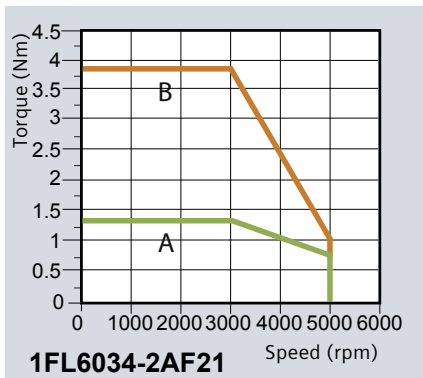
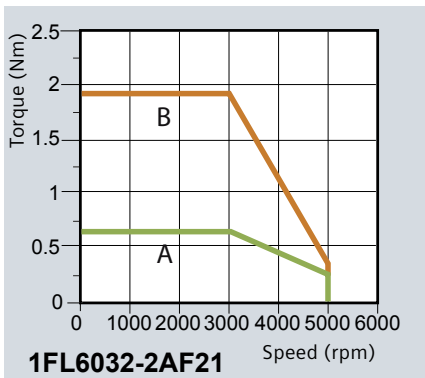
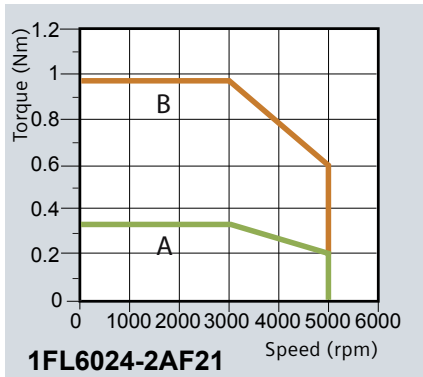
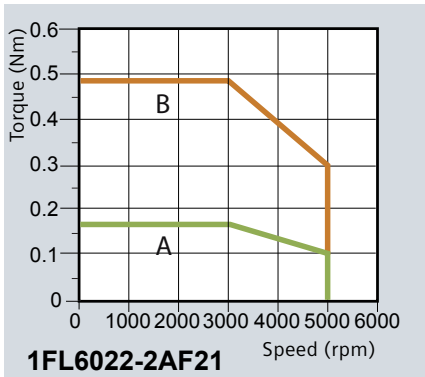
¹⁾ Rated torque, rated power and maximum torque listed in the table above allow a production tolerance of 10 %.

²⁾ It is not permissible to use the holding brake for an emergency stop.

³⁾ The different motor shaft heights and flange dimensions are perfectly dimensioned for the Asian market.

SIMOTICS S-1FL6 Low Inertia

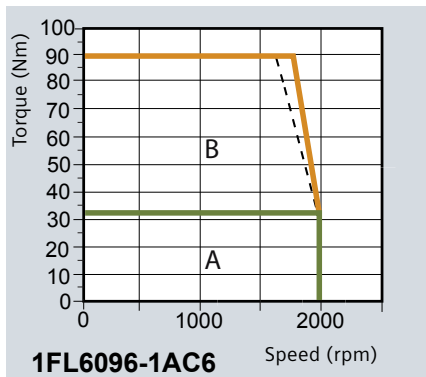
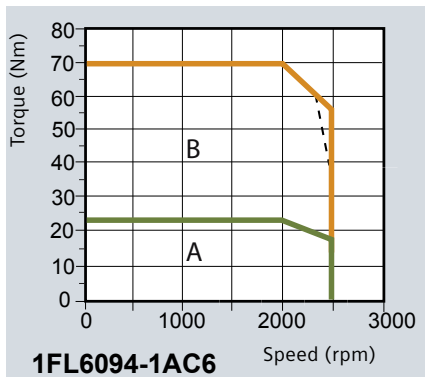
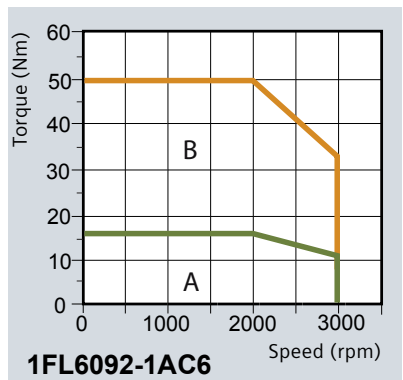
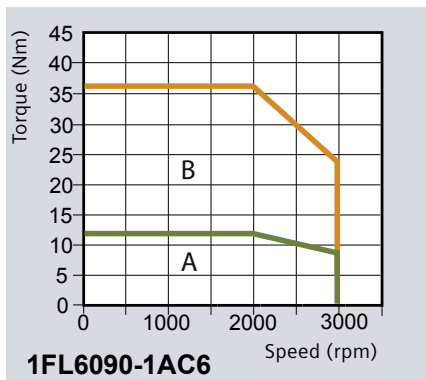
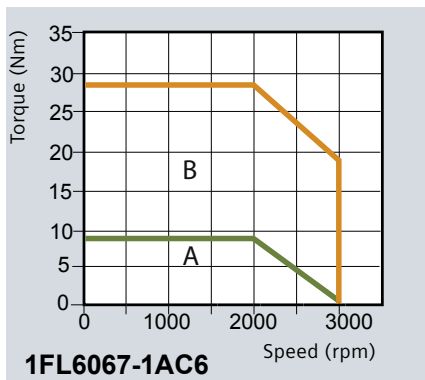
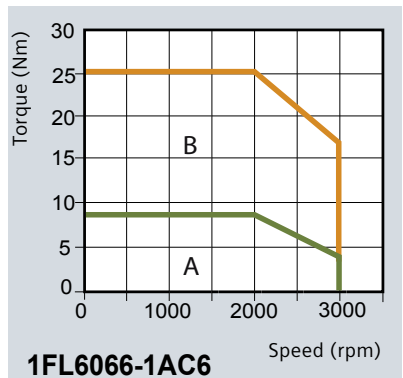
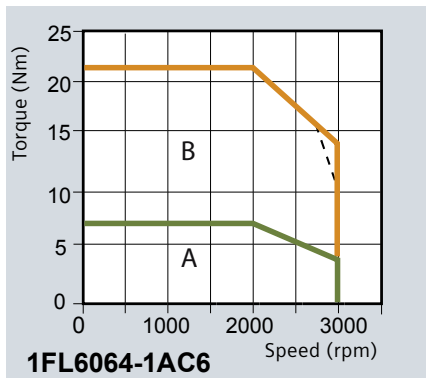
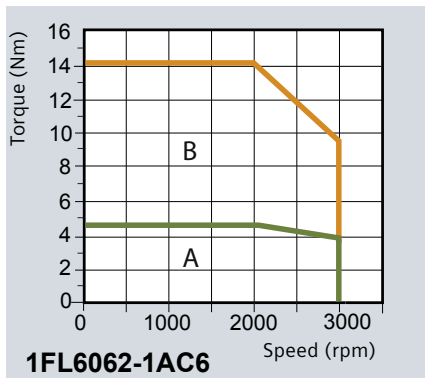
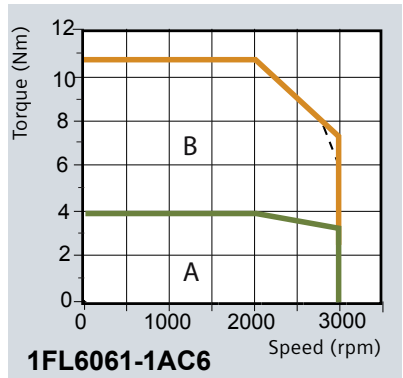
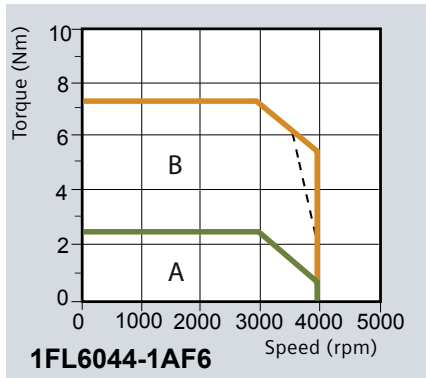
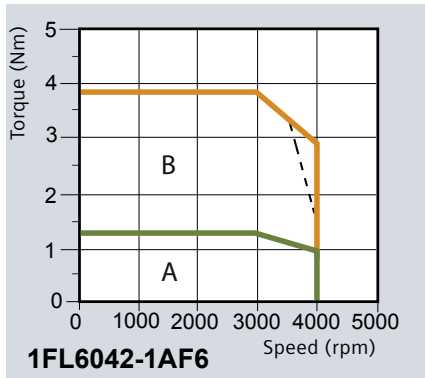
Torque-speed characteristic when connected to SINAMICS V90



220 V AC supply voltage
 A: Continuous operating area
 B: Short-term operating area
 — Supply voltage 220 V
 - - - Supply voltage 198 V

SIMOTICS S-1FL6 High Inertia

Torque-speed characteristic when connected to SINAMICS V90




Notes:

- A: Continuous operating area
- B: Short-term operating area

- Supply voltage 400 V
- - - Supply voltage 380 V

SIMOTICS S-1FL6 High Inertia for smooth operation

Motor

Technical data											
Article number 1FL6	042–1AF	044–1AF	061–1AC	062–1AC	064–1AC	066–1AC	067–1AC	090–1AC	092–1AC	094–1AC	096–1AC ³⁾
Shaft height (SH) ¹⁾	45		65					90			
Rated power (kW) ²⁾	0.40	0.75	0.75	1.00	1.50	1.75	2.00	2.50	3.50	5.00	7.00
Horsepower (HP)	0.54	1.02	1.02	1.36	2.04	2.38	2.72	3.40	4.76	6.80	9.52
Rated torque (Nm) ²⁾	1.27	2.39	3.58	4.78	7.16	8.36	9.55	11.90	16.70	23.90	33.40
Rated speed (rpm)	3000		2000					2000			
Maximum torque (Nm) ²⁾	3.8	7.2	10.7	14.3	21.5	25.1	28.7	35.7	50.0	70.0	90.0
Maximum speed (rpm)	4000		3000					3000		2500	2000
Rated current (A)	1.2	2.1	2.5	3.0	4.6	5.3	5.9	7.8	11.0	12.6	13.2
Maximum current (A)	3.6	6.3	7.5	9.0	13.8	15.9	17.7	23.4	32.9	36.9	35.6
Torque constant (Nm/A)	1.1	1.2	1.5	1.7	1.6	1.7	1.7	1.6	1.6	2.0	2.7
Moment of inertia (10 ⁻⁴ kg·m ²) (with brake)	2.7 (3.2)	5.2 (5.7)	8.0 (9.1)	15.3 (16.4)	15.3 (16.4)	22.6 (23.7)	29.9 (31.0)	47.4 (56.3)	69.1 (77.9)	90.8 (99.7)	134.3 (143.2)
Thermal class	B (130 °C)										
Degree of protection	IP65										
Recommended load to motor inertia ratio	Max. 10x		Max. 5x					Max. 5x			
Encoder types	Incremental encoder TTL 2500 S/R, absolute encoder 20-bit single-turn + 12-bit multi-turn										
Type of construction	IM B5 (IM V1 and IM V3)										
Weight (kg) ⁵⁾ (with brake)	3.3 (4.6)	5.1 (6.4)	5.6 (8.6)	8.3 (11.3)	8.3 (11.3)	11.0 (14.0)	13.6 (16.6)	15.3 (21.3)	19.7 (25.7)	24.3 (30.3)	33.2 (39.1)
Operating temperature	0 ~ 40 °C (without any restrictions)										
Operating humidity	90% RH maximum (no condensation at 30 °C)										
Vibration severity grade	Grade A										
Radial runout tolerance	N										
Installation altitude	≤ 1000 m (without power derating); > 1000 m and up to 5000 m (with power derating)										
Standards											
Holding brake data ⁴⁾											
Holding torque (Nm)	3.5		12.0					30.0			
Rated voltage (V)	24 V DC ± 10%										
Opening time (ms)	60		180					220			
Closing time (ms)	45		60					115			
Rated current (A)	0.9		1.5					1.9			

¹⁾ The different motor shaft heights and flange dimensions are perfectly dimensioned for the Asian market.

²⁾ The rated torque, rated power and maximum torque listed in the table above allow for a production tolerance of 10%.

³⁾ For 1FL6096 motors with brake, when the ambient temperature exceeds 30 °C, the power should be derated by 10%. Power derating is not required for other motors.

⁴⁾ It is not permissible to use the holding brake for an emergency stop.

⁵⁾ Motor weight with incremental encoder.

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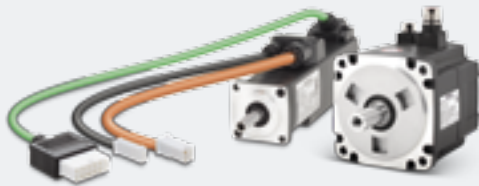
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SINAMICS V90 servo drive system Step-by-step selection

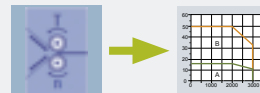
1 Select your motor: SIMOTICS S-1FL6



1. Select your motor based on the control properties:

- **Low Inertia** motor for the highest dynamic performance in terms of speed and acceleration
- **High Inertia** motor for better load adaption and optimum control quality in terms of torque and speed accuracy

2. Determine the motor power rating at the required torque and speed



3. Select encoder resolution
4. Select motor holding brake
5. Determine shaft type

2 Select your converter: SINAMICS V90



1. Select your converter based on the motor power rating

SIMOTICS S-1FL6		
	Power (kW)	Article number
High perf. (Low Inertia)	0.05	1FL6022-2AF21-1XX1

	2.00	1FL6054-2AF21-1XX1
Smooth operation (High Inertia)	0.40	1FL6042-1AF61-0XX1

	7.00	1FL6096-1AC61-0XX1

SINAMICS V90		
Power (kW)	Line supply voltage	Article number
0.05	230 V 1AC/3AC	6SL3210-5FB10-1UA0
...
2.00	230 V 3AC	6SL3210-5FB12-0UA0
0.40	400 V 3AC	6SL3210-5FE10-4UA0
...
7.00	400 V 3AC	6SL3210-5FE17-0UA0

3 Select your cables



1. Select your MOTION-CONNECT 300 connection system

- Power cable acc. to length and cross section (orange)
- Encoder cable acc. to length and encoder type (green)
- Brake cable if motor holding brake is selected acc. to length (black)

2. Control/setpoint cable to connect the drive to the PLC (grey)

4 Select your controller



1. Select your SIMATIC S7-1200

CPU according to the number of axes

2. Select PLC options

for DI/DO or for RS485 communication



The optimum servo drive solution
SINAMICS V90
has now been configured!

SINAMICS V90 servo drive system

Step-by-step selection

Ordering information:

1 SIMOTICS S-1FL6 servomotor							2 SINAMICS V90 converter				3 MOTION-CONNECT 300 Cables between SINAMICS V90 converter and SIMOTICS S-1FL6 servomotor				
	Rated Power (kW)	Rated torque (Nm)	Rated speed (rpm)	Shaft height (mm)	Article number		Rated power (kW)	Line supply voltage	Frame size	Article number	Power cable Article number	Encoder cable Article number			
High dynamic performance (Low Inertia)	0.05	0.16	3000	20	1FL6022-2AF21-1	A □ 1	0.05 0.10 0.20 0.40 0.75 1.00 1.50 2.00	200 ... 240 V 1AC / 3AC	FSA	6SL3210-5FB10-1UA0	6FX3002-5CK01-1 □ □ 0	6FX3002-2	CT		
	0.10	0.32	3000		1FL6024-2AF21-1	A □ 1				6SL3210-5FB10-2UA0					
	0.20	0.64	3000	30	1FL6032-2AF21-1	A □ 1				6SL3210-5FB10-4UA1					
	0.40	1.27	3000		1FL6034-2AF21-1	A □ 1				6SL3210-5FB10-8UA0					
	0.75	2.39	3000	40	1FL6042-2AF21-1	A □ 1				6SL3210-5FB11-0UA1					
	1.00	3.18	3000		1FL6044-2AF21-1	A □ 1				6SL3210-5FB11-5UA0					
	1.50	4.78	3000	50	1FL6052-2AF21-0	A □ 1				6SL3210-5FB12-0UA0					
2.00	6.37	3000		1FL6054-2AF21-0	A □ 1										
Smooth operation (High Inertia)	0.40	1.27	3000	45	1FL6042-1AF61-0	□ □ 1	0.40 0.75 0.75 1.00 1.50 1.75 2.00 2.50 3.50 5.00 7.00	380 ... 480 V 3AC	FSAA	6SL3210-5FE10-4UA0	6FX3002-5CL01-1 □ □ 0	6FX3002-2	□ □		
	0.75	2.39	3000		1FL6044-1AF61-0	□ □ 1				6SL3210-5FE10-8UA0					
	0.75	3.58	2000	65	1FL6061-1AC61-0	□ □ 1				6SL3210-5FE11-0UA0					
	1.00	4.77	2000		1FL6062-1AC61-0	□ □ 1									
	1.50	7.16	2000		1FL6064-1AC61-0	□ □ 1				6SL3210-5FE11-5UA0					
	1.75	8.4	2000		1FL6066-1AC61-0	□ □ 1									
	2.00	9.5	2000		1FL6067-1AC61-0	□ □ 1				6SL3210-5FE12-0UA0					
	2.50	11.9	2000	90	1FL6090-1AC61-0	□ □ 1									
	3.50	16.7	2000		1FL6092-1AC61-0	□ □ 1				6SL3210-5FE13-5UA0					
	5.00	23.9	2000		1FL6094-1AC61-0	□ □ 1				6SL3210-5FE15-0UA0					
7.00	33.4	2000		1FL6096-1AC61-0	□ □ 1	6SL3210-5FE17-0UA0									
Encoder type		Incremental encoder TTL 2500 S/R (13-bit)				A									
		Absolute encoder 20-bit single-turn and 12-bit multi-turn				L									
Shaft type feather key and holding brake		Feather key, without holding brake				A									
		Feather key, with holding brake				B									
		Plain shaft, without holding brake				G									
		Plain shaft, with holding brake				H									
		Length: 3 m		A D											
		Length: 5 m		A F											
		Length: 7 m ¹⁾		A H											
		Length: 10 m		B A											
		Length: 20 m		C A											
												For incremental encoder		C T	
												For absolute encoder		D B	

Recommended line-side components											
SINAMICS V90		Recommended line filter ²⁾		Recommended fuse/circuit breaker – IEC-compliant				Recommended fuse/circuit breaker to – UL-compliant			
Line supply voltage	Article number	Rated current	Article number	Fuse Rated current	Article number	Circuit breaker Rated current, voltage	Article number	Fuse Rated current, voltage	Class	Circuit breaker Rated current, voltage	Article number
200 ... 240 V 1AC	6SL3210-5FB10-1UA0	18 A	6SL3203-0BB21-8VA0	6 A	3NA3801	4 A, 690 V AC	3RV2011-1EA10	4 A, 600 V	IDSR	4 A, 690 V AC	3RV2011-1EA10
	6SL3210-5FB10-2UA0			6 A	3NA3801	4 A, 690 V AC	3RV2011-1EA10	6 A, 600 V	IDSR	4 A, 690 V AC	3RV2011-1EA10
	6SL3210-5FB10-4UA1			10 A	3NA3803	8 A, 690 V AC	3RV2011-1HA10	10 A, 600 V	IDSR	8 A, 690 V AC	3RV2011-1HA10
	6SL3210-5FB10-8UA0			16 A	3NA3803	12.5 A, 690 V AC	3RV2011-1KA10	20 A, 600 V	IDSR	12.5 A, 690 V AC	3RV2011-1KA10
200 ... 240 V 3AC	6SL3210-5FB10-1UA0	5 A	6SL3203-0BE15-0VA0	6 A	3NA3801	4 A, 690 V AC	3RV2011-1EA10	6 A, 600 V AC	IDSR	4 A, 690 V AC	3RV2011-1EA10
	6SL3210-5FB10-2UA0			6 A	3NA3801	4 A, 690 V AC	3RV2011-1EA10	6 A, 600 V AC	IDSR	4 A, 690 V AC	3RV2011-1EA10
	6SL3210-5FB10-4UA1			10 A	3NA3803	4 A, 690 V AC	3RV2011-1EA10	10 A, 600 V AC	IDSR	4 A, 690 V AC	3RV2011-1EA10
	6SL3210-5FB10-8UA0	12 A	6SL3203-0BE21-2VA0	16 A	3NA3803	8 A, 690 V AC	3RV2011-1HA10	20 A, 600 V AC	IDSR	8 A, 690 V AC	3RV2011-1HA10
	6SL3210-5FB11-0UA1			16 A	3NA3803	10 A, 690 V AC	3RV2011-1JA10	20 A, 600 V AC	IDSR	10 A, 690 V AC	3RV2011-1JA10
	6SL3210-5FB11-5UA0			25 A	3NA3810	16 A, 690 V AC	3RV2011-4AA10	25 A, 600 V AC	IDSR	16 A, 690 V AC	3RV2011-4AA10
6SL3210-5FB12-0UA0	25 A	3NA3810	16 A, 690 V AC	3RV2011-4AA10	25 A, 600 V AC	IDSR	16 A, 690 V AC	3RV2011-4AA10			
380 ... 480 V 3AC	6SL3210-5FE10-4UA0	5 A	6SL3203-0BE15-0VA0	6 A	3NA3801-6	3.2 A, 690 V AC	3RV1021-1DA10	10 A, 600 V AC	J	3.2 A, 690 V AC	3RV1021-1DA10
	6SL3210-5FE10-8UA0			6 A	3NA3801-6	4 A, 690 V AC	3RV1021-1EA10	10 A, 600 V AC	J	4 A, 690 V AC	3RV1021-1EA10
	6SL3210-5FE11-0UA0	10 A	6SL3203-0BE21-2VA0	10 A	3NA3803-6	5 A, 690 V AC	3RV1021-1FA10	10 A, 600 V AC	J	5 A, 690 V AC	3RV1021-1FA10
	6SL3210-5FE11-5UA0			10 A	3NA3803-6	10 A, 690 V AC	3RV1021-1HA10	15 A, 600 V AC	J	10 A, 690 V AC	3RV1021-1HA10
	6SL3210-5FE12-0UA0	16 A	6SL3203-0BE22-0VA0	16 A	3NA3805-6	16 A, 690 V AC	3RV1021-4AA10	15 A, 600 V AC	J	16 A, 690 V AC	3RV1021-4AA10
	6SL3210-5FE13-5UA0			20 A	3NA3807-6	20 A, 690 V AC	3RV1021-4BA10	25 A, 600 V AC	J	20 A, 690 V AC	3RV1021-4BA10
	6SL3210-5FE15-0UA0	20 A	6SL3203-0BE22-0VA0	20 A	3NA3807-6	20 A, 690 V AC	3RV1021-4BA10	25 A, 600 V AC	J	20 A, 690 V AC	3RV1021-4BA10
	6SL3210-5FE17-0UA0			25 A	3NA3810-6	25 A, 690 V AC	3RV1021-4DA10	25 A, 600 V AC	J	25 A, 690 V AC	3RV1021-4DA10

¹⁾ 7 m cable length is only available in combination with SIMOTICS S-1FL6 High Inertia servomotors (400 V 3AC)

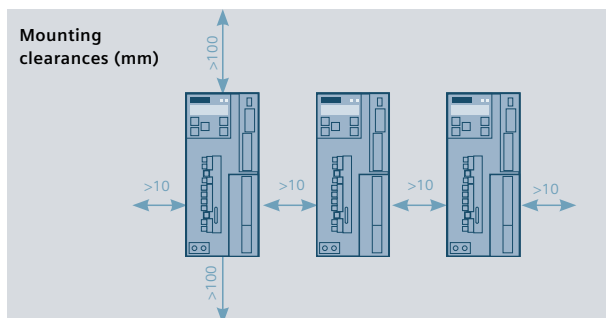
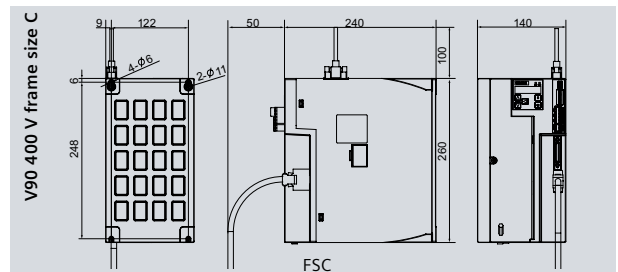
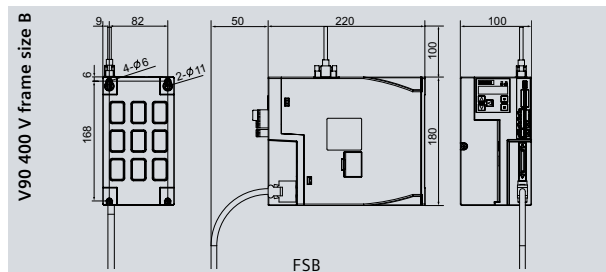
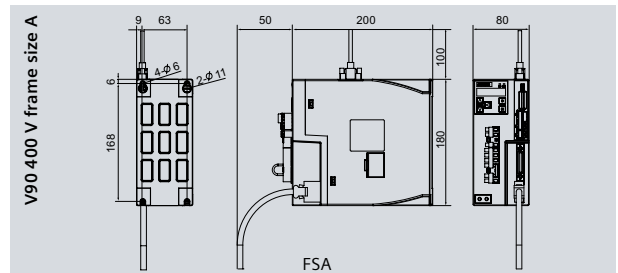
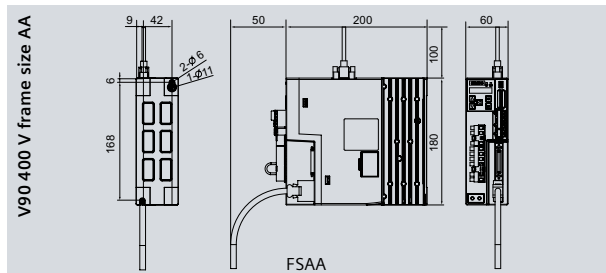
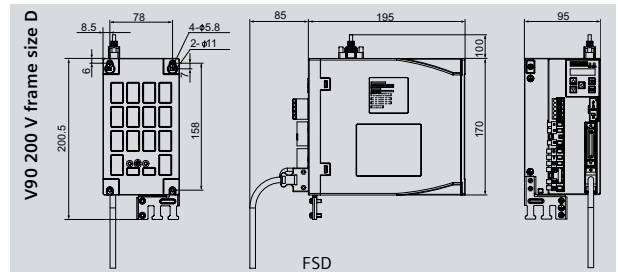
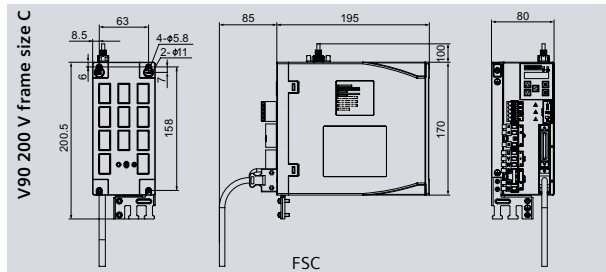
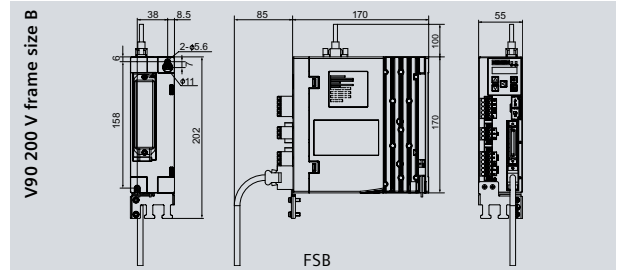
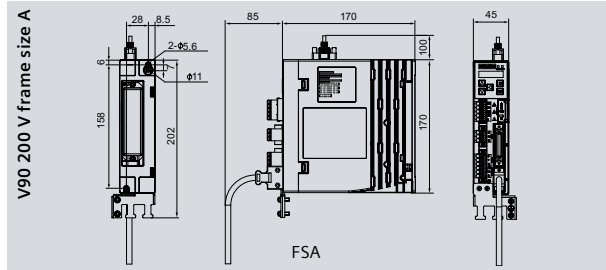
²⁾ With one of the recommended line filters, EN 61008-3 category C2 can be reached in combination with SINAMICS V90. For more information please refer to the EMC instructions in the SINAMICS V90 User Manual.

³⁾ When the internal braking resistor is not sufficient, select a standard braking resistor according to the table.

SINAMICS V90

Dimensions and mounting clearances

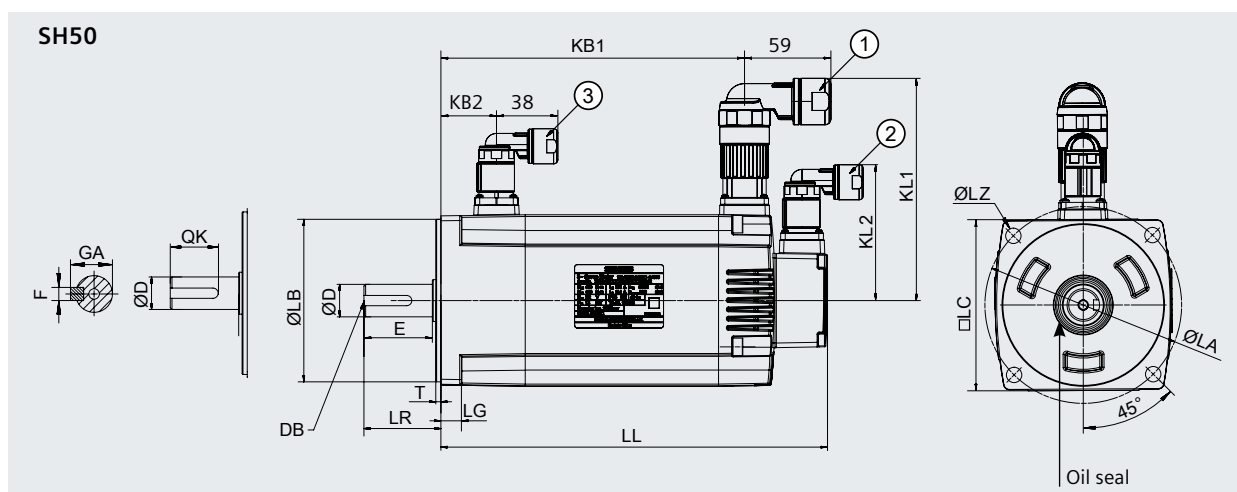
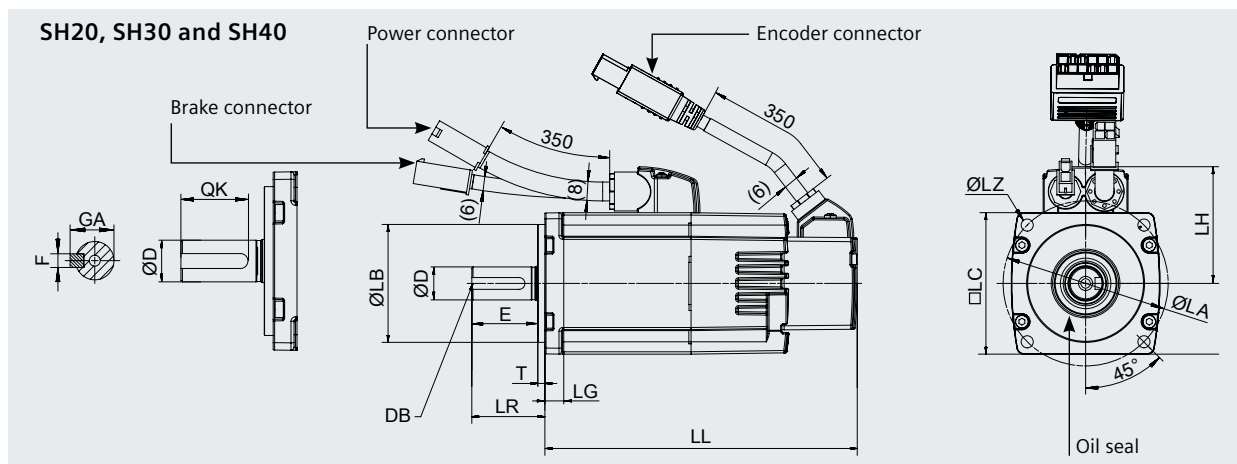
Dimension drawings (mm)



SIMOTICS S-1FL6 Low Inertia

Dimension drawings (mm) 1FL6 Low Inertia servomotors with incremental TTL 2500ppr encoder

Shaft height	Type														Without brake		With brake					
		LC	LA	LZ	LB	LH	LR	T	LG	D	DB	E	QK	GA	F	LL	KB1	LL	KB1	KB2	KL1	KL2
20	1FL6022-2AF	40	46	4.5	30	40	25	2.5	6	8	M3x8	22	17.5	9	3	86	-	119	-	-	-	-
	1FL6024-2AF	40	46	4.5	30	40	25	2.5	6	8	M3x8	22	17.5	9	3	106	-	139	-	-	-	-
30	1FL6032-2AF	60	70	5.5	50	50	31	3	8	14	M4x15	28	22.5	16	5	98	-	132.5	-	-	-	-
	1FL6034-2AF	60	70	5.5	50	50	31	3	8	14	M4x15	28	22.5	16	5	123	-	157.5	-	-	-	-
40	1FL6042-2AF	80	90	7	70	60	35	3	8	19	M6x16	30	28	21.5	6	139	-	178.3	-	-	-	-
	1FL6044-2AF	80	90	7	70	60	35	3	8	19	M6x16	30	28	21.5	6	158.8	-	198.1	-	-	-	-
50	1FL6052-2AF	100	115	9	95	-	45	3	12	19	M6x16	40	28	21.5	6	192	143.5	226	177.5	32.5	130	79
	1FL6054-2AF	100	115	9	95	-	45	3	12	19	M6x16	40	28	21.5	6	216	167.5	250	201.5	32.5	130	79

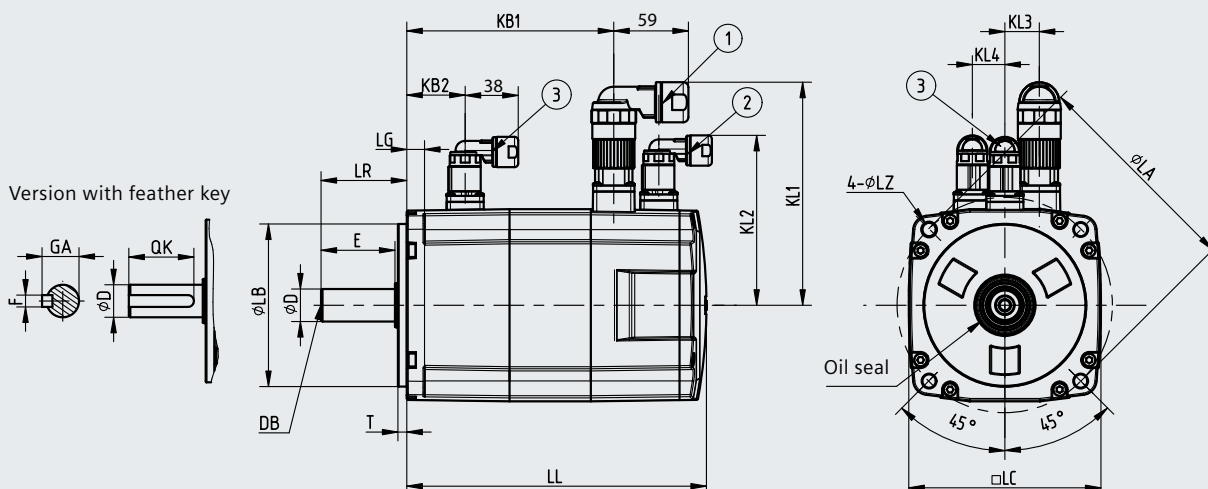


SIMOTICS S-1FL6 High Inertia

Dimension drawings (mm) 1FL6 High Inertia servomotors with incremental encoder

Shaft height	Type														Without brake			With brake						
		LC	LA	LZ	LB	LR	T	LG	D	DB	E	QK	GA	F	LL	KB1	KB2	LL	KB1	KB2	KL1	KL2	KL3	KL4
45	1FL6042-1AF	90	100	7	80	35	4	10	19	M6x16	30	25	21.5	6	154.5	93.5	-	201	140	31.5	136	92	-	-
	1FL6044-1AF	90	100	7	80	35	4	10	19	M6x16	30	25	21.5	6	201.5	140.5	-	248	187	31.5	136	92	-	-
65	1FL6061-1AC	130	145	9	110	58	6	12	22	M8x16	50	44	25	8	148	85.5	-	202.5	140	39.5	158	115	23	22
	1FL6062-1AC	130	145	9	110	58	6	12	22	M8x16	50	44	25	8	181	118.5	-	235.5	173	39.5	158	115	23	22
	1FL6064-1AC	130	145	9	110	58	6	12	22	M8x16	50	44	25	8	181	118.5	-	235.5	173	39.5	158	115	23	22
	1FL6066-1AC	130	145	9	110	58	6	12	22	M8x16	50	44	25	8	214	151.5	-	268.5	206	39.5	158	115	23	22
	1FL6067-1AC	130	145	9	110	58	6	12	22	M8x16	50	44	25	8	247	184.5	-	301.5	239	39.5	158	115	23	22
90	1FL6090-1AC	180	200	13.5	114.3	80	3	18	35	M12x25	75	60	38	10	189.5	140	-	255	206	44.5	184	149	34	34
	1FL6092-1AC	180	200	13.5	114.3	80	3	18	35	M12x25	75	60	38	10	211.5	162	-	281	232	44.5	184	149	34	34
	1FL6094-1AC	180	200	13.5	114.3	80	3	18	35	M12x25	75	60	38	10	237.5	188	-	307	258	44.5	184	149	34	34
	1FL6096-1AC	180	200	13.5	114.3	80	3	18	35	M12x25	75	60	38	10	289.5	240	-	359	310	44.5	184	149	34	34

With incremental encoder



Note: ① Power connector, ② Incremental encoder connector, ③ Brake connector
Connectors should be ordered separately, for ordering information please refer to section "Options" in this document.

Outline dimensions of ② incremental encoder connector ③ brake connector are the same.

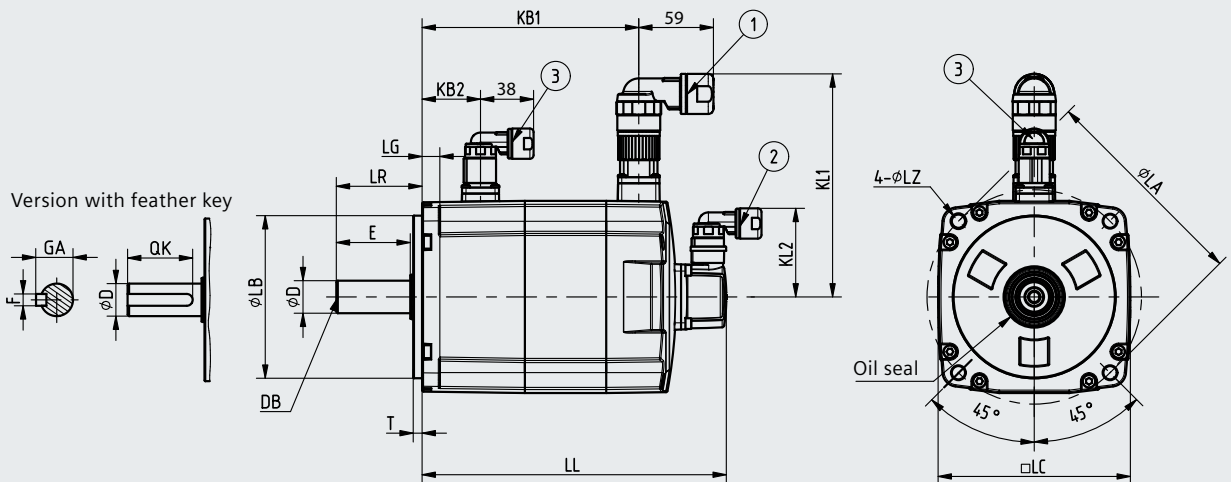
Shaft height 90 motor has M8 screws for eyebolts.

SIMOTICS S-1FL6 High Inertia

Dimension drawings (mm) 1FL6 High Inertia servomotors with absolute encoder

Shaft height	Type	LC	LA	LZ	LB	LR	T	LG	D	DB	E	QK	GA	F	Without brake			With brake			KL1	KL2	KL3	KL4
															LL	KB1	KB2	LL	KB1	KB2				
45	1FL6042-1AF	90	100	7	80	35	4	10	19	M6x16	30	25	21.5	6	157	100	-	203.5	147	31.5	136	60	-	-
	1FL6044-1AF	90	100	7	80	35	4	10	19	M6x16	30	25	21.5	6	204	147	-	250.5	194	31.5	136	60	-	-
65	1FL6061-1AC	130	145	9	110	58	6	12	22	M8x16	50	44	25	8	151	92	-	205.5	147	39.5	158	60	-	-
	1FL6062-1AC	130	145	9	110	58	6	12	22	M8x16	50	44	25	8	184	125	-	238.5	180	39.5	158	60	-	-
	1FL6064-1AC	130	145	9	110	58	6	12	22	M8x16	50	44	25	8	184	125	-	238.5	180	39.5	158	60	-	-
	1FL6066-1AC	130	145	9	110	58	6	12	22	M8x16	50	44	25	8	217	158	-	271.5	213	39.5	158	60	-	-
	1FL6067-1AC	130	145	9	110	58	6	12	22	M8x16	50	44	25	8	250	191	-	304.5	246	39.5	158	60	-	-
90	1FL6090-1AC	180	200	13.5	114.3	80	3	18	35	M12x25	75	60	38	10	197	135	-	263	201	44.5	184	60	-	-
	1FL6092-1AC	180	200	13.5	114.3	80	3	18	35	M12x25	75	60	38	10	223	161	-	289	227	44.5	184	60	-	-
	1FL6094-1AC	180	200	13.5	114.3	80	3	18	35	M12x25	75	60	38	10	249	187	-	315	253	44.5	184	60	-	-
	1FL6096-1AC	180	200	13.5	114.3	80	3	18	35	M12x25	75	60	38	10	301	239	-	367	305	44.5	184	60	-	-

With absolute encoder



Note: ① Power connector, ② Absolute encoder connector, ③ Brake connector
 Connectors should be ordered separately, for ordering information please refer to section "Options" in this document.
 Outline dimensions of ② absolute encoder connector ③ brake connector are the same.
 Shaft height 90 motor has M8 screws for eyebolts.

		Cables between SINAMICS V90 converter and PLC	
		Brake cable	Setpoint cable
		Article number	Article number
20-1	<input type="checkbox"/> <input type="checkbox"/> 0	6FX3002-5BK02-1	<input type="checkbox"/> <input type="checkbox"/> 0 6SL3260-4NA00-1VB0 Control/setpoint cable, 1 m cable with connector (MDR 50-pin connector, free pins to controller side)
10-1	<input type="checkbox"/> <input type="checkbox"/> 0	6FX3002-5BL02-1	<input type="checkbox"/> <input type="checkbox"/> 0 or
10-1	<input type="checkbox"/> <input type="checkbox"/> 0	6FX3002-5BL02-1	<input type="checkbox"/> <input type="checkbox"/> 0 6SL3260-4NA00-1VA5 Control/setpoint cable 0.5 m cable with connectors on both sides and separate terminal block (MDR 50-pin connector, terminal block to controller side)
	A D		A D
	A F		A F
	A H		A H
	B A		B A
	C A		C A

4 SIMATIC S7-1200

CPU			Communication	
CPU	Article number	Digital outputs	RS485 communication for USS or Modbus RTU	Article number
CPU 1211C DC/DC/DC	6ES7211-1AE40-0XB0	4 DO with 100 kHz rest 30 kHz	CM 1241 RS422/485 or CB 1241 RS485	6ES7241-1CH32-0XB0 or 6ES7241-1CH30-0XB0
CPU 1212C DC/DC/DC	6ES7212-1AE40-0XB0			
CPU 1214C DC/DC/DC	6ES7214-1AG40-0XB0			
CPU 1215C DC/DC/DC	6ES7215-1AG40-0XB0			
CPU 1217C DC/DC/DC	6ES7217-1AG40-0XB0			
Signal boards				
	Article number	Digital outputs		
SB 1222 DC 200 kHz	6ES7222-1BD30-0XB0	4 x 24 V DC 200 kHz		
SB 1222 DC 200 kHz	6ES7222-1AD30-0XB0	4 x 5 V DC 200 kHz		
SB 1223 DC/DC 200 kHz	6ES7223-3BD30-0XB0	2 x 24 V DC 200 kHz		
SB 1223 DC/DC 200 kHz	6ES7223-3AD30-0XB0	2 x 5 V DC 200 kHz		

Note:

One SIMATIC S7-1200 CPU can control up to 4 SINAMICS V90 axes, while each axis requires 2 fast digital outputs for the pulse train interface.

The shown SIMATIC S7 selection is only a suggestion.

For detailed and further information please refer to the SIMATIC S7-1200 brochure, catalog or web page: www.siemens.com/simatic-s7-1200

Requirements for external braking resistor					
External braking resistor ³⁾					
Line supply voltage	Frame size	Resistance (Ω)	Max. power (kW)	Rated power (W)	Max. energy (kJ)
200 ... 240 V 1AC/3AC	FSA	150	1.09	20	0.8
	FSB	100	1.64	21	1.23
	FSC	50	3.28	62	2.46
	FSD, 1 kW	50	3.28	62	2.46
	FSD, 1.5 to 2 kW	25	6.56	123	4.92
380 ... 480 V 3AC	FSAA	533	1.2	30	2.4
	FSA	160	4	100	8
	FSB	70	9.1	229	18.3
	FSC	27	23.7	1185	189.6

Replacement parts

Replacement fan for SINAMICS V90 400 V FSB	6SL3200-0WF00-0AA0
Replacement fan for SINAMICS V90 400 V FSC	6SL3200-0WF01-0AA0

Accessories

SINAMICS SD card	6SL3054-4AG00-2AA0
Training case SINAMICS V90 HI, 400 V	6AG1067-3AA00-0AB0
Training case SINAMICS V90 LI, 200 V	6AG1067-2AA00-0AC0

Connectors

Connectors	Plug on	Article number	Packaging unit (pcs)
Control/setpoint MDR 50-pin connector	converter side	6SL3260-2NA00-0VA0	30
Encoder connector	converter side	6FX2003-0SB14	30
Power connector	motor side	6FX2003-0LL1	<input type="checkbox"/>
Incremental 13-bit encoder connector	motor side	6FX2003-0SL1	<input type="checkbox"/>
Brake connector	motor side	6FX2003-0LL5	<input type="checkbox"/>
Absolute 20-bit encoder connector (only for high inertia motor 3AC 400 V)	motor side	6FX2003-0DB1	<input type="checkbox"/>
For SIMOTICS S-1FL6 motors with shaft heights 45, 50, 65, and 90			1 30
For SIMOTICS S-1FL6 motors with shaft heights 20, 30, and 40			2 5

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