The new SINAMICS S210 Servo drive system

Details – technical slides

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The new SINAMICS S210 Servo drive System

The new midrange **SINAMICS S210 Servo drive system** is a single axis AC/AC drive with enhanced features, connectivity and **performance for motion control applications.**

Designed for high dynamic motion control applications which you find for example in the packaging or handling area.

The servo drive system consists of the **SINAMICS S210 servo inverter**, the standard **SIMOTICS S-1FK2 servo motor** and the adaptable **S-1FT2 servo motor** (both also available as a **planetary gear motor** variant), and the **S-1FS2 hygienic servo motor** for food & beverage and pharmaceutical applications. All are connected to the inverter using the **one-cable connection (OCC)** technology.

Works perfectly together with a SIMATIC S7 controller, like SIMATIC S7-1500/ T-CPU/ ET200 SP Open Controller to perform motion control tasks like positioning, synchronous axis, gearing …

Highlights

- PROFINET IRT and EtherNet/IP
- Safety Integrated: Basic and Extended Functions via PROFIsafe
- Specially developed servo motors with One-Cable-Connection
- Integrated web server and "One Button Tuning", EMC filter and braking resistor
- Basic Positioner (EPOS) and UL certification
- Digital Twin with *DriveSim Advanced**

*license required

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The new SINAMICS S210 Servo Drive System
Easy, High Performant, Safe – top highlights

Compact design
with high performance and planetary gear servo motors

SIMOTICS S-1FK2/1FT2 Motors & Planetary Gearbox,
SIMOTICS S-1FS2 (Hygienic Design)
Fast Current Controller (62.5 µs)
Fast PROFINET IRT (250 µs)
DC-Coupling (for 3AC units)

Digitalization
Digital twin in Startdrive
Edge & Cloud connectivity

Ease of use
integrated webserver and TIA Startdrive
with “One Button Tuning”
and the use of the Smart Adapter**

Sustainability
DC-Link coupling, PROFIenergy and
the use of highly efficient servo motors

Security Integrated
User Management & Access Control, secure communication, integrity and authenticity check

Safety Integrated
Basic and extended Safety functions via PROFIsafe according to SIL3, PL e, Cat4.

Simple and fast installation
with One Cable Connection for the motor
and Integrated EMC Filter and Integrated Braking Resistor

Ready for worldwide markets
UL Certification
S-1FS2 Stainless Steel (F&B/Pharma)
3C3 for H_2S & SO_2 (Tire industry)
EtherNet/IP*

1AC 230V (200-240V) with 0.05 – 0.75kW

3AC 400V (200-480V) with 0.4 – 7kW

System integration
Optimal together with SIMATIC controller, also with EPOS*

* as of FW V6.3 | ** release approx Q1/24

Easy selection via TIA Selection Tool (TST), Siemens Product Configurator (SPC) and SINAMICS Selector App

Easy transition to the new SINAMICS Servo drive system with the **Migration tool**

Digitalisation in drive technology (**EN**)

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SINAMICS S Portfolio for Discontinuous Motion

Standard Servo Drive System
SINAMICS S200

Single axis AC/AC servo drive system with high dynamic and highest compactness

- S200 / S200 Basic with PTI or PN
- 1FL2 motors
- MC 350 / 380 cables

Midrange Servo Drive System
SINAMICS S210

Single axis AC/AC servo drive system with highest dynamic

- 1FK2, 1FT2, 1FS2 motors
- OCC – One cable connection
- Perfect match with SIMATIC controllers

High-End Servo Drive System
SINAMICS S120

Modular DC/AC multi axis system with highest performance, flexibility and most advanced drive based technology

- Seamless functionality from 1kW to 5.7MW

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Differentiation of SINAMICS S200, S210 and S120 System
Technical comparison

	SINAMICS S200 System ≤ 7kW	new SINAMICS S210 System ≤ 7kW	SINAMICS S120 System ≤ 3040 kW
 Dynamic	**High** (current controller 125 µs for PN version; PN IRT 250 µs)	**Very high** (current controller 62.5 µs; PN IRT 250 µs)	**Very high** (current controller 62.5 µs; PN IRT 250µs)
 Motion	**Drive/Controller Based** (EPOS & SIMATIC Technology Objects)	**Drive/Controller Based** (EPOS & SIMATIC Technology Objects)	**Drive/Controller Based** (EPOS, DCC & SIMATIC Technology Objects)
 DC link	**No**	**Energy between axes** (3AC device, DC link coupling up to 6 axes)	**Also recovery possible** (Depends on BLM / ALM / SLM)
 Ease to use	**Easy** (One button tuning, electronic type plate)	**Very Easy** (One button tuning, electronic type plate, OCC)	**More complex** (Drive can be adjusted to exact required machine complexity)
 Safety	**Only via Terminals** (only STO, SS1-t*)	**Also via PROFIsafe** (Basic, Extended, Advanced*)	**Also via PROFIsafe** (Basic, Extended, Advanced)
 System	**Closed System** with S-1FL2 motors	**Closed System** with S-1FK2, S-1FT2, S-1FS2 motors & planetary gear boxes	**Open System** (all different motors, infeed systems, encoders… possible)
 Price	**$**	**$$**	**$$$** **in preparation*

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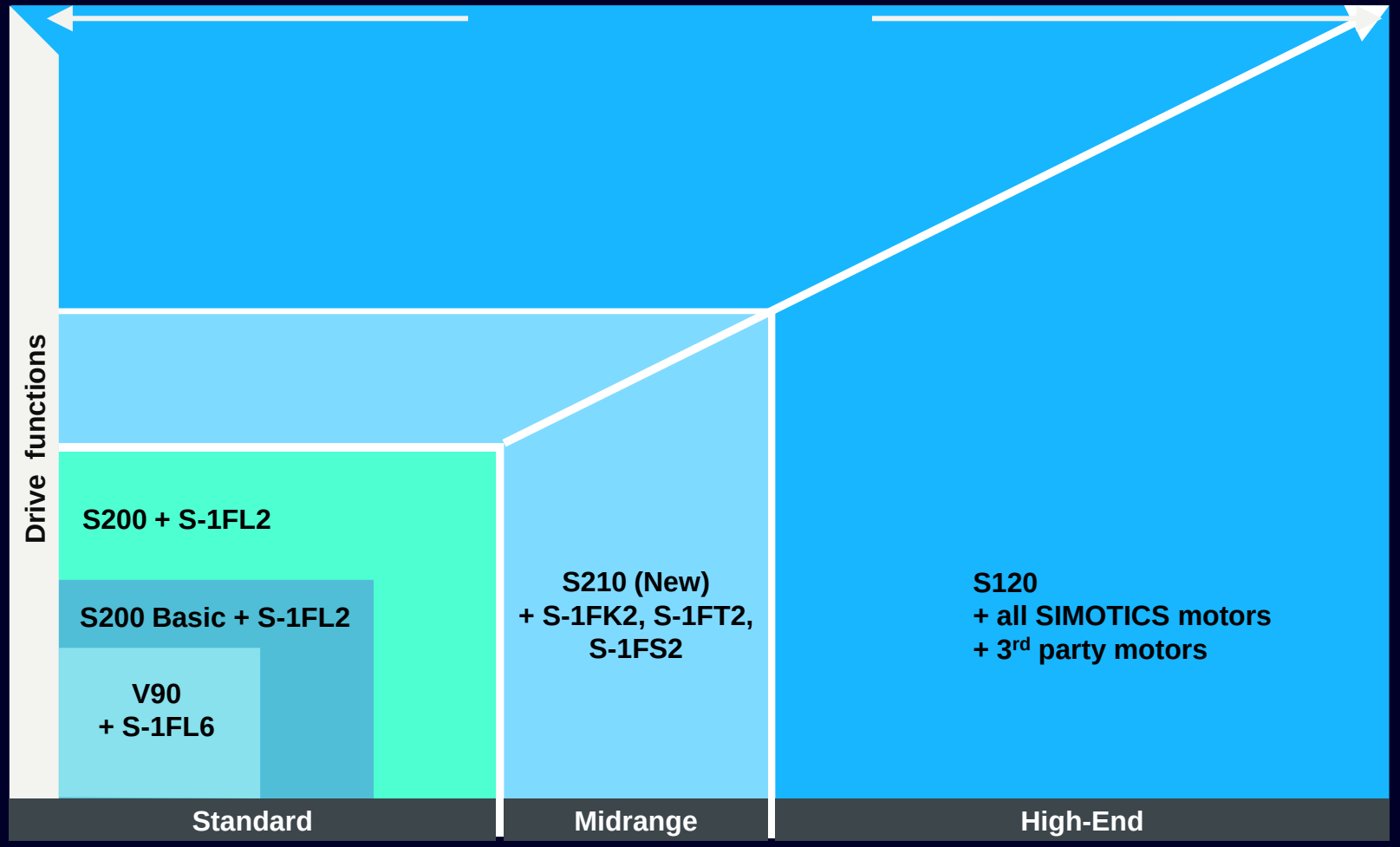
The scalable SINAMICS Drives Portfolio for „Discontinuous Motion“

	Standard	Midrange	High-End
Power range up to several Mega Watts			
Energy regeneration (sinusoidal), regulated DC link			
Flexibility/modularity in HW and SW			
Multi axis CU, DC/AC-System			
Drive based technology extensions DCC / TEC*			
Optional DC link coupling			
Safety incl. PROFIsafe Basic & Extended			
Safety: STO via terminal			
Brake & Encoder emulation*			
Startdrive + Webserver			
TIA Portal Integration			
PROFINET, serial com., e.g. Modbus, PTI			
Servo Control w/ Epos			



*DCC = Drive Control Chart; TEC = SINAMICS Technology; Brake = integrated holding brake control relay; Encoder emulation = PTO

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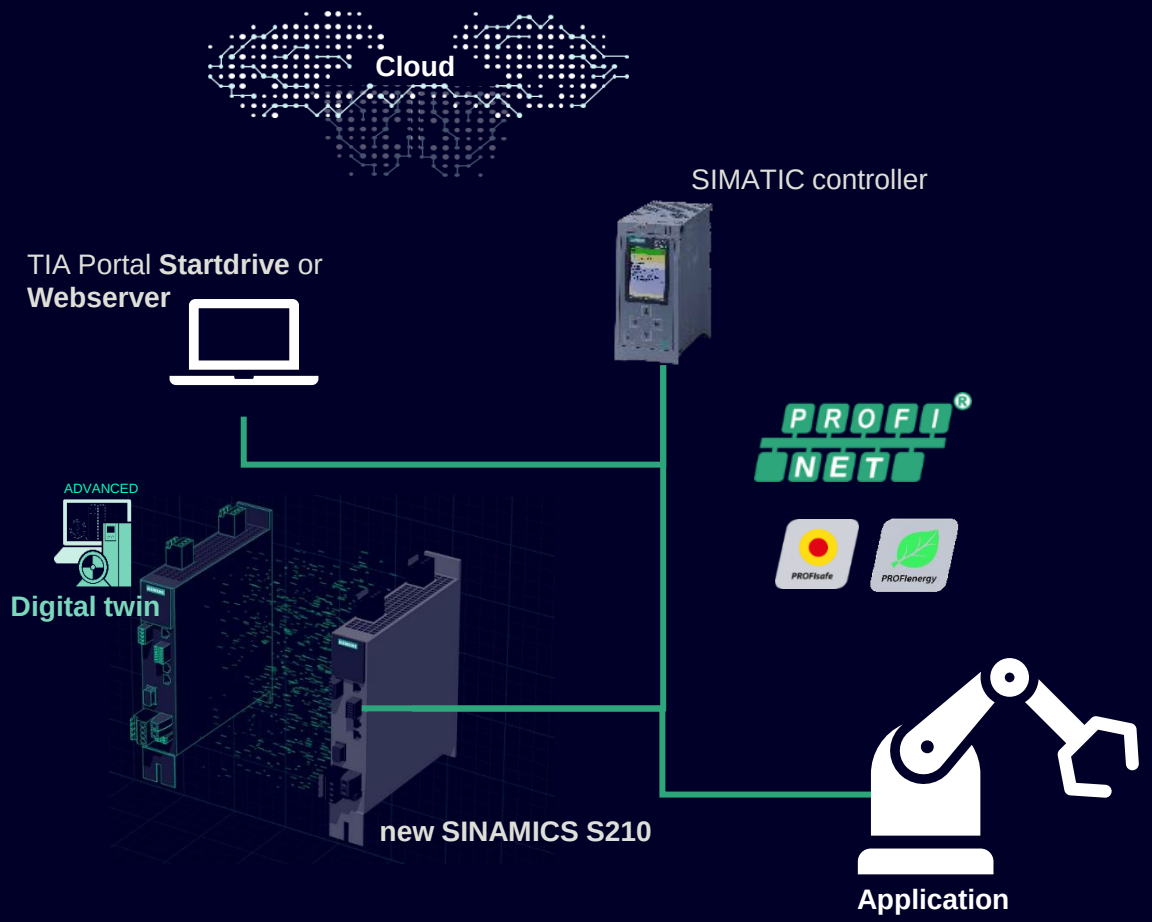
Added Value
seamless integration of SINAMICS S210 into the Automation Ecosystem



The certified **integrated safety functions** help to ensure to realize a practicable protection of personnel and machinery

Simple engineering and high performance with PROFINET, Safety and PROFIenergy on the same bus

Fully integrated in the **digitalization concept** of DI MC to maximize the benefits throughout the whole value chain from planning through commissioning to service.

Integrated engineering and data management via TIA-Portal. Standard operating philosophy. One project file, therefore consistency is always ensured.

Virtual Commissioning and testing with the digital twin DriveSim Advanced* available in TIA Portal Startdrive

* licence required

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Single axis servo systems
Strategy & positioning (differentiation – final expansion stage)

S200 Basic

Voltage range
1/3AC 200V (0.1 - 1kW)

Motors
1FL2 (30m, 2 cables, BISS)
Hybrid connector
IP65
Improved encoder resolution
Improved Speed ripple

Dynamic
125µs current controller

V90

Voltage range
1/3AC 200V (0.1 - 2kW)
3AC 400V (0.4 - 7kW)

Motors
1FL6 (30m, 3 cables, BISS)

Safety Integrated
STO (Terminals)

Dynamic
250µs current controller

S200

Voltage range
1/3AC 200V (0.1 - 1kW)
3AC 400V (0.2 - 7kW)

Motors
1FL2 (30m, 2-3 cables, BISS)
Hybrid connector
IP65
Improved encoder resolution
Improved Speed ripple

Safety Integrated
STO, SS1-t *) (Terminals)

Dynamic
125µs current controller

Brake Control
Integrated (24V fixed)

new S210

Integrated EMC Filter
1AC: C2 - 10m, 3AC: C3 - 25m

OCC
One Cable Connection (50m)

DC-Link coupling
with 3AC

Wide range voltage input
1AC 200V (0.1 – 0.8kW)
3AC 200V - 480V (0.4 - 7kW)

2nd encoder interface
+ motor temp. input

Motors
1FK2, 1FT2, 1FS2 (50m, OCC, DQ)
IP67
Highest encoder resolution
Lowest speed ripple

Safety Integrated
Basic, Extended & Adv.*) (Profisafe)

Dynamic
62.5µs current controller

Brake Control
Integrated (variable 16V-30V)

additional / higher performance features

*) in a later version

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Products of SINAMICS S210 Servo drive system

3 Product

- System overview
- SINAMICS S210
- SIMOTICS S-1Fx2 Servo motors
- SIMOTICS S-1FS2 Hygienic Servo Motor (F&B and Pharma)
- One Cable Connection (OCC)
- Accessories

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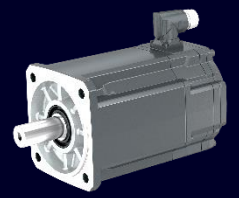
SINAMICS S210 servo drive system
System overview servo drives/motors

SINAMICS S210
6SL3210
SINAMICS S210 (New)
6SL5210

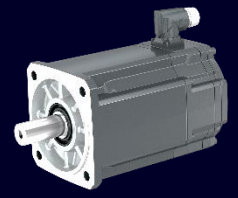
- Voltage: 1AC 200-240V and 3AC 200-480V
- Power: 50W-7.0kW
- PN IRT (250 µs), current cont. 62.5 µs, PROFIsafe
- Safety-Functions: STO, SS1-t, SBC, Ext. Safety: SS1, SLS, SDI, SSM SS2, SOS, SBT, SLA
- Up to 6 devices can be connected via DC link (only 3AC devices)
- Removable terminals
- DI: 1 F-DI (2 DI), 2 DI Measure Probes
- Side-by-side mounting
- Integrated EMC-Filter
- Integrated Braking resistor
- Integrated Webserver

SIMOTICS S-1FT2
(S-1FT21…) High Dynamic
(S-1FT22…) Compact



- Based on SIMOTICS S-1FK2 (same dimensions, more variants)
- Torque: 0.16 - 50Nm
- High Dynamic (HD) and Compact (CT), shaft height 20 to 100
- Encoder: 22 and 26 bit absolute (battery-free), single or multiturn
- 300% overload
- Protection class: IP64, IP65 and IP67
- With or without holding brake
- Plain or feather key shaft
- Rotatable, robust metal connector
- Various options for application-specific adaptations
- Also for use in North America (cURus) EAC, CEL

SIMOTICS S-1FK2
(1FK21…) High Dynamic
(1FK22…) Compact



- Torque (M_0): 0,16 - 40Nm
- High Dynamic (HD) and Compact (CT), shaft height 20 to 100
- Encoder: 22 Bit Abs. Single or Multiturn (battery-free)
- 300% overload
- Protection Degree: IP64, opt. IP65
- With or without holding brake
- Plain or feather key shaft
- Rotatable, robust metal connector
- Also for use in North America (cURus)
- S-1FK2 motor also with already equipped Planetary Gearbox available

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SINAMICS S210 Servo Drive System
System overview motors and connection systems

SIMOTICS S-1FK2/1FT2 Planetary coaxial and angular Gearbox Motor

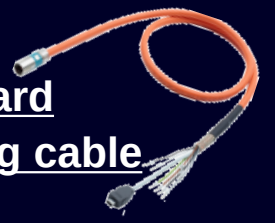
System tested, ready mounted servo gearmotor

- NRB(W): is the lightest gear with the highest power density. Due to low friction bearing design it is suitable for high speed and generates only low heating.
- NRK(W): suitable for higher radial and axial forces due to the large output bearing. The gearbox is suitable for higher speeds due to low internal friction.
- NLC(W): Possesses a preloaded tapered roller bearing suitable for high stiffness and high radial and axial loads, with IP65 sealing against dust and water.

SIMOTICS S-1FS2 Hygienic Design for F&B and Pharma Applications

- Meets the highest requirements in F&B and Pharma
- Torque: 3 - 23Nm
- Shaft height 40, 52, 63, 80
- Encoder: 22 bit multiturn absolute (battery-free)
- 300% overload
- Protection class: IP67/IP69X (housing); IP66/67 (shaft seal)
- With or without holding brake
- Plain or feather key shaft
- OCC connecting cable pre-assembled on motor, cable length selectable in motor ordering number.
- Also for use in North America (cURus)

One Cable Connection (6FX5002-8QN...) Standard (6FX8002-8QN...) Trailing cable



- Individual cable lengths up to 50m can be ordered
- SPEED- CONNECT fast connection system with rotatable motor connector
- Flexible cables with small bending radii
- Trailing cable version available (6FX800…)
- Small and compact M12 connector for motor SH20/30mm (only 25mm in height)
- Extension cables and mounting flange available

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SINAMICS S210
Powerrange regarding framesize

HD M_0 (Nm)	0.16-0.32	0.64-1.27	1.27-3.2	SH52: 5.0-8.0	9.0-15.0	
CT M0 (Nm)		0.64-1.27	2.4-3.2	SH48: 3.6-6.0	6.5-12.0	18.0-27.0	30.0-40.0

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Products of SINAMICS S210 Servo drive system

3 Product

- System overview
- **SINAMICS S210**
- SIMOTICS S-1Fx2 Servo motors
- SIMOTICS S-1FS2 Hygienic Servo Motor (F&B and Pharma)
- One Cable Connection (OCC)
- Accessories

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Changes in Hardware, Software and Compatibility (compared to previous system)
the new SINAMICS S210 Servo Drive System

Hardware

- **2nd encoder** (DQ encoders)
- **internal braking resistor with 3AC 200V**
- **3C3 / ANSI G3 compliant coating** (for tire industry**)**

Software

- **Safety SIL3 / PL e** incl. Extended* Safety
- **Security** (UMAC – User Management and Access Control)
- **New Webserver**
- **Basic Positioner*** (EPOS)
- **EtherNet/IP*** (USA)

Digitalization

- **Digital Twin** with DriveSim Advanced
- **Smart Adapter**** (commissioning via Wi-Fi instead of cable)

* as of FW V6.3 | ** release approx. 01/24

Hardware mechanically fully compatible

Software

- not spare part compatible to previous S210
- with V6.3 same functionality as previous S210 (plus additional features)
- Webserver in RT-Software → compatible
- Startdrive: V6.3 requires TIA V19
  → **Migration tool** for migration of S210 within TIA projects

Compatible Components (from previous SINAMICS S210)

- 1FK2/1FT2/1FS2 motors
- OCC cables
- EMC filters
- Connector sets (Spare sets, DC-Link, AC-Link)
- PROFINET Patch cables
- Replacement Fans for 3AC

new components for new SINAMICS S210

- 8 GB SD card (w/o and w/ Firmware)
- Extended Safety License V6

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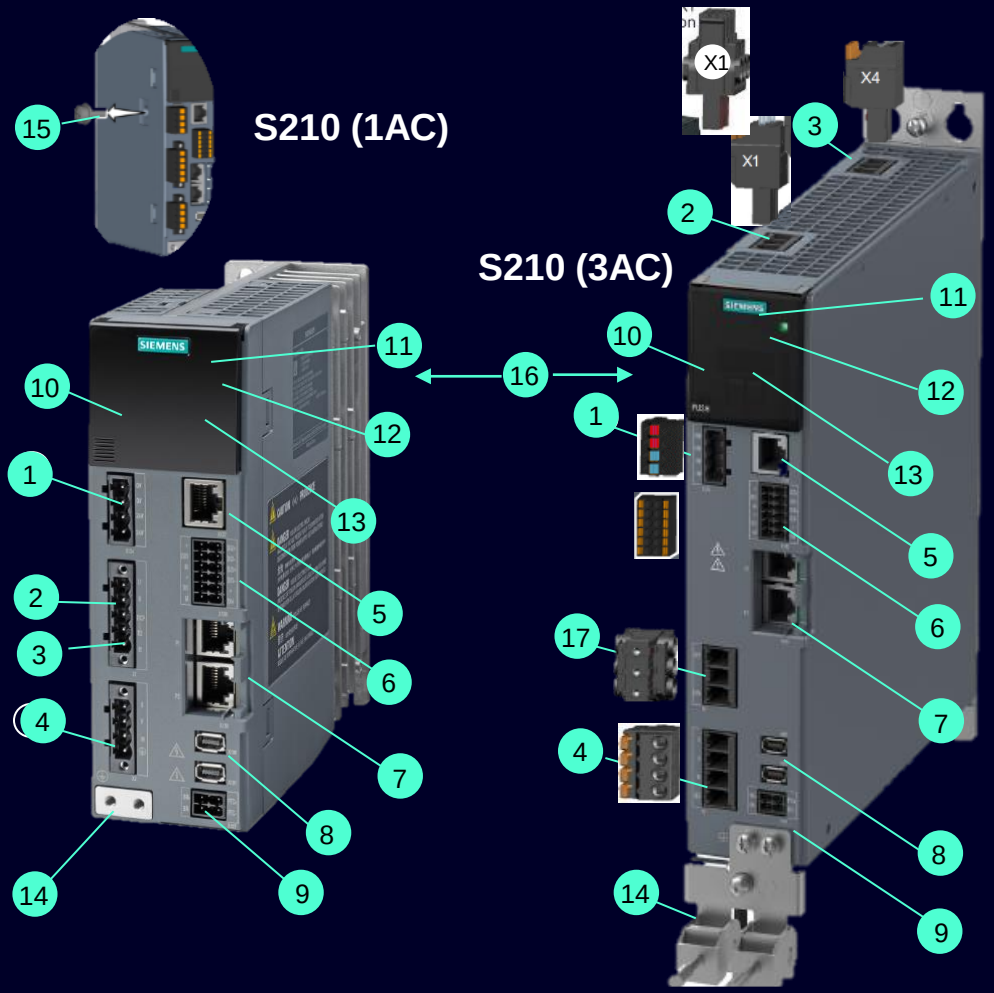
The new SINAMICS S210 Servo Drives System
Overview Hardware



Overview new SINAMICS S210 Hardware

1	Control voltage connection 24 V DC (X124)
2	Line supply connection (X1), also as optional Busbar Terminal Kit available (Include 1x DC-Busbar terminal and 1x 3AC Busbar terminal) X1 Order number 6SL3260-2DC00-0AA0.
3	Optional external braking resistor (1AC Version: X1), (3AC Version: X4)
4	Motor power connections (X2)
5	Service interface RJ45 for web server (X127)
6	Digital inputs (X130) (STO/SS1 safety, measuring probe, temp. monitoring of ext. braking resistor)
7	PROFINET RJ45 connection (X150)
8	Encoder (X100) and direct measuring system (X101, with later SW version)
9	Direct control of the motor holding brake (X107)
10	Acknowledge fault
11	Status LEDs
12	Fault display
13	SD card slot (SD card: copy parameters, external safety license, firmware update)
14	Shield connection for shielded cables, strain relief using cable ties for other cables
15	Only for S210 in 1AC version: Remove grounding screw when use the S210 in IT net supply. (This disconnects grounding of the internal EMC filter). The use of 3AC devices on an IT network is only permitted with an isolating transformer.
16	Integrated braking resistor and EMC filter
17	DC-Coupling (only at 3AC-units), Terminal Kit needs to be ordered separately Order number 6SL3260-2DC00-0AA0. (Include 1x DC-Busbar terminal and 1x 3AC Busbar terminal). The required 16 mm^2 wire for cabling of the DC/3ACBusbar Terminals have to be ordered separately from a 3rd party supplier.

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The new SINAMICS S210 Servo Drives System
Technical Data

Technical Data	
Line supply voltage	1AC 200V ~ 240V; 3AC 200V ~ 480V (-10%/+10%); 50/60Hz, (-10% / +10%)
Power range	0.1kW ~ 7.0kW, (Motor available starting with 0.05kW)
Overload capacity	300% x rated current
Control power supply	24V DC (-15%/+20%)
Control system	Servo control; current controller 62.5 µs, 8kHz pulse frequency
Protective functions	Earth fault protection, output short-circuit protection, overvoltage/under voltage protection, I^2t drive, I^2t motor
Operation temperature	0 to 50 °C, without power derating
Braking resistor	Integrated in drive, external braking resistor optional
Protection class	IP20; coated circuit boards (Class 3C3 for H_2S, SO_2 and ANSI/ISA G3 for tire industry)
Standards	CE, cULus, RCM, UKCA, KC
Safety	SIL3/Pl e Cat.4 | Basic and Extended Safety via PROFIsafe, Safe Torque Off (STO) and Safe Stop1 time-controlled (SS1-t) also via terminal
Service Interface	RJ45 Ethernet
Digital inputs/outputs	2 DI for Measuring probes, 1 F-DI for STO (NPN/PNP), 1DI for Temp. monitor of external brake resistor
Communication	PROFINET, 2 ports (IO-Device, PROFIdrive, RT/IRT, min. cycle time 250 µs) , Ring-Redundancy, Shared Device, PROFIsafe PROFIenergy, EtherNet/IP for 3rd party controllers
SD card slot	SD card for extended Safety License (only SINAMICS SD Card), Parameter Cloning, Firmware Update (SD Card </ 32GB)
EMC Filter	1AC 230V: Category C2: with Integrated EMC filter up to 10m or with external EMC filter up to 25m cable length; Category C3: with Integrated EMC filter up to 25m cable length, with external EMC filter up to 50m cable length 3AC 400V: Category C3: with Integrated EMC filter up to 25m, with DC-Link 100m total cable length (sum of all motor cables of coupled axes)
Cable length	Up to 50m

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The new SINAMICS S210 Servo Drive System
Power range regarding frame size

	1AC 200-240V			3AC 200-480V		
	FSA	**FSB**	**FSC**	**FSA**	**FSB**	**FSC**
P_{rated}	0.1 | 0.2kW	0.4kW	0.75kW	0.4 | 0.75 | 1.0kW	1.5 | 2.0kW	3.5 | 5.0 | 7.0kW
I_{rated}	0.8 | 1.4A	2.4A	4.4A	1.2 | 2.3 | 3A	5 | 7A	9 | 12 | 15A
	at 1AC-230V	at 1AC-230V	at 1AC-230V	at 3AC-400V	at 3AC-400V	at 3AC-400V

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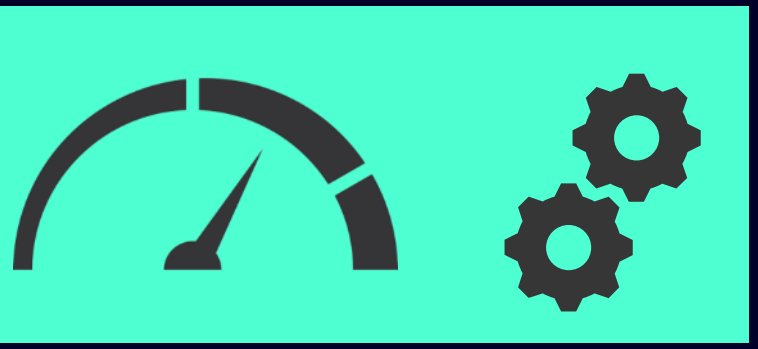
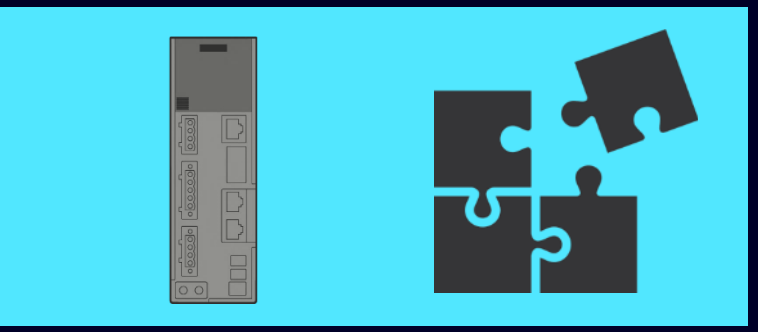
The new SINAMICS S210 Servo Drives System
Features



Control Modes

Servo Control: with DSC (62.5 µs, 8 kHz)
Motion control:
via S7-1500/1500 T-CPU and motion technology object (TO Axis) : speed control, positioning, gearing (relative/absolute), camming;
via SIMOTION: in addition to S7-1500/1500T-CPU also distributes synchronization and path interpolation.
Connection to PLC via PROFINET:
Fast PROFINET RT/IRT (up to 250 µs)
Supported PROFIdrive telegrams | standard: 3, 4 (2nd encoder), 5 (with DSC), 6 (2nd encoder), 102, 103, 105 (with DSC), 106 (2nd encoder) | EPOS: 7, 9, 111, 112 | supplementary: 700, 701, 750 | PROFIsafe: 30, 901; PROFIenergy; Shared Device, Ring Redundancy



Drive Features

- **Safety Integrated:** SIL3, Pl e, Cat. 4 | Basic: STO, SBC, SS1-t and Extended (new license required), SS1, SS2, SOS, SLS, SSM, SDI, SLA, SBT; All via PROFIsafe (STO/SS1-t alternatively also via Terminal), Internal Test pulse generation
- **EMC-Filter integrated**
- **Brake Resistor** included
- **Included Safe Brake Relay:** for motor holding brake no additional parts required (equipped as standard in all SINAMICS S210)
- **Side by Side mounting** possible; **Shielding plate as standard** with S210; **Push-In terminals** for easy installation
- **DC-Link** to couple multiple (max.6) S210 Servo drives to optimize energy transfer between accelerating and braking axis. (Only for 3AC S210 Drives)

Usability Features

- **Integrated. Webserver:** incl. commissioning pages and Safety Parameterization; no additional SW required; access via Ethernet/ Web browser
- **TIA Portal:** Full Integration into TIA Portal/Startdrive
- **One button tuning:** Estimates the machine load inertia and mechanical characteristics with an internal movement command and adjusts the control parameters. The process can be initiated from the Webserver.
- **Parameter cloning** and **Firmware update** via SD card
- **Connection to S7 controller:** standard example available via **Link to SIOS**
- **Commissioning via Webserver:** using the data of the electronic type plate of the motor

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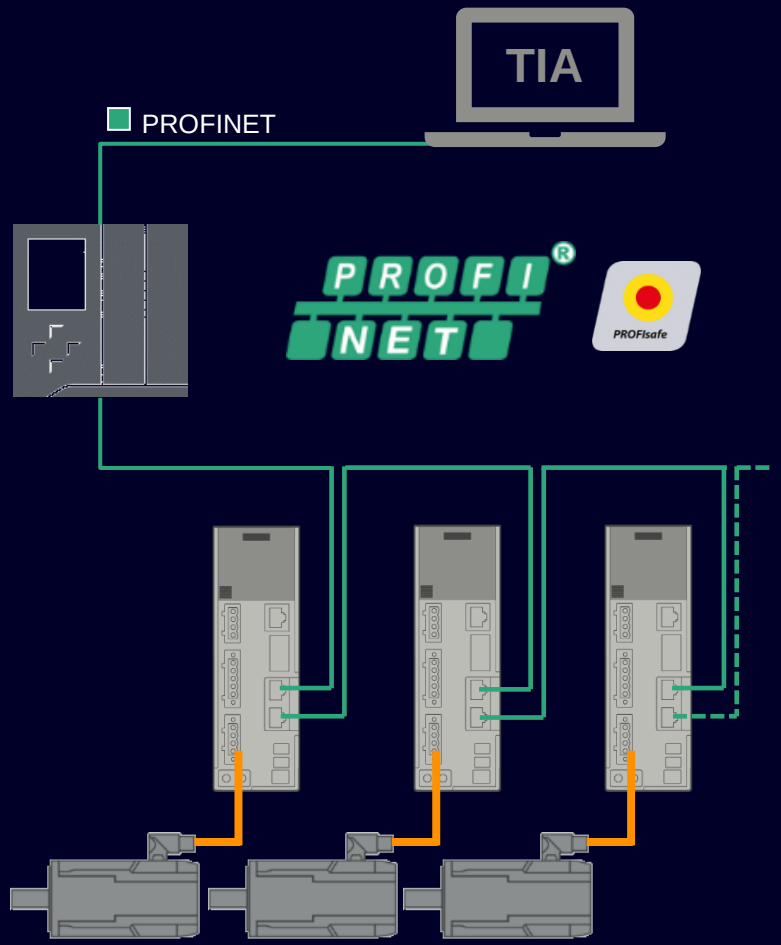
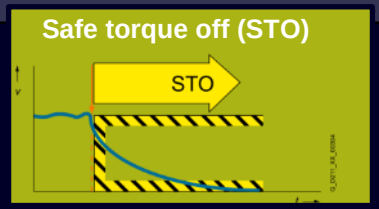
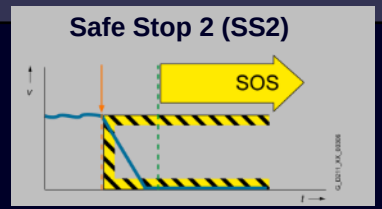
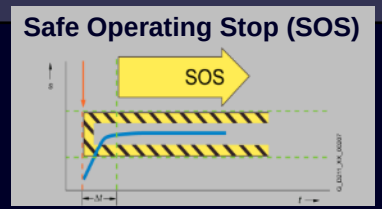
The new SINAMICS S210 – V6.3
Safety Integrated functions according to EN 61800-5-2 functional safety



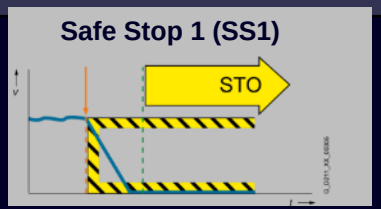
Functions for safe shutdown

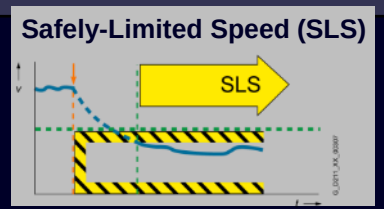


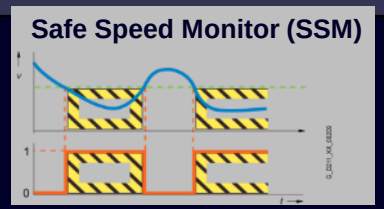


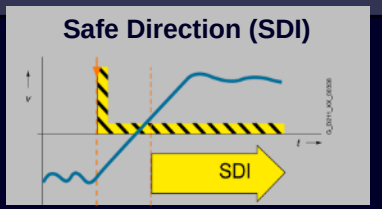


Functions for safety motion monitoring

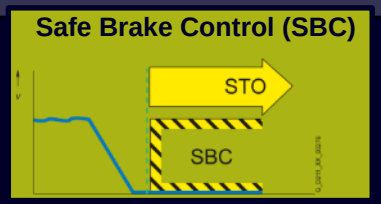




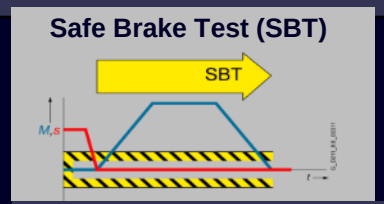




Functions for safe brake management and diagnosis



Standard Safety Function



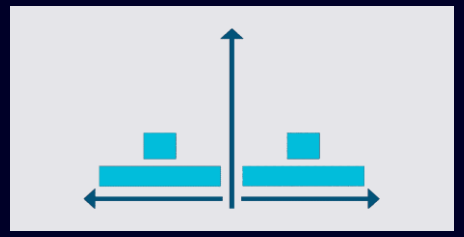
Extended Safety Function (available as of SINAMICS Firmware Version V6.3 *).
V6 License required (on SINAMICS SD-Card).

Safety functions are also available in your digital twin **DriveSim Advanced**
(STO; SS1 - supported; Via PROFIsafe - coming soon**)**

SIEMENS

SINAMICS Drive Software
Basic Positioner (**EPOS**) for SINAMICS S200 and the new S210

… use powerful drive integrated positioning function!



- ✓ Use **physical units (e.g. mm, °, in, …)** for positioning task
- ✓ Offer **new telegram type 112** for physical unit
- ✓ PLC control with SINAMICS Technology **BasicPosControl**
- ✓ **Easy to use** Basic Positioner **commissioning** with Guided quick startup in Startdrive
- ✓ **Basic Positioner Functionality consistency** across the entire SINAMICS Next Generation portfolio

Traversing block for autonomously positioning

Homing functions & Integrated Jogging

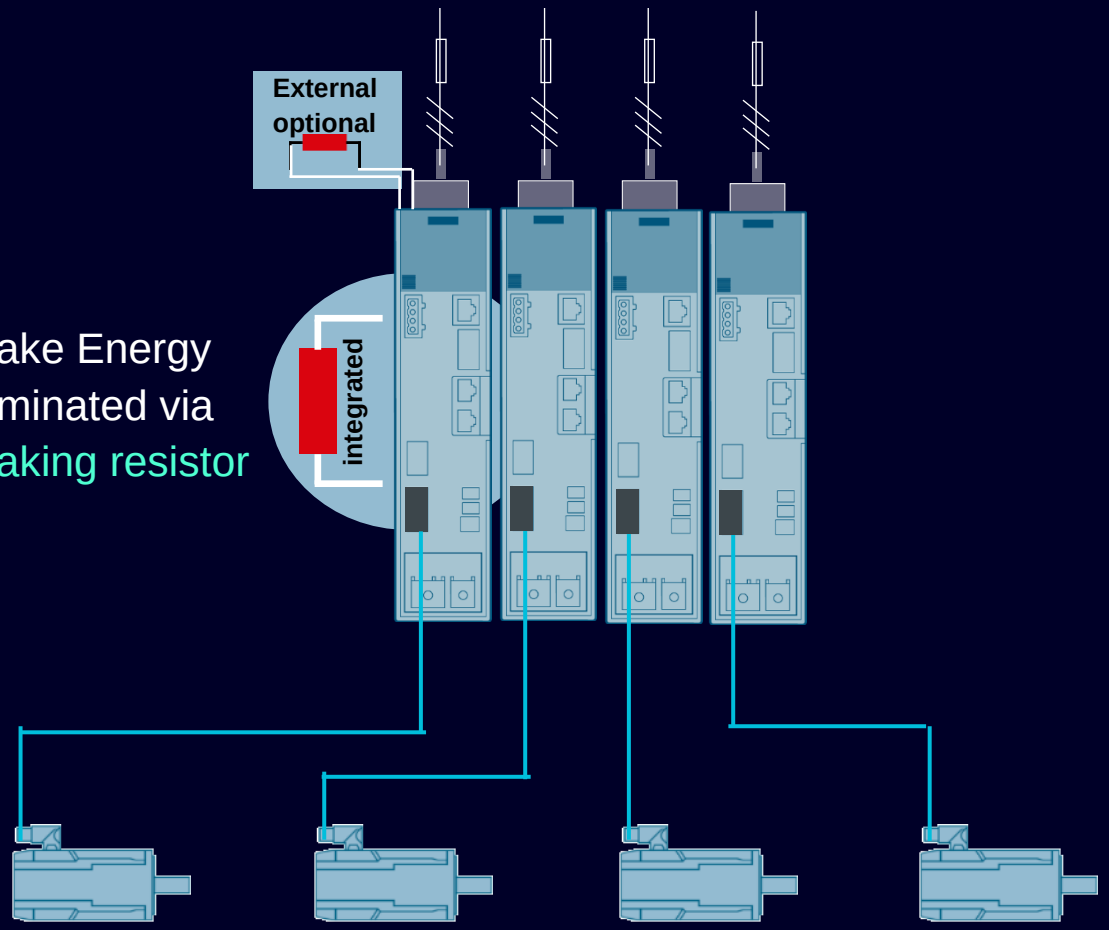
Directly enter setpoint (MDI) from PLC

***SINAMICS Drive Software**
V6.2: S200 PN / S200 Basic PN
V6.3: S200 PN / S200 Basic PN, S210 New

SIEMENS

SINAMICS S210 Servo Drive System
3AC 200V…240V operation

Brake Energy eliminated via Braking resistor



The energy generated during braking is dissipated via a braking resistor.

The use of the internal Braking Resistor is now also possible with 3AC 200V…240V and the new SINAMICS S210.
External braking resistors are not mandatory anymore.

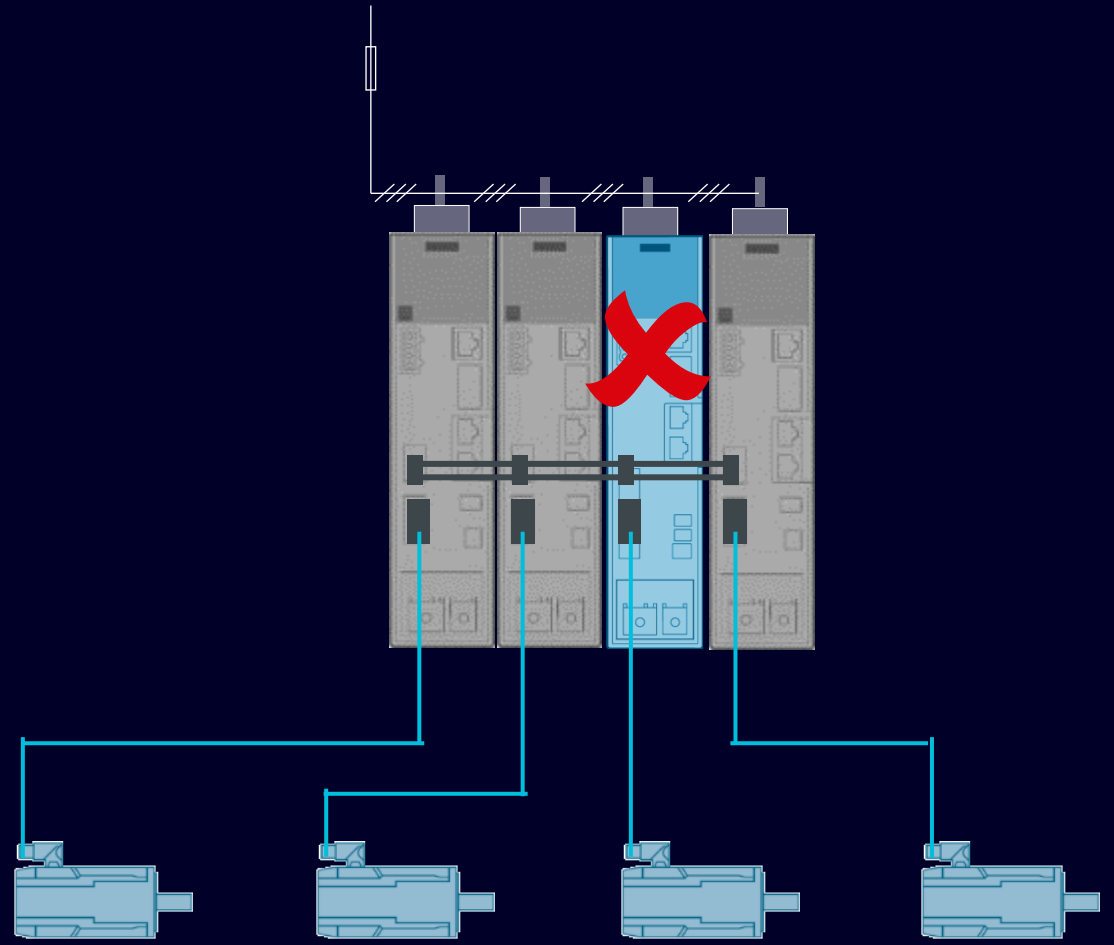
SIEMENS

SINAMICS S210 Servo Drive System
3AC supply network variant with DC-Coupling and AC-Link

The SINAMICS S210 3AC variant can be coupled in a DC-Link configuration for energy distribution.

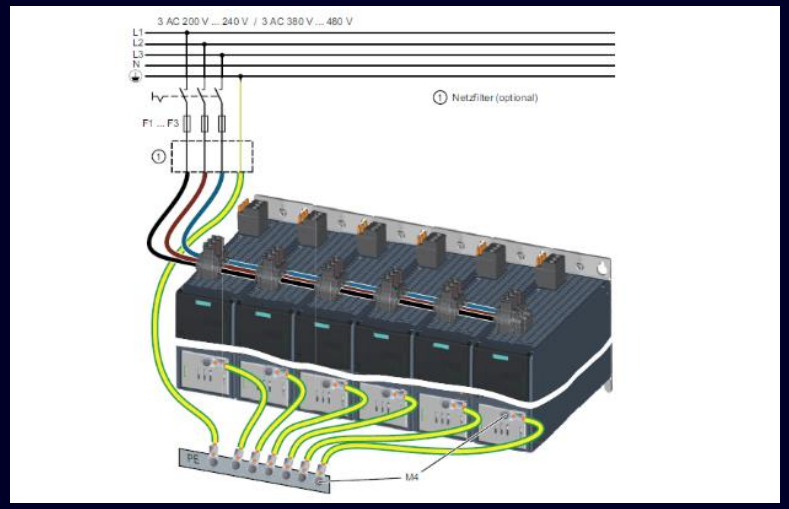
Currently mixing of old and new SINAMICS S210 in a DC-Link configuration is not tested and therefore not recommended.

Mixing of old and new SINAMICS S210 in an AC-Link configuration with group fusing is possible (w/o DC-Link).

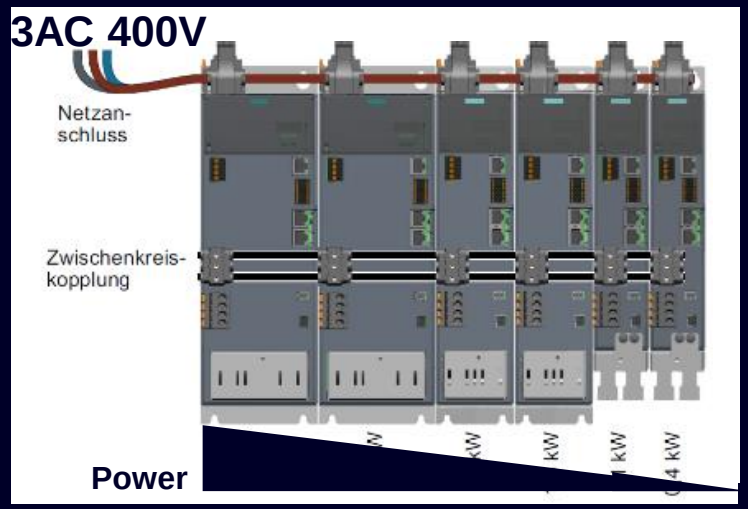


SIEMENS

The new SINAMICS S210 Servo Drive System
Common DC-Coupling in 3AC supply network variant



When DC coupling is used, **only group fusing is allowed!** For suggested fuses please refer to manual of SINAMICS S210 or „Protective Devices for SINAMICS S210“ at Siemens Industry Online Support.

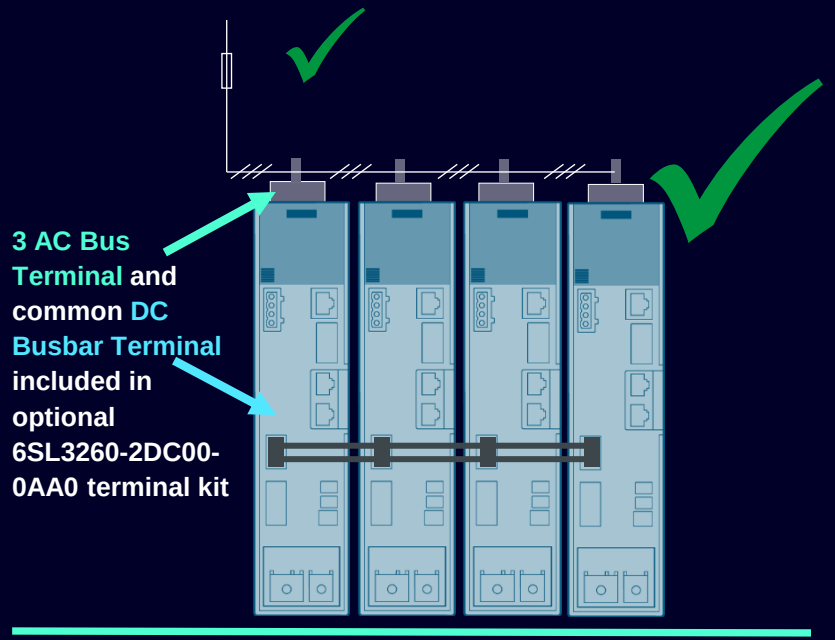


Up to 6 SINAMICS S210 (3AC devices) can be connected to each other via the DC link terminals. The **device with the highest power have to be placed on the left (supply side),** next smaller devices are placed on the right.
3AC 230V: Currently, DC link coupling is only **permitted for converters of the frame same size.**
! DC-link - It is not recommended to use S210 and new S210 units in the same DC-link.

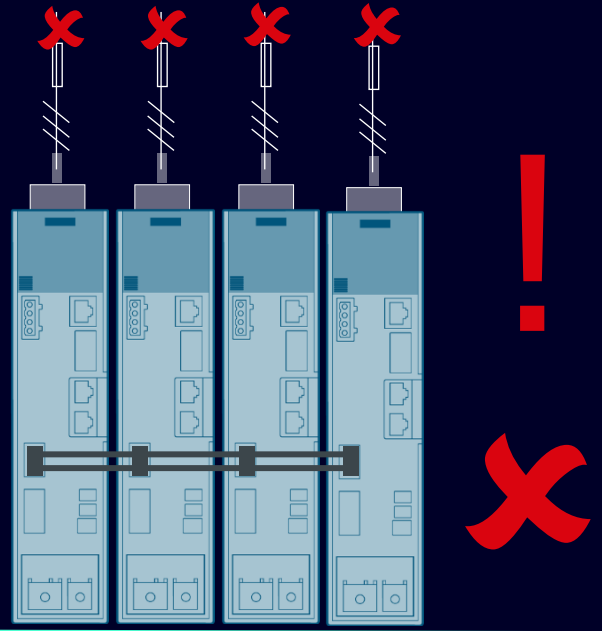
The following **cables** for the mains connection and DC link coupling: H07V2-K, 16 mm² (outside diameter 6.7 mm ... 8.1 mm), class 5 (flexible, PVC-insulated) according to DIN EN 50525-2-31 (refer also to the operating instructions).
The **common DC link must be connected via the optional connector set**
(order number 6SL3260-2DC00-0AA0).

SIEMENS

The new SINAMICS S210 Servo Drive System
3AC Devices – Line supply when DC-Link is used



Group fusing
When DC coupling is used, **only group fusing is allowed!** For suggested fuses please refer to manual of SINAMICS S210. Therefore, also the 3AC supply of the drives (Terminal X1) must be connected via the infeed AC busbar connectors (Terminal included in optional Kit Order Number 6SL3260-2DC00-0AA0)

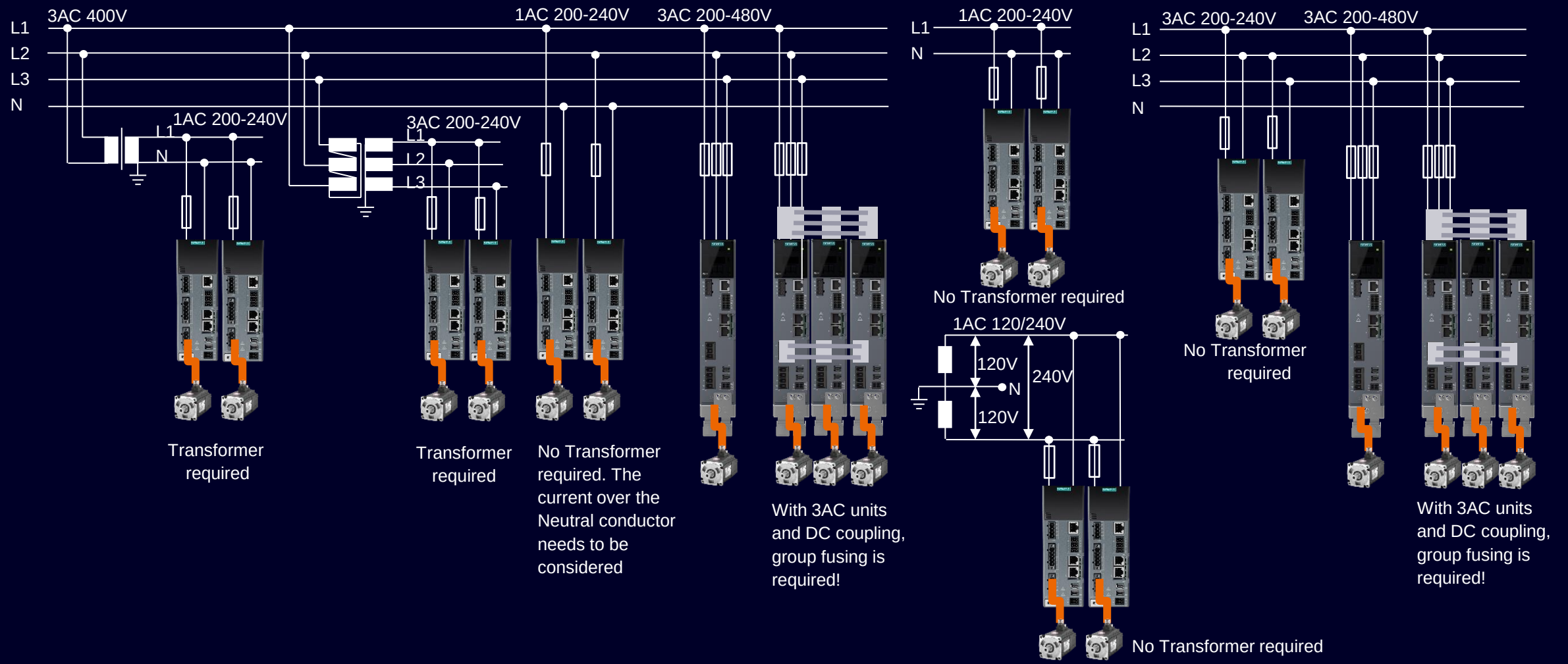


Line fusing
When DC coupling is used, single line fusing is **not allowed!** Therefore, the DC connector is not available separately.

Infeed of DC via DC Busbar
Using a common external DC supply, like a SLM of SINAMICS S120 System to power up the DC busbar of SINAMICS S210 is **not allowed!**
If this is required, please use SINAMICS S120 System instead!

SIEMENS

The new SINAMICS S210 Servo Drive System
1 and 3AC Devices – Line supply



SIEMENS

Products of SINAMICS S210 Servo drive system

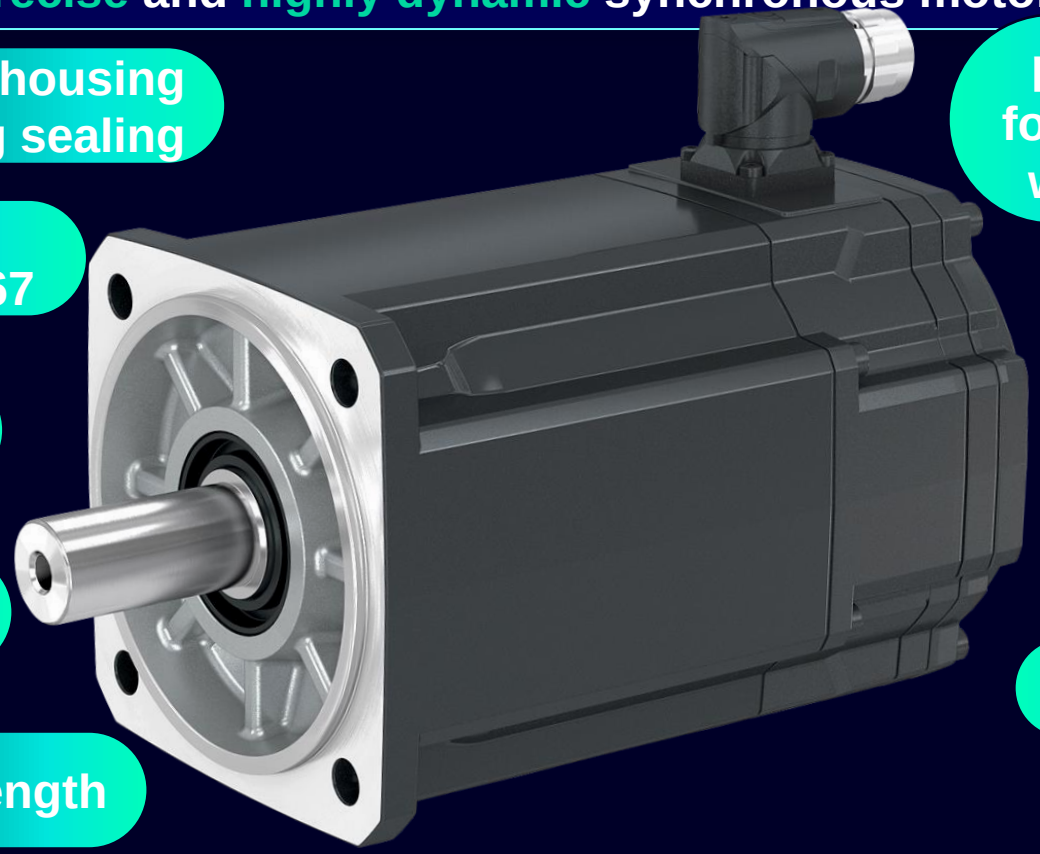
3 Product

- System overview
- SINAMICS S210
- **SIMOTICS S-1Fx2 Servo motors**
- SIMOTICS S-1FS2 Hygienic Servo Motor (F&B and Pharma)
- One Cable Connection (OCC)
- Accessories

SIEMENS

SIMOTICS S-1FK2 and S-1FT2 Portfolio

SIMOTICS S-1FK2 and S-1FT2 motors form the latest generation of servo motors from Siemens. They are compact, precise and highly dynamic synchronous motors.



- Robust metal housing with o-ring sealing
- protection class IP64, IP65 or IP67
- low cogging torque
- higher torque
- reduced length
- proven round metal plug for signal and power with reduced height
- high resolution encoder 22 bit or 26 bit
- many options and variants

SIEMENS

SIMOTICS S-1FK2 and **S-1FT2 motors** form the latest generation of servo motors from Siemens. These are compact, precise and highly dynamic synchronous motors.

SIMOTICS S-1FT2 servo motors are an extension of the 1FK2 motor portfolio. They are more finely graded in terms of rated speed, they offer additional torque levels and have numerous possible variations and options. This allows the diverse challenges in drive technology to be solved more precisely. 1FT2 motors represent the complete solution even for more demanding tasks or applications located in a difficult environment.

1FT2:
full functionality:

Complete portfolio
All lengths and windings,
self-cooling and forced ventilation

Full range of options:
for encoders, colors,
clean room, low temperature,
reinforced brake,
angular gear,
etc.

1FK2 for „mainstream features“

only core types
limited variance
variance in lengths and winding types

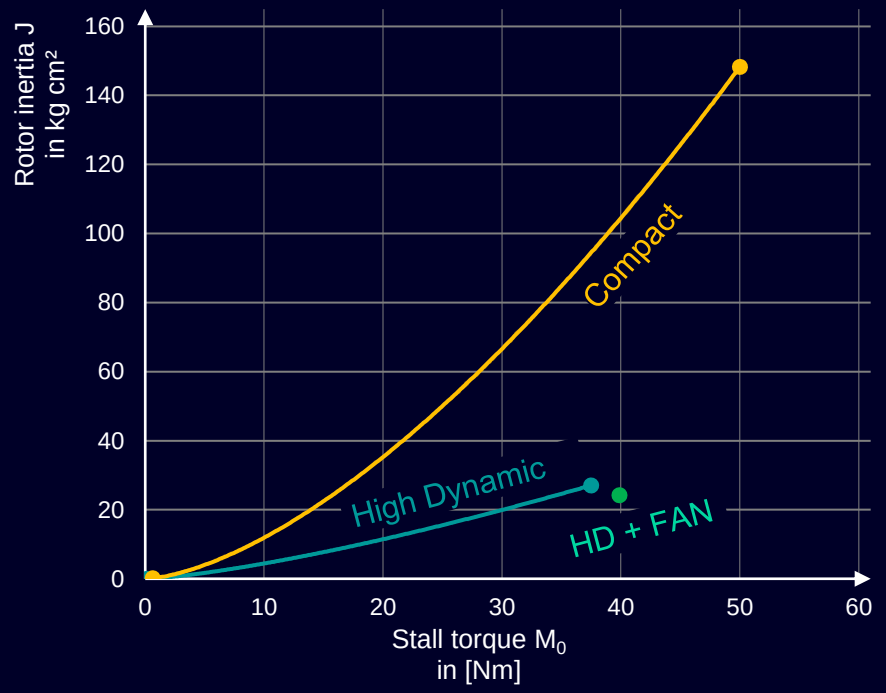
Only standard options:
- brake
- key
- IP64 , IP65
- encoder: 22 bit
- eco gearbox coaxial

The product range of SIMOTICS S-1FK2 servo motors includes a limited number of variants and options to meet the main challenges in servo drive technology.
They form the core of the new servo motor portfolio.

SIEMENS

SIMOTICS S-1Fx2 Servomotors for SINAMICS S210
Inertia types

1Fx2 motortypes:
moment of inertia / stall torque

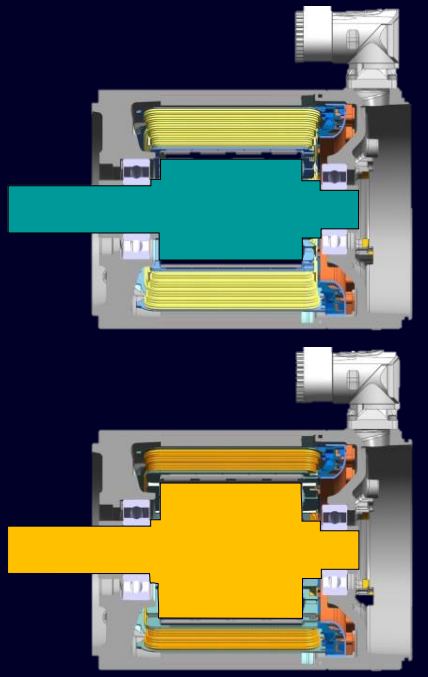


High Dynamic = Low inertia:

Low rotor inertia for highest acceleration and fastest cycle time
for small moving masses

Compact = Medium inertia:

- Precise and stable close loop control for medium to large moved masses due to medium rotor inertia
- high power density, compact design



SIEMENS

SIMOTICS S-1Fx2 Servomotoren für SINAMICS S210
Overview of stall torque at 3AC 380 - 480V

High Dynamic: Low rotor inertia for highest acceleration and fastest cycle time for small moving masses

rated speed n_N	1F■2103 SH30		1F■2104 SH40			1F■2105 SH52		1F■2106 SH63			1FT2108 SH80			1FT2108-■S SH80 FAN		
1500												30	37,5		40	
2000											25					
2500																
3000			1,27	2,4	3,2	5	8	9	12	16						
4500	0,64	1,27				5										
6000			1,27	2,4												

Compact:
- Precise and stable close loop control for medium to large moved masses due to medium rotor inertia
- high power density, compact design

rated speed n_N	1F■2203 SH30		1F■2204 SH40			1F■2205 SH48		1F■2206 SH63			1F■2208 SH80			1FT2208-■S SH80 FAN			1F■2210 SH100			
1500									9			18	22	27	22	28	35		30	40	50
2000						3,6		6		12		18	22	27	22	28		22	30	40	
3000				2,4	3,2	3,6	6	6,5	9	12	12,5	18	22		22			22			
4500						3,6		6,5		12											
6000	0,64	1,27		2,4																	

record = stall torque in Nm

XX = available as 1FK2 and 1FT2
XX = available as 1FT2

SIEMENS

SIMOTICS S-1Fx2 Servo motors for SINAMICS S120 and S210
Options

Standard options for all 1FK2, 1FT2 Servomotors

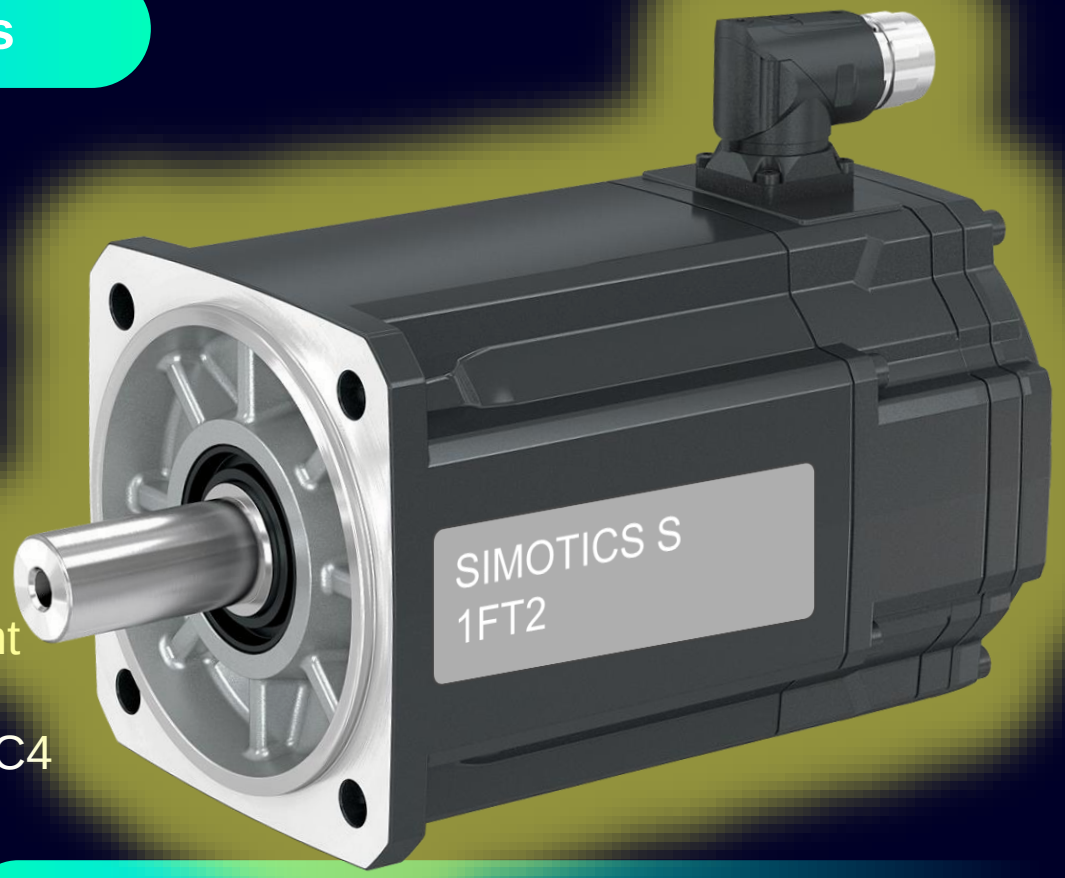
- Holding brake
- With or without key
- Alternative shaft geometry
- Protection level IP64, IP65
- Encoder Multiturn or singleturn
- One Plug for S210 / two plugs for S120
- With economy Gearbox NRB, NRK, NLC

SIEMENS

SIMOTICS S-1Fx2 Servo motors for SINAMICS S120 and S210
Options

Advanced options only for 1FT2 Servomotors

- Encoder Resolution 26 bit
- Protection level IP67
- With economy angular Gearboxes
  NRBW, NRKW, NLCW
- Enforced holding brake SH80 / SH100
- Customer text on rating plate
- Suitability for cold store -30°C
- Suitability for clean room / dry room
- Different colours
- Options for increased robustness / harsh environment
  - Extra primer
  - Enhanced chemical resistance for corossion class C4
  - Metal rating plate
  - pressure equalization
- Customer specific solution possible



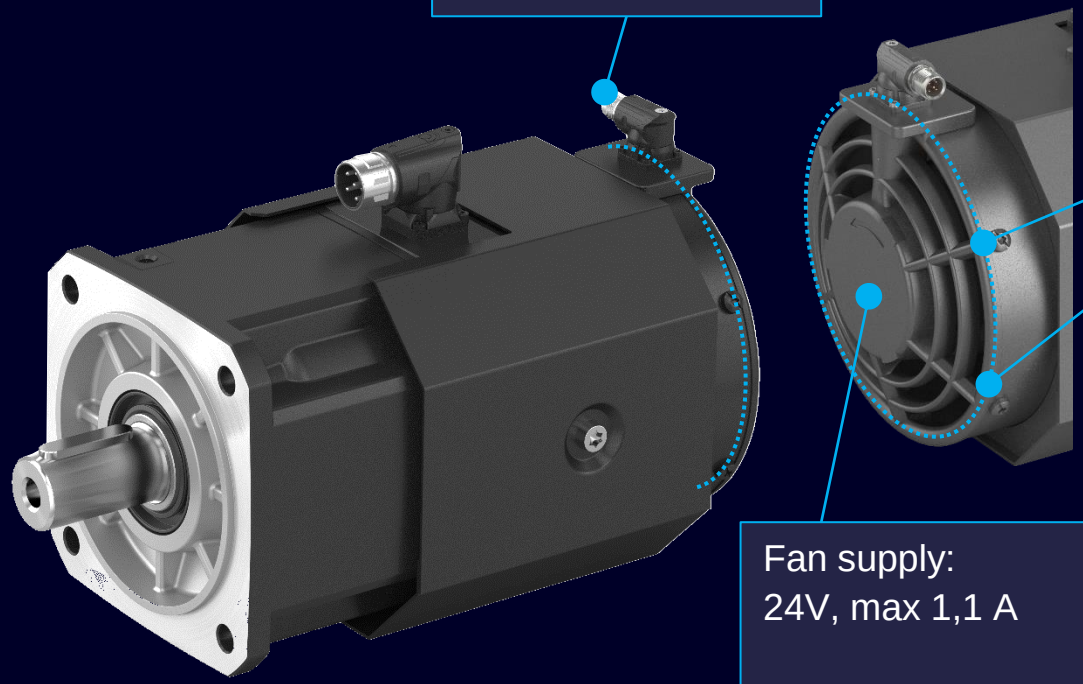
More to come…

SIEMENS

SIMOTICS S-1FT2 forced ventilation SH80 for S210

High Dynamic: M_0 = 40Nm
Compact: M_0 = 22-35Nm

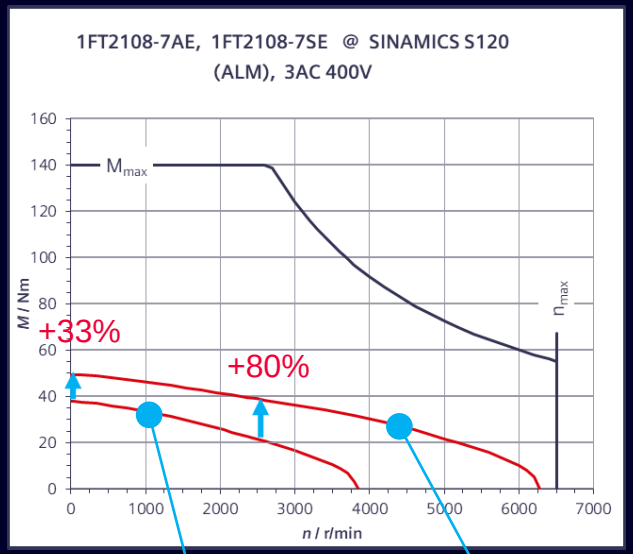
Plug for fan:
industry standard
- M12
- 5 polig, code A



Fan unit can be exchanged easily (available as spare part)

Fan supply:
24V, max 1,1 A

Example: 1FT2 SH 80



S1 natural cooling

S1 forced ventilation

SIEMENS

SIMOTICS S-1Fx2 Servomotors for SINAMICS S120
Component - Holding brake

Features

- The holding brake is used to lock the motor shaft when the motor is at a standstill. In some versions also available as a reinforced holding brake.
- The holding brake is designed for at least 5 million switching cycles when the motor is at a standstill.
- The holding brake is not a working brake for braking the rotating motor.
- A limited number of emergency stop operations are permitted.
- Do not exceed the specified maximum operating work per emergency stop.

SIEMENS

SIMOTICS S-1Fx2 Servomotors for SINAMICS S120
Brake - component

Motor	Holding torque at 120° C M_4 in Nm	Dyn. Braking torque M_{1m} in Nm	Maximum permissible single operating energy W_{max} in J	Total operating energy (service life) W_{total} in kJ	
For spring-loades brake				S120	S210
• 1F■2■02-■■■1	• 0,32	0,32	7,4	--	1,75
• 1F■2■03-■■■1	• 1,3	1,3	62	5	17,5
• 1F■2■04-■■■1	• 3,3	3,3	270	35	120
With permanent-magnet brake				S120	S210
• 1F■2■05-■■■1	• 8	5	570	284	284
• 1F■2106-■■■1	• 16	9	1065	774	774
• 1F■2206-■■■1 , 1F■2306-■■■1	• 13	6,5	1550	774	774
• 1F■2108-■■■1	• 36	12	1300	2400	2400
• 1F■2208-2■■1 , 1F22■08-3■■1	• 19	12	2000	1800	1800
• 1F■2208-4■■1 , 1F■2■08-5■■1 • 1F■2108-■■■2 (enforced) • 1F■2208-2■■2 (enforced) • 1F■2208-3■■2 (enforced)	• 32	17	4800	2400	2400
• 1F■2210-2-■■■1, 1F■2■10-3-■■■1	• 32	17	6500	2400	2400
• 1F■2210-4■■1, 1F■2■10-5■■1 • 1F■2210-2■■2 (enforced) • 1F■2■10-3■■2 (enforced)	• 55	26	8700	3800	3800

Holding torque M_4

The holding torque is the highest permissible torque with which the closed brake can be loaded in static operation without slip (holding function at motor standstill).

Dynamic braking torque M_{1m}

The dynamic braking torque is the smallest averaged dynamic braking torque that can occur in EMERGENCY STOP mode.

Maximum permissible individual switching work

The maximum permissible individual switching work of a single EMERGENCY STOP operation.
After an EMERGENCY STOP operation with the maximum single switching operation, allow a cooling time of at least 3 minutes before restarting the motor.

Total switching work (service life)

This total switching work is the sum of the individual switching operations (switching work for each EMERGENCY STOP operation). If the total switching work is exceeded, the proper functioning of the brake is no longer ensured.
The total switching work depends on the brake control and can be different for different inverters.

SIEMENS

SIMOTICS S-1Fx2 Servomotors for SINAMICS S120
Component - degrees of protection according to EN 60034-5

Depending on the operating and environmental conditions, a suitable degree of protection must be selected to prevent liquids as well as dust and foreign objects from entering the motor and damaging it.

Degree of protection according to IEC 60034-5

The degree of protection is specified by the two letters IP (for International Protection) and two digits:

- **First digit :** Protection against touching and ingress of solid foreign objects

  6: Protection against dust penetration and complete protection against contact

- **Second digit** for the degree of protection against the ingress **water**

  4: Protection against splash water from any direction
  5: Protection Jet water from any direction
  7: Protection against brief immersion in water

Recommended degrees of protection for servomotors

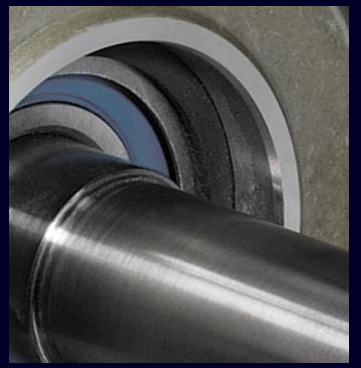
When cooling lubricants are used, protection against water alone is not sufficient. The protection class designation according to IEC 60034-5 should only be considered as a guideline in this case.

The motors may have to be protected by a suitable cover. Attention must be paid to providing suitable sealing of the motor shaft for the selected degree of protection of the motor. With mounting position IM V3 (with shaft end upwards), standing liquid on the flange must be avoided.

The table on the right can serve as a decision aid for selecting the required degree of protection for motors.

SIMOTICS S-1FT2 motors are designed with a degree of protection of IP64 as standard. Optionally, the motor can be provided in degree of protection IP65 or IP 67. Recommendation for selecting the motor protection type:

dry	Water / general cooling-lubricating medium (95% water, 5% oil)				
General factory environment	Liquid enriched environment	Mist	Spraying	Jet	Surge / brief immersion / constant inundation
IP64	IP64	IP65	IP65	IP67	IP67



IP64:
no shaft seal, sealing by motor bearing

IP65:
Radial shaft seal without annular spring on shaft or unground sleeve

IP67:
Radial shaft seal with annular spring on twist-free ground sleeve

SIEMENS

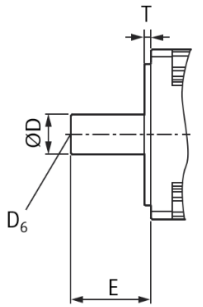
SIMOTICS S-1Fx2 Servomotors for SINAMICS S120
Components - shaft extension

Features

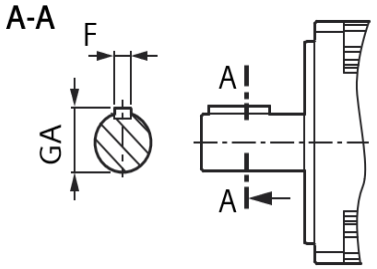
Standard:	plain shaft
Option:	Shaft with keyway and key (half key balancing)
Option:	Plain shaft, alternative shaft extension

Shaft height	Shaft end / centering DIN 332-DR Ø D x E / D_6		Feather key dimensions	Centering thread
	standard	alternative	GA / F	T / T2
SH30	14 x 30 / M5	11 x 23 / M4	16 / 5	2,5 / 8,5
SH40	19 x 40 / M6	14 x 30 / M5	21,5 / 6	3 / 8
SH48 / SH52	19 x 40 / M6	-	21,5 / 6	3 / 3
SH63	24 x 50 / M8	-	27 / 8	3,5 / 3,5
SH80	32 x 58 / M12	-	35 / 10	3,5 / 3,5
SH100	38 x 80 / M12	-	41 / 10	4 / 4

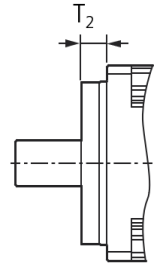
Shaft dimensions



Additional dimensions
for version with feather key

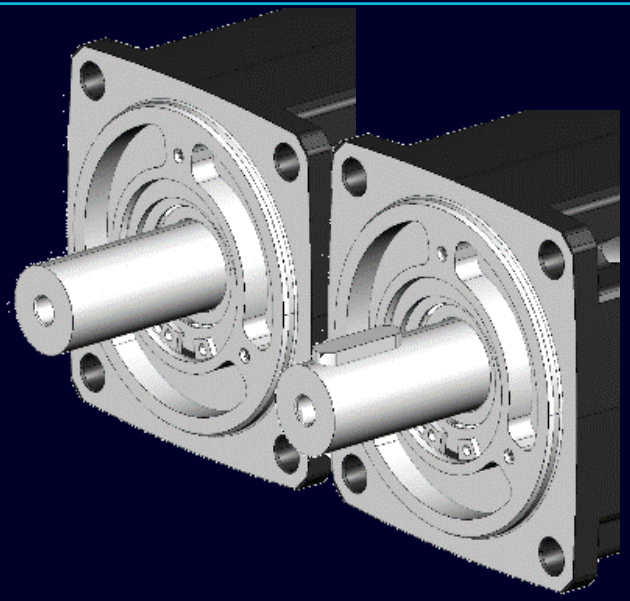
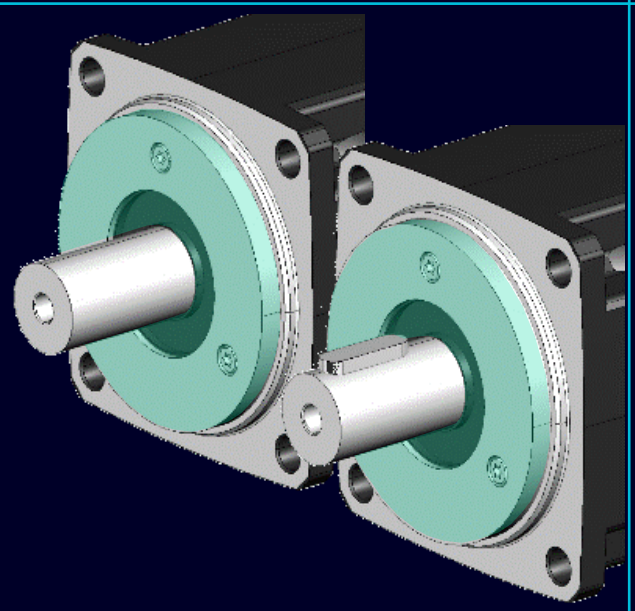
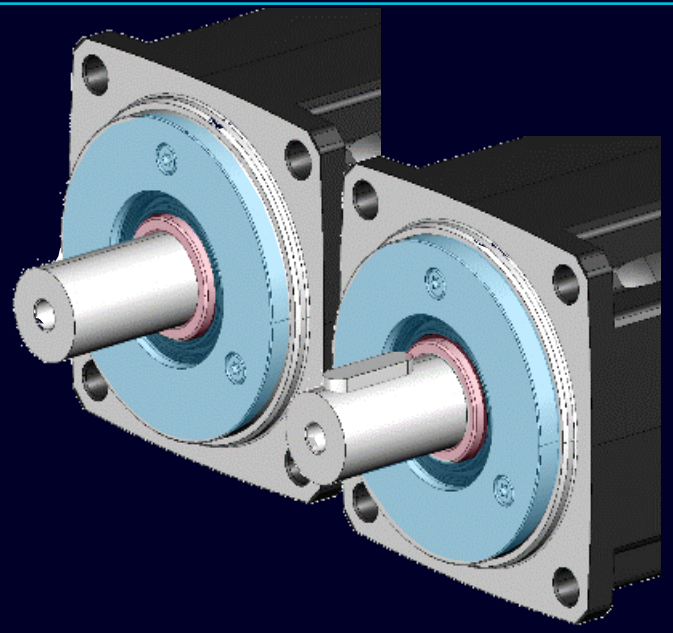
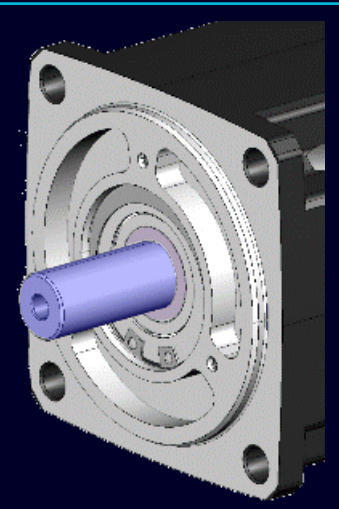


Version with shaft seal:
IP65/IP67 for SH30, 40



SIEMENS

SIMOTICS S-1Fx2 Servomotors for SINAMICS S120
Components - Motor shaft options for SH 30 - SH 40

IP64	IP65	IP67	thin shaft end
Shaft end usable until bearing inner ring	• Oil seal in front end cassette • Shortens the usable shaft end	• Shaft seal with sleeve in front end cassette • Shortens the usable shaft end • Axial stop on sleeve possible	• Only SH30, SH40 • Only without key • only without shaft seal (IP64)
			

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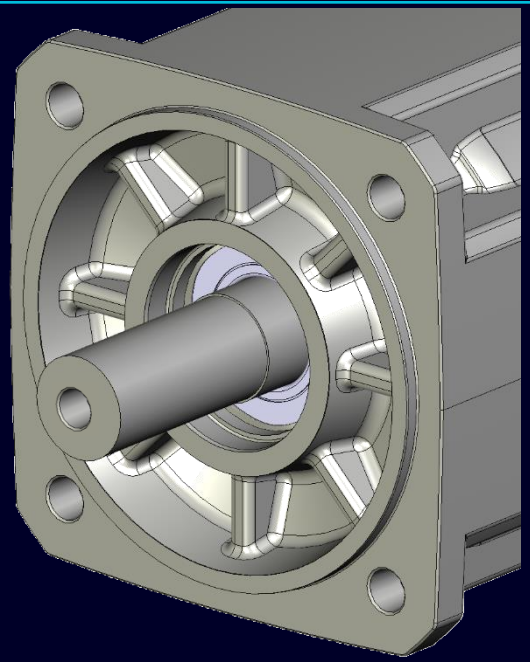
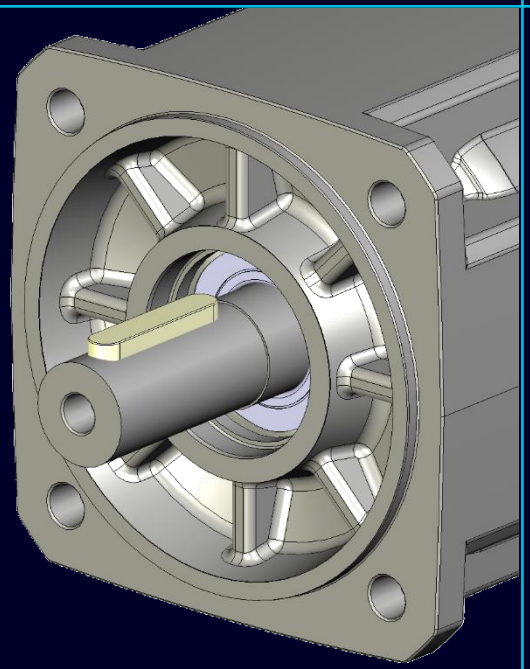
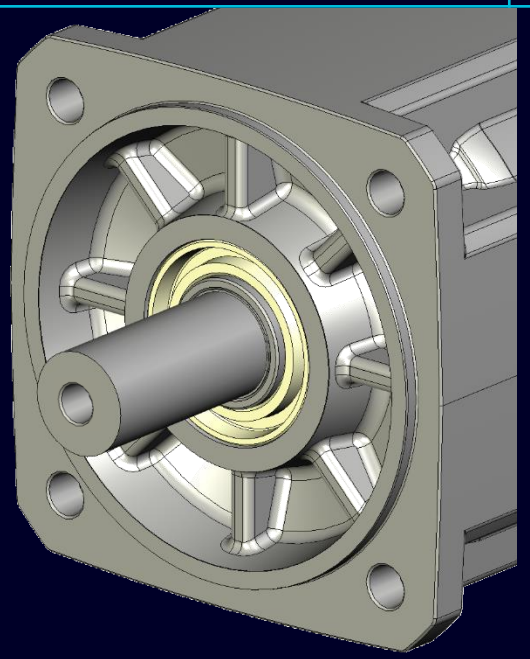
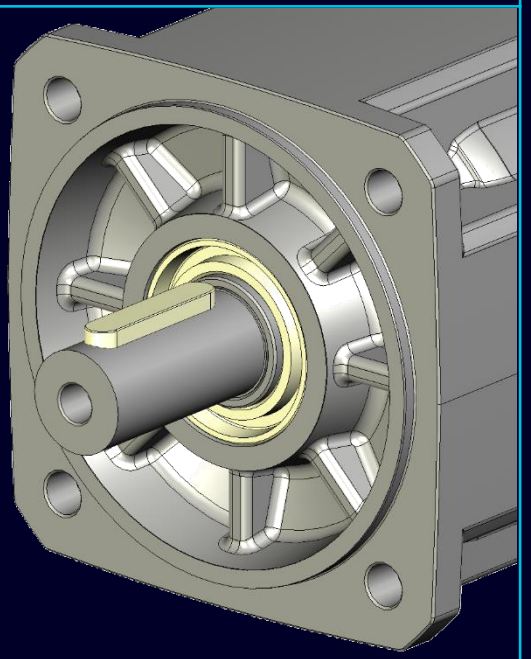
SIMOTICS S-1Fx2 Servomotors for SINAMICS S120
Components - Motor shaft options for SH 48 - SH 100

IP64		IP65 / IP67	
No axial stop		axial stop on sleeve	
without feather key	With key	without feather key	With feather key
			

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SIMOTICS S-1Fx2 Servomotors for SINAMICS S120
Motor encoder systems - Built-in encoder

1FK2	1FT2	Designation		Resolution of one revolution	Revolution counter (multiturn)
✓	✓	AS22DQC	Absolute encoder singleturn 22 bit	22 bit = 4.194.304	-
✓	✓	AM22DQC	Absolute encoder 22 bit + 12 bit multiturn	22 bit = 4.194.304	4069 Revolutions
-	✓	AS26DQC	Absolute encoder singleturn 26 bit	26 bit = 67.108.864	-
-	✓	AM26DQC	Absolute encoder 26 bit + 12 bit multiturn	26 bit = 67.108.864	4069 Revolutions

- All encoders are designed with digital DRIVE-CLiQ interface and electronic nameplate
- All encoders support extended satety functions

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SIMOTICS S-1Fx2 Servomotors for SINAMICS S120
Option paint finish

Paint finish standard

If specific color and paint/coating data are not specified when ordering, the 1F■2 motors are painted in the standard anthracite color (RAL 7016).

Optional colors for 1FT2

3-digit article designation	Color pattern	Designation
X00		No painting
X01	RAL 9005	Jet black, mat
X02	RAL 9001	Cream white
X03	RAL 6011	Reseda gray
X04	RAL 7032	Pebble gray
X05	RAL 5015	Sky blue
X06	RAL 1015	Light ivory
X08	RAL 9006	White aluminuim

The paint finish in standard and special colors meets the requirements for ambient conditions of climate class 3K4 according to IEC 60721-3-3 with the exception of the influencing variables "low air temperature", “condensation" and "low air temperature". The standard paint finish fulfills the corrosivity category C1 according to DIN EN ISO 12944-2.

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SIMOTICS S-1Fx2 Servomotors for SINAMICS S120
Option for resistance

Various robustness-enhancing measures can be ordered as options for S-1FT2 motors	
Article No. supplement	**Description**
N16	**Motors with increased chemical resistance** (Includes the properties of the coating worldwide K23) • 4-layer paint system (PS Premium paint system) • Nickel-plated plug connectors • Resistant to greases, mineral oils, aliphatic solvents (10 %), caustic soda (10 %) With this option, the motor meets the requirements of corrosivity category C4(M) to DIN EN ISO 12944-2. This option is available for 1FT2 for all frame sizes from 1FT2□03. A certification regarding resistance of common ECOLAB cleaning and disinfecting agents is available here: https://support.industry.siemens.com/cs/ww/en/view/58657336
K23	**Special painting with additional primer** Additional priming, primer and paint finish in RAL 7016, anthracite grey Properties as standard painting, additionally condensation on the outer surfaces of the motor is permissible. Combination with special color X■■ according to color table is permissible.
Q31	**Metal motor rating plate** As standard, the motor rating plate is designed as an adhesive plastic plate. With this option, an aluminum metal rating plate can be ordered instead. The inscription is lasered on, ensuring long-term readability even under poor ambient conditions.
Q20	**Pressure compensation** Option Q20 is available for 1FT2 in all frame sizes with the exception of 1FT2102 and 1FT2□03-□AG. When the motor with an IP67 protection class cools down following operation, underpressure may result in the motor. This may result in moisture ingress. You can prevent such moisture ingress with a defined air supply provided by a connected pressure compensation tube.

SIMOTICS S-1Fx2 Servomotors for SINAMICS S120
Suitability for ambient temperatures down to -30°C

Ambient temperature standard

As standard, the permissible temperature range is -15°C to +40°C (without derating)

Optional: Suitability for low temperatures down to -30°C
Order code to article number: Q30

As an option, the 1FT2 motors can be designed for an extended temperature range down to -30°C. Application e.g. in cold stores

The extended operating temperature range cannot be selected in combination with the following variants:

- Degree of protection IP67
- Motors with gearbox
- Motors with forced ventilation

SIMOTICS S-1Fx2 Servomotoren für SINAMICS S120 and S210
Suitability for cleanroom and dry room

New option for 1FT2: Certification for cleanroom, suitability for dry room

Order code to article number: Q40

As an option, the 1FT2 motors are available certified for cleanroom compatibility according to ISO 14644-1 and designed for suitability in a dry room

Application e.g. battery manufacturing

The achieved cleanroom class according to ISO 14644-1:

- motor w/o shaft seal IP64: class 7 (or better)
- motor with shaft seal IP65: class 6 (or better)
- motor with gearbox NRB(W), NRK(W), NLC(W): class 7 (or better)

Certificates: https://support.industry.siemens.com/cs/document/109815586

Furthermore, these motors are suitable for very dry environments with a relative humidity of 0.3% or a dew point of -50°C at an ambient temperature of 20°C

Order using order code Q40: 1FT2■■■-■■■■■-■■■■-Z Q40

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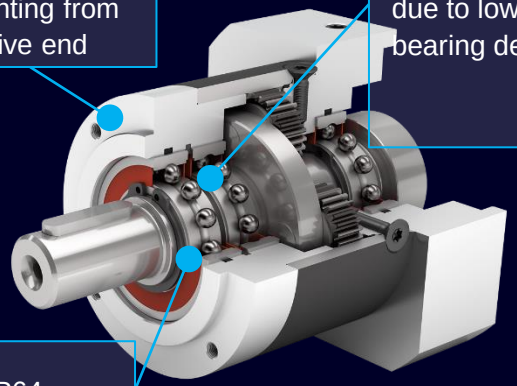
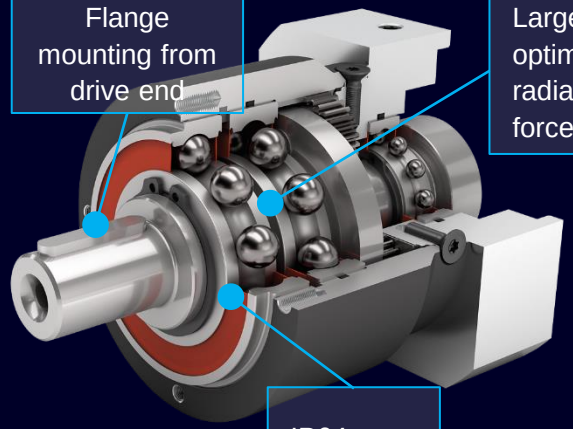
SIMOTICS S-1Fx2 servo planetary geared motors
Highlights

NRB(W)



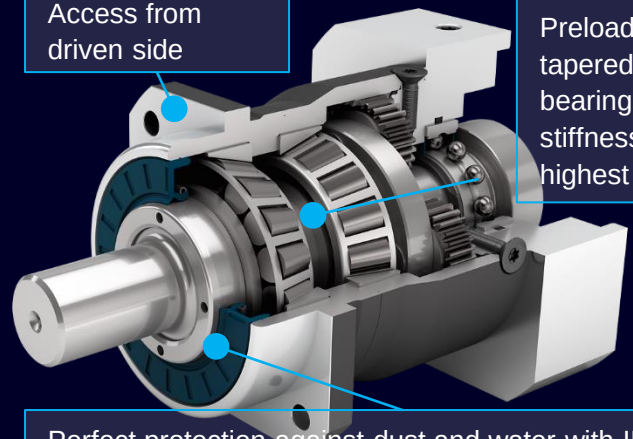
- Flange mounting from drive end
- High drive speed due to low-friction bearing design
- IP64

NRK(W)



- Flange mounting from drive end
- Large ball bearing optimized for high radial and axial forces
- IP64

NLC(W)



- Flange mounting Access from driven side
- Preloaded tapered roller bearings for high stiffness under highest loads
- Perfect protection against dust and water with IP65 sealing

Valid for all gearboxes:

- Maintenance-free due to lifetime lubrication
- Clamping systems optimized for low inertia
- Mountable in all spatial orientations
- Optionally with food-grade lubrication
- Specification and characteristic curves for the gear motor unit

NRB

NRBW

NRK

NRKW

NLC

NLCW

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SIMOTICS S-1Fx2 servo planetary geared motors
Overview planetary gear boxes

S-1FK2 / S-1FT2		NRB	NRK	NLC	NRBW	NRKW	NLCW
							
						S-1FT2	
Transmission ratio i		3 ... 512	3 ... 100	3 ... 100	3 ... 512	3 ... 100	3 ... 100
Gearbox stages z		1, 2 and 3-stage	1 and 2-stage	1 and 2-stage	1, 2 and 3-stage	1 and 2-stage	1 and 2-stage
Torsional backlash φ2		6 ... 22	8 ... 20	7 ... 10	6 ... 22	8 ... 20	7 ... 10
Geared motor data for 200 ... 240 V 1/3 AC							
Maximum torque M_{2max}	Nm	1.5 ... 1280	1.4 ... 736	3 ... 416	1.4 ... 416	1,5 ... 312	3,5 ... 416
Rated torque M_{2N}	Nm	0.2 ... 650	0.1 ... 460	0.14 ... 260	0.1 ... 260	0,11 ... 195	0,12 ... 230
Rated speed n_{2N}	rpm	3 ... 1000	15 ... 1000	15 ... 500	3 ... 1000	15 ... 1000	15 ... 375
Gearbox motor data for 380 ... 480 V 3 AC							
Maximum torque M_{2max}	Nm	4.9 ... 1280	4.7 ... 736	4.7 ... 416	4.6 ... 416	4,35 ... 312	4,6 ... 416
Rated torque M_{2N}	Nm	0.8 ... 650	0.54 ... 460	0.36 ... 260	0.52 ... 260	0,34 ... 195	0,26 ... 230
Rated speed n_{2N}	rpm	3 ... 1000	20 ... 750	25 ... 500	6 ... 1000	15 ... 750	15 ... 375
Suitability							
Power density		+++	++	++	++	+	+
Bearing loading capacity		+	++	+++	+	++	+++
Suitable for high speeds		++	++	+	+	+	+
degree of protection		+	+	++	+	+	++
Options							
Plain shaft / solid shaft with feather key		✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓
Standard lubrication / food-grade lubricant		✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓

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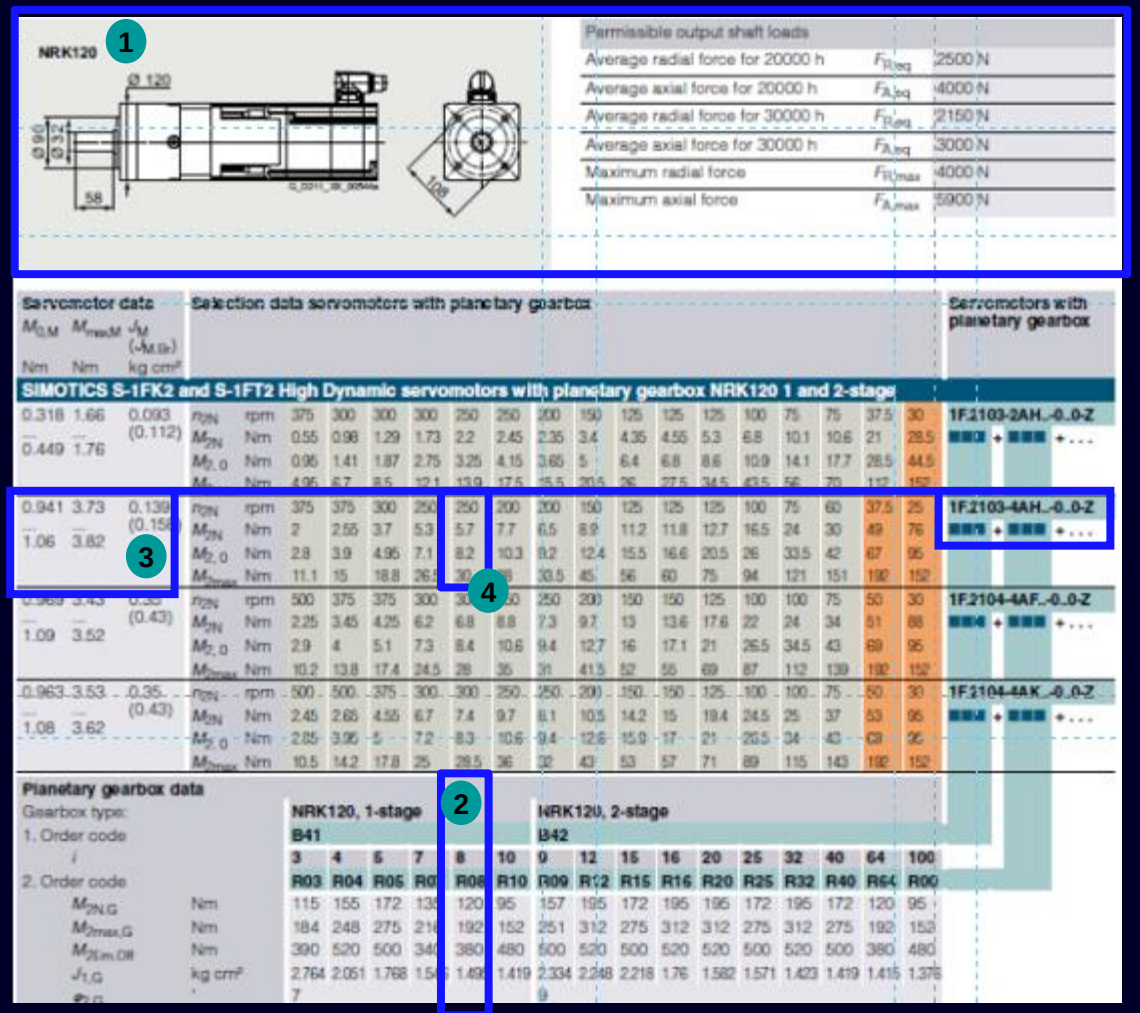
SIMOTICS S-1Fx2 servo planetary geared motors
Selection of a gearmotor in the catalog D32 or D21.4



Example, on the selection procedure of a servo planetary gearmotor:

1 Selection of the page with the desired gear unit series and gear unit size.Based on the desired application parameters torque range, required overhung load, torsional backlash, etc.

2 **Gearbox data (independently of the motor)**

- i Transmission ratio
- $M_{2N,G}$ Rated torque of the gearbox (limit for fatigue strength)
- $M_{2max,G}$ Maximum torque of the gearbox (limit for fatigue strength)
- $M_{2Em.Off}$ Emergency Off torque
- J_{1G} Mass moment of inertia of the gearbox
- m_G Mass of the gearbox component
- c_{T2} Torsional stiffness of the gearbox
- φ_2 Torsional backlash of the gearbox

3 Motor data (independently of gearbox)

- $M_{0,M}$ S1 Static torque of the motor (without gear limitation, with thermal interaction)
- $M_{max, M}$ Maximum torque of the motor (without gear limitation, with thermal interaction)
- J_M Mass moment of inertia of the motor
- m_M Masse of the motor component

4 Data for the geared motor (specified for the gearbox output side)

- n_{2N} Rated speed of the geared motor
- M_{2N} Rated torque of the geared motor
- $M_{2,0}$ S1 geared motor static torque (including gearbox limitation)
- M_{2max} Maximum torque (including gearbox limitation)

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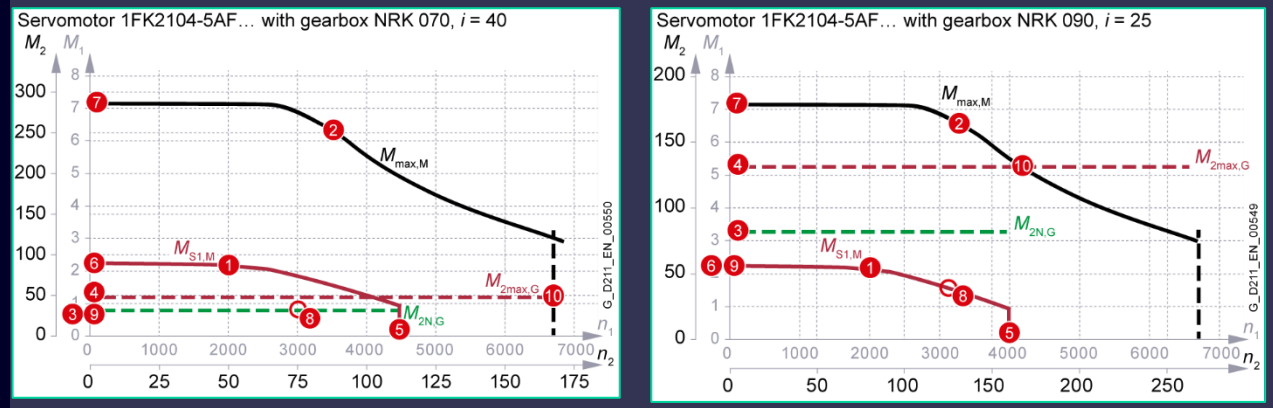
SIMOTICS S-1Fx2 servo planetary geared motors
Notes on the selection

Characteristic curves of the geared motor (available via the Siemens Product Configurator)

1. $M_{S1,M}$ – Characteristic of the largest thermally permissible effective torque of the motor component minus the gear friction and with consideration of the thermal interactions of the gearbox attachment.
2. The effective operating point must be below this line to avoid thermal overload of the geared motor.
3. $M_{max,M}$ – Characteristic of the largest torque that can be generated by the motor component for a short time minus the gear friction.
   $M_{S1,M}$ and $M_{max,M}$ may exceed the mechanically permissible limits of the gearbox, depending on the selection of the motor gearbox combination[1)].



Bilder: Verschiedene Beispielkennlinien mit unterschiedlicher Lage der Dauerfestigkeit

[1)] In this case, it must be ensured that the torque effective at the gearbox output does not exceed the permissible limits (consideration of the load-to-motor inertia ratio during acceleration processes). More information is provided in the Configuration Manual..

Important gearbox component data:

4. $M_{2N,G}$ – The rated torque of the gearbox component at the output. This represents the fatigue strength limit of the gear teeth (independently of the motor). If exceeded, the gearbox is partially damaged, and a service life calculation is required.
5. $M_{2max,G}$ – Maximum torque of the gearbox component. This is the limit of the time strength range (can be tolerated for 30000 revolutions of the output shaft). There is a risk of breakage if the limit is exceeded.
6. $n_{1av,G}$ – Greatest average input speed. In each time window of 15 minutes, the average input speed must be below $n_{1av,G}$.

Important motor component data:

7. $M_{0,M}$ – The motor component can deliver this torque thermally on a sustained basis at standstill and near standstill. It may exceed the mechanical limits of the gearbox component if necessary[1)].
8. $M_{max,M}$ – The motor component can deliver this torque for a short time. It may exceed the mechanical limits of the gearbox component if necessary [1)].

Important geared motor system data:

9. Rated operating point:
   M_{2N} – Rated torque and
   n_{2N} – Rated speed.
   This rated point can be permanently driven thermally and mechanically. If the S1 characteristic $M_{S1,M}$ at n_{2N} is greater than $M_{2N,G}$, M_{2N} is reduced accordingly. At the rated point, the geared motor has approximately its maximum power.
10. $M_{2,0}$ – The geared motor can deliver this torque thermally on a sustained basis at standstill and near standstill. It is reduced to $M_{2N,G}$ if necessary.
11. M_{2max} – The geared motor can deliver this torque for a short time. It may be within the time strength range of the gearbox.

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Products of SINAMICS S210 Servo drive system

3 Product

- System overview
- SINAMICS S210
- SIMOTICS S-1Fx2 Servo motors
- **SIMOTICS S-1FS2 Hygienic Servo Motor (F&B and Pharma)**
- One Cable Connection (OCC)
- Accessories

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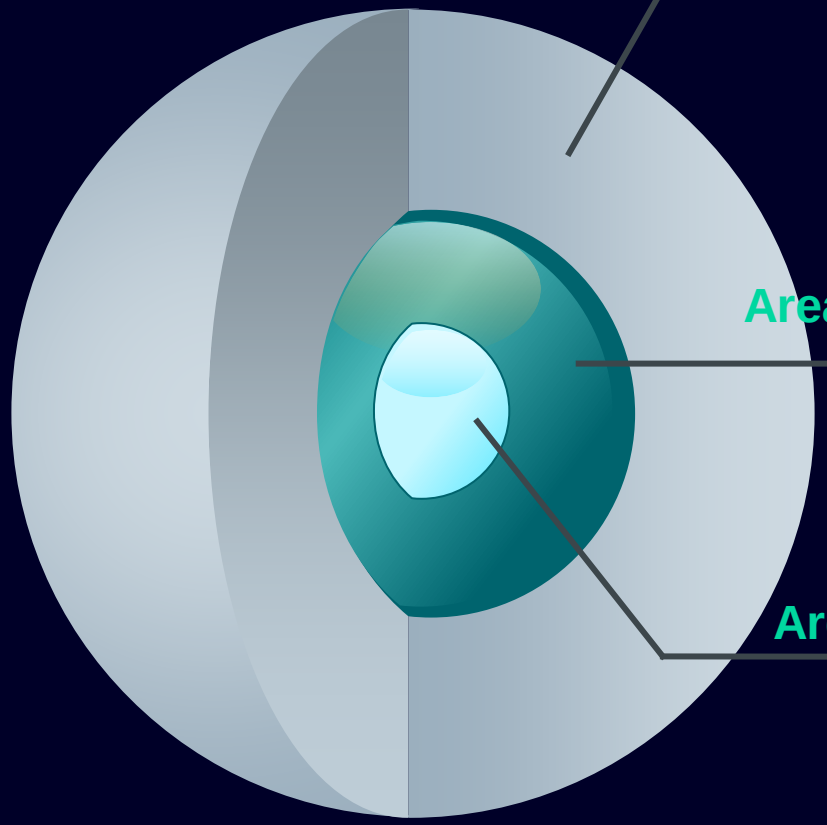
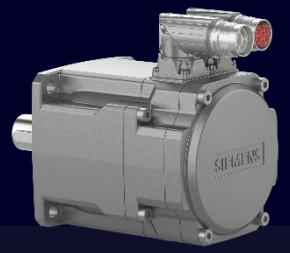
SIMOTICS S-1FS2 for F&B and Pharma Applications
Requirements for Food & Beverage Applications



Area 1

Standard motor (1FK2)

- Suitable for accidental spillage
- Not suitable for aggressive cleaning
- Housing needed in wet area or rough environment



Area 2

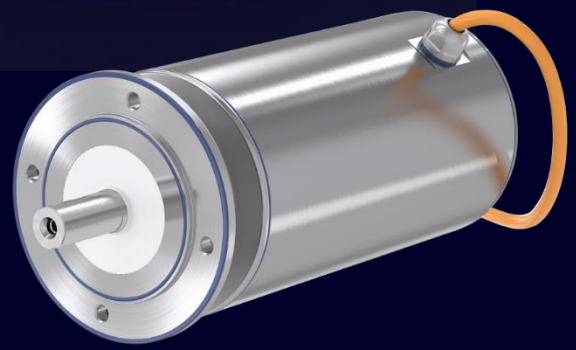
Standard motor with F&B options (1FT2 N16)

- With specific F&B options
- Suitable for regular cleaning
- IP rating needs to be respected
- Not hygienic

Area 3

Hygienic Design → SIMOTICS S-1FS2

- Specific F&B design
- Smooth surface / housing (food grade stainless steel, EHEDG certified)
- Suitable for pressure washing (IP69K) and Cleaning in Place (CIP)



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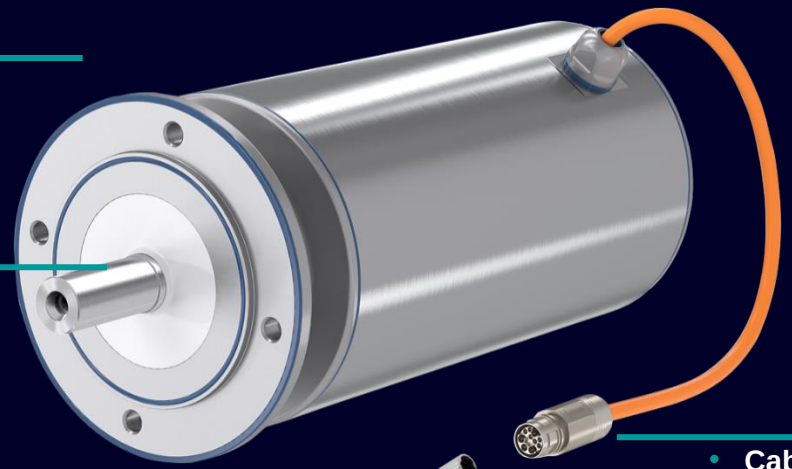
Servomotors SIMOTICS S-1FS2
Overview

With or without holding brake



Shaft:
plain or feather key

Different Shaft heights

SH	Stall torque	n_{rated}
SH40	3 Nm	3000 rpm
SH52	8 Nm	3000 rpm
SH63	14 Nm	3000 rpm
SH80	24 Nm	2000 rpm

- Cable pre-assembled on motor and cable can be ordered in 0.5m increments up to 11m
- Cable end with mounted connector, extension of motor cable possible with full MOTION-CONNECT product range (connector in protection class IP67)

- Cable pre-assembled on motor and cable can be ordered in 0.5m steps up to 11m
- IX connector partially assembled (shield plate and connector housing included so that the cable can be routed more easily through e.g. cable gland into the control cabinet.

Encoder:
Resolution 22 Bit absolute + 12Bit multiturn (=4096 revolutions)

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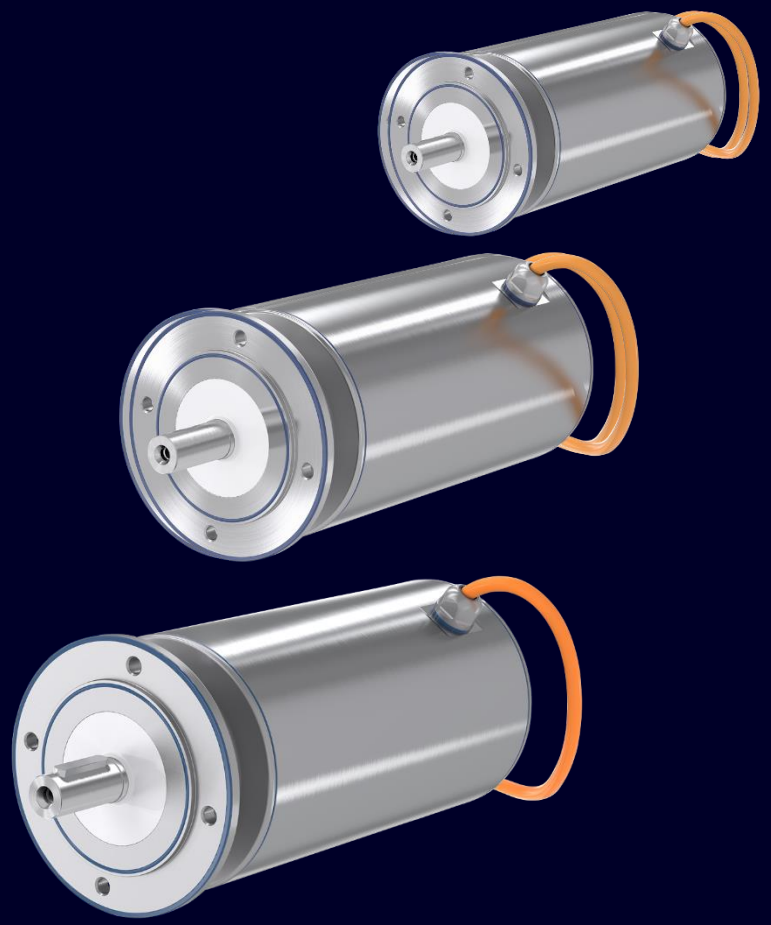
Servomotors SIMOTICS S-1FS2
Technical Data



Technical Data	
Line supply voltage	1AC 200-240V / 3AC 200 – 480V
Torque range	M0: 3 – 23 Nm; M_{max}: 10 – 80 Nm
Rotor Inertia	0,67 – 49 kg*cm²
Cooling	Self cooling
Operating range	Up to +40 °C without power derating
installation altitude	≤ 1000 m above sea level without power derating
Motor design	IM B5 (IM V1, IM V3)
Degree of protection	Complete motor IP66/67; Housing: IP69K
Thermal protection	Thermal motor model
Coating	Stainless Steel 1.4404 (Shaft and Housing)
Shaft end	Plain shaft, optional with feather key
Encoder systems	AM22DQC absolut encoder 22 bit + 12 bit Multiturn (travel range 4096 revolutions)
Connection	Cable pre-assembled on motor and cable tail can be ordered in 0.5m increments up to 11m: • Cable end (inverter side) for direct connection to the inverter • Cable end (inverter side) with SpeedConnect plug for connection of an extension cable of the MOTION-CONNECT system (must be ordered separately, protection class of connector is IP67)
Brake	optional holding brake (24V)
Line supply voltage	**Hygienic Design Planetary Gearboxes by Neugart (HLAE)**

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Products of SINAMICS S210 Servo drive system

3 Product

- System overview
- SINAMICS S210
- SIMOTICS S-1Fx2 Servo motors
- SIMOTICS S-1FS2 Hygienic Servo Motor (F&B and Pharma)
- **One Cable Connection (OCC)**
- Accessories

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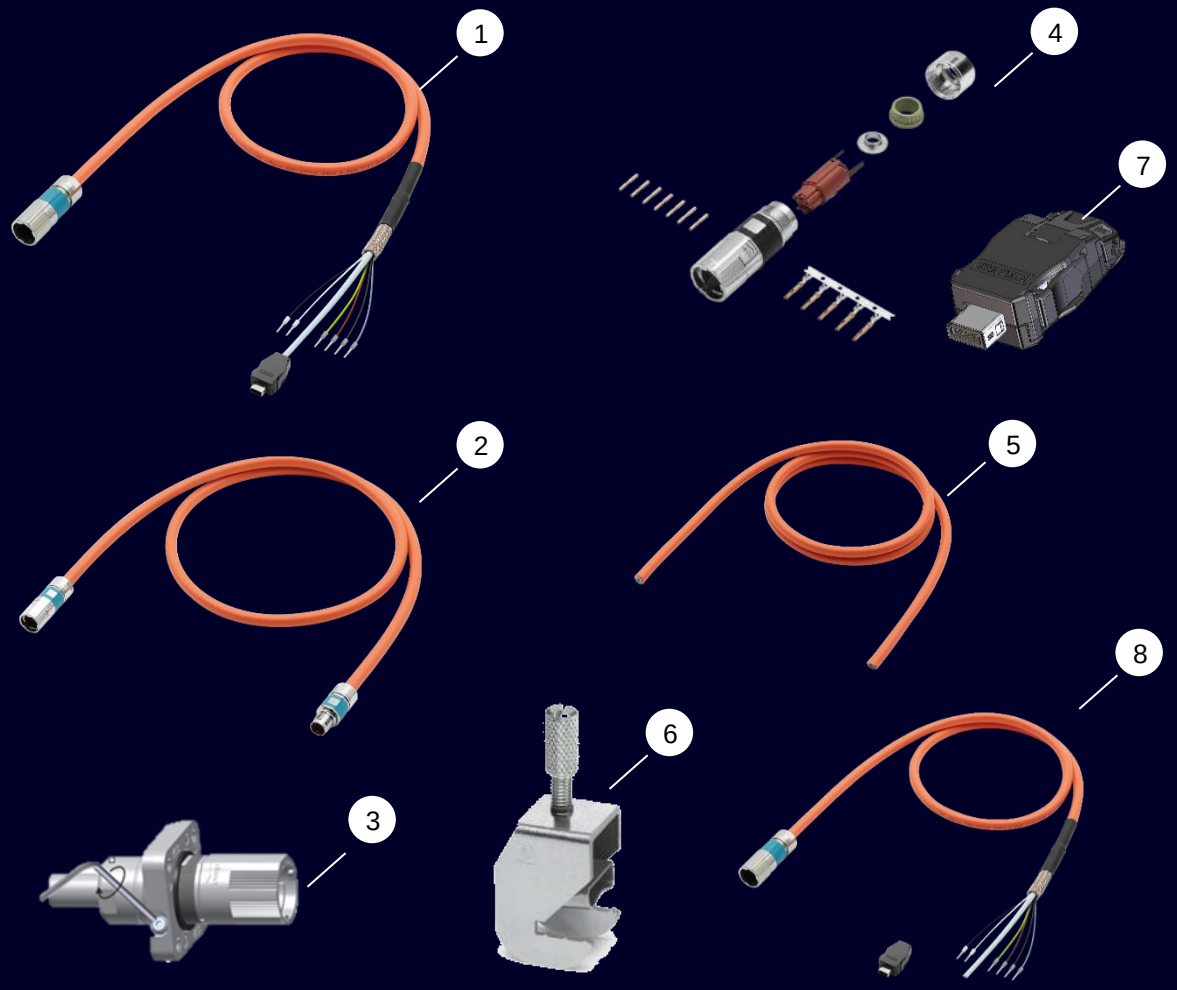
One Cable Connection OCC
Overview



Overview MOTION-CONNECT OCC cables and accessories

1 **Preassembled cables (MOTION-CONNECT 500 / 800), Order individual length up to 50m, in 10cm increments**

2 **Extension Cable (MOTION-CONNECT 500 / 800), Order individual length up to 50m, in 10cm increments**

3 **Mounting flange**

4 **Connector Kit**

5 **Raw Cable (MOTION-CONNECT 500 / 800) can be ordered in different length**

6 **Shield connection terminal block (come with the cable); also can be ordered as spare (10PC package)**

7 **Inverter-side signal connector (motor encoder signals) Siemens IX; Version for field assembly.**

8 **Preassembled cables (on motorsides) (MOTION-CONNECT 500 / 800), Order individual length up to 50m, in 10cm increments, with bypacked IX signal connector (on drive side) for self assembling.**

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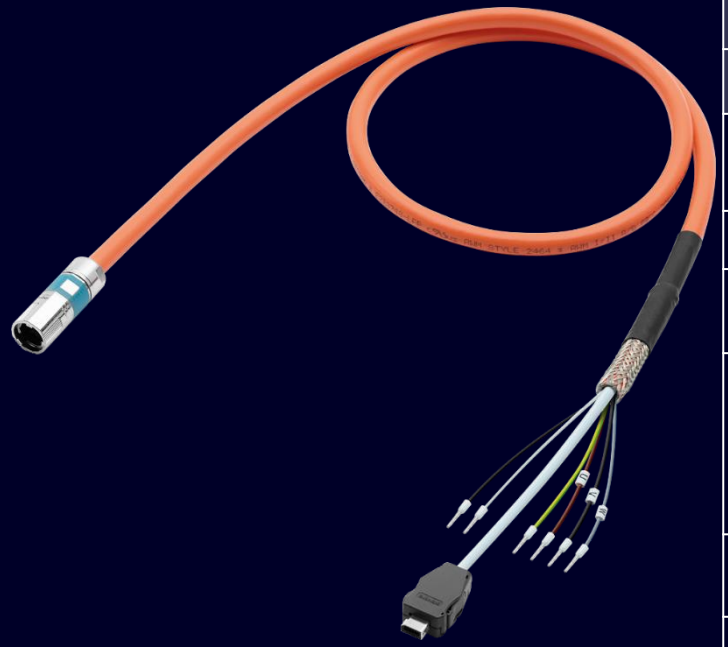
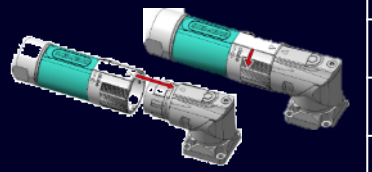
One Cable Connection OCC
Technical Data





Technical Data				
OCC Cable	**SH20-30**	**SH40-48/52**	**SH63-100**	
Connectors (Motor / Encoder)	M12 (SPEED-CONNECT) / IX	M17 (SPEED-CONNECT) / IX	M23 (SPEED-CONNECT) / IX	
No. of cores	10			
Length	Siemens offers a configurable cable length. The max. allowed cable length 50 m. Maximum 3 separating points allowed			
Cable configuration	outside-Ø: 9,4mm Power: 4x0.38mm² Brake: 2x0.38mm² Encoder; 4x0.2mm²	outside-Ø: 10,2mm Power: 4x0.75mm² Brake: 2x0.5mm² Encoder; 4x0,2mm²	outside-Ø: 12,3mm Power: 4x2.5mm² Brake: 2x1.5mm² Encoder; 4x0,2mm²	outside-Ø: 13,3mm Power: 4x2.5mm² Brake: 2x1.5mm² Encoder; 4x0,2mm²
Max. No. of bendings MC500	100.000			
Max. No. of bendings MC800	10.000.000			
Certification	cURus, CE, RoHS			
Protection	IP65 (Motor side), IP20 (Drive side)			
Static bending radius MC500	23,5mm	25mm	2,5x cable diameter x cable radius	
Dynamic bending radius MC800	4 x cable diameter		7,5 x cable diameter	

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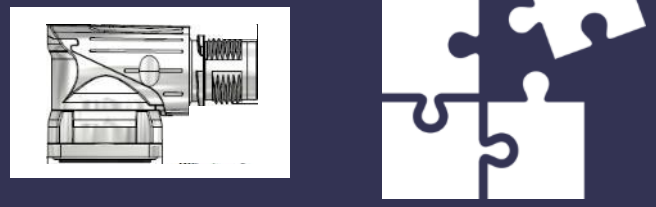
One Cable Connection
Features

Usability Features

- Install only one cable instead of 2 or 3
- Rotatable SPEED-CONNECT fast connection system
- Only one cable for power, encoder and brake required
- One cable version fits all different options for encoder & brake
- Small and compact M12 connector e.g. for motor SH20/30mm (only 25mm in height)
- Flexible cable with small bending radius (≥24mm)



Cable Options

- Order individual length up to 50m, in 10cm Inkrements, pre-fabricated
- Trailing cable version available
- Extension cables available
- Mounting flange available

SIEMENS

Products of SINAMICS S210 Servo drive system

3 Product

- System overview
- SINAMICS S210
- SIMOTICS S-1Fx2 Servo motors
- SIMOTICS S-1FS2 Hygienic Servo Motor (F&B and Pharma)
- One Cable Connection (OCC)
- **Accessories**

SIEMENS

The new SINAMICS S210 Servo Drive System
Peripheral / Optional components

Line filter (1AC)

- Protect the network from interference voltages with Siemens recommended line filter
- External line filter to fulfill EMC Directive IEC 61800-3 category C2 up to 25m

SINAMICS S210		Line filter 1	
Line supply	Rated power (kW)	Rated current (A)	Article No.
1 AC 200V…240V	0.1…0.75	18	**6SL3203-0BB21-8VA1**

Line filter (3AC)

- „S210 like“ housing
- EMC Category: C2 (up to 25m) or C3 (up to 50m)
- (The total cable length of the group needs to be considered - C2: 100m, C3: 250m)
- With Cat. C2, also KC Certificate (for operation in Korea) *)
- 2 Frame sizes, similar to FSA (35A) and FSB (65A)
- Must be directly connected via AC-Bus System to the S210
- System according to UL508A (SSCR 65kA)

EMC filter 3AC, 35A **6SL3203-0BE23-5HA0**
EMC filter 3AC, 65A **6SL3203-0BE26-5HA0**

*) with Firmware V6.3

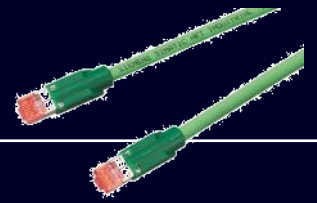
SD Card

- License Storage (e. g. Extended Safety License)
- Parameter transfer in case of drive replacement
- For series commissioning of several identical drives
- With or without Firmware

6SL5970-0AA00-0AA0	**Empty SD card**
6SL5370-0GB00-0AA0	**S210 V6.1 SD card**
6SL5370-0GD00-0AA0	**S210 V6.3 SD card**
6SL5977-0AA00-2HA0	**Safety Ext. License**

Other Accessories such as spare terminals, etc. can be found in catalog D32.

PROFINET Patch cable
for the connection of side-by-side mounted converters



Industrial Ethernet TP Cord, CAT 6A, TP cable 4x2 cores with 2 RJ45 plugs	
0.3m	6XV1870-3QE30
0.5m	6XV1870-3QE50

SIEMENS

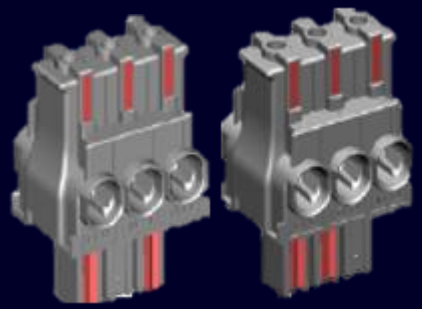
The new SINAMICS S210 Servo Drive System
Peripheral / Optional components

Connector Kit for DC- / AC coupling

1 DC-/AC-Link Package **6SL3260-2DC00-0AA0**

contains:

- 1 connector for DC coupling
- 1 connector for 3 AC supply network
- 2 end caps for the terminals



1 AC-Link Package 6SL3260-2DC10-0AA0 contains:

- **1 connector for 3AC supply network**
- **1 end caps for the terminals**

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Content

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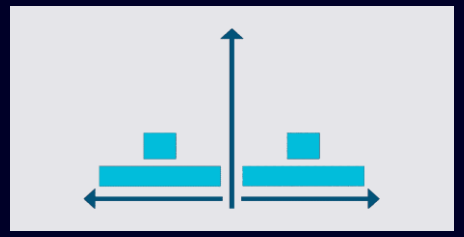
SINAMICS Drive Software
Basic Positioner (**EPOS**) for the new SINAMICS S210

… use powerful drive integrated positioning function!



- ✓ Use **physical units (e.g. mm, °, in, …)** for positioning task
- ✓ Offer **new telegram type 112** for physical unit
- ✓ PLC control with SINAMICS Technology **BasicPosControl**
- ✓ **Easy to use** Basic Positioner **commissioning** with Guided quick startup in Startdrive
- ✓ **Basic Positioner Functionality consistency** across the entire SINAMICS Next Generation portfolio

Traversing block for autonomously positioning

Homing functions & Integrated Jogging

Directly enter setpoint (MDI) from PLC

***SINAMICS Drive Software**
V6.2: S200 PN / S200 Basic PN
V6.3: S200 PN / S200 Basic PN, new S210

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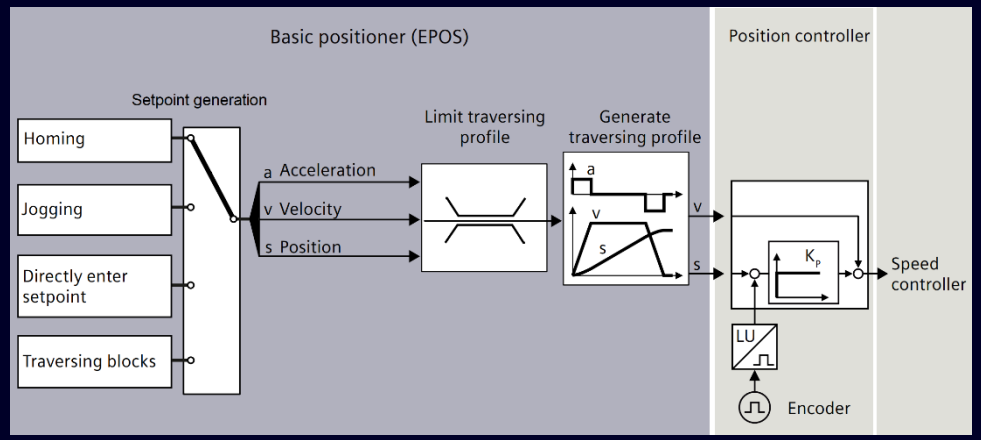
SINAMICS Drive Software
Basic Positioner (**EPOS**) – Features 1

SINAMICS drives offer an integrated positioning function to control the position of the axis, so called **“Basic Positioner (EPOS)”**.

An **"axis"** is a machine or system component that comprises the inverter with active position control and the driven mechanical system.

The **EPOS** in SINAMICS drives, solves extensive positioning tasks independently, without a high-end PLC controller. Two main EPOS functions are:

- ✓ The actual **basic positioner (EPOS)** calculates the traversing profile for the optimum process in terms of time.
- ✓ The subordinate **position controller** controls the position of the axis.



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SINAMICS Drive Software
Basic Positioner (EPOS) – Features 2

SINAMICS Software Version ≤V5.2 SPx:

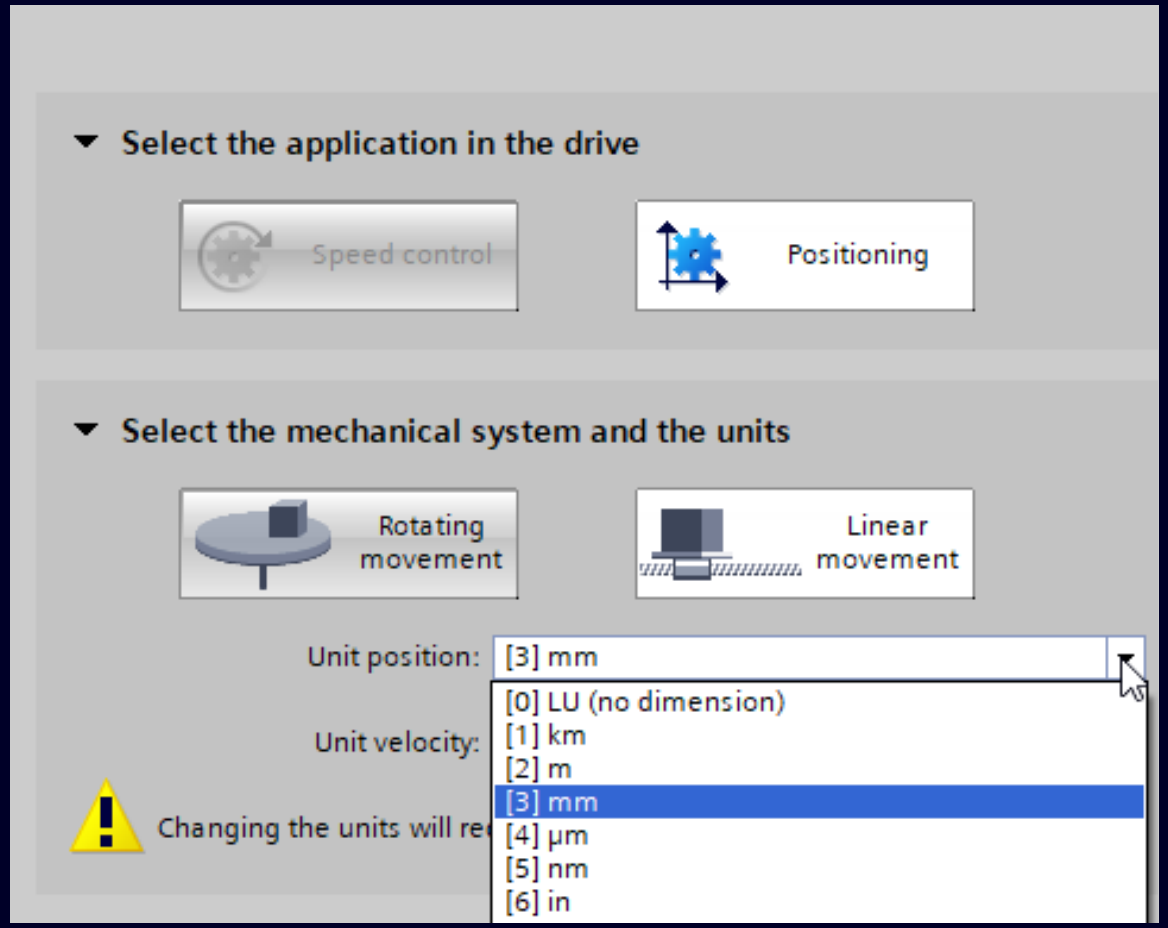
✓ Only Length Units (LU)
Position: LU
Velocity: 1000LU/min

SINAMICS Software Version ≥V6.2:

✓ Physical Units / LU

- Linear movement
  Position: km, m, mm, µm, nm, in, ft, mi, LU
  Velocity: km/h, km/min, m/h, m/min, m/s, mm/h, mm/min, mm/s, in/min, in/s, ft/min, ft/s, mi/h, 1000LU/min

- Rotating movement
  Position: Grad (°), LU
  Velocity: Grad (°)/s, 1000LU/min



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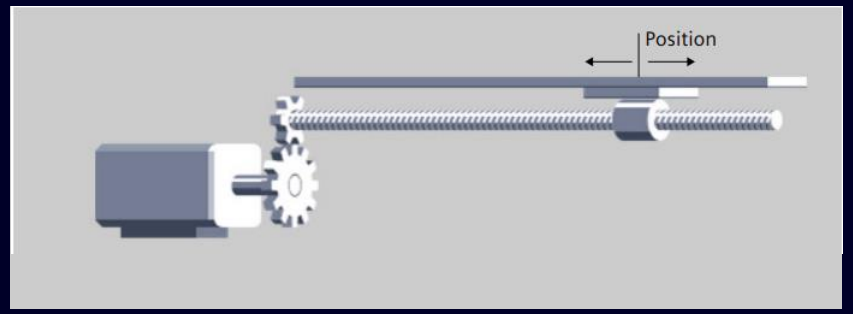
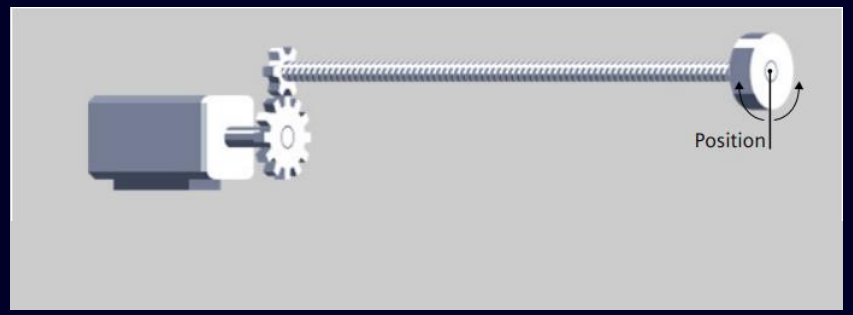
SINAMICS Drive Software
Basic Positioner (**EPOS**) – Features 3

The basic positioner (EPOS) offers the following mechanics systems:

✓ Positioning of linear axes:
A linear axis is an axis whose traversing range is limited in both motor directions of rotation by the mechanical system of the machine, e.g. stacker crane, lifts, gate/door drives, conveyor belt and roller conveyor



✓ Positioning of round / modulo axes:
A modulo axis is an axis with an infinite traversing range, e.g. rotary table, tilting stations



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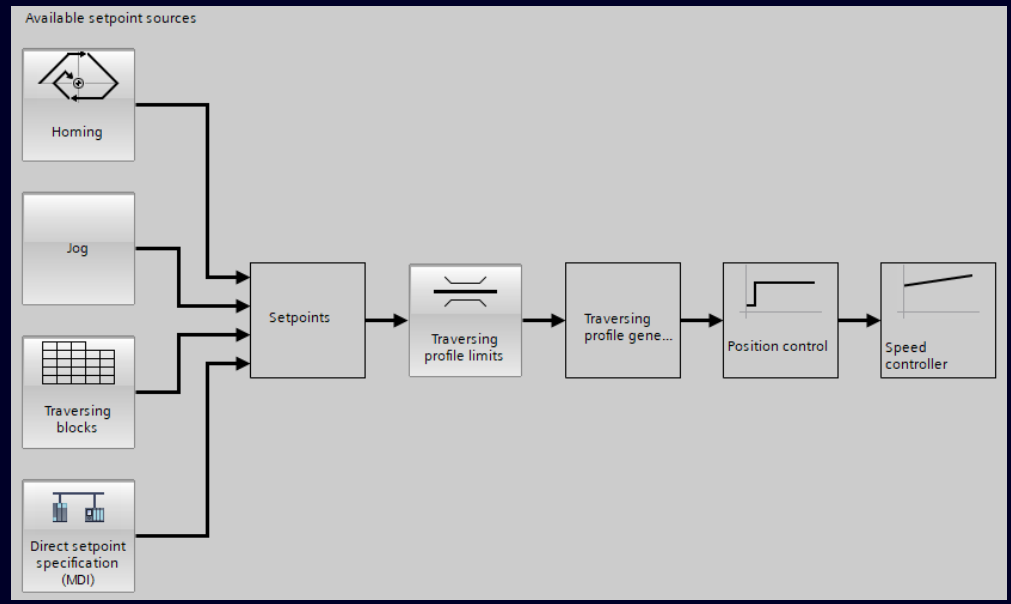
SINAMICS Drive Software
Basic Positioner (**EPOS**) – Features 4

The Basic Positioner (EPOS) has the following operating modes:



Homing:
Homing establishes the reference of the position measurement in the inverter to the machine.

Jogging:
This function is used to incrementally traverse the axis (e.g. for setting up).

Select the traversing blocks:
Position setpoints are saved in different traversing blocks in the inverter. The external control selects only a stored traversing block. Everything else is taken over autonomously by the inverter.

Direct setpoints specification (MDI):
The external control specifies the position setpoint, incl. traversing profile for the axis. There is no storage in the inverter. New target values should be specified by the higher-level controller for each new motion.

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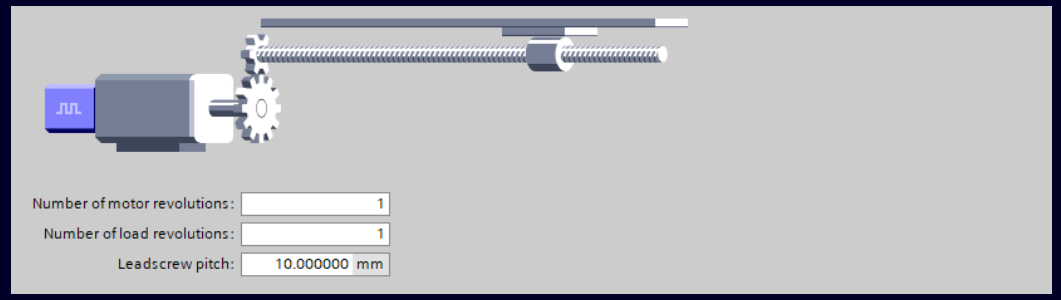
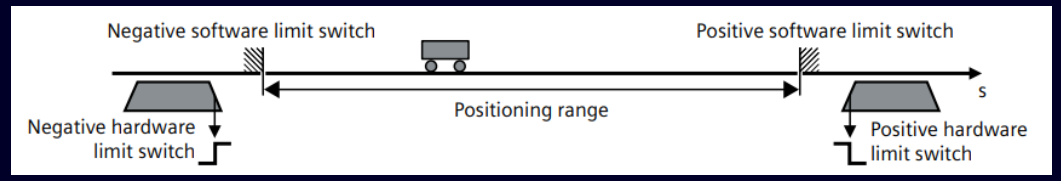
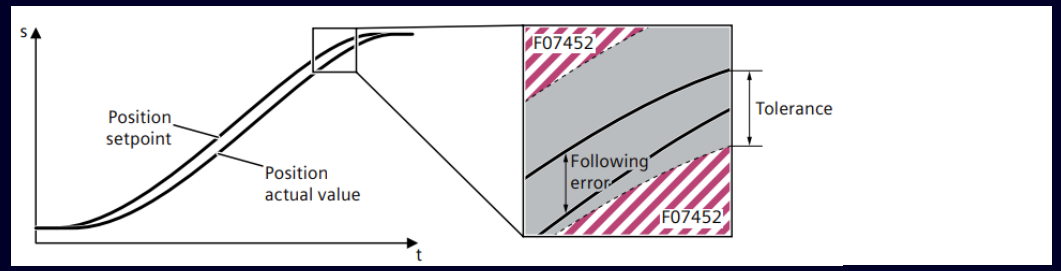
SINAMICS Drive Software
Basic Positioner (**EPOS**) – Features 5

The basic positioner offers the following adaptation and monitoring options:

- Mechanical system
  Load gearbox, Modulo, Backlash compensation
- Limits
  Position limits, Dynamic limits, Jerk limiting
- Monitoring functions
  - Following error monitoring, Position/standstill monitoring
- Travel to fixed stop (only for Traversing blocks)







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Field of application
Motion Control functions and typical applications

Integration of motion functions

S7-1200

S7-1500

S7-1500 T-CPU

Kinematics functions (with up to 6 interpolating axes, conveyor tracking)

- Cartesian portals
- Roller pickers
- Delta pickers
- SCARA robots
- Articulated arms, …

Coordination (synchronous operation, cams)

- Machines with a very high number of axes
- Synchronized axes (also cross-PLC)
- Cross cutters
- Flying shears, ...

Positioning
Speed setpoint

- Palletizers, ...
- Hoisting + vertical conveyors
- Feeder + door control systems
- Conveyor belts
- Auxiliary drives, ...

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Advanced Controller – SIMATIC S7-1500
Overview Motion Control functionalities (extract)

Integration of motion functions

S7-1500

S7-1500 T-CPU

Kinematics functions

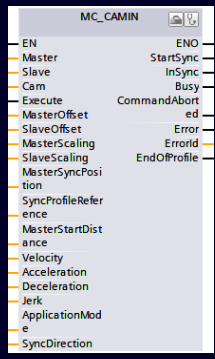
Camming
Gearing

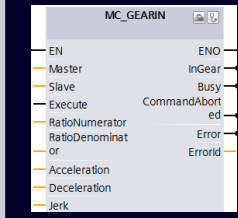
Positioning

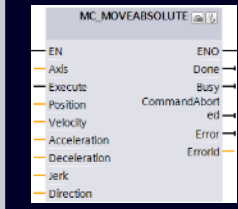
Speed setpoint

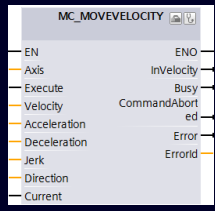
Output cams
Measuring input

- Kinematics with conveyor tracking (T-CPU only)
- **Kinematics with up to 6 interpolating axes** (T-CPU only) **New**
- Cross-PLC synchronous operation (T-CPU only)
- Leading value coupled correction profiles on the following axis (T-CPU only)
- Camming (T-CPU only)
- Coupling onto actual values (T-CPU only)
- Gearing - With synchronous position (T-CPU only)
- Gearing - Without synchronous position
- **Velocity gearing** (T-CPU only) **New**
- Encoder switch over to 2nd – 4th encoder (T-CPU only)
- Specification of motion vector from application (T-CPU only)
- Move axis to relative/absolute position or superimposed during active motion
- Cyclic interface for torque data
- Moving an axis with torque limiting
- Homing absolute and on the fly, Setting a position
- Traversing an axis with speed setpoint
- Enabling/disabling an axis
- Activating output cams and cam tracks and measuring inputs
- …









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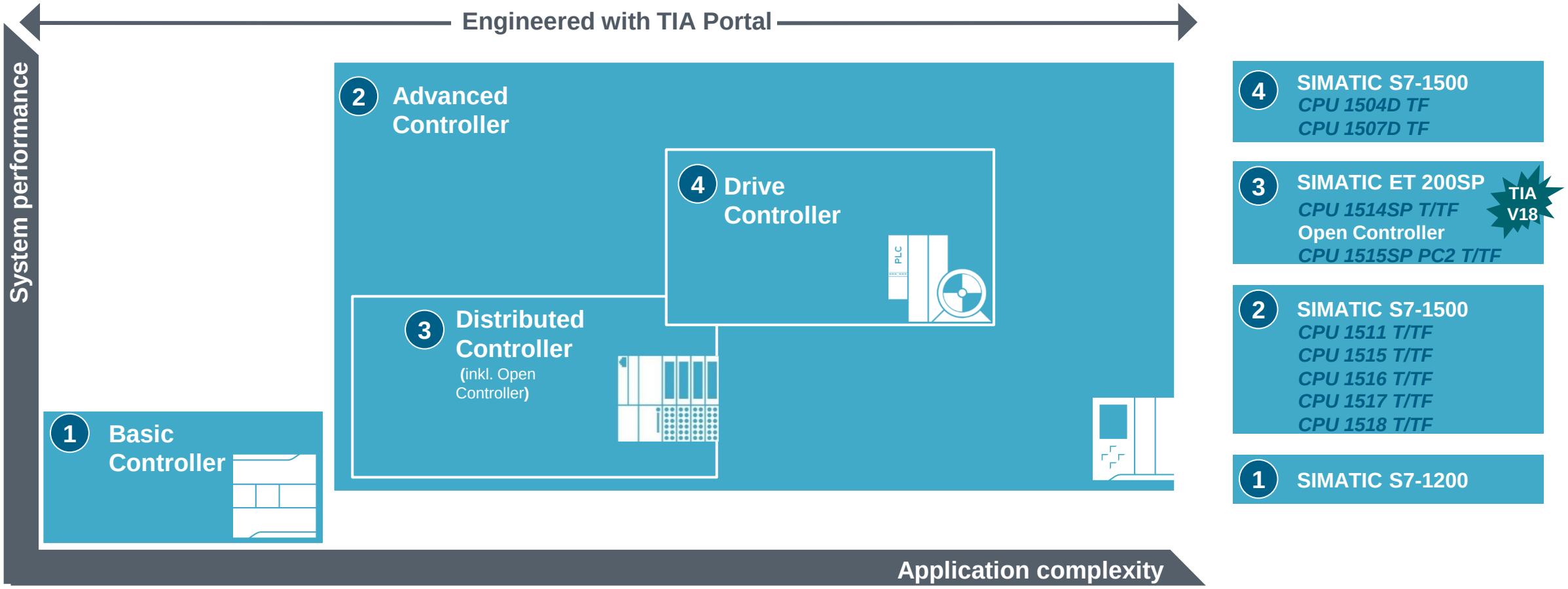
The SIMATIC Controllers Portfolio

Always the right controller – Plus integrated added value!



Efficient engineering	Innovative design	Reliable diagnostics	Safety integrated	Security integrated	**Technology integrated**

SIEMENS

Advanced Controller – SIMATIC S7-1500 T-CPU
Overview in comparison to standard controllers

Motion Control functionality

Performance (TIA Portal V18)			SIMATIC S7-1500 Controller							Distributed Controller		Drive Controller	
			CPU 1511	CPU 1513	CPU 1515	CPU 1516	CPU 1516T	CPU 1517	CPU 1518	CPU 1514SP	CPU 1515 SP PC2	CPU 1504D TF	CPU 1507D TF
Number Positioning axes	**Typical** [3]		11		11		55	70	140	11	30	12	55
	Maximum [4]		14		30		80	128	192	30	30	40	160
Cross-PLC synchronous operation		Technology											
Kinematics functions		Technology											
Camming		Technology											
Gearing[1] (with synchronous position)		Technology											
Gearing[2] (without synchronous position)		Standard											
Output cam / Measuring input		Standard											
Positioning		Standard											
Open-loop speed control		Standard											

[1] Synchronization with specification of the synchronous position, Velocity gearing
[2] Synchronization without specification of the synchronous position
[3] At 4 ms Servo/IPO cycle time and 35 % CPU load due to Motion Control. Estimated values are subject to implementation of use case.
[4] No further TO's applicable

SIEMENS

Advanced Controller – SIMATIC S7-1500
CPU Portfolio has been enlarged by T-CPU

	Standard CPU						Technology CPU				ET200SP Open Controller	
CPU-types	**1511F-1 PN**	**1513F-1 PN**	**1515F-2 PN**	**1516F-3 PN/DP**	**1517F-3 PN/DP**	**1518F-4 PN/DP**	**1511TF-1 PN**	**1515TF-2 PN**	**1516TF-3 PN/DP**	**1517TF-3 PN/DP**	**1514SP T/TF-2 PN**	**1515SP PC2 T/TF PN**
Interfaces	1 1	1 1	1 2 1	1 2 1 ■	1 2 ■ 1	1 2 ■ 1 3	1 1	1 2 1	1 2 ■ 1	1 2 ■ 1	1 2 1	1 3 1
Program / Data memory	150/225 KB 1 MB	600/900 KB 2,5 MB	1/1,5 MB 4,5 MB	2/3 MB 7,5 MB	2/3 MB 8 MB	6/9 MB 60 MB	450 kB 1,5 MB	1,5 MB 4,5 MB	3 MB 7,5 MB	3 MB 8 MB	900 kB 3,5 MB	3 MB 7,5 MB
Bit-Performance	25 ns	25 ns	30 ns	6 ns	2 ns	1 ns	25 ns	6 ns	10 ns	2 ns	6 ns	10 ns
Functions							Display, S7-1500 backplane bus				ET 200SP backplane bus (no isochronous mode)	
Positioning axes												
• **Typical**[2]	5	5	7	7	70	128	11	11	55	70	11	30
• **Maximum**[3]	14	14	30	30	128	128	14	30	80	128	30	30
Motion Control Ressources[4]	800	800	2.400	2.400	10.240	10.240	1.120	2.400	6.400	10.240	2.400	2400
Extended Motion Control Ressources[5, 6]							90	120	192	256	120	120

1 PROFINET IO with IRT 2 PROFINET IO with RT 3 PROFINET Basic communication ■ PROFIBUS

1 50 MB additional memory for ODK application | **2** At 4 ms Servo/IPO cycle time and 35% CPU load due to Motion Control, Estimated values are subject to implementation of use case.
3 No further TO's applicable | **4** Ressources for Motion Control technology objects: Speed setpoint = 40 | Positioning = 80 | Gearing = 160 | Output cam = 20 | Output camtrack = 160 | Measuring input = 40
5 Ressources for Extended Motion Control technology objects: Cams = 2 | Kinematics objects = 30 | **6** 1514 T/TF, 1515 T/TF: Maximum 1 kinematic object is recommended

SIEMENS

Advanced Controller – SIMATIC S7-1500 CPU

Increase productivity with the ultimate power

Security Integrated

- Integrated copy and know-how protection function protect intellectual property
- Improved access protection (authentication)

Safety Integrated

- A controller for standard and fail-safe tasks
- The high-density channel can be directly addressed during the engineering

High Performance

- Higher productivity and product quality thanks to the backplane bus and shortest reaction times
- PROFINET with deterministic time response ensure reproducibility and precision within µs

Efficient Engineering

- Support of all IEC 61131-3 programming languages (LAD/FBD, STL, SCL and Graph) and of high-level languages such as C/C++ (only for CPU 1518(F)-4 PN/DP MFP and CPU 1515SP PC2 (F/T/TF) through SIMATIC ODK 1500S)

Reliable diagnostics

- The automatic generation of system and user diagnostics enables quick error detection
- Any errors can be quickly localized on-site thanks to 1:1 LED channel assignment for peripheral systems

Technology Integrated

- Motion Control task can be programmed directly in the controller, e.g.
  - Speed-controlled axes, positioning axes, gearing, camming
  - Control of kinematics
  - Cross-PLC synchronous operation
- Implement various technology functions directly with I/O modules (e.g. PWM)

SIEMENS

Advanced Controller – SIMATIC S7-1500 T-CPU

Extended Motion Control functions with TIA Portal V18 and firmware V3.0 [1)]

Additional Motion Control functions

- Gearing and camming
  - Synchronization with specifying the synchro-nous pos. of the leading and following axes
  - Setpoint value coupling
  - Actual value coupling with extrapolation
  - Leading-value-coupled correction profiles on the following axis
  - **Velocity gearing** — New
- Cam profiles (1,000 points / 10,000 points)
- Cross-PLC synchronous operation
  - Synchronisation between axes on different CPUs
- Kinematic functions
  - **Control of kinematics with up to 6 interpolating axes** — New
- SIMATIC Safe Kinematics V2.0
  - Optional fee-based system library for safe motion monitoring in the cartesian space

Integrated editors and viewers

- Kinematics configuration
- Kinematics trace
- Cam profile editor with extended diagnostics
- Coordination of traces in different CPUs
- **Long-Term traces** — New

Hardware innovations

- SIMATIC S7-1500 T-CPUs
  - **CPU 1511T, CPU 1511TF** — Upd
  - **CPU 1515T, CPU 1515TF** — Upd
  - CPU 1516T, CPU 1516TF
  - CPU 1517T, CPU 1517TF
  - CPU 1518T, CPU 1518TF
  - **CPU 1514SP T, CPU 1514SP TF** — New
  - CPU 1515SP PC2 T/TF
  - CPU 1504D TF, CPU 1507D TF
- Standard-, Safety-plc and Motion Control on one controller

Programming

Consistent and seamless extension of S7-1500 by S7-1500 T-CPU

Web server

Diagnostic pages for Motion Control

[1)] Compared to the standard CPU

SIEMENS

SIMATIC S7-1500 Open Controller

The S7-1500 Controller for distributed, PC-based solutions

Compact PC-based system

- Controller, HMI and Windows applications on one CPU
- Windows applications parallel to automation tasks, e.g. for camera inspection / image transfer
- Optionally with installed visualization software WinCC RT Advanced *)

Robust

- Fanless design
- Wide temperature range (-20 to 60 degrees Celsius)

Motion Control in ET 200SP

- Easily expandable with ET 200SP peripheral modules
- Available in 2 versions
  CPU 1515SP PC2 T
  CPU 1515SP PC2 TF
- Optionally with pre-installed WinCC RT Advanced
  (128, 512 or 2048 Power Tags) *)

SIMATIC ODK 1500S

- Integration of C++ programs
- Calculation of MATLAB algorithms
- Tools and examples for solving your automation task

*) only with Software Controller V21.9

SIMATIC S7-1500 Distributed Controller
The controller especially for midrange Motion Control

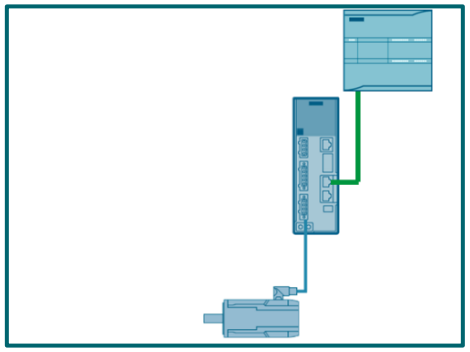
Neu

Distributed Controller SIMATIC CPU 1514SP T/TF

- Powerful technology CPU in the design of SIMATIC ET 200SP
- For the requirements of midrange Motion Control applications
- Same performance in comparison to CPU 1515T/TF-2 PN
- Easily expandable with the extensive portfolio of ET 200SP peripheral modules, including the new PTO2 modules for stepper drives
- Available in 2 versions
  CPU 1514SP T-2 PN
  CPU 1514SP TF-2 PN

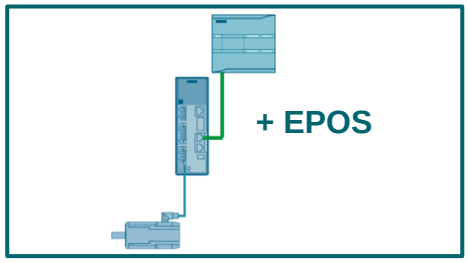
For midrange Motion Control

Additional information about controllers



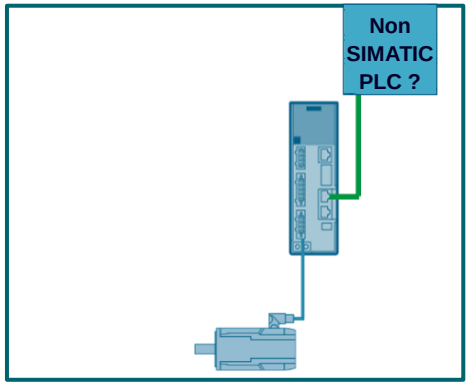
SINAMICS S210 and SIMATIC S7-1200 controller - is that possible?

The combination of S7-1200 with S210 is not in focus due to the runtime of the S7-1200 TO (minimum 10ms) and the non-clocked transmission.
This can result in an non smooth rotation, especially when accelerating and braking. From FW 5.2 a speed filter can be activated in the S210 (parameter p1416) which can improve this behaviour. See also the information on the following page and the SIOS Information Entry-ID: 109757918.
Furthermore, for high-speed motion the performance of the S7-1200 controller may not be sufficient. In addition, a coordinated multi-axis operation is not possible with PROFINET RT.



SIMATIC S7-1200 with EPOS

It is possible to use the S7-1200 in combination with SINAMICS S210 and EPOS (as of Version 6.3) to perform the position control within the drive.



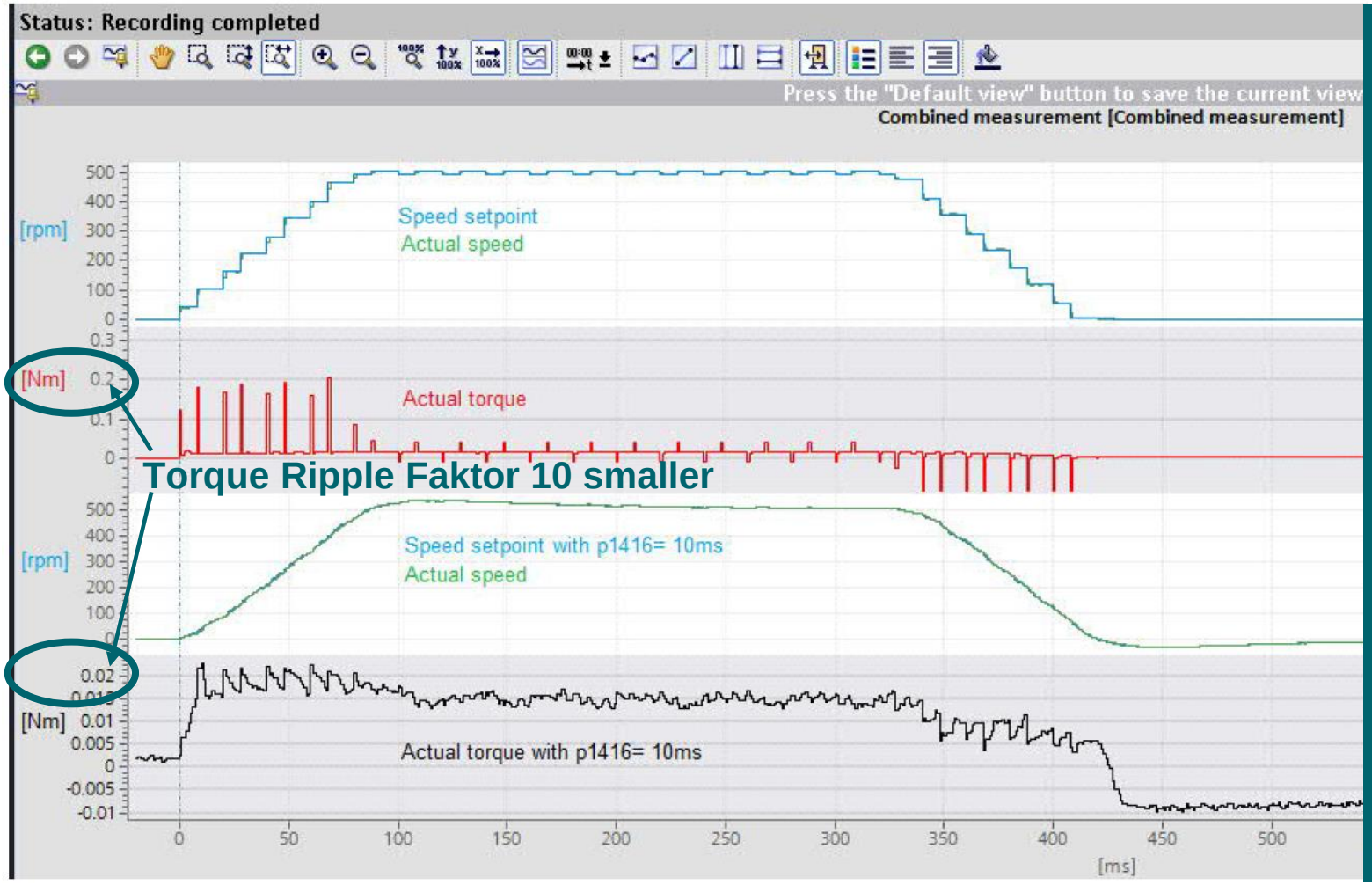
Can the S210 be operated on a non Siemens PLC (via PROFINET)?

Operation with external controllers is possible if the corresponding standard/Siemens telegrams and the Profidrive profile are supported. (speed-controlled operation).
Also here, the controller must perform the motion control functionality.

Operation is also possible using **EtherNet/IP** communication. In combination with EPOS it is now possible to operate together with 3rd party PLCs. Entry-ID: 109824950

SIEMENS

S7-1200 & S210 using PROFINET RT without EPOS
Entry-ID: 109757918



- When using PROFINET RT communication without EPOS it is required to activate setpoint filter 1.
- The only step to get a working speed setpoint filter is to set the filter time in the parameter p1416.
- The parameter p1416 can be achieved via the standard parameter list in the webserver or with Startdrive.

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Content

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Your advantages when using SINAMICS Safety Integrated
Introduction to Safety Integrated

- Powerful safety concepts with short response times
- Simplified verification of machine safety according to ISO 13849 and EN 62061
- No additional hardware components required (contactors, safety relays, etc.)
- Lower wiring costs
- High degree of flexibility – Practical safety and operating concepts can be realized
- High degree of cost effectiveness – Reduction of hardware and installation costs
- Higher availability – Electromechanical switching elements that are prone to faults are eliminated

SINAMICS of **2nd Generation** (SINAMICS G1xx, S1xx & S210)

Certified according

- IEC 61508 **SIL 2**
- EN ISO 13849-1 **PL d and Cat. 3**

SINAMICS of **3rd Generation** (SINAMICS G2xx, S2xx & **new S210**)

Certified according

- IEC 61508 **SIL 3**
- EN ISO 13849-1 **PL e and Cat. 4**

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SINAMICS Safety Integrated for the SINAMICS Drives of the 3rd Generation

New Safety Integrated architecture for SINAMICS S2xx and G2xx

Our SINAMICS helps you …

…to protect personnel, machines and systems!

Always on the safe side with Safety Integrated functions up to SIL3/PL e/Cat. 4.

This includes an online self-test, so there is no need to perform a regularly scheduled manual test stop.

Safety Functionality consistency across the entire 3rd Generation SINAMICS portfolio

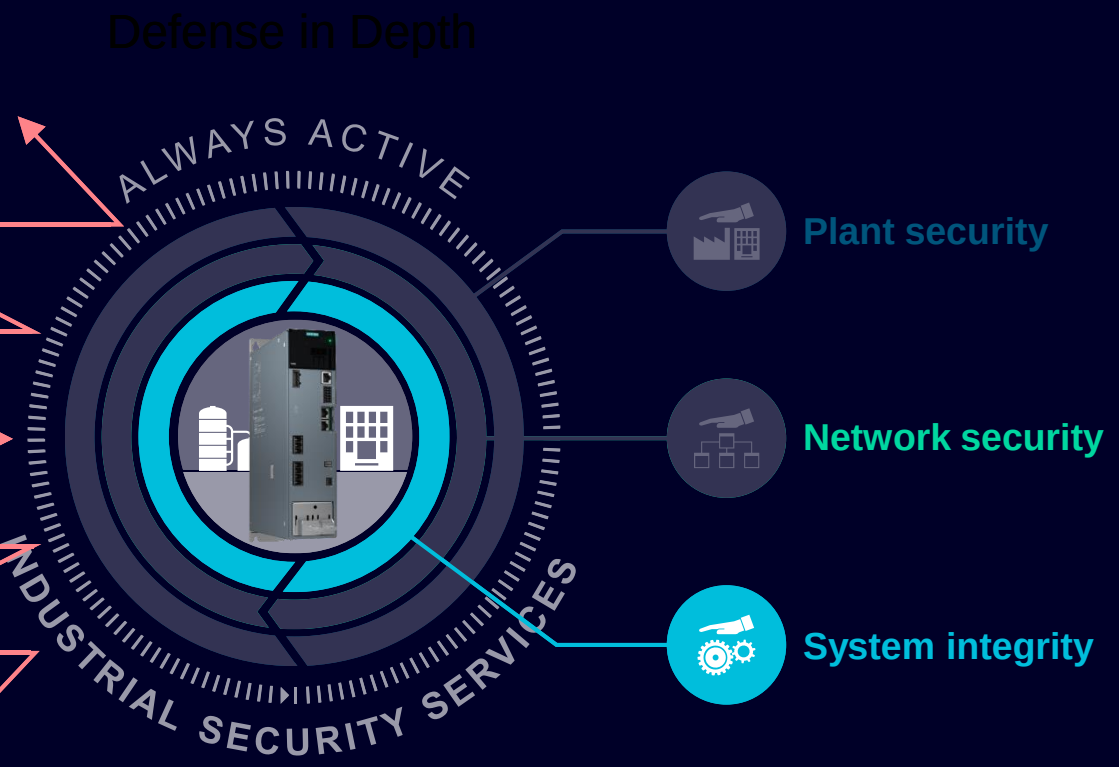
SIEMENS

Master tomorrow‘s challenges today with secure technology

Our SINAMICS helps you …

… secure the access to your automation processes!

- ✓ User Management & Access Control (UMAC) → **protects** your machine from **unauthorized access**
- ✓ Secure default factory settings only necessary functions enabled and **preconfigured with secure settings**
- ✓ Secure communication between **TIA Portal**/Web client and **drive**
- ✓ integrity and authenticity check to **protect** the use of manipulated Firmware



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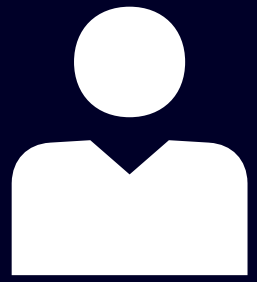
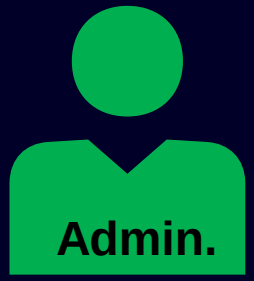
User Management & Access Control (UMAC)

User Management to create User and User Data

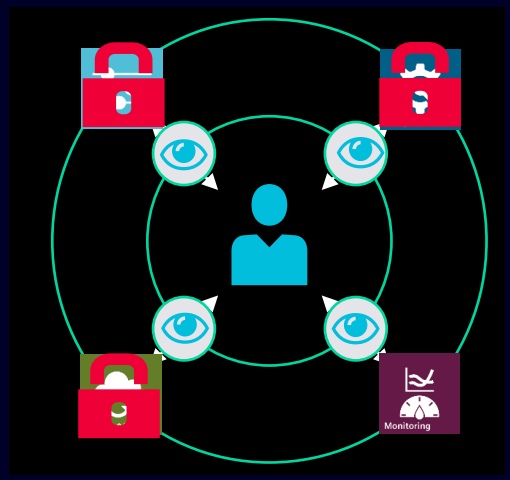
Access Control & Function Rights





Full access (login with Password)

Read only and reset alarms



WHO can do something?

WHAT can someone do?

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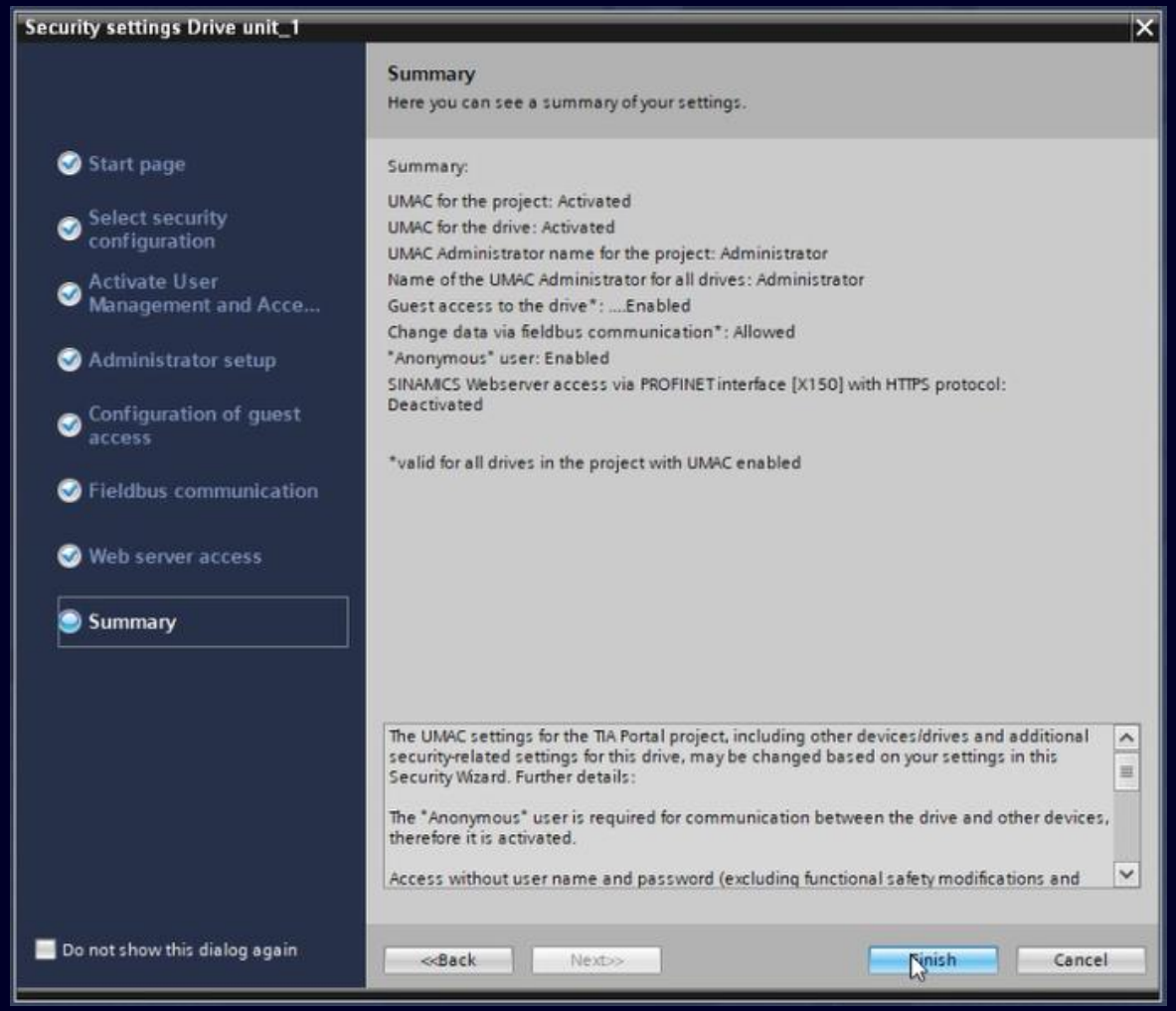
Security Wizzard in TIA-Portal / Startdrive ≥ V18 SP1

Only available for 3rd Generation SINAMICS Drives (S2xx, G2xx)



- ✓ **Configuration:** Start with the Security Wizzard
- ✓ **Select Configuration:** New, Edit or Copy existing
- ✓ **UMAC:** Activate User Management & Access Control
- ✓ **Admin config.:** Document User Name & Password
- ✓ **Guest Config.:** No authentication required! Read only, acknowledge events
- ✓ **Fieldbus Communication:** required so the PLC can talk to the drive.
- ✓ **Web Server Access:** to allow also via PN communication
- ✓ **Summary:** Overview of the actual settings → **FINISHED!**

SIEMENS

Mastering tomorrow's challenges today with secure technology!

Our SINAMICS support you to secure the access to your automation processes!

• **Safe factory setting.** Only necessary functions are activated and preconfigured with safe settings.	**We make it as easy as possible for you!**
• **User Management & Access Control** (UMAC) → Protects your device from unauthorized access	**You decide who can do what!**
• **Secure communication** between TIA Portal/Web Client and drive	**Makes attacks on the transmitted data more difficult**
• **Integrity and authenticity check** to protect against the use of manipulated firmware	**Brings more security to your system**
• **Security vulnerability management**	**Brings quick help for security breaches**
• **TÜV SÜD** independently certified, secured development lifecycle process	**Enables a safe product life cycle!**

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Content

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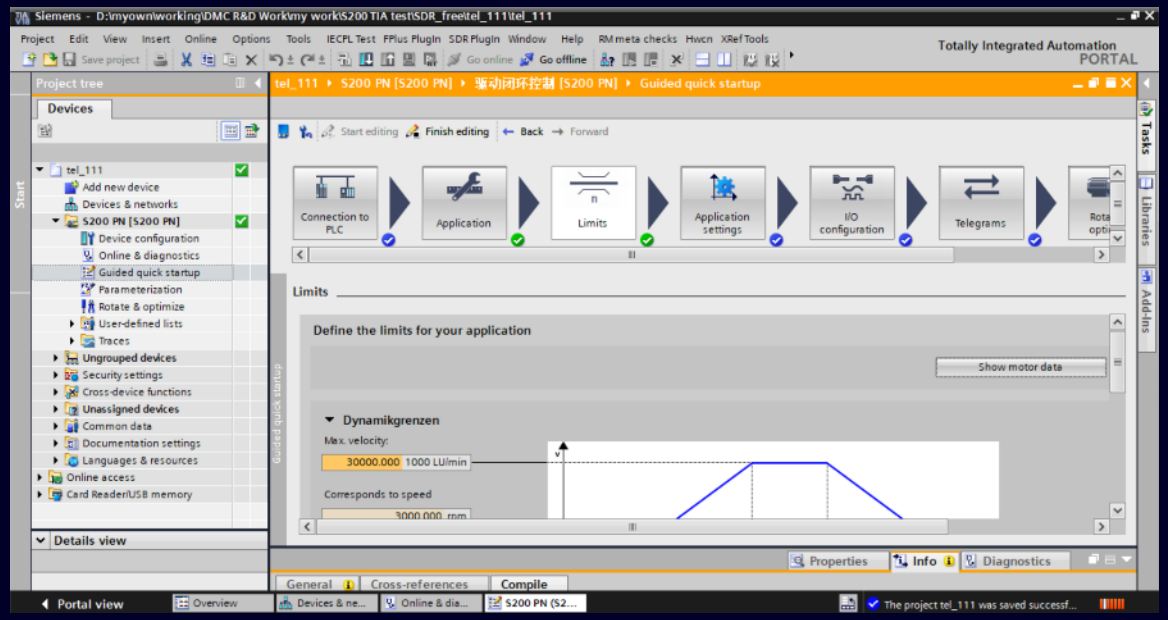
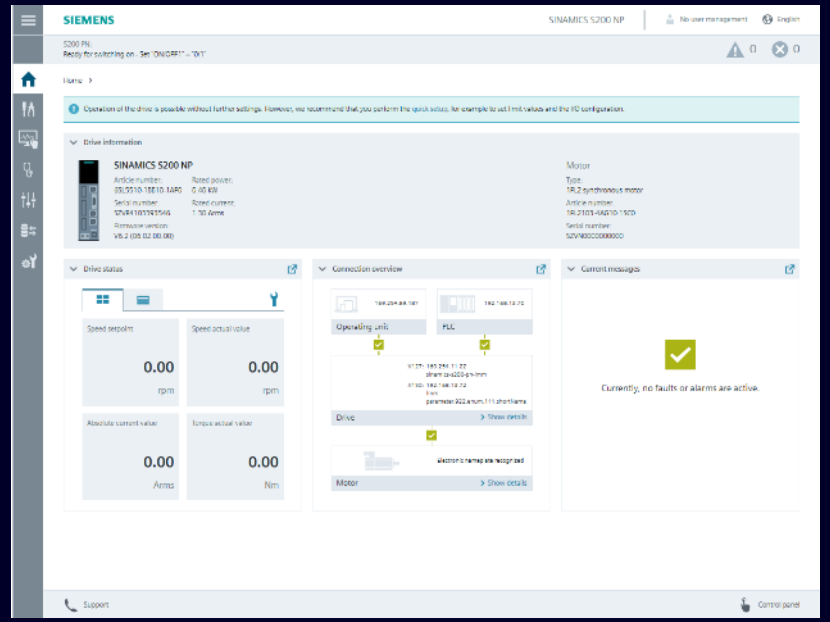
Engineering, Setup, Diagnostics, Service, Monitoring and Operation
Available platforms

SINAMICS Startdrive
(TIA Portal)

Web Application
(Webserver / -client)





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Use case scenarios

Main use case and still valid use case for Startdrive and Web Application

Standalone drive

Main use case: Web Application
- Setup drive quickly without additional software
- Optimize / parameterize drive
- Do application specific settings
- Create a Backup of a commissioned drive

Still valid use case: Startdrive
- commission drive using Startdrive software

\+ **Quick setup without tool installation**

Main use case: Web Application
- Drive monitoring and operation
- Diagnostics (check and analyze messages)
- Service (faults, alarms, firmware update)
- Adjust parameterization

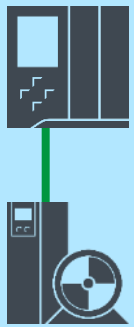
Still valid use case: Startdrive
- Go online with the drive and trace signals, check alarms, adjust parameterization,…

\+ **Fast diagnostics without version dependencies**

Commissioning phase

Operation phase

Networked drive



Main use case: TIA Portal Startdrive
- Configure hardware
- Setup drive (Basic settings, application settings)
- Configure communication to PLC
- Optimize control behavior (Trace)

Still valid use case: Webserver
- First quick check to see if motor is running

\+ **Project scope with ideal component interplay**

Main use case: Web Application
- Drive monitoring and operation
- Diagnostics (check and analyze messages)
- Service (faults, alarms, firmware update)
- Adjust parameterization

Still valid use case: Startdrive
- Go online with the drive and trace signals, check alarms, adjust parameterization,…

\+ **Fast diagnostics without version dependencies**

*Web Application includes panels!

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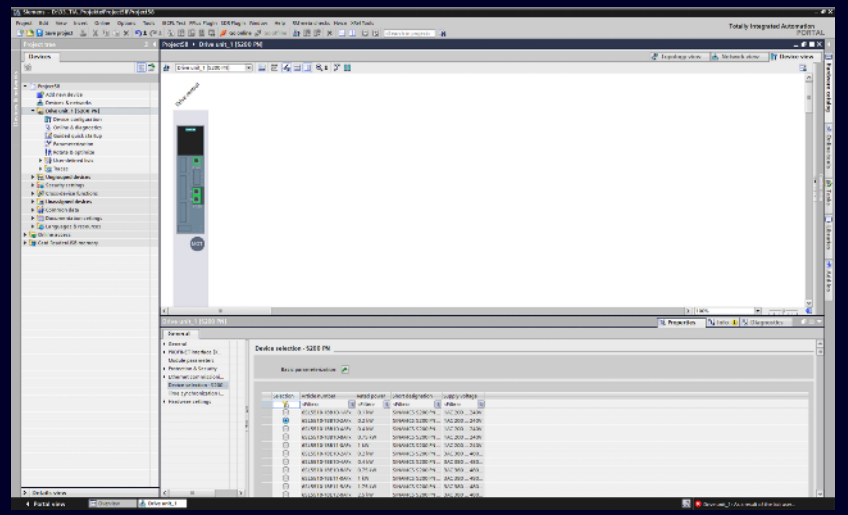
Integration of drives via Startdrive
Works only for SIEMENS drives

What is possible and what are the advantages?



Drive engineering with same look and feel in **one tool** with SIMATIC and HMI and common data handling in **one project**

User friendly optimization, traces and diagnosis in one tool

Simple communication setup and **automatic data exchange** between **SIMATIC** and **SINAMICS** (encoder data, reference values, limitations) for easy motion control setup

Integrated system diagnosis including automatic alarm handling from drive to PLC

Using SINAMICS drives integrated into TIA Portal via Startdrive brings a lot benefits compared to GSDML integration!

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Comparison overview
Startdrive integration vs. GSDML integration

	Startdrive integration	GSDML integration
Engineering	Common engineering tool for PLC, HMI and drives ✓	Different engineering tools for PLC and drives !
Data handling	Common project database for PLC, HMI and drives ✓	Separate projects and storage for automation components !
Communication setup	One entry point for communication setup in TIA Portal ✓	Communication setup necessary on PLC and drive side separately !
Data exchange between PLC and drive for Technology objects	Automatic data exchange (encoder data, reference values) ✓	Double configuration of parameters on PLC and drive side necessary !
Optimization & diagnosis	Simple optimization, traces and common diagnosis in one tool ✓	Optimization and diagnosis in separate tools for PLC and drive !

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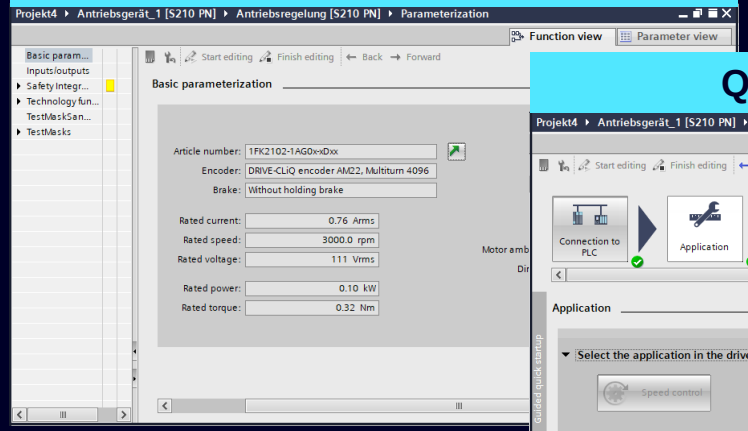
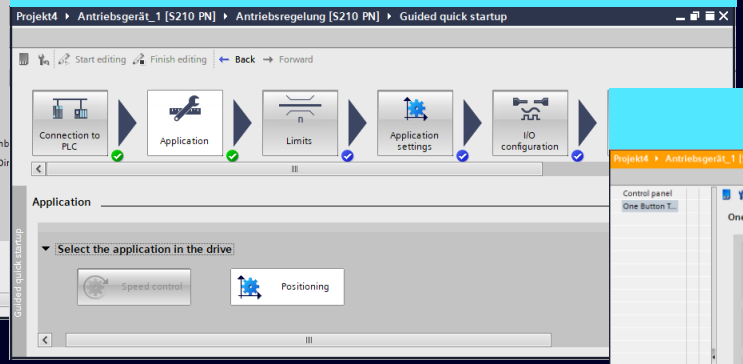
TIA Portal / Startdrive integrated engineering of the new SINAMICS S210
Main functions

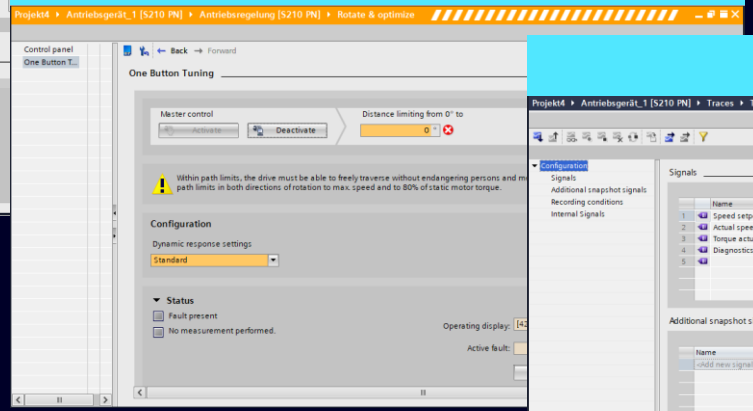
Parameterization



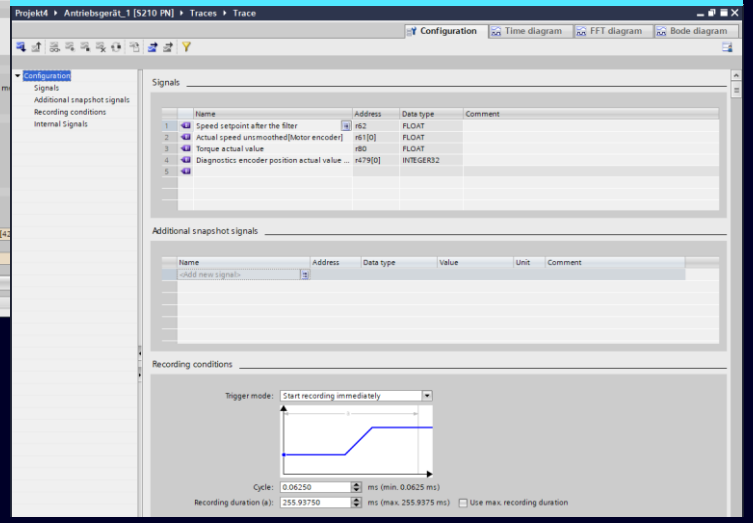
Quick guided setup



Optimization



Trace



- **Automatic optimization**
  with Automatic servo tuning by one-button auto tuning
- Integrated **system diagnosis** including automatic alarm handling from drive to PLC

- **Online and offline commissioning**
- **Parametrization, I/O configuration and technology functions**
  e.g. basic positioner (EPOS)
- **Quick guided setup**
  with seamless and straightforward configuration via innovated quick guided setup of the drive (applications, telegram type, …)

more information

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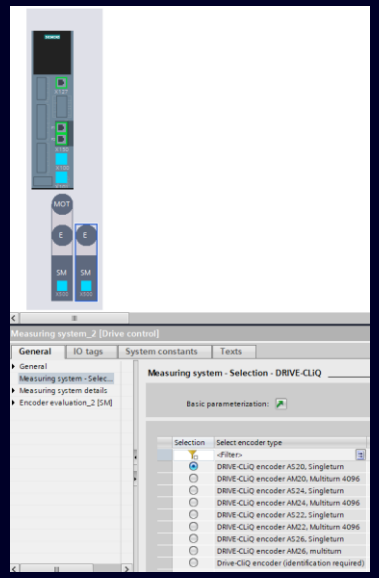
SINAMICS S210
the new features of SINAMICS S210 in Startdrive V19

Usage of 2nd encoder interface

Available from Startdrive V19 and drive version 6.3

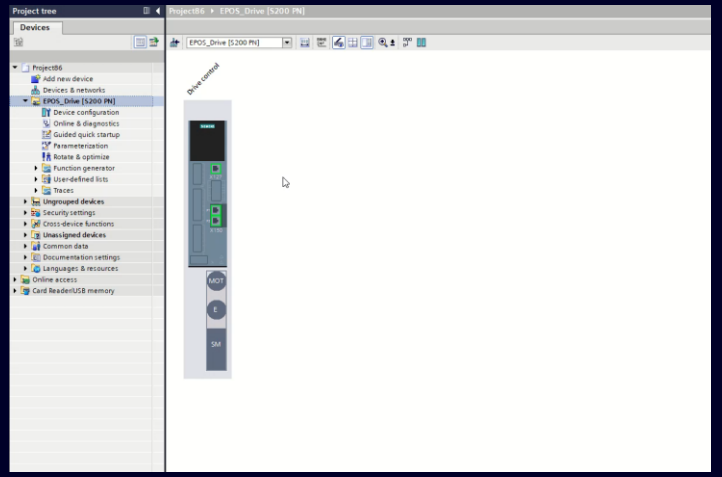
Interfaces:
- X100: always used for motor encoder
- X101: optional for machine encoder

Conditions:
- Only DRIVE-CLiQ encoders supported



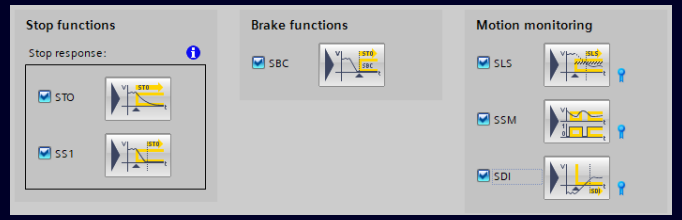
Basic Positioner (EPOS)

Available from Startdrive V19 & drive version 6.3

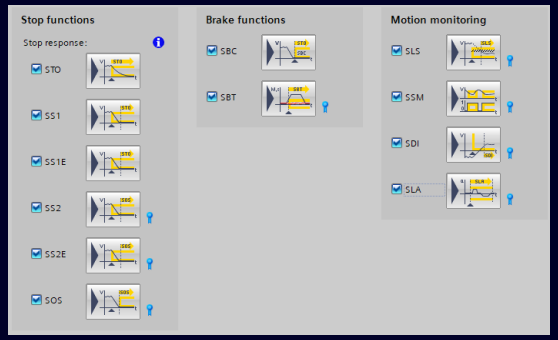


Safety Integrated functions

Safety Integrated functions V6.1 / Startdrive V18 SP1



Safety Integrated functions V6.3 / Startdrive V19



more information

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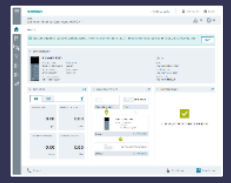
SINAMICS Web Server

The web server comes with the converter over its entire life cycle



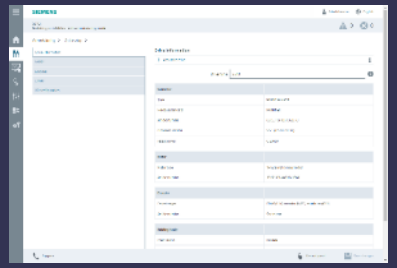
Dashboard (Home screen)

Drive information
Drive status – Connection status – Current Messages

more information

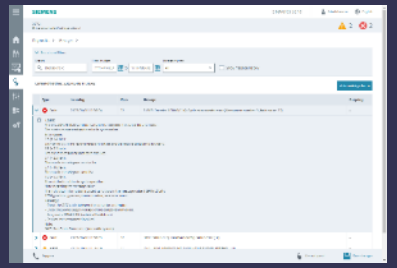
Commissioning

- Quick setup
- Optimization



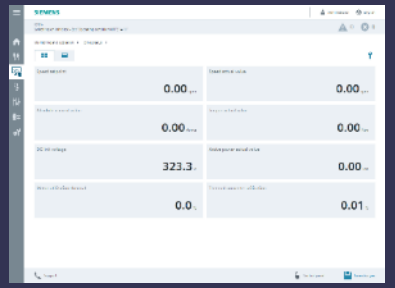
Diagnostics

- Messages
- Diagnostic buffer
- Safety Integrated
- Communication
- Connection overview



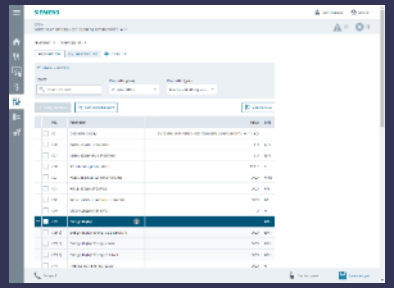
Monitoring & Operation

- Drive status
- Control- /status word
- IO status
- Manual Operation



Service & Maintenance

- Parameter list
- Backup & Restore
- Firmware update
- Interface settings
- Date & Time setting
- User Management & Access Control (UMAC)



Support

- Product specific links to FAQs, Downloads, Manuals,…
- Access to support pages
- Component specific QR-code

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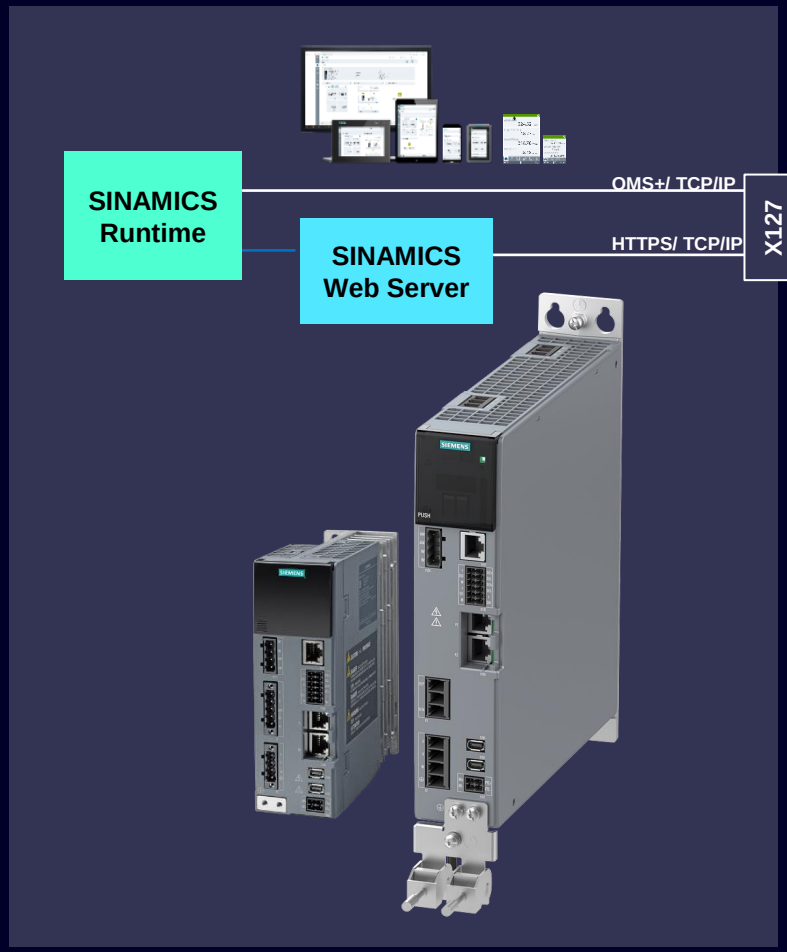
User Interface concept for next generation SINAMICS Converter

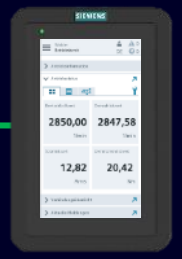
SINAMICS Converter



Service Interface
incl. Power Supply
for SDI Pro and Smart Adapter

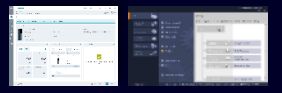
Optional Web Clients (Stationary solutions)

SINAMICS SDI Pro 5.5“



SIMATIC HMI

PCs/ Notebooks



Web Server Startdrive

In preparation

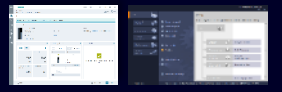
Optional Web Clients (Mobile solutions)

SINAMICS Smart Adapter*

* available soon

Tablets/ Smartphones

PCs/ Notebooks



Web Server Startdrive

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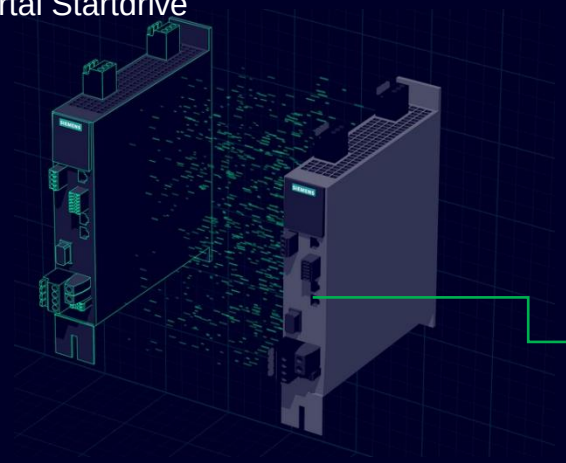
The new SINAMICS S210 System offers a consistent unified digitalization concept to maximized the benefits throughout the chain

1 Planning

Easy selection via
- TIA Selection Tool (TST)
- Siemens Product Configurator (SPC)
- SINAMICS Selector App

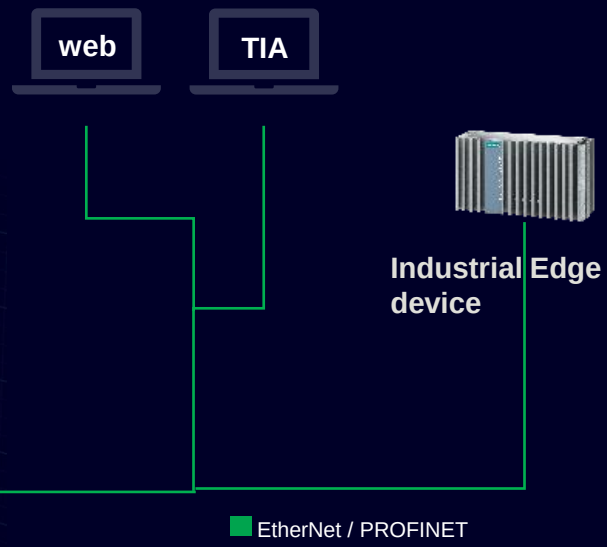
ADVANCED

Virtual Commissioning and testing with the digital twin DriveSim Advanced* available in TIA Portal Startdrive



2 Commissioning & Engineering

Easy commissioning and engineering via **webserver** or TIA Portal with **Startdrive**



3 Optimization & Service

Transfer data to Industrial Edge with Drive System Framework* ** and **monitor/analyze data** with Analyze MyDrives* **

Use data from your production system with the **Industrial Edge platform***

Connect and store data in the cloud

* license required | ** planned in later steps

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SINAMICS Serial Drive Commissioner

The app for even more efficient drive handling in TIA Portal

Create

- Creation of 1:1 copies of a selected drive
- Automatic assignment to SIMATIC controller

Update

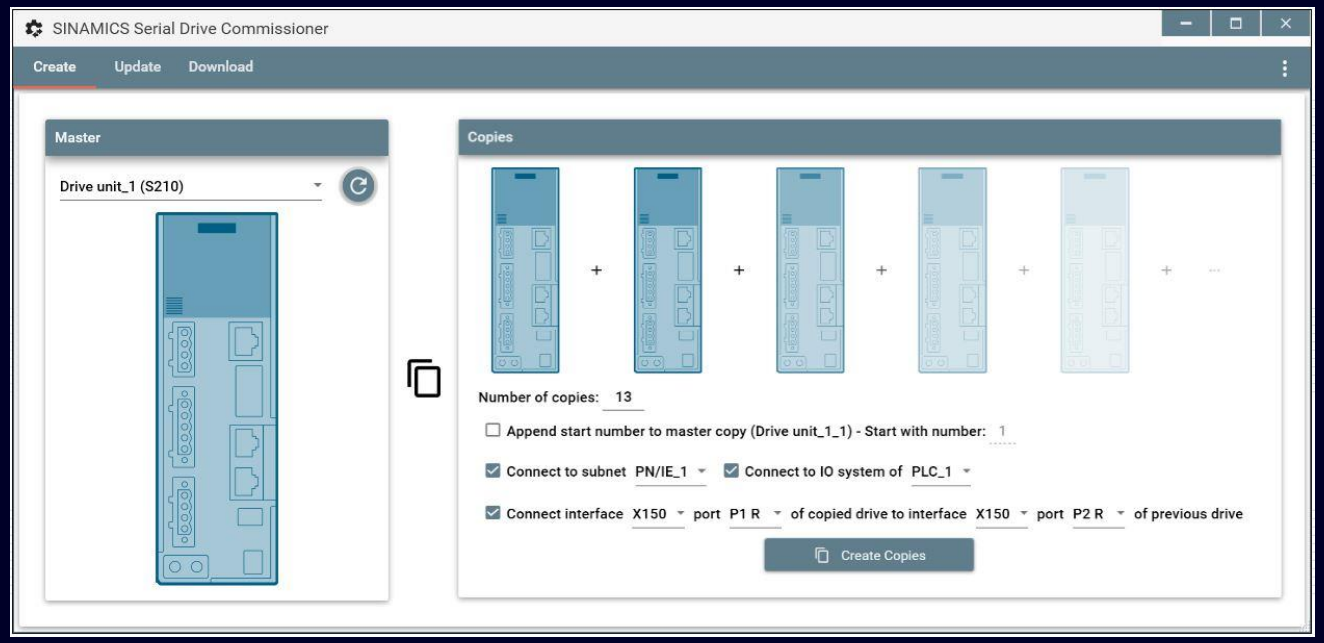
- Transmission of specific drive parameterization to selected drives of identical type

Download

- Download of selected drives including Ram2Rom function and copying of safety parameters

Devices

All SINAMICS single drive devices in Startdrive:
S210 | G110M | G120, G120C, G120D, G120P | G130, G150



SIOS | Startdrive / Openness Application / V1.0

three use cases in one app!

as of TIA V18

SIEMENS

SINAMICS Migration tool is a tool to replace in existing TIA Portal Projects the previous drive generation with the next generation drives. *

Benefits

Easy & Fast ▸ Fast migration of existing TIA Portal Projects including all parameters (as of V18 SP1)

Free ▸ Free download via SIOS

Industry Online Support

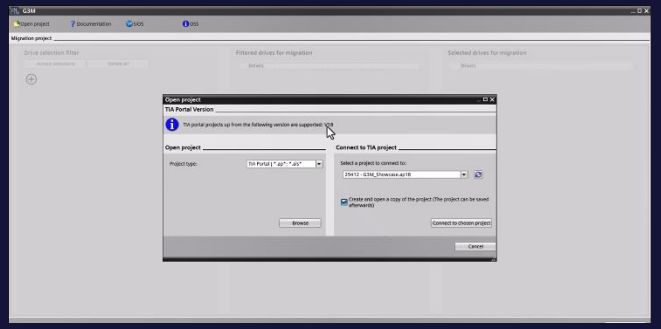
Download | Documentation | Tutorials

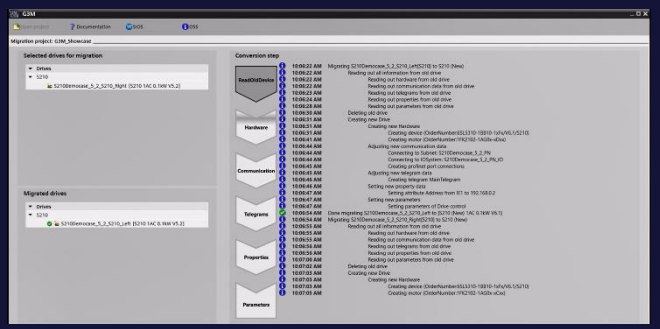
Contact

tech.team.motioncontrol@siemens.com

SIOS page

Start:
TIA Portal Project **V18** with “old” drives → **Select** project, drives and target version of drives → **Run** migration → **End:**
drives with all previous settings & parameters migrated in TIA Portal Project





* first version of SINAMICS Migration tool migrates S210 (V5.2 or V5.2.3) to the new S210 (V6.1), Migration to V6.3 possible with next version of Startdrive

SIEMENS

Easy migration of TIA Portal projects to the new SINAMICS S210

SINAMICS Migration tool is a tool to replace in existing TIA Portal Projects the previous drive generation with the next generation drives. *

Industry Online Support

Download | Documentation | How-to Video in English & German

Contact

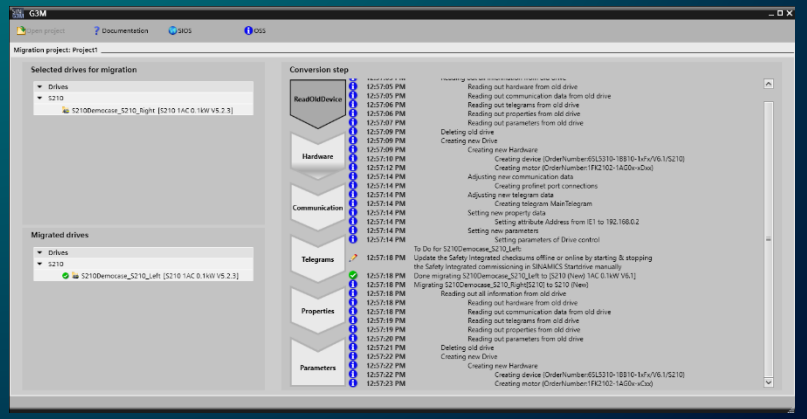
Application Center

tech.team.motioncontrol@siemens.com

Benefits

Easy & Fast ▸ Fast migration of existing TIA Portal Projects including all parameters (as of V18 SP1)

Free ▸ Free download via SIOS



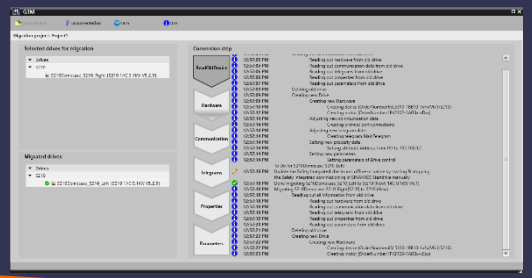
* first version of SINAMICS Migration tool migrates S210 (V5.2 or V5.2.3) to the new S210 (V6.1), Migration to V6.3 possible with next version of Startdrive

SIEMENS

Migration of TIA Portal Project from previous SINAMICS S210 to the new SINAMICS S210 to FW V6.x

Step 1

Use the SINAMICS Migration tool
to migrate from previous SINAMICS S210 (**FW V5.x**)
to the **new SINAMICS S210 FW V6.1**



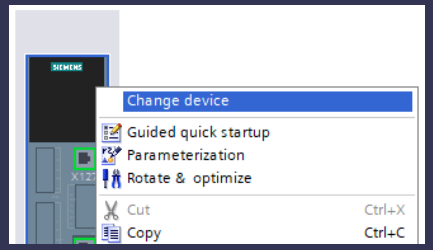
Step 2 and 3: Intermediate solution for Startdrive V19 only!

Step 2

Use the “Offline Version upgrade” to upgrade the drive from **FW V6.1 to FW V6.x**

Usage:
1) Context menu → “Change device”
2) Select new version from Change device dialog

1



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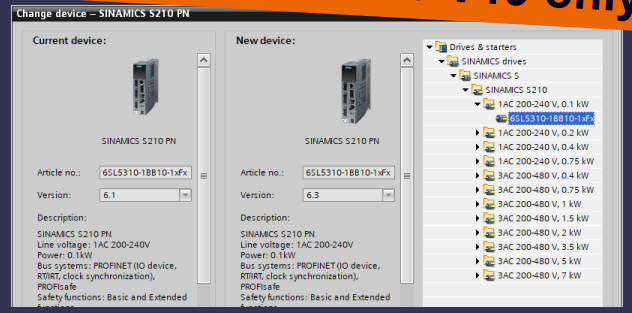

Step 3

Safety Integrated functions

☛ STO, SBC, SS1-t, SS1, SLS, SDI, SSM are already migrated with the Migration tool (part of FW V6.1)

☛ SS2, SOS, SLA and SBT have to be configured **manually**

→ direct migration of SINAMICS S210 in TIA Portal projects from FW V5.x to 6.x will be possible in next steps of Startdrive

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Content

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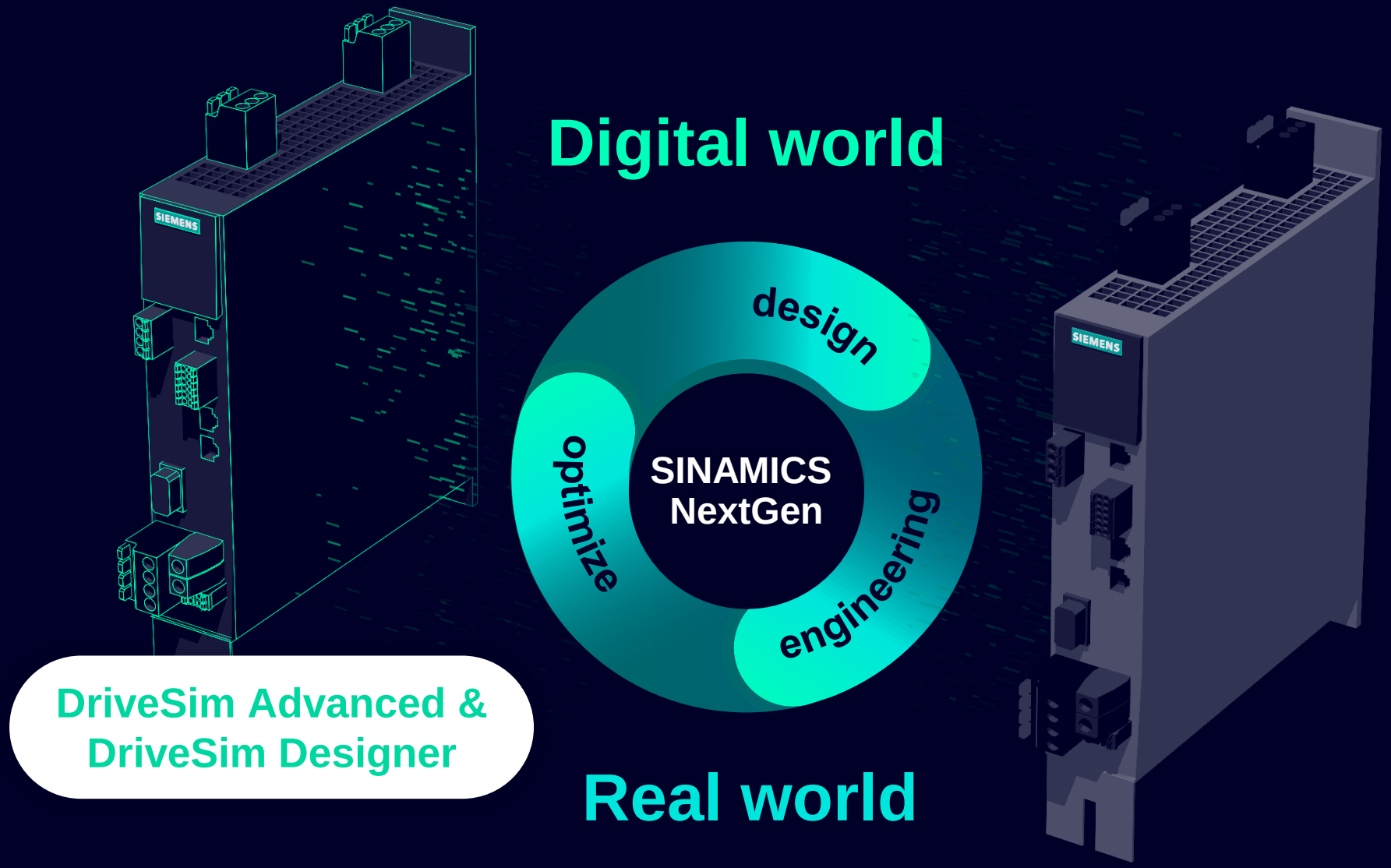
Our DriveSim offering comprises DriveSim Advanced and DriveSim Designer



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Major Challenges in the Design & Engineering Phase

As a machine builder, you might wonder…

… test the product **before building it?**

… test the machine configuration and parametrization **in advance?**

… have **free tests without material damage?**

… do faster the reconfiguration of the system ?

… simulate the **alternative without any hardware?**

… have **education trainings in advance?**

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DriveSim Family Use Cases

This is where DriveSim Designer & Advanced come to play

Virtual demonstration (in advance even before building it or buying)

Better quality through more testing

Optimization of the real machine

Train the engineers and new users by virtual twin, which acts as an realistic partner

Virtual commissioning & engineering of SINAMICS drives (new generation) in advance even before building it or buying

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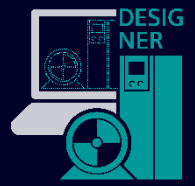
DriveSim Family is a set of powerful digital twins of the SINAMICS drives for design, commissioning and optimization of the drive train system.

We offer two solutions:

DriveSim Designer

Digital twin of the SINAMICS drives, with a **sub-selection of the drive's parameters**, which are same to the real drive. Model-based simulation in time-based simulation programs.



DriveSim Advanced

The virtual SINAMICS: **Complete digital twin of the Next Generation SINAMICS drives**, with all parameters and configurations available, which are same to the real drive. Embedded in TIA Portal and Startdrive.

Benefits:

Speed up time to market	For OEMs by creating a digital twin of the drive train
Reduce testing & integration efforts	And thus time and cost
Validated against real SINAMICS	To guarantee accurate behavior
Cost-effective & efficient way to	Test and optimize drive system
Optimal design	Through multi-dimensional optimalization
Tool independent	Compatible with various standard time-based simulation tools

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Product, feature and use case differentiation within DriveSim Family

	DriveSim Basic & Designer	DriveSim Advanced
Required Domain Expertise	Simulation (Electrical and/or Mechanical)	Drive Technology (SINAMICS, Startdrive, Commissioning and Engineering of drives)
Main	One model (FMU) for ALL SINAMICS drives	One software integrated in Startdrive
Functional and logical part	Sub-selection of the drive's parameters (focus on core features of drive functionality)	Real firmware with target specific modifications and all parameters and configurations
Specifications	As least parameters as possible, with the same meaning as in the real drive	All parameters and configurations as in the real drive
Tools	Tool independent, can be used in any time-based simulation tools (e.g., SIMIT)	Available directly in TIA Portal (with Startdrive) as an add on
Focus on	Validation of the PLC code and drive parameters & Sizing in the design phase	Virtual drive commissioning (Virtual engineering tool directly in TIA Portal)
Communication with the PLC	Connection to PLCSIM Advanced with original telegram content interface	Connection to PLCSIM Advanced with original telegram content interface (coming soon, DSA v2.0)

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Feature and value differentiation between freemium test offering DriveSim Basic with reduced feature scope and paid version DriveSim Designer with full functionality set

	DriveSim Basic	DriveSim Designer
Main	Simple version of the DSD, with the core functions	Full-featured paid version with all functions and parameters
Simulation Model Generator (SMG)	—	✓
Safety telegrams 30 & 31	—	✓
Basic Brake control application examples	—	✓
Position telegram	—	✓
EPOS	—	currently in development
Price	free of charge	with a price tag

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DriveSim Advanced
The digital twin of your drive

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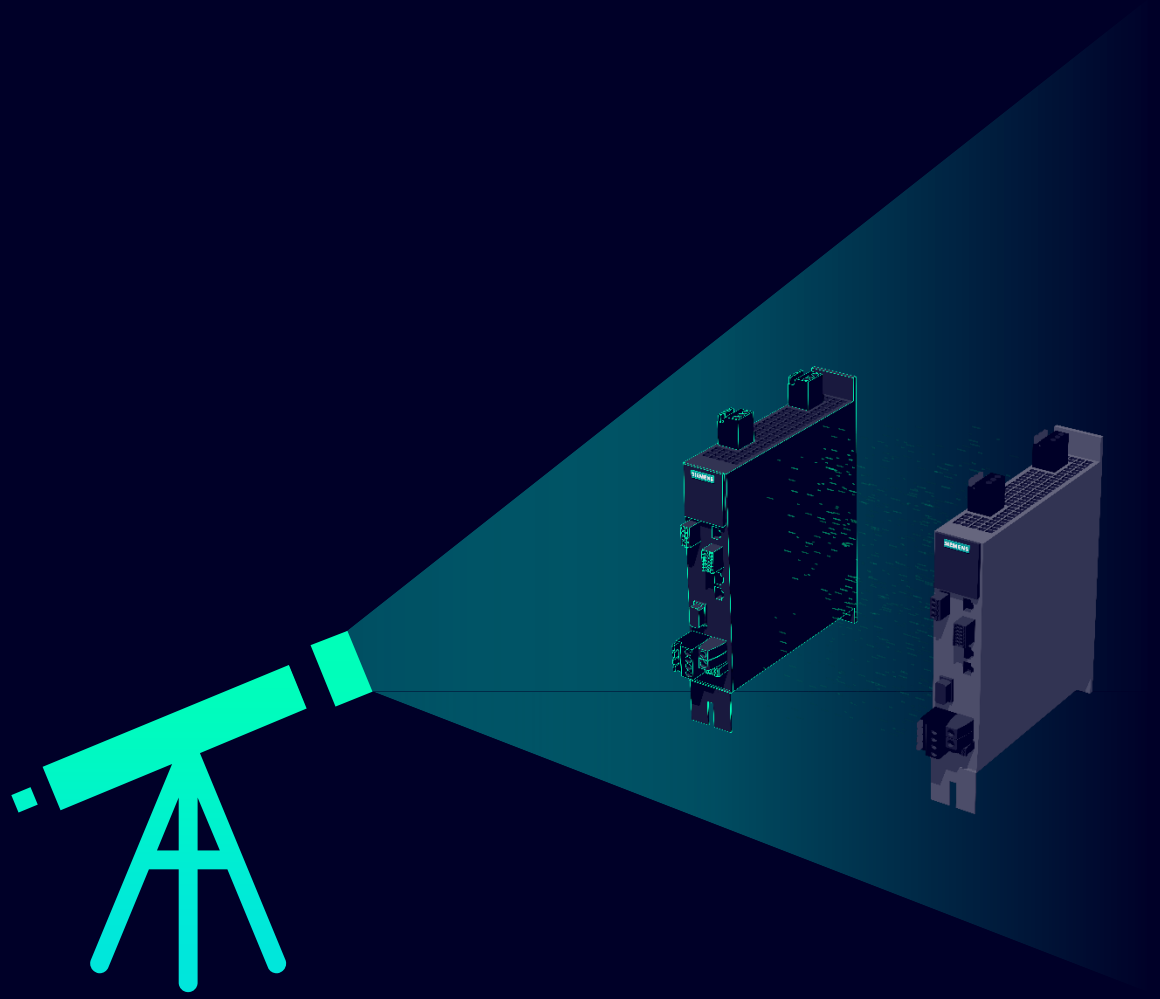
DriveSim Advanced
The real digital twin of your drive



First digital twin of the next Generation SINAMICS Drive's (S210 new, G220 …)

Available in: TIA Portal Startdrive

Functional and logical part of the real firmware

Virtually commission your drive

Handshake to **PLCSIM Advanced – coming soon (DSA v2.0)**

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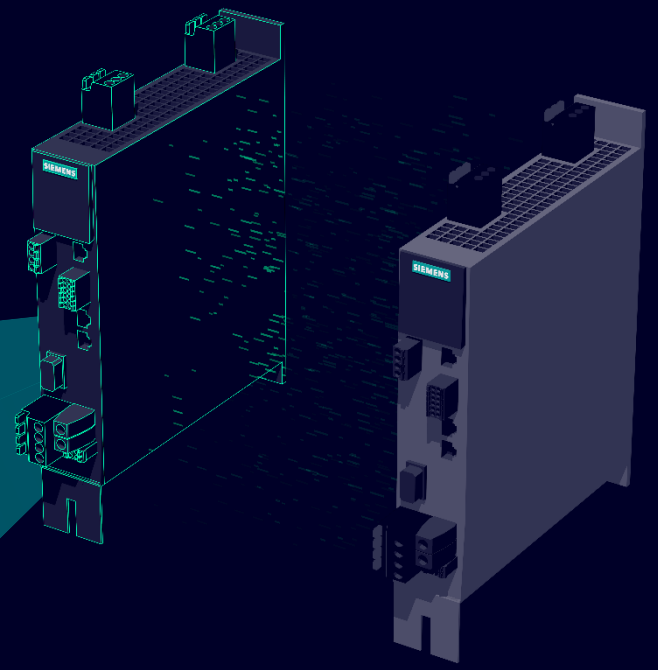
DriveSim Advanced
The virtual SINAMICS for virtual commissioning use cases

DriveSim Advanced shortens **engineering and commissioning times by up to 50%!**



DriveSim Advanced

Virtual SINAMICS: complete digital twin of the Next Generation SINAMICS drives designed to achieve realistic results through virtual commissioning.

DriveSim Advanced is an innovative, software-in-the-loop solution which combines drive simulation and virtual commissioning. With this powerful combination, you can optimize your drive systems, test and validate your projects, ensure that your drive systems are functioning correctly before they are installed, and virtually commission them. And all seamlessly embedded in TIA Portal and SINAMICS Startdrive.

* Website: DriveSim Family
(Please contact us: support.digital.drives@siemens.com)

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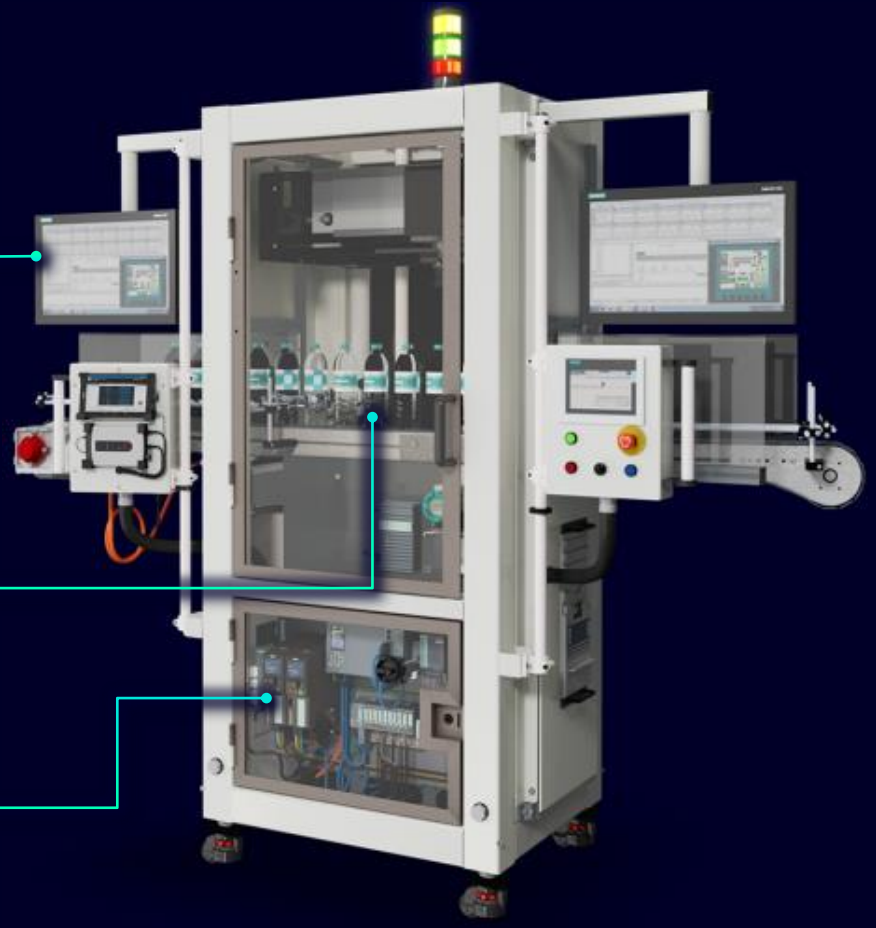
With the digital twin of the machine, every relevant component is represented virtually – DriveSim Advanced

From the real machine …

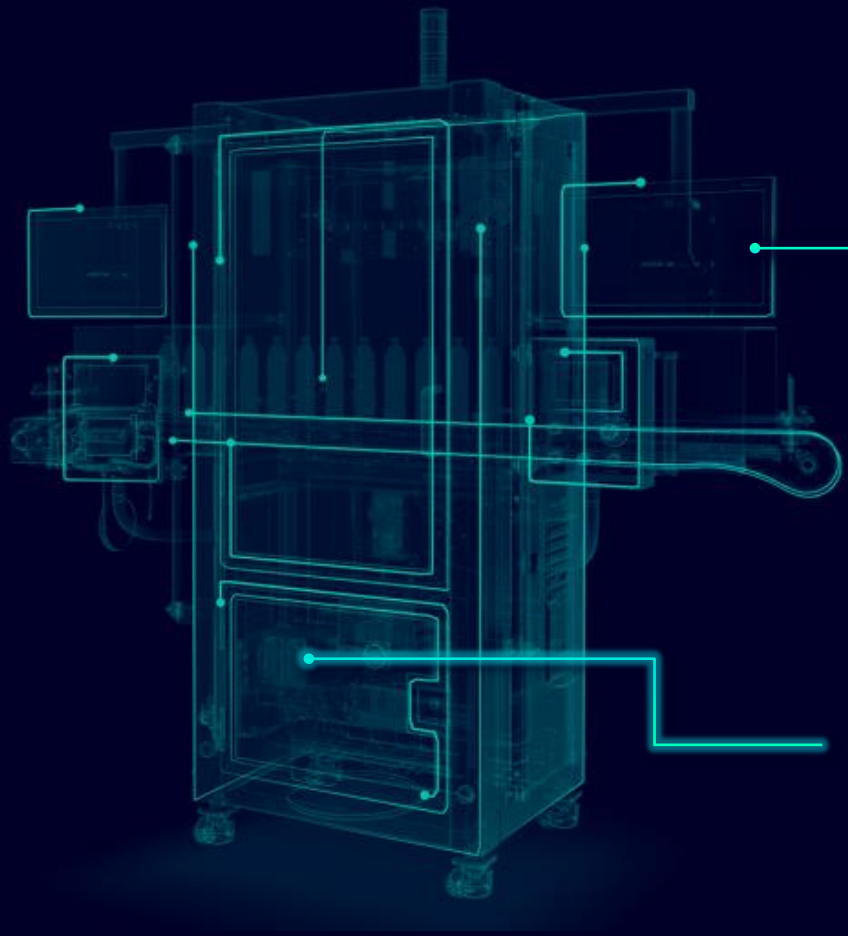
Automation system layer
SIMATIC PLC

Mechanical application layer
Conveyor

Drive Train layer
SINAMICS drives



… to the digital twin of the machine



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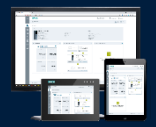
The value proposition of DriveSim Advanced

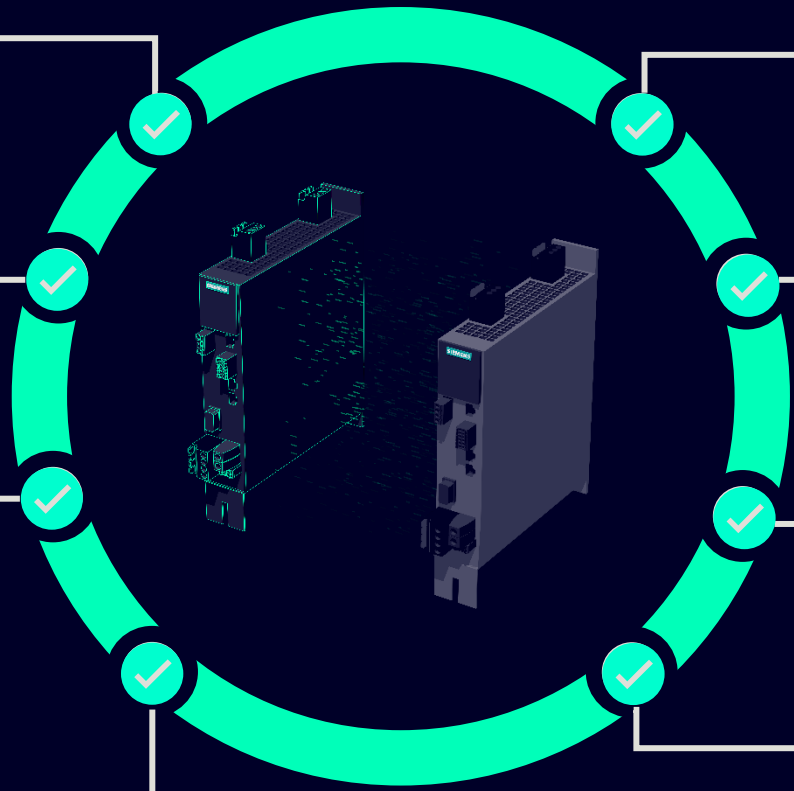
- **Software-in-the-loop simulation**: Complete digital twin of the real firmware of the NextGen SINAMICS drives.

- DriveSim Advanced is integrated into the **TIA Portal (Startdrive).**



- Virtual commissioning of drive systems using a **web server.**

- **Enhance Safety:** Virtual engineering and commissioning reduces the need for onsite visits and improves safety.



- Supports virtual commissioning with **third-party motors.**

- Will support **external mechanics models.***

- **Virtual educational trainings** without any potential harm to the resp. hardware equipment

- Will support a connection to **SIMATIC S7-PLCSIM Advanced** virtual PLC.*

** Will be available soon.*

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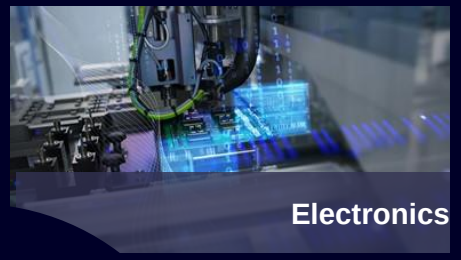
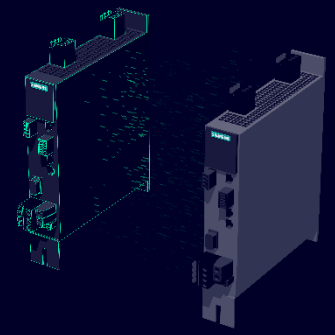
DriveSim Family adds to the value proposition of our SINAMICS drives portfolio and addresses the same focus verticals as each individual converter type





… and many more!

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License options for DriveSim Advanced

Free Test license for 30 days

- ✓ Available as **Single license**
- ✓ Available once per user

Annual subscription

- ✓ **Article number: 9SV1210-3AA00-0AA0**
- ✓ **All releases,** in the given time frame **included**
- ✓ **All updates and hotfixes** in the given time frame **included**
- ✓ Available as **Floating** license

One-time perpetual license

- **Article number: 9SV1210-4AA00-0AA0**
- ✓ Access and usage **only of purchased software** version
- ✓ Minor updates and **hotfixes included**
- ✓ Available as **Single license**

Single license:
Available as one license per device

Floating license:
Available for unlimited number of devices but just one user can use the license at a time

**Please contact us: digitalization.drives@siemens.com*

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DriveSim ordering process

1. Go to SiePortal
2. Select the license you need
(annual subscription; one-time perpetual license, trial)
3. Find the product you need by article number
4. Order a license
5. After purchase of the license, you will automatically get an email from the OSD (Online Software Delivery)
6. Download and activate the license with the steps described in the email
7. After successful activation of the license go to the Support SIOS page of SINAMICS DriveSim Advanced or Designer
8. Select the right version of the Software and download it

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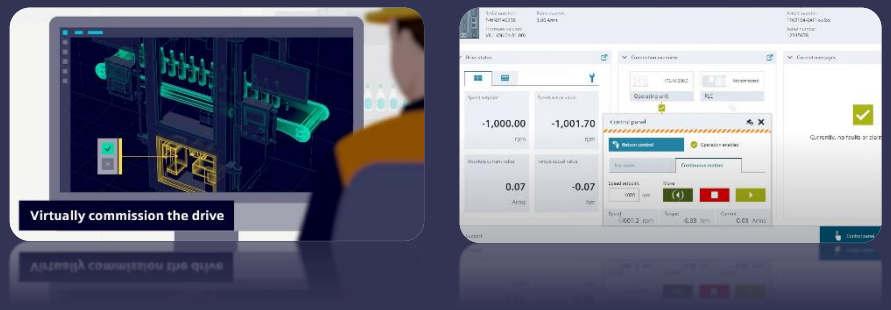
DriveSim Advanced
Useful content and additional information

Additional information

Documentation

- Manual DriveSim Advanced

Video materials



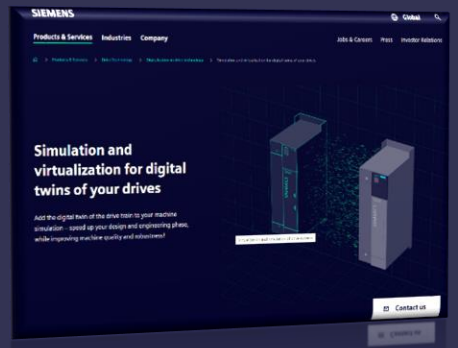
How to videos:

- DriveSim Advanced - Virtual commissioning of **S210** new drive
- Commissioning of a SINAMICS **S210** drive using the webserver

Links

Website:
SINAMICS DriveSim Family

Siemens Industry Online Support (SIOS):
Find more information on SIOS (EN)



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DriveSim Basic & Designer
The digital twin of your drive

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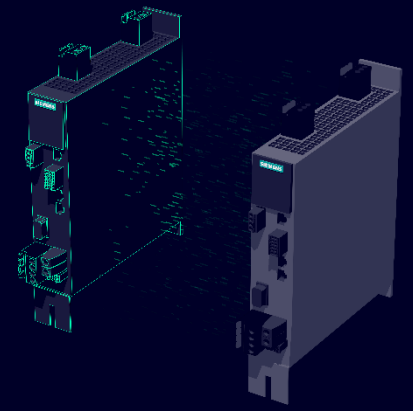
DriveSim Designer
The missing puzzle piece for your comprehensive simulation model



DriveSim Designer

An expert tool for creating a comprehensive simulation model with special needs for sizing and simulating the drive system behavior.

With the flexible and model-based simulation software DriveSim Designer, you can simulate, adapt, and optimize specific drive combinations and their behavior in complex machines and systems even before a definitive drive selection has been made.

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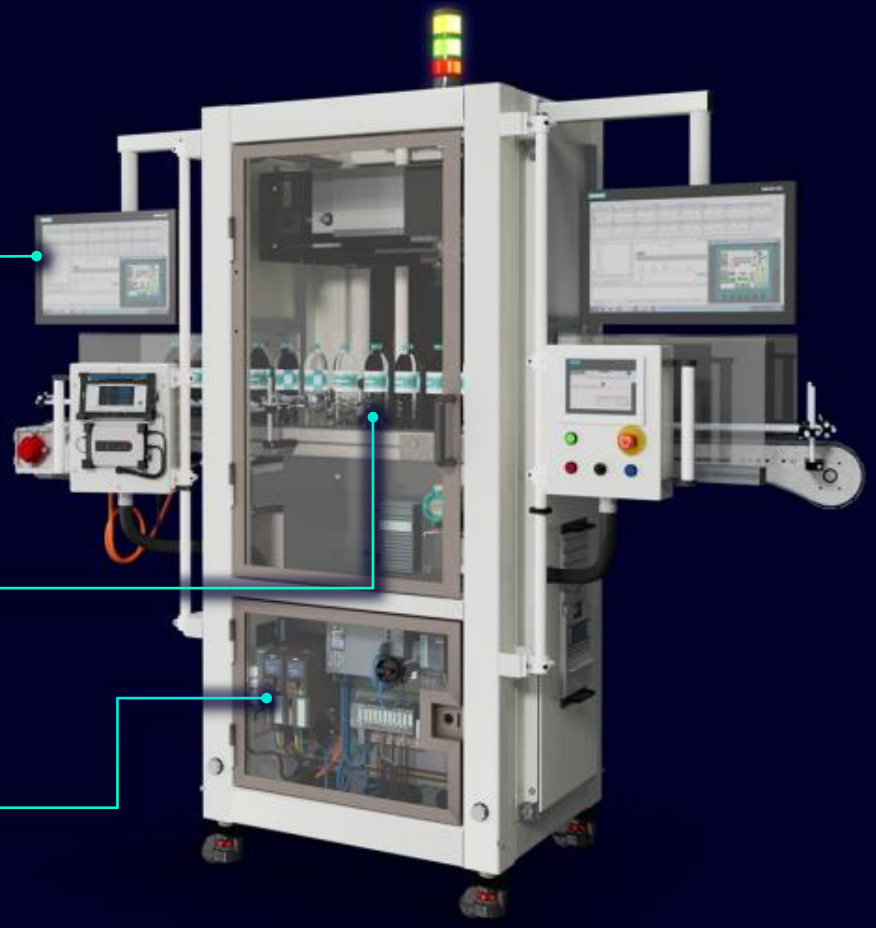
With the digital twin of the machine, every relevant component is represented virtually – DriveSim Designer & Basic

From the real machine …

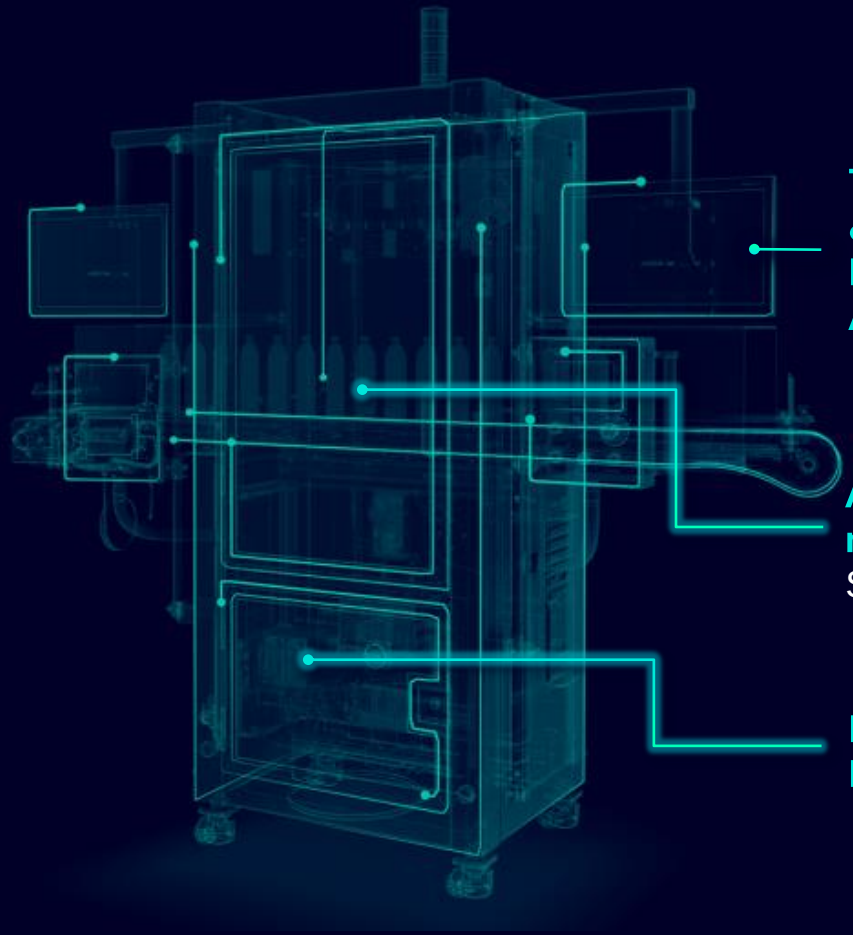


Automation system layer
SIMATIC PLC

Mechanical application layer
Conveyor

Drive Train layer
SINAMICS drives

… to the digital twin of the machine



TIA Portal & PLCSIM Advanced

Application model e.g.,
SIMIT, Amesim

DriveSim Designer

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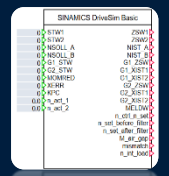
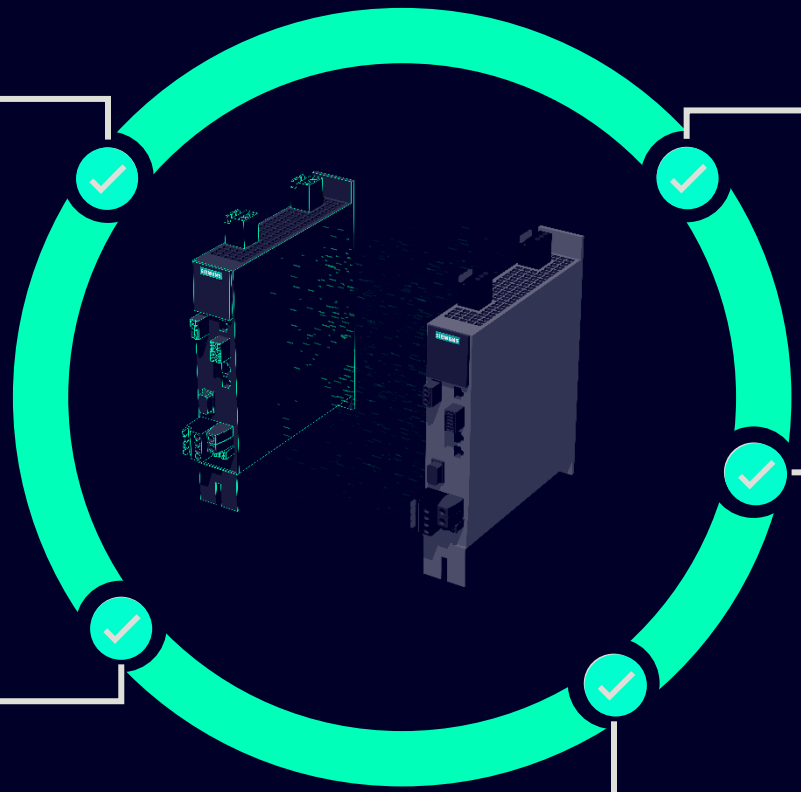
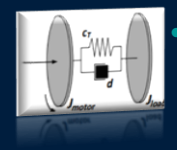
The value proposition of DriveSim Designer



The models are available as standardized **FMUs (Functional Mockup Unit).** Therefore, they are compatible with any standard time-based simulation program.





- DriveSim Designer includes **internal mechanical models** and supports connection to the external mechanical models.

SMG

- The **Simulation Model Generator (SMG)** automatically creates a SIMIT simulation model by using existing information from a TIA Portal project.

ADV PLC SIM

- DriveSim Designer has compatibility with other virtual Siemens solutions, e.g. **SIMATIC S7-PLCSIM Advanced or NX Mechatronics Concept Designer.**

- Ability to **configure the available drive parameters as you would configure** your real drive

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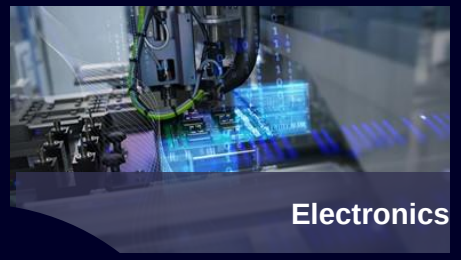
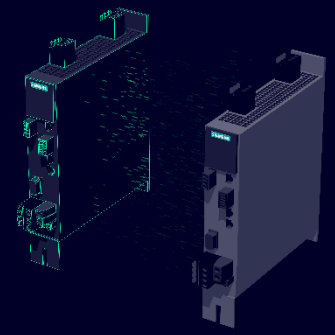
DriveSim Family adds to the value proposition of our SINAMICS drives portfolio and addresses the same focus verticals as each individual converter type





… and many more!

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License options for DriveSim Designer and DriveSim Basic

Freemium test version

- ✓ **DriveSim Basic**
- ✓ Minor updates and **hotfixes included**
- ✓ Available as **Single / Floating** license

Annual subscription

- ✓ **DriveSim Designer**
- ✓ **Article number: 9SV1110-3AA00-0AA0**
- ✓ **All releases,** in the given time frame **included**
- ✓ **All updates and hotfixes** in the given time frame **included**
- ✓ Available as **Single** license

Single license:
Available as one license per device

Floating license:
Available for unlimited number of devices but just one user can use the license at a time

**Please contact us: digitalization.drives@siemens.com*

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DriveSim ordering process

1. Go to SiePortal
2. Select the license you need (annual subscription)
3. Find the product you need by article number
4. Order a license
5. After purchase of the license, you will automatically get an email from the OSD (Online Software Delivery)
6. Download and activate the license with the steps described in the email
7. After successful activation of the license go to the Support SIOS page of SINAMICS DriveSim Advanced or Designer
8. Select the right version of the Software and download it

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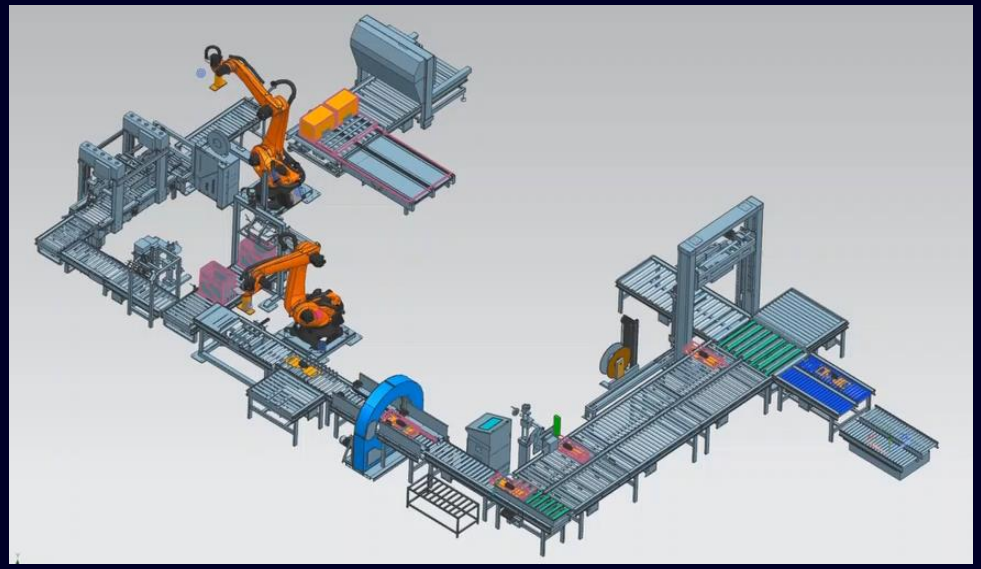
Application Example: Simulation of Motor Packaging Line
Siemens Numerical Control Ltd., Nanjing

Customer challenges	Products/ solutions	Customer benefits
Testing the behavior of the SINAMICS drive for rolling conveyors upfront not possible	Creating digital twins of the drives for all conveyor lines with SINAMICS DriveSim Basic and SIMIT	Testing an improving the behavior of drive in simulation tool, without the need of having real hardware
Verifying the functionality of the PLC code not possible	Virtual commissioning of the PLC with SINAMICS DriveSim Basic, SIMIT, TIA Portal and PLCSIM Advanced	Verification of the PLC code and drive parameters in simulation tool before implementing the drives on the real line, reducing cost and time for commissioning
Synchronizing the robots with the conveyor lines challenging	Parametrizing SINAMICS DriveSim Basic according to the application and simulating the drive behavior depending on the external load (derived from NX MCD)	Virtual commissioning of the PLC and drive in synchronization with other equipment in the production line

Simulation of the Motor Packaging Line



Products used

- SINAMICS DriveSim Basic, SIMIT, TIA Portal, S7-PLCSIM Advanced and NX MCD

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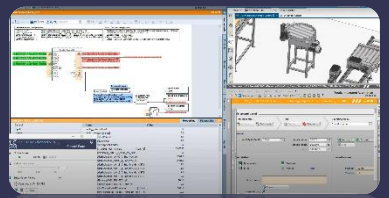
DriveSim Designer
Support Materials

Additional information

- **Website**
- Drive Train Digitalization (EN/DE)
- DriveSim Designer (EN/DE)

- **Siemens Industry Online Support (SIOS)**
- Detailed Product Information (EN)
- Manual (EN) (DE)
- Starter Kit Project
- Application Examples
- FMU Download



- **Pre-sales Support**
- support.digital.drives@siemens.com

- **Videos and Tutorials**
- Explore Drivesim Designer how-to videos and tutorials on Siemens Website

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Content

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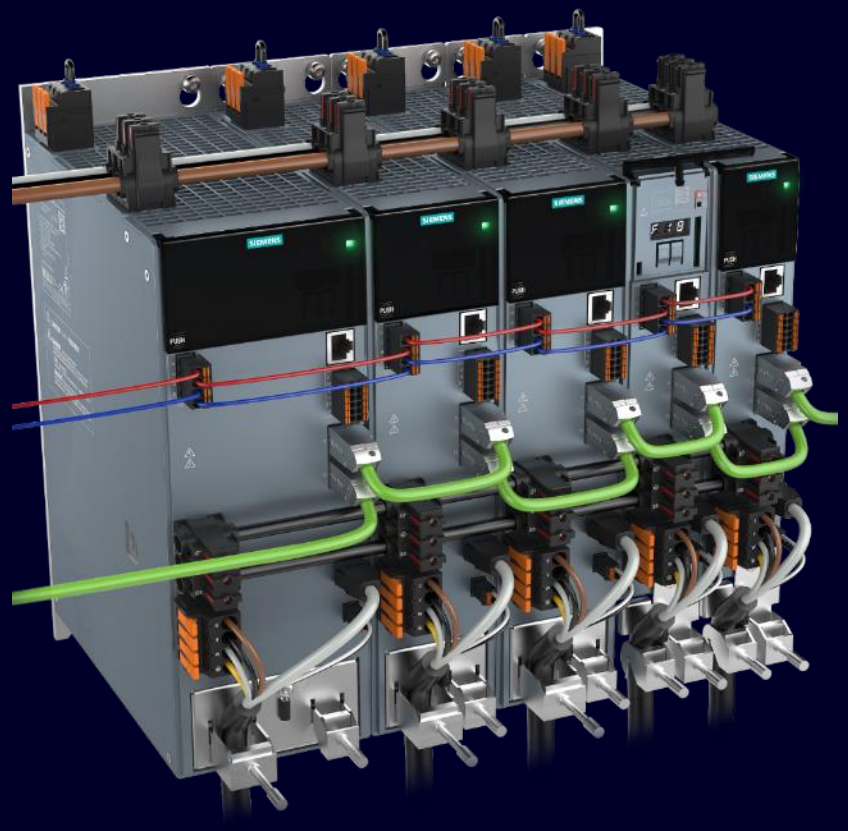
SINAMICS S210
Features and Benefits: Hardware



Feature / Function	Benefits
DC Coupling (for 3AC version only) The DC link coupling of the converters enables energy compensation during dynamic reversing processes.	This reduces the thermal waste heat generated during braking via the integrated braking resistor and increases the travel cycle of the individual axes.
One Cable Connection (OCC) Single cable for power, encoder and brake	Saves installation time. Less effort to keep clean.
Integrated Braking Resistor to dissipate regenerative power for fast ramp down	No need for an additional external braking resistor in most applications
Integrated Brake Relay For direct control of the motor holding brake	Holding brake directly connectable without external components
Push-In Connectors All connector accessible from the front of the drive	Easy to install and maintain
Compact design Small size of the drive	Saves cabinet space
2nd encoder interface (for rotary DQ encoders)	Enables even more precise working
3C3 / ANSI G3 compliant coating (Withstanding sulforic gases (H_2S and SO_2)	Enables the use for tire industry

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SINAMICS S210
Features and Benefits: Functions

Feature / Function	Benefits
Integrated in TIA-Portal/Startdrive ≥V18 SP1 Tool for configuration, on/offline commissioning and diagnostics	A common working environment for PLC, HMI and drives. Integrated engineering and data management. Standard operating philosophy. One project file, therefore consistency is always ensured.
Firmware update via SD-card, Webserver and TIA-Portal	Convenient upgrade to the latest SINAMICS FW functions
Integrated innovated Webserver for new generation drives for easy commissioning	No additional tool required. No software installation necessary.
One-Button Tuning for control loop optimization	Achieve a high dynamic performance and smooth operation in a wide range of applications
PROFINET Interface Standard communication for real-time transmission (RT/IRT) and **EtherNet/IP**	Full connectivity to SIMATIC Controllers with a wide range of motion control functionality and possibility to communicate with 3rd party controllers via EtherNet/IP
High System performance • 3 time overload capacity • Low motor torque ripple	Fast acceleration/deceleration and smoothly running system for a high machine productivity
Parameter cloning Parameter settings can be transferred easily using an SD-card or the Webserver	Reduced commissioning time

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SINAMICS S210
Features and Benefits: Safety Integrated Functions

Feature / Function	Benefits
Safety Integrated Integrated Basic and Extended Safety functions available	No additional Safety Hardware required (License for Extended Functions)
Safety via PROFIsafe All safety functions can be performed via PROFINET	Safety functions can be controlled directly by the motion controller
STO/SS1 via Terminals “Safe Torque Off” is available via terminals in addition	If hard wired components need to be connected directly

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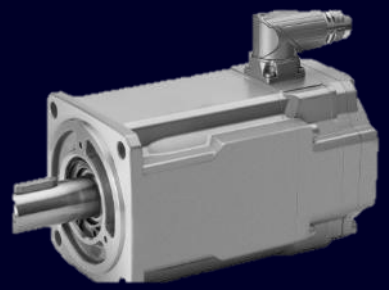
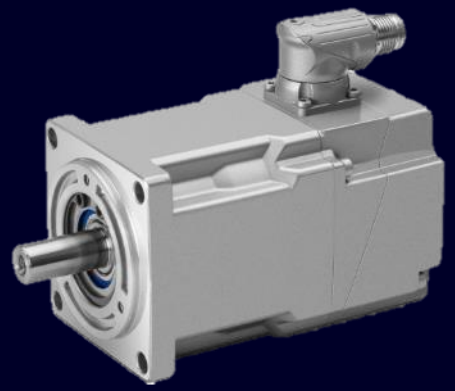
SIMOTICS S-1FK2
Features and Benefits





Feature / Function	Benefits
Robust Connector One rotatable connector for the One Cable Connection	Free choice for cable outlet direction in the machine
Sealing ring IP65 degrees of protection with optional sealing ring	High tolerance against harsh environmental conditions
High Dynamic Motors Motors with very low inertia	High performance for high dynamic machines with low moment of inertia
Compact Motors Motors with medium inertia and very compact design	For Applications with higher moment of inertia

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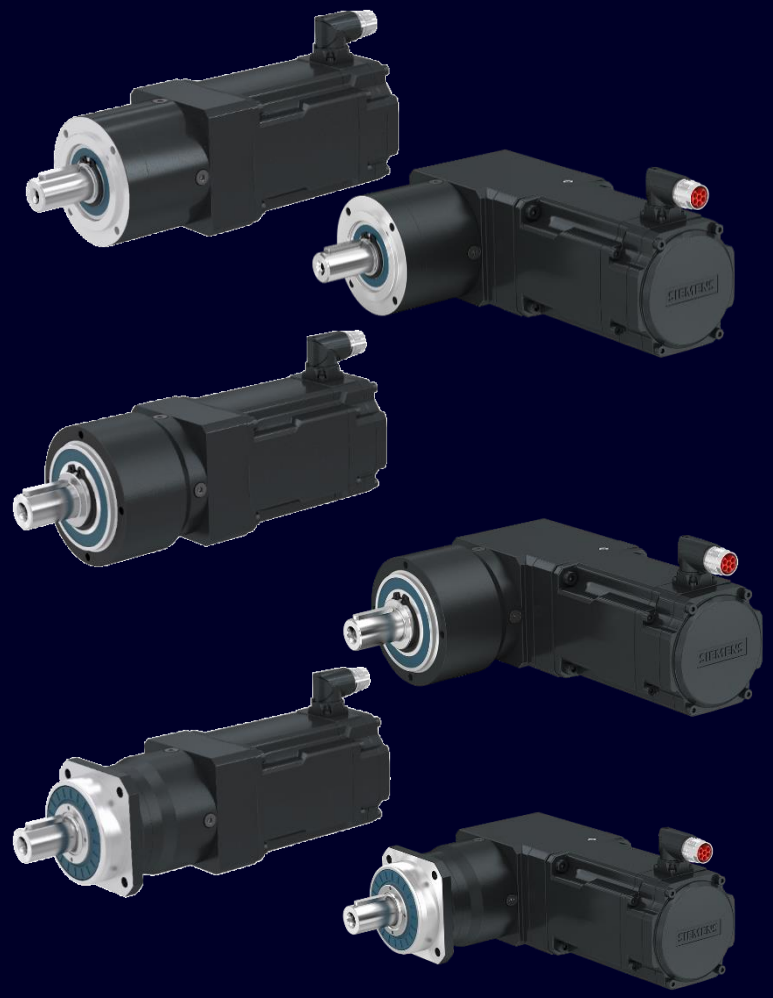
SIMOTICS S-1FK2/S-1FT2 servo planetary geared motors
Features and Benefits



Feature / Function	Benefits
Planetary Gearboxes	• Adjustment of **speed and torque** • Adjustment of **inertia ratio** (load/motor) • Enable **more dynamic solution** compared to direct drive
Complete Servo-Gear-Motor solution One order number for motor and planetary gearbox	**Easy to use** because the Servomotor comes completely equipped as ordered
Complete Siemens Solution	Complete **system responsibility by Siemens**
Integrated in the TIA Selection Tool and the Drive Technology Configurator	Fully integrated in the tools for dimensioning, ordering and documentation. **All within the Siemens ecosystem**
Thermal design of the gearmotor via digital twin in TST	including thermal interaction between motor and gearbox via S1 characteristic possible
Providing S1 characteristic curves	**Dimensioning of the complex gearmotor simple like a classic servomotor**

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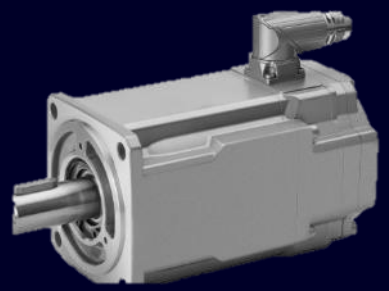
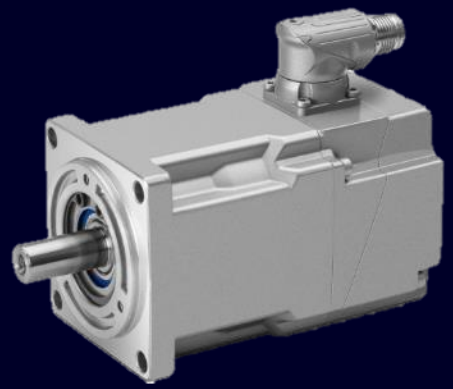
SIMOTICS S-1FT2 flexible and ETO
Features and Benefits





Optional Features / Function	Benefits
Absolute Single & Multiturn Encoder with **26 bit resolution** available	**Higher resolution for higher accuracy**
Protection Class IP 67 Options for special coatings Metal name plate	**More robust in harsh and humid environments**
Customer specific solutions available (ETO)	**Adapt to customer needs in special machines & applications**
Additional windings in comparison to S-1FK2	**Higher rated speed / increased maximum speed (short time)**

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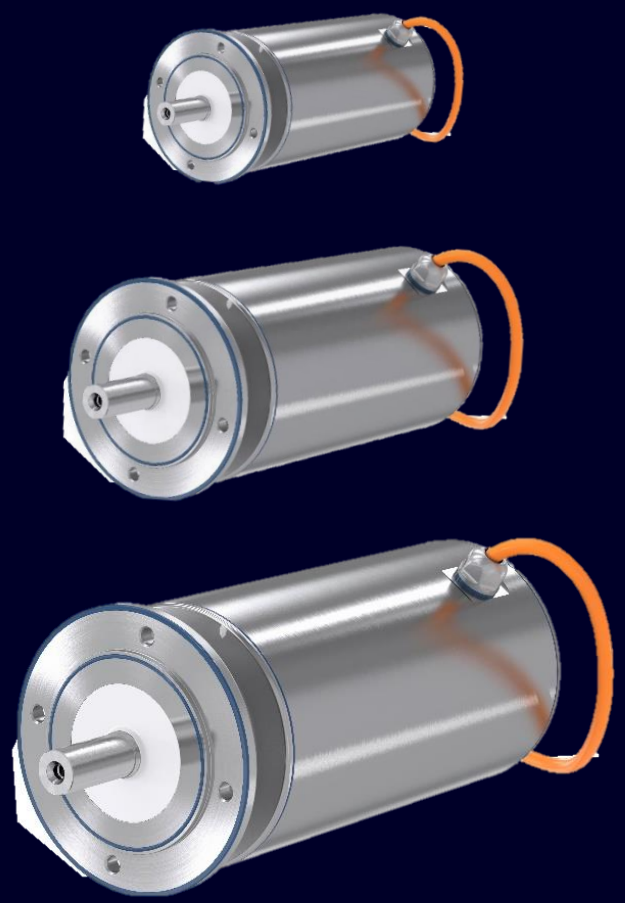
SIMOTICS S-1FS2 hygienic servo motor for F&B and Pharma
Features and Benefits



Features / Function	Benefits

• **High Protection Level:**
  • Complete motor IP66/67
  • Housing: IP69K (max. 30 bar)
	▶ **High Protection Level** according to EN60529: More robust in **harsh and humid** environments

• Stainless steel 1.4404 (shaft & housing) • EHEDG Certification (in preparation) • FDA listed sealings (#177.2600) • Bearing grease according to NSF H1 • Pressure compensation in case of temperature fluctuation	▶ **Fulfill Highest Requirements in F&B and Pharma**
• Cable can be ordered in 0.5m steps up to 11m • Motor cable extension possible with MOTION-CONNECT product range • Concept for hygienic control cabinet feed-through	▶ **Flexible OCC** (One Cable Connection) to connect to SINAMICS S210
• Four sizes • Bolt circle, centering rim, shaft as 1FK2 (AH40/ 52/ 63/ 80) Stall torques 3Nm- 23Nm	▶ **Variance for many applications**

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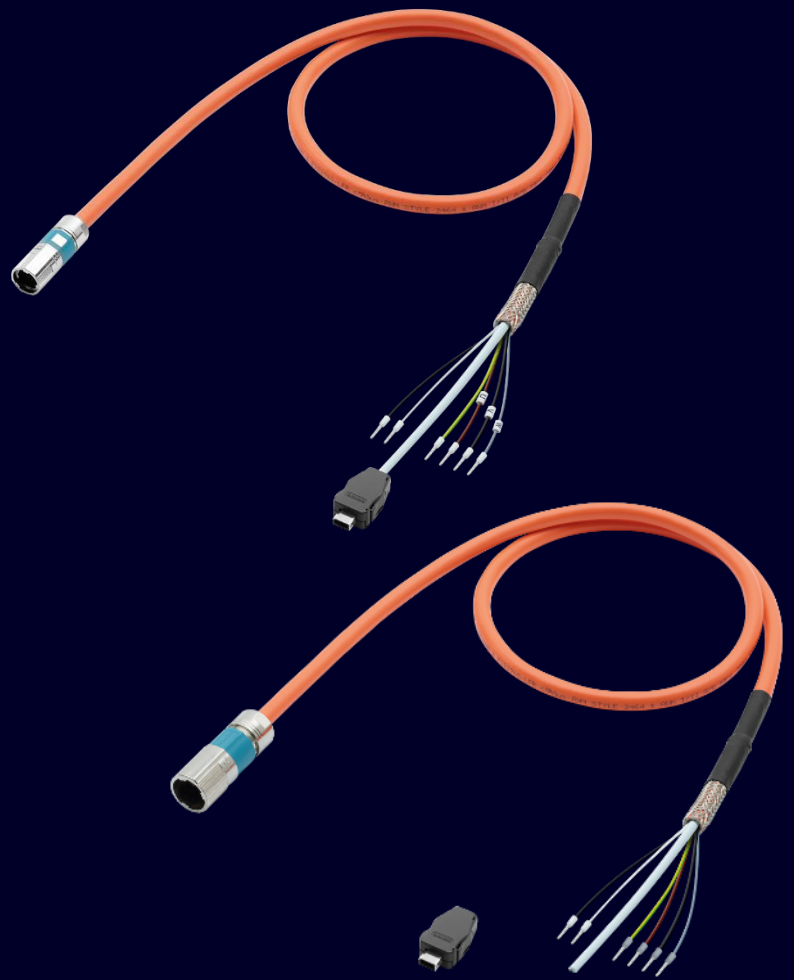
OCC One Cable Connection
Features and Benefits



Feature / Function	Benefits
One Cable Connection (OCC) ▶	• Only one cable for power, encoder and brake required • One cable version fits all different options for encoder & brake • Order individual length up to 50m • Trailing cable version available
Simple Installation ▶	• Install only one cable instead of 2 or 3 • Rotatable SPEED CONNECT fast connection system • Mounting flange available • Ready to order preassemlbled
Compact design ▶	• Small and compact connector M12 e.g. for motor SH20/30mm (only 25mm high) • Flexible cable with small bending radius (≥24mm)

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Content

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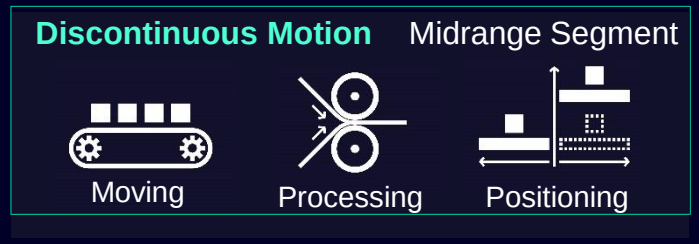
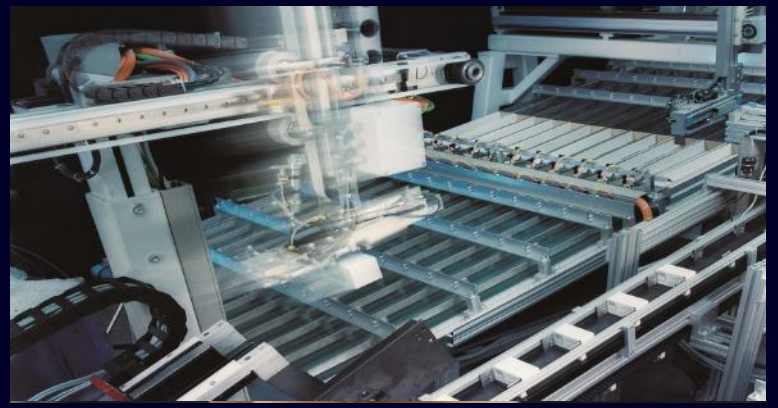
SINAMICS S210 Servo Drive System
The drive for high dynamic performance applications

Packaging, Printing & Converting

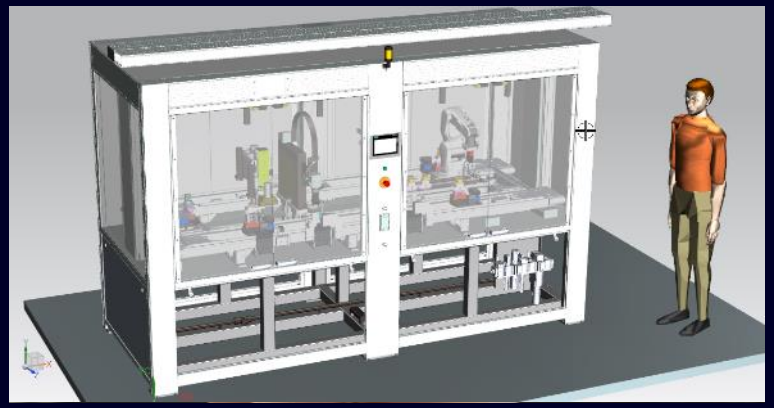
- Packaging machines
- Printing machines
- Labeling machines
- F&B and Pharma applications





Handling & Moving

- Pick and Place machines
- Rotary tables
- Stacking machines
- Linear axes
- Conveyor belts
- H-portals, Kinematics
- F&B and Pharma applications



General Machine Building

- Assembling machines
- Chip sorting machines
- Bonding machines
- Cross cutter
- Filling machines
- F&B and Pharma applications

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Reference MC Factory F80 Erlangen
Production line for SINAMICS S120 Motor Modules

Equipment manufacturing

MC Factory – F80 Erlangen, Germany

Benefits

- **Commissioning**: Very easy setup, Commissioning of the drive already finished after 5 minutes! Thanks to One Button Tuning and electronic type plate of the motor.
- **Installation:** Fast Installation with One Cable
- **Controller**: Works perfectly together with distributed SIMATIC ET200 SP Open Controller

Equip the material feeding conveyor for the new SINAMICS S120 Motor Module production line in MC Factory Erlangen F80. The S210/ S-1FK2 drive a linear axes. The linear axe lifts and positioned the roller conveyor 1 which is attached to it. In total there are 4 conveyor stations with each 4 lifters. Products used: SINAMICS S210 Servo Drive System and SIMATIC ET200 SP open controller.
Please see application video here

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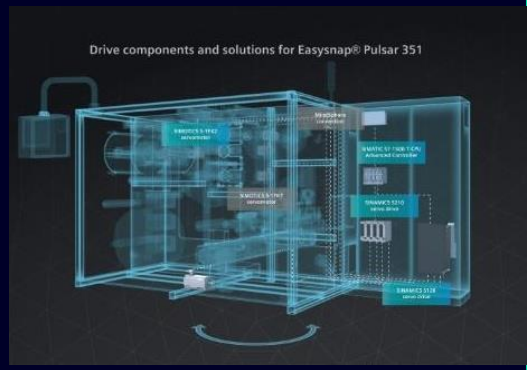
Reference Easysnap
The one hand opening technology

Packaging

Easysnap Technology S.r.l. – Italy

Benefits

- **Product:** Performance and Dimensions of the S210 drive system is very important for the customer. In the future this will reduce the required cabinet dimensions.
- **Digitalization:** Significant benefits seen in digitalization is related to the data collection and analytics. For example the predictive maintenance via Mindsphere. For the future it is planned to start with virtual commissioning and presentation of the machine via the digital twin.
- **Siemens Brand**: The customer is interested to use Siemens because the Siemens brand is strongly present in the machine market and some of their customers ask to equip the machine with Siemens products.



Packaging machine to fill liquid products into sachets (320PC/min)

SINAMICS S210 Servo Drive System
SINAMICS S120 Servo Drive (C/D Type) with SIMOTICS S-1FK7
SIMATIC S7-1500T controller
SIMATIC ET200SP

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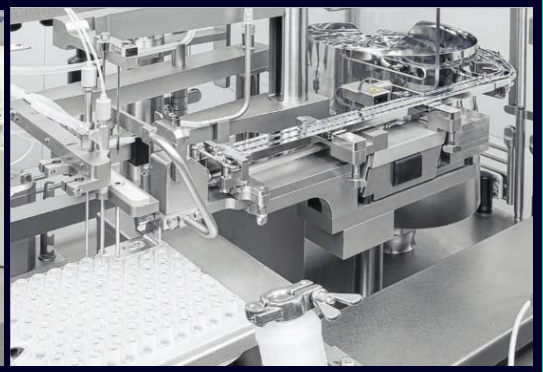
Application
Packaging and filling machine (for medicine)

Packaging and filling machine for medicine

Benefits

- **Digitalization**: With the digital twin of the machine al processes, starting with the conception up till the conversion can be tested and optimized ahead, without complex test setups.
- **Engineering time:** The operator personal can be trained ahead and the engineering time can be up to 30% reduced. This also enables the interaction of hard and software, for example at a virtual commissioning.



Solution: The TIA Portal integrated the hardware components like SIMATIC S7-1500 T-CPU with safety functionality, combined with the innovative SINAMICS S210 Servo Drive System as well as fully enclosed INOX HMIs.

High performance packaging and filling machine for individualized medicine

- SINAMICS S210 Servo Drive System
- Controller SIMATIC S7-1500 T-CPU with Safety-Functionality
- Fully Enclosed INOX HMIs

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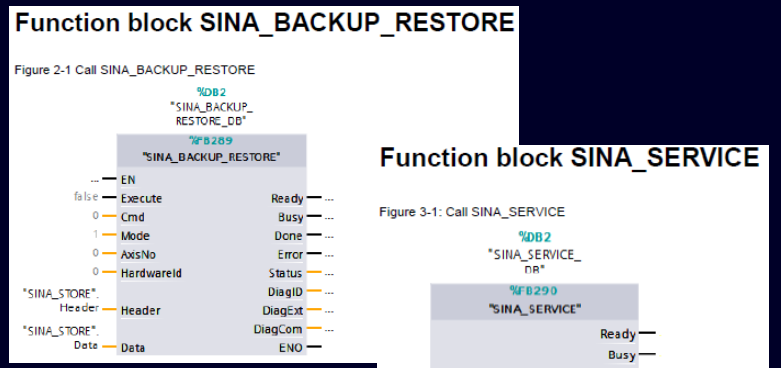
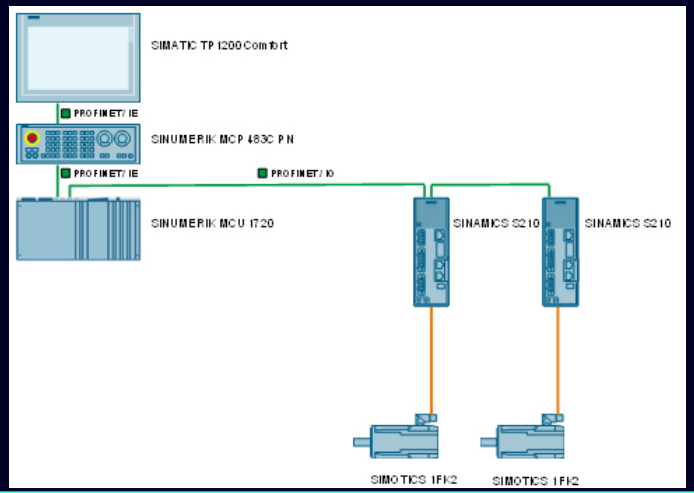
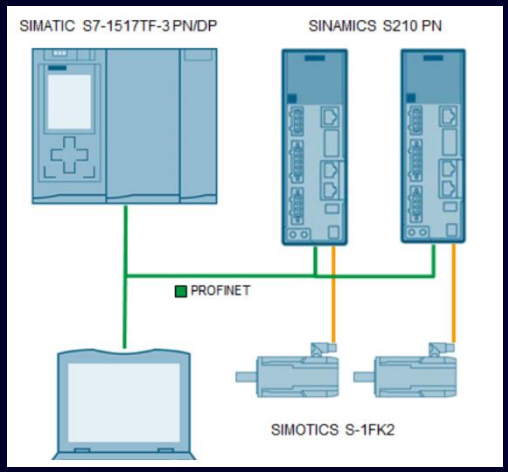
Standard examples for SINAMICS S210



SIMATIC Function Block for S210 sparepart replacement and serial comissioning:
Backup and Restore of the SINAMICS S210 device settings with SIMATIC. Two SIMATIC function blocks to control several drive functions of the SINAMICS S210. The function block SINA_BACKUP_RESTORE is used to save drive settings remanently in the controller's memory. The drive settings therefore are stored in a global DB of the controller. By the function block the stored settings can be transferred to a drive device.
Link



SINUMERIK MC and S210 as NC axis
Commissioning of NC-axis on SINUMERIK MC over PROFINET IRT with SINAMICS S210
This application example describes how to interface a SINUMERIK MC with a SINAMICS S210 via PROFINET IRT. Two drives are used as NC axes. The SIMATIC TP1200 Comfort is used as the HMI device, and the SINUMERIK MCP 483C PN is used to control the movement of the axes.
Link



Configuring Technology Objects with SIMATIC S7 1500 and SINAMICS S210 in TIA-Portal.
In this application example, two "SINAMICS S210" will be used. The first one will act as position-controlled drive and will serve as master axis for the second drive configured with gear synchronization.
Link

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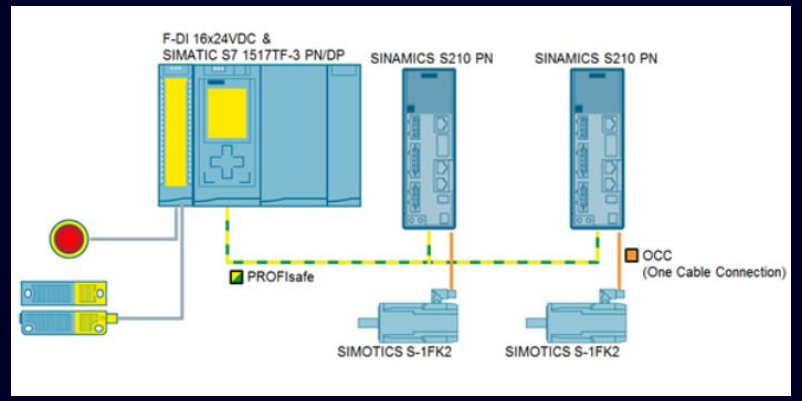
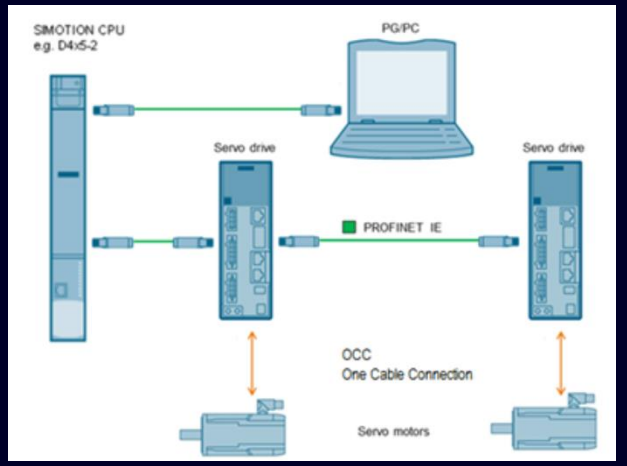
Standard examples for SINAMICS S210



Controlling SINAMICS S210 Safety Integrated Functions using SIMATIC S7-1500TF via PROFIsafe
In addition to the standard drive functions, using a SIMATIC F-PLC, the (Extended) Safety Integrated Functions of a SINAMICS S210 can be controlled using PROFIsafe Link



Configuring technology objects with SIMOTION SCOUT TIA and SINAMICS S210
In this application example, "SINAMICS S210" drives are used, and are linked using a GSD file. The S210 drives are moved via the axis control panel of the SIMOTION technology objects. Link

👉 **available soon for the new SINAMICS S210** (FY24)

- **Updates** on existing application examples with the new SINAMICS S210
- Position Control with **Basic Positioner** (EPOS)

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Content

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Support material

Webpage

Official website:
www.siemens.com/sinamics-s210

SIOS: Product note, catalogue, manual

Tools

Selection

Siemens Product Configurator

TIA Selection Tool

SINAMICS Selector App

Commissioning

Startdrive V19

Migrationtool

Digital Twin

DriveSim Advanced

Service

Service Catalog S210

www.siemens.com/industryservices

Differentiation between previous and new SINAMICS S210 servo drive system marked with *NEW*

Additional material

Tutorial video – commissioning & engineering

Application examples

Support

Technical Support E-mail:
support.industry.siemens.com

Forum for customers EN | DE

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Single Axis Servo Drives
The new SINAMICS S210 – Article numbers

SINAMICS S210 article numbers

		Previous Version		New Version
Supply	**Power [kW]**	**previous S210 converter**	**Frame size**	**new S210 Converter**
1AC 230V	0,1	6SL3210-5HB10-1UF0	FSA	6SL5310-1BB10-1CF0
1AC 230V	0,2	6SL3210-5HB10-2UF0	FSA	6SL5310-1BB10-2CF0
1AC 230V	0,4	6SL3210-5HB10-4UF0	FSB	6SL5310-1BB10-4CF0
1AC 230V	0,75	6SL3210-5HB10-8UF0	FSC	6SL5310-1BB10-8CF0
3AC 400V	0,4	6SL3210-5HE10-4UF0	FSA	6SL5310-1BE10-4DF0
3AC 400V	0,75	6SL3210-5HE10-8UF0	FSA	6SL5310-1BE10-8DF0
3AC 400V	1	6SL3210-5HE11-0UF0	FSA	6SL5310-1BE11-0DF0
3AC 400V	1,5	6SL3210-5HE11-5UF0	FSB	6SL5310-1BE11-5DF0
3AC 400V	2	6SL3210-5HE12-0UF0	FSB	6SL5310-1BE12-0DF0
3AC 400V	3,5	6SL3210-5HE13-5UF0	FSC	6SL5310-1BE13-5DF0
3AC 400V	5	6SL3210-5HE15-0UF0	FSC	6SL5310-1BE15-0DF0
3AC 400V	7	6SL3210-5HE17-0UF0	FSC	6SL5310-1BE17-0DF0

6SL5970-0AA00-0AA0	Empty SD card
6SL5370-0GB00-0AA0	S210 V6.1 SD card
6SL5370-0GD00-0AA0	S210 V6.3 SD card
6SL5977-0AA00-2HA0	Safety Ext. License V6

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Disclaimer

Subject to changes and errors. The information given in this document only contains general descriptions and/or performance features which may not always specifically reflect those described, or which may undergo modification in the course of further development of the products. The requested performance features are binding only when they are expressly agreed upon in the concluded contract.

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