SINAMICS S120:

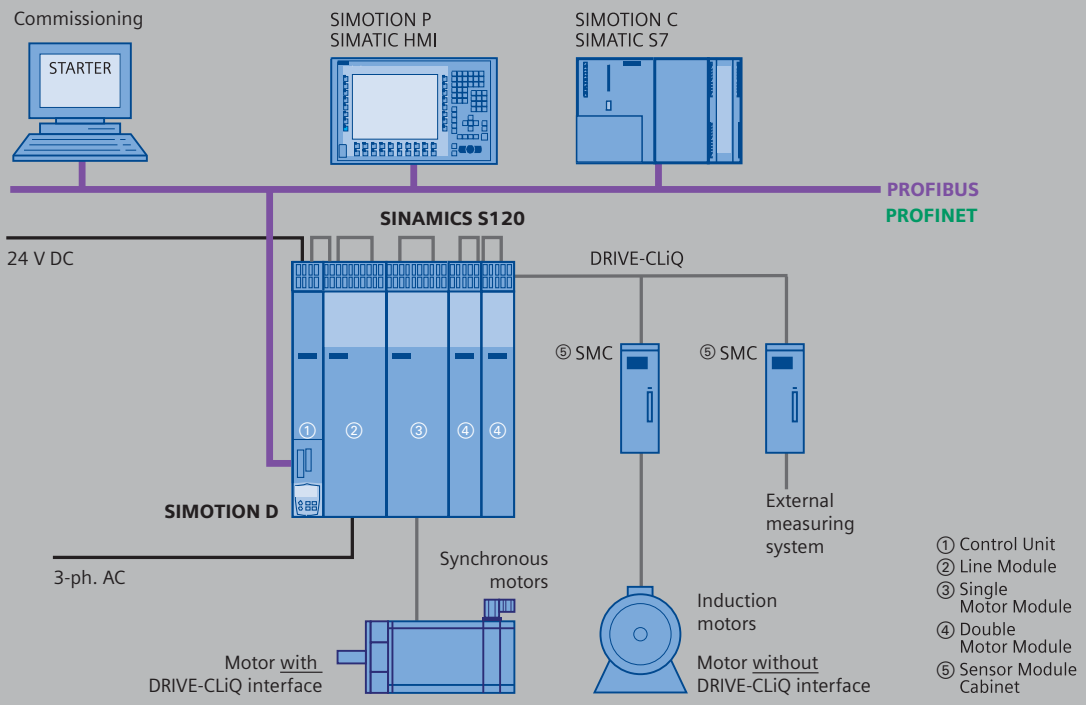
The flexible, modular drive system for sophisticated tasks

SINAMICS S120 is the modular drive system with servo and vector control for sophisticated drive tasks in machinery and plant construction. Versions are available both for single- as well as multi-axis applications.
SINAMICS S120 covers a range of power ratings from 0.12 kW up to 4500 kW (0.16 up to 6000 HP) and various control modules with graduated functionality. A precisely tailored drive configuration can be engineered quickly and simply from the modular SINAMICS S120 system – for almost any high-performance drive application.
SINAMICS S120 control modules (Control Units) have extensive onboard drive intelligence even in the basic version: Servo, and vector control, *V/f* control, positioning and safety functions, as well as many other functions that are useful in achieving reliable operation.

Integrated PROFIBUS DP interfaces allow the drives to be simply integrated into overall automation solutions. Among others, PROFINET is supported as an additional fieldbus interface. Seamless classic automation and drive solutions based on SINAMICS S120 can be implemented, especially in conjunction with SIMATIC, the Siemens automation system. When used with SIMOTION D or SINUMERIK 840 solution line Control Units, even complete motion control and machine tool solutions can be realized integrated in the drive.
SINAMICS S120 Cabinet Modules are available as cabinet system specifically for use in plant construction. These can be combined to form a cabinet lineup with a total power rating of up to 4500 kW (6000 HP). Using standard interfaces, the modules can be quickly interlinked to form a ready-to-connect drive solution for multi-motor applications.

Cabinet Modules – the modular cabinet system for power ratings up to 4500 kW (6000 HP)

Configuration example
SINAMICS S120 booksize system with SIMOTION D



Applications

As a result of its various features, SINAMICS S120 is predestined for use in production and machine tools as well as in plant construction – for example in:

- Packaging machines
- Machines in the food and beverage industries
- Plastics machines
- Textile machines
- Presses, punches, printing and paper machines
- Machines in the woodworking, glass and ceramic sectors
- Assembly and automatic testing machines
- Handling devices, cranes
- Lathes, milling and grinding machines
- Rolling mill drives
- Vehicle and gearbox test stands

Benefits for you

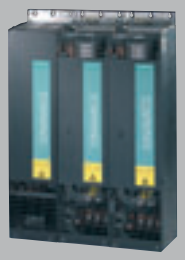
SINAMICS S120 distinguishes itself through the following features:

- Can be universally used in high-performance single- and multi-axis applications
- Can be freely combined to create tailored solutions
- Wide range of power ratings
- Wide functional scope
- SINAMICS Safety Integrated functions
- Various cooling types are supported
- Various infeed concepts are supported
- Can be simply integrated into higher-level automation and IT environments
- Simple to handle
- Simple mounting and installation
- Practical connection system

Structure

SINAMICS S120 drive units are available as single-axis as well as multi-axis drive systems.

SINAMICS S120:
The modular drive system for sophisticated single- and multi-axis applications



AC/AC units for single-axis applications		DC/AC units for multi-axis applications		
Blocksize format	**Chassis format**	**Booksize format**	**Chassis format**	**Cabinet Modules**
IP20	IP20	IP20	IP00/IP20	IP20 (IP21/IP23/IP54)
0.12 kW to 90 kW (0.16 to 120 HP)	110 kW to 250 kW (150 to 340 HP)	1.6 kW to 107 kW (2 to 145 HP)	75 kW to 1200 kW (100 to 1600 HP)	1.6 kW to 4500 kW (2 to 6000 HP)

SINAMICS S120 AC Drives for high-performance single-motor drives

The SINAMICS S120 AC Drives series was specifically designed for single-motor drives. This series has a modular design and comprises a Power Module in which the infeed and power units are integrated. Power Modules are available for power ratings from 0.12 kW to 250 kW (0.16 to 340 HP). The Control Unit, in which all of the closed-loop control intelligence is concentrated, is plugged onto the Power Module. These control modules include all of the drive interfaces – for communication and to connect expansion components.

SINAMICS S120 DC/AC drive units for multi-axis applications

With SINAMICS S120, we are offering multi-axis units with central line supply infeed and DC current link – optimized for use in multi-axis applications. They also have a modular design – comprising Control Unit, Line Module and Control Modules.

Control Unit

The closed-loop control intelligence for all of the drive axes integrated in the multi-axis group is combined in the Control Unit. Control Units also include the drive-related I/Os and interfaces to communicate with higher-level control systems. Control Units are available with different functional scopes and performance levels.

Line Module

The Line Module includes the central line supply infeed for the DC link. Different versions are available depending on the particular type of application: from the non-regulated infeed unit for motoring operation up to the regulated infeed/regenerative feedback unit. Even when the line supply voltage fluctuates, these units ensure a higher degree of security against failure by maintaining the DC link voltage at a constant level. They regenerate excess energy back into the line supply in a line-friendly fashion. Line Modules are available for power ratings from 5 kW to 6000 kW (7 to 8000 HP).

Motor Modules

One or several Motor Modules are supplied with energy for the motors from the DC link. Both synchronous as well as induction motors can be connected. Motor modules are available for rated powers extending from 1.6 kW up to 1200 kW (2 up tp 1600 HP).

Additional modules and components

There are a whole series of supplementary modules and components to connect various position measuring and encoder systems as well as to expand the drive system by adding drive-related I/Os:

- **Terminal Modules, Terminal Boards:**
  To expand the drive system by adding drive-related I/Os.
- **Sensor Modules:**
  To connect position measuring encoders to the drive system
- **Communication Boards:**
  These provide the Control Unit with an additional communication port

System interface DRIVE-CLiQ

All of the SINAMICS S120 components are equipped with the high-performance DRIVE-CLiQ system interface. Line and Motor Modules are connected to the Control Unit and Terminal and Sensor Modules are connected to the drive system via DRIVE-CLiQ – it is both simple and efficient. Motors that have this leading-edge interface can also be directly connected to the drive system.

Different frame sizes – can be flexibly combined

SINAMICS S120 is available in different frame sizes:

- SINAMICS S120 AC Drives
  - compact blocksize format for power ratings from 0.12 kW to 90 kW (0.16 to 120 HP)
  - chassis format for power ratings from 110 kW to 250 kW (150 to 340 HP)

- SINAMICS S120 multi-axis units
  - booksize format for power ratings from 1.6 kW to 107 kW (2 to 145 HP) – also available with external air cooling and in a Cold Plate version
  - chassis format for power ratings from 75 kW to 1200 kW (100 to 1600 HP) – these are also available with liquid cooling, for example for applications in dusty, aggressive or salt-laden environments – or when space is restricted
  - Cabinet Modules up to 4500 kW (6000 HP)

All of these formats and frame sizes support internal air cooling and can be extremely flexibly combined with one another. Even S120 AC Drives can be combined via the DRIVE-CLiQ interface to create multi-axis applications.

Auto-configuration using an electronic type plate

All SINAMICS S120 components have a digital type plate that contains all of the relevant technical data. For instance, for motors this includes the parameters of the electronic equivalent circuit diagram and the characteristic values of the integrated motor encoder. This data is automatically sensed from the control module via DRIVE-CLiQ and doesn't have to be entered again when commissioning the drive or replacing components.

In addition to technical data, the digital type plate also includes logistical data – for instance, the manufacturer's ID, Order No. and the globally unique identification number. These values can be electronically called up locally on-site as well as via remote diagnostics. This allows all of the components used in a machine to be uniquely identified – and that, at any time. This correspondingly simplifies service.

Technical data

Electrical data	
Line voltages	1-ph. 200 ... 240 V AC, ± 10% 3-ph. 380 ... 480 V AC, ± 10% 3-ph. 660 ... 690 V AC, ± 10%
Power range	0.12 ... 1200 kW (0.16 ... 1600 HP) (4500 kW [6000 HP] Cabinet Modules)
Line types supported	IT, TN, TT
Line frequency	50 Hz/60 Hz
Open-loop/ closed-loop control techniques	*V/f* Control, Vector Control, Servo Control Dynamic Servo Control (DSC)
Digital inputs/outputs	Yes, number can be scaled
Analog inputs/outputs	Yes, number can be scaled
Communication interfaces	Digital I/O, 24 V DC Analog inputs/outputs PROFIBUS DP PROFINET CANopen

Functions	
Technological functions	Several command/drive data sets Free interconnectability using BICO technology, using graphic configuring, freely interconnectable logic/control/arithmetic blocks (Drive Control Chart) Flying measurement, flying restart, kinetic buffering, Motion control in conjunction with SIMOTION D, Numerical control in conjunction with SINUMERIK 840 solution line, Technological controller (PID), integrated positioning functions
Safety functions (Safety Integrated)[1)]	Safe Torque Off (STO) Safe Stop 1, Safe Stop 2 (SS1, SS2) Safely Limited Speed (SLS) Safe Speed Monitor (SSM) Safe Brake Control (SBC)

Functions (continued)	
Limits	Torque limiting/current limiting Power limiting Speed limiting
Protective functions (excerpt)	Thermal monitoring of the motor and power units Overcurrent, overvoltage and undervoltage Anti-stall protection Overspeed, zero speed Short and ground-fault strength
Set point conditioning	Direction of rotation reversal 4 skip bands Basic ramp-function generator without smoothing, with a special fast stop ramp Expanded ramp-function generator with smoothing and setting function Speed set point filter
Motors that can be connected	Induction motors Synchronous motors Torque motors Linear motors
Supported encoders	Resolvers Absolute encoders Incremental encoders sin/cos 1 V_{pp} Incremental encoders TTL signal, RS 422 Incremental encoders HTL

Mechanical data	
Degree of protection	IP00/IP20, optionally up to IP54
Cooling types	Internal or external air cooling, liquid cooling, Cold Plate cooling

Standards	
In conformance with the following standards	CE, UL, cUL, Safety Integrated IEC 61508/SIL 2

1) availability dependent on the frame size