



SINAMICS

Driving to the future

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 **SITRAIN** Training for
Automation and Industrial Solutions

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SINAMICS System Overview



Training objectives:

You are informed about
 the SINAMICS drive family system concept
 the family members and their corresponding tasks
 the design-types “compact drive” and “modular drive configuration”



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- ❑ Siemens is THE top supplier for drives technology
- ❑ For variable speed drives we recommend for the future one brand: SINAMICS
- ❑ SINAMICS offers a proper drive solution for every application

Targets of SINAMICS

- Development of a unified, integrated scalable modular drive system
- Unified standard engineering over all drive families
- Machine engineering is significantly simplified by integrating all of the drives into the automation environment
- Increased usability
- Medium term:
SIMODRIVE, MASTERDRIVES and MICROMASTER will be merged

- The drives of the SINAMICS family are available in different housings
- **Ready to run cabinets for high output ratings**
- **flexible chassis devices for high output ratings**
- **modular booksize devices for multi axis drives with low to medium ratings**
- **compact blocksize devices for single drives with small to medium rating**

SINAMICS is part of Totally Integrated Automation

Tools

SIMATIC STEP 7



SINUCOM NC



SIZER



STARTER



SIMOTION SCOUT



Systems

SIMATIC S7



SINUMERIK



SIMOTION



SINAMICS

Asynchronous motors



Synchronous motors



Applications for A&D Drive Systems

elevators



Pumps for chemical industry



conveyors



Printing machines

Bottle filling



Pumps for water treatment of pools



Robots

Machine tools



Packing machines

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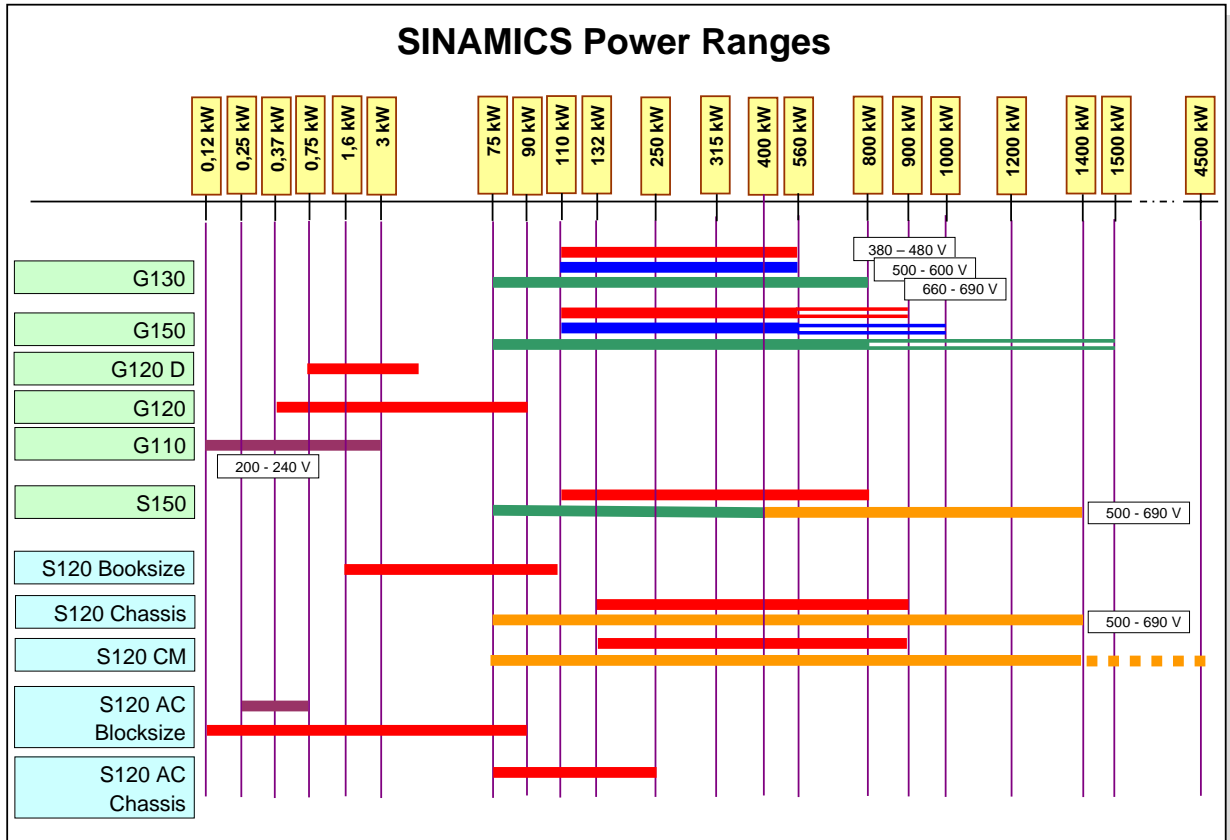
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Notes



Overview of Siemens drive systems

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MICROMASTER / MIDIMASTER
Drive system for standard applications

SIMOVERT MASTERDRIVES VC
Drive system for general machine and plant construction

SIMOVERT MASTERDRIVES MC
Servo drive system for production machines (except machine tools)



SIMODRIVE 611
Servo drive system for machine tools



SIMOREG DC-Master - SIMOVERT MV-Converter



Ship cranes




rockmill



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Notes

The SINAMICS Family

Single axis / Compact

G110 ET200S FC G120

1LA, 1LG, 1PQ, 1MJ, 1LE2, 1FW4

G130 G150 S150

Multi axis/ Modular

1PH7 1PH4

S120 Booksize

1FT6/7 1FK7

S120 Chassis



1PH2 1FE

1FN 1FW

S120 AC Drive

S120 Cabinet Modules

Typical Applications for SINAMICS

Basic drives	High-performance single drives	Coordinated drives	Servo drives
<ul style="list-style-type: none"> ■ Pumps ■ Fans ■ Compressors ■ Conveyors 	<ul style="list-style-type: none"> ■ Centrifuges ■ Travel drives ■ Elevators ■ Extruders ■ Mixers ■ Kneaders ■ Mills 	<ul style="list-style-type: none"> ■ Multi-motor drives in: ■ Paper machines ■ Rolling mills ■ Foil machines ■ Man-made fiber systems ■ Crane systems 	<p>Motion control applications in:</p> <ul style="list-style-type: none"> ■ Packaging machines ■ Printing machines ■ Handling ■ Weaving machines ■ Machine tools
<p>SINAMICS G</p> 		<p>SINAMICS S</p> 	

SINAMICS G for general purpose applications
SINAMICS S for highly sophisticated applications

Tools for SINAMICS configuration



- A single configuration-tool for all drives of the new generation

**SINAMICS G110, G120, G130, G150, S120, S150, ET200S FC
Micromaster 410, 420, 430, 440**



- A single start-up tool for all drives of the new generation

**SINAMICS G110, G120, G130, G150,
S120, S150, ET200S FC
Micromaster 410, 420, 430, 440**



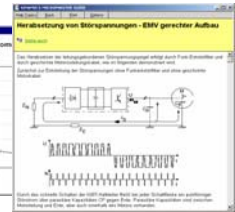
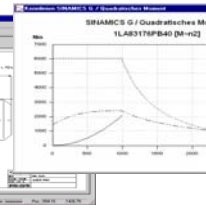
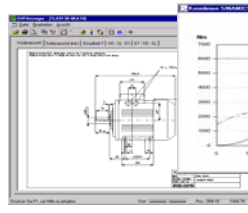
- The universal configuration-tool and start-up tool for all SIMOTION applications

SIMOTION P350, C230, D435

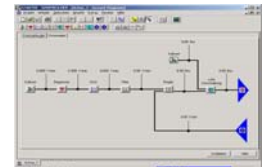
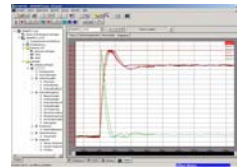
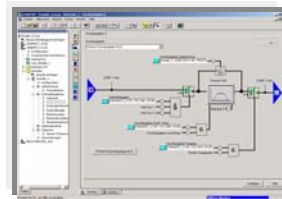
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Continuous Tools

- The configuration of the SINAMICS drives is carried out by **SIZER**

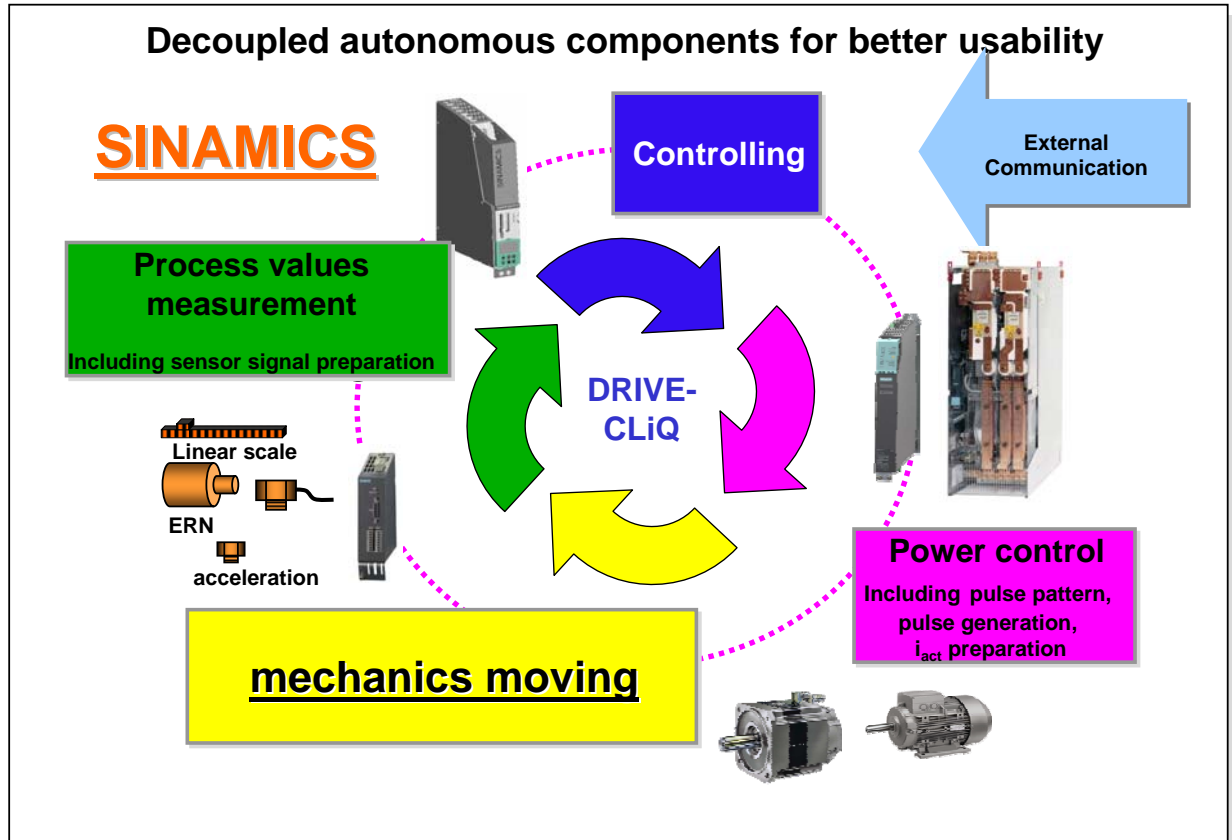


- The start-up of the SINAMICS drives is carried out by **STARTER**



- SIZER and STARTER provide a standard look and feel as well as data management
- STARTER is totally embedded into the Siemens Engineering systems

Notes



Trends

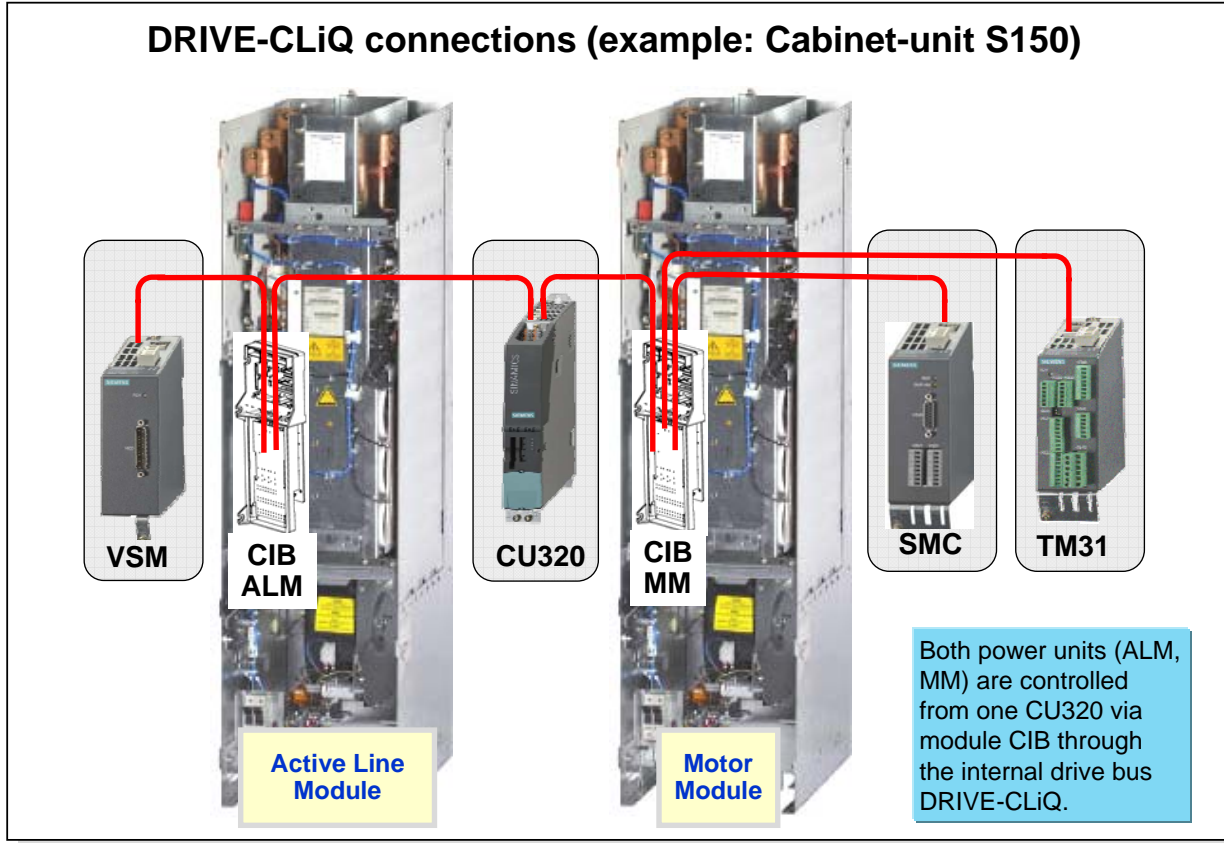
in manufacturing systems engineering to unitize systems require a new system architecture in the drive technology. Like in the machine building this architecture is characterizes by the decoupling of functional objects. Autarkic harmonized function units are developed, like control units, power units, intelligent motors and encoders.

Advantages

by the new system architecture

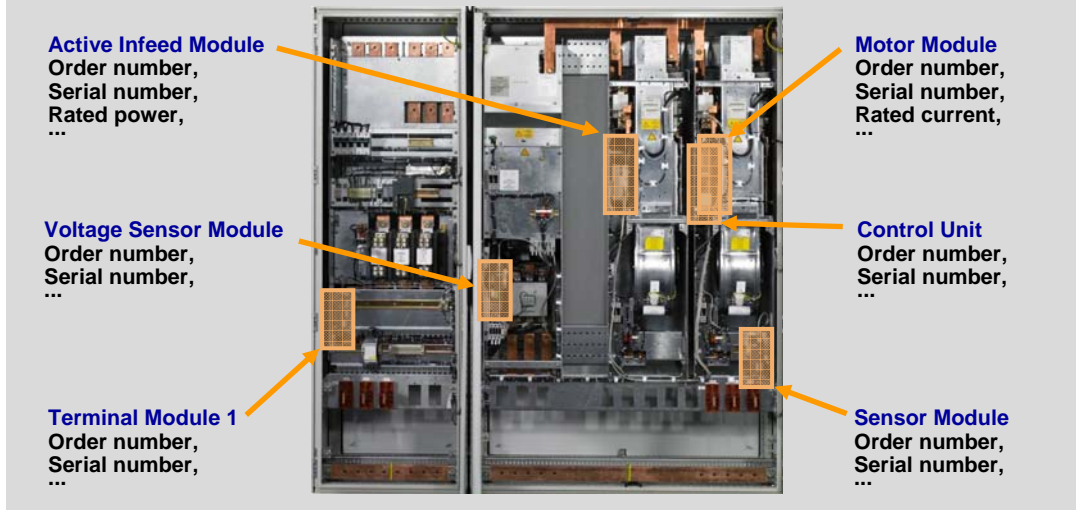
- Highest flexibility with the configuration and scalable performance
- Easy commissioning, diagnostics down to the components
 - Automatic identification of all components
 - Automatic topology identification
 - Electronic type plate
 - Memory of power section data
 - Detailed fault messages via DRIVE-CLiQ
- Easy mounting
 - All connections are pluggable
 - Only one type of connection cables
- Fault-tolerant protocol
 - Robustness
- System is expandable without changes on the communication level
- Future-proof by protection of interest of the compatibility

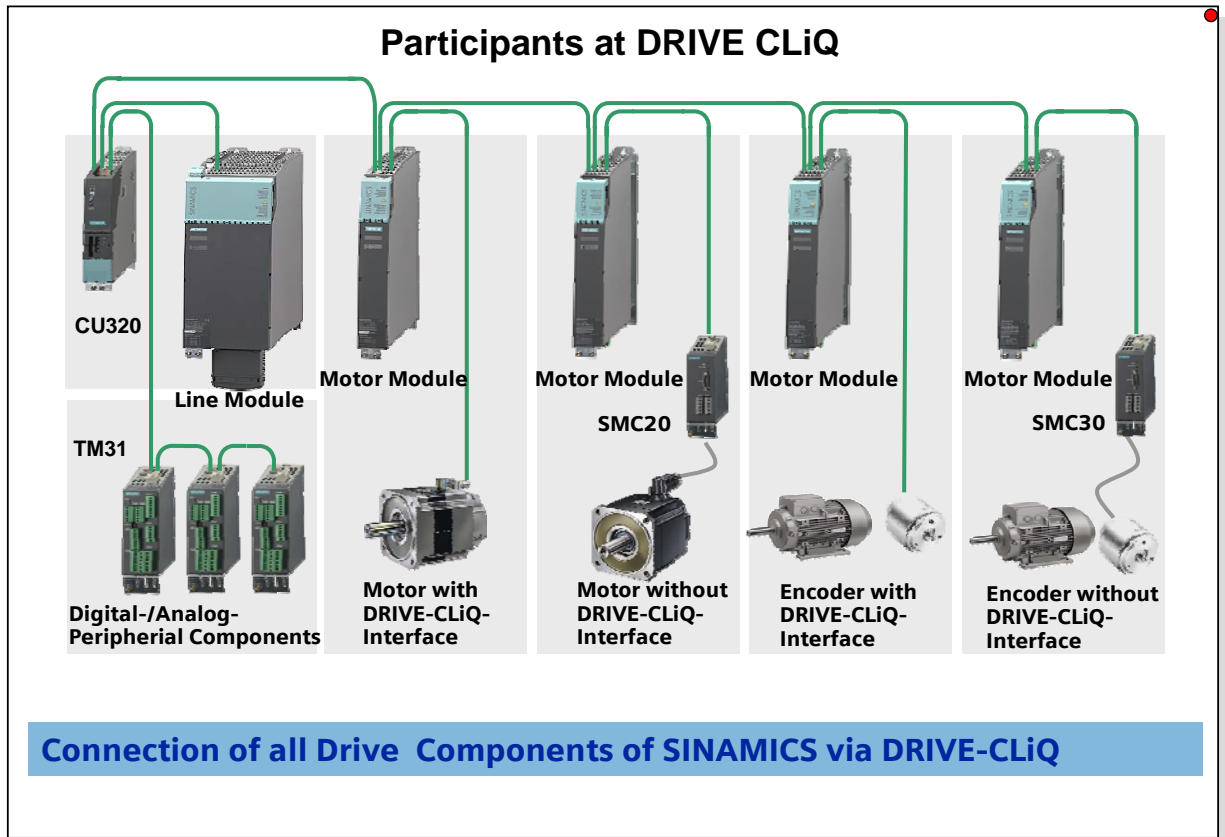
DRIVE-CLiQ connections (example: Cabinet-unit S150)



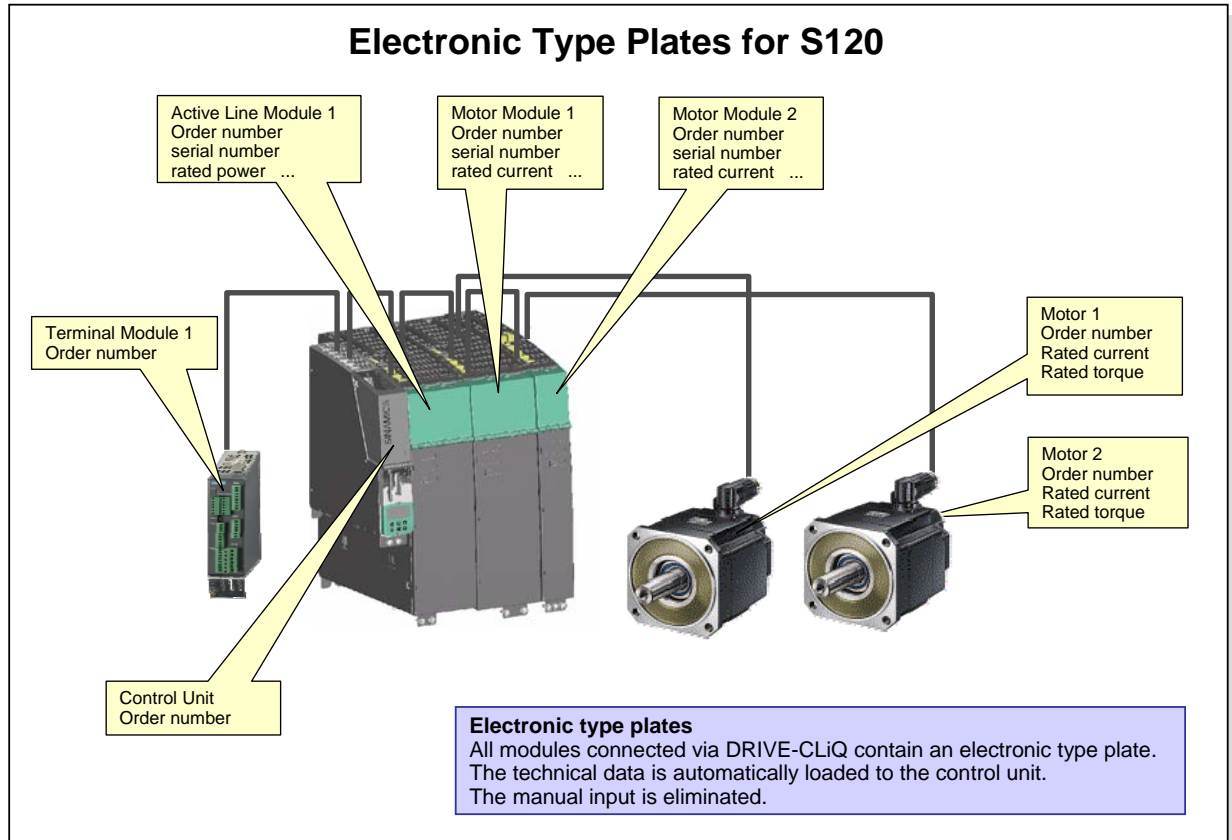
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Electronic Type Plates





Electronic Type Plates for S120



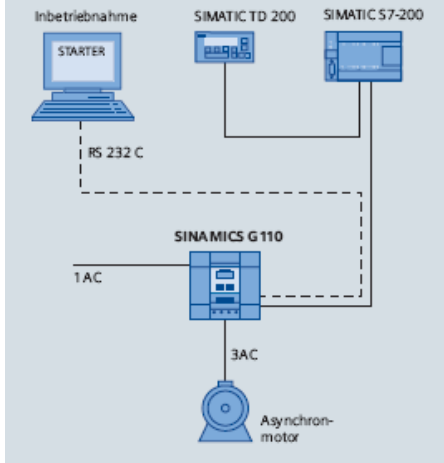
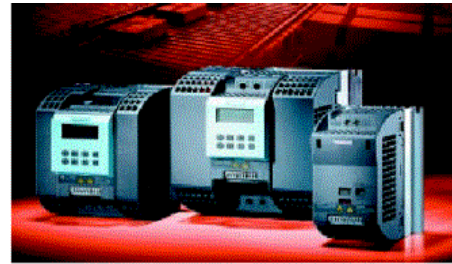
SINAMICS G110

The frequency converter for drive applications with variable speeds

- can be used flexibly
- with V/f control
- for the lower power and performance range of 0.12 - 3 kW
- for single-phase supplies (200 – 240 V)
- for industrial and public networks

Features

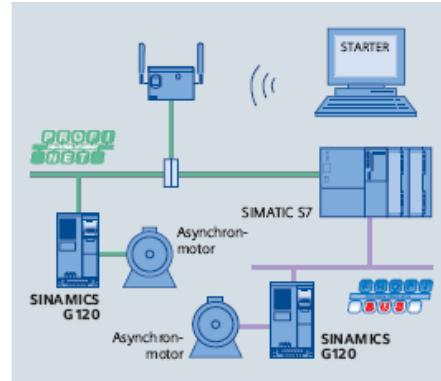
- low stress on mechanics
- low noise levels
- Compact, robust
- simple installation, parameterization and commissioning
- 3 frame sizes
- Analog input or RS485 communication interface



SINAMICS G120

Single motor drive for small to medium power ratings

- Vector control with/without encoder
- For the power range 370 W - 90 kW
- For variable speed drives
- With square-law torque ($T \sim n^2$)
- With constant torque load characteristics ($T = \text{const.}$)
- With medium performance requirements
- Communication via PROFIBUS, PROFINET
- Regenerative feedback without brake resistor and line reactor
- Silent and compact
- Modular design
- High usability
- simple installation, parameterization and start-up



SINAMICS G120 D

□ **Innovative Converter in high protection class**

- **Optimized for conveyor technology applications that need a de-central converter on PROFIBUS**
- **Focus: Automobile industry. Also adequate for high-performance applications for airports, food & beverage (dry part) and for overhead monorail**
- **V/f control, vector control with / without encoder**
- **Power range: from 750W to 7,5kW (380V-500V) with 3-phase power supply**

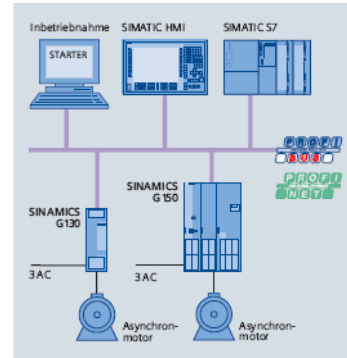
□ **Features**

- **Perfect mechanics through very flat design and identical footprint for all power ranges**
- **Safety Integrated inside the converter for innovative and cost effective safety applications**
- **Innovative energy recovery generates a variety of cost saving**
- **High mechanical and electrical robustness**



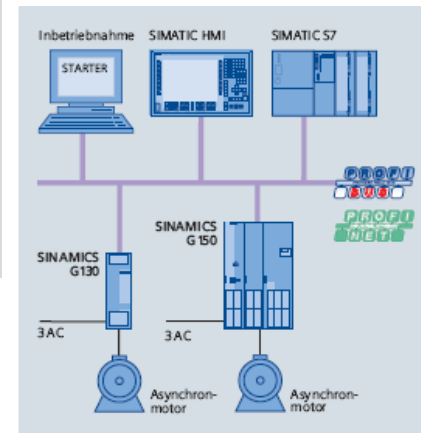
SINAMICS G130

- The universal drive solution for high-rating single-motor drives as chassis unit
- V/f control, vector control with/without encoder
- For the power range from 75 – 800 kW
- For variable-drives with square-law load torque ($M \sim n^2$) and constant ($M = \text{Const}$) load characteristic with average performance requirements,
- without regenerative feedback into the line supply
- Quiet and compact
- Modular design
- Operator-friendly
- Simple installation, parameterization and commissioning



SINAMICS G150

- The universal drive solution for high-rating single-motor drives in a standard cabinet
- V/f control, vector control with / without encoder
- For the power range from 75 – 1500 kW
- For variable-drives with square-law load torque ($M \sim n^2$) and constant ($M = \text{Const}$) load characteristic with average performance requirements,
- without regenerative feedback into the line supply
- Features
- Quiet and compact
- Service-friendly
- Operator-friendly
- Simple installation, parameterization and commissioning



SINAMICS ET 200S FC



The frequency converter ET 200S FC is totally embedded in ET 200S and provides all advantages of this system

- Variable speed drive
- with V/f control, vector and torque-control
- for the lower power and performance range of 0.75 - 4 kW
- For winders, pumps, fans, extruders
- for 3-phase supplies (380 – 480 V)
- for industrial and public networks
- PROFIBUS- and PROFINET- Interface
- simple installation, parameterization and commissioning
- Safety integrated functions like
 - Safe standstill
 - safe brake ramp
 - safely reduced speed without encoder

Modular converter concept

Combination of control modules and power modules

Control Module



Power Module



6 different frequency converters possible:

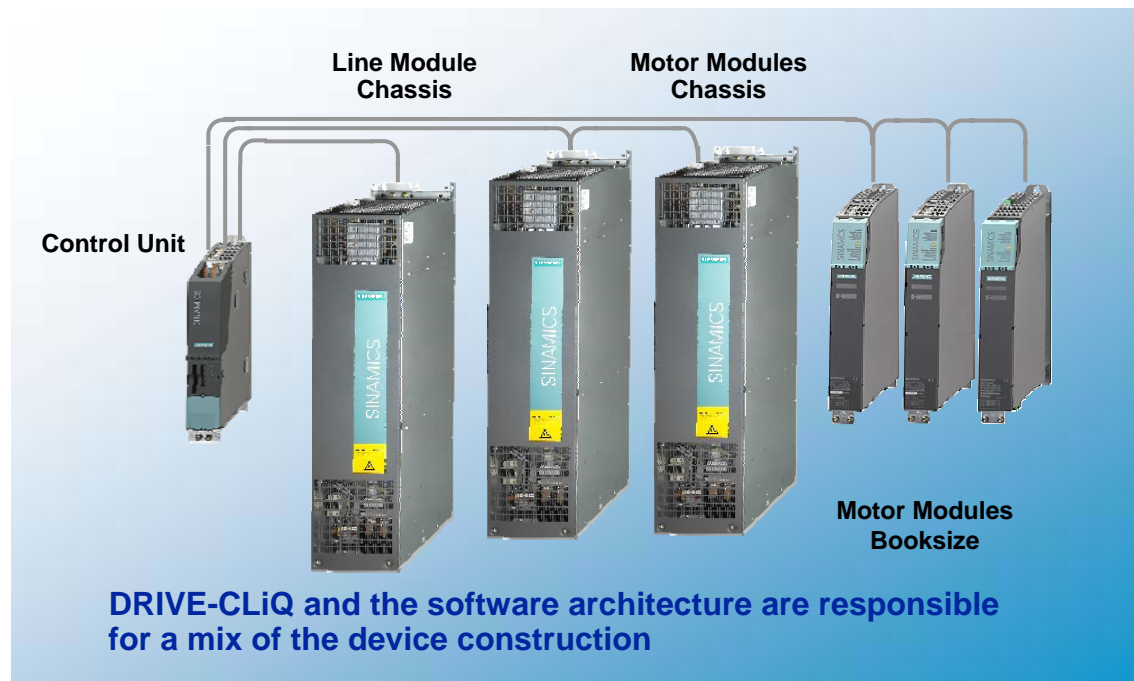


ICU24 + IPM25
0.75 kW

SINAMICS S120 – optimized for single and multi-axis applications

SINAMICS S120				
Modular drive system for sophisticated single/multi-axis applications				
Blocksize	Chassis	Booksize	Chassis	Cabinet Modules
				
AC/AC drive units for single-axis applications		DC/AC drive units for multi-axis applications		
IP20	IP20	IP20	IP00, IP20	IP20 (IP21, 23, 54)
0.12 – 1.1 kW (0.16 – 1.5 HP)	–	–	–	–
0.37 – 90 kW (0.5 – 120 HP)	110 – 250 kW (150 – 340 HP)	1.6 – 107 kW (2 – 145 HP)	110 – 800 kW (150 – 1000 HP)	110 – 3000 kW (150 – 4000 HP)
–	–	–	75 – 1200 kW (100 – 1600 HP)	75 – 4500 kW (100 – 6000 HP)

Booksize and Chassis



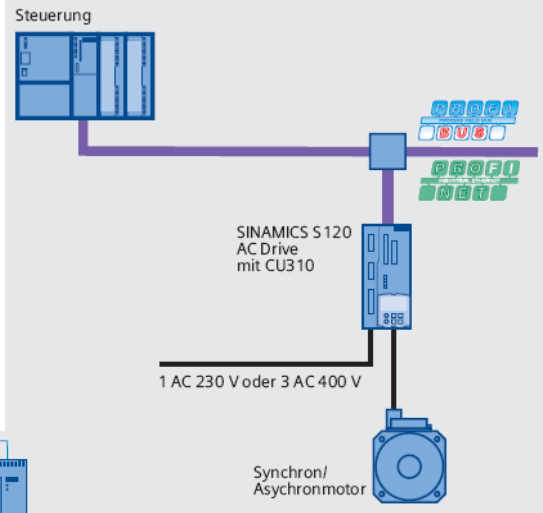
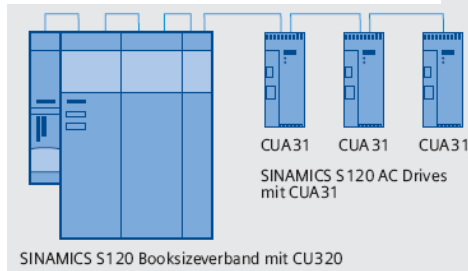
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SINAMICS S120 AC Drive

The ready to start stand-alone drive



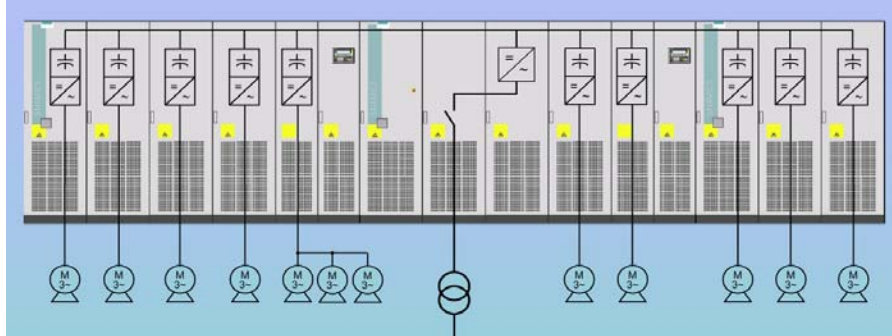
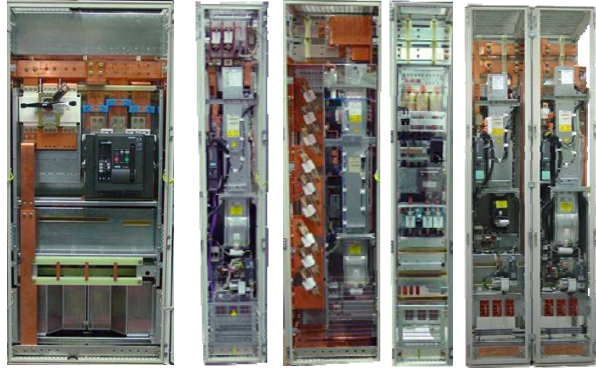
1 AC 230 V
0,25 – 1,1 kW
3 AC 400 V
0,37 – 90 kW
110 – 250 kW



Also for multi-axis applications as decentralized drives
Combination with other S120 drives possible

SINAMICS S120 CM

The modular Cabinet system for multi-axis drive systems



SINAMICS S150



For single drives with high power

- Standard regenerative feedback
- For the power range from 75 – 1200 kW
- Centrifuges, motor testing,
- Compact design
- Low noise
- Simple installation, parameterization and start-up
- Easy to maintain

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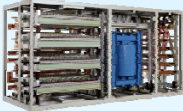
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Medium Voltage Converters

<p>SINAMICS GM150</p> <p>0.6–10 MVA max. 28 MVA</p> <p>Medium voltage 2.3 kV / 3.3 kV / 4.16 kV / 6 kV / 6.6 kV / 7.2 kV /</p> <p>3-level NPC voltage-source DC link converters</p> <p>HV IGBT IGCT Air-/water- cooled</p> 	<p>SINAMICS SM150</p> <p>5 – 10 MVA max. 28 MVA</p> <p>Medium voltage 3.3 kV</p> <p>3-level NPC voltage-source DC link converters</p> <p>IGCT Water- cooled</p> 	<p>SIMOVERT D</p> <p>3–25 MVA</p> <p>Medium voltage 1 – 4 kV</p> <p>Cyclo- converters</p> <p>Thyristor Air-/water- cooled</p> 	<p>SINAMICS GL150 (SIMOVERT S)</p> <p>2.5–70 MW max. 140 MW</p> <p>Medium voltage 1.8 – 13.4 kV</p> <p>LCI current-source DC link converters</p> <p>Thyristor Air-/water- cooled</p> 
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Product characteristic: Special products for specific sectors; support by local competence center

SINAMICS GM150

□ **The universal drive solution for high-rating single-motor drives in a standard cabinet design**

- Vector control with / without encoder
- For a power range from 800 kW to 25 MW
- For variable-speed drives with square-law ($M \sim n^2$) and constant ($M = \text{const.}$) load characteristics
- with average performance requirements
- without regenerative feedback into the line supply
- Consequentially favorably-priced - from planning through to service
- Simple integration and installation
- Straight forward operator control
- Intelligent maintenance functions
- Power section up to 10 MVA with HV-IGBTs (up to 28 MVA with IGCTs)
- Wide range of voltages and power ratings



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SINAMICS GL150

- **The rugged single drive for synchronous machines up to 100 MW**
 - Vector control with / without encoder
 - For a power range from 6 MW to 100 MW
 - Regenerative feedback into the line supply
 - Compressors, pumps, extruders, kneaders, blast furnace blowers etc.
 - Space saving, compact design
 - Simple integration and installation
 - Straightforward operator control
 - Extremely reliable and almost maintenance-free



SINAMICS SM150

- ❑ **The sophisticated drive solution for high rating, medium voltage single-motor drives**
 - Vector control with / without encoder
 - Regenerative feedback into the line supply as standard
 - For a power range from 5 MW to 28 MW
 - High drive quality and availability for sophisticated, complicated processes
 - Test stand drives, centrifuges, etc.
 - Consequentially favorably-priced - from planning through to service
 - Simple integration and installation
 - Straightforward operator control
 - Intelligent maintenance functions
 - Wide range of voltages and power ratings



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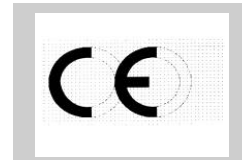
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Certification

- The system conforms with the applicable low-voltage and EMC directives



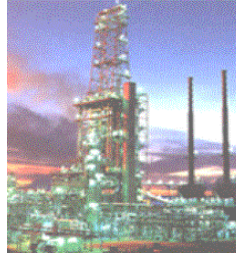
- The system components are cULus approved and listed (approval by UL to UL and CSA standards)



- Safety functions "Safe Standstill" and "Safe Break Control" will be certified according EN954-1/ Category 3 and IEC61508/SIL 2.



- Chemical industry
- Shipbuilding industry



SINAMICS Drives have the certification necessary for world wide usage