

Can a cost-effective drive be operator-friendly?



SINAMICS G150 - lower noise, lower footprint,
more user-friendliness

Answers for industry.

SIEMENS

SINAMICS – the optimum drive for every application

The drive family for drive solutions that are fit for the future

| Low voltage | | | | | | DC | Medium voltage | | | | |
|---|---------------------|-----------------------------------|---|----------------|--------------------|---|---|--|---|--|--|
| AC | | | | | | | AC | | | | |
| For basic applications | | For high-performance applications | | | | For basic servo applications | For basic and demanding applications | For applications with high power ratings | | | |
| | | | | | | | | | | | |
| SINAMICS G110 | SINAMICS G110D | SINAMICS G120P | SINAMICS G120 | SINAMICS G120D | SINAMICS G130/G150 | SINAMICS S110 | SINAMICS S120 | SINAMICS S150 | SINAMICS DCM | SINAMICS GM150 / SM150 / GL150 / SL150 | |
| V/f control | V/f control/FCC | V/f control/FCC/Vektor control | V/f control/Vector control | | | Servo control | V/f control/Vector control/Servo control | | Closed-loop speed/torque control | V/f control/Vector control | |
| 0.12 – 3 kW | 0.75 – 7.5 kW | 0.37 – 90 kW | 0.37 – 250 kW | 0.75 – 7.5 kW | 75 – 2,700 kW | 0.12 – 90 kW | 0.12 – 4500 kW | 75 – 1200 kW | 6 kW – 30 MW | 0.8 – 120 MW | |
| Pumps, fans, conveyor belts | Conveyor technology | Pumps, fans, compressors | Pumps, fans, conveyor belts, compressors, mixers, crushers, extruders | | | Single-axis positioning, applications in machinery and plant construction | Motion control applications in production machines (packaging, textile and printing machines, paper machines, plastics machines) machine tools, plants, process lines and rolling mills | | Test stands, cross-cutters, centrifuges | Rolling mill drives, wire drawing machines, extruders, kneaders, cable railways and lifts, test stand drives | Pumps, fans, compressors, mixers, extruders, crushers, rolling mills, mine hoists, excavators, test stands |
| Common Engineering Tools | | | | | | | | | | | |
| SIZER – for simple planning and engineering | | | | | | STARTER – for fast commissioning, optimization and diagnostics | | | | | |

The SINAMICS family offers the optimum drive for each and every drive application – and all of the drives can be engineered, parameterized, commissioned and operated in a standard fashion.

SINAMICS – fit for every application

- Wide range of power ratings from 0.12 kW to 120 MW
- Available in low-voltage and medium-voltage versions
- Standard functionality using a common hardware and software platform
- All of the drives can be engineered using just two tools:
SIZER – for engineering
STARTER – for parameterizing and commissioning
- High degree of flexibility and combinability

SINAMICS G150 – ideal for pumps, fans, extruders and mixer drives



reaches up to 105% of the line supply voltage but at the same time there is an extremely high harmonic content in the motor current. This results in significant harmonic losses in the motor and a significantly poorer utilization when compared to direct on-line operation. Our SINAMICS G150 drive converter operates with a technique that is unique in the marketplace – that combines the advantages of both techniques. The so-called edge modulation with optimized pulse pattern. Even under load it reaches 100% of the line supply voltage without any negative effects such as an extremely high harmonic content and supplementary losses in the motor. The drive converter losses are also lower. Only Siemens drive converters – such as the SINAMICS G150 – have edge modulation.

Quieter, more compact, more user-friendly

SINAMICS® G150 is the Siemens drive solution for applications that do not require regenerative feedback into the line supply. These are predominantly applications with square-law load torque characteristics – i.e. pumps, fans and compressors, but also constant-torque applications such as extruders, mixers and crushers. A new concept makes these drive converter cabinets unique. A modular packaging design, extremely low-loss IGBT power semiconductors and an innovative cooling solution make SINAMICS G150 the quietest and most compact drive converter in a standard cabinet. The plug and play cabinet units are extremely easy to handle and their modular design simplifies service.

Low costs – from planning up to service

Our SINAMICS G150 drive converters have been completely redeveloped and distinguish themselves in every phase of

the product life cycle with low costs and simplicity – from planning and procurement through installation and commissioning up to daily operation and service. SINAMICS G150 units offer an excellent price-performance ratio and can be completely integrated into any automation solution.

100% line supply voltage at the motor – without any harmonics

Up until now, there were two alternatives for voltage-source DC link converters to generate a variable output voltage. Both of these alternatives have specific disadvantages: Although the so-called space vector technique minimizes the harmonic component in the motor current and therefore supplementary losses in the motor, with this technique, only a maximum of 90% of the line supply voltage is available at the motor. This means that the rated operating point of the driven load may not be able to be reached – especially for square-law load characteristics. The alternative technique – the square-wave clocking technique –

SINAMICS G150

- Favorably priced: Across the board – from planning through to service
- Compact: up to 70% smaller footprints
- Quiet: noise, typically 69 dB (A)
- Energy-saving: up to 50% less energy requirement for the drive system
- Precise: to flexibly adapt to the process
- Uncomplicated: simple operator control across the board
- Unique: 100% line supply voltage at the motor without any secondary effects
- Modular: also as SINAMICS G130 chassis unit

Power and voltage ranges SINAMICS G150

| | |
|-----------|--------------|
| 380–480 V | 110–900 kW |
| 500–600 V | 110–1,000 kW |
| 660–690 V | 75–2,700 kW |

SINAMICS G150 reduces the costs – even before production starts



SINAMICS G150
Version A, IP54, 250 kW



SINAMICS G150
Version C, IP2, 250 kW

Quick and easy: Plant integration

For instance – plant construction companies can quickly and reliably select the optimum SINAMICS G150 version for worldwide use from the easy-to-use catalog. The standardized versions for all relevant voltage ranges and line frequencies are available within the shortest time. The drive can be precisely dimensioned thanks to the range of outputs that are orientated to the user and the motor. Possibilities of connecting the drive to grounded and non-grounded line supplies (TN and IT line supplies) are already integrated. Not only this, SINAMICS G150 drives can be easily integrated into your automation environment through various analog and digital interfaces.

Flexible range of options: Transparent and cost-reducing

The ready-to-connect drive converter cabinet units can be precisely adapted to customer-specific requirements thanks to a wide range of components and options. A transparent structure makes it simple to select the appropriate options. The drive unit can be flexibly adapted to a specific application, which means that it does not have functions that are not actually required.



SINAMICS G150
Version A, IP20, 800 kW



SINAMICS G150
Version A, IP20, 2,400 kW

Easy planning and installation: Low space requirement

The small SINAMICS G150 footprint is impressive: When compared to other drive units for the same application, it is up to 50 % smaller. For Version C, where the line supply connection components are installed in a central low-voltage switchboard, the footprint can even be reduced by up to 70 %! The cabinet widths decrease in a 200 mm grid pattern. This has all been made possible by the use of low-loss components, for example by using flat copper busbars instead of cables for the power connections.

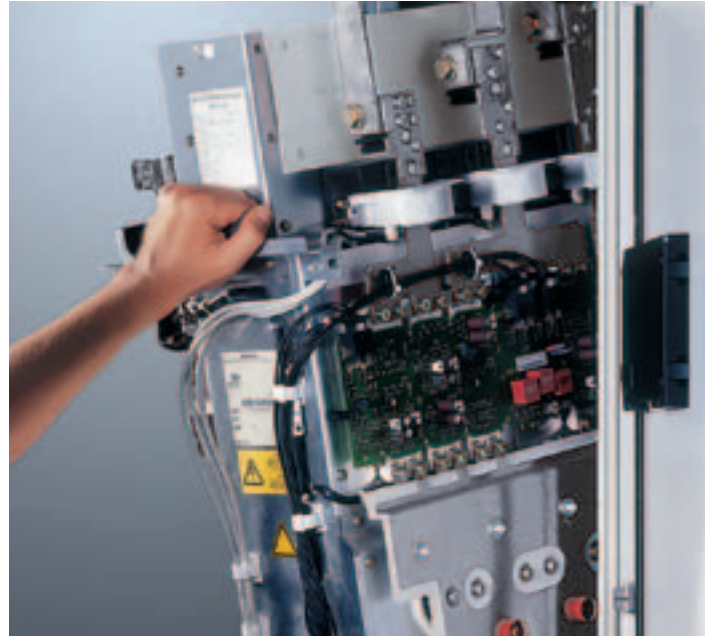
The amount of cabling is also reduced thanks to the modular design and by sensibly combining functions.

The degree of protection can be subsequently increased up to IP54 thanks to filter elements that have been specifically designed for this purpose – and that without changing the mounting footprint.

Well conceived: Easy installation

Our SINAMICS G150 drive converter is supplied in a standard cabinet with 200 mm grid dimensions. In spite of the compact envelope dimension, the internal space for routing cables is generous so that even thick cables can be easily connected. Furthermore, cables can either be introduced from the top or the bottom (the cable entry is prepared in the factory) without increasing the mounting footprint.

Simply faster from the word go! SINAMICS G150 is as straightforward as it gets



Commissioning: Finished quickly – without a manual

A SINAMICS G150 is commissioned directly at the AOP30 user-friendly operator panel or the STARTER software. Commissioning is extremely simple and can be quickly learned. Only a few parameters have to be set during the menu-prompted commissioning at the cabinet. The time required for installation and handling is reduced to approx. 1/10 as it is no longer necessary to study manuals – a time-consuming affair.

Simple to learn: The operator control

Drive units that are easy to handle help avoid operator errors. This in turn also increases their availability. This is where the user-friendly operator panel shows its strengths: A graphics-capable LC display in conjunction with a menu-based system in plain text. Context-sensitive function keys reduce the overall number of keys and simplify operator prompting and

navigation. Important process values can be seen at a glance using the bar-type displays. Extensive help and diagnostic functions provide detailed information about actual faults, including their causes and possible measures to resolve them.

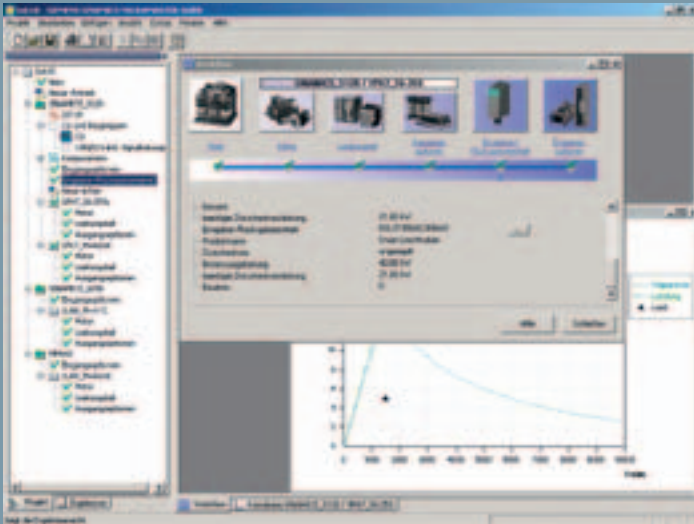
In operation the quietest drive converter

SINAMICS G150 is quietness itself. The reason for this is that the latest CAD techniques for thermal simulation were used during the development. This simulation allowed an optimum cooling air flow to be achieved. However, a lower cooling demand was achieved by consequentially using state-of-the-art, low-loss components. The tangential fans, located in the lower section of the cabinet, are extremely quiet and the cooling air is blown upwards through the drive converter so that all of the power elements have the same air intake temperature. This means that in comparison to conventional cabinet units, the noise level is up to 18 dB (A) lower.

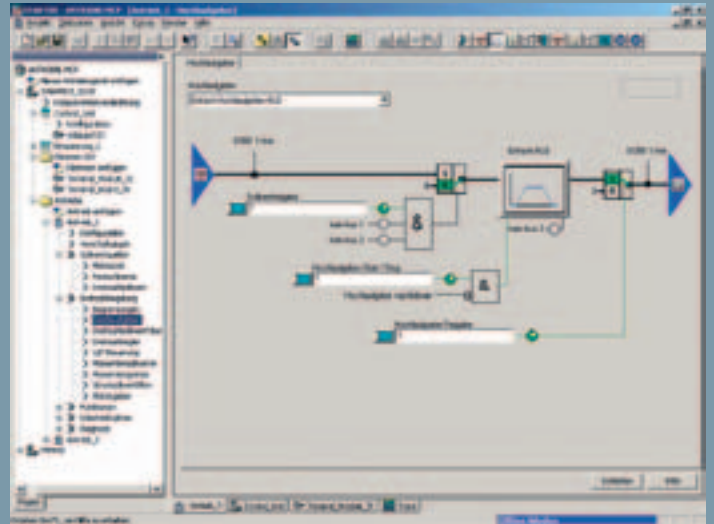
Modular design for the highest degree of service-friendliness

Function blocks and modules have been combined which means that SINAMICS G150 drive converters not only have an extremely compact design, but are also extremely service-friendly. When designing the drive units, good accessibility and the ability to quickly replace all of the various modules had topmost priority in the requirement specifications. Individual modules such as the fan assembly, control electronics, customer interfaces and power components, can be easily replaced when service is required. This guarantees a high degree of availability. Typically, only 15 screws have to be released in order to replace the "Power-block" power module.

One system for all drives – seamlessly integrated engineering



SIZER tool



STARTER tool

Favorably priced with system-based flexibility

The completely newly designed SINAMICS family of drives can address new cost-saving potential thanks to its unique, seamless, integrated philosophy and operator navigation! This means easy entry into the drive system and once know-how has been built up, this can be directly transferred – e.g. using the higher-level tools for engineering, configuring and commissioning. The two tools – SIZER and STARTER – run as dedicated Windows applications. The experience gained when using these tools can be used when engineering any other SINAMICS drive.

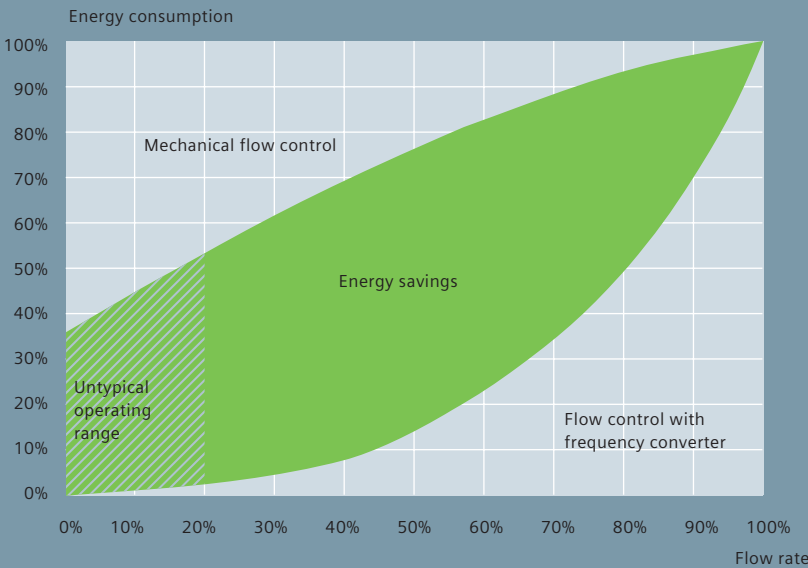
Minimizes the costs: SIZER engineering tool

This engineering tool makes it possible to engineer a drive system as quickly and reliably as never before. This is because it includes all of the SINAMICS components that can be used when designing a drive system and, thanks to the graphic interface, can be intuitively handled. Once learned, every SINAMICS drive system can be quickly engineered using SIZER. SIZER stands for reducing the manufacturing costs of the plant through accelerated engineering.

Speeds up commissioning: STARTER tool

Faster to the final goal with STARTER – and that without any specific system know-how. STARTER allows drive components to be simply configured and commissioned – graphically and menu-prompted. Data can be imported from the electronic rating plates of the drive components, which makes parameterizing simpler and faster for users – and also avoids incorrect entries.

With variable speed – SINAMICS G150 saves energy



Save energy instead of wasting it: Variable-speed operation

Often, pumps, fans and compressors are controlled using traditional control techniques. This has a decisive disadvantage as the motor permanently runs at the rated speed with the maximum flow rate – although in practice, this is only infrequently required. This results in frequent partial load operation with high-energy losses, e.g. when throttles are used for the closed-loop control. Variable-speed frequency converter operation makes this expensive energy wastage a thing of the past.

Savings in the double-digit percentage range

Variable-speed drive systems utilizing drive converters precisely adapt the energy they draw to the actual requirements. The motor only draws the power that is precisely required at that particular operating point. This means that the power factor and efficiency remain almost constant – resulting in energy savings of up to 60%, in extreme cases, even up to 70%.

Less stress on the plant and the balance sheet

Drive converters avoid current peaks, torque surges as well as unfavorable operating conditions and with soft starting and stopping ensure low stressing on the complete mechanical transmission line. Mechanical closed-loop control is not required. The result – improved performance, lower service and maintenance costs and a longer

service lifetime. This reduces the stressing on your plant and makes your commercial manager happy.

Ideal for applications without regenerative feedback into the line supply

SINAMICS G150 converters with their rugged, sensorless, closed-loop vector control are especially tailored for drive applications that do not require regenerative feedback into the line supply. Many of these applications include pumps, fans and compressors, i.e. applications with the largest energy-saving potential.

Investments that pay off – SinaSave calculates the payback time



Correct calculation using specific data

Our SinaSave software tool shows you how quickly an investment made in a SINAMICS G150 frequency converter pays off. The program calculates the energy saving based on the specific plant characteristics and data. The payback time is derived from the total monthly saving and the costs of the frequency converter. Often, this payback time is only just a few months.

A handle on all factors

The SinaSave energy-saving program takes into account all of the parameters required for the calculation:

- Flow rate and delivery head for pumps
- Mass flow and total pressure difference for fans
- Density of the pumped medium

- Efficiency of the fan or pump, electrical efficiency and overall efficiency of the plant
- Number of working days and working shifts
- Operating profile over a day and a year

The optimum technology at the right price

To start, SinaSave generates the ideal drive system from the basic plant-specific data that was entered. This ideal drive system has the appropriate power rating and a price is generated for a suitable frequency converter. The program then determines the energy required by the variable-speed drive system for the specific application. It then compares this with the values also calculated for the alternative concepts that could be considered (for example, various throttle valves, bypass systems or pole changing motors). The energy saving in Kilowatt hours is obtained from the difference. Based on the

actual cost of energy, SinaSave outputs this value as a specific saving. The costs for planning, engineering, integration and commissioning must then be added to the price of the frequency converter itself. SinaSave then calculates the individual payback time taking into account the energy saving and additional cost-reducing effects of variable-speed operation (e.g. improved power factor and operation with low stressing on the overall plant or system).

SinaSave itself not only offers user-friendly functions - such as the automatic update - but also, all of the world's major languages, electrical and mechanical units as well as currencies. The latter are dynamically updated through the European Central Bank.

More on the subject of energy saving with SinaSave under:
www.siemens.com/energysaving

SINAMICS G150 drive converters – options and versions



SINAMICS G150, Version A

Version A offers sufficient mounting space for all of the available options. The line supply as well as the motor can either be connected up at the top or bottom thanks to the different versions. This results in a high degree of flexibility regarding installation and mounting.

SINAMICS G150, Version C

The especially space-saving version for arrangements where the line connection components are accommodated in a central low-voltage distribution and therefore don't have to be mounted in the cabinet. For both versions, the AOP30 user-friendly operator panel is mounted in the cabinet door.

SINAMICS G150 Clean Power – the cost-effective solution for line-friendly operation

SINAMICS G150 Clean Power is the simple and cost-effective response to the increasing requirements placed on current and voltage quality. This solution, which is fully integrated in the control cabinet, combines the advantages of rugged 6-pulse rectifier technology with an innovative, passive Line Harmonics Filter (LHF compact). This concept sets itself apart as a result of its simplicity, compactness, high reliability and energy efficiency as well as its price-performance ratio. Regarding its harmonic values, SINAMICS G150 Clean Power is the ideal response to the trend towards increasingly higher line supply quality. It easily complies with standard IEEE519, with the most stringent international requirements placed on line harmonics generated by frequency converters – and this even for weak line supplies. With this passive filter, there are no pulse-frequency components in the line current that have to be eliminated – an otherwise

complex process. Further, with its innovative filter technology, SINAMICS G150 Clean Power facilitates an extremely compact design in conjunction with increased efficiency and the highest degree of reliability. A three-winding transformer with secondary windings offset by 30° to one another is not required. The passive components of the LHF compact essentially don't influence the probability of failure of the converter – thus ensuring the highest degree of reliability. SINAMICS G150 Clean Power is subject to exhaustive tests and is supplied type-tested and installed as a ready-to-connect package. For SINAMICS G150 Clean Power, the filter is an integral component of the electrical cabinet – which sets itself apart from conventional external passive filters. As a consequence, fuses, switches and contactor do not have to be duplicated – which would otherwise involve additional costs. This solution also does not require an additional line reactor.

SINAMICS G130 – the compact chassis unit



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We can help you under our hotline 0180/5050222. From a fast tip to resolve a simple problem solution up to qualified technicians on-site for competent service.

SINAMICS G150 options (selection)

- Main/switch/contactors including line fuses
- Circuit-breakers
- Radio interference suppression filters
- Line reactors
- Braking units
- Output reactors
- Emergency Stop functions
- Connections for external auxiliaries
- Thermistor motor protection
- Communication interfaces
- Mechanical options:
 - Increased degree of protection up to IP54, additional shock hazard protection when the cabinet is open
- Sinusoidal filter
- dv/dt filter plus or du/dt-Filter compact plus VPL to limit voltage gradients
- Chemical industry version
- Marine version

The “modular version”

The SINAMICS G130 drive system is the “modular version” of the SINAMICS G150. It has a modular design therefore allowing machinery and plant construction companies to engineer individual solutions. These can be adapted to the application and integrated into cabinets.

SINAMICS G130 comprises two modular, autonomous components:

- Power Module and
- Control Unit

These units can either be mounted separately from one another or as a single unit. A slot is provided in the Power Module for the Control Unit. The AOP30 user-friendly operator panel is available for commissioning and local operator control. Predefined interfaces, whether a terminal strip or communication interfaces – simplify commissioning and controlling of the drive. The control unit interfaces can be supplemented by additional modules. SINAMICS G130 chassis units are available for the power range 75 kW to 800 kW.

Additional informations on SINAMICS is provided under
www.siemens.com/sinamics

The addresses and contact partners are provided under
www.siemens.com/automation/partner

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