

What fulfills the highest demands on the current and voltage quality?



SINAMICS G150 Clean Power: rugged 6-pulse rectifier technology with innovative passive line harmonics filter.

Answers for industry.

SIEMENS

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



High-rating frequency converters are being increasingly used where the permissible line harmonics must be kept at a low level. They are also increasingly becoming the first choice for basic applications for reasons especially relating to energy efficiency and process quality – for instance for pumps, fans, compressors, extruders, mixers and crushers. At the same time, demands placed on the current and voltage quality are increasing: Low-frequency harmonics must be kept at the lowest possible level. The intelligent response to these requirements: SINAMICS G150 Clean Power.

Well conceived down to the finest details

With SINAMICS G150 Clean Power, users have a frequency converter, which, as far as its functionality is concerned, is precisely tailored to fluid-flow machines and basic constant-torque applications. They also profit from current and voltage characteristics with an extremely low harmonic content. The completely integrated solution combines the advantages of the rugged 6-pulse rectifier technology with an innovative, passive line harmonics filter (LHF compact). This leading-edge concept distinguishes itself as a result of its simplicity and compact design, its highest degree of reliability and energy efficiency – and last but not least – as a result of its outstanding price-performance relationship.



SINAMICS G150

SINAMICS G150 AC/AC converters are accommodated in standard electrical cabinets that are ready to be connected-up. They can be seamlessly integrated into any plant or system. The maintenance-optimized, compact units can be quickly and simply installed and commissioned. Further, they can be perfectly adapted to the prevailing requirements thanks to an extensive range of options. SINAMICS G150 converters are available with cabinet widths starting from 400 mm and increasing in incremental steps of 200 mm. They can be supplied in various degrees of protection up to IP54 – with the AOP30 Advanced Operator Panel installed in the cabinet door as standard. The units are available for the power range extending from 75 kW up to 1500 kW.

SINAMICS G150: universal converter for single-motor drives without energy recovery

SINAMICS G150 cabinet units have been designed for variable-speed drives in machine and plant construction – and more specifically to address the requirements of single-motor drives with square-law and constant load characteristic without energy recovery. Here, they are perfectly suited as a cost-effective drive solution, which can be perfectly adapted to customer-specific requirements based on a wide range of components and options.

Wide range of application possibilities

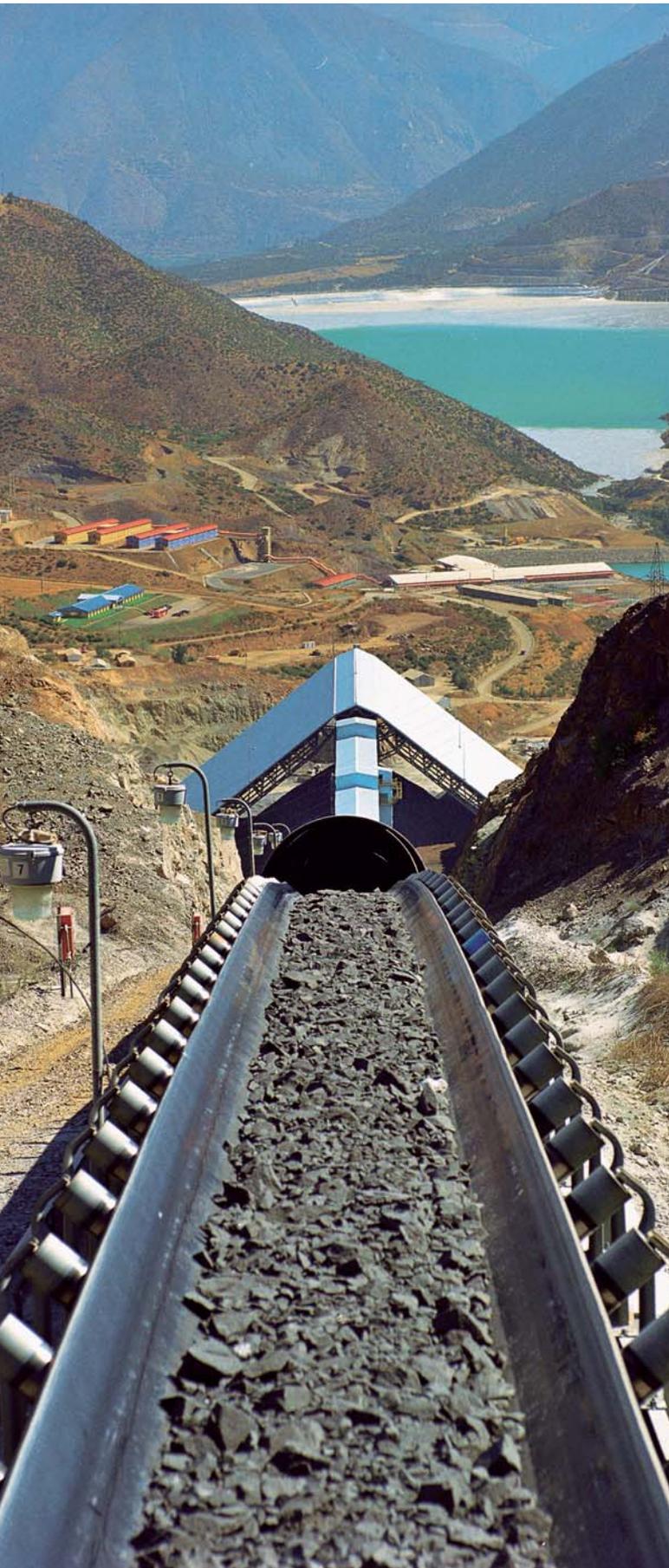
SINAMICS G150 is the first choice whenever solid, liquid or gaseous materials and substances have to be moved, transported, pumped or compressed.

Put another way – wherever variable-speed drives make commercial sense. This essentially involves the following applications:

- Pumps, fans and compressors
- Extruders, mixers and crushers

Advantages at a glance

- Especially quiet and compact thanks to state-of-the-art IGBT power semiconductors and an innovative cooling concept
- Can be simply integrated thanks to the standard PROFIBUS interface, PROFINET, CAN bus or analog and digital interfaces
- Higher degrees of plant and system availability thanks to the individual modules and power components that can be quickly and simply replaced.
- Simple commissioning and parameterization: menu-prompted at the AOP30 Advanced Operator Panel with graphics-capable LCD display and plain text display.
- Integrated safety function



Climate change, the globally rising energy usage as well as increasing energy costs are reinforcing the trend toward frequency-controlled drive solutions with a high-energy efficiency. However, without taking the appropriate countermeasures, the use of electronic components with non-linear current-voltage characteristics in converter-fed three-phase drives has a negative impact on the line supply: Current and voltage harmonics diminish the quality of the power system. At the same time, increasingly stringent limit values in this area are being specified – and that around the globe. All of this together means that measures to reduce harmonics are becoming increasingly more and more important.

System-based clean line supply



SINAMICS Clean Power at a glance

- Extremely line friendly: fulfills even the most stringent standards
- Rugged and reliable: the overall unit availability remains high
- Compact: small dimensions and completely integrated in the drive unit
- Energy efficient: has a significantly higher efficiency than other solutions
- Cost effective: perfect price-performance ratio
- Simple: ready to connect-up, type tested and easy to install
- Safe: also for high degrees of protection and integrated safety functions

Minimizing harmonics – simply and efficiently

SINAMICS G150 Clean Power combines the advantages of the well proven SINAMICS technology with an LHF compact, which is available for the complete range of power ratings and is fully integrated into the SINAMICS electrical cabinet.

With this passive filter system, suitably dimensioned lowpass filters are connected between the converter and line supply. These devices filter out the harmonics generated by the converter – representing an extremely simple, rugged and economic solution to reduce line harmonics. What is especially advantageous is that by using the optimized passive filters to reduce the line harmonics, neither active components nor complex transformer technology is required. Not only this, there is no noticeable negative impact on the efficiency and availability of the converter.

Lowest line harmonics

When it comes to its harmonic values, SINAMICS G150 Clean Power is the ideal response to the trend toward an ever-increasing line supply quality. It complies with standard IEEE 519, which places the most stringent requirements on line harmonics generated by frequency converters worldwide, and that without any problems. In conjunction with the capacitances integrated in the LHF compact, this innovative filter reactor means that SINAMICS G150 Clean Power complies with the limit values of this standard – even for weak line supplies ($u_k \leq 5\%$). It goes without saying that other standards – such as EN 61000-2-4 Class 2 and G5/4 – are also simply complied with. The line supply current drawn by the LHF comes very close to a sinusoidal waveform and therefore completely fulfills the strict stipulations of the power utility companies. Pulse-frequency components in the line current, which are generated by converters with active clocking infeeds and active filters, do not occur with the passive filter and therefore do not have to be eliminated – an otherwise complex procedure.

Compact and reliable

The central component of the LHF compact is a filter reactor wound around a common core. This innovative technology facilitates an extremely compact design in conjunction with increased efficiency and the highest degree of reliability. Contrary to conventional 12-pulse infeeds, for concepts involving 6-pulse converters with LHF compact, a three-winding transformer with secondary windings offset through 30° is not required. The lower rms current value permits smaller cross-sections for the line supply feeder cable and reduces the losses in the transformer. Not only this, the complete system is significantly more compact as a second rectifier is not necessary. And finally, the passive filter technology sets itself apart as a result of its ruggedness. When compared to converters with active clocked rectifiers, the operational reliability (MTBF) is increased by approximately 75%. The reason for this is that the passive components of the LHF compact have practically no influence on the probability of failure of the converter.

Highest energy efficiency and cost effectiveness



SINAMICS G150 Clean Power sets standards when it comes to energy efficiency and cost effectiveness. Compared with other solutions to reduce the line harmonics, the LHF compact scores plus points thanks to its efficiency as the power loss is approximately 40% lower. As the incoming rectifier does not use comparatively expensive IGBTs, when compared to converters with an active infeed, SINAMICS G150 Clean Power offers a very good price-performance ratio. The advantage: maximum benefits with minimum investment.

Minimum installation costs

With its SINAMICS G150 Clean Power, for the first time ever, Siemens is offering a solution that can be supplied to customers as a ready-to-connect package. It is type tested, preinstalled and has been exhaustively tested. On the other hand, conventional passive filters are mounted as external components between the converter and line supply connection point. As a consequence, additional space must be made available at the

mounting location. Further, line-side protection is required and the filter also has to have additional noise suppressing components.

The filter for SINAMICS G150 Clean Power is an integral component of the electrical cabinet. This means that the line filters used for the converter also protect the filter. The main switch and power contactor safely and reliably disconnect and isolate the converter and filter from the line supply. Fuses, switches and contacts do not have to be installed twice – an otherwise complex configuration – and an additional line reactor is also not required.

Efficient filter solution – also for high degrees of protection and integrated safety function

A problem that frequently occurs in the field: While frequency converters are available in high degrees of protection, external filter solutions only have lower IP classes. This is not the case for SINAMICS G150 Clean Power: The electrical converter cabinet is available in degrees of protection IP20 to IP54. The filter only slightly



increases the cabinet dimensions. The standard options of the SINAMICS G150 are also available in the Clean Power version. This means that the inverter can be supplemented, for instance, by the line filter for use in residential environments according to C2 (EN 61800-3). EMERGENCY OFF and EMERGENCY STOP are also available just like the certified Safety Integrated functions – Safe Torque Off and Safe Stop 1. dv/dt and sinusoidal filters can be integrated on the output side when used with old motors or if the motor cables are not shielded. It goes without saying that the SINAMICS G150 Clean Power is also equipped with the well-proven AOP30 graphics operator panel. This facilitates extremely simple parameterization and operator control if the user-friendly STARTER commission software is not used.

LHF compact as built-in unit: for integration into the electrical cabinet or machine

If the converter is to be directly integrated into the machine or a switchgear panel on the plant side, LHF compact is also available as built-in version for SINAMICS G130 – the modular version of the SINAMICS G150. Only a small amount of space is required in the switchgear cabinet due to its ultra-compact design. It is supplied almost completely pre-installed so that nothing stands in the way of simple integration.

Additional information 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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