

SIEMENS



SINAMICS S120 liquid-cooled

For harsh environmental conditions

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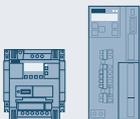
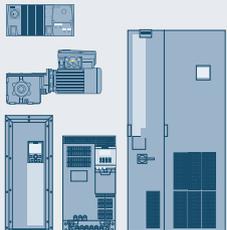
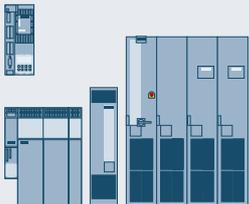
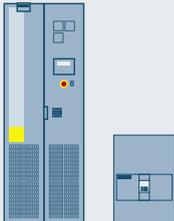
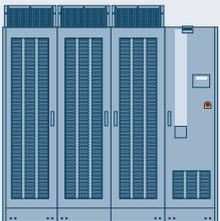
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SINAMICS – the optimum drive for every application

SINAMICS is the drive family for future-proof drive solutions, offering you the optimum drive for every application. All of the members of this converter family can be engineered, parameterized, commissioned and operated in the same standard way. One drive system – to tackle every application.

SINAMICS S120 liquid-cooled is part of the SINAMICS family

- Wide range of power ratings from 0.12 kW to 85 MW
- Available in low-voltage, medium-voltage and also DC versions
- High degree of flexibility and combinability
- Simple link to SIMATIC control systems, seamless integration in the automation landscape as well as part of Totally Integrated Automation
- Higher-level, standard Safety Integrated concept
- Standard engineering for all drives
 - SIZER for engineering
 - STARTER / SINAMICS Startdrive for parameterizing and commissioning

Low voltage AC			DC voltage	Medium voltage AC
Basic Performance	General Performance	High Performance	DC applications	For applications with high power ratings
				
V-series	G-series	S-series	DCM	Medium voltage series
0.12 – 30 kW	0.37 – 6,600 kW	0.15 – 5,700 kW	6 kW – 30 MW	0.15 – 85 MW
When it comes to the hardware as well as the functionality, SINAMICS V converters concentrate on the essentials. This results in a high degree of ruggedness with low associated investment costs.	The functionality of SINAMICS G converters makes them the perfect choice when addressing basic and medium requirements relating to the control dynamic performance.	SINAMICS S converters are predestined for demanding single-axis and multi-axis applications in plant and machinery construction – as well as for the widest range of motion control tasks.	In addition to the highest power ratings, SINAMICS DC converters also offer the maximum degree of availability.	Our seamless and integrated range – which is unique worldwide – encompasses all dynamic response and performance levels in voltage classes 2.3 to 11 kV.



Efficient and rugged: liquid-cooled SINAMICS S120

The clever alternative for harsh environmental conditions

Liquid-cooled SINAMICS S120 converters are predestined for harsh conditions. High degrees of protection can be achieved when using these devices. They are also not affected by dirty or aggressive ambient air. When compared to air-cooled versions, liquid-cooled versions have a footprint that is up to 50 % smaller than for chassis devices – an ideal solution where mounting space is restricted. Less space is required in the control cabinet as a result of the lower envelope dimensions. Not only this, these liquid-cooled drive systems are especially quiet, efficient and require little maintenance. In many applications, the heat recovery can create additional energy saving potential. In this case, the cooling water that has been heated up can be used for process heat, heating or process water.

Independent of the ambient air

As the power loss for liquid-cooled SINAMICS S120 can be very effectively dissipated to the cooling liquid, sealed control cabinets in an IP55 degree of protection can be easily implemented. The ingress of dusty or aggressive air is just as low as the humidity, spray water or salt-laden sea air in marine applications. Even high ambient temperatures are less critical when compared with air-cooled devices as the thermal load is essentially determined by the cooling water temperature. Further, the temperature in electrical rooms does not increase as much.

SINAMICS S120 liquid-cooled – advantages at a glance

- Highest power density through efficient cooling
- Predestined for applications where space is restricted
- High degrees of protection can be simply implemented
- Perfectly suitable for dusty and aggressive ambient air
- Redundant cooling systems can be implemented with low additional costs
- Room climate control can be significantly reduced
- Maintenance and operating costs can be reduced
- Additional energy saving potential by recovering heat



Cost-saving, compact and versatile

Up to 50% smaller footprint

Where space costs a lot of money – for instance on ships, offshore platforms and industrial plants and systems – liquid-cooled converters are attractive as a result of their extremely compact design. These reduce the footprint by about 50% when compared to air-cooled chassis devices with the same power rating, as they require significantly smaller envelope dimensions as a result of the more effective cooling. The control cabinets can be designed smaller as the chassis units require less space. In turn, this means that electrical rooms can be made smaller, which also has a positive impact on the civil engineering costs.

Quiet and low maintenance

Liquid-cooled versions certainly make sense where cooling water is available anyway. This is because significantly less climate control is required for the electrical rooms that accommodate the converters. SINAMICS S120 converters are quieter to start off with as they have no fans. No additional noise dampening measures are required for typically up to 60 db (A). This is the reason that these converters are recommended for applications that are sensitive to noise, for example on cruise ships – and when directly located close to workplaces in production environments. And, last but not least, eliminating fans enhances drive reliability – and, in turn, plant availability.

Climate control is not required

For liquid cooling, up to 95% of the power loss is dissipated through the cooling medium. This means that the temperature of the ambient air surrounding the converter hardly increases, and complex climate control can be eliminated – this is an important issue for retrofit and modernization projects. A redundant cooling system can be easily configured using two pumps in the cooling system, and can be implemented with low associated costs.

Additional energy saving potential by recovering heat

In addition to the energy savings as a result of the efficient cooling concept, heat can also be recovered. The cooling water that is heated up as part of the cooling process can be used for process heat, heating or hot water at no charge. Using a heat pump, the cooling water temperatures can be increased in an energy-efficient fashion. An especially high amount of energy can be saved if hot water is required for the production process, which for example, is the case when manufacturing paper. Cost savings can also be realized for heating and for hot water required in production and office environments. As a consequence, these devices frequently have a payback time of just several years.

Energy savings

Contrary to converters with a rectifier input on the line side, SINAMICS S120 converters equipped with an Active In-feed can feed back energy into the line supply. This means that they can save a lot of energy. Further, for multi-axis systems, it is also possible to transfer the energy (energy balancing). For example, for crane applications when the load is lowered, energy is recovered that can then be used to power the crane trolley. By connecting up to four identical liquid-cooled modules in parallel, power ratings of up to 5,700 kW can be realized on the motor side and up to 6,460 kW on the line side.

Sophisticated cooling system

The compact design and high efficiency of liquid-cooled SINAMICS S120 devices is based on a sophisticated cooling system. All of the main components, such as power semi-conductors, DC link capacitors and symmetrizing resistors, can be cooled by the cooling circuit. Only a low amount of cooling liquid is required as a result of the physical attributes of water. As a consequence, the required flow rate is very low. This factor reduces the drive power of the pumps when compared to fan power ratings. As a consequence, power costs are very low, which noticeably reduces the operating costs, especially for those plants and systems that operate continuously.

The standard modular system

For liquid-cooled SINAMICS S120, a complete range of standard as well as type-tested components are available. These can be flexibly combined to create the optimum solution for customized applications. Supplementary components such as heat exchanger modules and piping can be simply integrated. Liquid-cooled SINAMICS S120 devices can also be mounted horizontally.

The ideal industry solution

The liquid-cooled concept provides significant advantages in the widest range of sectors – in marine engineering and offshore platforms, for example. The space-saving design especially pays off as every square meter counts. Also the fact that the heat resulting from the cooling process is removed from hot machine rooms and dissipated to the seawater via heat exchangers. Further, the salt-laden atmosphere cannot reach the device electronics as a result of the sealed control cabinet. A cabinet solution that protects against dirt and water certainly makes sense in the process and steel industries. The same is true for plants with high levels of dust, such as cement plants, mining facilities, coal-fired power plants or printing shops, in the automotive industry, or for applications in the food and beverage industry. Here, control cabinets in production areas must be sprayed down with water for hygiene reasons. For applications in environments that are not so harsh, the reduced space requirement results in lower costs for the room climate control – and the recovered heat can be used for process water and heating.

As team – even better

The inverter pulse patterns are precisely designed for the rated motor pulse frequency. The motor windings are adapted to the inverter output currents and voltages. SIMOTICS FD motors are significantly quieter as a result of the optimized pulse patterns and the new ribless frame. The inverters are also quiet due to the liquid cooling concept employed. The result is an optimized overall system with a high power density.



SINAMICS S120 Cabinet Modules: liquid-cooled cabinet systems – can be flexibly combined in a modular way

Modularity for customized solutions

SINAMICS S120 Cabinet Modules comprise converter modular cabinet modules that can be combined to address the particular drive application. As a consequence, almost any drive solution can be optimally implemented. This modular system is especially suitable for multimotor drive configurations with central line infeed and a common DC link busbar.

Simple planning, straightforward service

The liquid-cooled SINAMICS G120 Cabinet Modules represent a completely new development that sets itself apart in every phase of the product lifecycle with a high degree of cost effectiveness and simplicity – from planning and procurement through mounting/installation and commissioning up to everyday operation and service. Further, these systems offer an excellent price-performance ratio, and can be integrated into any automation solution.

Rugged and straightforward for the highest degree of reliability

With their rugged, straightforward design, the SINAMICS S120 Cabinet Modules system is extremely reliable. A special cabinet design guarantees a high degree of mechanical endurance. Another additional positive issue: nickel-plated standard busbars and coated electronic modules are protected against the effects of the environment. It goes without saying that all of the components – from the production of individual parts up to a ready-to connect cabinet – are subject to extensive checks throughout the complete production process. This guarantees a high degree of functional reliability when configuring, commissioning and in operation.

Operational reliability built in

All SINAMICS S120 Cabinet Modules have been developed according to the zone concept, which means that they offer the highest degree of operational reliability. EMC design measures have been consequentially implemented. Partitions to guide the air and control temperature gradients have been designed based on simulation runs.

The highlights at a glance

- High degrees of protection up to IP55 can be easily implemented
- Cabinet system used: Rittal TS8, 2,200 mm high (industrial standard)
- Can be engineered using known engineering tools, simply ordered based on an article number and with short delivery times
- A comprehensive range of options supports flexible adaptation to address specific requirements
- Series device with type-tested design, for example the appropriate partitions for optimally cooling the passive components and corrosion-resistant, favorably priced plastic pipes
- Comprehensive documentation is available in many languages
- Spare parts can be called up via SparesOnWeb as the components used have been standardized





Liquid-cooled chassis devices

Power Modules For 2-quadrant operation with rectifier and inverter to feed a motor
Basic Line Modules for 2-quadrant operation if energy recovery is not required
Active Line Modules und Active Interface Modules for 4-quadrant operation if energy recovery makes sense and if line harmonics must be reduced to a minimum
Motor Modules to control the speed of connected motors

Liquid-cooled Cabinet Modules

Basic Line Connection Modules include the Basic Line Modules and the Line Connection Modules to connect to the line supply
Active Line Connection Modules include the Active Line Modules with Active Interface Modules and the Line Connection Modules to connect to the line supply
Motor Modules include the chassis and components to connect to the DC link
Auxiliary Power Supply Modules to the auxiliary power supply
Heat Exchanger Modules to cool the cabinet units

SINAMICS S120 liquid-cooled – voltage ranges and power ratings

3AC 380 – 480 V						
Power Modules						
Type rating ¹	kW	110	132	160	250	
Rated output current ²	A	210	260	310	490	
Basic Line Modules/Basic Line Connection Modules						
Rated power	kW	360	600	830	1,100	
Rated DC link current ²	A	740	1,220	1,730	2,260	
Parallel connection	kW				2 x 600	
Active Line Modules and Active Interface Modules/Active Line Connection Modules						
Rated power	kW	300	380	500	630	
Rated infeed current ²	A	490	605	840	985	
Parallel connection	kW					
Motor Modules						
Type rating ¹	kW	110	132	160	250	
Rated output current ²	A	210	260	310	490	
Parallel connection	kW					
3AC 500 – 690 V						
Basic Line Modules/Basic Line Connection Modules						
Rated power	kW	355	630	1,100	1,370	
Rated DC link current ²	A	420	730	1,300	1,650	
Parallel connection	kW					
Active Line Modules and Active Interface Modules/Active Line Connection Modules						
Rated power	kW	630	800	900	1,100	
Rated infeed current ²	A	575	735	810	1,025	
Parallel connection	kW					
Motor Modules						
Type rating ¹	kW	90	132	200	315	
Rated output current ²	A	100	150	215	330	
Parallel connection	kW					
3AC 380 – 415 V, 3AC 660 – 690 V						
Heat Exchanger Modules						
Cooling power	kW	32	48	72	110	
Volumetric flow rate	l/min	88	132	197	267	

¹ Rated power of a typical 6-pole standard induction motor at 3AC 400 V / 50 Hz or 3AC 690 V / 50 Hz

² The current derating required as a result of the parallel connection has already been taken into account

³ Optimized regarding space and weight



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1,535	1,665	2,220	2,300	3,070										
3,200	3,385	4,515	4,800	6,400										
2 x 830 ³	3 x 600	4 x 600	3 x 830 ³	4 x 830										

900	1,200	1,425	1,710	1,800	1,900	2,400	2,560	3,420						
1,405	1,875	2,395	2,670	2,810	3,190	3,750	4,000	5,340						
	2 x 630	3 x 500	2 x 900	3 x 630	4 x 500	4 x 630	3 x 900 ³	4 x 900						

315	400	450	560	710	800	1,065	1,350	1,520	1,600	2,025	2,130	2,280	2,700	3,040
605	745	840	985	1,260	1,405	1,875	2,395	2,670	2,810	3,590	3,745	4,000	4,790	5,340
						2 x 560	2 x 710	2 x 800 ³	3 x 560	3 x 710	4 x 560	3 x 800 ³	4 x 710	4 x 800

1,750	2,035	2,535	3,055	3,800	4,070	5,070								
2,030	2,405	3,055	3,610	4,580	4,810	6,105								
3 x 630	2 x 1,100	2 x 1,370	3 x 1,100	3 x 1,370	4 x 1,100	4 x 1,370								

1,400	1,700	2,090	2,660	3,230	3,990	4,850	5,320	6,460						
1,270	1,560	1,950	2,415	2,965	3,620	4,450	4,830	5,930						
		2 x 1,100	2 x 1,400	2 x 1,700	3 x 1,400	3 x 1,700	4 x 1,400	4 x 1,700						

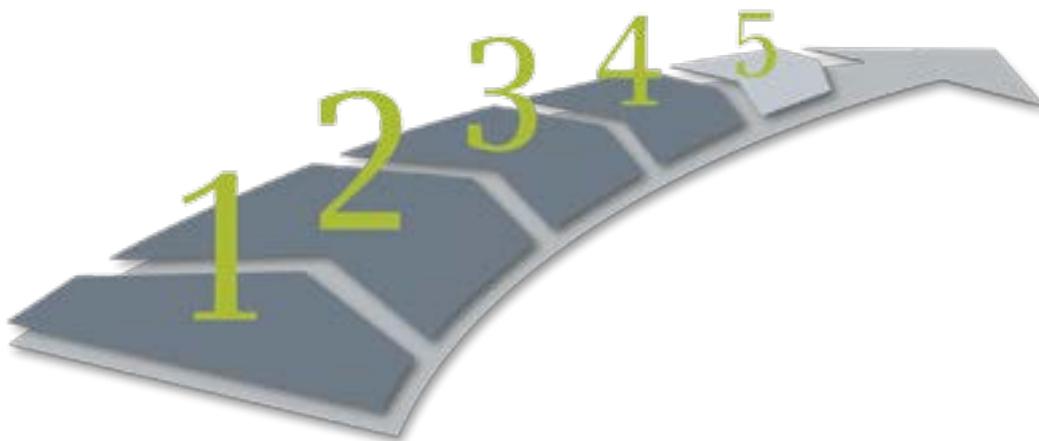
450	560	710	800 ³	800	1,000	1,200	1,500	1,900	2,280	2,850	3,420	4,280	4,560	5,700
465	575	735	810	810	1,025	1,270	1,560	1,950	2,415	2,965	3,620	4,450	4,830	5,930
								2 x 1,000	2 x 1,200	2 x 1,500	3 x 1,200	3 x 1,500	4 x 1,200	4 x 1,500

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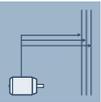
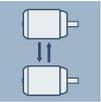
The drive that optimizes your energy efficiency

UP TO
60%
ENERGY SAVING
POTENTIAL

Electric drives use about two thirds of all industrial electric power. This is why it is decisive to use drive technology right from the start to already effectively reduce future energy consumption in the engineering phase – thus optimizing plant/system availability and process reliability.



- 1 Product design
- 2 Production planning
- 3 Production engineering
- 4 Production
- 5 Service

Integrated energy saving functions		
Recovering braking energy		Converters capable of energy recovery feed back the braking energy into the line supply. For example, for hoisting applications (i.e. cranes), energy consumption can be reduced by up to 70%, the system temperature rise is reduced and a more compact design can be facilitated.
Energy balancing in the DC link		For coupled drives, the SINAMICS S120 allows energy to be exchanged along the common DC link. This minimizes the power loss in the system, so that the power rating or size of the infeed can be significantly lower than the total power of the drive system.
Storing excess energy		Transient power peaks can be covered (e.g. for reversing operations) and flicker avoided by using additional capacitors in the DC link. As a result, regenerative energy is stored rather than wasted in the form of heat.
Automatic adaptation of the operating point		Motor losses are reduced in the ECO mode. This is realized by automatically adapting and optimizing the motor operating point in the partial load range, e.g. for machines, which do not require a high torque over the complete operating range.
Energy-saving when idle		When variable-speed drives are only temporarily used, then they can be switched into the hibernation mode. They are automatically reactivated as a function of the demand.
Optimized pulse pattern		SINAMICS G and S are perfectly harmonized to operate with SIMOTICS motors as a result of the optimized clock frequency and pulse pattern. SINAMICS G and S converters are recommended when drives have to be operated efficiently at their rated speed. They are perfectly harmonized and coordinated for SIMOTICS motors as the clock frequency and pulse pattern have been optimized. The advantages: optimized operating response and system efficiency, lower system losses as well as lower temperature rise and noise.
Energy transparency in all engineering phases		Already during the engineering phase, the SIZER engineering software provides you with information about your specific energy requirement. It visualizes the energy consumption in the complete drive train, and compares this with different system concepts.

Find out more:

siemens.com/ids

Experience how
Integrated Drive
Systems can boost
the competitiveness
of production plants
and entire companies
in every sector.

The advantages
of Integrated
Drive Systems
at a glance



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