

What makes DC current technology extremely cost effective and fit for the future?



SINAMICS DCM – The Innovative DC Converter:
Scalable and with Integrated Intelligence

Answers for industry.

SIEMENS

SINAMICS: The innovative drive family for all requirements

Low voltage							DC	Medium voltage			
AC								AC			
For basic applications		For higher-value applications			For basic servo applications	For demanding applications		For basic applications and demanding applications	For applications with high power ratings		
SINAMICS G110	SINAMICS G110D	SINAMICS G120P	SINAMICS G120	SINAMICS G120D	SINAMICS G130G150	SINAMICS S110	SINAMICS S120	SINAMICS S150	SINAMICS DCM	SINAMICS GM150 / SM150 / GL150 / SL150	
V/f open-loop control	V/f open-loop control/FCC	V/f/FCC/vector control	V/f open-loop/vector control			Servo control	V/f open-loop/vector control/servo control		Closed-loop speed control/torque control	V/f open-loop/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 – 1500 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 machine and plant construction	Production machines (packaging machines, textile and printing machines, paper machines, plastics machines), machine tools, plants, process lines and rolling mills		Test stands, cross cutters, centrifuges	Multi motor drives, rolling mills, Test stands, wire-drawing machines, extruders and kneaders, cableways and lifts	Pumps, fans, compressors, mixers, extruders, crushers, rolling mills, mine hoist drives, excavators, test stands
Common Engineering Tools											
Sizer – for simple planning and engineering						STARTER – for fast commissioning, optimization and diagnostics					

With SINAMICS, Siemens supplies a complete and integrated drive family that covers all performance levels and provides the highest degree of flexibility, functionality and efficiency. All SINAMICS drives can be configured, parameterized, commissioned and operated in the same standard way. The new SINAMICS DCM completes our drive family in the area of DC technology.

Well-proven technology – fit for the future

Worldwide, we are the only supplier who covers DC, AC and medium-voltage applications with just one single family of drives. Further, with the integration into SINAMICS, we have updated our DC systems to reflect the latest state-of-the-art technology. And in turn, it offers the highest degree of standardization and integration – regarding closed-loop control technology, operator philosophy and interfaces as well as engineering tools. Users can select between the AOP30 Advanced Operator Panel and the BOP20 numerical operator panel and enjoy the wide range of benefits of the STARTER and SIZER engineering tools that always ensure the highest degree of engineering efficiency. A wide range of interfaces is available for perfect integration into existing and future automation solutions. Further, just like all of the SINAMICS members, SINAMICS DC MASTER (SINAMICS DCM) is an integral component of Totally Integrated Automation, our open system architecture for seamless and integrated automation.

The advantages of SINAMICS at a glance:

- Wide range of power ratings from 0.12 kW to 120 MW
- Available in low-voltage as well as medium-voltage versions
- Standard functionality by using a common hardware and software platform
- Common engineering for all of the drives using just two tools
- High degree of flexibility and combinability

SINAMICS DCM: The scalable drive system for basic and sophisticated applications



For many years now, DC drives have proven themselves in daily use. Thanks to their dynamic performance, ruggedness and cost effectiveness, even today, DC technology is the most favorably priced drive solution for many applications – with many advantages regarding reliability, operator friendliness and its operational characteristics:

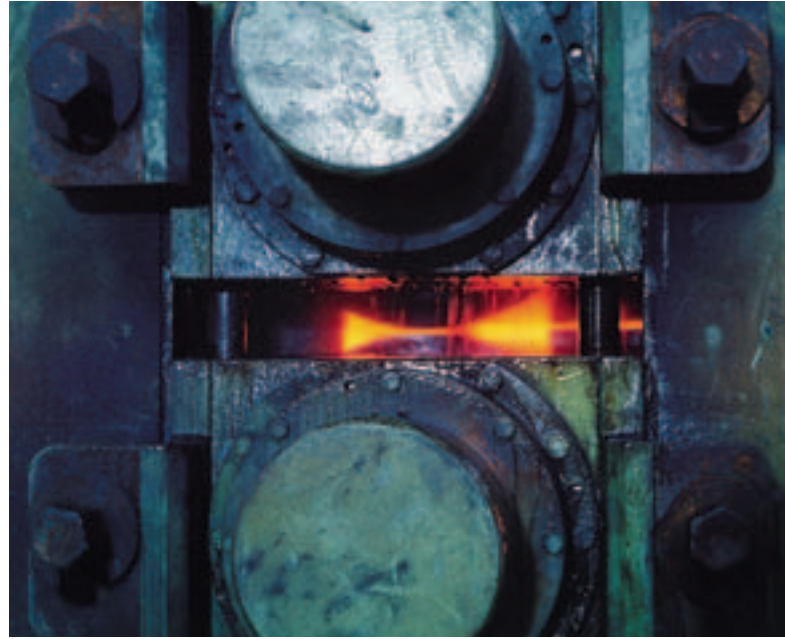
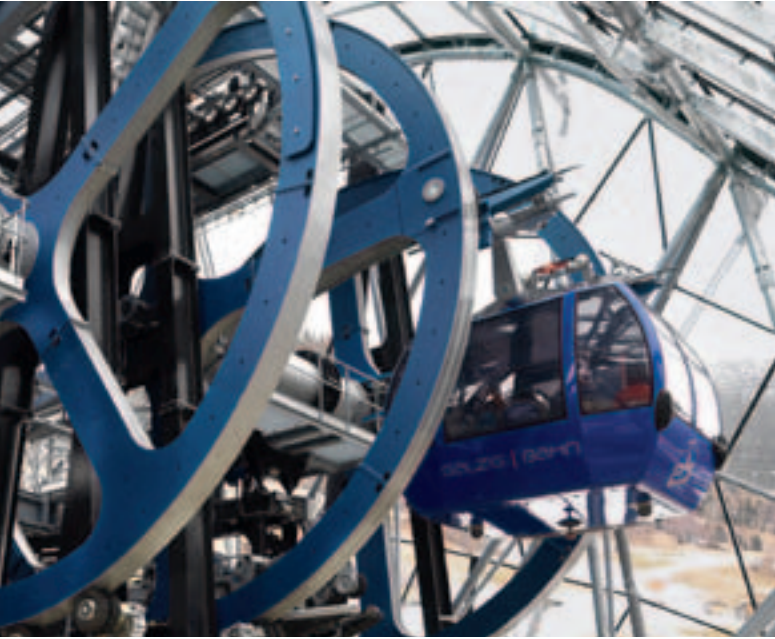
In many areas of industry, DC drives still make sense technically and economically – just as before:

- 4Q operation at a favorable price
- Continuous operation at low speeds
- Full torque even at low speeds
- High starting torque
- Wide speed control range
- Low space requirements
- Reliability
- Low torque ripple also at low speed
- High overload capability

SINAMICS DCM highlights at a glance:

- Integrated in the SINAMICS drive family
- Interfaces for PROFIBUS (as standard) and PROFINET (optional)
- Variance of the Control Units
- Field power supply in-line with market requirements
- Electronics power supply for connection to DC 24 V
- Power unit and voltage measurement from power unit is insulated with respect to ground
- Free function blocks and Drive Control Chart (DCC)
- Expandable functionality using SINAMICS components
- Single phase operation possible
- Coated printed circuit boards and nickel-plated copper busbars
- Wide temperature range

Innovative solutions based on tradition



Users worldwide have been using DC drives from Siemens for decades now. And for a good reason: Many years of experience, extensive and specific know-how and consequential ongoing development guarantee solutions with the highest degree of reliability reflecting state-of-the-art technology.

Pioneer in DC technology

The Siemens name stands for the highest power of innovation in the long history of DC technology: We built the first DC motor more than 130 years ago and played a decisive role in the leading edge development of thyristor converter technology – going back more than 40 years. 1986 we were first on the market with a full digital DC converter.

The most modern converter in the DC market: SINAMICS DCM

Many of the SINAMICS tools and components already known from our AC technology are now available with SINAMICS DC MASTER for DC technology. This combines the quality, reliability and functionality of its well-proven predecessor – SIMOREG DC-MASTER – with the highlights of the SINAMICS family. Beyond this, it offers new features that among other things ensure that DC technology remains fit for the future in the automation environment.

This again clearly confirms that we believe in this well-proven technology – also tomorrow.

The right choice for every application

With its high precision closed-loop motor speed control, our SINAMICS DC MASTER series of converters always ensures the optimum processes and sets itself apart as a result of the highest dynamic performance: The current and torque rise times respectively lie significantly below 10 milliseconds. SINAMICS DC MASTER is used everywhere, where just as before, DC drives are demanded:

- Rolling mills
- Cross cutters and shears
- Wire-drawing machines
- Extruders and kneaders
- Presses
- Elevator and crane systems
- Cableways and lifts
- Mine hoists
- Test stand drives



SINAMICS DCM is available in two versions:

The DC converter series –

as ready-to-connect converter chassis units with rated DC currents from 15 to 3000 A and rated input voltages extending from 3-phase 400 up to 950 V AC – as two-quadrant as well as four-quadrant drive.

The optimum current and voltage increments, the overload capability, the large permissible tolerances regarding input quantities as well as the numerous options allow users to select the perfect unit for their particular application – just like a tailored solution.

The DC converter includes:

- Electronic module including the Control Unit and standard interface as well as slots to expand the drive system with an additional Control Unit and other optional interfaces
- Power unit with thyristors in a fully-controlled three-phase bridge circuit configuration (two-quadrant drive: B6C or four-quadrant drive: (B6) A (B6) C)

- The two quadrant drive offers motoric operation in one drive direction and generatoric operation in reverse drive direction. With 4 quadrant drives motoric and generatoric operation in both drive directions is possible.
- Fan (up to 125 A: self-ventilated)
- Field power unit with integrated free-wheeling circuit (optional, also without field or as two-quadrant field for high dynamic variation of excitation current with integrated field overvoltage protection)
- Electronics power supply
- Standard BOP20 operator panel

The Control Module –

makes retrofit quite simple. Old is transformed into new – simply and economically: SINAMICS DC MASTER Control Module, successor of the well-proven SIMOREG Control Module, is the ideal solution for retrofitting and modernizing existing DC drives – with fully digital closed-loop control and all of the advantages of state-of-the-art open-loop control technology. While the motor, mechanical system and

power unit remains unchanged, only the closed-loop control section is replaced. As a consequence, an existing DC drive gets the full functional scope of the new SINAMICS DC Master: It becomes an integrated member of the SINAMICS family of drives, simple to operate, with precise closed-loop control characteristics and a high dynamic performance. Not only this, it can be flexibly expanded and fully integrated into any automation environment.

Just like the DC Converter, the Control Module is also freely scalable – regarding performance and functionality. Its space-saving design guarantees simple integration into the plant or system. The control module can be split depth-wise so that users profit from the optimal mounting and installation options. Further, the PC boards for firing, voltage sensing and fuse monitoring can be separated and located outside the unit, directly at the power unit. Our control module is extremely service-friendly as all of the individual components can be easily accessed.

Well conceived down to the finest detail



With SINAMICS DCM, DC technology

users profit from the perfect combination of the well-proven and the highest degree of innovation Highlights:

This leading-edge converter sets

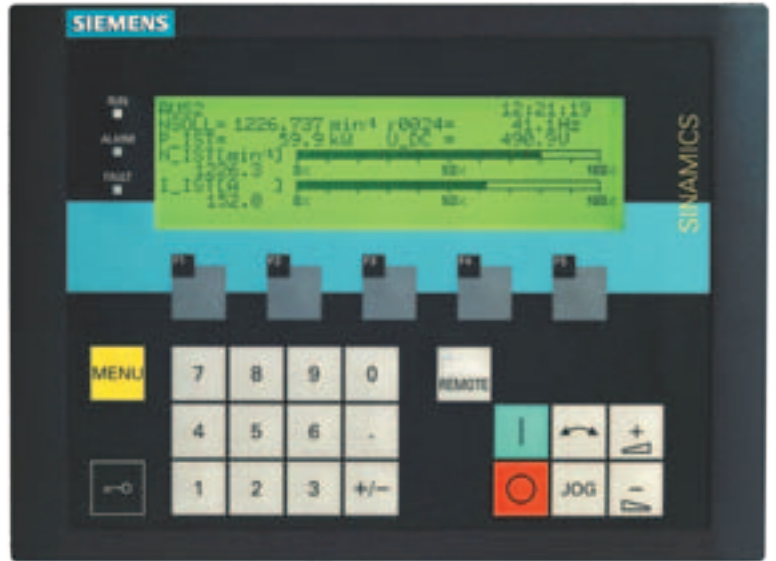
itself apart as a result of its perfected technology and a whole raft of well-conceived features.

Perfectly scalable

Thanks to its scalability, our series of converters has a convincing performance both in basic applications as well as in sophisticated and demanding tasks. For standard closed-loop control tasks, SINAMICS DC MASTER is equipped with a Standard Control Unit (CU). The closed-loop control performance can be expanded using the Advanced CU for applications with higher requirements placed on the computational performance and interfaces. The ability to select the various options – Standard CU, Advanced CU, or a combination of both – means that the computational performance and speed can be optimally adapted to the specific requirements. Depending on the particular application the units are available as two quadrant converter and as four quadrant converter, in the standard configuration also with integrated field supply. The rated DC current range extends from 15 A all the way up to 3000 A and can be further increased by connecting DC converters in parallel.

Can be flexibly expanded

SINAMICS DC MASTER can be flexibly expanded in a modular fashion – from the standard up to the high performance solution. The comprehensive range of products and the whole raft of options allow the drive system to be optimally adapted to the specific plant or system requirements – both technically and economically. The interfaces of the CU and the number of digital inputs and outputs can, when required, be supplemented – e.g. using supplementary SINAMICS modules such as the TM15 and TM31 Terminal Modules.



High degree of plant or system availability

SINAMICS DC MASTER plays a decisive role when it comes to a high plant or system availability. This doesn't just happen by chance. The converter as a whole and its components distinguish themselves through a maximum degree of reliability, individually and when interconnected and operating with one another. Throughout the complete production process, all of the components are subject to exhaustive checks and tests. This guarantees a high functional safety – when installing, commissioning and operating these units. However, if service is required, then the components can be quickly and simply exchanged.

And last but not least, the consequential level of standardization across our extensive range of products ensures that service personnel don't have to get to know each and every version, but can use their existing know-how.

An additional advantage: SINAMICS DC MASTER allows redundant operation. As a consequence, in the extremely unlikely event of a failure of a master or slave unit, the complete system still functions.

Fast and simple commissioning

All members of the SINAMICS family can be quickly and simply commissioned and parameterized – either menu-assisted at the AOP30 Advanced Operator Panel or PC-supported using the STARTER commissioning tool.

SINAMICS DC MASTER is already pre-configured in the factory. This means that unit-specific parameters do not have to be set. Application specific adaptations can be done simply by parameter setting – there are no pots, switches or jumpers which need to be adjusted. As a consequence, when service is required, the units can be immediately installed and used.

Intuitive operator control

The AOP30 Advanced Operator Panel with graphics-capable, illuminated LCD display has a menu-assisted interface with plain text display. This makes operator control more reliable. Further, analog setpoints and actual values can be displayed in a bar-type diagram on the graphics-capable display. This means that important operating parameters of the drive can be seen at a glance. Additional features of the AOP30: a help function to signal faults, including their causes and instructions on how they can be resolved as well as a keypad to control the drive in operation.

Infinite communication possibilities



Just like all of the SINAMICS drive members, SINAMICS DCM fulfills all requirements regarding the communication options. Whether PROFIBUS or PROFINET: Our innovative converter is available with all of the corresponding interfaces.

PROFIBUS: the number 1 under the field buses

SINAMICS DC MASTER supports PROFIBUS DP as standard. The globally leading standard fieldbus allows high performance integrated communication between all of the components in an automation solution: HMI (operator control and visualization), open-loop control, drives and I/O.

PROFINET: for more performance and open IT communication

SINAMICS DC MASTER is optionally available with the PROFINET interface. The leading Industrial Ethernet Standard allows closed-loop control data to be quickly exchanged. As a consequence, the converter can also be used in multi-axis applications demanding the highest performance. PROFINET is based on well-proven IT standards, supports TCP/IP without any restrictions and therefore permits a direct access to be made from the management level down to the field level. In this case, both vertical as well as horizontal integration is guaranteed.

PROFIdrive: the fit-for-the-future drive profile

PROFIdrive defines the functional interface between the control and the drives for PROFINET and PROFIBUS. PROFIdrive is the leading edge drive profile according to IEC 61800-7 specified by the PROFIBUS International (PI) User Organization. The specific advantage for users is that the user program does not have to be changed at a transition from PROFIBUS to PROFINET. PROFIdrive defines the device behavior and how internal device data is accessed for electric drives connected to PROFIBUS and PROFINET – from basic single drives up to complex an high performance multi motor applications.

Ideal partner for SINAMICS DCM: DC motors from Siemens



Our DC motors prove themselves daily in global use – wherever favorably-priced drive technology and the highest degree of availability are demanded. They are available in degrees of protection IP23 and IP54 or IP55 and are equipped with the high-quality DURIGNIT® insulation system. As a consequence, the optimum solution is always available – even under the toughest of environmental conditions. But what is especially important is that they are perfectly harmonized for use with SINAMICS DCM converters.

Highest power density in the smallest space

Our DC motors allow innovative machine concepts to be implemented and reduce the mechanical design costs. In order to optimize the thermal and magnetic utilization as well as the mechanical design, these motors were developed using computer-based computational techniques. We only use the highest quality materials with outstanding mechanical, magnetic and electrical properties for our motor production. The result: the highest power densities with an extremely compact design with low shaft heights.

Extremely quiet

When it comes to noise, we haven't left anything to chance with our DC motors. Examples include the special main pole shape and the optimized separately-driven fan. These measures in the mechanical and magnetic area as well as the optimum fan design guarantee a very low noise level. Operating personnel benefit from this and the costs for local noise insulation on-site are reduced.

Long lifetime with minimum service costs

The use of especially coordinated and harmonized materials reduces brush wear. This facilitates a high smooth running quality and therefore ensures quiet operation, reduces the stress on the motor and minimizes torque ripple and vibration. In conjunction with our sealed insulation system, this guarantees a high lifetime with minimum service and maintenance costs. In the unlikely event of a problem, then our global service and support guarantee short delivery times – to achieve the highest degree of availability.

First choice for every class of power

Our DC motors cover a range of power ratings extending from 31.5 kW up to 1610 kW – non-compensated from shaft heights 160 to 280 and compensated from shaft heights 355 to 630, naturally cooled or force-ventilated, with or without fan. The modular structure of our portfolio permits all combinations to be realized. Not only this, our DC motors can be optimally integrated into the automation environment via specific interfaces on the converter – for monitoring in operation, precise diagnostics and effective service & maintenance.

Standard engineering



SIZER engineering software

SIZER LD web is used when engineering SINAMICS DC MASTER. It is used to select and dimension the optimum converter for the particular application:
www.siemens.com/sizer-ld

SIZER LD web supports all engineering steps of a converter in a workflow:

- Input of motor data, converter data and AC line supply data
- Selection of SINAMICS DC MASTER options
- Compilation of the required documentation and accessories

Engineering results include:

- Data sheet with the technical data of the engineered converter and where relevant, the accessories
- Converter dimension drawing

However, in the future, not only will SIZER LD web be able to be used to engineer SINAMICS DC MASTER. It can also be directly carried out via the configuration list in the Industry Mall (<https://mall.automation.siemens.com>)

STARTER commissioning software

STARTER is available for commissioning all SINAMICS drives. The intelligent tool provides support when it comes to simply configuring and commissioning the drive components – menu assisted and graphically supported. What is especially helpful is the fact that STARTER allows all of the relevant data to be imported from the electronic rating plates of the drive components. This significantly reduces the associated costs, speeds up parameterization and prevents possible incorrect entries. Entries can be checked and parameters optimized using integrated test functions.

Further information you find under:
www.siemens.com/drivesolutions in the navigation under “Engineering and Commissioning Software”

Even stronger in the team

STARTER can run as dedicated Windows applications. It is coupled to the drives through a serial interface, PROFIBUS DP or PROFINET.

STARTER can be integrated both into SCOUT – the engineering system of our SIMOTION motion control system – as well as into STEP 7, the engineering software of our SIMATIC industrial automation system. This well-conceived concept pays off when service is required as this permits simple diagnostics and troubleshooting either locally or through teleservice.

Drive Control Chart

Using Drive Control Chart (DCC), SINAMICS can handle classic closed-loop drive control. Not only this, drive-related open-loop and closed-loop control tasks can be shifted into the drive itself. The advantages: This ensures the highest degree of flexibility when it comes to optimum adaptation to specific drive and automation scenarios. It also relieves the load on higher-level controls, simplifies the implementation of machine sequences and significantly increases the overall machine performance.

SINAMICS DCM:

An overview of the technical data and options

Technical data

Rated data					Two-quadrant operation	Four-quadrant operation
Armature circuit			Field circuit			
Rated supply voltage V	Rated DC voltage V	Rated DC current A	Rated supply voltage V	Rated DC current A		
3 AC 400	485 for 2Q 420 for 4Q	15	2 AC 400	3	–	X
		30		5	–	X
		60		10	X	X
		90		10	X	X
		125		10	X	X
		210		15	X	X
		280		15	X	X
		400		25	X	X
		600		25	X	X
		850		30	X	X
		1200	2 AC 480	40	X	X
		1600		40	X	X
		2000		40	X	X
		3000		40	X	X
3 AC 480	575 for 2Q 500 for 4Q	15	2 AC 480	3	–	X
		30		5	–	X
		60		10	X	X
		90		10	X	X
		125		10	X	X
		210		15	X	X
		280		15	X	X
		400		25	X	X
		600		25	X	X
		850		30	X	X
		1200		40	X	X
		3 AC 575		690 for 2Q 600 for 4Q	60	2 AC 480
125	10		X		X	
210	15		X		X	
400	25		X		X	
600	25		X		X	
850	30		X		X	
1100	40		X		X	
1600	40		X		X	
2000	40		X		X	
2200	40		X		X	
2800	40		X		X	
3 AC 690	830 for 2Q 725 for 4Q	720	2 AC 480	30	X	–
		760		30	–	X
		1000		40	X	X
		1500		40	X	X
		2000		40	X	X
		2600		40	X	X
3 AC 830	1000 for 2Q 875 for 4Q	950	2 AC 480	40	X	X
		1500		40	X	X
		1900		40	X	X
3 AC 950	1140 for 2Q 1000 for 4Q	2200	2 AC 480	40	X	X

Options

Control Unit
Advanced Control Unit, left
Standard Control Unit, right
Advanced Control Unit, right
Communication Board CBE20, left
Communication Board CBE20, right
Memory card, left
Memory card, right
Field
Field power unit, 2Q
Without field power unit
85 A field power unit
Fans
Fan for single-phase power supply
Additional options
Electronics power supply for connection to DC 24 V
Armature circuit voltage with low voltage 10 to 50 V
Coated modules
Nickel-plated copper busbars
External sensors for the mean ambient or intake temperature

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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