TECHNICAL DOCUMENTATION

SINAMICS DC Master (DCM) Base Drives

Standard range 3 hp (2.2 kW) to 800 hp (600 kW) DC I rated

Unmatched reliability and flexibility for your system upgrade

For many applications, DC drives are the best solution. Since DC motors have an extremely long lifecycle, saving the motor and upgrading the drive is often the most cost-efficient and best solution. Combining leading-edge DC drive technology with an existing application or motor installation provides overall process improvements and minimizes system downtime—all while keeping costs under control. SINAMICS DC Master Base Drives offer unmatched reliability and flexibility for your system upgrade and are backed by a 3-year extended warranty exclusive to the US market.

SINAMICS DCM Base Drives build upon the success of the legacy SIMOREG DC drives. The Base Drive concept is perfect for retrofit and upgrade scenarios where shutdown times need to be minimized.

The SINAMICS DCM Base Drive is extremely flexible and cost-effective for both new installations and retrofits where space is limited. The pre-wired solution comes complete and tested with all the necessary components mounted on a back panel. The product is ideal for end-users and third-parties such as a Siemens solution partners and system integrators.

The DC Base Drive has been around for more than 25 years, beginning with the third-generation 6RA22 digital DC drives, circa 1986. The SINAMICS DCM Base Drive is unique in that the DC I rating of the converter is used for each panel design. The advantage is more power per panel in the same footprint as the previous two generations of base drive panels. This makes it easy to retrofit existing base drive installations. In addition, in new installations where 150% overload is not needed (i.e. MG Set Field supplies), the SINAMICS DCM Base Drive offers a significant cost advantage.

SIEMENS

SINAMICS DC Master Base Drives

Highlights

With SINAMICS DCM Base Drives, increased productivity and decreased project costs directly result from extraordinary product reliability, unsurpassed dynamic performance and seamless integrat\ion into the automation environment. SINAMICS DCM Base Drive includes:

- Backed by a 3-year extended warranty exclusive to the US market
- Ethernet connectivity provided as standard via the Advanced Control Unit DC (CUD) and CBE20 Communication Board Ethernet
- UL and cUL (508A) certification
- 65 kA SCCR (short circuit current rating)
- Dual-rated voltages 240V / 480V AC
- Multiple current ratings set by parameter
- Panel dimensions equivalent to the previous two generations of base drives
- Windows-based STARTER software — common to all models of the SINAMICS drive family
- Drawings available in AutoCad / .dwg
- Available from stock

Standard features

- 3–800 hp in DC I rating or up to 500 hp with DC II rating as pre-engineered, standard designs minimizing engineering and delivery times
- AC Contactor Line Side 15–850A, DC Loop Contactor ≥ 1200A
- DC Converter — includes Advanced CUD (option G00), CBE20 (option G20), Memory Card (option S01) and BOP20 Basic Operator Panel
- DC Converter — the 450–1200A converters include a single-phase fan at 230V AC (option L21) as standard on the corresponding base drives
- Fusing — input fuses, field fuses, DC output fuse for regen units
- Control power transformer

Base drive benefits

- Standard 4-port Ethernet switch provides Ethernet connectivity and programming capability
- Easy-to-install
- Pre-wired and tested for easy startup
- Converters can be replaced without changing the panel
- Drop in replacement for 6RA24 and 6RA70 base drives
- More current per panel than previous generations
- Supplementary SINAMICS I/O modules are easy to add
- 125A and below base drives can be run at single-phase incoming supply with drive de-rating.

Typical user / target group

- Machine builders
- End-users
- Solution partners
- Distributors
- System integrators

Business drivers

- Increased productivity
- High-dynamic performance
- Reduced maintenance costs
- Proven track record
- Decreased project costs

Note: All SINAMICS DCM Base Drives are provided with the Advanced CUD and CBE20 cards installed. The CBE20 allows for Ethernet programming capability as standard. Take advantage of Siemens' progressive developments in Industrial Ethernet technology and open connectivity. With direct network connectivity to PROFINET, EtherNet/IP™ and standard Ethernet TCP/IP, SINAMICS DCM Base Drives fit comfortably within your plant's network, providing you with maximum productivity and capacity planning.

Product selection—Standard Range Base Drives

Typical horsepower @ continuous current w/ 150% 1 minute Use DC II rating		Current		SINAMICS DCM Base Drive	SINAMICS DCM dimensions			Easy migration	
at 240V DC	at 500V DC	DC I Continuous Current	DC II Continuous Current					SIMOREG 6RA70 Base Drive	SIMOREG 6RA24 Base Drive
HP	HP	Amps	Amps	Model No.	H	W	D	Model	Model
3	**7.5**	15	13.9	**6RA8013-2FV62-0AA0***	**25.1**	**10.6**	**10.6**		
7.5	**15**	30	24.9	**6RA8018-2FV62-0AA0***	**25.1**	**10.6**	**10.6**	6RA7013-2F**xy**2-0	6RA2413-2F**xy**2
15	**30**	60	53.1	**6RA8025-2Fxy2-0AA0***	**25.1**	**10.6**	**10.6**	6RA7018-2F**xy**2-0	6RA2418-2F**xy**2
20	**40**	90	78.2	**6RA8028-2Fxy2-0AA0***	**28.9**	**10.6**	**13.2**	6RA7025-2F**xy**2-0	6RA2425-2F**xy**2
30	**60**	125	106	**6RA8031-2Fxy2-0AA0***	**32.7**	**10.6**	**12.0**	6RA7030-2F**xy**2-0	6RA2428-2F**xy**2
50	**100**	210	164	**6RA8075-2Fxy2-0AA0***	**38.6**	**11.4**	**11.7**	6RA7072-2F**xy**2-0	6RA2471-2F**xy**2
75	**150**	280	226	**6RA8078-2Fxy2-0AA0***	**44.1**	**11.4**	**13.0**	6RA7075-2F**xy**2-0	6RA2474-2F**xy**2
100	**200**	450	320	**6RA8082-2Fxy2-0AA0***	**47.3**	**21.7**	**13.4**	6RA7077-2F**xy**2-0	6RA2477-2F**xy**2
150	**300**	600	470	**6RA8085-2Fxy2-0AA0***	**47.3**	**21.7**	**13.4**	6RA7082-2F**xy**2-0	
200	**400**	850	658	**6RA8087-2Fxy2-0AA0***	**47.3**	**21.7**	**15.3**	6RA7083-2F**xy**2-0	6RA2483-2F**xy**2
250	**500**	1200	884	**6RA8091-2Fxy2-0AA0***	**60.0**	**32.0**	**20.0**	6RA7087-2F**xy**2-0	6RA2487-2F**xy**2

xy = S2 (2 Quad)
V6 (4 Quad)

All horsepower ratings above are calculated using the DC II continuous current rating with overload capability of 150% overload for 60 seconds, every 15 minutes.
The calculated result is rounded down to the nearest NEMA DC motor horsepower rating.
*Amp ratings for the 6RA80 SINAMICS DCM Base Drives are based upon DC I ratings with no overload capability.

Note: Standard product designs up to 2000 hp (Extended Range Base Drives) are available and are built after receipt of order. Custom designs consisting of non-standard combination of DC converter options are available upon request and are built after receipt of order. Please consult your Siemens representative or send your request for quote to: drives-marketing.industry@siemens.com

Supplementary control unit DC options

SINAMICS DCM options	Catalog No.		Standard features	
	Non-coated	Coated		
Standard CUD	6RY1803-0AA00-0AA1	6RY1803-0AA20-0AA1	▪ 4 digital inputs ▪ 4 bi-directional DI/DO ▪ 4 digital outputs ▪ 7 analog inputs ▪ 2 analog outputs ▪ 1 HTL/TTL pulse encoder	▪ 1 temperature sensor ▪ PROFIBUS connection ▪ RS232/RS485 ▪ Paralleling ports ▪ MMC Flash connector ▪ 4 three-color status LEDs
Advanced CUD	6RY1803-0AA05-0AA1	6RY1803-0AA25-0AA1	The Advanced CUD includes the connections/features of the Standard CUD plus: two DRIVE-CLiQ connections and one option slot (CBE20).	
Connector board	6RY1803-0GA00	6RY1803-0GA20	The connector board needs to be ordered in addition to a CUD board. CUD boards do not include the connector board when ordered as a spare part.	

Notes:

1. "Standard CUD" and "Advanced CUD" parts are meant to be replacements (upgrade or spare) for the CUD supplied with the converter. These parts do not include the screws and connector board.
2. To upgrade the unit with an additional CUD, the customer will need to purchase the spare CUD and the connector board. The connector board comes with all of the screws and studs to mount the CUD in the drive.
3. Four CUD Kits are available that bundle the available CUDs and connector boards at a reasonable cost:

CUD Kit part no.	Description	Catalog no.	CUD Kit part no.	Description	Catalog no.
A6X30112022	Standard CUD — not coated Connector Board — not coated	6RY1803-0AA00-0AA1 6RY1803-0GA00	A6X30112023	Advanced CUD — not coated Connector Board — not coated	6RY1803-0AA05-0AA1 6RY1803-0GA00
A6X30112024	Standard CUD — coated Connector Board — coated	6RY1803-0AA20-0AA1 6RY1803-0GA20	A6X30112025	Advanced CUD — coated Connector Board — coated	6RY1803-0AA25-0AA1 6RY1803-0GA20

Supplementary communication board and memory card options

SINAMICS DCM options	Catalog No.		Standard features
	Non-coated	Coated	
CBE20		6SL3055-0AA00-2EB0	The CBE20 can be used to connect to PROFINET, EtherNet/IP and Modbus TCP networks via the Advanced CUD. The CBE20 also allows SINAMICS Link connections to be established in conjunction with the memory card.
Memory Card	6RX1800-0AS01		The memory card can be used in either the Standard or Advanced CUD. The memory card offers the following options: ▪ Save drive parameters and transfer to additional drives or control units (CUDs) ▪ Additional languages can be downloaded into the AOP30 Advanced Operator Panel ▪ Perform an offline long-time trace ▪ Download DCC block library ▪ Firmware updates ▪ SINAMICS Link

Supplementary external components / accessories

SINAMICS DCM options	Catalog No.	Standard features
	Non-coated	
Sensor Module Cabinet SMC30 via DRIVE-CLiQ to Advanced CUD boards	6SL3055-0AA00-5CA2	Features include the following interfaces: ▪ 1 DRIVE-CLiQ interface ▪ 1 encoder connection Sub D ▪ 1 connection for electronics power supply via 24V DC ▪ 1 PE / protective conduction cable
Terminal Module TM15 via DRIVE-CLiQ to Advanced CUD boards	6SL3055-0AA00-3FA0	▪ 24 bi-directional digital inputs / outputs ▪ 24 green LEDs ▪ 2 DRIVE-CLiQ sockets ▪ 1 connection for electronics power supply via 24V DC ▪ 1 PE / protective conduction cable
Terminal Module TM31 via DRIVE-CLiQ to Advanced CUD boards	6SL3055-0AA00-3AA1	▪ 8 digital inputs ▪ 4 bi-directional digital inputs / outputs ▪ 2 relay outputs with changeover contact ▪ 2 analog inputs ▪ 2 analog outputs ▪ 1 temperature sensor input (KTY84-130 or PTC) ▪ 2 DRIVE-CLiQ sockets ▪ 1 connection for electronics power supply via 24V DC ▪ 1 PE / protective conduction cable
TM150 Terminal Module for RTD monitoring via DRIVE-CLiQ to Advanced CUD boards	6SL3055-0AA00-3LA0	▪ A range of temperature sensors is supported: Pt100 Platinum RTD** 100 ohm and Pt1000 Platinum RTD 1,000 ohm, KTY84 temperature sensor, PTC (Positive temperature coefficient thermistor), Temperature switch contact (Thermoclick, bimetallic, NC) ▪ The TM150 supports: up to 12 sensors in 2-wire connection or up to 6 sensors in 3- or 4-wire connection
DRIVE-CLiQ Cables 0.11m pre-fabricated	6SL3060-4AB00-0AA0	▪ 0.11 meter in length (See D23.1 for different part numbers and lengths)
Advanced Operator Panel AOP30	6SL3055-0AA00-4CA5	▪ AOP30 Advanced Operator Panel is an accessory for mounting outside the converter on a cabinet door ▪ Graphical LCD Display (240 x 64) with backlighting for plain-text display and bar-type display for process viables ▪ LEDs: RUN=green, ALARM=yellow, FAULT=red ▪ RS232 and (RS485 / SINAMICS DCM) ▪ 24V DC power supply ▪ Help functions ▪ Time and date memory with internal battery backup ▪ 26-key membrane keyboard
RS 485 cable for AOP30 to connect one CUD to AOP30	6RY1807-0AP00	▪ Connection cable with integrated 24V power supply, 3 meter cable
RS 485 cable for AOP30 to connect two CUDs to AOP30	6RY1807-0AP10	▪ Connection cable with integrated 24V power supply, 3 meter cable

* The supplementary external components options are not available as coated.
** The RTD inputs are not galvanically isolated. Only temperature sensors that meet the insulation requirements per IEC 61800-5-1 may be connected.

Product selection — example 1

Application: The customer has an existing winder application with the following requirements: Supply input of 480V AC, 200 hp DC motor with encoder feedback, a continuous current of 315 amps and an overload requirement of 150% for one minute every 15 minutes. The winder application requires regeneration. The interface requirements for the application are PROFIBUS communication protocol, 8 digital inputs, 6 digital outputs, 4 analog outputs, 3 analog inputs, 2 relay outputs, and an additional encoder input to measure the diameter of the roll.

Solution: The first step is to select the SINAMICS DCM base drive based upon the power requirements. Per the product selection table, look under the current rating column for the DC II rating that allows for continuous current plus the 150% overload requirement.

From the product selection table, the proper selection for the SINAMICS DC Master Base Drive is:

6RA80822FV620AA0 — 450A, 4-Quad Unit

Next, determine whether the standard features of the Base Drive meet the interface requirements, or whether additional field-installed options are required. The Advanced CUD, which is standard, provides the PROFIBUS interface and all other options except for 4 of the I/O points, the two relay outputs and the additional encoder interface. The optional TM31 Terminal Module provides the additional 4 I/O and the two relay outputs. The optional SMC30 Sensor Module provides the encoder interface. Both the TM31 and SMC30 connect to the Advanced CUD via DRIVE-CLiQ.

Please check Catalog D23.1 SINAMICS DCM to select the best length DRIVE-CLiQ cables.

The ordering data are as follows:

1 6RA80822FV620AA0 — 450A, 4-Quad SINAMICS DCM Base Drive

1 6SL3055-0AA0-3AA1 — Terminal Module 31

1 6SL3055-0AA00-5CA2 — Sensor Module

Product selection — example 2

Application: The customer has an existing motor generator set and is looking to upgrade the field on the generator. The input power is 240V AC, the motor field is rated at 56 amps at 150V DC and there is no overload requirement. The customer has no communication protocol requirement and the Start/Stop and speed reference (0- +10V DC) is discrete wired. The customer wants to utilize the existing cabinet and to replace the existing contactor, fuses and control components.

Solution: Siemens can meet the customer's expectations with the SINAMICS DCM Base Drive. Additionally, use of the Base Drive will save engineering and installation time since the pre-engineered components are mounted on a sub-panel. The application does not require any overloads, so we can size the drive according to the product selection table using the current rating column for the DC I rating with no overload capability.

From the product selection table, the 60A unit is the best solution. Since the field control for the MG set is non-reversing, a 2-Quad non-reversing drive can be used. The Advanced CUD, which is provided as standard, has sufficient I/O to meet the discrete control requirements, so no additional options are required.

For any application, it is important to get the required motor data, overloads and duty cycle. This gives the customer the best opportunity to size the drive correctly and not over-size or under-size in certain applications.

The ordering data is as follows:

1 6RA80252FS220AA0 — 60A, 2-Quad SINAMICS DCM Base Drive

Technical information

Electrical data			
Supply voltages and output ranges	240V / 480V 3-phase AC, ±10%, 3–800 hp / single-phase AC with 30% de-rate up to 125A continuous current		
Supply systems	Grounded or ungrounded supplies		
Rated line frequency	45–65 Hz		
Output voltage	0–500V DC		
Overload possibility.	Max. 1.8x rated DC current		
Short circuit current rating	SCCR per UL508A: 65 kA		
Mechanical data			
Type of enclosure	Open IP00		
Type of cooling	Self-ventilated / forced-air ventilation		
Noise level LpA (1 m)	70–74.4 dB(A) at 60 Hz line frequency		
Compliance with standards			
UL listing	UL and cUL (508A), drive components are listed UL508C		
Ambient conditions	**Operation**	**Storage**	**Transport**
Ambient temperature	32˚F to 113˚F (0˚C to +45˚C)	-40˚F (-40˚C) to 158˚F (+70˚C)	-40˚F (-40˚C) to 158˚F (+70˚C)
Relative humidity (non-condensing)	5% to 95%	5% to 95%	5% to 95% at 40˚C
Installation altitude	Up to 3,300 ft (1,000 m) above sea level without reduction in performance, > 3,300 ft see derating data		

For more comprehensive information on the SINAMICS DCM Base Drive, please refer to Catalog D23.1 or the base drive instruction manual.

Engineering information

Overload capability

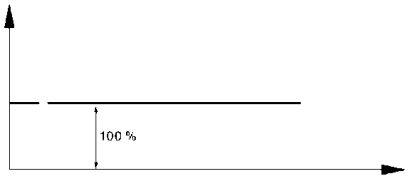
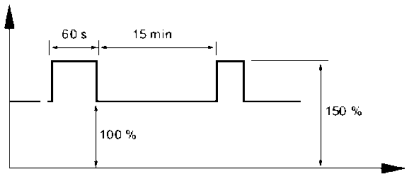
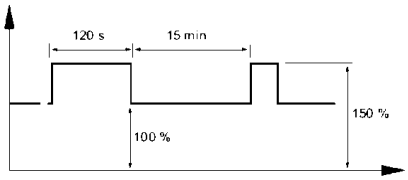
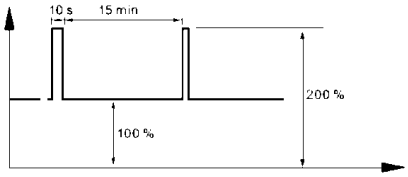
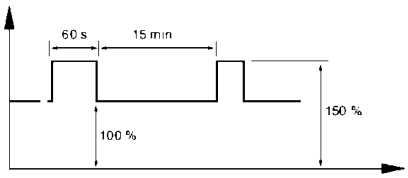
The rated DC current specified on the unit rating plate (maximum permissible continuous DC current) may be exceeded in operation. The extent to which this value is exceeded and how long this lasts are subject to certain limits.

The absolute upper limit for the value of the overload currents is 1.8x the rated DC current. The maximum overload duration depends on the time characteristic of the overload current as well as on the load history of the unit and also depends on the specific unit.

Each overload must be preceded by an under load (load phase with load current < rated DC current). Once the maximum permissible overload duration has elapsed, the load current must return to at least an absolute value ≤ the rated DC current.

The SINAMICS DCM Base drive may be operated with five different overload settings configured in the drive parameters.

- The DC I through DC IV load classes are rated at 40˚C
- ***DC I*** — Continuous Duty without no overloads possible
- ***DC II*** — Continuous rating with 150% overload for 60 seconds with a 15 minute cool down below base load current setting.
- ***DC III*** — Continuous rating with 150% overload for 120 seconds with a 15 minute cool down below base load current setting.
- ***DC IV*** — Continuous rating with 200% overload for 10 seconds with a 15 minute cool down below base load current setting.
- ***US Rated*** — Continuous rating with 150% overload for 60 seconds with a 15 minute cool down below base load current setting. Ambient temp at 45˚C

Load class (parameter)	Load for the converter	Load cycle
DC I	$I_{DC\ I}$ continous (I_{dN})	
DC II	$I_{DC\ II}$ for 15 min. and 1.5 x $I_{DC\ II}$ for 60 s	
DC III	$I_{DC\ III}$ for 15 min. and 1.5 x $I_{DC\ III}$ for 120 s	
DC IV	$I_{DC\ IV}$ for 15 min. and 2 x $I_{DC\ IV}$ for 10 s	
U.S. rating	I_{US} for 15 min and 1.5 x I_{US} for 60 s Note: with this setting, for all unit types, an ambient and / or cooling medium temperature of 45 °C is permissable.	

STARTER—the drive commissioning tool

This easy-to-use software provides graphical support when it comes to the configuration and commissioning of drive components. STARTER is menu-assisted and 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 can be optimized using integrated test functions

Drive Control Charts (DCC)

SINAMICS can handle classic closed-loop drive control using Drive Control Charts. Drive-related open-loop and closed-loop control tasks can be shifted into the drive itself. 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.

Published by
Siemens Industry, Inc.

100 Technology Drive
Alpharetta, GA 30005

(770) 871-3800

Order No. DRTD-DCMBD-0322

Printed in USA

usa.siemens.com/motioncontrol