DC Converter

Overview

The series of SINAMICS DC MASTER DC Converters includes the following components:

- Electronics module with Control Unit (CUD) and slot for expansion using another CUD (in a cradle that can be swiveled out)
- Power section with thyristors in a fully-controlled three-phase bridge circuit configuration (two-quadrant drive: B6C or four-quadrant drive: (B6) A (B6) C) [2)]
- Fan (up to 125 A: self-ventilated)
- Single-quadrant field power section with integrated freewheeling circuit (optionally, also without field or as two-quadrant field for highly dynamic field current changes with integrated field overvoltage protection)
- Electronics power supply
- Standard BOP20 operator panel (AOP30 Advanced Operator Panel as accessory)

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Technical specifications

General technical specifications			
Relevant standards			
EN 50178	Electronic equipment for use in power installations		
EN 50274	Low-voltage switchgear and controlgear assemblies: Protection against electric shock – Protection against unintentional direct contact with hazardous live parts		
EN 60146-1-1	Semiconductor converters: General requirements and line-commutated converters; specification of basic requirements		
EN 61800-1	Adjustable speed electrical power drive systems, Part 1 – (DC drives) General requirements – Rating specifications for low voltage adjustable speed DC power drive systems		
EN 61800-3	Adjustable speed electrical power drive systems, Part 3 – EMC product standard including specific test methods		
EN 61800-5-1	Adjustable speed electrical power drive systems – Part 5-1: Requirements regarding safety – electrical, thermal, and energy requirements		
IEC 62103 (identical to EN 50178)	Electronic equipment for use in power installations		
UBC 97	Uniform Building Code		
Electrical specifications			
Overvoltage category	Category II acc. to EN 61800-5-1 within line supply circuits Category III acc. to EN 61800-5-1 for line supply circuits with respect to the environment (other line supply circuits, housing, electronics)		
Overvoltage strength	Class 1 acc. to EN 50178		
Short-circuit current	Rated supply voltage V	Rated DC current A	Short-circuit current, max. kA
	400, 480 3 AC	15 ... 1200	65
		1600, 2000	85
		3000	100
	575, 690, 830, 950 3 AC	60 ... 850	65
		950 ... 1600	85
		1900 ... 2800	100
Radio interference suppression	No radio interference suppression according to EN 61800-3		

[1)] Conditions:
The closed-loop control (PI control) stability is referred to the rated motor speed and applies when the SINAMICS DC MASTER is in the warm operating condition. This is based on the following preconditions:
- Temperature changes of ±10 °C
- Line supply voltage changes of +10 % / -5 % of the rated input voltage
- Temperature coefficient of the tachometer generator with temperature compensation 0.15 ‰ every 10 °C (for analog tachometer generators only)
- Constant setpoint

[2)] In two-quadrant operation, the drive can operate in "driving" mode in one direction of rotation and in "braking" mode with regenerative feedback in the opposite direction of rotation. In four-quadrant operation, the drive can operate in "driving" mode and in "braking" mode with regenerative feedback in both directions of rotation.

Technical specifications (continued)

General technical specifications			
Mechanical data			
Degree of protection	IP00 acc. to EN 60529; IP20 with accessories "Mounting kit to upgrade to IP20" for units up to 850 A		
Protection class	Class 1 acc. to EN 61140		
Cooling method			
• Units ≤ 125 A rated DC current: Permissible ambient temperature in operation	Self-ventilated 0 ... 45 °C – for higher ambient temperature, see current derating on page 3/8		
• Units ≥ 210 A rated DC current: Permissible ambient temperature in operation	Forced-air cooling with integrated fan 0 ... 40 °C – for higher ambient temperature, see current derating on page 3/8		
Closed-loop control stability			
• for pulse encoder operation and digital setpoint	Δ_n = 0.006 % of the rated motor speed		
• for analog tachometer and analog setpoint [1]	Δ_n = 0.1 % of the rated motor speed		
MTBF	> 170000 h		
Environmental conditions			
Permissible ambient temperature during storage and transport	-40 ... +70 °C		
Permissible humidity	Relative air humidity ≤ 95 % (75 % at 17 °C as average annual value, 95 % at 24 °C max., condensation not permissible)		
Climate class	3K3 acc. to EN 60721-3-3		
Insulation	Pollution degree 2 according to EN 61800-5-1 Condensation not permissible		
Installation altitude	≤ 1000 m above sea level (100 % load capability) > 1000 ... 5000 m above sea level (see under "Coolant temperature and installation altitude" on page 3/8)		
Mechanical strength	**Storage**	**Transport**	**Operation**
Vibratory load	1M2 acc. to EN 60721-3-1 (dropping not permissible)	2M2 acc. to EN 60721-3-2 (dropping not permissible)	Constant deflection: 0.075 mm at 10 to 58 Hz Constant acceleration: 10 m/s^2 at > 58 to 200 Hz (testing and measuring techniques acc. to EN 60068-2-6, Fc)
Shock load			100 m/s^2 at 11 ms (testing and measuring techniques acc. to EN 60068-2-27, Ea)
Approvals			
UL/cUL	UL file No.: E203250		
UL 508 C (UL Standard for Power Conversion Equipment)	Certification of the units up to and including 575 V		
GOST	In order to maintain the important limit values for marine certification, radio interference suppression filters should be used (see "Accessories and supplementary components") and option M08 (coated PCBs) should be selected.		
Lloyd´s Register			
Det Norske Veritas			
American Bureau of Shipping			
Germanischer Lloyd			

Technical specifications (continued)

SINAMICS DC MASTER converters for 480 V 3 AC, 280 to 1200 A, four-quadrant operation

		Type				
		6RA8078-6FV62-0AA0	6RA8082-6FV62-0AA0	6RA8085-6FV62-0AA0	6RA8087-6FV62-0AA0	6RA8091-6FV62-0AA0
Rated armature supply voltage [1]	V	480 3 AC (+10/-20 %)				
Rated armature input current	A	232	374	498	706	996
Rated supply voltage, electronics power supply	V	380 (-25 %) … 480 (+10 %) 2 AC; I_n = 1 A or 190 (-25 %) … 240 (+10 %) 2 AC; I_n = 2 A				
Rated fan supply voltage	V	24 V DC internal	400 V 3 AC ± 10 % (50 Hz) 460 V 3 AC ± 10 % (60 Hz)			
Rated fan current	A	Internal supply	0.23 [3]			0.3 [3]
Cooling air requirement	m^3/h	300	600			1000
Sound pressure level [2]	dB (A)	52.4	64.5			
Rated field supply voltage [1]	V	480 2 AC (+10/-20 %)				
Rated frequency	Hz	45 … 65				
Rated DC voltage [1]	V	500				
Rated DC current	A	**280**	**450**	**600**	**850**	**1200**
Overload capability	x × I_n	1.8				
Rated power	kW	140	225	300	425	600
Power loss at rated DC current	kW	0.81	1.58	1.91	2.60	4.24
Rated DC field voltage [1]	V	Max. 390				
Rated DC field current	A	**15**	**25**	**25**	**30**	**40**
Normal ambient temperature in operation [4]	°C	0 … +40				
Storage and transport temperature	°C	-40 … +70				
Installation altitude above sea level [4]		≤ 1000 m for rated DC current				
Dimensions						
• Width	mm	268				
• Height	mm	385	625		700	785
• Depth	mm	252	275		311	435
Weight, approx.	kg	15	31		42	78

Note:
Detailed dimensional drawings in PDF and DXF format are available on the Internet at http://support.automation.siemens.com/WW/view/en/81717045.

[1] The armature/field supply voltage may be lower than the rated armature/field voltage (set by parameter). A minimum input voltage of 50 V is permissible for units with a rated voltage of 400 V, 480 V and 575 V, or 85 V for higher rated voltages. The output voltage is reduced accordingly. The specified DC output voltage can be maintained up to an undervoltage of 5 % of the line supply voltage (rated armature/field supply voltage).

[2] Fan noise for a unit installed in an IP20 electrical cabinet (door closed, 50 Hz operation or operation at 24 V DC for units with an internal supply).

[3] For fan motor type R2D220-AB02-19 in units 6RA8081, 6RA8085, and 6RA8087 with a rated voltage of 400 V or 575 V, UL systems require a Siemens motor circuit breaker of type 3RV1011-0DA1 or 3RV1011-0EA1, set to 0.3 A.

[4] For derating factors at higher temperatures and installation altitudes, see page 3/8.

Selection and ordering data (continued)

DC Converters for four-quadrant operation

Rated data						DC Converter	Fuses		
Armature circuit				Field circuit			Armature circuit		Field circuit
Rated supply voltage [1]	Rated DC voltage	Rated DC current	Rated power	Rated supply voltage [1]	Rated DC current	Article No.	Phase	DC current	2 each
V	V	A	kW	V	A		Type	Type	Type
400 3 AC	420	15	6.3	400 2 AC	3	**6RA8013-6DV62-0AA0**	3NE1814-0	3NE1814-0	5SD420
		30	12.6		5	**6RA8018-6DV62-0AA0**	3NE8003-1	3NE4102	5SD420
		60	25		10	**6RA8025-6DV62-0AA0**	3NE1817-0	3NE4120	5SD420
		90	38		10	**6RA8028-6DV62-0AA0**	3NE1820-0	3NE4122	5SD420
		125	53		10	**6RA8031-6DV62-0AA0**	3NE1021-0	3NE4124	5SD420
		210	88		15	**6RA8075-6DV62-0AA0**	3NE3227	3NE3227	5SD440
		280	118		15	**6RA8078-6DV62-0AA0**	3NE3231	3NE3231	5SD440
		400	168		25	**6RA8081-6DV62-0AA0**	3NE3233	3NE3233	5SD440
		600	252		25	**6RA8085-6DV62-0AA0**	3NE3336	3NE3336	5SD440
		850	357		30	**6RA8087-6DV62-0AA0**	3NE3338-8	3NE3334-0B [3]	5SD480
		1200	504	480 2 AC	40	**6RA8091-6DV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
		1600	672		40	**6RA8093-4DV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
		2000	840		40	**6RA8095-4DV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
		3000	1260		40	**6RA8098-4DV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
480 3 AC	500	15	6	480 2 AC	3	**6RA8013-6FV62-0AA0**	3NE1814-0	3NE1814-0	5SD420
		30	15		5	**6RA8018-6FV62-0AA0**	3NE1815-0	3NE4102	5SD420
		60	30		10	**6RA8025-6FV62-0AA0**	3NE1817-0	3NE4120	5SD420
		90	45		10	**6RA8028-6FV62-0AA0**	3NE1820-0	3NE4122	5SD420
		125	63		10	**6RA8031-6FV62-0AA0**	3NE1021-0	3NE4124	5SD420
		210	105		15	**6RA8075-6FV62-0AA0**	3NE3227	3NE3227	5SD440
		280	140		15	**6RA8078-6FV62-0AA0**	3NE3231	3NE3231	5SD440
		450	225		25	**6RA8082-6FV62-0AA0**	3NE3233	3NE3334-0B	5SD440
		600	300		25	**6RA8085-6FV62-0AA0**	3NE3336	3NE3336	5SD440
		850	425		30	**6RA8087-6FV62-0AA0**	3NE3338-8	3NE3334-0B [3]	5SD480
		1200	600		40	**6RA8091-6FV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
575 3 AC	600	60	36	480 2 AC	10	**6RA8025-6GV62-0AA0**	3NE1817-0	3NE4120	5SD420
		125	75		10	**6RA8031-6GV62-0AA0**	3NE1021-0	3NE4124	5SD420
		210	126		15	**6RA8075-6GV62-0AA0**	3NE3227	3NE3227	5SD440
		400	240		25	**6RA8081-6GV62-0AA0**	3NE3233	3NE3233	5SD440
		600	360		25	**6RA8085-6GV62-0AA0**	3NE3336	3NE3336	5SD440
		850	510		30	**6RA8087-6GV62-0AA0**	3NE3338-8	3NE3334-0B [3]	5SD480
		1100	660		40	**6RA8090-6GV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
		1600	960		40	**6RA8093-4GV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
		2000	1200		40	**6RA8095-4GV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
		2200	1320		40	**6RA8096-4GV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
		2800	1680		40	**6RA8097-4GV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
690 3 AC	725	760	551	480 2 AC	30	**6RA8086-6KV62-0AA0**	3NE3337-8	3NE3334-0B [3]	5SD420
		1000	725		40	**6RA8090-6KV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
		1500	1088		40	**6RA8093-4KV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
		2000	1450		40	**6RA8095-4KV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
		2600	1885		40	**6RA8097-4KV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
830 3 AC	875	950	831	480 2 AC	40	**6RA8088-6LV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
		1500	1313		40	**6RA8093-4LV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
		1900	1663		40	**6RA8095-4LV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]
950 3 AC	1000	2200	2200	480 2 AC	40	**6RA8096-4MV62-0AA0**	– [2]	– [2]	3NE1802-0 [4]

[1] 50/60 Hz
[2] Arm fuses included in the unit, external semiconductor fuses not required
[3] Two fuses connected in parallel
[4] UL-recognized