

SIEMENS

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SINAMICS DCM

Base Drive panel instructions – V 1.0
Extended Range: 1500A - 2800A DC
575V, 690V, 830V & 950V
3-phase AC Rated Armature Supply

Converter software version:

As these Operating Instructions went to print, SINAMICS DCM converters were being delivered from the factory with **software version 1.4.1 installed**.

These Operating Instructions also apply to *other software versions*.

Earlier software versions: *Some parameters* described in this document *might not be available in the software* (i.e. the corresponding functionality is not available on the converter) or some parameters will have a restricted setting range. Sinamics DCM Base Drive Panel series requires software version 1.3 or later.

Later software versions: *Additional parameters might be available* on the SINAMICS DCM (i.e. extra functions might be available which are not described in these Operating Instructions) or some parameters might have an extended setting range. In this case, leave the relevant parameters at their factory setting, or do not set any parameter values which are not described in these Instructions!

The latest software version of the SINAMICS DCM can be read in parameter r500060_0.

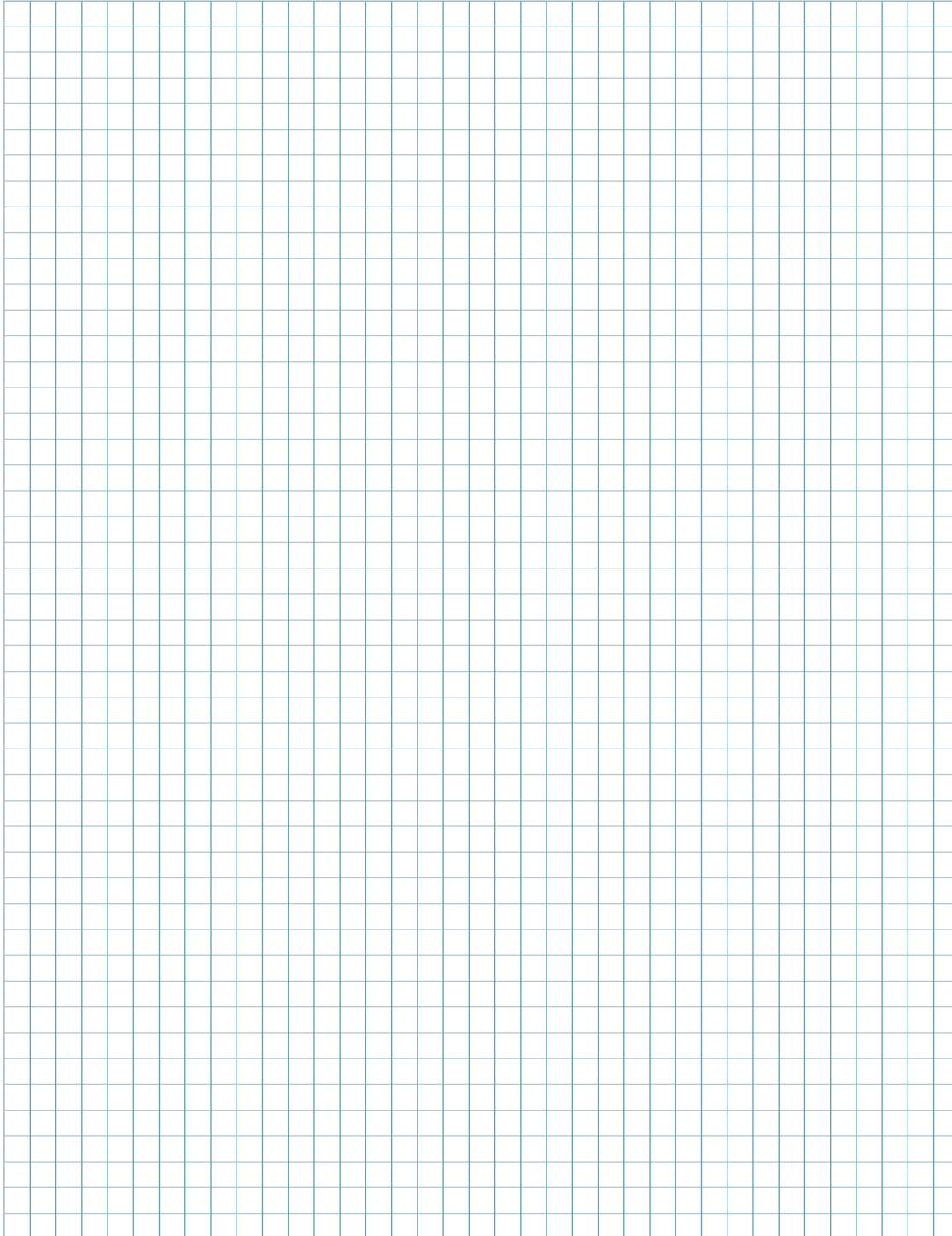
Contents

1	Safety information	1-1
2	Introduction	
2.1	Base Drive panel description	2-1
2.2	General information	2-1
2.3	Rated DC current	2-2
2.4	Expandable functionality using SINAMICS components	2-4
3	Parts and service	
3.1	Base Drive panel catalog numbers	3-1
3.2	Service	3-2
3.3	Option part numbers	3-3
3.4	CUD Kits	3-4
3.5	Spare parts	3-4
4	Receiving and unpacking	4-1
5	Technical data	
5.1	1600-2800A DC, 575V 3-Ph AC	5-1
5.2	1500-2600A DC, 690V 3-Ph AC	5-2
5.3	1500-1900A DC, 830V 3-Ph AC	5-3
5.4	2200A DC, 950V 3-Ph AC	5-4
5.5	Applicable standards	5-6
6	Installation and dimensions	
6.1	Installation information	6-1
6.2	Base Drive panel outlines	6-2
7	Base Drive panel connections	
7.1	Base Drive panel schematics	7-2
7.2	Control connections control units (CUD)	7-4
7.3	Control units (CUD)	7-6
7.4	Description of power / control terminals	7-7

Notes

Notes

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1 Safety information



WARNING



Hazardous voltages and moving parts are present in this electrical equipment during operation. Non-observance of the safety instructions can result in death, severe personal injury or substantial property damage.

Only qualified personnel should work on or around the equipment after first becoming thoroughly familiar with all warning and safety notices and maintenance procedures contained herein. The successful and safe operation of this equipment is dependent on proper handling, installation, operation and maintenance.

Definitions

QUALIFIED PERSONNEL

For the purpose of this Instruction Manual and product labels, a “Qualified Person” is someone who is familiar with the installation, construction and operation of the equipment and the hazards involved. He or she must have the following qualifications:

1. Trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety procedures.
2. Trained in the proper care and use of protective equipment in accordance with established safety procedures.
3. Trained in providing first aid.

DANGER

For the purpose of this Instruction Manual and product labels, “**Danger**” indicates that death, severe personal injury or substantial property damage will result if proper precautions are not taken.

WARNING

For the purpose of this Instruction Manual and product labels, “**Warning**” indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.

CAUTION

For the purpose of this Instruction Manual and product labels, “**Caution**” indicates that minor personal injury or property damage can result if proper precautions are not taken.

NOTE

For the purpose of this Instruction Manual, “**Note**” indicates information about the product or the respective part of the Instruction Manual which requires particular attention.

1 Safety information (continued)

NOTE

These operating instructions do not purport to cover all details or variations in equipment, or to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens Sales Office.

The contents of these operating instructions shall not become part of or modify any prior or existing agreement, commitment or relationship. The Sales Contract contains the entire obligations of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.



DANGER

Converters contain hazardous electrical voltages, Death, severe bodily injury or significant material damage can occur if the safety measures are not followed.

1. Only qualified personnel, who are knowledgeable about the converters and the provided information, can install, start up, operate, troubleshoot or repair the converters.
2. The converters must be installed in accordance with all relevant safety regulations (e.g. NEC, DIN, VDE) as well as all other national or local regulations. Operational safety and reliability must be ensured by correct grounding, cable sizing and appropriate short-circuit protection.
3. All panels and doors must be kept closed during normal operation.



4. Before carrying out visual checks and maintenance work, ensure that the AC power supply is disconnected and locked out. Before the AC supply is disconnected, both converters and motors have hazardous voltage levels. Even when the converter contactor is open, hazardous voltages are still present.
5. When making measurements with the power supply switched on, electrical connections must not be touched under any circumstances. Remove all jewelry from wrists and fingers. Ensure that the test equipment is in good condition and operationally safe.
6. When working on units that are switched on, stand on an insulating surface, i.e. ensure that you are not grounded.
7. Carefully follow the relevant instructions and observe all danger, warning and cautionary instructions.
8. This does not represent a full listing of all the measures necessary for safe operation of the equipment. If you require other information or if certain problems occur which are not handled in enough detail in the information provided in the Instruction Manual, please contact your local Siemens office.

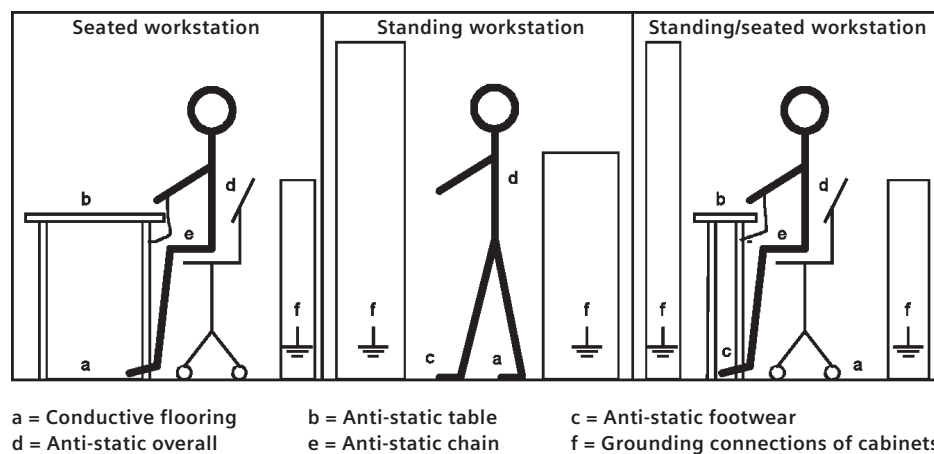


CAUTION Electro-statically sensitive devices

The converter contains electro-statically sensitive devices. These can easily be destroyed if they are not handled correctly. If, however, it is absolutely essential for you to work on electronic modules, please pay careful attention to the following instructions:

- Electronic modules (PCBs) should not be touched unless work has to be carried out on them.
- Before touching a PCB, the person carrying out the work must himself be electro-statically discharged. The simplest way of doing this is to touch an electrically conductive ground object, e.g. socket outlet ground contact.
- PCBs must not be allowed to come into contact with electrically insulating materials * plastic foil, insulating table tops or clothing made of synthetic fibers *
- PCBs may only be set down or stored on electrically conducting surfaces.
- When carrying out soldering jobs on PCBs, make sure that the soldering tip has been grounded.
- PCBs and electronic components should generally be packed in electrically conducting containers (such as metallized-plastic boxes or metal cans) before being stored or shipped.
- If the use of non-conducting packing containers cannot be avoided, PCBs must be wrapped in a conducting material before being put in them. Examples of such materials include electrically conducting foam rubber or household aluminum foil.

For easy reference, the protective measures necessary when dealing with sensitive electronic components are illustrated in the sketches below.



Notes

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A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

2 Introduction

2.1 Base Drive panel description

SINAMICS DCM Base Drive panels are complete drive assemblies ready to be installed into an enclosure. Base Drive Panels are fully digital, compact units which supply the armature and field of variable-speed DC motors with rated armature currents from 1500 Amps to 2800 Amps. The motor field circuit can be supplied with DC currents up to 40 Amps, 85 Amps (L85 Option) is available upon request on the 1500A – 2800A Base Drives (Please consult with your Siemens Representative or send an e-mail to drives-marketing.industry@siemens.com). Each Base Drive panel includes the following components and factory installed converter options.

- 3-phase Armature Converter
- 1-phase Field Converter
- DC Output Contactors
- Protective Semiconductor Fuses (internal to the Converter)
- Control Power Transformer
- Power and Control Terminals
- Advanced CUD – G00 Option
- PROFINET, EtherNet/IP Communication CBE20 – G20 Option
- Micro Memory Card – S01 Option
- Three phase fan (460V AC) – standard on 1500A – 2800A Base Drives

Providing the Advanced CUD, provides several customer advantages.

- DRIVE-CLiQ connectivity allows for the connection of Terminal Modules (TM15, TM31, TM150) plus the SMC30 Encoder Module. This gives the customers flexibility for future expansion of additional Input/Outputs by simply adding DRIVE-CLiQ modules rather than adding another Advanced CUD board to add additional Inputs/Outputs.
- Option Slot allows the CBE20 to be installed in the Advanced CUD. The CBE20 allows the drive to utilize ProfiNet or Ethernet-IP communications. The CBE20 can alternatively be used to provide high speed peer to peer communications with the drives.

2.2 General information

SINAMICS DCM converters are characterized by their compact, space-saving construction. Their compact design makes them particularly easy to service and maintain since individual components are readily accessible.

All SINAMICS DCM units are equipped with a BOP20 “Basic operator panel” mounted in the converter cover. The BOP20 has a backlit two-line display area and 6 keys. It may be used to acknowledge faults, set parameters and read diagnostic information.

The AOP30 optional advance operator panel can be mounted externally, e.g., in the cubicle door. When mounted remotely, the AOP30 can be connected to the converter with cables up to 50 meters (164 feet) in length. Cables up to 200 meters (600 feet) in length can be used if a separate 24V DC power supply is available. The AOP30 connects to the SINAMICS DCM through connector X178 using the RS485 interface. The AOP30 can be installed as an economic alternative to conventional door mounted metering devices (i.e., voltmeters, ammeters, and speed indicator).

2 Introduction (continued)

The AOP30 features a liquid crystal display (240 × 64 pixels) with backlighting for plain-text display and a bar-type display for process variables. English, German, French, Spanish, Italian and Chinese can be selected as the display languages.

The converter can also be parameterized on a standard PC with appropriate software connected to the serial interface on the basic unit. This PC interface is used during start-up, for maintenance during shutdown and for diagnosis in operation.

On 2-quadrant converters, a fully controlled three-phase bridge supplies the armature. On 4-quadrant converters, two fully controlled three-phase bridges are connected in an inverse-parallel connection to allow both positive and negative armature current. For the field converter, a single-phase, half-controlled 2-pulse bridge supplies the motor shunt field.

The armature and field converters can operate with AC line frequencies from 45–65 Hz. If required for a specific application, the frequency of the armature and field AC supplies can be different. The power section cooling system is monitored by means of temperature sensors.

The power section for the armature and field converters is constructed of isolated thyristor modules for converters rated from 1500A to 2800A at 575V, 690V, 830V and 950V, 3-phase AC line voltages. The heat sink in this case is electrically isolated and at ground potential. The housing and terminal covers on power connections provide protection against accidental contact for operators working in the vicinity. All connecting terminals are accessible from the top.

All open and closed-loop drive control and communication functions are performed by powerful microprocessors. Drive control functions are implemented in the software as program modules that can be “wired up” and changed by parameters.

2.3 Rated DC current

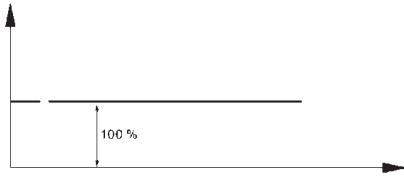
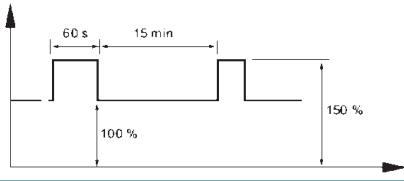
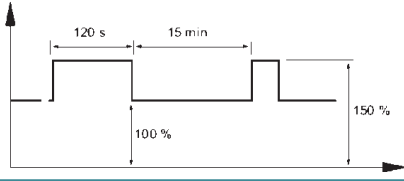
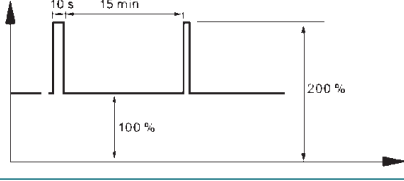
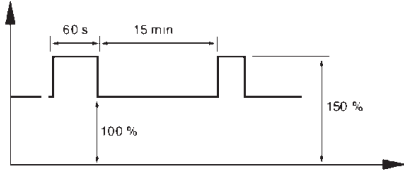
- The rating plate of the SINAMICS DCM Base drive panel has the rated Armature current listed of the output rating for IEC DC I constant duty rating.
- The Base Drive Panels are designed using the DC I rating which means that fuses, contactors and terminal blocks are sized for the full continuous DC I current.
- The DC I rating is the maximum current the power module can supply continuously with no overload. Because an overload is not possible, the DC I rated current is higher than the continuous DC II rating.
- The microprocessor calculates the current I_{2t} value of the power section cyclically to ensure that the thyristors are not damaged in overload operation.
- The DC II rated current allows operation by an overload of 150% for 60 seconds in a 40° C ambient. The overload can be applied no sooner than every 15 minute intervals.

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.

DC I through DC IV 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	$I_{DC I}$ continuous (I_{dN})	
DC II	$I_{DC II}$ for 15 min. and $1.5 \times I_{DC II}$ for 60 s	
DC III	$I_{DC III}$ for 15 min. and $1.5 \times I_{DC III}$ for 120 s	
DC IV	$I_{DC IV}$ for 15 min. and $2 \times I_{DC IV}$ for 10 s	
U.S. rating	I_{US} for 15 min and $1.5 \times I_{US}$ for 60 s Note: with this setting, for all unit types, an ambient and / or cooling medium temperature of 45 °C is permissible.	

2 Introduction (continued)

2.4 Expandable functionality using SINAMICS components

One of the many features of the SINAMICS DCM Base Drive is its ability to expand its functionality modularly through the use of coupling supplementary modules from the SINAMICS drives family to the DRIVE-CLiQ interface. Modules include digital, analog I/O, external encoder and communications options. As a result, the flexibility, when engineering the plant or system is increased, costs are optimized at the same time. A complete list of the option modules can be found in the SINAMICS DCM catalog available from your local Siemens sales office.

The SINAMICS DCM Base Drive contains one advanced CUD (left) microprocessor board with the CBE20 installed, and one additional bay for another advanced or standard CUD (right).

In order to optimally fulfill the requirements relating to interfaces and computational performance for technology functions, a standard or advanced CUD or a combination can be selected. It is also possible to use two CUDs to increase the performance for technological open-loop and closed-loop control tasks. This allows optimum adaptation to the wide range of requirements relating to drive technology and complementary markets — both technically and economically.

3 Parts and service

3.1 Base Drive panel catalog numbers

575V 3-phase AC Rated Armature Supply Base Drives:

² DC I rating (Amps DC)	DC II rating (Amps DC)	2-quad type (Catalog No.)	4-quad type (Catalog No.)	¹ Horsepower (240V DC)	¹ Horsepower (500V DC)	¹⁴ Q Horsepower (600V DC)
1600	1255	6RA80932GS220AA0	6RA80932GV620AA0	400 Hp	800 Hp	1000 Hp
2000	1663	6RA80952GS220AA0	6RA80952GV620AA0	500 Hp	1000 Hp	1250 Hp
2200	1779	6RA80962GS220AA0	6RA80962GV620AA0	500 Hp	1000 Hp	1250 Hp
2800	2136	6RA80972GS220AA0	6RA80972GV620AA0	600 Hp	1250 Hp	1500 Hp

690V 3-phase AC Rated Armature Supply Base Drives:

² DC I rating (Amps DC)	DC II rating (Amps DC)	2-quad type (Catalog No.)	4-quad type (Catalog No.)	¹⁴ Q Horsepower (725V DC)
1500	1171	6RA80932KS220AA0	6RA80932KV620AA0	1000 Hp
2000	1589	6RA80952KS220AA0	6RA80952KV620AA0	1500 Hp
2600	1992	6RA80972KS220AA0	6RA80972KV620AA0	1750 Hp

830V 3-phase AC Rated Armature Supply Base Drives:

² DC I rating (Amps DC)	DC II rating (Amps DC)	2-quad type (Catalog No.)	4-quad type (Catalog No.)	¹⁴ Q Horsepower (875V DC)
1500	1171	6RA80932LS220AA0	6RA80932LV620AA0	1250 Hp
1900	1485	6RA80952LS220AA0	6RA80952LV620AA0	1500 Hp

950V 3-phase AC Rated Armature Supply Base Drive:

² DC I rating (Amps DC)	DC II rating (Amps DC)	2-quad type (Catalog No.)	4-quad type (Catalog No.)	¹⁴ Q Horsepower (1000V DC)
2200	1674	6RA80962MS220AA0	6RA80962MV620AA0	2000 Hp

¹ All horsepower ratings above are calculated using the DC II continuous rating with 150% overload for one minute, the result is rounded down to the nearest NEMA DC motor horsepower rating.

² Amp ratings for the 6RA80 SINAMICS DCM Base Drives are based upon DC I continuous ratings with no overload capability.

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 base drives fit comfortably within your plant's network, providing you with maximum productivity and capacity planning.

3 Parts and service (continued)

3.2 Service

Spare parts

An excellent stock of drive products and spare parts are maintained at the distribution center in Southaven, Mississippi. Same day, after hour shipments can be serviced from this stock, including weekends and holidays.

To contact Customer Service, call our Customer Service Group Hotline:

1-888-454-4704

Technical assistance

Should you need technical assistance (other than ordering a part), a reliable answering service ensures that your request is relayed immediately to one of our technical support engineers 24-hours a day.

To contact the Technical Support and Field Service groups, simply call:

1-800-333-PIC1 (7421)

3.3 Option part numbers

Options	Order No.
⁴ Standard CUD coated in right slot (Possible with Advanced CUD in left)	6RY18030AA200AA1
⁴ Standard CUD	6RY18030AA000AA1
⁴ Advance CUD coated in right slot (Possible with Advanced CUD in left)	6RY18030AA250AA1
⁴ Advance CUD	6RY18030AA050AA1
AOP30 - Advance Operator Panel	6SL30550AA004CA5
RS485 connecting cable for connecting the AOP30 to one CUD; 3m	6RY18070AP00
RS485 connecting cable for connecting the AOP30 to two CUDs; 3m	6RY18070AP10
³ SMC10 - Sensor Module Cabinet-Mounted – Resolver	6SL30550AA005AA3
¹ SMC30 - Sensor Module Cabinet-Mounted – Incremental Encoder	6SL30550AA005CA2
CBE20 coated left – PROFINET, EtherNet/IP (Possible with Advanced CUD in left)	6SL30550AA002EB0
CBE20 coated right – PROFINET, EtherNet/IP (Possible with Advanced CUD in right)	6SL30550AA002EB0
TM15 - Terminal Module	6SL30550AA003FA0
TM31 - Terminal Module	6SL30550AA003AA1
TM150 - Terminal Module	6SL30550AA003LA0
² TMC - Terminal Module Cabinet – G63 option (C98043-A7125-L1)	6RY18030AB05

¹ A pulse encoder evaluation circuit is a standard component of the basic SINAMICS DCM DC Converter. The SMC30 only needs to be ordered in configurations requiring evaluation of a second pulse encoder.

² To equip two CUDs with one TMC each, option G63 must be ordered twice.

³ Only SMC10 devices with Part # 6SL30550AA005AA3 (slim construction) are supported. Older SMC10 devices may not be used!

An Advanced CUD must be installed to connect the SMC10. The Standard CUD does not have Drive-Clq connectors.

Firmware version V1.4 SP1 HF3 or higher is required. If an older Firmware is loaded in the drive and the SMC10 is connected, the drive will generate fault F01360 – “Topology: Actual topology invalid” with fault value 8 during startup and the drive won’t be operational.

⁴ Standard CUD and Advanced CUD parts are meant to be replacements (spare or upgrade) for the CUD supplied with the Converter. The CUD boards do not include the mounting screws, studs and connector board.

To upgrade the drive with an additional CUD, the customer will need to purchase both 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) or a CUD Kit which bundles both the CUD and connector board at a reasonable cost – reference Section 3.4 CUD Kits below.

3 Parts and service (continued)

3.4 CUD Kits

CUD Kit part numbers	Description	Individual Part number
A6X30112022	Standard CUD – not coated	6RY1803-0AA00-0AA1
	Connector Board – not coated	6RY1803-0GA00
A6X30112023	Advanced CUD – not coated	6RY1803-0AA05-0AA1
	Connector Board – not coated	6RY1803-0GA00
A6X30112024	Standard CUD – coated	6RY1803-0AA20-0AA1
	Connector Board – coated	6RY1803-0GA20
A6X30112025	Advanced CUD – coated	6RY1803-0AA25-0AA1
	Connector Board - coated	6RY1803-0GA20

3.5 Spare parts

There are two types of Spare Parts for the SINAMICS DCM Base Drives:

- Spare parts internal to the Converter
- Spare parts external to the Converter

Spare parts internal to the Converter

Spares on Web

Spare parts internal to the Converter can be referenced using Spares on Web which is an online tool for identifying spare parts: [siemens.com/sow](https://www.siemens.com/sow)

Please reference the Nameplate of the Converter when entering the following information in the Spares on Web dialog window:

- Enter the Article No. or order number (MLFB) of the Converter
- Enter the Serial Number of the Converter
- Click on the Search button

If the Serial Number of the Converter is not readily available or if the options of the Converter have been changed since the initial sale and the options are known, then the options may be specified directly in the Spares on Web dialog window:

- Enter the Article No. or order number (MLFB) of the Converter
- Check the Options Box
- Enter the Options of the Converter
- Click on the Search button

When submitting an inquiry without specifying the serial number, the spare parts of the current production status will be displayed. To eliminate misinterpretations on the Converter in question, we recommend that you submit the serial number in order to ensure compatibility.

SINAMICS DCM Spare Parts Tool

Alternatively, spare parts internal to the Converter can also be referenced using the SINAMICS DCM Spare Parts Tool which is a MS Excel based software tool for identifying spare parts of a Converter equipped with specific options.

Siemens Distributors can assist with identifying spare parts for SINAMICS DCM Converters. Distributors have access to download the Spare Parts Tool from the SINAMICS DC Master Drives page on the Siemens Distributor Resource Center (DRC): <https://extranet.w3.siemens.com/us/DistributorResourceCenter/dp-drives/Pages/SINAMICS-DC-Master.aspx>

- Expand the Selection & Ordering heading near the bottom of the page
- Hover the mouse over the link for the “-> SINAMICS DCM Spare Parts Selector Tool – v1.7” and right-click
- Select Save Target as... and save the MS Excel file to your computer
- Open the MS Excel file and enable the active content

If you're not able to contact your Distributor then please contact your Siemens Representative or send an email to drives-marketing.industry@siemens.com and request the SINAMICS DCM Spare Parts Tool.

Spare parts external to the Converter

Spare parts external to the 1500-2800 Amp Converters are listed below.

Fans / blowers (MSP)

Description	Where used DCI rating 575V	Where used DCI rating 690V	Where used DCI rating 830V	Where used DCI rating 950V	Part number	Recommended spare
Motor Starter Protector (MSP), 480V AC, 3-phase (2Q and 4Q)	1600, 2000, 2200, 2800 Amp	1500, 2000, 2600 Amp	1500, 1900 Amp	2200 Amp	3RV10111AA10	1
MSP Auxiliary Contact Block (MSP Aux), (2Q and 4Q)	1600, 2000, 2200, 2800 Amp	1500, 2000, 2600 Amp	1500, 1900 Amp	2200 Amp	3RV19011A	1

3 Parts and service (continued)

Field converter AC line fuses (1FSFU, 2FSFU)

Description	Where used DCI rating 575V	Where used DCI rating 690V	Where used DCI rating 830V	Where used DCI rating 950V	Part number	Recommended spare
50 Amp, 700 Volt (with 40 Amp Field - Standard)	1600, 2000, 2200, 2800 Amp	1500, 2000, 2600 Amp	1500, 1900 Amp	2200 Amp	FWP-50B	2
100 Amp, 700 Volt (with 85 Amp Field - L85 Option)	1600, 2000, 2200, 2800 Amp	1500, 2000, 2600 Amp	1500, 1900 Amp	2200 Amp	FWP-100B	2

Control transformer primary fuses (1CFU, 2CFU)

Description	Where used DCI rating 575V	Where used DCI rating 690V	Where used DCI rating 830V	Where used DCI rating 950V	Part number	Recommended spare
2.50 Amp, 600 Volt Class "CC"	1600, 2000, 2200, 2800 Amp	1500, 2000, 2600 Amp	1500, 1900 Amp	2200 Amp	FNQ-R-2-1/2	2

Control transformer secondary fuse (3CFU)

Description	Where used DCI rating 575V	Where used DCI rating 690V	Where used DCI rating 830V	Where used DCI rating 950V	Part number	Recommended spare
1.50 Amp, 250V, Type MDL	1600, 2000, 2200, 2800 Amp	1500, 2000, 2600 Amp	1500, 1900 Amp	2200 Amp	MDL-1-1/2	2

Control transformer (1CTR)

Description	Where used DCI rating 575V	Where used DCI rating 690V	Where used DCI rating 830V	Where used DCI rating 950V	Part number	Recommended spare
250 VA, 240V AC secondary	1600, 2000, 2200, 2800 Amp	1500, 2000, 2600 Amp	1500, 1900 Amp	2200 Amp	A1TRCQ0C286	–

Rectifier for Main contactors (MREC)

Description	Where used DCI rating 575V	Where used DCI rating 690V	Where used DCI rating 830V	Where used DCI rating 950V	Part number	Recommended spare
Rectifier Diode Module, 1-Phase, 30A, 800V	1600, 2000, 2200, 2800 Amp	1500, 2000, 2600 Amp	1500, 1900 Amp	2200 Amp	A6X30057309	–

Main contactors (M1, M2)

Description	Where used DCI rating 575V	Where used DCI rating 690V	Where used DCI rating 830V	Where used DCI rating 950V	Part number	Recommended spare
1-pole DC contactor, 240V DC coil	1600, 2000, 2200, 2800 Amp	1500, 2000, 2600 Amp	1500, 1900 Amp	2200 Amp	A1CRDCAC010	–

Enable control relay (EN)

Description	Where used DCI rating 575V	Where used DCI rating 690V	Where used DCI rating 830V	Where used DCI rating 950V	Part number	Recommended spare
Control Relay, 2NO, 2NC, 240V AC Coil	1600, 2000, 2200, 2800 Amp	1500, 2000, 2600 Amp	1500, 1900 Amp	2200 Amp	3RH11221AP60	–

3 Parts and service (continued)

Coil suppressor for enable control relay (ENSP)

Description	Where used DCI rating 575V	Where used DCI rating 690V	Where used DCI rating 830V	Where used DCI rating 950V	Part number	Recommended spare
Suppressor, varistor type 127 - 240V	1600, 2000, 2200, 2800 Amp	1500, 2000, 2600 Amp	1500, 1900 Amp	2200 Amp	3RT19161BD00	–

4 Receiving, unpacking

SINAMICS DCM Base Drive panels are packed at the manufacturing plant in protective containers suitable for shipping. Avoid dropping and shocks during unloading and moving the SINAMICS DCM Base Drive during receiving. Observe the instructions on the package for transport, storage, and correct handling.

If you discover the SINAMICS DCM Base Drive panel has been damaged during shipment, please inform your shipping agent immediately.



WARNING



If a SINAMICS DCM Base Drive panel was damaged during transport, it must not be connected up without first being repaired and tested by a qualified repair person.

Non-observance of the safety instructions can result in death, severe personal injury or substantial property damage.

Only qualified personnel should work on or around the equipment after first becoming thoroughly familiar with all warning and safety notices and maintenance procedures contained herein. The successful and safe operation of this equipment is dependent on proper handling, installation, operation and maintenance.

Procedure for shipping damage

SINAMICS DCM Base Drive panels are normally shipped FOB factory making it the buyer's responsibility to make sure the equipment is received undamaged. Carefully examine the equipment before accepting the shipment from the transport carrier. If you do not notify the carrier immediately of any damage you may lose your right to file a damage claim. If required, you can request support from the local Siemens office.

- When received, examine the shipment to ensure that it is complete and not damaged.
- Damaged or missing items that are obviously visible should be specified in the shipping papers and must be countersigned by personnel from the transport company.
- Immediately notify the transport company in writing of any damage or missing items.

5 Technical data

5.1 1600 - 2800A DC (2 and 4Q)

Base Drive panels, 575V 3-Phase AC Rated Armature Supply

Rated supply voltage armature ¹⁾	V	3-phase 575 (+10% / - 20%)			
Rated input current armature ²⁾	A	1328	1660	1826	2324
Fan type	V	3-phase 460V			
Air flow rate	m ³ /h	2400			
Fan noise level	dB(A)	75.6			
Rated Supply voltage field	V	1-phase 480 (+10% / - 20%)			
Rated frequency	Hz	45-65 Hz self-adapting (armature and field are independent)			
Rated DC voltage ³⁾	V	600			
Rated DC armature current (DCI)	A	1600	2000	2200	2800
Overload capability for 60s (DC II) ⁷⁾		150% of rated DC armature current			
Rated output @ 600V DC	Hp	1000	1250	1250	1500
Rated output @ 500V DC	Hp	800	1000	1000	1250
Rated output @ 240V DC	Hp	400	500	500	600
Power loss at rated DC current (approximate)	kW	6.04	7.07	7.39	10.53
Rated DC voltage field	V	390 Max.			
Rated DC field current	A	40			
Optional rated DC field current (L85 option)	A	85			
Operational ambient temperature	°C	0–40 at I _{rated} (fan-cooled) ⁴⁾			
Storage and transport temperature	°C	– 40 to +70			
Installation altitude above sea level		≤ 1000 m at rated DC current ⁵⁾			
Control stability		$\Delta n = 0.006\%$ of the rated motor speed, valid for pulse encoder operation and digital setpoint $\Delta n = 0.1\%$ of the rated motor speed, valid for analog tachometer or analog setpoint ⁶⁾			
Degree of protection		Open Chassis (IP00)			
Dimensions		Refer to dimension drawings in Section 6			
Weights (approx.)	Lbs.	615	615	645	645

^{x)} Explanation at end of list of tables

5.2 1500 - 2600A DC (2 and 4Q)

Base Drive panels, 690V 3-Phase AC Rated Armature Supply

Rated supply voltage armature ¹⁾	V	3-phase 690 (+10% / - 20%)		
Rated input current armature ²⁾	A	1245	1660	2158
Fan type	V	3-phase 460V		
Air flow rate	m ³ /h	2400		
Fan noise level	dB(A)	75.6		
Rated supply voltage field	V	1-phase 480 (+10% / - 20%)		
Rated frequency	Hz	45–65 Hz self-adapting (armature and field are independent)		
Rated DC voltage ³⁾	V	725		
Rated DC armature current (DC I)	A	1500	2000	2600
Overload capability for 60s (DC II) ⁷⁾		150% of rated DC armature current		
Rated output @ 725V DC	Hp	1000	1500	1750
Power loss at rated DC current (approximately)	kW	6.67	8.16	10.30
Rated DC voltage field	V	390 Max.		
Rated DC field current	A	40		
Optional rated DC field current (L85 option)	A	85		
Operational ambient temperature	°C	0–40 at I _{rated} (fan-cooled) ⁴⁾		
Storage and transport temperature	°C	– 40 to +70		
Installation altitude above sea level		≤ 1000 m at rated DC current ⁵⁾		
Control stability		$\Delta n = 0.006\%$ of the rated motor speed, valid for pulse encoder operation and digital setpoint $\Delta n = 0.1\%$ of the rated motor speed, valid for analog tachometer or analog setpoint ⁶⁾		
Degree of protection		Open Chassis (IP00)		
Dimensions		Refer to dimension drawings in Section 6		
Weights (approx.)	Lbs.	615	615	645

x) Explanation at end of list of tables

5 Technical data (continued)

5.3 1500 - 1900A DC (2 and 4Q)

Base Drive panels, 830V 3-Phase AC Rated Armature Supply

Rated supply voltage armature ¹⁾	V	3-phase 830 (+10% / - 20%)	
Rated input current armature ²⁾	A	1245	1577
Fan type	V	3-phase 460V	
Air flow rate	m ³ /h	2400	
Fan noise level	dB(A)	75.6	
Rated Supply voltage field	V	1-phase 480 (+10% / - 20%)	
Rated frequency	Hz	45-65 Hz self-adapting (armature and field are independent)	
Rated DC voltage ³⁾	V	875	
Rated DC armature current (DCI)	A	1500	1900
Overload capability for 60s (DC II) ⁷⁾		150% of rated DC armature current	
Rated output @ 875V DC	Hp	1250	1500
Power loss at rated DC current (approximate)	kW	7.12	8.67
Rated DC voltage field	V	390 Max.	
Rated DC field current	A	40	
Optional rated DC field current (L85 option)	A	85	
Operational ambient temperature	°C	0-40 at I _{rated} (fan-cooled) ⁴⁾	
Storage and transport temperature	°C	- 40 to +70	
Installation altitude above sea level		≤ 1000 m at rated DC current ⁵⁾	
Control stability		$\Delta n = 0.006\%$ of the rated motor speed, valid for pulse encoder operation and digital setpoint $\Delta n = 0.1\%$ of the rated motor speed, valid for analog tachometer or analog setpoint ⁶⁾	
Degree of protection		Open Chassis (IP00)	
Dimensions		Refer to dimension drawings in Section 6	
Weights (approx.)	Lbs.	615	615

x) Explanation at end of list of tables

5.4 2200A DC (2 and 4Q)

Base Drive panels, 950V 3 Phase AC Rated Armature Supply

Rated supply voltage armature ¹⁾	V	3-phase 950 (+10% / - 20%)
Rated input current armature ²⁾	A	1826
Fan type	V	3-phase 460V
Air flow rate	m ³ /h	2400
Fan noise level	dB(A)	75.6
Rated supply voltage field	V	1-phase 480 (+10% / - 20%)
Rated frequency	Hz	45–65 Hz self-adapting (armature and field are independent)
Rated DC voltage ³⁾	V	1000
Rated DC armature current (DC I)	A	2200
Overload capability for 60s (DC II) ⁷⁾		150% of rated DC armature current
Rated output @ 1000V DC Hp		2000
Power loss at rated DC current (approximately)	kW	11.34
Rated DC voltage field	V	390 Max.
Rated DC field current	A	40
Optional rated DC field current (L85 option)	A	85
Operational ambient temperature	°C	0–40 at I _{rated} (fan-cooled) ⁴⁾
Storage and transport temperature	°C	- 40 to +70
Installation altitude above sea level		≤ 1000 m at rated DC current ⁵⁾
Control stability		Δn = 0.006% of the rated motor speed, valid for pulse encoder operation and digital setpoint Δn = 0.1% of the rated motor speed, valid for analog tachometer or analog setpoint ⁶⁾
Degree of protection		Open Chassis (IP00)
Dimensions		Refer to dimension drawings in Section 6
Weights (approx.)	Lbs.	645

^{x)} Explanation at end of list of tables

5 Technical data (continued)

Notes

- 1) Operation with reduced input voltage will result in reduced maximum output voltage accordingly.
- 2) Values apply for rated DC output current on the armature circuit.
- 3) The specified output DC voltage can be guaranteed up to an undervoltage of 5% of rated line voltage.
- 4) The table below gives load values, (DC current), as a function of ambient temperature surrounding the SINAMICS DCM Base Drive panel.

IMPORTANT

When SINAMICS DCM Base Drive panels are installed into enclosures, make sure the temperature inside does not exceed the (Operational Ambient Temperature) rating of 40 or 45° C depending on the unit size, otherwise de-rate the DC current rating per the table below.

Ambient temperature	% reduction in base drive dc ampere rating	
	Self-cooled converters (15, 30, 60, 90, 125A DC)	Fan-cooled converters (210–2800A DC)
+40° C	– 0 %	– 0 %
+45° C	– 0 %	– 0 %
+50° C	– 6 %	– 10 % a)
+55° C	– 12 %	N/A

a) Operation of fan cooled units at ambients above 50°C is not permitted because of limitations on the allowable fan operating temperature.

- 5) Load values, (DC current), as a function of installation altitude.

Maximum permissible load of the DC converter in continuous operation (the load is specified as a % of the rated DC current)										
Installation altitude above sea level (the derating factors for values in between can be determined using linear interpolation)										
Ambient or coolant temperature	1000 m		2000 m		3000 m		4000 m		5000 m	
	Units up to 125 A	Units from 210 A and higher	Units up to 125 A	Units from 210 A and higher	Units up to 125 A	Units from 210 A and higher	Units up to 125 A	Units from 210 A and higher	Units up to 125 A	Units from 210 A and higher
30° C	100%		98%	96%	88%	86%	78%	78%	70%	
35° C	100%		93%	90%	83%	80%	73%			
40° C	100%		94%	88%	84%	78%				
45° C	100%		95%	88%	83%					
50° C	94%	90%	82%	78%						
55° C	88%									

Voltage de-rating:

The units can be operated up to an installation altitude of 4,000 m above sea level with the specified rated supply voltages. Line supply voltages may have overvoltage category III with respect to ground. For installation altitudes above 4,000 m, in some cases, it will be necessary to reduce the supply voltage or ensure that overvoltage category II is maintained.

6) Requirements to achieve control stability

The control stability (closed-loop PI control) is referred to the rated motor speed and applies when the SINAMICS DCM is in the warm operating condition. This is based upon the following pre-conditions:

- Temperature changes of $\pm 10^{\circ}$ K.
- Line voltage changes corresponding to +10% / – 5% of the rated input voltage.
- Temperature coefficient of the tachometer generator with temperature compensation 0.15‰ every 10 °K (for analog tachometer generators only).
- Constant set point (14-bit resolution).
- Motor, load and encoder are correctly aligned and the load is balanced.

7) Details of overload capability

Following operation at rated load, SINAMICS DCM Base Drive panels are capable of carrying 150% of rated load for 1 minute, followed by a period of light load operation of such duration that the RMS load does not exceed rated continuous current. SINAMICS DCM Base Drive panels are designed for operation with heatsink air inlet temperatures up to 40 or 45°C depending on the unit size as stated above.

5.5 Applicable standards

- UL508A
- National Electrical Code

6 Installation and dimensions

6.1 Installation information

SINAMICS DCM Base Drive panels are designed as chassis units intended to be mounted inside a protective enclosure or inside a control room. The units are to be mounted vertically in cubicles usually with the power connections at the top and the control connections at the bottom. A minimum 100-mm (4-inch) clearance must be kept above and below the converter in order to ensure unrestricted cooling airflow. The open chassis units are designed to operate in a 45°C (15 to 125 Amp units) and 40°C ambient (210 to 2800 Amp units). When enclosed in a cubicle the ambient temperature outside the cubicle should not exceed 40°C, which then allows for a 5°C-temperature rise inside the cubicle. Care must be taken in the selection of the cubicle so that the internal temperature rise does not exceed 5°C. Refer to section 5 for approximate system de-rating data.

Note, Important: This equipment is designed and package-protected to handle the normal shock and vibration typically encountered in shipment. **Do not install these SINAMICS DCM Base Drive panels on equipment subject to shock or vibration. Select a reasonably clean location for installation, free from corrosive or conductive materials or fumes.**



CAUTION

Failure to lift the SINAMICS DCM Base Drive panel in the correct manner can result in bodily injury and/or property damage.

The SINAMICS DCM Base Drive panel must be lifted using suitable equipment and under the instruction of appropriately qualified personnel.

The user is responsible for installing the SINAMICS DCM Base Drive panel, motor, transformer as well as other equipment according to safety regulations (e.g. NEC), as well as all other relevant national or local regulations regarding cable sizing and protection, grounding, disconnects, overcurrent protection, etc.



The SINAMICS DCM Base Drive panels must be installed in accordance with the relevant safety regulations (e.g. NEC), as well as all other relevant national and local regulations. It must be ensured that the grounding, cable sizing and appropriate short-circuit protection have been implemented to guarantee operational safety and reliability.

Note, Important: SINAMICS DCM Base Drive panels have high-speed semiconductor fuses installed for protection of the thyristors in the event high fault currents are encountered. These fuses are "special purpose" fuses, and do not meet the requirements of the NEC for short-circuit protection in motor branch circuits. It is necessary to provide other devices for short-circuit protection. Typically molded case circuit breakers or NEC style fuses are used for this purpose. Refer to applicable sections of the NEC for additional information.



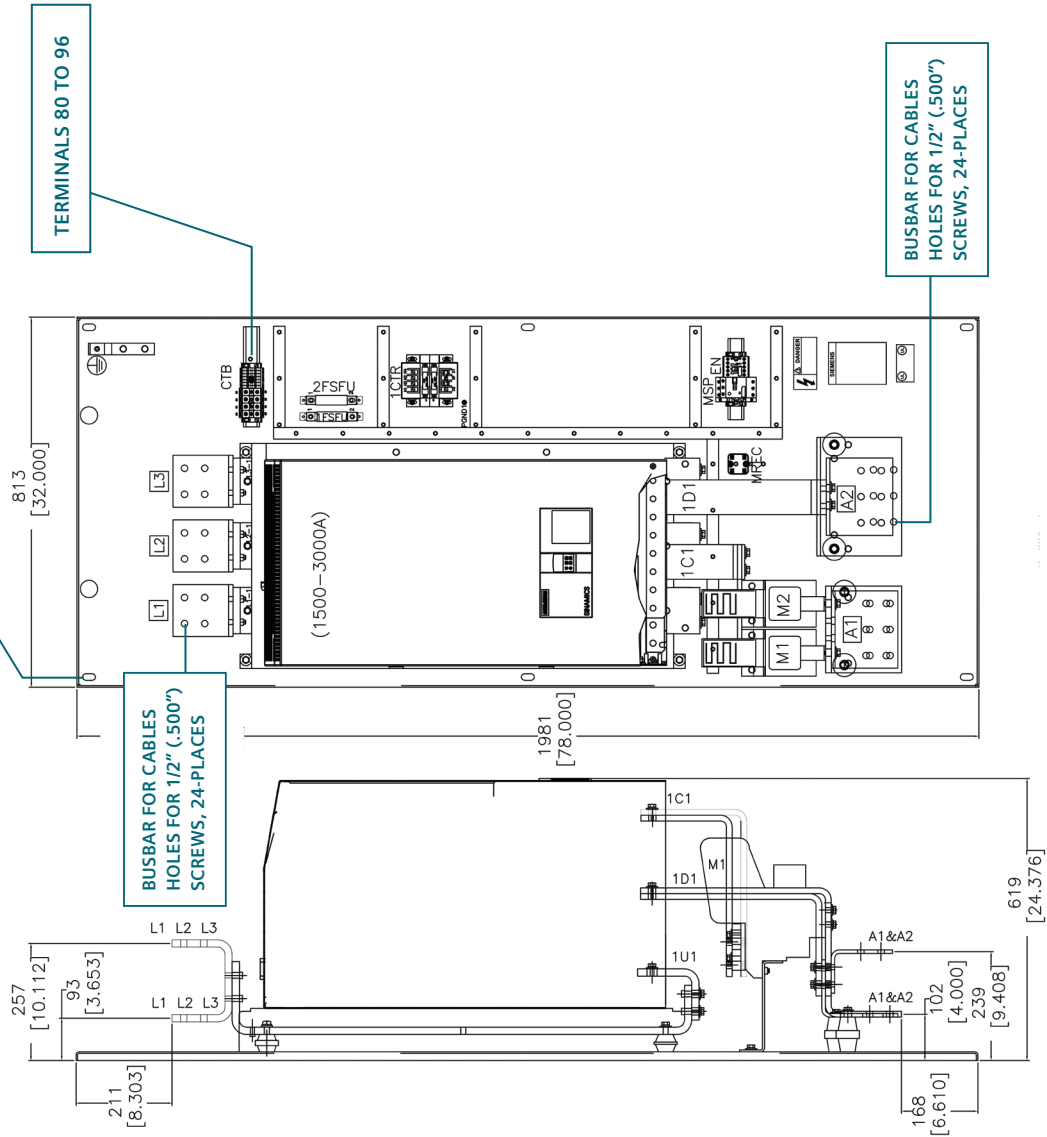
CAUTION

The fundamental principles of EMC in Section 6.1 of SINAMICS DCM Converter operating instructions (Order # C98130A7066A1047619) must be adhered to when installing any unit.



6.2 Base Drives panel outline

Dimensions are mm (inches) 1500 - 2800 Amp panels (2Q and 4Q)

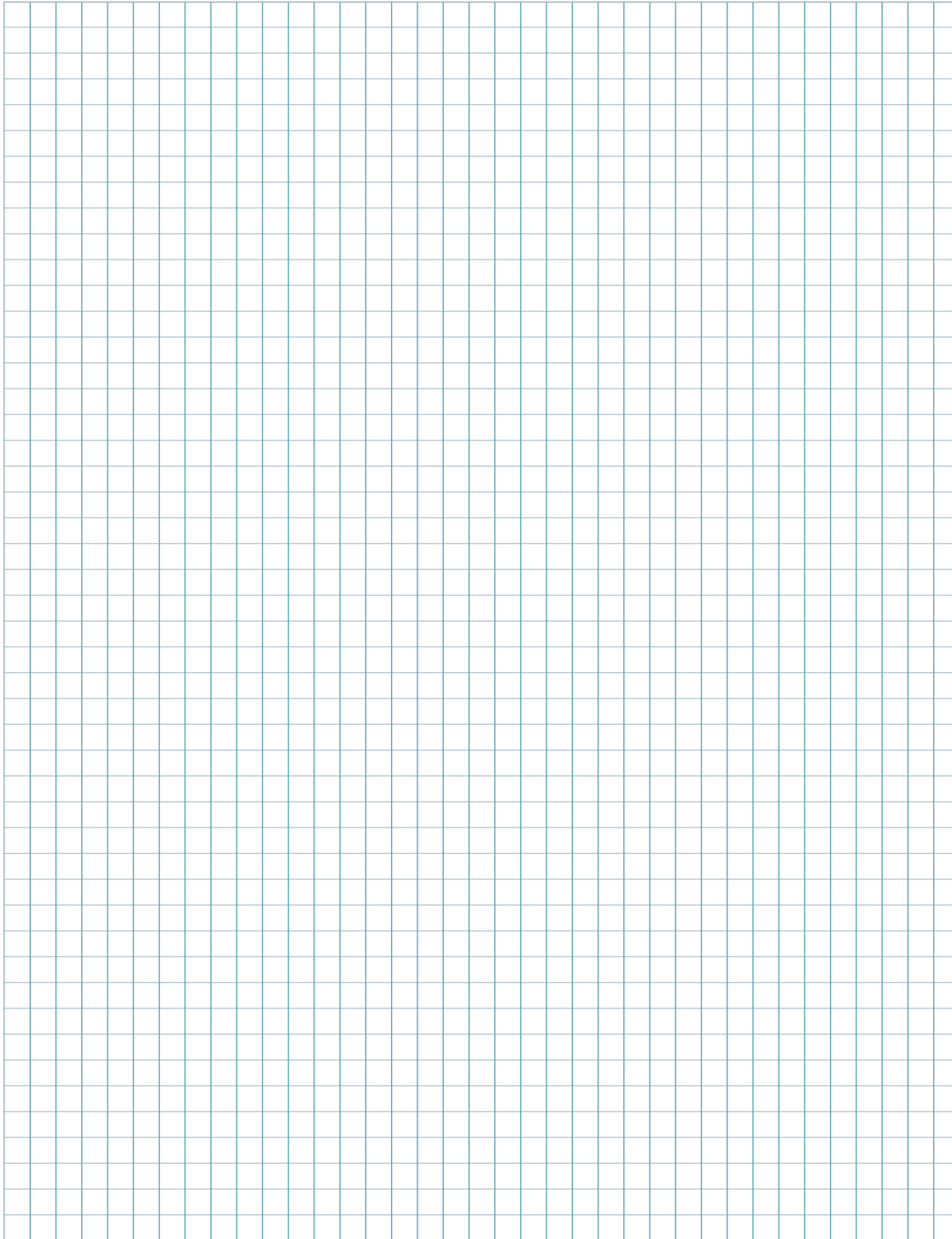


IMPORTANT NOTE: ALLOW AT LEAST 100 MILLIMETERS, (4") OF CLEARANCE ABOVE AND BELOW THE UNIT TO ENSURE UNRESTRICTED AIR FLOW, ADDITIONAL CLEARANCE MAY BE REQUIRED TO ALLOW FOR WIRE OR CABLE ENTRY/EXIT AND BENDING. REFER TO APPLICABLE CODES FOR FURTHER INFORMATION.

Notes

Notes

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A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

7 Base Drive panel connections



WARNING

SINAMICS DCM Base Drive panels are operated at high voltages.

Disconnect the power supply before making any connections!

Only qualified personnel who are thoroughly familiar with all safety notices contained in the operating instructions as well as erection, installation, operating and maintenance instructions should be allowed to work on these devices.

Non-observance of the safety instructions can result in death, severe personal injury or substantial property damage.

Failure to make the correct connections may result in irreparable damage to the unit.



Voltage may be present at the power and control terminals even when the motor is stopped.

The snubber capacitors may still carry a hazardous voltage for up to 2 minutes after disconnection. For this reason, wait for at least 2 minutes before opening the converter.

When working on the open converter, remember that live parts are exposed. The unit must always be operated with the standard front covers in place.

The user is responsible for ensuring that the motor, SINAMICS DCM Base Drive panel and other devices are installed and connected up in accordance with the approved codes of practice of the country concerned and any other regional or local codes that may apply. Special attention must be paid to proper conductor sizing, fusing, grounding, isolation and disconnection measures and to overcurrent protection.

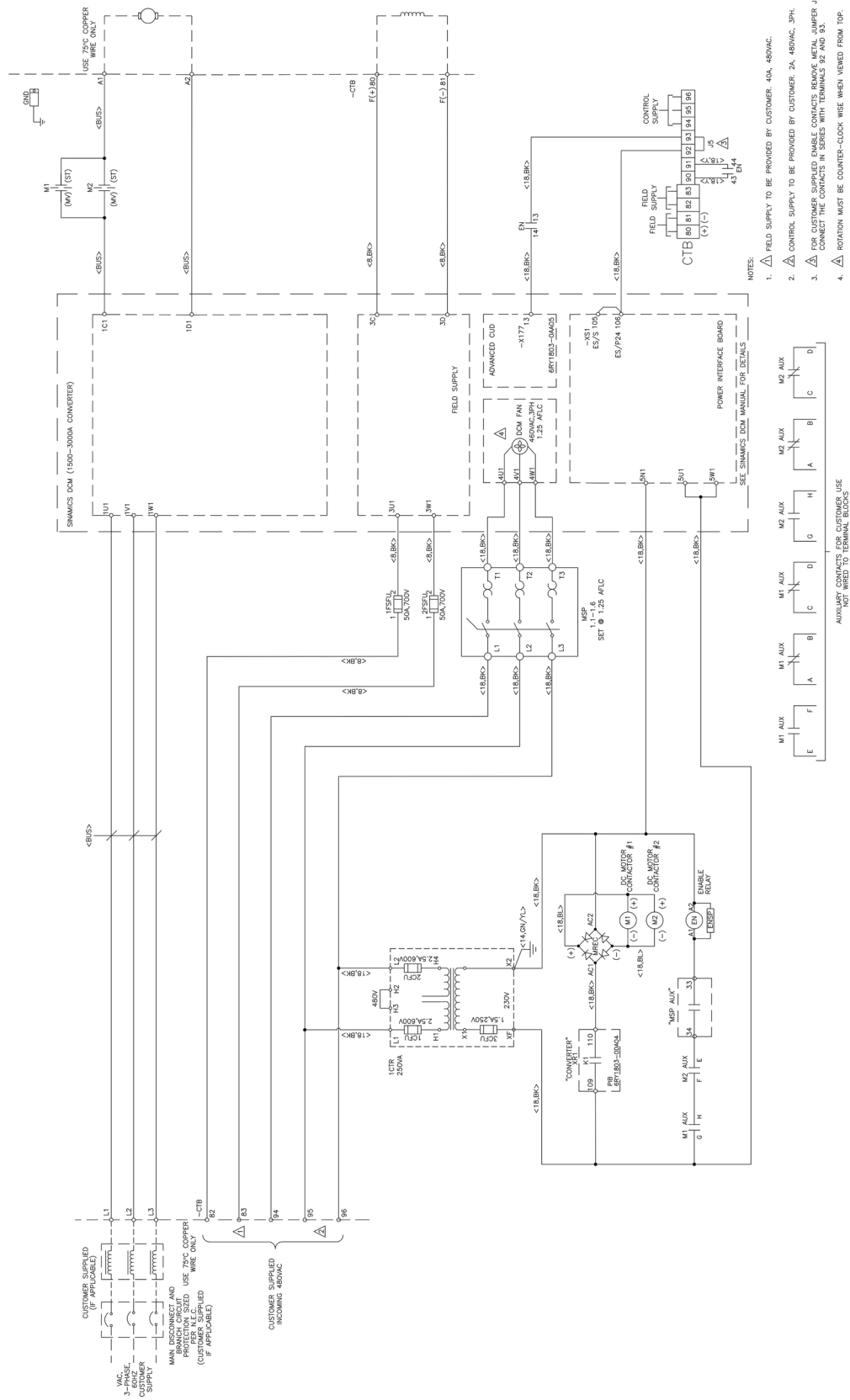
These units contain hazardous rotating machinery (fans) and control rotating mechanical components (motors). Death, serious bodily injury or substantial property damage may occur if the instructions in the relevant manuals are not observed.

The successful and safe operation of this equipment is dependent on careful transportation, proper storage and installation as well as correct operation and maintenance.

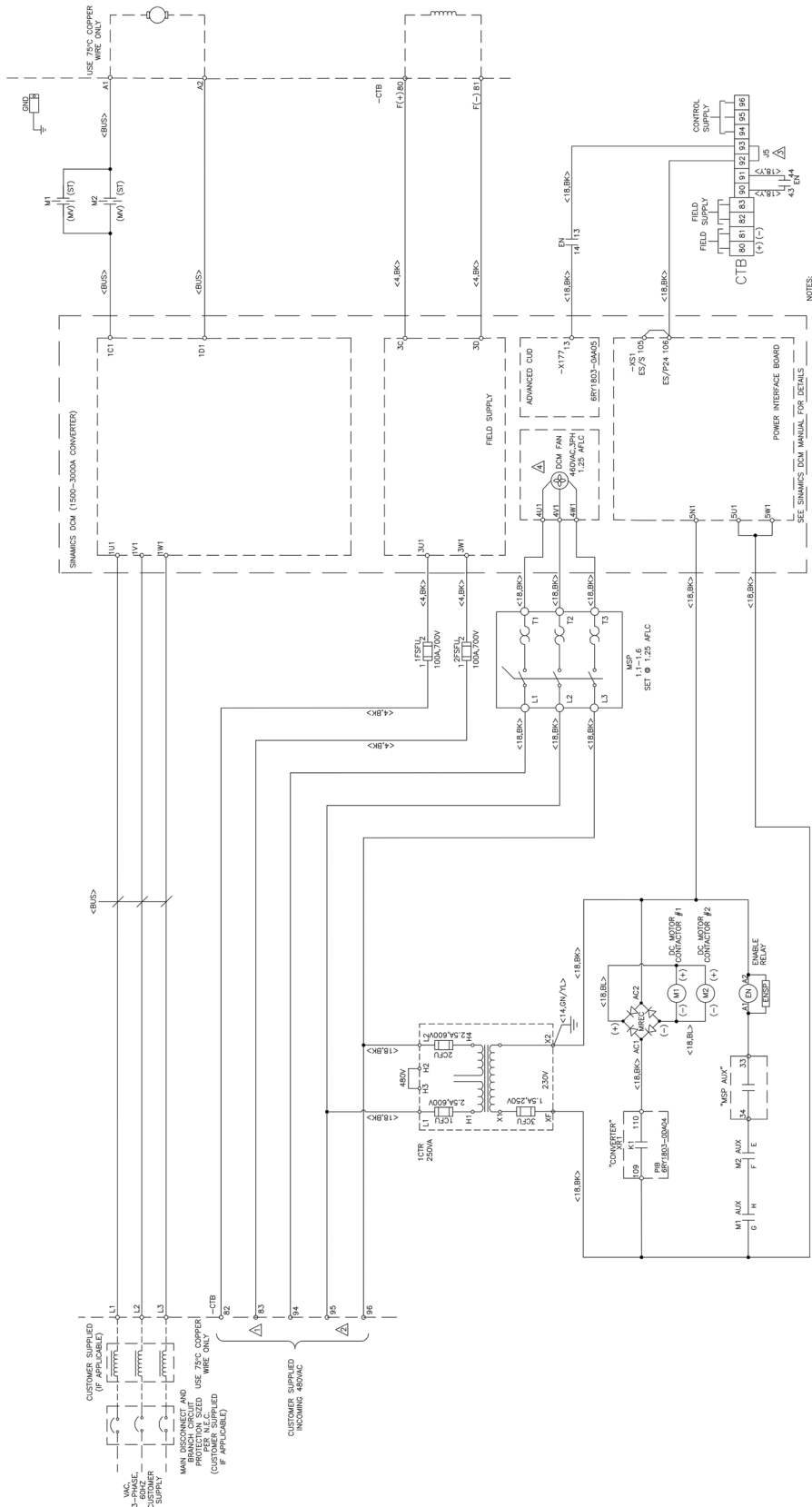
7 Base Drive panel connections (continued)

7.1 Base Drives panel schematics

1500A – 2800A DC panels with 40 Amp Field Supply

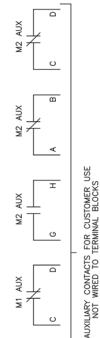


1500A – 2800A DC panels with 85 Amp Field Supply



NOTES:

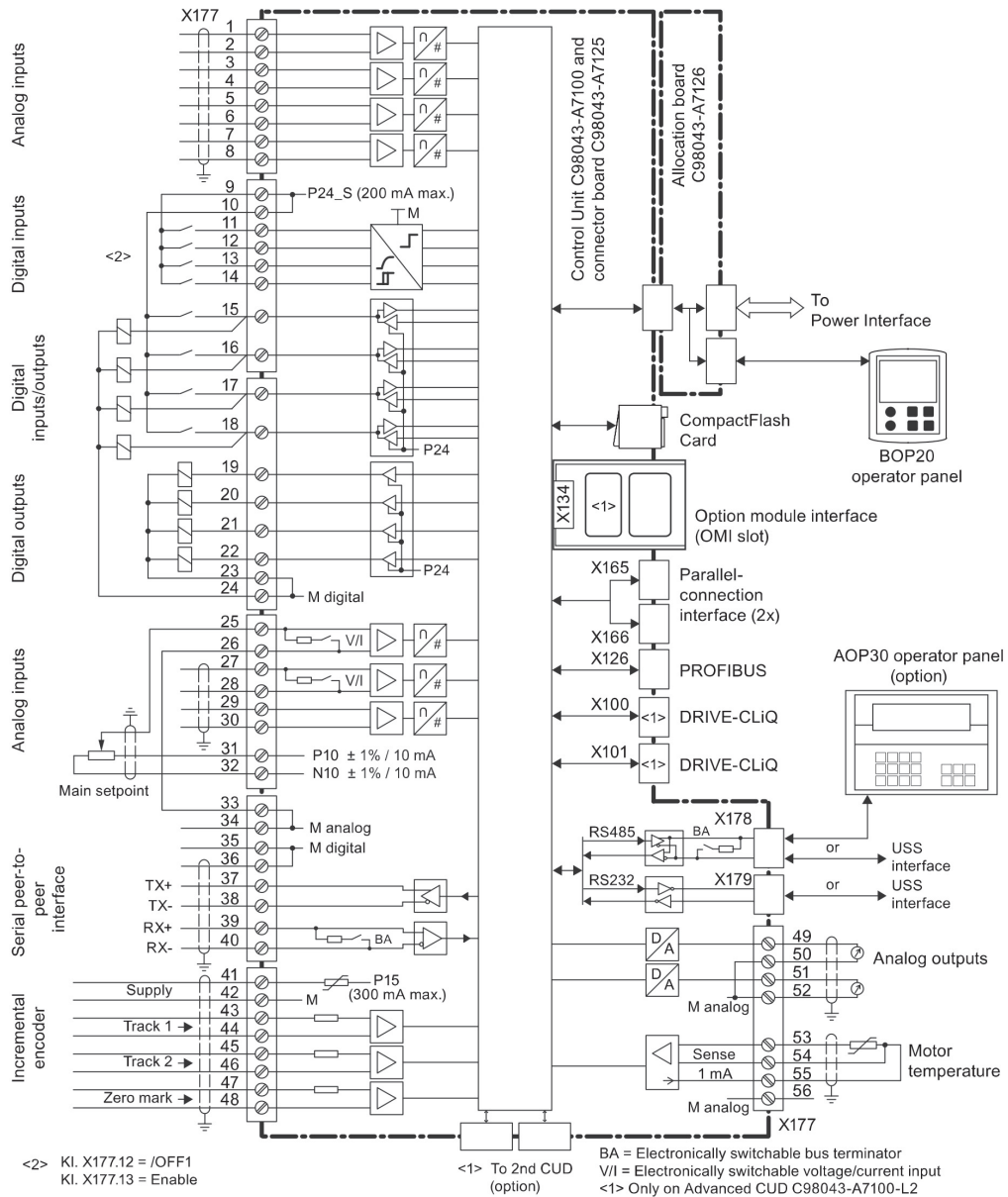
1. FIELD SUPPLY TO BE PROVIDED BY CUSTOMER, 85A, 480VAC.
2. CONTROL SUPPLY TO BE PROVIDED BY CUSTOMER, 2A, 480VAC, 3PH.
3. FOR CUSTOMER SUPPLIED ENABLE CONTACTS REMOVE METAL JUMPER J5 AND CONNECT THE CONTACTS IN SERIES WITH TERMINALS 92 AND 93.
4. ROTATION MUST BE COUNTER-CLOCK WISE WHEN VIEWED FROM TOP.



7 Base Drive panel connections (continued)

7.2 Control connections control units (CUD)

Block diagram with connection suggestion



Terminal locations advanced and standard control unit DC (CUD)

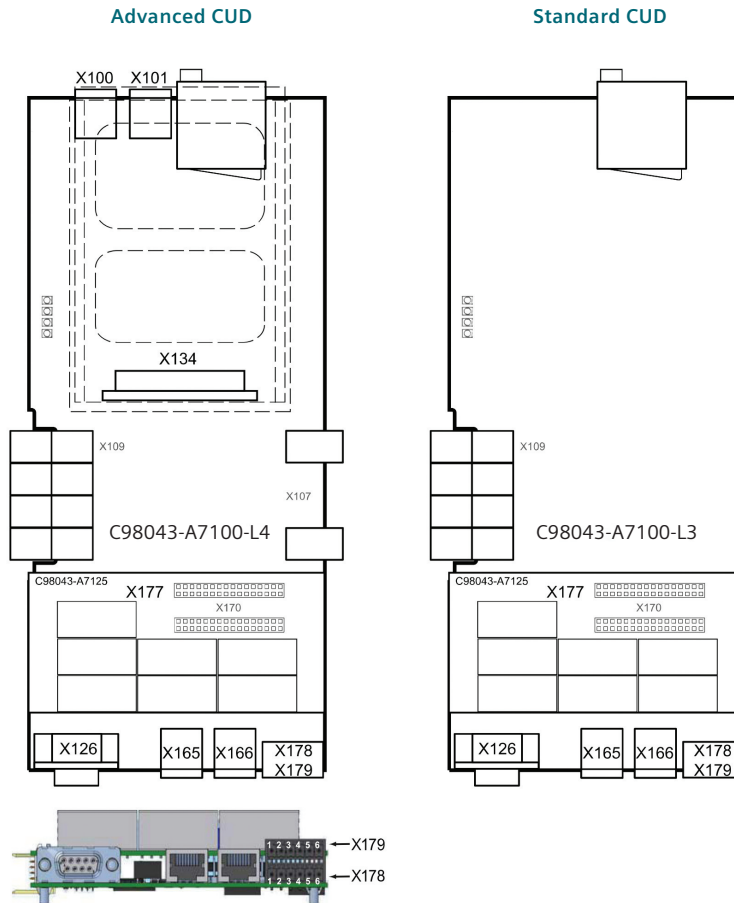
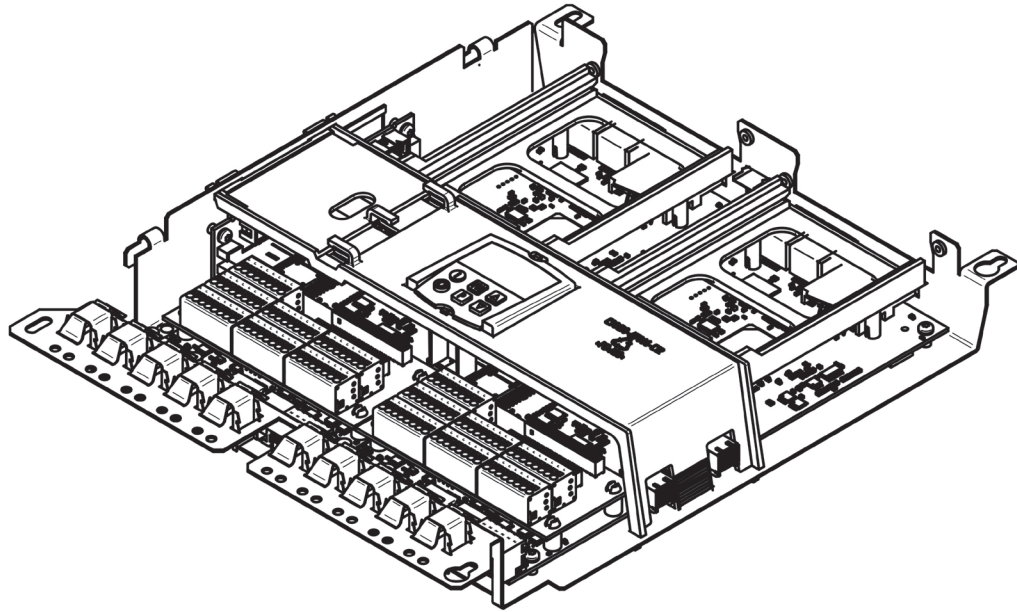


Figure 6-38 A7100 terminal/connector arrangement

Module C98043-A7100 — Control unit (CUD)
 C98043-A7100-L4 = Advanced CUD
 C98043-A7100-L3 = Standard CUD
 (Both CUD's are shown with connector board C98043-A7125 installed)

7 Base Drive panel connections (continued)

7.3 Control units (CUD)



7.4 Description of power / control terminals



WARNING

The SINAMICS DCM Base Drive panel might sustain serious or irreparable damage if connected incorrectly.



The power cables and/or busbars must be secured mechanically outside the converter in order to provide proper stress relief at the terminals.

SINAMICS DCM Base Drive panels are complete drive assemblies that include all semiconductor type fuses, main contactor and a control transformer — ready to be connected and operated. All external connections to the SINAMICS DCM Base Drive panels, including power connections are made with compression type terminals on the drive.

The user is responsible for installation of the motor, SINAMICS DCM Base Drive panel, transformer and other devices in accordance with the National Electric Code and other applicable local codes that cover such items as wire size, protective grounding, disconnects and short circuit protection. Depending on the rating, base drives can accommodate a range of cable sizes as indicated below.

Base Drive panel power connections 1500–2800 Amp, 575V, 690V, 830V and 950V, 3-phase AC Rated Armature Supply


Rating / termination	Cable range	Recommended torque
1500-2800 Amp		
L1, L2, L3	(8X) NEMA 2 Hole Pattern Lugs	N/A
A1, A2	(12X) NEMA 2 Hole Pattern Lugs	N/A
GND	(1X) #2 to #4/0 AWG	150 In-Lbs

7 Base Drive panel connections (continued)

Base Drive panel control connections, (CTB), 1500-2800 Amp, 575V, 690V, 830V & 950V, 3-phase AC Rated Armature Supply

Rating	Wire range	Recommended torque
1500–2800 Amp with 40 A Field		
CTB-80 to CTB-83	(1x) #12 to #4 AWG	11 In-Lbs
CTB-90 to CTB-96	(1x) #18 to #10 AWG	5 In-Lbs
1500-2800 Amp with 85 A Field		
CTB-80 to CTB-83	(1x) #10 to #1 AWG	22 In-Lbs
CTB-90 to CTB-96	(1x) #18 to #10 AWG	5 In-Lbs

Motor armature circuit, 1500-2800 Amp, 575V, 690V, 830V & 950V, 3-phase AC Rated Armature Supply

Function	Terminal	Connection values/remarks	Possible settings
Armature supply AC input	L1 L2 L3	Externally connected to incoming, customer supplied 3 Phase voltage supply	See SINAMICS DCM operating instruction manual and additional files on converter DVD for detailed parameter descriptions and settings.
Ground PE conductor		See technical data, section 5 for voltage and current ratings	
Armature circuit motor connection	A1 + A2 -		

Motor field circuit, 1500-2800 Amp, 575V, 690V, 830V & 950V, 3-phase AC Rated Armature Supply

Function	Terminal	Connection values/remarks	Possible settings
Field supply AC input	CTB 82 CTB 83	Externally connected to incoming, customer supplied 480 VAC, Single Phase supply See section 5 for voltage and current ratings	See SINAMICS DCM operating instruction manual and additional files on converter DVD for detailed parameter descriptions and settings.
Motor field connection	CTB 80 + CTB 81 -	See section 5 for voltage and current ratings	See SINAMICS DCM operating instruction manual and additional files on converter DVD for detailed parameter descriptions and settings.

Electronics power supply, main contactor, cooling fans 1500-2800 Amp, 575V, 690V, 830V & 950V 3-phase AC Rated Armature Supply

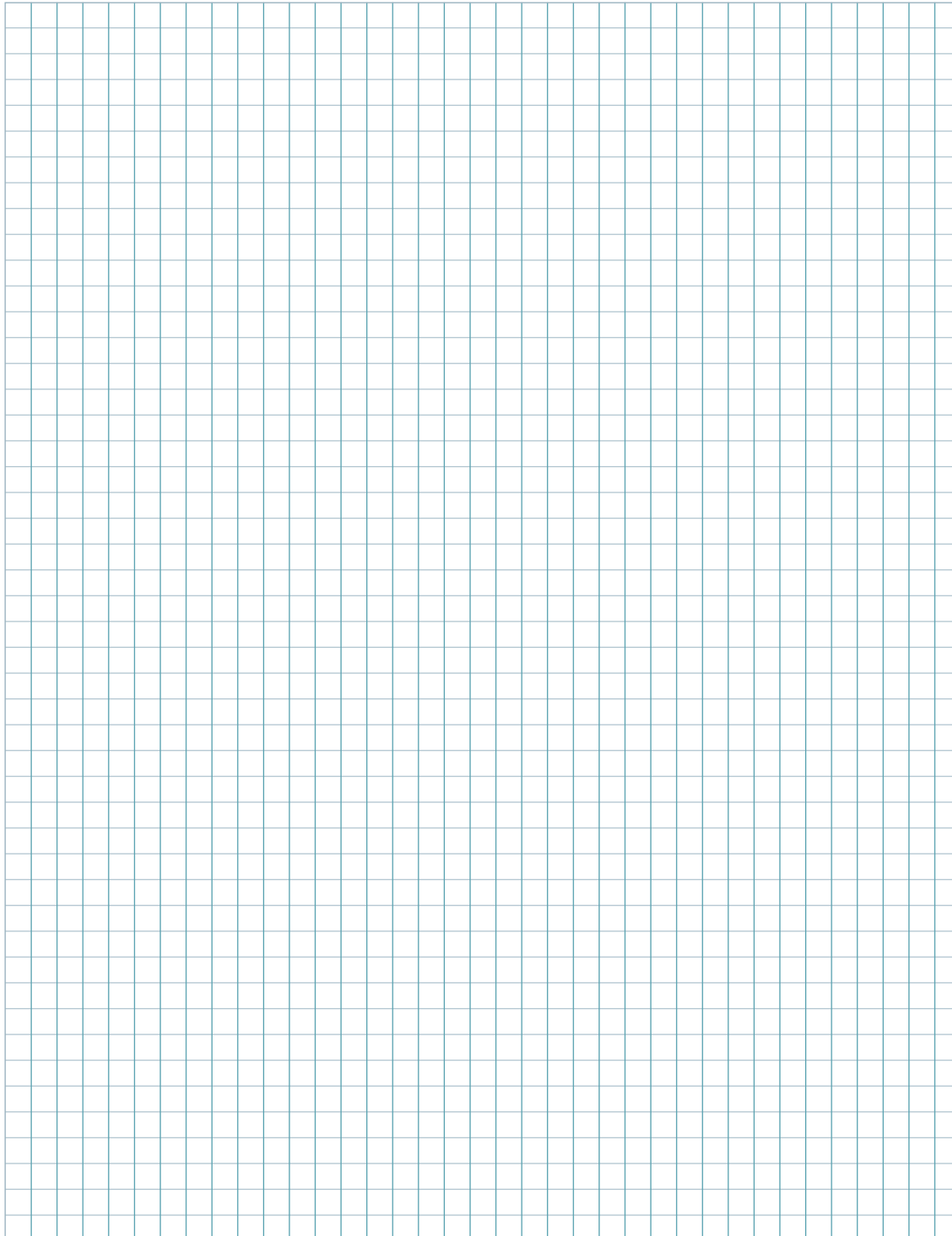
Function	Terminal	Connection values/remarks	Possible settings
Incoming 480 VAC, 3 Phase supply	CTB 94 CTB 95 CTB 96	Externally connected to incoming, customer supplied 480 VAC, 3 Phase supply	

For guidance on commissioning the SINAMICS DCM Base Drive, please refer to both the Operating Instructions Manual and the List Manual for the SINAMICS DCM DC Converter. Both manuals are provided on the Documentation DVD that is shipped with each Base Drive.

Notes

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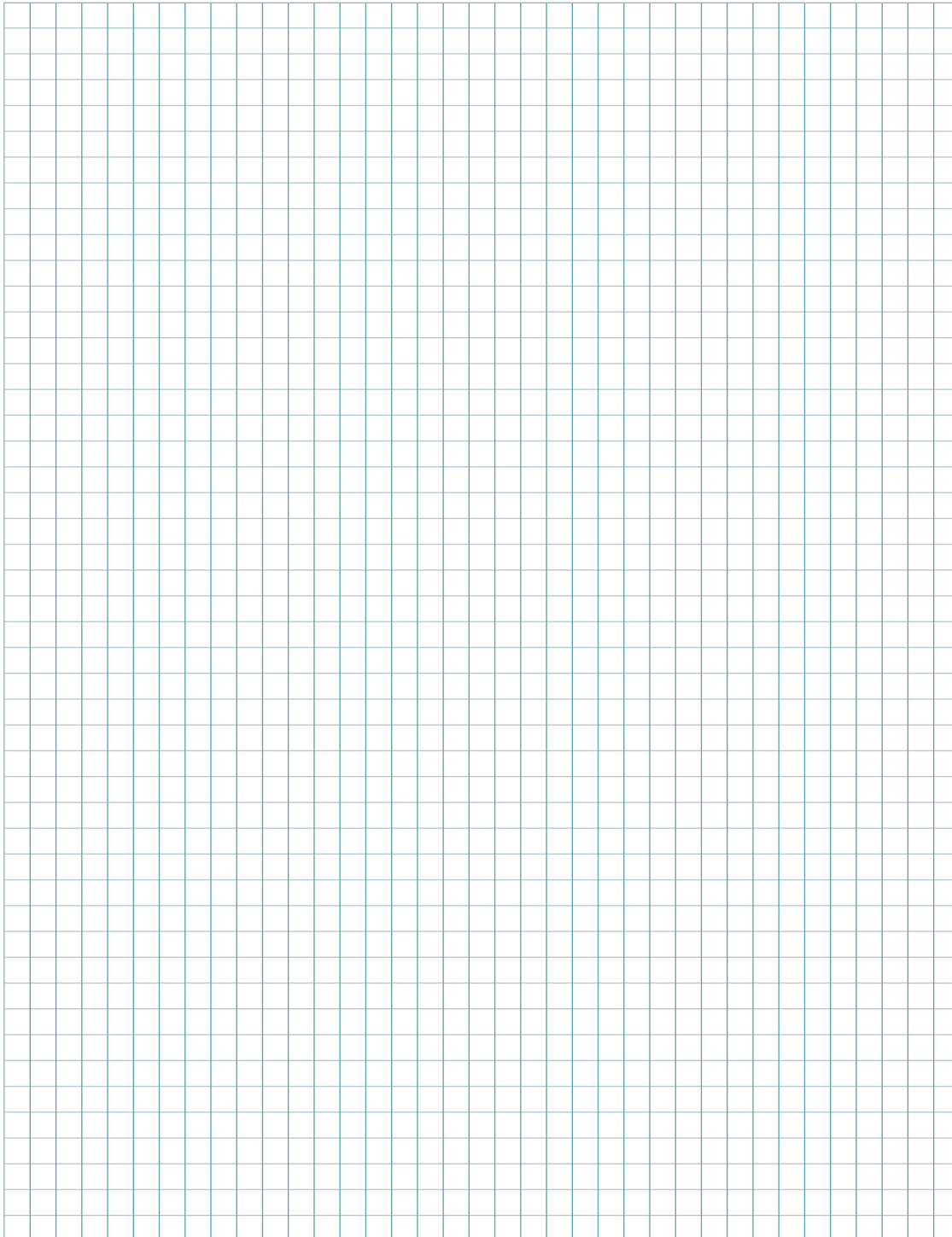


A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

Notes

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