

SIMOREG DC-MASTER Converter Commutation Protector

Operating Instructions

(SIMOREG CCP)



Unit software version:

When these operating instructions went to print, SIMOREG CCP units were being supplied from the factory with software release 1.2.

When using a SIMOREG DC-MASTER as basic converter unit:

The SIMOREG DC-MASTER must have software release 2.2 or higher.

The software release of the SIMOREG DC-MASTER can be read-out at parameters r060 and r065, the software release of the associated SIMOREG CCP can be read-out at parameter n560.

When using a SINAMICS DCM as basic converter unit:

The SINAMICS DCM must have software release 1201400 or higher.

The software release of the SINAMICS DCM can be read-out at parameter r50060[6], the software release of the associated SIMOREG CCP can be read-out at parameter r51560[0].

The latest software release for the SIMOREG CCP is available on the Internet page

http://support.automation.siemens.com/WW/view/de/19847387/133100

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1 Notes

Legal notes

Warning concept

This manual contains information that you should observe to ensure your own personal safety as well as to avoid material damage. The notes referring to your personal safety are highlighted in the manual by a triangular safety alert symbol; notices referring to property damage only have no safety alert symbol. Depending on the hazard level, warnings are displayed in descending order as follows.

Indicates that death or serious injury will result if the appropriate precautionary measures are not taken.

indicates that death or serious injury can result if the appropriate precautionary measures are not taken.

with a triangular safety alert symbol indicates that minor personal injury can result if the appropriate precautionary measures are not taken.

CAUTION

without a triangular safety alert symbol indicates that property damage may result if the appropriate precautionary measures are not taken.

NOTICE

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

In the event of a number of levels of danger occurring simultaneously, the warning corresponding to the highest level of danger is always used. A warning with a triangular safety alert symbol indicating possible injury to personnel may also include a warning relating to property damage.

Qualified personnel

The product/system that belongs to this documentation may be operated only by **personnel qualified** for the associated task while observing the appropriate documentation for the associated task, in particular, the safety and warning notes provided in the documentation. Because of their training and experience, qualified personnel can recognize any risks involved with handling these products/systems and avoid any possible dangers.

Correct usage of Siemens products

Note the following:

Siemens products are only permitted to be used for the applications listed in the catalog and in the associated technical documentation. If third-party products and components are used, they must be recommended or approved by Siemens. These products can only function correctly and safely if they are transported, stored, set up, mounted, installed, commissioned, operated and maintained correctly. The permissible ambient conditions must be adhered to. Notes in the relevant documentation must be observed.

Trademarks

All names appearing with the registered trademark sign ® are registered trademarks of Siemens AG. Other product names used in this documentation may be trademarks which, if used by third parties, could infringe the rights of their owners.

Disclaimer of liability

We have checked that the contents of this publication correspond to the hardware and software described here. However, since deviations cannot be entirely precluded, we cannot guarantee full conformance. The information given in this publication is reviewed at regular intervals and any corrections that might be necessary are made in the subsequent editions.

1.1 Warning notes

Note

In the interests of clarity, these operating instructions do not contain full details of all information for all product types and cannot take into account every possible aspect of installation, operation, or maintenance.

If you require further information, or problems arise, which these operating instructions do not cover in enough detail, please contact your local Siemens office.

Furthermore, the contents of these operating instructions shall not become a part of or modify any prior or existing agreement, commitment, or legal relationship. The Purchase Agreement contains the complete and exclusive obligations of Siemens, including the warranty provisions. Any statements contained in these operating instructions neither expand nor restrict the scope of these contractual warranty conditions.

This unit is at a hazardous voltage level and contains dangerous rotating machine parts (fans). Failure to comply with these operating instructions can lead to death, serious physical injury and material damage.

Only qualified personnel who are familiar with all the safety instructions provided in these operating instructions, as well as the assembly, operating, and maintenance instructions, should carry out work on this unit.

Only safety extra-low voltages (DVC A) that comply with EN 60204-1 may be connected to all of the connections and terminals between 0 and 48 V.

When this unit is operated, it is inevitable that certain components will be subject to dangerous voltage levels. Touching these components may lead to serious physical injury or even death. The following precautions should be taken in order to reduce the risk to life and limb.

- 1. Only qualified personnel who are familiar with this unit and the information supplied with it should work on the unit involving installation, operation, troubleshooting and fault rectification, or repair.
- 2. The unit must be installed in compliance with the relevant safety regulations (e.g. EN, DIN, VDE) as well as all of the other relevant national or local regulations. Grounding, conductor dimensioning, and the appropriate short-circuit protection measures must be carried out correctly in order to ensure operational safety.
- 3. The unit must be operated with all covers supplied.
- 4. Before carrying out visual inspections and maintenance work, ensure that the unit is disconnected from the supply voltage and locked-out. Before they are shut down, both the converter unit and the motor are at dangerous voltage levels. These hazardous voltages may be present even when the converter unit line contactor is open.
- 5. If measurements need to be taken while the power supply is switched on, under absolutely no circumstances touch the electrical connection points. Remove all jewelry from wrists and fingers. Make sure that the measuring and test equipment is in good condition and is safe to operate.
- 6. When working on a unit that is switched on and on an insulated surface, make sure that no grounding has been put in place.
- 7. Follow these operating instructions precisely and observe all notes concerning hazards, warnings, or areas where caution is required.
- 8. This list is not exhaustive and as such cannot outline all the measures required in order to operate the unit safely. Should you require further information or encounter specific problems which have not been handled in enough detail for the purposes of the buyer, please contact your local Siemens office.

CAUTION

Operating the unit in the immediate vicinity (< 1.5 m) of mobile telephones with a transmitter power of > 1 W may lead to incorrect operation of the unit.

1.2 Electrostatic sensitive devices (ESD)

The electronic boards contain electrostatic sensitive devices. These components can be easily destroyed if not handled correctly. Observe the following notes if you nevertheless have to work with electronic modules:

- You should only touch electronic modules if absolutely necessary.
- If you do have to touch modules, your body must be electrically discharged first.
- Modules must not be brought into contact with highly insulating materials, e.g. plastic foils, insulated tabletops, or clothing made from synthetic fibers.
- Modules may be set down only on conducting work surfaces.
- Modules and components should only be stored and transported in conductive packaging (such as metalized plastic boxes or metal containers).
- If the packaging material is not conductive, the modules must be wrapped with a conductive packaging material, such as conductive foam rubber or household aluminum foil, prior to placing them in the packaging.

The necessary ESD protective measures are illustrated once again in the following diagram:



- a conductive floor
- b ESD table
- c ESD footwear
- d ESD overall
- e ESD wrist strap
- f cabinet ground connection

2 Type spectrum, ordering information

2.1 Units - order numbers

| Unit | Rated current | Rated voltage | Current range that can be covered | Order No. (MLFB) |
|----------------------------|------------------|------------------|---|---------------------|
| SIMOREG CCP 600 A / 460 V | 600 A | 460 V | to 600 A | 6RA7085-6FC00-0 |
| SIMOREG CCP 1200 A / 460 V | 1200 A | 460 V | to 1200 A | 6RA7091-6FC00-0 |
| SIMOREG CCP 1000 A / 690 V | 1000 A | 690 V | to 1000 A | 6RA7090-6KC00-0 |
| SIMOREG CCP 2000 A / 460 V | 2000 A | 460 V | to 2000 A | 6RA7095-6FC00-0 |
| SIMOREG CCP 2000 A / 690 V | 2000 A | 690 V | to 2000 A | 6RA7095-6KC00-0 |

2.2 Ordering information for options and accessories

Ordering options with order codes

| 6 | R | A | 7 | 0 | | - | 6 | С | 0 | 0 | - | 0 |] - | Ζ |
|---|---|---|---|---|--|---|---|---|---|---|---|---|-----|---|
| | | | + | | | | | | | | | | | |
| | | | | | | |] | | | | | | | |

Order No. of the SIMOREG CCP with identifier Z Order codes (additional) and/or where necessary, plain text

Options:

| Option | Order codes | Order No. (MLFB) |
|--|-------------|------------------|
| Printed operating instructions for Converter Commutation Protector SIMOREG CCP in German/English | D74 | 6RX1700-0DD74 |

Accessories:

| Item | Order No. (MLFB) |
|---|------------------|
| Operating instructions for SIMOREG DC-MASTER and SIMOREG CCP and DriveMonitor in all of the available languages on CD-ROM | 6RX1700-0AD64 |
| Operating instructions for SINAMICS DCM and SIMOREG CCP in all of the available languages on DVD | 6RX1800-0AD64 |
| Operating instructions for SINAMICS DCM DC Converters in | |
| German | 6RX1800-0AD00 |
| English | 6RX1800-0AD76 |
| French | 6RX1800-0AD77 |
| Italian | 6RX1800-0AD72 |
| Russian | 6RX1800-0AD56 |
| Spanish | 6RX1800-0AD78 |
| List Manual for SINAMICS DCM in | |
| German | 6RX1800-0ED00 |
| English | 6RX1800-0ED76 |
| French | 6RX1800-0ED77 |
| Italian | 6RX1800-0ED72 |
| Russian | 6RX1800-0ED56 |
| Spanish | 6RX1800-0ED78 |

| Item | Order No. (MLFB) |
|---|------------------|
| Patch cable UTP CAT5 acc. to ANSI/EIA/TIA 568 Parallel cable for SIMOREG DC-MASTER 6RA70 / SINAMICS DCM and SIMOREG CCP approx. 5 m | 6RY1707-0AA08 |
| Connecting cable, pulse turn-off interface to the parallel SIMOREG CCP connection and | |
| Connecting cable, summed firing pulse interface to the SIMOREG DC-MASTER (CUD2) and | |
| Connecting cable "fast pulse cancellation interface" to SINAMICS DCM | |
| Fast pulse inhibit interface module (Firing Unit Trigger Board) | 6RY1803-0CP00 |

Selecting a suitable SIMOREG CCP 2.3

The rated unit data (taking into account the relevant limit values) of the SIMOREG DC-MASTER or SINAMICS DCM and SIMOREG CCP components form the basis for the selection table.

2.3.1 Selection table for 4Q basic units

| SIMOREG DC- | MASTER | Converter Commutation Protector SIMOREG CCP 6RA70 | | | | | | |
|-----------------|-----------------|---|------------|------------|------------|------------|--|--|
| | Rated | 85-6FC00-0 | 91-6FC00-0 | 90-6KC00-0 | 95-6FC00-0 | 95-6KC00-0 | | |
| | DC voltage | 460 V / | 460 V / | 690 V / | 460 V / | 690 V / | | |
| Order No. | / DC current | to 600 A | to 1200 A | to 1000 A | to 2000 A | to 2000 A | | |
| 6RA7013-6DV62-0 | 420 V / 15 A | | | | | | | |
| 6RA7018-6DV62-0 | 420 V / 30 A | | | | | | | |
| 6RA7025-6DV62-0 | 420 V / 60 A | | | | | | | |
| 6RA7028-6DV62-0 | 420 V / 90 A | | | | | | | |
| 6RA7031-6DV62-0 | 420 V / 125 A | | | | | | | |
| 6RA7075-6DV62-0 | 420 V / 210 A | | | | | | | |
| 6RA7078-6DV62-0 | 420 V / 280 A | X | | | | | | |
| 6RA7081-6DV62-0 | 420 V / 400 A | х | | | | | | |
| 6RA7085-6DV62-0 | 420 V / 600 A | X | X | | | | | |
| 6RA7087-6DV62-0 | 420 V / 850 A | | X | | | | | |
| 6RA7091-6DV62-0 | 420 V / 1200 A | | X | | x | | | |
| 6RA7093-4DV62-0 | 420 V / 1600 A | | | | x | | | |
| 6RA7095-4DV62-0 | 420 V / 2000 A | | | | x | | | |
| 6RA7098-4DV62-0 | 420 V / 3000 A | | | | | | | |
| 6RA7018-6FV62-0 | 480 V / 30 A | | | | | | | |
| 6RA7025-6FV62-0 | 480 V / 60 A | | | | | | | |
| 6RA7028-6FV62-0 | 480 V / 90 A | | | | | | | |
| 6RA7031-6FV62-0 | 480 V / 125 A | | | | | | | |
| 6RA7075-6FV62-0 | 480 V / 210 A | | | | | | | |
| 6RA7078-6FV62-0 | 480 V / 280 A | X | | | | | | |
| 6RA7082-6FV62-0 | 480 V / 450 A | X | | | | | | |
| 6RA7085-6FV62-0 | 480 V / 600 A | X | x | | | | | |
| 6RA7087-6FV62-0 | 480 V / 850 A | | x | | | | | |
| 6RA7091-6FV62-0 | 480 V / 1200 A | | x | | | | | |
| 6RA7025-6GV62-0 | 600 V / 60 A | | | | | | | |
| 6RA7031-6GV62-0 | 600 V / 125 A | | | | | | | |
| 6RA7075-6GV62-0 | 600 V / 210 A | | | | | | | |
| 6RA7081-6GV62-0 | 600 V / 400 A | | | X | | | | |
| 6RA7085-6GV62-0 | 600 V / 600 A | | | X | | | | |
| 6RA7087-6GV62-0 | 600 V / 850 A | | | X | | | | |
| 6RA7090-6GV62-0 | 600 V / 1100 A | | | | | X | | |
| 6RA7093-4GV62-0 | 600 V / 1600 A | | | | | X | | |
| 6RA7095-4GV62-0 | 600 V / 2000 A | | | | | X | | |
| 6RA7096-4GV62-0 | 600 V / 2200 A | | | | | | | |
| 6RA7097-4GV62-0 | 600 V / 2800 A | | | | | | | |
| 6RA7086-6KV62-0 | 725 V / 760 A | | | X | | | | |
| 6RA7090-6KV62-0 | 725 V / 1000 A | | | X | | X | | |
| 6RA7093-4KV62-0 | 725 V / 1500 A | | | | | X | | |
| 6KA/095-4KV62-0 | 725 V / 2000 A | | | | <u> </u> | X | | |
| 6KA/09/-4KV62-0 | 725 V / 2600 A | | | | | | | |
| 6KA/088-6LV62-0 | 8/5 V / 950 A | | | | | - | | |
| 0KA/093-4LV62-0 | 0/5 V / 1500 A | | | | | | | |
| 0KA/095-4LV62-0 | 8/5 V / 1900 A | | | | | | | |
| 0KA/U90-4MV62-0 | 1000 V / 2200 A | | | | | | | |

= suitable Х

= not suitable (see note)

| SINAMICS DCM | | Converter Commutation Protector SIMOREG CCP 6RA70 | | | | | | |
|---------------------|-----------------|---|------------|------------|------------|------------|--|--|
| | Rated | 85-6FC00-0 | 91-6FC00-0 | 90-6KC00-0 | 95-6FC00-0 | 95-6KC00-0 | | |
| | DC voltage/DC | 460 V / | 460 V / | 690 V / | 460 V / | 690 V / | | |
| Order No. | current | to 600 A | to 1200 A | to 1000 A | to 2000 A | to 2000 A | | |
| 6248013 60\/62 0440 | 420 V / 15 A | | | | | | | |
| 6DA8018 6DV62 0AA0 | 420 V / 15 A | | | | | | | |
| 6PA8025-6DV62-0AA0 | 420 V / 50 A | | | | | | | |
| 6PA8028-6DV62-0AA0 | 420 V / 00 A | | | | | | | |
| 6PA8031_6DV62_0AA0 | 420 V / 30 A | | | | | | | |
| 6PA8075-6DV62-0AA0 | 420 V / 125 A | | | | | | | |
| 6PA8078-6DV62-0AA0 | 420 V / 210 A | × | | | | | | |
| 6PA8081 6DV62 0AA0 | 420 V / 200 A | × | | | | | | |
| 6DA8085 6DV62 0AA0 | 420 V / 400 A | X | ~ | | | | | |
| 6DA8083-0DV02-0AA0 | 420 V / 000 A | X | X | | | | | |
| 6RA6067-6DV62-0AA0 | 420 V / 650 A | | X | | | | | |
| 6RA6091-6DV62-0AA0 | 420 V / 1200 A | | X | | X | | | |
| 6RA8093-4DV62-0AA0 | 420 V / 1600 A | | | | X | | | |
| 6RA8095-4DV62-0AA0 | 420 V / 2000 A | | | | X | | | |
| 6RA8098-4DV62-0AA0 | 420 V / 3000 A | | | | | | | |
| 6RA8013-6FV62-0AA0 | 500 V / 15 A | | | | | | | |
| 6RA8018-6FV62-0AA0 | 500 V / 30 A | | | | | | | |
| 6RA8025-6FV62-0AA0 | 500 V / 60 A | | | | | | | |
| 6RA8028-6FV62-0AA0 | 500 V / 90 A | | | | | | | |
| 6RA8031-6FV62-0AA0 | 500 V / 125 A | | | | | | | |
| 6RA8075-6FV62-0AA0 | 500 V / 210 A | | | | | | | |
| 6RA8078-6FV62-0AA0 | 500 V / 280 A | X | | | | | | |
| 6RA8082-6FV62-0AA0 | 500 V / 450 A | X | | | | | | |
| 6RA8085-6FV62-0AA0 | 500 V / 600 A | X | X | | | | | |
| 6RA8087-6FV62-0AA0 | 500 V / 850 A | | X | | | | | |
| 6RA8091-6FV62-0AA0 | 500 V / 1200 A | | X | | | | | |
| 6RA8025-6GV62-0AA0 | 600 V / 60 A | | | | | | | |
| 6RA8031-6GV62-0AA0 | 600 V / 125 A | | | | | | | |
| 6RA8075-6GV62-0AA0 | 600 V / 210 A | | | | | | | |
| 6RA8081-6GV62-0AA0 | 600 V / 400 A | | | X | | | | |
| 6RA8085-6GV62-0AA0 | 600 V / 600 A | | | X | | | | |
| 6RA8087-6GV62-0AA0 | 600 V / 850 A | | | x | | | | |
| 6RA8090-6GV62-0AA0 | 600 V / 1100 A | | | | | X | | |
| 6RA8093-4GV62-0AA0 | 600 V / 1600 A | | | | | X | | |
| 6RA8095-4GV62-0AA0 | 600 V / 2000 A | | | | | x | | |
| 6RA8096-4GV62-0AA0 | 600 V / 2200 A | | | | | | | |
| 6RA8097-4GV62-0AA0 | 600 V / 2800 A | | | | | | | |
| 6RA8086-6KV62-0AA0 | 725 V / 760 A | | | х | | | | |
| 6RA8090-6KV62-0AA0 | 725 V / 1000 A | | | x | | X | | |
| 6RA8093-4KV62-0AA0 | 725 V / 1500 A | 1 | | | | x | | |
| 6RA8095-4KV62-0AA0 | 725 V / 2000 A | 1 | l . | ľ | l | x | | |
| 6RA8097-4KV62-0AA0 | 725 V / 2600 A | 1 | | | | | | |
| 6RA8088-6LV62-0AA0 | 875 V / 950 A | | | | | | | |
| 6RA8093-4LV62-0AA0 | 875 V / 1500 A | 1 | | | | | | |
| 6RA8095-4LV62-0AA0 | 875 V / 1900 A | 1 | | | | | | |
| 6RA8096-4MV62-0AA0 | 1000 V / 2200 A | | | | | | | |

= suitable

= not suitable (see note)

Note

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For system configurations, with reduced rate values (e.g. DC rating, US rating, voltage derating), under certain circumstances, suitable combinations of units can be found that are not listed in the table.

2.3.2 Selection table for 2Q basic units

| SIMOREG DC-MA | STER | Converter Commutation Protector SIMOREG CCP 6RA70 | | | | | | |
|-----------------|-----------------|---|------------|------------|------------|------------|--|--|
| | Rated | 85-6FC00-0 | 91-6FC00-0 | 90-6KC00-0 | 95-6FC00-0 | 95-6KC00-0 | | |
| | DC voltage | 460 V / | 460 V / | 690 V / | 460 V / | 690 V / | | |
| Order No. | / DC current | to 600 A | to 1200 A | to 1000 A | to 2000 A | to 2000 A | | |
| 6PA7018-6DS22-0 | 485 V / 30 A | | | | | | | |
| 6PA7025-6DS22-0 | 405 V / 60 A | | | | | | | |
| 6PA7028-6DS22-0 | 405 V / 00 A | | | | | | | |
| 6PA7031_6DS22-0 | 405 V / 30 A | | | | | | | |
| 6PA7075-6DS22-0 | 405 V / 125 A | | | | | | | |
| 6PA7078-6DS22-0 | 405 V / 210 A | × | | | | | | |
| 6PA7081_6DS22-0 | 405 V / 200 A | × | | | | | | |
| 6PA7085-6DS22-0 | 485 V / 600 A | × | v | | | | | |
| 6DA7087 6DS22-0 | 405 V / 000 A | ~ | X | | | | | |
| 6DA7001 6DS22-0 | 405 V / 050 A | | X | | ~ | | | |
| 0RA7091-0D322-0 | 465 V / 1200 A | | X | | X | | | |
| 6RA7093-4D522-0 | 465 V / 1600 A | | | | X | | | |
| 0RA7090-4D522-0 | 465 V / 2000 A | | | | X | | | |
| 0RA7098-4D522-0 | 485 V / 3000 A | | | | | | | |
| 6RA7018-6FS22-0 | 550 V / 30 A | | | | | | | |
| 0RA/025-0F522-0 | 550 V / 60 A | | | | | | | |
| 0RA/028-0F522-0 | 550 V / 90 A | | | | | | | |
| 6RA7031-6FS22-0 | 550 V / 125 A | | | | | | | |
| 6RA7075-6FS22-0 | 550 V / 210 A | | | | | | | |
| 6RA7078-6FS22-0 | 550 V / 280 A | X | | | | | | |
| 6RA7082-6FS22-0 | 550 V / 450 A | X | | | | | | |
| 6RA7085-6FS22-0 | 550 V / 600 A | X | X | | | | | |
| 6RA7087-6FS22-0 | 550 V / 850 A | | X | | | | | |
| 6RA7091-6FS22-0 | 550 V / 1200 A | | X | | | | | |
| 6RA7025-6GS22-0 | 690 V / 60 A | | | | | | | |
| 6RA7031-6GS22-0 | 690 V / 125 A | | | | | | | |
| 6RA7075-6GS22-0 | 690 V / 210 A | | | | | | | |
| 6RA7081-6GS22-0 | 690 V / 400 A | | | X | | | | |
| 6RA7085-6GS22-0 | 690 V / 600 A | | | x | | | | |
| 6RA7087-6GS22-0 | 690 V / 850 A | | | x | | | | |
| 6RA7090-6GS22-0 | 690 V / 1100 A | | | | | X | | |
| 6RA7093-4GS22-0 | 690 V / 1600 A | | | | | X | | |
| 6RA7095-4GS22-0 | 690 V / 2000 A | | | | | X | | |
| 6RA7095-4GS22-5 | 690 V / 2000 A | | | | | X | | |
| 6RA7096-4GS22-0 | 690 V / 2200 A | | | | | | | |
| 6RA7096-4GS22-5 | 690 V / 2200 A | | | | | | | |
| 6RA7097-4GS22-0 | 690 V / 2800 A | | | | | | | |
| 6RA7086-6KS22-0 | 830 V / 720 A | | | x | | | | |
| 6RA7088-6KS22-0 | 830 V / 950 A | | | x | | X | | |
| 6RA7093-4KS22-0 | 830 V / 1500 A | | | | | X | | |
| 6RA7095-4KS22-0 | 830 V / 2000 A | | | | | x | | |
| 6RA7095-4KS22-5 | 830 V / 2000 A | | | | | X | | |
| 6RA7097-4KS22-0 | 830 V / 2600 A | | | | | | | |
| 6RA7088-6LS22-0 | 1000 V / 900 A | | | | | | | |
| 6RA7093-4LS22-0 | 1000 V / 1500 A | | | | | | | |
| 6RA7095-4LS22-0 | 1000 V / 1900 A | | | | | | | |
| 6RA7095-4LS22-5 | 1000 V / 1900 A | | | | | | | |
| 6RA7096-4MS22-0 | 1140 V / 2200 A | | | | | | | |

x = suitable

able

= not suitable (see note)

| SINAMICS DCM | | Converter Commutation Protector SIMOREG CCP 6RA70 | | | | | | |
|----------------------|-----------------|---|------------|------------|------------|------------|--|--|
| | Rated | 85-6FC00-0 | 91-6FC00-0 | 90-6KC00-0 | 95-6FC00-0 | 95-6KC00-0 | | |
| | DC voltage | 460 V / | 460 V / | 690 V / | 460 V / | 690 V / | | |
| Order No. | / DC current | to 600 A | to 1200 A | to 1000 A | to 2000 A | to 2000 A | | |
| 6RA8025-6DS22-0AA0 | 485 V / 60 A | | | | | | | |
| 6RA8028-6DS22-0AA0 | 485 V / 90 A | | | | | | | |
| 6RA8031-6DS22-0AA0 | 485 V / 125 A | | | | | | | |
| 6RA8075-6DS22-0AA0 | 485 V / 210 A | | | | | | | |
| 6RA8078-6DS22-0AA0 | 485 V / 280 A | X | | | | | | |
| 6RA8081-6DS22-0AA0 | 485 V / 400 A | x | | | | | | |
| 6RA8085-6DS22-0AA0 | 485 V / 600 A | X | X | | | | | |
| 6RA8087-6DS22-0AA0 | 485 V / 850 A | | x | | | | | |
| 6RA8091-6DS22-0AA0 | 485 V / 1200 A | | x | | x | | | |
| 6RA8093-4DS22-0AA0 | 485 V / 1600 A | | | | x | | | |
| 6RA8095-4DS22-0AA0 | 485 V / 2000 A | | | | х | | | |
| 6RA8098-4DS22-0AA0 | 485 V / 3000 A | | | | | | | |
| 6RA8025-6FS22-0AA0 | 575 V / 60 A | | | | | | | |
| 6RA8028-6FS22-0AA0 | 575 V / 90 A | | | | | | | |
| 6RA8031-6FS22-0AA0 | 575 V / 125 A | | | | | | | |
| 6RA8075-6FS22-0AA0 | 575 V / 210 A | | | | | | | |
| 6RA8078-6FS22-0AA0 | 575 V / 280 A | x | | | | | | |
| 6RA8082-6FS22-0AA0 | 575 V / 450 A | x | | | | | | |
| 6RA8085-6FS22-0AA0 | 575 V / 600 A | x | x | | | | | |
| 6RA8087-6FS22-0AA0 | 575 V / 850 A | ~~~~~ | X | | | | | |
| 6RA8091-6FS22-0AA0 | 575 V / 1200 A | | x | | | | | |
| 6RA8025-6GS22-0AA0 | 690 V / 60 A | | | | | | | |
| 6RA8031-6GS22-0AA0 | 690 V / 125 A | | | | | | | |
| 6RA8075-6GS22-0AA0 | 690 V / 210 A | | | | | | | |
| 6RA8081-6GS22-0AA0 | 690 V / 400 A | | | x | | | | |
| 6RA8085-6GS22-0AA0 | 690 V / 600 A | | | x | | | | |
| 6RA8087-6GS22-0AA0 | 690 V / 800 A | | | x | | | | |
| 6RA8090-6GS22-0AA0 | 690 V / 1100 A | | | ~ | | Y | | |
| 6RA8093-4GS22-0AA0 | 690 V / 1600 A | | | | | x x | | |
| 6RA8095-4GS22-0AA0 | 690 V / 2000 A | | | | | x x | | |
| 6RA8096-4GS22-0AA0 | 690 V / 2200 A | | | | | ~ | | |
| 6RA8097-4GS22-0440 | 690 V / 2800 A | | | | | | | |
| 6RA8086-6KS22-0AA0 | 830 V / 720 A | | | x | | | | |
| 6R48090_6KS22_0440 | 830 V / 1000 A | | | x | | v | | |
| 6R48093-4KS22-0440 | 830 V / 1500 A | | | ^ | | × | | |
| 6RA8005_4KS22-0AA0 | 830 V / 2000 A | | | | | × × | | |
| 6RA8007_4KS22-0AA0 | 830 V / 2600 A | | | | | ^ | | |
| 6DA8088_61 \$22-0AA0 | 1000 V / 2000 A | | | + | + | | | |
| 6DA8003-11 S22-0AA0 | 1000 V / 950 A | | | + | + | | | |
| 6RA8005-4L322-0AA0 | 1000 V / 1000 A | | | | | | | |
| 6RA8006_4M922_0AA0 | 1140 V / 2200 A | | | | | | | |
| 01 | 1140 V / 2200 A | L | L | 1 | I | 1 | | |

Х = suitable

= not suitable (see note)

Note

For system configurations, with reduced rate values (e.g. DC rating, US rating, voltage derating), under certain circumstances, suitable combinations of units can be found that are not listed in the table.

2.4 Rating plate, packaging label

| SIMOREG DC-MASTER Converter Commutation Protector | | | | | | | |
|---|--------------------------------------|--|--|--|--|--|--|
| SIEMENS Bestellnr./Order No 1P 6RA7060 Fabrik-Nr./Serial No S Q6 Mennstrom/Rated Current Mennstro | Barco For or Identii Bar co | | | | | | |
| ErzStand/Prod State A1 CE Kühlung/Cooling S | | | | | | | |

- .. Barcode for MLFB
- ... For options, the MLFB is followed by a **-Z**
- ... Identifier for options (order-specific)
- ... Bar code, serial number (order-specific)

Rating plate



For options, after the MLFB is a –
 Z, followed by its identifier (order-specific)

Packaging label

3 Description, Technical Data

3.1 Description

Application

The SIMOREG DC-MASTER Converter Commutation Protector (SIMOREG CCP) is used to protect the semiconductor fuses of a line-commutated converter when operating in the inverter mode. When an inverter commutation fault occurs, a high current flows in the regenerative feedback direction via the line supply or a cross-current in the converter. SIMOREG CCP limits the current to a non-hazardous value so that the thyristors and the associated super-fast fuses are protected. This therefore eliminates the complex replacement of fuses that takes a considerable amount of time. Although it cannot prevent inverter commutation faults, it can provide protection against its effects.

Compatibility

The SIMOREG CCP is compatible to line-commutated SIMOREG DC-MASTER converters (from software release 2.2) and SINAMICS DCM (from software release 1.2). It can be used for converters connected in parallel.

Note

It is not possible to use the SIMOREG CCP for converters connected in series.

Mode of operation

The line supply voltage, line current and the armature voltage are continually sensed in the basic converter unit. These quantities are used to identify as to whether a commutation fault (inverter commutation fault) has occurred.

If this is the case, then the following occurs:

- 1. The firing pulses are immediately disabled in the SIMOREG DC-MASTER or SINAMICS DCM.
- 2. The basic converter unit sends a turn-off command to the SIMOREG CCP (via the serial interface)
- 3. SIMOREG CCP turns-off the thyristors by connecting the pre-charged quenching capacitors anti-parallel to all thyristors. As a consequence, the current commutates from the converter into SIMOREG CCP. The quenching capacitors are initially discharged by the current that has been commutated and then they are charged. The armature current starts to decrease as soon as the voltage of the quenching capacitors has reached the value of the motor EMF. However, the armature voltage continues to increase. As soon as it has reached the limit value, resistors are switched-in, which absorb the energy fed back from the motor during the remaining time of the current reduction phase.
- 4. A fault message is output in the basic converter unit (Fault F030 or F60030).
- 5. The SIMOREG CCP re-charges the quenching capacitors with the reverse polarity so that a new turn-off operation is possible.

Note

After the line supply voltage has been connected and after a quenching operation, wait and recovery times must be maintained, refer to the Technical data.

3.2 Technical data

| Order No. 6RA70 | 85-6FC00-0 | 91-6FC00-0 | 90-6KC00-0 | 95-6FC00-0 | 95-6KC00-0 |
|--|---|------------------------|------------------------|------------------------|------------------------|
| Rated voltage | 460 V (+15% / -20%) | 460 V (+15% / -20%) | 690 V (+10% / -20%) | 460 V (+15% / -20%) | 690 V (+10% / -20%) |
| Rated current | 600 A | 1200 A | 1000 A | 2000 A | 2000 A |
| current range that can be covered | to 600 A | to 1200 A | to 1000 A | to 2000 A | to 2000 A |
| Rated supply voltage Electronics power supply | 2 AC 380 V (-20 %) to 460 V (+15 %); I _n =1 A or 1 AC 190 V (-20 %) to 230 V (+15 %); I _n =2 A | | | | |
| Rated frequency | 45 to 65 Hz | | | | |
| Power loss | 100 W | | | | |
| Ambient temperature | Operation:0 to 55 °Cstorage, transport:-25 to +70 °C | | | | |
| Installation altitude above sea level | 2000 m without derating > 2000 m with voltage derating *) | | | | |
| Environmental class | 3K3 acc. to DIN IEC 60 721-3-3 | | | | |
| Pollution degree | 2 acc. to EN50178 **) | | | | |
| Degree of protection | IP00 acc. to DIN EN 60529 | | | | |
| Dimensions (W x H x D) | 780 x 406 x 500 mm, dimension drawing, see Chapter 5.1 | | | | |
| Weight (approx.) | 35 kg | 35 kg | 45 kg | 55 kg | 75 kg |

*) Voltage derating as a function of installation altitude:

When supplying the electronics with voltages of 460 VAC phase to phase (maximum 300 VAC with respect to ground) operation is permitted up to 4500 m. A maximum of 400 VAC phase to phase (maximum 230 V AC with respect to ground) is permitted up to 5000 m. At higher altitudes or a higher voltage, there is no longer "safe electrical separation" - but only basic insulation.

**) Definition, pollution degree 2:

Normally, only non-conductive pollution occurs. However, occasionally conductive pollution can be expected for a short period of time if the electronic equipment is not operational.

Wait time, recovery time:

Each time that the line supply voltage is connected (e.g. via a line contactor):

The quenching capacitors in the unit are charged. The wait time until the SIMOREG CCP is ready, is **approx. 3 s**

After one quenching operation:

The time until the SIMOREG CCP is ready again depends on the operations during the quenching process and immediately afterwards.

The quenching capacitors in the SIMOREG CCP are again recharged to the required value, duration **approx. 10 s**.

The chopper resistors, which convert the energy into heat when the armature current is reduced, require a cooling time.

This is calculated using a software algorithm, and depending on the energy that is dissipated during the quenching operation, is up to **approx. 20 min**.

3.3 Block diagram



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Arrangement of the thyristor and diode modules

Units 6RA70...85-6FC00-0 / ...91-6FC00-0 / ...90-6KC00-0 (all 1000 A)



Units 6RA70...95-6FC00-0 / ...95-6KC00-0 (all 2000 A)



4 Transport, Unpacking

The units are packaged in the manufacturer's factory in accordance with the order specification. A product packaging label is attached to the cardboard box.

Avoid heavy vibration and severe shocks during transportation, e.g. when placing down.

Follow the instructions on the packaging concerning transportation, storage, and proper handling.

The unit can be installed once it has been unpacked, and you have checked that the delivery is complete and the unit is intact and has not been damaged.

The packaging materials consist of a cardboard box and corrugated cardboard, and can be disposed of in accordance with local regulations for cardboard packaging materials.

If you identify any damage that has occurred in transit, please inform your shipping agent immediately.

5 Installation

Failure to lift the unit properly can lead to physical injury or material damage.

The unit should only be lifted with suitable equipment (work gloves should be used) and by appropriately qualified personnel.

In order to prevent the enclosure from becoming deformed, no horizontal forces may be exerted on the lifting eyes.

The user is responsible for installing the converter, the motor, the transformer as well as all of the other devices and units according to the relevant safety regulations (e.g. EN, DIN, VDE) as well as all of the other relevant national or local regulations regarding dimensioning conductors and protection, grounding, disconnectors, overcurrent protection etc.

The unit must be installed in compliance with the relevant safety regulations (e.g. EN, DIN, VDE) as well as all of the other relevant national or local regulations. Grounding, conductor dimensioning, and the relevant short-circuit protection measures must be carried out correctly in order to ensure operational safety.

Cabinet installation of SIMOREG units in conformance with UL 508 C

If this unit is to be installed in a cabinet, the cabinet must be sufficiently ventilated and of "Type 1" in accordance with standard UL 508 C.

To install the unit, the cabinet must have minimum dimensions of 2200 mm x 600 mm x 600 mm (H x W x D).

5.1 Dimension drawing

600 A / 1000 A / 1200 A - units:





5.2 SINAMICS DCM - Installing the Firing Unit Trigger Board

When using the SIMOREG CCP with SINAMICS DCM connected in parallel, each SINAMICS DCM must be equipped with a supplementary module "fast pulse cancellation interface" (Firing Unit Trigger Board) (Order No.: 6RY1803-0CP00). See chapter 6.3.2.

CAUTION

Please observe the information provided on "Electrostatic sensitive devices (ESD)" in Chapter 1.

Always carry out the work with the SINAMICS DCM in a no-voltage condition!

- Remove the front cover of the SINAMICS DCM
- ① Break-off the extension of the module A7126 Allocation Board
- ② Using the guide slots in the holder for the electronic modules, position the Firing Unit Trigger Board A7103 and by shifting the plug connection (X110), establish a connection to the Allocation Board A7126



- ③ Fasten the Firing Unit Trigger Board A7103 using the screw provided, tightening torque 1 Nm
- ④ The BOP holder can be released at the side and swung upwards to route the connecting cable



 After connecting the cable (see Chapter 6.3.3) relocate the front cover of the SINAMICS DCM and fasten using all of the screws

6 Connecting

The units are operated at high voltage levels.

All connection work must be carried out in the no-voltage condition!

Only qualified personnel who are familiar with all the safety instructions in these operating instructions, as well as the assembly, installation, operating, and maintenance instructions, - should carry out work on these units.

Non-observance of these warnings can result in death, serious personal injury, or substantial property damage.

Connecting the unit incorrectly can lead to it being damaged or destroyed.

The units may be connected to a line supply with a residual current operated circuit breaker if a universal current sensitive device is being used, which in the case of a ground fault, can also detect a DC component in the fault current. It is recommended to use a residual current operated circuit breaker with a response current \geq 300 mA, which means that it is not suitable for protecting personnel. If you have additional questions, please contact Technical Support.

Even when the motor is stationary, power terminals and control terminals can still be at a certain voltage.

Even after being disconnected from the power supply, the snubber capacitors in the converter unit can still be at a dangerous voltage level. For this reason, the unit should not be opened until an adequate period of time has elapsed.

When handling the unit while it is open, remember that live parts are exposed. The unit must only be operated with the front covers provided by the factory in place.

The user is responsible for ensuring that the SIMOREG CCP, the motor, converter unit and other devices are installed and connected in accordance with the recognized technical rules in the country of installation and applicable regional regulations. Special attention should be paid to cable dimensioning, fuses, grounding, shutdown, disconnection, and overcurrent protection.

The units described here control rotating mechanical equipment (drives). Failure to follow these operating instructions may result in death, serious physical injury, or extensive material damage.

Perfect, safe and reliable operation of the units is conditional upon them having been professionally transported, stored, mounted, and installed, and having been carefully operated and maintained.

Also observe all of the safety instructions in the converter unit operating instructions.

Note

Please observe the installation instructions for EMC-compliant design of drives in Chapter 6.1 of the operating instructions of the basic SIMOREG DC-MASTER or SINAMICS DCM unit.

6.1 Cable lengths

Lengths of the connecting cables between connections 1U1, 1V1, 1W1, 1C1, 1D1 of the basic converter unit and the SIMOREG CCP

The connecting cables between the basic converter unit and the SIMOREG CCP also serve as commutation inductance for quenching operations and must therefore have a defined length.

The cable length is valid for each cable for 1U1, 1V1, 1W1, 1C1, 1D1 and can be taken from the following diagram. The actual cable length used must lie between I_min and I_max (also refer to the example below).

Note

The correct values for parameters U578 or p51578 must be available before determining the cable length.





<1> I = cable length

Cable length to connect the AC connections I_{UVW}

Cable length to connect the DC connections I_{CD}

The following basic rule applies

The sum of the lengths, formed from I_{UVW} and I_{CD} must have twice the value of I (2*I) according to the diagram above (2*I= I_{UVW} + I_{CD}). You can e.g. keep the line-side connecting cables as short as possible or as required (e.g. using busbars) and use motor-side connecting cables with the required length.

Example

The minimum required cable length I_min is 3 m.

- Use 3m lengths each for 1U1, 1V1, 1W1, 1C1, 1D1.
- Or: e.g. use 1m lengths each for 1U1, 1V1, 1W1 and 5 m lengths each for 1C1, 1D1

6.2 Recommended connection

6.2.1 Connecting a SIMOREG DC-MASTER



<1>

CAUTION

Operation without a main contactor/circuit breaker is not permissible.

The control voltage for the main contactor (or the circuit breaker) must always be routed via terminal XR (connections 109 and 110) of the SIMOREG unit and via terminal X_SCHÜTZ (connections 4 and 5) of the SIMOREG CCP.

For a parallel connection (see Chapter 6.3.1) <u>all</u> SIMOREG units must be incorporated in this interlock circuit.

In applications with SIMOREG CCP, in the case of a fault, the basic converter unit or the SIMOREG CCP must be able to safely and reliably disconnect the arrangement from the line supply.

In addition, it must be carefully observed that the total of the delay times of all of the switching elements in the control circuit must not exceed the time set at parameter P089.



6.2.2 Connecting a SINAMICS DCM

<1>

Operation without a main contactor/circuit breaker is not permissible.

The control voltage for the main contactor (or the circuit breaker) must always be routed via terminal XR1 (connections 109 and 110) of the SINAMICS DCM and via terminal X_SCHÜTZ (connections 4 and 5) of the SIMOREG CCP.

For a parallel connection (see Chapter 6.3.2) <u>all</u> SINAMICS DCM units must be incorporated in this interlock circuit.

In applications with SIMOREG CCP, in the case of a fault, the basic converter unit or the SIMOREG CCP must be able to safely and reliably disconnect the arrangement from the line supply.

In addition, it must be carefully observed that the total of the delay times of all of the switching elements in the control circuit must not exceed the time set at parameter P50089.

CAUTION

6.2.3 Versions to interconnect the main contactor (circuit breaker) K1

after the supply transformer



before the supply transformer



6.2.4 Recommended connection when using a Siemens 3WL circuit breaker

If circuit breakers from other manufacturers are used, then the recommended connection described here applies accordingly.

It should be noted that the circuit breaker is equipped with a ready to close signal contact (S20, order option Z=C22) and undervoltage release (F3 short-time delayed or F4 with the shortest possible delay time, the version is defined using the 15th position of the MLFB of the circuit breaker).

Also refer to the operating instructions for the 3WL circuit breaker, Order No.: 3ZX1812-0WL00-0AN0 Chapter8.4 Auxiliary release/ electrical close inhibit (<u>http://support.automation.siemens.com/WW/view/en/8912465</u>)

Connecting

with undervoltage release F4:



with undervoltage release F3:



6.3 Connecting units in parallel

6.3.1 Parallel connection of SIMOREG DC-MASTER units

A SIMOREG CCP is directly connected in parallel to each of the converter units connected in parallel (SIMOREG DC-MASTER).



6.3.2 Parallel connection of SINAMICS DCM units

The following topologies are possible when connecting SINAMICS DCM in parallel:

- **12-pulse parallel connection:** Each of the two SINAMICS DCM should be equipped with one SIMOREG CCP. Interconnection and parameterization is just the same as for a single SINAMICS DCM.
- 6-pulse parallel connection: Each of the SINAMICS DCM used should be equipped with one SIMOREG CCP. Parameterization is just the same as for a single SINAMICS DCM.

Note

For series connections it is not permissible to use a SIMOREG CCP.

A SIMOREG CCP is directly connected in parallel to each of the converter units connected in parallel (SINAMICS DCM).

Each SINAMICS DCM must be equipped with a supplementary module "fast pulse cancellation interface" (Firing Unit Trigger Board) - available as accessory - also refer to Chapter 5.2 (Installation) and 6.3.3 (connection).

Ordering data, refer to chapter 2.2 (ordering data for options and accessories)

The interconnection must be made according to the following diagram.

Mode of operation:

- The inverter commutation fault monitoring is continuously active in the SINAMICS DCM.
- If an inverter commutation fault is identified in a SINAMICS DCM then a turn-off command is issued to the associated SIMOREG CCP. The turn-off command is transferred via the serial connection 3.2.
- The turn-off command is transferred from this SIMOREG CCP to the additional SIMOREG CCP. All SIMOREG CCP units simultaneously execute the turn-off operation. The turn-off command is transferred via the turn-off pulse interface 3.3, with which all SIMOREG CCPs are connected with one another.
- At the same time, the firing pulses are immediately disabled in all SINAMICS DCM units from the assigned SIMOREG CCP. This therefore ensures that the SINAMICS DCM, which have (still) not identified an inverter commutation fault, do not prevent the turn-off operation. The firing pulses are disabled via the fast pulse cancellation interface 3.4.

CAUTION

The parallel interface (X165, X166) at the SINAMICS DCM is not compatible to the parallel interface (X165) at the SIMOREG DC-MASTER CCP. It is not permissible that both connectors are connected.



ENGLISH

for additional connections and settings for the SINAMICS DCM units, refer to the operating instructions of the SINAMICS DCM

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6.3.3 Connecting the Firing Unit Trigger Board

Routing of the connecting cable "fast pulse cancellation interface" to the SINAMICS DCM with shield support:



- ① Firing Unit Trigger Board
- ② Connector X165_2
- ③ Shield support
6.4 Fuses

Fuses in the armature circuit and in the motor circuit

Recommended Siemens semiconductor fuses (depending on the SIMOREG CCP used):

| Unit Order No. (MLFB) | Rated current | Rated voltage | Fuses 1U1, 1V1, 1W1 | Fuses 1C1, 1D1 |
|--------------------------|---------------|------------------|---------------------------|-----------------------------|
| 6RA7085-6FC00-0 | 600 A | 460 V | 3NE3335 (560 A / 1000 V) | 3NE7431-0C (350 A / 2000 V) |
| 6RA7091-6FC00-0 | 1200 A | 460 V | 3NE3335 (560 A / 1000 V) | 3NE7431-0C (350 A / 2000 V) |
| 6RA7090-6KC00-0 | 1000 A | 690 V | 3NE3335 (560 A / 1000 V) | 3NE7431-0C (350 A / 2000 V) |
| 6RA7095-6FC00-0 | 2000 A | 460 V | 3NE3338-8 (800 A / 800 V) | 3NE7648-1C (525 A / 2000 V) |
| 6RA7095-6KC00-0 | 2000 A | 690 V | 3NE3338-8 (800 A / 800 V) | 3NE7648-1C (525 A / 2000 V) |

Note

It is no longer recommended to use the fuse types as listed in previous editions of the SIMOREG CCP operating instructions.

Fuses for pre-charging

10 A line protection e.g. type Diazed 5SD604

Fuses F1 and F2 in the Power Interface

Only UL-listed or UL-recognized fuses may be used in UL-listed units. Wickmann 198 1 A / 250 V 5 x 20 mm time-lag Wickmann 343 1 A / 250 V 6.3 x 32 mm time-lag Schurter FSD 1 A / 250 V 5 x 20 mm time-lag order designation 0034.3987 Schurter FST 1 A / 250 V 5 x 20 mm time-lag order designation 0034.3117

6.5 Arrangement of the terminals, connectors and fuses

Module C98043-A7046 Power Interface SIMOREG CCP



6.6 Terminal assignment, connectors

If the unit is incorrectly connected, this can result in damage or destruction. The power cable or busbars must be mechanically fixed outside the unit.

Power unit

Terminal type:

| 600 A / 1000 A / 1200 A units | Through hole for M10 (Cu - busbar 3x25) |
|-------------------------------|---|
| 2000 A units | Through hole for M10 (Cu - busbar 5x40) |

The units are designed for a permanent line supply connection in accordance with DIN VDE 0160, Section 6.5.2.1.

Protective conductor connection: Minimum cross-section 10 mm². (Connection option, see Chapter 5.1)

The connection cross-sections should be determined according to the applicable regulations - e.g. DIN VDE 100 Part 523, DIN VDE 0276 Part 1000.

The connection lengths should be determined according to the diagram in Chapter 6 – Connecting.

| Function | Terminal | Connection values/Comments |
|-----------------------------------|------------------------|---------------------------------|
| Armature power input | 1U1 | |
| | 1V1 | |
| | 1W1 | |
| Protective conductor PE | ÷ | see Technical data, Chapter 3.2 |
| Armature circuit-motor connection | 1C1 (1D1) 1D1 (1C1) | |

Pre-charging, main contactor / circuit breaker

| Terminal strip WAGO 264-105 | |
|--------------------------------|-------------------------------------|
| Conductor cross section AWG | max. 2.5 mm ² max. 12 |
| Stripped length | 8 - 9 mm |

| Function | Connection | Terminal X_SCHÜTZ | Connection values/Comments |
|--|-------------|----------------------|--|
| Power connection, pre-charging | 1 2 3 | 2U1 2V1 2W1 | Cable cross-section 1.5 mm ² Fuse protection 10 A (see Chapter 6.4) Connection values the same as for the power unit SIMOREG CCP (see above) |
| Control circuit for main contactor / circuit breaker | 4 5 | | Wiring, main contactor/circuit breaker (see the recommended connection in Chapter 6.2) |

Electronics power supply

| Terminal type: | plug-in terminal, type 49 | |
|----------------|---|-----------------|
| | maximum conductor cross-section 1.5 mm ² | finely stranded |

| Madula C09042 A7046 | Dower Interface SIMOREC CCD |
|---------------------|-----------------------------|
| WOULLE C90043-A7040 | |

| Function | Connection | Terminal XP | Connection values/Comments |
|--------------|---|-------------------|--|
| Infeed 400 V | 1 2 NC 3 | 5U1 5W1 5N1 | 2 AC 380 V (–20 %) to 460 V (+15 %); I _n =1 A internal fuse protection with F1, F2 on the C98043- A7046 module (see Chapter 6.4) external fuse protection max. 6A, Characteristic C recommended |
| or | | | |
| Infeed 230 V | $- \underbrace{ \begin{array}{c} 1 \\ 2 \\ - \end{array} } 3$ | 5U1 5W1 5N1 | 1 AC 190 V(–20 %) to 230 V (+15 %); I _n =2 A internal fuse protection with F1, F2 on the C98043- A7046 module (see Chapter 6.4) external fuse protection max. 6 A, Characteristic C recommended |

Note

For line supply voltages outside the tolerance range specified in Chapter 3.2, the electronic supply voltage must be adapted using transformers in order to comply with the value specified in Chapter 3.2. An isolation transformer is mandatory for rated line supply voltages exceeding 460 V.

The rated supply voltage for the armature circuit should be set in parameter P078 (Index 001) or p50078[1].

Serial interface RS 485

Module C98043-A7046 Power Interface SIMOREG CCP

| Function | Terminal X172 | Connection values/Comments |
|----------|------------------|--|
| TX+ | 56 | RS485, 4-wire send cable, positive differential output |
| TX- | 57 | RS485, 4-wire send cable, negative differential output |
| RX+ | 58 | RS485, 4-wire receive cable, positive differential input |
| RX- | 59 | RS485, 4-wire receive cable, negative differential input |
| М | 60 | Ground |

max. cable length 600 m

The following points must be noted: DIN 19245 Part 1

It is especially important that the voltage difference between the data reference potential M of all connections does not exceed -7 V/+12 V. Equipotential bonding must be implemented if this cannot be guaranteed.

Activating the serial interface by setting the protocol at parameter P790 or p50790.

Connecting to a SIMOREG DC-MASTER:



Connecting to a SINAMICS DCM:



Programming interface for the software update X300

Serial interface RS232

9-pin SUBMIN D socket

Module C98043-A7046 Power Interface SIMOREG CCP

| Connector pin X300 | Function |
|-----------------------|--------------------------------------|
| 2 | Receive cable, RS232 standard (V.24) |
| 5 | Ground |
| 7 | Send cable, RS232 standard (V.24) |

Cable:



Use a shielded connecting cable. Ground the shield at both ends.

Additional connectors

Module C98043-A7046 Power Interface SIMOREG CCP

| Connector | Function |
|-----------|---|
| X165 | "Output pulse inhibit": Used when connecting several SINAMICS DCM in parallel |
| X29_PAR | Pulse turnoff interface to the parallel connection of SIMOREG CCPs |
| X30_PAR | The two connectors are connected in parallel. |

7 Commissioning

CAUTION

The operator must be electrostatically discharged before coming into contact with modules in order to protect electronic components against high voltages caused by electrostatic charge. The easiest way to do this is to touch a conductive, grounded object immediately beforehand (for example, the bare metal part of a control cabinet).

It is not permissible that modules come into contact with highly insulating materials (e.g. plastic foils, insulating desktops, articles of clothing manufactured out of man-made fibers).

Modules may be set down only on conducting work surfaces.

The unit is at a hazardous voltage. Failure to comply with these operating instructions can lead to death, serious physical injury, and material damage.

The units may be connected to a line supply with a residual current operated circuit breaker if a universal current sensitive device is being used, which in the case of a ground fault, can also detect a DC component in the fault current. It is recommended to use a residual current operated circuit breaker with a response current \geq 300 mA, which means that it is not suitable for protecting personnel. If you have additional questions, please contact Technical Support.

Only qualified personnel who are familiar with all of the safety instructions in this description, as well as the assembly, installation, operating, and maintenance instructions, should carry out work on these units.

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

The unit is at dangerous voltage levels even when the converter unit line contactor is open. Before commencing any maintenance or service work, disconnect all power sources of the converter infeed and lock them out so that they cannot be accidentally reconnected.

These instructions are not exhaustive and, as such, cannot outline all the measures required in order to operate the unit safely. Where necessary, additional information or instructions may be required for special applications. If you encounter specific problems that have not been handled in enough detail for the purposes of the buyer, then please contact your local Siemens office.

The use of non-approved parts for carrying out repair work on the unit or handling of the unit by inadequately qualified personnel will result in dangerous conditions with the risk of death, serious physical injury, or extensive damage to equipment. All safety measures listed in these operating instructions, as well as all warning signs attached to the unit, must be followed.

Observe all the warning information outlined in Chapter 1 of these operating instructions.

7.1 Operation via the basic unit (SIMOREG DC-MASTER or SINAMICS DCM)

The basic converter unit has setting and monitoring parameters for commissioning, operation, monitoring and diagnostics of the SIMOREG CCP. The state of the SIMOREG CCP is signaled via connectors and the triggering of the SIMOREG CCP or erroneous states are signaled using fault and alarm messages.

Data is exchanged between the basic converter unit and SIMOREG CCP via the serial interface.

7.1.1 SIMOREG DC-MASTER parameters

(see below for a detailed description)

| P790 *) | Protocol selection for the basic converter interface G-SST2 |
|---------|--|
| r799 *) | Diagnostics information for G-SST2 |
| r812 *) | Receive data at G-SST2 |
| n560 | Software version of the SIMOREG CCP |
| n569 | Serial number of the SIMOREG CCP |
| n570 | MLFB (Order No.) of the SIMOREG CCP |
| n571 | Rated supply voltage of the SIMOREG CCP |
| n572 | Rated current of the SIMOREG CCP |
| n574 | State of the SIMOREG CCP |
| n575 | Display of the I2t value of the voltage limiting choppers 1 of the SIMOREG CCP |
| n576 | Display of the I2t value of the voltage limiting choppers 2 of the SIMOREG CCP |
| U577 | Voltage setpoint for the upper response threshold of the SIMOREG CCP chopper |
| U578 | Voltage setpoint for the pre-charging of the SIMOREG CCP quenching capacitors |
| U580 | Control word for commutation monitoring |
| U581 | Diagnostics memory for the commutation monitoring |
| U582 | Response of the commutation monitoring |
| U583 | Test command for the SIMOREG CCP |

*) For a description of these parameters, see the operating instructions SIMOREG DC-MASTER Chapter 11

Detailed description of parameters

The specified software release refers to the software release of the SIMOREG DC-MASTER

| PNU | Description | Value range [dimension] Graduation | No. of indices Factory setting (FS) Type | See/ change (Access / state) |
|-----------------------|--|--|--|---------------------------------------|
| n560 (2560) | Software version of the SIMOREG CCP [from SW 2.1 and higher] i001: Version release of the SIMOREG CCP software i002: Version release of the SIMOREG CCP software, boot sector | 0.0 to 9.9 0,1 | Ind: 2 Type: O2 | P052 = 3 |
| n569 (2569) | Serial number of the SIMOREG CCP [from SW 2.1 and higher] i001: 1. and 2nd position of the serial number i002: 3. and 4th position of the serial number i003: 5. and 6th position of the serial number i004: 7. and 8th position of the serial number i005: 9. and 10th position of the serial number i006: 11. and 12th position of the serial number i007: 13. and 14th position of the serial number i008 to i015: 0 i016: Checksum of the serial number The ASCII-Code of the serial number can be read from this parameter. | | Ind: 16 Type: L2 | P052 = 3 |
| n570 (2570) | MLFB (Order No.) of the SIMOREG CCP [from SW 2.1 and higher] Here, the coding of the corresponding MLFB is displayed. | 250 to 254 1 | Ind: None Type: O2 | P052 = 3 |
| n571 (2571) | Rated supply voltage of the SIMOREG CCP [from SW 2.1 and higher] Rated supply voltage of the SIMOREG CCP stamped on the rating plate | 10 to 830 [V] 1V | Ind: None Type: O2 | P052 = 3 |

| PNU | Description | | Value range [dimension] Graduation | No. of indices Factory setting (FS) Type | See/ change (Access / state) |
|-----------------------|--|--|--|--|---------------------------------------|
| n572 | Rated current of the SIMOREG CCP | [from SW 2.1 and higher] | 0.0 to 6553.5 | Ind: None | P052 = 3 |
| (2572) | Rated current of the SIMOREG CCP stamped on t | the rating plate | 0.1A | Type. 02 | |
| n574 | State of the SIMOREG CCP | [from SW 2.2 and higher] | | Ind: None | P052 = 3 |
| (2574) | Display at the operator panel (PMU): | | | Type: V2 | |
| | 15 14 13 12 11 10 9 7 6 5 4 3 2 1 | 8 0 | | | |
| | Segment lit or bit = 1: significance specified below Segment dark or bit = 0: significance specif | applies ïed below <u>does not</u> apply | | | |
| | Segment or bit 0 Voltage at U, V, W is OK 1 Voltage at C – D greater than + 2 Voltage at C – D less than -100 3 The quenching capacitors have voltage 4 Turn-off operation running 5 Connection between parallel SI 6 - 7 - 8 Parallel interface connected at 4 9 I2t value of voltage limiting chop 10 I2t value of voltage limiting chop 11 Contents of the memory of the the SIMOREG CCP (MLFB, rated work valid 12 Pre-charging of the chopper cap 13 - 14 - 15 - Note: This parameter has the same bit assignment as con | 100 V V reached the setpoint MOREG CCP OK CCP pper 1 is too high pper 2 is too high technical data of the values, serial number) pacitors completed | | | |
| n575 | Display of the I2t value | [from SW 2.1] | 0 to 100 | Ind: None | P052 = 3 |
| (2575) | of the voltage limitingchoppers 1 of the SIMOR | EG CCP | [%] 1 % | Type: O2 | |
| n576 (2576) | Display of the l2t value of the voltage limitingchoppers 2 of the SIMOR | [from SW 2.1] EG CCP | 0 to 100 [%] 1 % | Ind: None Type: O2 | P052 = 3 |

Commissioning

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| PNU | Description | | | Value range [dimension] Graduation | No. of indices Factory setting (FS) | See/ change (Access / state) |
|--------|--|--|--|--|--|---------------------------------------|
| U577 | Voltage setpoint for t | he upper response f | hreshold of the SIMOREG | 850 to 1600 | Ind: None | P052 = 3 |
| (2577) | CCP chopper | | [from SW 2.2 and higher] | [V] | FS=1600 | P051 = 40 |
| | The set voltage value of limiter implemented in operation of the CCP, also necessary - when dangerous for the basi required setting value of power semiconductors MASTER) and in the S Unit MLFB. The following table sho | defines the upper resp the SIMOREG CCP. this limits the counter- the armature current ic unit and the associa depends on the block s used in the basic cor SIMOREG CCP and is build be used to correct | | 1990. 02 | Uninte | |
| | As a result of the unit I two setting values are set at U577. | MLFB for the basic co obtained from which t | nverter and SIMOREG CCP, he lower of the two should be | | | |
| | Example: Basic converter MLFB: SIMOREG CCP MLFB therefore the following | : 6RA7085-6DV62-0 (3: 6RA7085-6FC00-0 setting is obtained: <u>U</u> | | | | |
| | Table to determine the | setting value for U57 | 7: | | | |
| | MLFB SIMOREG DC-MASTER | MLFB characteristic number (r070) | Setting value for U577 [V] | | | |
| | 6RA7013-6DV62-0 | 1 | 1300 | İ | | |
| | 6RA7018-6DV62-0 | 2 | 1300 | | | |
| | 6RA7025-6DV62-0 | 3 | 1300 | | | |
| | 6RA7028-6DV62-0 | 4 | 1300 | | | |
| | 6RA7031-6DV62-0 | 5 | 1300 | | | |
| | 6RA7075-6DV62-0 | 6 | 1300 | | | |
| | 6RA7070-0DV02-0 | / 8 | 1300 | | | |
| | 6RA7085-6DV62-0 | 9 | 1300 | | | |
| | 6RA7087-6DV62-0 | 10 | 1300 | | | |
| | 6RA7091-6DV62-0 | 11 | 1300 | | | |
| | 6RA7093-4DV62-0 | 12 | 1500 | | | |
| | 6RA7095-4DV62-0 | 13 | 1500 | | | |
| | 6RA7025-6GV62-0 | 14 | 1700 | | | |
| | 6RA7031-6GV62-0 | 15 | 1700 | | | |
| | 6RA7075-6GV62-0 | 16 | 1700 | | | |
| | 6RA7085-6GV62-0 | 17 | 1700 | | | |
| | 6RA7087-6GV62-0 | 19 | 1700 | | | |
| | 6RA7090-6GV62-0 | 20 | 1700 | | | |
| | 6RA7093-4GV62-0 | 21 | 1700 | | | |
| | 6RA7095-4GV62-0 | 22 | 1700 | | | |
| | 6RA7086-6KV62-0 | 23 | 2100 | | | |
| | 6KA7090-6KV62-0 | 24 | 2100 | | | |
| | 6RA7093-4KV62-0 | 20 26 | ∠100 2100 | | | |
| | 6RA7095-4RV02-0 | 20 | 2500 | | | |
| | 6RA7093-4LV62-0 | 28 | 2500 | | | |
| | 6RA7095-4LV62-0 | 29 | 2500 | | | |
| | 6RA7018-6DS22-0 | 30 | 1300 | | | |
| | 6RA7025-6DS22-0 | 31 | 1300 | | | |
| | 6RA7028-6DS22-0 | 32 | 1300 | | | |
| | 6RA7031-6DS22-0 | 33 | 1300 | | | |
| | 0KA/U/5-0DS22-0 | 34 35 | 1300 | | | |
| | 6RA7081_6DS22-0 | 36 | 1300 | | | |
| | 6RA7085-6DS22-0 | 37 | 1300 | | | |
| | 6RA7087-6DS22-0 | 38 | 1300 | | | |
| | 6RA7091-6DS22-0 | 39 | 1300 | | | |
| | 6RA7093-4DS22-0 | 40 | 1500 | | | |
| | 6RA7095-4DS22-0 | 41 | 1500 | | | |

| Description | | | | Value range [dimension] Graduation | No. of indices Factory setting (FS) Type | See/ change (Access / state) |
|--------------------|------------------|------------------------------------|----------------------------|--|--|---------------------------------------|
| 6RA7025-6GS | 322-0 4 | 2 | 1700 | | | |
| 6RA7031-6GS | \$22-0 4 | ,3 | 1700 | | | |
| 6RA7075-6GS | 322-0 4 | .4 | 1700 | | | |
| 6RA7081-6GS | \$22-0 4 | ,5 | 1700 | | | |
| 6RA7085-6GS | \$22-0 4 | <i>,</i> 6 | 1700 | | | |
| 6RA7087-6GS | \$22-0 4 | 7 | 1700 | | | |
| 6RA7090-6GS | \$22-0 4 | /8 | 1700 | | | |
| 6RA7093-4GS | 322-0 4 | .9 | 1700 | | | |
| 6RA7095-4GS | \$22-0 5 | 0 | 1700 | | | |
| 6RA7086-6KS | 522-0 5 | 51 | 2100 | | | |
| 6RA7088-6KS | 522-0 5 | 2 | 2100 | | | |
| 6RA7093-4KS | 522-0 5 | 3 | 2100 | | | |
| 6RA7095-4KS | 522-0 5 | 4 | 2100 | | | |
| 6RA7088-6LS | 22-0 5 | 5 | 2500 | | | |
| 6RA7093-4LS | 22-0 5 | 6 | 2500 | | | |
| 6RA7095-4LS | 22-0 5 | 7 | 2500 | | | |
| 6RA7096-4GV | /62-0 5 | 8 | 1700 | | | |
| 6RA7096-4GS | \$22-0 5 | 9 | 1700 | | | |
| 6RA7000-0MV | /62-0 6 | 0 | 2900 | | | |
| 6RA7095-4GS | 322-5 9 |)6 | 1700 | | | |
| 6RA7095-4KS | 522-5 9 |)7 | 2100 | | | |
| 6RA7095-4LS | 22-5 9 | 18 | 2500 | | | |
| 6RA7096-4GS | \$22-5 9 | 19 | 1700 | | | |
| 6RA7018-6FV | '62-0 1 | 01 | 1500 | | | |
| 6RA7025-6FV | '62-0 1 | 02 | 1500 | | | |
| 6RA7028-6FV | '62-0 1 | 03 | 1500 | | | |
| 6RA7031-6FV | '62-0 1 | 04 | 1500 | | | |
| 6RA7075-6FV | '62-0 1 | 05 | 1500 | | | |
| 6RA7078-6FV | '62-0 1 | 06 | 1500 | | | |
| 6RA7082-6FV | '62-0 1 | 07 | 1500 | | | |
| 6RA7085-6FV | '62-0 1 | 08 | 1500 | | | |
| 6RA7087-6FV | '62-0 1 | 09 | 1500 | | | |
| 6RA7091-6FV | '62-0 1 | 10 | 1500 | | | |
| 6RA7018-6FS | 22-0 1 | 11 | 1500 | | | |
| 3RA7025-6FS | 22-0 1 | 12 | 1500 | | | |
| 6RA7028-6FS | 22-0 1 | 13 | 1500 | | | |
| 6RA7031-6FS | 22-0 1 | 14 | 1500 | | | |
| 6RA7075-6FS | 22-0 1 | 15 | 1500 | | | |
| 6RA7078-6FS | 22-0 1 | 16 | 1500 | | | |
| 6RA7082-6FS | 22-0 1 | 17 | 1500 | | | |
| 6RA7085-6FS | 22-0 1 | 18 | 1500 | | | |
| 6RA7087-6FS | 22-0 1 | 19 | 1500 | | | |
| 6RA7091-6FS | 22-0 1 | 20 | 1500 | | | |
| 6RA7098-4DV | /62-0 1 | 21 | 1500 | | | |
| 6RA7097-4GV | /62-0 1 | 22 | 1700 | | | |
| 6RA7097-4KV | /62-0 1 | 23 | 2100 | | | |
| 6RA7096-4M\ | /62-0 1 | 24 | 2100 | | | |
| 6RA7098-4DS | 322-0 1 | 25 | 1500 | | | |
| 6RA7097-4GS | 322-0 1 | 26 | 1700 | | | |
| 6RA7097-4KS | 22-0 1 | 27 | 2100 | | | |
| 6RA7096-4MS | 322-0 1 | 28 | 2900 | | | |
| 6RA7095-4M\ | /62-0 1 | 29 | 2900 | | | |
| | | | | - | | |
| MLFB SIMOREG CC | ML P ch nu | -FB aracteristic mber (n570) | Setting value for U577 [V] | | | |
| 6RA7085-6FC | :00-0 | 250 | 1100 | | | |
| 6RA7001_6FC | :00-0 | 251 | 1100 | | | |
| 6RA7005_6EC | 00-0 2 | .51 | 1100 | | | |
| 6DA7000 6KC | 100-0 2 | . <u></u> 253 | 1600 | | | |
| | | .55 | 1600 | | | |
| 6DA7005 6KC | | | | 1 | 1 | 1 |

| PNU | Description | | | | Value range [dimension] Graduation | No. of indices Factory setting (FS) Type | See/ change (Access / state) |
|-----------------------|---|--|---|---|--|--|---------------------------------------|
| U578 (2578) | Voltage setpoint for capacitors To successfully turn of minimum charge volt SIMOREG CCP. This which precharges the The maximum pre-ch average rectified valu (minimum value acco The value to be set a using the characteris operating instructions To start, the number from the following tab according to parameter rated armature voltage | the pre-charging off the thyristors, the age required for the s value is used as a e quenching capac harging voltage tha ue of the line supple ording to the lower at the parameter US tic diagrams provid s. of the associated of ble for the SIMORE ter n570 or according ge of the motor according | 145 to 830 [V] 1 V | Ind: None FS=145 Type: O2 | P052 = 3 P051 = 40 online | | |
| | MLFB SIMOREG CCP | MLFB characteristic number (n570) | P101 [V] | No. of the associated characteristic diagram | | | |
| | 6RA7085-6FC00-0 6RA7091-6FC00-0 | 250 251 | 420 470 420 | 1, 1A 2, 2A 3, 3A | - | | |
| | 6RA7095-6FC00-0 | 252 | 470 420 | 4, 4A 5, 5A | - | | |
| | 6RA7090-6KC00-0 | 253 | 470 520 | 6, 6A 7.0, 7.0A | - | | |
| | | | 600 720 | 7, 7A 8, 8A | | | |
| | 6RA7095-6KC00-0 | 254 | 520 600 720 | 9.0, 9.0A 9, 9A 10, 10A | | | |
| | Then, for the specifie the associated voltage Below is an example n570 = 6RA7091 P101 = 470 V P111 = 0.23 mH r072i002 = 890,0 A According to $n570$ and As abscissa value, as next lower grid value interpolation is made next higher ordinate of As a consequence, L If the armature circuit range shown in the c determined for the m Depending on the value searched for can lie of characteristic diagram The upper limit show P351 = -20 % of P07 upper limit applies for 1.35 * F | d values of P111 a je value in the char for determining US -6FC00-0 (characteris is an approximation of 0.22 mH is used in the associated of grid value for 380 V J578 = 380 V shou t inductance according haracteristic diagra aximum value of P lues of P111 and n butside the upper con- n. n in the characteris 8i001 (according to r a value of P351 tt P078.001* $\left(1 + \frac{P3}{100} + \frac{P3}{10} + $ | and r072i0 racteristic 578 for teristic num tic diagram , instead d. For r07: current ran / is used I ld be set. ding to P1 am, then ti 111 that is 072i002, t or lower lim stic diagram to the factor hat deviat $51 \over \frac{10}{9}$ | 102, a search is made for diagram. mber = 251) m 4 (4A) should be used. of P111 = 0.23 mH the 2i002 = 890.0 A, a linear nge 800 A to 900 A. The here as an approximation. 11 exceeds the value he value should be s shown. the voltage value being nit shown in the m is valid for a value of ory setting). The following es from the factory setting: | | | |

| PNU | Description | Value range [dimension] Graduation | No. of indices Factory setting (FS) Type | See/ change (Access / state) |
|----------------|--|--|--|---|
| | The following situations can occur: Determined voltage value < 145 V (lower limit in the characteristic diagram): U578 = 145 V should be set. The successful turn-off operation by the SIMOREG CCP is assured in all situations, however, the voltage load (or torque increase) of the motor that can briefly occur for a turn-off operation is higher than necessary. Determined voltage value lies between the lower limit (145 V) and the upper limit: The voltage value determined should be set at U578. The successful turn-off operation by the SIMOREG CCP is assured in all situations. Determined voltage value > upper limit: Operation involving the basic converter - SIMOREG CCP combination is not permissible. The successful turn-off operation by the SIMOREG CCP is not assured. This problem may be able to be resolved by contacting the manufacturer. <u>Note:</u> When communications are established between the basic converter and SIMOREG CCP (P790=6), then the setpoint according to U578 in the SIMOREG CCP is set using its operating firmware. If the selected setpoint cannot be reached due to the fact that the actual line supply voltage is too low, for operating states < 4.0, the basic converter outputs Alarm A032 - followed by Fault F032 (fault value 3) - to signal that the required charge voltage has not been achieved. | | Туре | |
| U580 (2580) | If, after commissioning, one of the relevant system parameters changes, then the correct setting of U578 should be checked and, if required, it should be appropriately set again. Control word for commutation monitoring [from SW 2.1 and higher] Converter commutation is permanently monitored. Fault message F030 is output when a commutation fault is detected and the SIMOREG CCP (if being used) initiates that the thyristors are turned off. Detecting a commutation fault is based on 3 criteria. Using this parameter, these can be individually activated/deactivated for test purposes. 0: None of the 3 decision-making criteria is evaluated 1: Decision-making criterion 1 (adequate voltage-time integral for the commutation) is evaluated 2: Decision-making criterion 2 (curvature of the current cusp) is evaluated 4: Decision-making criterion 3 (magnitude of the current actual value) is evaluated Setting note: Each decision-making criteria are to be evaluated, then the sum of the corresponding numbers should be set. If U806 ≥ 2 (this means that the basic converter is a slave connected in parallel), then decision-making criterion 1, is not evaluated independent of the setting of U580. Diagnostics memory for the commutation monitoring [from SW 2.1 and | 0 to 7 1 0 to 65536 | Ind: None FS=7 Type: O2 | P052 = 3 P051 = 40 online P052 = 3 |
| (2581) | higher] This memory is updated each time that fault message F030 is output. It includes more detailed information about the cause of the commutation fault, which can be evaluated by Siemens experts. | 1 | Type: O2 | 11052 - 5 |

| PNU | Description | Value range [dimension] Graduation | No. of indices Factory setting (FS) Type | See/ change (Access / state) |
|-----------------------|---|--|--|---------------------------------------|
| U582 (2582) | Response of the commutation monitoring [from SW 2.1 and higher] This parameter can be used to define the response of the commutation - monitoring. 1 After a commutation fault or an overcurrent condition has been detected, this results in an immediate pulse cancellation and Alarm message A030 is output. The pulses are enabled again after approx. 20 ms and alarm message A030 disappears. 2 After a commutation fault or an overcurrent condition has been detected, this results in an immediate pulse cancellation and fault message F030 is output. Notice: The setting U582=1 is not permissible for a selected SIMOREG CCP (P790=6)! | 1 to 2 1 | Ind: None FS=2 Type: O2 | P052 = 3 P051 = 40 online |
| U583 (2583) | Test command for the SIMOREG CCP [from SW 2.2 and higher] This parameter can be used to issue a turn-off command to the SIMOREG CCP for test purposes. 0 No turn-off command is issued 1 A turn-off command is issued in MI 2 A turn-off command is issued in MII After issuing a single turn-off command to the SIMOREG CCP, this parameter automatically sets itself back to the value 0! Note: If the test command is issued while operational (i.e. in operating states I and II), then the basic converter defines the torque direction required to select the correct test command. In the operating state, torque direction 0 () the test command is issued in torque direction I. | 0 to 2 1 | Ind: None FS = 0 Type: O2 | P052 = 3 P051 = 40 online |

7.1.2 SINAMICS DCM parameters

(see below for a detailed description)

| r50047[031] | Faults, supplementary information |
|-------------|--|
| r50071 | Rated unit supply voltage for armature |
| p50790 | P2P interface operating mode |
| p50795 | P2P/CCP bus termination |
| p50797 | P2P interface telegram monitoring time |
| r50799[08] | P2P/CCP diagnostics |
| r51560[01] | CCP software version |
| r51569[015] | CCP serial number |
| r51570 | CCP order number |
| r51571 | CCP rated supply voltage |
| r51572 | CCP rated current |
| r51574.012 | CO/BO: CCP state |
| r51575 | CO: CCP I2t value voltage limiting chopper 1 |
| r51576 | CO: CCP I2t value voltage limiting chopper 2 |
| p51577 | CCP chopper voltage setpoint, upper response threshold |
| p51578 | CCP quenching capacitor pre-charging voltage setpoint |
| r51579.07 | CO/BO: CCP command |
| p51580 | Commutation monitoring, control word |
| p51583 | CCP test turn-off command |

Detailed description of parameters

| PNU | Description | Value range [dimension] Graduation | No. of indices Factory | Access level |
|-----------------|---|--|------------------------------|-----------------|
| | | Graduation | setting (FS) | |
| r50047 [031] | Faults, additional information/fault addit. info | - 1 | Ind: 32 - | 1 |
| | Description: Display of additional information on faults that have occurred with numbers from 60000 and higher. | 1 | | |
| | [0] = fault value [1] = additional information on the last fault that occurred (refer to the corresponding fault) | | | |
| | [30] = additional information on the last fault that occurred (refer to the corresponding fault) [31] = fault number | | | |
| r50071 | Rated unit supply voltage armature / Unit Va_rated | - [Vrms] - | Ind: None - | 1 |
| | Description: Displays the unit rated supply voltage for the armature according to the rating plate of the unit. | | | |
| p50790 | P2P interface operating mode / P2P operating mode | 0 to 6 1 | Ind: None FS = 0 | 2 |
| | Description: Sets the operating mode for the peer-to-peer interface (P2P interface). | 1 | | |
| | Value: 0: No function 5: Peer-to-peer communication 6: Communication with SIMOREG CCP | | | |
| | Note: | | | |
| | Correct communication is optically displayed using an LED on the Power Interface module C98043-A7046: | | | |
| | LED flashes slowly (<1 Hz): Communication with SINAMICS DCM OK | | | |
| | LED flashes quickly (~3 Hz): Communication error with SIMOREG CCP | | | |
| p50795 | P2P/CCP bus termination / P2P/CCP bus term. | 0 to 1 1 | Ind: None FS = 0 | 2 |
| | Description: | 1 | | |
| | Sets the bus termination for the peer-to-peer interface and the interface to the SIMOREG CCP. | | | |
| | Value: | | | |
| | U: off | | | |
| | Note | | | |
| | CCP: Converter Commutation Protector P2P: Peer-to-peer interface | | | |

Commissioning

| PNU | Description | Value range [dimension] Graduation | No. of indices Factory setting (FS) | Access level |
|----------------|---|--|--|-----------------|
| p50797 | P2P interface telegram monitoring time / P2P t_tel_monit Description: Sets the telegram monitoring time for the peer-to-peer interface (P2P interface). The set time is only effective in the "peer-to-peer interface" operating mode (p50790 = 5). p50797 = 0: Monitoring is disabled. p50797 > 0: Monitoring is enabled. Within the set time, after a valid telegram has been received, the next valid telegram must be received. Otherwise, Fault F60012 is output. Dependency: See also: F60012 Note: Telegram monitoring is activated in the following cases: From the reception of the first error-free telegram. After the electronics power supply has been switched-on. From the reception of the first error-free telegram after the telegram monitoring responds (when the telegram monitoring time expires - timeout). The telegram monitoring time (p50797) is dependent on the selected baud rate (p50793). For safe, reliable operation, the following minimum setting values are recommended: 300 Baud → p50797 = 0.520 s (recommended minimum value) 600 Baud → p50797 = 0.040 s (recommended minimum value) 2400 Baud → p50797 = 0.040 s (recommended minimum value) 4800 Baud → p50797 = 0.040 s (recommended minimum value) 4800 Baud → p50797 = 0.040 s (recommended minimum value) 4800 Baud → p50797 = 0.040 s (recommended minimum value) | 0 to 65 [s] 0.01 s | Ind: None FS = 0 | 2 |
| r50799 [08] | P2P/CCP diagnostics / P2P/CCP diag Description: Displays the diagnostics information for the peer-to-peer interface and the interface to the SIMOREG CCP. Index: [0] = number of error-free telegrams [1] = number telegrams with error [2] = number of byte frame errors [3] = number of overrun errors [4] = number of parity errors [5] = number of STX errors [6] = number of block check errors [7] = number of block check errors [8] = number of timeout errors Note: The error frequency is detected using free-running counters and when 65535 is reached, the particular counter is reset to 0. For communication with SIMOREG CCP (p50790 = 6) the diagnostics information in indices 5, 6 and 8 has no significance. Possible error causes for STX errors: The start pause before STX was not maintained. STX error, i.e. not equal to 02. Possible error cause for timeout errors: The telegram monitoring interval has expired (p50797). | 0 to 65534 1 1 | Ind: 9 - | 1 |
| r51560 [01] | CCP software version / CCP SW version Description: Displays the software version for the Converter Communication Protector (CCP). Index: [0] = version release of the CCP software [1] = version release of the software of the CCP boot sector | - | Ind: 2 - | 3 |

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| PNU | Description | n | | | Value range [dimension] Graduation | No. of indices Factory setting (FS) | Access level |
|----------------|---|--|-------------|------------|--|--|-----------------|
| r51569 | CCP serial | number / CCP serial No. | | | 0 to 255 | Ind: 16 | 3 |
| [015] | Description: Displays the serial number of the Converter Commutation Protector (CCP). | | | | 1 | - | |
| | The ind | ividual characters of the number are displayed in t | the ASCII c | ode in the | | | |
| | An ASC example | II table (excerpt) can be found in the Appendix of e. | the List Ma | nual for | | | |
| r51570 | CCP order | number / CCP Order No. | | | 0 to 254 | Ind: None | 3 |
| | Description Displays Protecto | n: s the order number (MLFB) of the connected Conv or (CCP). | verter Comr | nutation | 1 | - | |
| | Value: 0: No CCP connected 250: 6RA7085-6FC00-0 251: 6RA7091-6FC00-0 252: 6RA7095-6FC00-0 253: 6RA7090-6KC00-0 254: 6RA7095-6KC00-0 | | | | | | |
| r51571 | CCP rated | supply voltage / CCP V_rated | | | - | Ind: None | 3 |
| | Description: Displays the rated supply voltage according to the rating plate of the Converter Communication Protector (CCP). | | | | | - | |
| r51572 | CCP rated | current / CCP I_rated | | | - | Ind: None | 3 |
| | Description: Displays the rated current according to the rating plate of the Converter Communication Protector (CCP). | | | | | - | |
| r51574. 012 | CO/BO: CO Description Displays Protecto | CP state/ CCP state n: s the connector output for the state of the Convert or (CCP). | er Commur | lication | - 1 1 | Ind: None - | 3 |
| | Bit array | Signal name | 1 signal | 0 signal | | | |
| | Bit 00 | Voltage at U, V, W ok. | Yes | No | | | |
| | Bit 01 | Voltage at C - D higher than +100 V | Yes | No | | | |
| | Bit 02 | Quenching capacitors have reached their | Yes | No | | | |
| | | setpoint voltage | | | | | |
| | Bit 04 | Turn-off operation running | Yes | No | | | |
| | Bit 08 | Connector X165_2 (at the DCM) is connected with X165 (at the CCP) | Yes | No | | | |
| | Bit 09 | I2t value voltage limiting chopper 1 too high | Yes | No | | | |
| | Bit 10 | 12t value voltage limiting chopper 2 too high | Yes | No | | | |
| | Bit 11 | Memory for technical data for the CCP ok. | Yes | No | | | |
| r51575 | CO: CCP I2 | 2t value voltage limiting chopper 1 / CCP I2t ch | opper 1 | | - | Ind: None | 3 |
| | Description Displays Commu | n: s the l2t value for voltage limiting chopper 1 for the itation Protector (CCP). | e Converter | | [%] - | - | |
| r51576 | CO: CCP I | 2t value voltage limiting chopper 2 / CCP I2t ch | opper 2 | | - | Ind: None | 3 |
| | Description Displays Commu | n: s the l2t value for voltage limiting chopper 2 for the tation Protector (CCP). | e Converter | | [%] - | - | |

| PNU | Description | | Value range [dimension] Graduation | No. of indices Factory | Access level |
|--------|---|---|--|------------------------------|-----------------|
| | | | | setting (FS) | |
| p51577 | CCP chopper voltage setpo CCP V_set thresh up | int, upper response threshold / | 850 to 2900 [V] 1 V | Ind: None FS=1600 | 3 |
| | Description: Sets the upper response t CCP. Within the scope of counter-voltage - which is current is reduced to a val and the associated CCP. | hreshold of the voltage limiter implemented in the the turn-off operation of the CCP, this limits the also necessary - that occurs when the armature ue that is not dangerous for the basic converter unit | | | |
| | Note: | | | | |
| | CCP: Converter Commuta The parameter is automat | ation Protector ically set for the "Optimization run for CCP" (p50051 | | | |
| | The following table should | be used to correctly set this parameter. | | | |
| | As a result of the unit MLF two setting values are obt at p51577. | B for the basic converter unit and SIMOREG CCP, ained from which the lower of the two should be set | | | |
| | Example: | | | | |
| | Basic converter unit MLFE SIMOREG CCP MLFB: 6F therefore the following set | 8: 6RA8085-6DV62-0 p51577=1300 V RA7085-6FC00-0 p51577=1100 V ting is obtained: p51577=1100 V | | | |
| | Table to determine the setting | value for p51577: | | | |
| | MLFB SINAMICS DCM | Setting value for p51577 [V] | | | |
| | 6RA8013-6DV62-0AA0 | 1300 | | | |
| | 6RA8018-6DV62-0AA0 | 1300 | | | |
| | 6RA8025-6DV62-0AA0 | 1300 | | | |
| | 6RA8028-6DV62-0AA0 | 1300 | | | |
| | 6RA8031-6DV62-0AA0 | 1300 | | | |
| | 6RA8075-6DV62-0AA0 | 1300 | | | |
| | 6RA8078-6DV62-0AA0 | 1300 | | | |
| | 6RA8081-6DV62-0AA0 | 1300 | | | |
| | 6RA8085-6DV62-0AA0 | 1300 | | | |
| | 6RA8087-6DV62-0AA0 | 1300 | | | |
| | 6RA8091-6DV62-0AA0 | 1300 | | | |
| | 6RA8093-4DV62-0AA0 | 1500 | | | |
| | 6RA8095-4DV62-0AA0 | 1500 | | | |
| | 6RA8098-4DV62-0AA0 | 1500 | | | |
| | 6RA8013-6FV62-0AA0 | 1500 | | | |
| | 6RA8018-6FV62-0AA0 | 1500 | | | |
| | 6RA8025-6FV62-0AA0 | 1500 | | | |
| | 6RA8028-6FV62-0AA0 | 1500 | | | |
| | 6RA8031-6FV62-0AA0 | 1500 | | | |
| | 6RA8075-6FV62-0AA0 | 1500 | | | |
| | 6RA8078-6FV62-0AA0 | 1500 | | | |
| | 0KA0002-0FV02-0AA0 | 1500 | | | |
| | 6R48087-6F\/62-0440 | 1500 | | | |
| | 6R48091-6F\/62-0440 | 1500 | | | |
| | 6RA8025-6GV62-0AA0 | 1700 | | | |
| | 6RA8031-6GV62-0AA0 | 1700 | | | |
| | 6RA8075-6GV62-0AA0 | 1700 | | | |
| | 6RA8081-6GV62-0AA0 | 1700 | | | |
| | 6RA8085-6GV62-0AA0 | 1700 | | | |
| | 6RA8087-6GV62-0AA0 | 1700 | | | |
| | 6RA8090-6GV62-0AA0 | 1700 | | | |
| | 6RA8093-4GV62-0AA0 | 1700 | | | |
| | 6RA8095-4GV62-0AA0 | 1700 | | | |
| | 6RA8096-4GV62-0AA0 | 1700 | | | |
| | 6RA8097-4GV62-0AA0 | 1700 | | | |
| | 6RA8086-6KV62-0AA0 | 2100 | | | |
| | 6RA8090-6KV62-0AA0 | 2100 | | | |
| | 6RA8093-4KV62-0AA0 | 2100 | | | |
| | 6RA8095-4KV62-0AA0 | 2100 | | | |
| | 6RA8097-4KV62-0AA0 | 2100 | | | |
| | 6RA8088-6LV62-0AA0 | 2500 | | | |
| | 6RA8093-4LV62-0AA0 | 2500 | | | |
| | 6RA8095-4LV62-0AA0 | 2500 | | | |
| | 6RA8096-4MV62-0AA0 | 2900 | | | |

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| PNU | Description | | Value range | No. of | Access |
|--------|--|--------------------------|-------------------|-------------------------|--------|
| | | | [dimension] | indices | level |
| | | | Graduation | Factory setting (FS) | |
| | 6RA8025-6DS22-0AA0 1300 | | | ootting (1 0) | |
| | 6RA8028-6DS22-0AA0 1300 | | | | |
| | 6RA8031-6DS22-0AA0 1300 | | | | |
| | 6RA8075-6DS22-0AA0 1300 | | | | |
| | 6RA8078-6DS22-0AA0 1300 | | | | |
| | 6RA8085-6DS22-0AA0 1300 | | | | |
| | 6RA8087-6DS22-0AA0 1300 | | | | |
| | 6RA8091-6DS22-0AA0 1300 | | | | |
| | 6RA8093-4DS22-0AA0 1500 | | | | |
| | 6RA8095-4DS22-0AA0 1500 | | | | |
| | 6RA8025-6FS22-0AA0 1500 | | | | |
| | 6RA8028-6FS22-0AA0 1500 | | | | |
| | 6RA8031-6FS22-0AA0 1500 | | | | |
| | 6RA8075-6FS22-0AA0 1500 | | | | |
| | 6RA8078-6FS22-0AA0 1500 | | | | |
| | 6RA8085-6FS22-0AA0 1500 | | | | |
| | 6RA8087-6FS22-0AA0 1500 | | | | |
| | 6RA8091-6FS22-0AA0 1500 | | | | |
| | 6RA8025-6GS22-0AA0 1700 | | | | |
| | 6RA8031-6GS22-0AA0 1700 6RA8075-6GS22-0AA0 1700 | | | | |
| | 6RA8081-6GS22-0AA0 1700 | | | | |
| | 6RA8085-6GS22-0AA0 1700 | | | | |
| | 6RA8087-6GS22-0AA0 1700 | | | | |
| | 6RA8090-6GS22-0AA0 1700 | | | | |
| | 6RA8095-4GS22-0AA0 1700 | | | | |
| | 6RA8096-4GS22-0AA0 1700 | | | | |
| | 6RA8097-4GS22-0AA0 1700 | | | | |
| | 6RA8086-6KS22-0AA0 2100 | | | | |
| | 6RA8090-6K522-0AA0 2100 6RA8093-4K522-0AA0 2100 | | | | |
| | 6RA8095-4KS22-0AA0 2100 | | | | |
| | 6RA8097-4KS22-0AA0 2100 | | | | |
| | 6RA8088-6LS22-0AA0 2500 | | | | |
| | 6RA8093-4LS22-0AA0 2500 | | | | |
| | 6RA8096-4MS22-0AA0 2900 | | | | |
| | MLER SIMOREC CCR Sotting value f | or p54577 [\/] | | | |
| | | | | | |
| | 6RA7085-6FC00-0 1100 | | | | |
| | 6RA7095-6FC00-0 1100 | | | | |
| | 6RA7090-6KC00-0 1600 | | | | |
| | 6RA7095-6KC00-0 1600 | | | | |
| | Note: | | | | |
| | The setting value for p51577, according to the table above | e, defines the maximum | | | |
| | permissible value of the voltage minit for the particular unit | | 1 45 to 000 | la di Nisara | 0 |
| p51578 | CCP quenching capacitor pre-charging voltage setpoi | nt / | 145 to 830 [V] | Ind: None FS=145 | 3 |
| | | | 1V | 10 140 | |
| | Description: | | | | |
| | Setting of the minimum required charge voltage of the | quenching capacitors in | | | |
| | the CCP for successful thyristor turn-off. This value is | used as setpoint for the | | | |
| | supply The maximum pre-charging voltage that can b | e reached is limited by | | | |
| | the rectified average value of the line supply voltage th | nat is connected. | | | |
| | Note: | | | | |
| | CCP: Converter Commutation Protector | | | | |
| | The parameter is automatically set for the "Optimization | on run for CCP" | | | |
| | (p50051 = 30). | | | | |
| | The correct setting for this parameter can be taken fro | m the following | | | |
| | reference: SIMOREG CCP operating instructions | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Commissioning

| PNU | Description | | | Value range [dimension] Graduation | No. of indices Factory setting (FS) | Access level |
|-----|--|--|--|--|--|-----------------|
| | MLFB SIMOREG CCP | p50101 [V] | No. of the associated | | | |
| | 6RA7085-6FC00-0 | 420 470 | 1, 1A 2. 2A | • | | |
| | 6RA7091-6FC00-0 | 420 470 | 3, 3A 4, 4A | | | |
| | 6RA7095-6FC00-0 | 420 470 | 5, 5A 6, 6A | | | |
| | 6RA7090-6KC00-0 | 520 600 720 | 7.0, 7.0A 7, 7A 8, 8A | | | |
| | 6RA7095-6KC00-0 | 520 600 720 | 9.0, 9.0A 9, 9A 10, 10A | | | |
| | Then, for the specified va associated voltage value | alues of p50111 ar in the characteris | nd r50072[1], a search is made for the tic diagram. | | | |
| | p51570 = 6RA7091-6 $p50101 = 470 V$ $p50111 = 0.23 mH$ $r50072[1] = 890,0 A$ According to p51570 and abscissa value, the next instead of P50111 = 0.23 made in the associated of grid value for 380 V is us As a consequence, p515 If the armature circuit ind shown in the characterist maximum value of p5017 Depending on the values searched for can lie outs diagram. The upper limit shown in -20 % of p50078[0] (according applies for a value of p507 $\frac{1.35 * p500}{1.35 * p500}$ | SFC00-0 d r50071, characte lower grid value of 3 mH. For r50072[ourrent range 800 / sed here as an app 578 = 380 V should ductance according tic diagram, then the 11 that is shown. s of p50111 and r5 ide the upper or lo the characteristic proding to the factor 0351 that deviates 078[0] * $\left(1 + \frac{p5035}{100 9}\right)$ 1.073 | ristic diagram 4 (4A) should be used. As f 0.22 mH is used as an approximation, 1] = 890.0 A, a linear interpolation is A to 900 A. The next higher ordinate roximation. I be set. 1 to p50111 exceeds the value range he value should be determined for the 0072[1], the voltage value being wer limit shown in the characteristic diagram is valid for a value of p50351 = y setting). The following upper limit from the factory setting: $\frac{51}{6}$ | | | |

| PNU | Descriptio | n | | | Value range [dimension] Graduation | No. of indices Factory setting (FS) | Access level |
|---------|---|--|---|-----------------------------|--|--|-----------------|
| | The following | ng situations can occur: | | | | | |
| | Determined p51578 = 1 The succes situations, I briefly occu | d <u>voltage value < 145 V</u> (lower limit in the charact 45 V should be set. Suful turn-off operation by the SIMOREG CCP is however, the voltage load (or torque increase) or ir for a turn-off operation is higher than necessa | cteristic diag assured in a of the motor t ry. | ram): all :hat can | | | |
| | Determined The voltage The succes situations. | d voltage value lies between the lower limit (145 e value determined should be set at p51578. ssful turn-off operation by the SIMOREG CCP is | V) and the use assured in a | <u>upper limit:</u> all | | | |
| | Determined Operation i permissible assured. This proble | <u>d voltage value > upper limit:</u> nvolving the basic converter unit - SIMOREG C e. The successful turn-off operation by the SIMO m may be able to be resolved by contacting the | CP combina REG CCP is manufactur | tion is not s not er. | | | |
| | Note: When comm SIMOREG SIMOREG be reached operating s Fault F6032 been achie | munications are established between the basic CCP (p50790=6), then the setpoint according to CCP is set using its operating firmware. If the s due to the fact that the actual line supply voltag tates < 4.0, the basic converter outputs Alarm A 20 (fault value 3) - to signal that the required chaved. | it and the oint cannot , for owed by has not | | | | |
| | If one of the correct sett appropriate | e relevant system parameters changes after cor ing of p51578 should be checked, and if require ly set again. | nmissioning ed, it should l | , then the be | | | |
| r51579. | CO/BO: CO | CP command/ CCP command | | | 0 to 255 | Ind: None | 3 |
| 07 | Descriptio Display the SIM | n: and connector output for the commands from tl IOREG CCP. | ne SINAMIC | S DCM to | 1 | - | |
| | Bit array | Signal name | 1 signal | 0 signal | | | |
| | Bit 00 Bit 01 | Fire turn-off thyristors | Yes | No No | | | |
| | Dicol | tolerance range | 100 | | _ | | |
| | Bit 02 | master | Yes | NO | | | |
| | Bit 03 | Main contactor CLOSE | Yes | No | | | |
| | Bit 04 | Torque direction I active | Yes | No | | | |
| | Bit 05 | Torque direction II active | Yes | No | | | |
| | BIt 06 | Reserved (always 1) | Yes | NO | _ | | |
| | Note: | Reserved (always T) | Tes | NU | - | | |
| | CCP: C | converter Commutation Protector | | | | | |
| p51580 | Commutat | ion monitoring control word / commut_moni | t STW | | 0 to 7 | Ind: None | 3 |
| | Description: Setting of the criterion to detect a commutation fault for the commutation monitoring. | | | tation | 1 1 | FS = 7 | |
| | Bit array | Signal name | 1 signal | 0 signal | | | |
| | Bit 00 | Use criterion 1 (message from the thyristor blocking voltage) | Yes | No | 1 | | |
| | Bit 01 | Use criterion 2 (curvature of the current cusp) | Yes | No | 1 | | |
| | Bit 02 | Use criterion 3 (magnitude of the current | Yes | No | 1 | | |
| | | actual value) | | | 1 | | |
| | actual value) Note: Converter commutation is permanently monitored. When a commutation fault is detected, Fault F60030 is output and thyristor turn-off is initiated by the CCP (if being used). The detection of a commutation fault is based on 3 decision-making criteria. Using this parameter, these can be individually set for test purposes. If several decision-making criteria are to be evaluated, then the sum of the | | | | | | |
| 1 | corresp | onding numbers should be set. | | | 1 | | |

Commissioning

| PNU | Description | Value range [dimension] Graduation | No. of indices Factory setting (FS) | Access level |
|--------|--|--|--|-----------------|
| p51583 | CCP test turn-off command / CCP turn-off command | 0 to 2 1 | Ind: None FS = 0 | 3 |
| | Description: Setting to issue a turn-off command to the Converter Commutation Protector (CCP) for test purposes. | 1 | | |
| | Value: 0: No turn-off command 1: Issue in torque direction I 2: Issue in torque direction II | | | |
| | Notice: After a turn-off command has been issued to the CCP, this parameter automatically sets itself back to the value 0. | | | |
| | Note: If the test command is issued during operation (i.e. in the operating state o0.1 or o0.2), then the turn-off operation of the SIMOREG CCP acts on the thyristor bridge that is presently enabled. This is independent of issuing the turn-off command in torque direction I or II. | | | |

7.1.3 SIMOREG DC-MASTER connectors

| States of | the SIMOREG CCP | | |
|-----------|--|----------------|--|
| K0574 | State of the SIMOREG CCP | 1 ≙ 1 | |
| K0575 | I2t value of voltage limiting chopper 1 of the SIMOREG CCP | 16294 \(100%) | |
| | | 10304 = 100% | |
| K0576 | I2t value of voltage limiting chopper 2 of the SIMOREG CCP | 16384 ≙ 100% | |
| K0577 | Low byte: Command to the SIMOREG CCP Bit0 = Fire turn-off thyristors Bit1 = Line supply voltage (armature) is in the tolerance range Bit2 = This SIMOREG CCP is connected to the parallel switching master Bit3 = Main contactor CLOSE Bit4 = Torque direction 1 active Bit5 = Torque direction 2 active Bit6 = always 1 Bit7 = always 1 High byte: Diagnostics information about the monitoring of the blocking voltage-time integral The monitoring of the blocking voltage-time integral results in the SIMOREG CCP being triggered (and A030 or F030 with fault value 1), if bit 8 OR bit 9 = 1 AND ALL additional bits = 1 (i.e. the condition is fulfilled) Bit 8 = Torque direction I AND EMF <= +5% (i.e. regenerative feedback) | 1 ≙ 1 | |

7.1.4 SIMOREG DC-MASTER faults

| F030 | Commutation fault or an overcurrent condition has occurred | - or a test command was issued via U583 | | | | | |
|------|---|---|--|--|--|--|--|
| | (active in all operating states) | | | | | | |
| | Possible error causes | | | | | | |
| | Line veltage din during regenerative exerction | | | | | | |
| | Current control loop not optimized | | | | | | |
| | Fault value: | r047 indices 002 to 016: | | | | | |
| | 1 The blocking voltage-time integral for the commutating thyristor pair was too small | for i001= 1 to 3 and 5, i002 to i006 are valid for i001= 4, i002 to i015 are invalid | | | | | |
| | 2 The current cusp breaks upwards | i002 delay angle (K0100) for a fault situation | | | | | |
| | 3 The amplitude of the current cusp was higher than 250% of the actual rated unit current according to r072i002 | i003 EMF actual value (K0287) for a fault situation i004 Gating unit diagnostics (K0989) for a fault situation i005 Field current actual value (K0265) for a fault situation i006 Pulse number (K0105) for a fault situation | | | | | |
| | 4 A SIMOREG DC-MASTER connected in parallel has detected a commutation fault or an overcurrent condition | | | | | | |
| | 5 Test command was entered via U583 | | | | | | |
| F032 | SIMOREG CCP not ready | | | | | | |
| | (active for operating states < o4.0) | | | | | | |
| | | | | | | | |
| | Possible error causes | | | | | | |
| | Missing connection or interrupted cable at X1/2 (G-SS12) For a parallel connection, missing connection or interrupted of | pable at X165 (narallel interface, master) | | | | | |
| | For a parallel connection, missing connection or interrupted of | cable at X29 PAR or X30 PAR (turn-off pulse interface) | | | | | |
| | Hardware defect in the charge circuit of the quenching capac | itors | | | | | |
| | Ruptured fuse in the armature circuit, either line side or moto | r side | | | | | |
| | Ruptured fuse in the pre-charging circuit for the chopper capa | acitors | | | | | |
| | presently in the cooling-down phase necessary for the chopp MLER data at the CIMOREC COR (#570, #571, #572) is valid | er resistors | | | | | |
| | MLFB data of the SIMOREG CCP (n570, n571, n572) invalid or not available | | | | | | |
| | Fault value: | r047 indices 002 to 016: | | | | | |
| | 1 Voltage not available at the connections U, V, W of the SIMOREG CCP | for i001= 1 to 12, i002 to i006 are valid | | | | | |
| | 2 Voltage at C-D at the SIMOREG CCP does not match the | for i001= 20, only i002 is valid | | | | | |
| | voltage C-D at the SIMOREG DC-MASTER | i002 state of the SIMOREG CCP (K0574) for a fault situation | | | | | |
| | 3 The quenching capacitors of the SIMOREG CCP have not reached the setpoint voltage | i003 I2t value of chopper 1 (K0575) for a fault situation | | | | | |
| | 4 The parallel interface cable is not connected at the | i004 I2t value of chopper 2 (K0576) for a fault situation | | | | | |
| | SIMOREG CCP, which is assigned the parallel switching master | i005 armature voltage actual value (r038) for a fault situation in 0.1 V for i005 > 32767 the following applies: | | | | | |
| | 5 No connection between the SIMOREG DC-MASTER and | $V_{\text{ARMATURE}}[V] = (65536 - r047i005)/10$ | | | | | |
| | SIMOREG CCP via the serial interface G-SST2 | i006 effective time until a fault is initiated in 20 ms | | | | | |
| | 6 No connection between parallel SIMOREG CCP units | | | | | | |
| | | | | | | | |
| | 7 Contents of the memory of the technical data of the SIMOREG CCP (MLFB, rated values, serial number) | | | | | | |
| | invalid | | | | | | |
| | 11 I ne l2t value (n5/5) of the voltage limiting chopper 1 is too high (> 100%) | | | | | | |
| | 12 The l2t value (n576) of the voltage limiting chopper 2 is too high (> 50%) | | | | | | |
| | 20 The pre-charging of the chopper capacitors was not able | | | | | | |
| | to be completed within the time set in P089 - or the | | | | | | |
| | | | | | | | |

7.1.5 SINAMICS DCM faults

| F60300 | Commutation fault or an overcurrent condition has occurre | d - or a test command was issued via p51583 | | | |
|--------|--|--|--|--|--|
| | (active in all operating states) | | | | |
| | Possible error causes | | | | |
| | Line voltage dip during regenerative operation | | | | |
| | Current control loop not optimized | | | | |
| | | 500 (7/0 0) | | | |
| | | r50047[08]: | | | |
| | Commutation was unsuccessful because the commutating thyristor did not assume a blocking voltage | criterion 1: | | | |
| | (only when parameter p50166 is activated). | $r_{50047[0]} = fired thyristor pairs$ | | | |
| | 2: The current cusp breaks upwards | r50047[2] = thyristor state (=r53146) | | | |
| | 3: The amplitude of the current cusp was greater than | r50047[3] = actual delay angle | | | |
| | 290 % of the actual rated unit current acc. to r50072[1]. | r50047[4] = actual EMF as a % | | | |
| | 4: A SINAMICS DCM connected in parallel has detected a | | | | |
| | | Criterion 2: | | | |
| | 5: Test command was entered via p51583. | r50047[0] = decision-making criterion (=2) | | | |
| | | Criterion 2.1: | | | |
| | | r50047[1] = sub-criterion (=1) | | | |
| | | r50047[2] = delta la sampling values when initiating | | | |
| | | r50047[3] = last la sampling value | | | |
| | | r50047[4] = actual la sampling value | | | |
| | | r50047[5] = actual delay angle | | | |
| | | r50047[6] = currently valid counter status | | | |
| | | Orthonian 0.0 | | | |
| | | reconstruction (-2) | | | |
| | | r=10047[1] = sub-criterior (=2) | | | |
| | | $r_{50047[2]}$ = delta na sampling values when miniating | | | |
| | | r50047[4] = actual la sampling value | | | |
| | | r50047[5] = first delta la | | | |
| | | r50047[6] = actual delay angle | | | |
| | | r50047[7] = currently valid counter status | | | |
| | | | | | |
| | | Criterion 3: | | | |
| | | r50047[0] = decision-making criterion (=3) | | | |
| | | r50047[1] = delta counter status when initiating | | | |
| | | r50047[2] = last CD voltage | | | |
| | | r50047[3] = actual CD voltage | | | |
| | | r50047[4] = delta Va | | | |
| | | r5004/[5] = actual delay angle | | | |
| | | r50047[6] = actual firing instant | | | |
| | | r50047[7] = actual EMF | | | |
| | | r50047[8] = actual la sampling value | | | |
| | | Triggering a CCP in a parallel connection. | | | |
| | | r50047[0] = fault value (=4) | | | |
| | | | | | |
| | | Test command: | | | |
| | | r50047[0] = decision-making criterion (=5) | | | |
| | | r50047[1] = actual CD voltage | | | |
| | | r50047[2] = actual delay angle | | | |
| | | r50047[3] = actual firing instant | | | |
| | | r50047[4] = actual EMF | | | |
| | | r50047[5] = actual la sampling value | | | |
| | | r50047[6] = torque direction when triggering | | | |
| | | | | | |

| F60320 | SIM | OREG CCP not ready | | | | |
|--------|--|--|--|--|--|--|
| | Possible error causes | | | | | |
| | Missing connection or interrupted cable at X177 | | | | | |
| | For a parallel connection, missing connection or interrupted cable at X165/X166 (parallel interface, master) | | | | | |
| | • | For a parallel connection, missing connection or interrupted | cable at X29_PAR or X30_PAR (turn-off pulse interface) | | | |
| | • | Ruptured fuse in the armature circuit, either line side or mot | or side | | | |
| | • | Ruptured fuse in the pre-charging circuit for the chopper car | pacitors | | | |
| | • | presently in the cooling-down phase necessary for the chop | per resistors | | | |
| | • | MLFB data of the SIMOREG CCP (r51570,r51571,r51572) i | nvalid or not available | | | |
| | Fau | It value: | r50047[02]: | | | |
| | 1 | Voltage not available at the connections U, V, W of the | r50047[0] = fault value | | | |
| | | SIMOREG CCP. Trigger time: 5 s | r50047[1] = CCP state (extended status word + r51574) | | | |
| | 2 | Voltage at C-D at the SIMOREG CCP does not match | r50047[2] = armature voltage | | | |
| | | the voltage C-D at the SINAMICS DCM. | | | | |
| | 2 | Trigger time: 15 s. | | | | |
| | 3 | not reached the setpoint voltage | | | | |
| | | Trigger time: 15 s for 460 V, 7 s for 690 V. | | | | |
| | 4 | The parallel interface cable is not connected at the | | | | |
| | | SIMOREG CCP, which is assigned the parallel switching master | | | | |
| | | Trigger time: 15 s. | | | | |
| | 5 | No connection between the SINAMICS DCM and | | | | |
| | | SIMOREG CCP via the serial interface. (The dynamic | | | | |
| | | Trigger time: 15 s | | | | |
| | 6 | No connection between parallel SIMOREG CCP units. | | | | |
| | | Trigger time: 15 s | | | | |
| | 7 | Contents of the memory of the technical data of the | | | | |
| | | SIMOREG CCP (MLFB, rated values, serial number) | | | | |
| | | Trigger time: immediately | | | | |
| | 11 | The l2t value (r51575) of the voltage limiting chopper 1 | | | | |
| | | is too high (> 100 %). Trigger time: immediately | | | | |
| | 12 | The 12t value (r51576) of the voltage limiting chopper 2 | | | | |
| | 12 | is too high (> 50 %). | | | | |
| | | Trigger time: immediately | | | | |
| | 20 | The pre-charging of the chopper capacitors was not able | | | | |
| | | condition according to fault value 5 is fulfilled. | | | | |
| | | Trigger time: 20 ms. | | | | |
| | | | | | | |

| F60050 | Optimization run interrupted by an internal cause. | | | | |
|--------|--|---|--|--|--|
| | Possible error causes Missing connection or interrupted cable at X177 For a parallel connection, missing connection or interrupted cable at X165/X166 (parallel interface, master) For a parallel connection, missing connection or interrupted cable at X29_PAR or X30_PAR (turn-off pulse interface) Hardware defect in the charge circuit of the quenching capacitors Ruptured fuse in the armature circuit, either line side or motor side Ruptured fuse in the pre-charging circuit for the chopper capacitors presently in the cooling-down phase necessary for the chopper resistors MLFB data of the SIMOREG CCP (r51570, r51571, r51572) invalid or not available | | | | |
| | Fault value: | r50047[04] | | | |
| | 701 Parameter p50790 P2P-interface, operating mode not set to communicate with SIMOREG CCP 702 No communication to the CCP 703 p51570 incorrect order number (MLFB) of the CCP 704 Incorrect supply voltage 705 SINAMICS DCM chopper threshold = 0 706 Armature circuit inductance = 0 707 Vmax > as maximum value that can be set for p51578 708 Calculated chopper energy too high | Note regarding fault value = 701: r50047[1]: Parameter value p50790 Note regarding fault value = 704: r50047[1]: Parameter value p50078[0] r50047[2]: Parameter value p51571 r50047[3]: Line supply voltage tolerance SINAMICS DCM r50047[4]: Line supply voltage tolerance SIMOREG CCP | | | |
| | | Note regarding fault value = 707: r50047[1]: Calculated Vmax r50047[2]: Parameter p51578 maximum possible value Note regarding fault value = 708: r50047[1]: Calculated chopper energy r50047[2]: maximum possible chopper energy for SIMOREG CCP | | | |

7.1.6 SIMOREG DC-MASTER alarms

| A030 | Commutation fault or overcurrent condition has occurred (active for operating states, I, II) Possible causes • Line voltage dip during regenerative operation |
|------|--|
| A032 | Current control loop not optimized SIMOREG CCP not ready |
| | (active for operating states < o4.0) |
| | Possible causes Voltage not available at the connections U, V, W of the SIMOREG CCP Voltage at C-D at the SIMOREG CCP does not match the voltage C-D at the SIMOREG DC-MASTER The quenching capacitors of the SIMOREG CCP have not reached the setpoint voltage The parallel interface cable is not connected at the SIMOREG CCP, which is assigned the parallel switching master No connection between the SIMOREG DC-MASTER and SIMOREG CCP via the serial interface G-SST2 No connection between parallel SIMOREG CCP units Contents of the memory of the technical data of the SIMOREG CCP (MLFB, rated values, serial number) invalid The I2t value of the voltage limiting chopper 1 in the SIMOREG CCP is too high (> 100 %). The I2t value of the voltage limiting chopper 2 in the SIMOREG CCP is too high (> 50 %). |

7.1.7 SINAMICS DCM alarms

| A60321 | SIM | OREG CCP not ready |
|--------|-----|---|
| | Pos | sible causes: |
| | 1. | Voltage not available at the connections U, V, W of the SIMOREG CCP. Trigger time: 1 s |
| | 2. | Voltage at C-D at the SIMOREG CCP does not match the voltage C-D at the SINAMICS DCM. Trigger time: 1 s |
| | 3. | The quenching capacitors of the SIMOREG CCP have not reached the setpoint voltage. Trigger time: 1 s |
| | 4. | The parallel interface cable is not connected at the SIMOREG CCP which is assigned to the parallel switching master . Trigger time: 1 s |
| | 5. | No connection between the SINAMICS DCM and SIMOREG CCP via the serial interface. (The dynamic values are not updated) Trigger time: 1 s |
| | 6. | No connection between parallel SIMOREG CCP units. Trigger time: 1 s |
| | 7. | Contents of the memory of the technical data of the SIMOREG CCP (MLFB, rated values, serial number) invalid. Trigger time: immediately |
| | 11. | The I2t value (r51575) of the voltage limiting chopper 1 is too high (> 100 %). Trigger time: immediately |
| | 12. | The I2t value (r51576) of the voltage limiting chopper 2 is too high (> 50 %). Trigger time: immediately |
| | 20. | The pre-charging of the chopper capacitors was not able to be completed within the time set in p50089 - or the condition according to fault value 5 is fulfilled. Trigger time: 20 ms after fault value 5 occurs |

7.2 Commissioning steps

7.2.1 SIMOREG DC-MASTER commissioning steps

Note

The parameter values to be set when commissioning the SIMOREG CCP must be graphically determined using the characteristic diagram (Appendix).

Alternatively, an existing commissioning script for the DriveMonitor can be used (script fileccp.ssc and database filesimoreg-ccp-mlfb.xml).

If the basic converter unit has a software release from V 3.1 and higher, SIMOREG CCP can be commissioned by selecting P051=30 (automatic setting of the parameters for SIMOREG CCP). This optimization run must be performed after commissioning step 4. In this case, commissioning steps 3, 5 and 6 are not performed. If Fault F050 occurs during the optimization run (optimization run cannot be performed) the fault description of the particular fault value (r047.001) provides information about possible causes.

- 1. Connect SIMOREG CCP according to the recommended connection in Chapter 6.
- Set P790=6 (communication with the CCP). Correct communication is optically displayed using an LED on the Power Interface module C98043-A7046: LED flashes slowly (<1 Hz) LED flashes quickly (approx. 3 Hz)
 Communication with SIMOREG CCP OK, no communication with the SIMOREG CCP
- Determining the setting value for parameter U577 (factory setting = 1600) Required parameter values: r070...MLFB (characteristic number) of the SIMOREG DC-MASTER n570...MLFB (characteristic number) of the SIMOREG CCP

 \Rightarrow Determining the setting value according to the parameter description for U577

4. Commission the basic converter unit according to the operating instructions SIMOREG DC-MASTER, Chapter 7.

The commissioning must be correctly completed. This also means that the optimization runs according to commissioning step 8 must be performed.

The optimization run for the pre-control and current controller for the armature and field (P051=25) is absolutely mandatory, as the armature inductance is determined in this run and the value of P111 is required for the subsequent SIMOREG CCP commissioning.

Notice:

P351 must not be parameterized more negative than the factory setting. Otherwise, when the line contactor is closed (or the circuit breaker) then a charging current surge occurs in the chopper capacitors. This can destroy the CCP power semiconductors. Comment:

The chopper capacitors are charged via an internal pre-charging circuit. When reaching the undervoltage threshold defined by P351, the line contactor (or circuit breaker) is closed, which means that the pre-charging circuit is bypassed.

Note:

If Fault F030 occurs when commissioning the basic converter unit (especially during the optimization runs), then the commutation monitoring should be deactivated for the commissioning (U580=0). After commissioning has been successfully completed, the commutation monitoring must be reactivated (U580=7).

Notice:

If an existing drive system was retrofitted with a SIMOREG CCP, then the optimization run for the pre-control and current controller for the armature and field (P051=25) is absolutely necessary. The value of P111 determined in this optimization run is required to commission the SIMOREG CCP. Parameter P111 can be modified through manual optimization. This is the reason that before performing the optimization run with P051=25, the actual value of

P111 should be noted and only set again after the SIMOREG CCP commissioning has been completed.

5. Determining the maximum energy in the armature circuit for the turn-off operation

| Parameter v | alue required: |
|-------------|---|
| n570 | MLFB (Order No.) of the SIMOREG CCP |
| r072i002 | Actual rated unit DC current, armature [A] |
| P101 | Rated motor armature voltage [V] ^{1.)} |
| P111 | Armature circuit inductance [mH] |

as well as a characteristic diagram according to the following table:

| MLFB SIMOREG CCP | MLFB characteristic number | P101 [V] ^{1.)} | No. of the associated characteristic diagram ^{2.)} |
|---------------------|----------------------------------|-------------------------|---|
| 6RA7085-6FC00-0 | 250 | 420 | 11 |
| | | 470 | 12 |
| 6RA7091-6FC00-0 | 251 | 420 | 11 |
| | | 470 | 12 |
| 6RA7095-6FC00-0 | 252 | 420 | 13 |
| | | | |
| 6RA7090-6KC00-0 | 253 | 520 | 14.0 |
| | | 600 | 14 |
| | | 720 | 15 |
| 6RA7095-6KC00-0 | 254 | 520 | 16.0 |
| | | 600 | 16 |
| | | 720 | 17 |

1.) Rated DC voltage according to the motor rating plate (the values are typical rated data for Siemens DC motors from the product catalog DA12

2.) The characteristic diagrams are provided in the appendix to these operating instructions

If the graphically determined value lies below the limit line W_max, then the energy reduction in the armature circuit is assured using the SIMOREG CCP.

6. Determining the setting value for parameter U578 (factory setting = 145)

| Required parameter values: | | | |
|----------------------------|--|--|--|
| | | | |
| | | | |
| | | | |
| e [V] | | | |
| | | | |
| | | | |
|]. | | | |
| | | | |

 \Rightarrow Determining the setting value according to the parameter description for U578

The SIMOREG CCP is now ready to run.

7.2.2 SINAMICS DCM commissioning steps

Note

If the basic converter unit has a software release from V 1.2 and higher, the SIMOREG CCP can be commissioned by selecting p50051=30 (automatic setting of the parameters for SIMOREG CCP). This optimization run must be performed after commissioning step 4. In this case, commissioning steps 3, 5 and 6 are not performed. If Fault F60050 occurs during the optimization run (optimization run interrupted internally) the fault description of the particular fault value (r50047) provides information about possible causes.

- 1. Connect SIMOREG CCP according to the recommended connection in Chapter 6.
- Set p50790=6 (communication with the CCP). Correct communication is optically displayed using an LED on the Power Interface module C98043-A7046: LED flashes slowly (<1 Hz) LED flashes quickly (approx. 3 Hz)
 Communication with SIMOREG CCP OK, no communication with the SIMOREG CCP
- Determining the setting value for parameter p51577 (factory setting = 1600) Required parameter values: r50070...MLFB (characteristic number) of the SINAMICS DCM r51570...MLFB (characteristic number) of the SIMOREG CCP

 \Rightarrow Determining the setting value according to the parameter description for p51577

4. Commission the basic converter unit according to the operating instructions SINAMICS DCM, Chapter 7.

The commissioning must be correctly completed. This also means that the optimization runs according to commissioning step 8 must be performed.

The optimization run for the pre-control and current controller for the armature and field (p50051=25) is absolutely mandatory, as the armature inductance is determined in this run and the value of p50111 is required for the subsequent SIMOREG CCP commissioning.

Notice:

p50351 must not be parameterized more negative than the factory setting. Otherwise, when the line contactor is closed (or the circuit breaker) then a charging current surge occurs in the chopper capacitors. This can destroy the CCP power semiconductors. Comment:

The chopper capacitors are charged via an internal pre-charging circuit. When reaching the undervoltage threshold defined by p50351, the line contactor (or circuit breaker) is closed, which means that the pre-charging circuit is bypassed.

Note:

If Fault F60300 occurs when commissioning the basic unit (especially during the optimization runs), then the commutation monitoring must be deactivated for the commissioning (p51580=0). After commissioning has been successfully completed, the commutation monitoring must be reactivated (p51580=7).

Notice:

ENGLISH

If an existing drive system was retrofitted with a SIMOREG CCP, then the optimization run for the pre-control and current controller for the armature (p50051=25) and field (p50051=24) is absolutely necessary. The value of p50111 determined in this optimization run is required to commission the SIMOREG CCP. Parameter p50111 can be modified through manual optimization. This is the reason that before performing the optimization run, the actual value of p50111 should be noted and only set again after the SIMOREG CCP commissioning has been completed.

5. Determining the maximum energy in the armature circuit for the turn-off operation

| Parameter value required: | | | |
|---------------------------|---|--|--|
| p51570 | MLFB (Order No.) of the SIMOREG CCP | | |
| r50072[1] | actual rated unit DC current, armature [A] | | |
| r50101 | rated motor armature voltage [V] ^{1.)} | | |
| p50111 | Armature circuit inductance [mH] | | |

as well as a characteristic diagram according to the following table:

| MLFB SIMOREG CCP | MLFB characteristi c number | p50101 [V] ^{1.)} | No. of the associated characteristic diagram ^{2.)} |
|---------------------|-----------------------------------|---------------------------|---|
| 6RA7085-6FC00-0 | 250 | 420 | 11 |
| | | 470 | 12 |
| 6RA7091-6FC00-0 | 251 | 420 | 11 |
| | | 470 | 12 |
| 6RA7095-6FC00-0 | 252 | 420 | 13 |
| | | | |
| 6RA7090-6KC00-0 | 253 | 520 | 14.0 |
| | | 600 | 14 |
| | | 720 | 15 |
| 6RA7095-6KC00-0 | 254 | 520 | 16.0 |
| | | 600 | 16 |
| | | 720 | 17 |

1.) Rated DC voltage according to the motor rating plate (the values are typical rated data for Siemens DC motors from the product catalog DA12

2.) The characteristic diagrams are provided in the appendix to these operating instructions

If the graphically determined value lies below the limit line W_max, then the energy reduction in the armature circuit is assured using the SIMOREG CCP.

6. Determining the setting value for parameter p51578 (factory setting = 145)

| Required parar | meter values: |
|----------------|--|
| p51570 | MLFB (Order No.) of the SIMOREG CCP |
| r50071 | Rated unit supply voltage (armature) [V] |
| r50072[1] | actual rated unit DC current, armature [A] |
| r50078[0] | actual rated converter input voltage, armature [V] |
| r50101 | rated motor armature voltage [V] |
| p50111 | armature circuit inductance [mH] |
| p50351 | Threshold for the undervoltage shutdown [%]. |
| | |

 \Rightarrow Determining the setting value according to the parameter description for p51578

The SIMOREG CCP is now ready to run.

8 Maintenance

When electrical equipment is operated, some of the components will be at hazardous voltage levels.

Failure to handle/operate the equipment properly can result in death or severe bodily injury as well as substantial property damage.

When performing maintenance on this unit, you should therefore observe all information provided in this chapter as well as any notices attached to the product itself.

- Only qualified personnel who are familiar with all the safety instructions in this description, as well as the installation, operating, and maintenance instructions, should carry out maintenance work on this unit.
- Before carrying out visual inspections and maintenance work, it must be ensured that the unit is disconnected from the AC power supply, locked out so that the power supply cannot be reconnected, and grounded. Before they are shut down, both the converter unit and the motor are at dangerous voltage levels. A hazardous voltage is present even if the converter unit contactor is open.
- Even after being disconnected from the power supply, the snubber capacitors in the basic converter unit can still be at a hazardous voltage. For this reason, the unit should not be opened until an adequate period of time has elapsed.
- Before commencing any work, ensure that the unit is in a no-voltage condition (see Chapter 1)

Only spare parts approved by the manufacturer may be used.

The converter unit must be well protected against pollution in order to prevent voltage flashovers and, therefore, destruction. Dust and foreign bodies, which are drawn in by the cooling-air flow in particular, must be thoroughly removed at specific intervals; this depends on the rate of accumulation of dirt, but should be carried out at least every 12 months. The unit should be cleaned using dry compressed air, max. 1 bar, or using a vacuum cleaner.

8.1 Software update of the SIMOREG CCP

- 1 Switch-off the electronics power supply of the SIMOREG CCP
- 2 Connect one COM port of the PC to connector X300 at the SIMOREG CCP.
- 3 Switch-on the electronics power supply AND while doing this press button S1 on the Power Interface module C98043-A7046
 - ⇒ the SIMOREG CCP goes into the programming mode (the yellow monitoring LED on the SIMOREG CCP remains dark)
- 4 At the PC, start the load program LOAD_CCP.exe and using the "Open file" button, select the required data file (7046Axxx.hex). Pressing the "Open" button starts the load operation (this takes about 10 s).
- ⁵ After the software has been successfully updated, the SIMOREG CCP automatically goes into the normal operating state (the yellow monitoring LED at the SIMOREG CCP flashes slowly if communication with the basic unit has been established).
- 6 Check the new software release at 560 or r51560[0].

END

7

Order number of the cable: 6SX7005-0AB00 (also see Chapter 6.5)

Note:

From this instant onwards, a timer runs in the SIMOREG CCP for approximately 2 minutes. If, during this time, the update is not started from the PC, then the SIMOREG CCP returns to the normal operating state. To restart the software - update, the sequence from step 1 should be repeated.

Note:

In the properties dialog of a link to LOAD_CCP.exe a parameter of form COMx can be transferred - whereby 1 or 2 should be used for x (default: COM1)

Note:

If the electronics power supply is switched-off during the software update, then you must repeat the operation starting from Step 4.

8.2 Replacing components

8.2.1 Replacing modules

Modules must only be replaced by qualified personnel.

Modules must not be inserted or withdrawn under voltage.

Non-observance of the warnings can result in death, severe personal injury or significant property damage.



CAUTION

The modules contain electrostatically sensitive devices. Discharge yourself before touching any electronic modules. The easiest way to do this is to touch a conductive, grounded object immediately beforehand (for example, bare metal parts of control cabinet or the protective ground contact of a socket outlet).

Replacing the chopper unit

- Remove the Limiter Board C98043-A7047
- Release screw (1)
- Release screw (2)
- Replace the module(s)



Note

For units 6RA7085-6FC00-0, 6RA7091-6FC00-0 and 6RA7090-6KC00-0, there is only one chopper unit (Item A)

Replacing printed circuit boards



8.2.2 Replacing diode, thyristor and IGBT modules

The modules are fixed using self-tapping screws. To mount modules, it is absolutely necessary to use screws with metric thread with the same length as the original screws and locking elements (washer and spring washer). When screwing modules to busbars and other assemblies, screws with metric thread with the same length as the original screws and locking elements (washer and spring washer) must also be used.

Module design



IGBT type SKM 500 GA 174 DS



9 Service, Technical Support

Note

We would be grateful if you could specify the following unit data when you have any queries:

- Unit order number and serial number
- Software version
- Hardware version of the C98043-A7046 module (Power Interface) (screen printed on the component side)

You can find information on our services and regional contact partners under: <u>http://www.siemens.de/automation/csi_de/service</u>

Technical support

Our technical support service can provide you with technical assistance for products, systems, and solutions.

http://www.siemens.de/automation/support-request (German)

http://www.siemens.com/automation/support-request (English)

Central hotlines for technical support for SIMOREG CCP / SIMOREG DC-MASTER / SINAMICS DCM:

| Time zone Europe and Africa | Tel: +49 (0)911 895 7222 Fax: +49 (0)911 895 7223 mailto:support.automation@siemens.com | 8:00 to 17:00 CET | |
|--------------------------------|--|--|--|
| Time zone, Americas | 24-hour hotline: +1 800 333 7421 | 8:00 to 17:00 Eastern Standard Time | |
| | Tel.: +1 423 262 2960 Fax: +1 423 262 2200 <u>mailto:support.america.automation@siemens.co</u> <u>m</u> | | |
| Time zone Asia / Australia | Tel: +86 1064 757575 Fax: +86 1064 747474 mailto:support.asia.automation@siemens.com | 7:30 to 17:30 Local time, Beijing | |

Repairs

If you wish to have a part/unit repaired, then please contact your regional contact partner for repairs.

Service calls

Qualified personnel can perform repair work on your units and offer services that ensure their availability. This work can be carried out with charges that are scaled according to the amount of time and work involved, or at a flat rate as part of a contract. Services whose charges depend on the amount of time and work involved are performed within the normal working hours for the region and with an appropriate response time. You can request service calls through your regional contact partner.

10 Spare parts

| Equipment identifiers | Designation | Dimensions LxWxH (mm) | Weight (kg) | Order No. (MLFB) | used in 6RA70 |
|--|--|--------------------------|----------------|---------------------|--|
| C98043-A7046 | Power-Interface SIMOREG CCP printed circuit board | 360x260x42 | 0,8 | 6RY1703-0DC01 | 85-6FC00-0 91-6FC00-0 90-6KC00-0 95-6FC00-0 95-6KC00-0 |
| C98043-A7047 | Limiter Board SIMOREG CCP | 375x360x68 | 1 | 6RY1703-0AC01 | 85-6FC00-0 91-6FC00-0 90-6KC00-0 95-6FC00-0 95-6KC00-0 |
| V100.1 | Chopper unit 460 V | 310x110x210 | 3 | 6RY1703-0FC01 | 85-6FC00-0 91-6FC00-0 |
| V100.1, V100.2 | Chopper unit 460 V | 310x110x210 | 3 | 6RY1703-0FC01 | 95-6FC00-0 |
| V100.1 | Chopper unit 690 V | 310x110x210 | 3 | 6RY1703-0FC02 | 90-6KC00-0 |
| V100.1, V100.2 | Chopper unit 690 V | 310x110x210 | 3 | 6RY1703-0FC02 | 95-6KC00-0 |
| V41+V44, V42+V45, V43+V46, V47, V48 | Diode module SKKD162/18 | 94x30x34 | 0,165 | 6RY1700-0BA06 | 85-6FC00-0 91-6FC00-0 |
| V41+V44, V42+V45, V43+V46, V47, V48 | Diode module SKKD162/22 | 94x30x34 | 0,165 | 6RY1700-0BA07 | 90-6KC00-0 |
| V41+V44, V42+V45, V43+V46, V47, V48 | Diode module DD261N22 | 115x52x50 | 0,8 | 6RY1700-0BA08 | 95-6FC00-0 95-6KC00-0 |
| V31+34, V32+33, V35+38, V36+37, V39, V40 | Thyristor module SKKT162/18 | 94x30x34 | 0,165 | 6SY7010-0AA73 | 85-6FC00-0 91-6FC00-0 |
| V31+34, V32+33, V35+38, V36+37, V39, V40 | Thyristor module MCC161-22io1 | 94x30x34 | 0,125 | 6SY7010-0AA74 | 90-6KC00-0 |
| V31+34, V32+33, V35+38, V36+37, V39, V40 | Thyristor module MCC224-22io1 | 115x52x50 | 0,75 | 6SY7010-0AA75 | 95-6KC00-0 |
| V31+34, V32+33, V35+38, V36+37, V39, V40 | Thyristor module MCC312-18io1 | 115x52x50 | 0,75 | 6SY7010-0AA22 | 95-6FC00-0 |
| F1, F2 | Fuses on the Power- Interface printed circuit board | 20x5 | 0,002 | 6RY1702-0BA00 | 85-6FC00-0 91-6FC00-0 90-6KC00-0 95-6FC00-0 95-6KC00-0 |
11 Appendix

11.1 Characteristic diagrams

Characteristic diagrams to define the voltage setpoint for the pre-charging of the SIMOREG CCP quenching capacitors (parameter U578 for SIMOREG DC-MASTER or p51578 for SINAMICS DCM) using the armature circuit inductance (P111 for SIMOREG DC-MASTER or p50111 for SINAMICS DCM) and the actual unit rated DC armature current (r072i002 for SIMOREG DC-MASTER or r50072[1] for SINAMICS DCM)

< Untergrenze >= lower limit

< Obergrenze > = upper limit















Note: The values shown refer to the example in the description for parameter U578















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Characteristic diagrams to determine the maximum energy in the armature circuit using the armature circuit inductance (P111 or p50111) and the actual rated unit armature DC current (r072i002 or r50072[1])



















11.2 Relevant standards

| | Electronic equipment for use in power installations |
|------------------------|--|
| Part 2 A93 | Electrical engineering; basic environmental testing techniques; checks |
| Part 1 | Adjustable speed electrical power drive systems: General requirements. Definition for the dimensioning of low-voltage DC drive systems |
| Part 1 | Semiconductor converters: General requirements and special requirements for line-commutated converters |
| | Machinery Directive |
| Part 4-2 A12.01 | Degrees of protection; protection against contact, foreign objects, and water for electrical equipment (EN 60529: 1991) |
| | Electrical engineering; certification of environmental conditions: |
| | Protection against electric shock |
| Part1 A08.03 | Classification of electrical and electronic equipment |
| Part 3 | EMC product standard for adjustable speed drives |
| Part 1 and 2 A01.89 | Insulation coordination for electrical equipment in low- voltage systems |
| | Environmentally friendly product design |
| | Power Conversion Equipment |
| | Environmental management |
| | Part 2 A93 Part 1 Part 1 Part 4-2 A12.01 Part 1 A08.03 Part 3 Part 1 and 2 A01.89 |

11.3 Certification

The products listed in this document are manufactured and sold according to DIN ISO 9001. The SIMOREG CCP complies with all of the requirements of UL 508, however has not been certified.

11.4 Abbreviations, terminology

| CE | Communauté Européenne |
|-------|---|
| cULus | for ready-to-connect products, tested by UL in accordance with the UL and CSA standards |
| UL | Underwriters Laboratories |
| CCP | Converter Commutation Protector |
| IGBT | insulated gate bipolar transistor |

11.5 Environmental compatibility

Environmental aspects during development

The use of highly-integrated components has enabled the number of parts to be kept to a minimum, with energy being used as efficiently as possible during production as a result.

Particular emphasis has been placed on ensuring that the metal and plastic parts have a low volume and low weight, and that the number of different types is kept to a minimum.

| Front parts: | PC + ABS ABS | Cycoloy Novodur | GE-Plastics Bayer |
|----------------------------|--------------------------|----------------------|----------------------|
| Plastic parts in the unit: | PC PA 6.6 SE1-GFN1 | Lexan 141-R Noryl | |
| Insulation materials: | PC (FR) fl | Makrolon or Le | exan |
| Rating plate: | Polyester film | | |

Pollutant-free materials have been used for all significant parts. No flame retardants containing halogen or insulation materials containing silicon have been used.

Environmental compatibility was a key criterion in selecting supplier parts.

Environmental aspects during production

The majority of supplier parts are transported in reusable packaging. The packaging materialitself can be reused, it mainly comprises cardboard.

With the exception of the enclosure, no surface coatings have been used.

The production processes do not produce any emissions.

Environmental aspects for disposal

The unit features screw-in and snap-in connections that can be easily released in order to separate it into different mechanical components for recycling purposes.

The printed circuit boards may be used in recycling processes involving energy recovery. The proportion of components containing hazardous substances is low.

Bisher sind folgende Ausgaben erschienen: The following versions have appeared so far:

| Ausgabe Version | interne Sachnummer Internal Part No. |
|--------------------|---|
| 01 | C98130-A7046-A1-01-7419 |
| 02 | C98130-A7046-A1-02-7419 |
| 03 | C98130-A7046-A1-03-7419 |
| 04 | C98130-A7046-A1-04-7419 |

SIMEA Siemens Industrial Manufacturing, Engineering and Applications

Postfach 83, A-1211 Wien

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