

SIMOREG

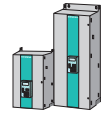
6RA70 DC MASTER

SIMOREG CCP



7/2	Overview
7/2	Benefits
7/3	Design and Working principle
7/4	Overview SIMOREG DC MASTER – SIMOREG CCP
7/5	Technical Data
7/5	Standards
7/6	Overview diagram
7/8	Options

SIMOREG 6RA70 DC MASTER SIMOREG CCP



Overview



Fig. 7/1
SIMOREG CCP

The SIMOREG CCP (Converter Commutation Protector) is used to protect a line-commutated SIMOREG 6RA70 DC MASTER from the effects of inverter commutation failures.

For line-commutated converters in order to commutate the current between the individual power semiconductors, an appropriate line-side counter voltage is required. As a result of uncontrolled switching operations caused by line supply interruptions/dips (e.g. weak line supplies, thunderstorms, etc.), the completion of commutation can be prevented (inverter commutation failures). A large current is created in the regenerating direction via the power system or a crossover current is created in the power converter. This can result, in turn, to ruptured fuses or under certain circumstances, to destroyed power semiconductors.

By expanding the basic software of the SIMOREG DC MASTER, an inverter commutation failure is quickly detected and a command is then issued to the SIMOREG CCP to turn-off the power semiconductors in the basic unit. The SIMOREG CCP turns-off the power semiconductors, ensures that the right conditions are available to reduce the current in the motor and absorbs the magnetic energy, stored in the motor, as electrical energy.

Benefits

The SIMOREG CCP limits the current created with inverter commutation fault to a harmless level so that thyristors and the associated super-fast fuses are protected. As a result, time-consuming and expensive replacement of the fuses is no longer necessary.

The inverter commutation failure cannot be prevented but its effects can.

- Any gear units used are protected against inadmissibly high torque surges in the event of a fault by de-energizing the current in good time before the maximum current value is reached.

- Up till now high-speed DC circuit-breakers have already been used to protect against blown fuses in the event of high system rated currents. The use of the CCP now provides cost-effective protection even in the case of smaller rated currents; the SIMOREG CCP offers the following advantages compared to high-speed DC circuit-breakers:
 - Protection even in the case of circulating current
 - Lower system costs
 - Lower space requirement
 - No additional air reactors necessary to reduce current gradients in the event of a fault
 - Lower operating costs due to being maintenance-free
 - Higher availability



SIMOREG 6RA70 DC MASTER SIMOREG CCP

Design and Working principle

SIMOREG CCP is distinguished by its compact and space-saving design.

The line voltage, the line current, and the armature voltage are recorded in the basic unit. These quantities are used to determine whether a commutation failure has occurred ("conduction-through").

If this is the case, the following happens:

1. The firing pulses in the SIMOREG DC MASTER are blocked immediately
2. The SIMOREG DC MASTER transmits (via serial interface) an "extinguish command" to the SIMOREG CCP
3. The SIMOREG CCP extinguishes the thyristors by connecting precharged extinguishing capacitors anti-parallel to all thyristors. Consequently, the current commutates from the converter into the SIMOREG CCP. The surge absorbing capacitors will initially be discharged by the accepted current and then charged reversed. Once the voltage of the surge absorbing capacitors has reached the value of the motor EMF, the armature current begins to extinguish itself. The armature voltage, however, continues to increase. As soon as it has attained the limiting value, resistors will be added that accept the energy fed back from the motor during the remaining time of the current reduction.
4. Fault indication F030 is triggered in the SIMOREG DC MASTER.
5. The SIMOREG CCP recharges the commutation capacitors again in reverse direction so that a new extinguishing process is possible.

Each time the line voltage is switched on (e.g. by means of a line contactor), the SIMOREG CCP needs approx. 3 s until it is ready for use again because the commutation capacitors first have to be charged.

After one extinguishing process, the SIMOREG CCP requires some time before it becomes operational again. This duration depends on the actions during the extinguishing process and immediately afterwards. Firstly, the surge absorbing capacitors in the SIMOREG CCP must be recharged to the required value (approximately 10 s). Secondly, the chopper resistors that during the armature current reduction convert the energy to heat need a cooling time which is calculated by a software algorithm. Depending on the energy to be extinguished, this time can be as long as approximately 20 minutes.

The SIMOREG DC MASTER contains setting and display parameters for the commissioning, operation, monitoring and diagnostics of the SIMOREG CCP. The status of the SIMOREG CCP is signaled via connectors and triggering of the SIMOREG CCP or faulty statuses are signaled via fault and alarm messages.

The necessary data transfer between the SIMOREG DC MASTER and SIMOREG CCP takes place via the serial interface.

SIMOREG 6RA70 DC MASTER

SIMOREG CCP



Overview SIMOREG DC MASTER – SIMOREG CCP

The following table contains the types of SIMOREG CCP suitable for SIMOREG DC MASTER.

The basis for the selection is not only the device rated data (considering the associated limit values) for the SIMOREG DC MASTER and SIMOREG CCP components, but also typical rated data for Siemens direct current motors from the DA 12 · 2004 product catalog.

Note:

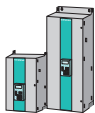
For plant configurations with reduced rated values (e.g. DC Rating, US Rating, voltage de-rating), in some circumstances suitable device combinations can be found that are not listed in the above table.

If required the specialist support group will help you with the detailed engineering and selection of the CCP. Please contact your Siemens representative and specify the following plant/system data:

- Line supply voltages and power sections
- Undervoltage range of the power section that will be required
- Rated motor armature voltage
- Rated motor current
- Information regarding the overcurrent capability required (magnitude, duty cycle)
- Load inductance (motor, cable and, where relevant, smoothing reactor)

SIMOREG DC MASTER		Converter Commutation Protector SIMOREG CCP				
Type	Rated DC voltage/DC current	6RA7085-6FC00-0 460 V / 600 A	6RA7091-6FC00-0 460 V / 1200 A	6RA7095-6FC00-0 460 V / 2000 A	6RA7090-6KC00-0 690 V / 1000 A	6RA7095-6KC00-0 690 V / 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	x	-	-	-	-
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
6RA7095-4KV62-0	725 V / 2000 A	-	-	-	-	x
6RA7097-4KV62-0	725 V / 2600 A	-	-	-	-	-
6RA7088-6LV62-0	875 V / 950 A	-	-	-	-	-
6RA7093-4LV62-0	875 V / 1500 A	-	-	-	-	-
6RA7095-4LV62-0	875 V / 1900 A	-	-	-	-	-
6RA7096-4MV62-0	1000 V / 2200 A	-	-	-	-	-

x = suitable
- = Not suitable (see note)



SIMOREG 6RA70 DC MASTER SIMOREG CCP

Technical data

Type	6RA70□□-6FC00-0			6RA70□□-6KC00-0		
	85	91	95	90	95	
Rated voltage	V	460 (+15 % / -20 %)			690 (+10% / -20%)	
Rated current	A	600	1200	2000	1000	2000
Live area that can be covered ¹⁾	A	up to 600	up to 1200	up to 2000	up to 1000	up to 2000
Rated supply voltage electronics power supply	V	2 AC 380 (-20 %) to 460 (+15 %); I _n = 1 A or 1 AC 190 (-20 %) to 230 (+15 %); I _n = 2 A				
Rated frequency	Hz	45 to 65				
Power loss	W	100	100	100	100	100
Operational ambient temperature	°C	0 to 55				
Storage and transport temperature	°C	-25 to +70				
Installation altitude above sea level	m	≤ 1000				
Environmental class		3K3 accord. to DIN IEC 60 721-3-3				
Degree of pollution		2 accord. to EN 60178 ²⁾				
Degree of protection		IP00 accord. to DIN EN 60529				
See dimension drawings on Page		9/17				
Weight (approx.)	kg	35	35	35	35	35
Fuses for connections 1U1, 1V1, 1W1 and 1C1, 1D1		3NA3 365-6 1 fuse per conn.	3NA3 365-6 1 fuse per conn.	3NA3 365-6 2 fuse in parall. per conn.	3NA3 365-6 1 fuse per conn.	3NA3 365-6 2 fuse in parall. per conn.
Fuses for connections 2U1, 2V1, 2W1 (10 A line protection)	A	Diazed 5SD604				

Derating as a function of installation altitude:

Units can operate at altitudes of up to 4500 m when the electronics is supplied with voltages of 460 VAC line-to-line (maximum 300 VAC to earth). The maximum permissible voltage up to 5000 m is 400 VAC line-to-line (maximum 230 VAC to earth).

At higher altitudes, or at higher voltages, only basic insulation is afforded rather than "Protection by electrical separation".

Standards

EN 50178		Electronic equipment for use in power installations
EN 60068	Part 2 A93	Basic environmental testing procedures; Tests
EN 61800	Part 1	Adjustable speed electrical power drive systems: General requirements. Rating specifications for low voltage adjustable speed d.c. power drive systems
EN 60146	Part 1	Semiconductor converters; general requirements and line commutated converters
EN 60204		Machine directive
EN 60529	Part 4-2 A12.01	Degrees of protection provided by enclosures (EN 60529: 1991)
EN 60721		Classification of environmental conditions
EN 61140		Protection against electric shock
	Part 1 A08.03	Classification of electrical and electronic equipment
EN 61800	Part 3	Adjustable speed electrical power drive systems – Part 3: EMC product standard including specific test methods
DIN VDE 0110	Part 1 and 2 A01.89	Insulation coordination for equipment within low-voltage systems – Coordination of high-frequency voltage stress
SN 36350		Environmentally compatible product design (Siemens Standard)
UL 508 C		Power conversion equipment

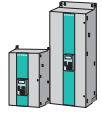
1) The current range that can be covered corresponds to the actual rated current of the 6RA70 SIMOREG DC MASTER (display parameter r072.02). If the rated current is reduced by parameter P076.01 and/or P067 the resulting lower value is valid.

Thus the CCP can then be used for a SIMOREG DC MASTER with a rated current higher than 2000 A according to its rating plate (necessary, for example, to obtain partly longer required overload times), if the actual rated current that has been

parameterized does not exceed 2000 A. The possible overload capability with 1.8 times the actual rated current can be additionally utilized in the process.

2) Definition of degree of pollution 2: Under normal conditions, only non-conductive pollution occurs. Occasionally, pollution may become conductive for a short period of time when the electronic equipment is not in operation.

SIMOREG 6RA70 DC MASTER SIMOREG CCP



Overview diagram

SIMOREG CCP

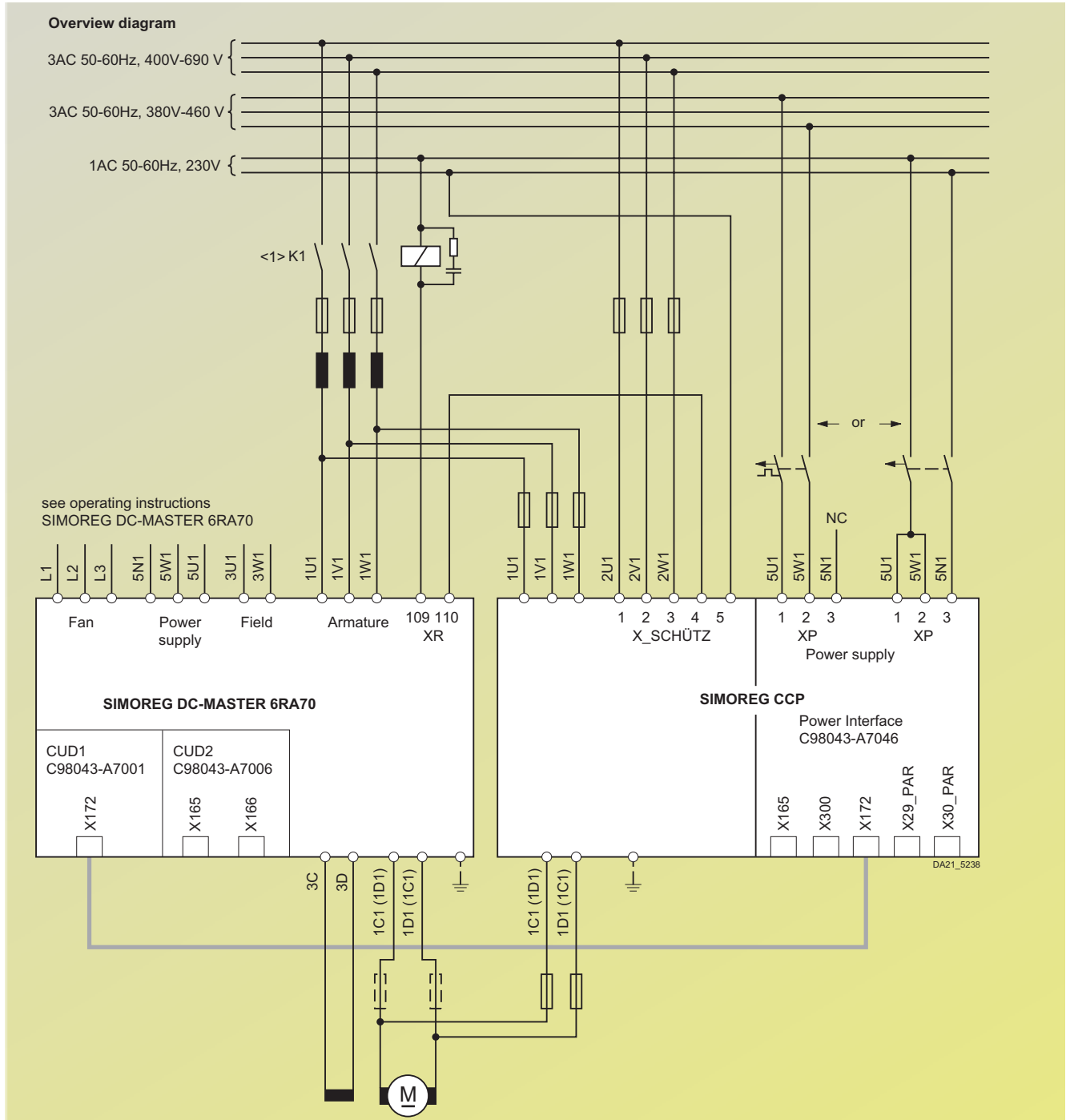


Fig. 7/2

<1> CAUTION!

Operation without main contactor is not permitted. The control voltage for the main contactor (or the circuit-breaker) must always be led via the XR terminal (connections 109 and 110) of the SIMOREG device **and** the X_SCHÜTZ terminal (connections 4 and 5) of the SIMOREG CCP

For parallel connection, all SIMOREG devices must be included in this interlock chain.

In applications with SIMOREG CCP, if a fault occurs, the basic unit or the SIMOREG CCP must be able to reliably separate the arrangement from the supply line voltage.

Also note that the total of the delay times for all switching elements contained in the control loop must not exceed the time set on the P089 parameter.

For converter devices SIMOREG DC MASTER connected in parallel one SIMOREG CCP is connected directly parallel to each (see overview diagram page 7/7).



SIMOREG 6RA70 DC MASTER SIMOREG CCP

Overview diagram of device connected in parallel

SIMOREG CCP

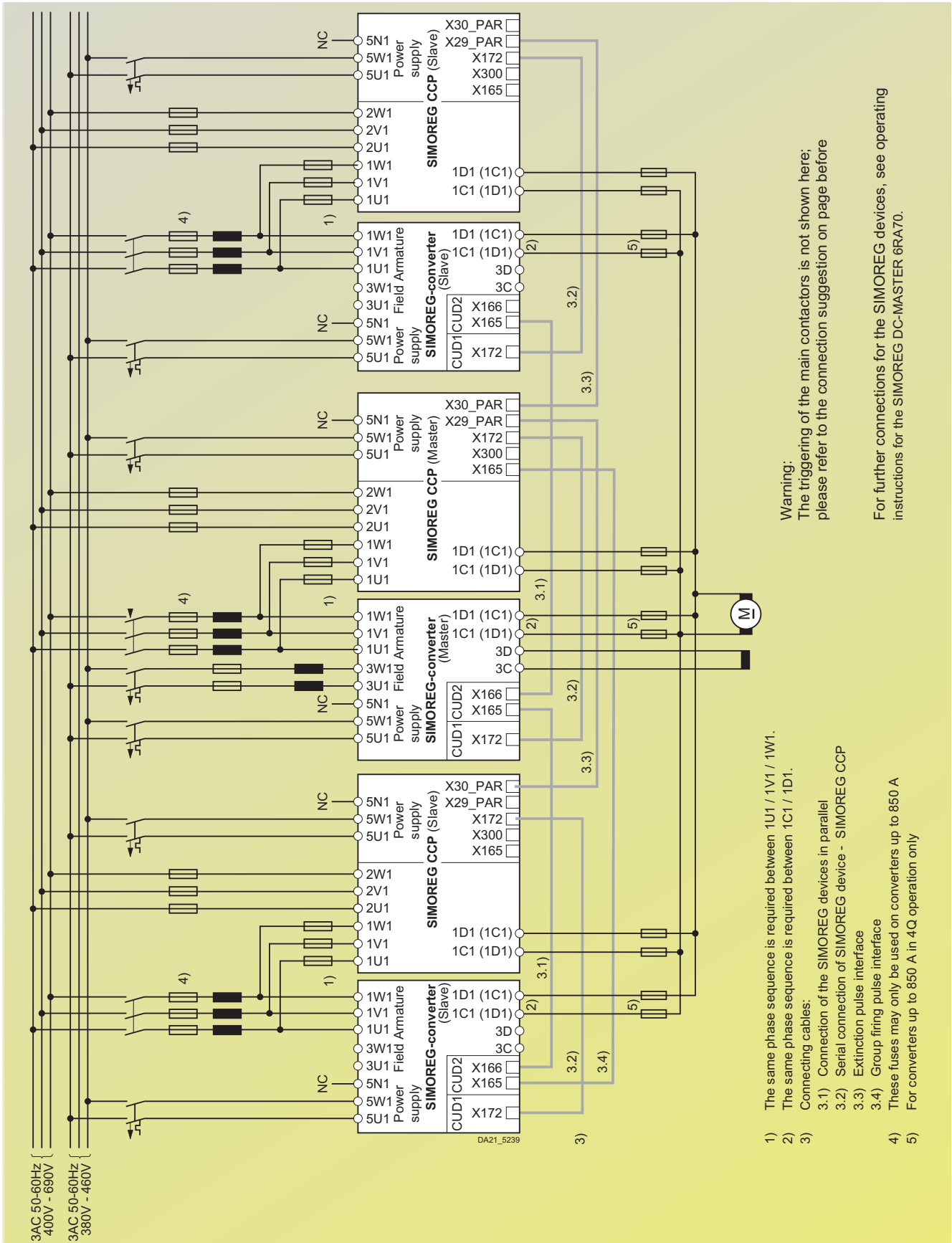
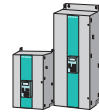


Fig. 7/3

SIMOREG 6RA70 DC MASTER SIMOREG CCP



Options

Description	Order No.:
Operating instructions in printed form for Converter Commutation Protector SIMOREG CCP in German / English French / Italian / Spanish	6RX1700-0DD74 6RX1700-0DD83
Operating instructions for SIMOREG DC Master 6RA70 and SIMOREG CCP and Drive Monitor in German / English / French / Italian / Spanish on CD-ROM	6RX1700-0AD64
UTP CAT5 patch cable in accordance with ANSI/EIA/TIA 568 Parallel switch cable for SIMOREG 6RA70 and SIMOREG CCP approx. 5 m Connecting cable for the extinction-pulse interface for connecting SIMOREG CCPs in parallel and connecting cable for the group firing-pulse interface to the SIMOREG (CUD2)	6RY1707-0AA08