SIEMENS

SIPLUS PSU Power Supply Unit

6DL3500-8BA

Operating Instructions

A5E00854207E

General and safety information

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We have checked that the contents of this document correspond to the hardware and software described. However, since deviations cannot be precluded entirely, we cannot guarantee full consistency.

The information in this document is regularly checked, however, and the necessary corrections included in subsequent editions. Suggestions for improvement are welcome. Technical data are subject to modifications.

Warning notices

These Operating Instructions contain information which you should observe in order to ensure your own personal safety, as well to avoid material damage. The notices referring to your personal safety are highlighted in the manual by a warning triangle. Notices referring only to equipment damage have no safety alert symbol. Warnings are shown in descending order according to the degree of danger as follows:

indicates that death or serious injury **will** result if proper precautions are not taken.

indicates that death or serious injury **may** result if proper precautions are not taken.

indicates that minor personal injury **may** result if proper precautions are not taken.

NOTICE

means that material damage **can** occur if the appropriate precautions are not taken.



Note

highlights important information about the product, handling the product, or part of the documentation that is of particular importance.

In the event of a number of levels of danger prevailing simultaneously, the warning corresponding to the highest level of danger is always used. A warning that uses a safety alert symbol indicating possible personal injury may also include a warning relating to material damage.

Qualified personnel

The device/system must only be set up and used in conjunction with this documentation. Transport, commissioning and operation of the device/system may only be performed by qualified personnel. For the purpose of the safety information in these Operating Instructions, a "Qualified Person" is someone who is authorized to energize, ground, and tag equipment, systems, and circuits in accordance with established safety procedures.

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Please observe the following:

Danger in case of none designated use of the product!

Serious injury may result.

Siemens products may only be used for the applications indicated in the catalog and in the relevant technical description. If third-party products and components are used, these must be recommended or approved by Siemens. To ensure trouble-free and safe operation of the products, they must be appropriately transported, stored, assembled, installed, commissioned, operated and maintained. The permitted environmental and ambient conditions must be adhered to. Notices in the relevant documentation must be observed.



Risk to be burnt!

Burns at the hands by hot surfaces of the equipment's housing or the heat sink!

Do not touch the surface of the housing and the heat sink and let it cool down before an exchange.

Electrostatic Sensitive Devices ESD

Almost all electronic devices and modules are equipped with highly integrated components or elements in MOS technology. For technological reasons, these electronic components are very sensitive to overvoltage and, consequently, to electrostatic discharge.

The short designation for such electrostatic sensitive components/modules is: "ESD", which is the commonly used international abbreviation "ESD" (Electrostatic Sensitive Device).

NOTICE



Electrostatic Sensitive Devices ESD can be damaged!

The presence of this symbol on cabinet, rack or packaging labels indicates the use of electrostatically sensitive devices and thus the touch sensitivity of the respective modules. When touching the modules these can be damaged. This can lead to an immediate failure or to a reduction of the life time of the modules.

Open the packing only at an ESD workplace. Discharge the body of your own by establishing of an electrical connection to the earth potential before touching the module.

These modules can be destroyed by voltage and energy far below the limits of human perception. Voltages of this kind occur as soon as a device or an assembly is touched by a person who is not electrostatically discharged.

Components which were subject to such overvoltage are usually not recognized immediately as being defective, because the malfunction does not occur until after a longer period of operation.

When working on the system, the following points must be followed exactly to ensure the safe discharge of electrostatic charges:

- Before performing any work on the system, create a ground connection by wearing a wrist band.
- Always place or work on components on a grounded, conductive surface.
- Only transport components in suitable protective bags.

Tolerances of the prescribed tightening torques



Note:

If not indicated differently, the tolerances of the prescribed tightening torques in these operating instructions are ± 10 %.

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1 List of abbreviation used

AWG BGT DC	American Wire Gauge, coding for wire diameter Module rack Direct current
	Digital Input
EU902, EU903, EU905 FET	Product name of FUM module racks of the SPPA-systems Field-Effect-Transistor
FUM	Function module of the SPPA module spectrum
H x W x D	Height x width x depth
HC	High Current
1 & C	Instrumentation and control
LED	Light Emitting Diode
MELD	Collective message output active HIGH
MELD_N	Collective message output active LOW
PCS7	PC supported automation system S7
PELV	Protective Extra Low Voltage according to EN 50178
PLC	Programmable Logic Controller
PSU	Power Supply Unit
SELV	Safety Extra Low Voltage according to EN 60950-1
SIPLUS	Siemens brand
SPPA	Siemens Power Plant Automation

2 Application

2.1 Utilization

SIPLUS PSU is a power supply module in electronic cabinets for the feeding and sub-distribution of the power supply DC 24 V. It was developed especially for use in instrumentation and control cabinets of the Siemens power station instrumentation and control systems SPPA-T2000 and SPPA-T3000 and the Siemens automation system PCS7. It serves for the protected power supply of cabinet components like racks, fans, heat exchangers, thermostats, door contacts and cabinet lamps.



Figure 1: SIPLUS PSU

The SIPLUS PSU was designed for the installation into electronic cabinets with 19 inch modular design. By turning the lateral mounting angles by 180° backwards it can also be screwed to rear assembly walls without problems (see Chapter 7 "Commissioning").

2.2 Functions

The SIPLUS PSU integrates the following functions in a compact unit:

- Redundant cabinet feeding power supply DC 24V
- Separate branch terminals DC 24V for the power supply of an adjacent cabinet
- 20 supply outputs for sub-distribution of the DC 24 V supply within the instrumentation and control cabinet
- Fuse Protection of the cabinet sub-distribution
- Manual switch-off of every single electrical circuit of the cabinet sub-distribution
- Monitoring and signaling of a blown fuse or detection of a failure
- Indication of the operating state of all power supply outputs (X1-20) via LED displays
- Electrical connection of the ground potential M of the cabinet feeding with cabinet ground
- Disconnection of the earth connection for plants with central earth connection point
- · Flexible installation by lateral assembly brackets with several fixing options
- Test of the feeder diodes with power supply in operating state

3 Design

3.1 Mechanical Structure



Figure 2: Physical dimensions of the SIPLUS PSU

3.2 Electrical Structure

3.2.1 Block Diagram



Figure 3: Block Diagram SIPLUS PSU

3.2.2 Electrical Terminals



Figure 4: Electrical Terminals SIPLUS PSU

4 Mode of Operation

4.1 Feeding

The 24 V DC power supply is fed in redundantly via four screw terminals L1, L2, 2 x M (X101 – X104). To keep the voltage drops in the supply lines to the first instrumentation and control cabinet low, wire cross-sections of 25 mm² up to 50 mm² resp. AWG 6 up to AWG 0 can be attached to the feeder terminals. For connecting adjacent instrumentation and control cabinets another four screw terminals 2 x M, L1, L2 (X105 – X108) for wire cross-sections of 4 up to max. 16 mm² resp. AWG 12 - 4 are disposable at every SIPLUS PSU. The feeder terminals and the branch terminals for the adjacent cabinet are internally linked.

4.2 Sub-Distribution

The redundant supply potentials L1 and L2 feed via two feeding diodes in wired-or connection on a common potential L1/L2 (X109). Twenty protected outputs DC 24 V (X1-X20) are built from this for the sub-distribution in the instrumentation and control cabinet. The connection of the cabinet components to be provided is carried out at SPPA-cabinets via pre-assembled current supply lines according to chapter 5.4 "Supply Outputs". The supply lines are accomplished with 2 poles (L and M). They are attached by line plugs to the jacks X1-X20. The connection elements for the power supply lines are not included in the scope of delivery. However they can be ordered separately.

4.3 Fuse Protection

The supply outputs X1-X20 are protected via blade fuses. The fuses are plugged in fuse holders and are accessible external for the exchange.

In supply outputs for EU902/EU903/EU905 module racks only slow acting fuses with 15 A rated current may be used. When using other fuses the selectivity to the post-connected rack built-in fuses is not ensured.

In the delivery state all fuse holders are fit with slow acting blade fuses 15 A. Sets of slow acting fuse links 4 A, 8 A and 15 A can be ordered as spare parts (see chapter 9 "Order Designations").

In addition the supply outputs have an electronic short-circuit and overcurrent supervision (see chapter 4.5 "Monitoring and Signaling")

N	NOTICE
C	Danger when using unsuitable blade fuses.
D fa	Dangerous conditions at the equipment or in the plant may occur in case of ault.
6	Only blade fuses with a nominal current of max 15 A and a nominal voltage of

Only blade fuses with a nominal current of max. 15 A and a nominal voltage of minimum 45 V may be used (see chapter 9 "Order Designations").

4.4 Switching off the Supply Outputs

Every supply output can be switched on and off manually over a channel switch. This channel switch switches a Smart-FET-transistor which interrupts the electrical circuit. The state of a supply output is indicated by the channel LED. Green light signals the "ON" state (toggle switch lever in up position). Yellow light signals the "OFF" state (toggle switch lever in down position). In the "OFF" state the output is in high-impedance mode.

Not used supply outputs can be inactivated by switching the output off and unplugging the fuse. Inactive outputs are signaled by dark LEDs.

The operating states are described in the chapter 4.7 "Signaling Scheme" in tabular form.

4.5 Monitoring and Signaling

The fuses are monitored on interruption. The monitoring is only active when the supply output is switched on (operating state "ON"). A blown fuse is signaled by the channel LED with a red continuous light. In addition an accumulative status signal is output at the signaling outputs MELD (active HIGH) and MELD_N (active LOW).



The Smart-FET-transistors have electronic short circuit and overload supervisions. The electronic supervision can activate and switch off the output at high short-circuit currents. The short circuit and overload supervisions are only active when the supply output is switched on (operating state "ON"). An activating of the electronic supervision is signaled by the channel LED with a red continuous light. In addition at the signaling outputs MELD (active HIGH) and MELD_N (active LOW) a collective status signal is output.

For electronic switching off there are two possible reasons:

- Overload At overload condition the transistor/Smart-FET switches off thermally. After a short cooling time the transistor switches on automatically again. This process recurs until there is no more overload condition or the fuse is blown.
- Low impedance short circuit The short circuit supervision responds and a clocked current limitation is realized. When the short circuit is eliminated it is automatically switched on.

If a power supply output channel LED signals a red continuous light in the "OFF" state, then there is an internal fault. The supply channel is faulty and must not be switched on any more. In addition at the signaling outputs MELD (active HIGH) and MELD_N (active LOW) a collective message is output.

When a monitoring circuit is activated the supply output concerned goes into the operating state "FAULT". Fault treatment and reset conditions are described in the chapter 8 "Maintenance and Diagnosis".

The operating states are described in the chapter 4.7 "Signaling Scheme" in tabular form.

4.6 Signaling Outputs

When a monitoring facility in a supply output is activated a collective message is output. The signal is provided at two signaling outputs via the plug connector X21. The signaling output MELD provides a HIGH active signal DC 24 V/0.5 A. The signaling output MELD_N provides a LOW active signal DC 24 V/0.5 A.

The signaling outputs are short-circuit-proof and overload-proof against M and DC 24 V. After removal of the short-circuit or overload condition, the outputs resume their function automatically. By means of suppressor diodes they are protected against positive and negative overvoltage.

Note:

In order to connect the signaling outputs in wired-or with other digital DC outputs, both outputs are high-impedance in the inactive condition. Therefore the MELD output must be charged with a pull-down resistor against M and the MELD_N output must be charged with a pull-up resistor to DC 24 V¹

To match the specified signal levels in the inactive state, the pull resistors must not exceed 100 k Ω . At wired-or connection with other digital DC outputs the pull resistors have to be more low-impedance according to the specification of these outputs. Example: Wired-or connection with a second digital DC output. The second output requires a pull resistor of 39 k Ω . The pull resistor is the parallel connection of 39 k Ω and 100 k Ω and results in 28 k Ω .

¹ or with current drawing digital DC inputs (MELD) and current sourcing digital DC inputs (MELD_N) respectively SIPLUS PSU Power Supply Unit A5E00854207E 12 of 30

4.7 Signaling Scheme

LED - Display	State of operation	Switch position	Fuse	Output condition (X1…X20)	MELD (X21)	MELD_N (X21)
dark	"INACTIVE"	OFF	unplugged	High impedance	Low	High
yellow	"OFF"	OFF	ОК	High impedance	Low	High
green	"ON"	ON	ОК	DC 24 V	Low	High
red	"FAULT"	OFF/ON	OK/blown	High impedance	High	Low

The states of the supply outputs are signaled by channel LEDs.

Table 1: Signaling scheme

The operating state "FAULT" is described in detail in the chapter 8.2 "Malfunctions".

4.8 Earthing Concept

The reference potential of the cabinet feeding (M feeding terminals) is electrically connected to the metal housing of the SIPLUS PSU internally. The connection between M potential and cabinet earth is established by mounting the PSU at the cabinet rack.

For use of the SIPLUS PSU in plants with central earthing point the internal connection between M potential and unit casing can be disconnected.

The chapter 7 "Commissioning" contains more information about the professional mounting.

4.9 **Protective Equipment**

Device internal electronics is protected by Suppressor diodes from surge at every supply output and signaling output.

EMC capacitors at supply outputs X1-X20 increase the electromagnetic compatibility of the cabinet supply.

The short circuit and overload protection is described in the chapter 4.5 "Monitoring and Signaling".

4.10 Checking of the Feeder Diodes

The diodes for the redundant feeding of the supply potential L1 resp. L2 can be checked in online operation without interrupting the voltage lines at the supply outputs. For this purpose the supply potential L1/L2, that is wired-or connected from L1 and L2, is provided at a screw terminal (X109) (see figure 3 and figure 4).

The screw terminal L1/L2 (X109) is dimensioned for wire cross-sections according to chapter 5.3 "Feeding".

The procedure for checking the feeder diodes is described in detail in the chapter 8 "Maintenance and Diagnosis".

5 Technical Data

5.1 Mechanics

Housing Dimensions H x W x D Weight	sh 15	eet steel, sendzimir galvanized 9 mm x 484 mm x 130 mm 5.0 kg
Screws for fixing the mo Thread Strength category Tightening torque fixing dimensions	ounting angle at the rad M6 8.8 ap DI	ck 5 3 prox. 10 N m (depends on mounting frame) ² N 41494
Screws for fixing the mo Thread Strength category Tightening torque	ounting angle at the SI M6 8.8 6 1	PLUS PSU housing 3 3 N m
Screw for fixing the con Thread Strength category Tightening torque	tact shell between M-p M6 8.8 6 1 Conditions	otential and housing 3 3 N m
Ambient temperature (u Ambient temperature (u Heat flow Transport and storage to Degree of protection Mixed gas test Degree of pollution Overvoltage class	ip to 35 A) 0 ° ip to 60 A) 0 ° na emperature -40 IP2 2 3	 ¹C to +60 °C ³ ¹C to +40 °C ¹tural convection according to chapter 6 ²C to +70 °C ²0 according to DIN EN 60529 ²according to DIN EN 60068-2-60, Ke, Method 4 ³according to VDE 0110 ⁴according to VDE 0160
Conditions in operation climatic environr chemical active mechanical envi mechanical active usage at altitude	and storage nental conditions environmental conditio ronmental conditions /e environm. conditions	according to EN 60721-3-3, stationary, weather protected 3K3 condensation excluded ns 3C3 salt fog excluded 3M4 s 3S2 sand appearing excluded ≤ 2000 m

² Important to a safe electrical connection to the cabinet earth. The minimum tightening torque depends on the material in which the fixing screws are screwed.

³ When using cabinets it is recommended to install the SIPLUS PSU in the lowermost tier. The maximum ambient temperature in dependency of the consant current through the feeder diodes is to be considered according to derating in chapter 6.1.

5.3 Feeding

Nominal voltage L1, L2 Permitted ripple	DC 24 V according to DIN IEC 60038 ⁴ ±3.6 V (corresponds ±15 % of the nom. voltage)
Static limits (incl. ripple) Lower limit Upper limit	20 V 30 V
Dynamic limits (incl. ripple) Upper limit	35 V, duration \leq 500 ms, recovery time \geq 50 s
Max. permitted constant current through the feeder diodes	60 A, notice the derating in chapter 6.1
Power loss complete device (at 30 A current consumption) ⁵	typ. 26 W
Line terminal connection	screw terminals
Feeder terminals L1, L2, 2 x M X101, X102, X103, X104	min. wire cross-section 25 mm ² or AWG 6 max. wire cross-section 50 mm ² or AWG 0 dismantling length 24 mm tightening torque 6 N m – 8 N m
Branch terminals 2 x M, L1, L2, L1/L2 X105, X106, X107, X108, X109	min. wire cross-section 4 mm ² or AWG 12 max. wire cross-section 16 mm ² or AWG 4 dismantling length 11 mm tightening torque 1.5 N m -1.8 N m
Branch terminal L1/L2, X109	This terminal may be used exclusively for test purposes according to chapter 8.3 "Checking of the Feeder Diodes"



Figure 6: Feeding and branch terminals





⁵ Typical value for project planning when supplying four FUM sub racks with 7.5 A current consumption each

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⁴ External supply voltage is to be generated as potential free Protective Extra Low Voltage PELV (according to EN 50178).

5.4 Supply Outputs

Max. permitted constant current ⁶

Voltage drop from feeder terminal up to supply terminals X1-X20

fuse link

type

Tripping characteristic ⁷ Rated voltage

Line terminal connection



Imax = 15 A

typ. 1.00 V, max. 1.30 V

blade fuse according to DIN 72581-3 (withdrawn standard) style C 15 A slow acting (5-fold rated current 200 ms min.) ≥ 45 V

plug connectors, 2-pole COMBICON MSTB 2,5 HC/ 2-ST-5.08 RDB min. wire cross-section 0.25 mm² or AWG 24 max. wire cross-section 2.5 mm² or AWG 12 (see chapter 9 "Order Designations")

NOTICE

Possible damages of the facility!

At insufficient dimensioning of the wire cross-section the respective line may be excessive charged. This leads to strong heating of the conductor up to damage.

The wire cross-section has to be dimensioned according to the nominal current of the selected fuse and the expected load current.



Figure 8: Supply outputs

 $^{^{6}}$ when using fuse-links of the type Little fuse TF90 – 15 A (delivery condition) and considering the maximum permitted continuous current at the input terminals, see chapter 5.3. For selection of the correct fuses see chapter 9 "Order Designations".

5.5 Signaling Outputs

MELD (X21, Pin right) HIGH-level LOW-level Load current (HIGH level)

Short circuit current

MELD_N (X21, Pin left) LOW-level HIGH-level Load current (LOW level)

Short circuit current leakage current

Line terminal connection



Digital output DC 24 V, active HIGH (at fault) min. L1 – 3.0 V resp. L2 – 3.0 V max. 3.0 V max. 0.5 A (current sourcing, short circuit proof towards M) max. 2.1 A

Digital output DC 24 V, active LOW (at fault) max. 3.0 Vmin. L1 – 3.0 V resp. L2 – 3.0 Vmax. 0.5 A (current drawing, short circuit proof towards L) max. $15 \mu\text{A}$ (high impedant state)

plug connectors, 2-pole COMBICON MSTB 2,5 HC/ 2-ST-5.08 RDB min. wire cross-section 0.25 mm² or AWG 24 max. wire cross-section 2.5 mm² or AWG 12 (see chapter 9 "Order Designations")

NOTICE

Possible damages of the facility!

At insufficient dimensioning of the wire cross-section the respective line may be excessive charged. This leads to strong heating of the conductor up to damage.

The wire cross-section has to be dimensioned according to the short circuit current of the respective signaling output.





Figure 9: Pin assignment signaling outputs

Figure 10: Schematic diagram signaling outputs

As an option an external pullup can be connected to the MELD_N output in order to generate Hlevels when feeding voltage driven inputs (see fig. 10). The application impedance and the MELD_N leakage current have to be considered here among other constraints.

6 Installation instruction

6.1 Mounting position, heat dissipation and derating

According to figure 11 the SIPLUS PSU has to be installed so that a vertical unimpeded flow of the cooling air at the heat sink on the back side of the equipment is ensured.



Figure 11: Airflow



For thermal optimizing of the incoming air the installation in the lower part of the cabinet is recommended. In this case the equipment is placed close at the air inlet.

The Device is designed to handle a rated current of I = 60 A at ambient temperatures of Ta \leq 60°C without getting damaged.

However the ambient temperature is limited depending on the operating current through the feeder diodes according to Figure 12 to ensure a save operation with a maximum allowed housing surface temperature as required in the product safety standard EN 60950-1.



Risk to be burnt!

The heat sink and housing parts may be highly heated causing risk of injury in case of touch.

Before touching the metal parts these have to cool down sufficiently.

6.2 Installation into the cabinet

When operating the SIPLUS PSU in I & C cabinets the installation in the lowermost tier is recommended. The supply cables and transfer cables to the neighboring cabinet are connected vertically from below.

The SIPLUS PSU is designed for wall mounting, holm mounting and for installation in racks and cabinets. The fixing dimensions are designed according to chapter 5.1 "Mechanics".

The SIPLUS PSU has to be installed exclusively in plants with limited admission (according to EN 60950-1). This ensures that exclusively repairer (according to EN 60950-1) with sufficient technical instruction and experience have access to this installation.

For further instructions to installation and commissioning see chapter 7 "Commissioning"

6.3 Back-up fuse



The SIPLUS PSU has to be operated only with sufficient back-up fuse.

Figure 13: Operation with back-up fuse

In this case the potentials L1 and L2 have to be provided with external fuses (F1ext and F2ext) like shown in the figure 13.

Dimensioning of the back-up fuse:

Recommended back-up fuse	NEOZED 5SE2 63 A
Rated current	max. 63 A
Rated voltage	min. 60 V DC
Rated cut-off capability	min. 2000 A
Cut-off I ² t value I ² t _A	max. 16000 A² s (t _A = 4 ms)
Pre-arcing l ² t value l ² t _S for reasons of the selectivity	min. 3000 A² s (t _s = 4 ms)

If necessary the nominal current and the cut-off integral of the back-up fuse for the line protection of the conductor to the supply terminals (X101 - X104) as well as for the line protection of the conductors to the branch terminals (X105 - X108) has to be dimensioned less.

7 Commissioning

7.1 Mounting into the instrumentation and control cabinet

The instructions of chapter 6 "Installation instruction" have to be observed!

Step 1:

Mount the lateral mounting brackets at the housing in the desired installation position.





Figure 14: Installation variant for wall mounting

Figure 15: Installation variant for 19" - mounting

For the horizontal mounting position of the case several positions can be chosen. For this fastening holes are provided at the mounting brackets in a 18 mm pitch.

- For the installation in SPPA standard cabinets choose the foremost position (see figure 15).
- For mounting to rear assembly walls turn the mounting bracket around 180° (see figure 14). For the horizontal mounting position choose the position with the longest distance to the rear assembly wall in order to get an optimum heat dissipation via airflow at the heat sink.

For unearthed mounting please notice chapter 7.3 "Unearthed Mounting"

Step 2:

For the fastening of the SIPLUS PSU select under the following screws:

Screw type	Remark	
Cylinder head screw M6 according to ISO 1207/ISO 1580 (DIN 84/DIN 85)	Use screws of the strength category 8.8. Select	
Hexagon head screw M6 according to ISO 4017 (DIN 4017)	the screw length according to your construction	

For the assembly at coated and anodized cabinet bars use suitable bonding means, such as self locking screws or special contact disks.

When changing the equipment, please notice chapter 8.5 "Replace of an Equipment"

Step 3:

For an optimal cable routing install the SIPLUS PSU in the undermost level.

Screw the mounting brackets together with the underground. Tighten the screws with a torque according to chapter 5.1 "Mechanics" to get an electrical connection of low impedance between housing and cabinet earth.

Step 4:

Put all channel switches into the "OFF" position. For not used supply outputs see chapter 7.4 "Inactivating of unused supply outputs"

Step 5:

Make sure that the feeding cables are de-energized.

Attach the cables for the cabinet feeding and for the transfer to the neighbor cabinet from below to the SIPLUS PSU.

Step 6:

Standard cabinets are equipped with pre-assembled cable sets for the wiring. Put the cables for the current sub-distribution into the plug connectors X1-X20 and those of the signaling wiring into plug connector X21 (MELD / MELD_N). A wrong plugging of the lines is prevented by reverse polarity protection.

Line plugs according to chapter 5.4 "Supply Outputs" and chapter 5.5 "Signaling Outputs" with high current contacts (type HC) and increased withdrawal forces (type RDB) are used.



Note:

The plugs can be obtained as spare parts see chapter 9 "Order Designations".

7.2 Earthed Mounting

The connection of the reference potential of the DC 24 V supply voltage (M) to the cabinet ground is carried out via a screw M5 x 20-8.8 and a contact bushing inside of the housing (earthed mounting see figure 16: m-connection with the case). The connection is factory made in the delivering state.





Figure 17: earthed mounting



Figure 16: M-connection with the case

Figure 18: unearthed mounting

To reconnect an undone connection, open the housing cover situated on the left above the feeding clamps. Insert the contact bushing marked in figure 16 between M bus bar and case lug and fasten it. Tighten the screw with a torque of 6 N m to get a low impedance electrical connection between M bus bar and case.

7.3 Unearthed Mounting

For a mounting isolated from earth (e.g. in plants with a central earthing point) the SIPLUS PSU offers the possibility to undo the connection of the reference potential of the DC 24 V supply voltage to the cabinet earth.

Open the case cover situated on the left above the feeding clamps. Loosen the screw marked in figure 16 and remove screw and contact bushing.

7.4 Inactivating of unused supply outputs

To indicate unused branches, the channel LEDs can be turned dark. In this way the used branches can be visually distinguished of the unused easily.

Pull the corresponding fuse link out of the socket and put the channel switch in the "OFF" position.

The channel is in the operating state "INACTIVE" now.

8 Maintenance and Diagnosis

8.1 Self-Test Functions

For the protection of the Smart-FET-transistors each of the 20 supply branches is equipped with an electronic shut-down at very high short-circuit currents. This electronic shut-down is activated when the respective channel switch is in the "OFF" position and its functioning is supervised. A fault is indicated with a red continuous light of the channel LED. In addition - depending on the appeared fault – a collective status signal is provided at the signaling outputs MELD (active HIGH) and MELD_N (active LOW). See also chapter 8.2 "Malfunctions"

A failure of the electronic shut-down can cause a destruction of the Smart-FET- transistor in case of a short circuit.

LED - display	State of operation	Switch position	Fuse	Output condition (X1 – X20)	MELD (X21)	MELD_N (X21)	Reset condition
red	"FAULT"	ON	melted	High impedance	High	Low	Fuse blown: remove short circuit, replace fuse
red	"FAULT"	ON	ок	High impedance	High	Low	Electronic shut-down: clear short circuit, switch off and on again
green	"OFF"	OFF	ОК	DC 24 V	Low	High	short circuit of Smart-FET: unit replace- ment

8.2 Malfunctions

Table 2: Fault diagnosis

Other possible conditions of the LED displays are described in chapter 4.7 "Signaling Scheme"

8.3 Checking of the Feeder Diodes

For the check of the feeder diodes a power supply unit is required for the auxiliary supply of the DC 24 V supply voltage. At the auxiliary supply unit an output voltage of 30 V and a current limitation of 60 A must be adjustable.

Repair of faulty feeding diodes is not provided. In that case the SIPLUS PSU must be replaced by a new unit (see chapter 8.5 "Replace of an Equipment").

Step 1: Checking of the feeder diodes for short circuit

Measure the voltage drops of the feeder diodes between L1 and L1/L2 and between L2 and L1/L2 (see figure 19). The voltages UL1 and UL2 can be tapped at the screw heads of the feeder clamps.

The voltage drops UL1 and UL2 must be in the range of 0.3 V to 1.0 V (valid for voltage at L1 = voltage at L2 and feeding current $I \ge 1$ A). At voltage drops under 0.3 V one or both feeder diodes are in a short circuit condition.



Figure 19: Checking of the feeder diodes for short circuit

Step 2: Connecting the Auxiliary Supply

Disconnect one of the feeding cables from M (see figure 20). Adjust at the PELV auxiliary power supply an output voltage of 30 V and a current limitation of 60 A.

NOTICE

Danger of property damage!

The SIPLUS PSU as well as post-connected equipments may be damaged in case of false polarity. The auxiliary supply may be damaged in case of feed-ing back.

Please observe the correct polarity before connecting the auxiliary supply. The used power supply must be re-feeding protected.

Turn the auxiliary power supply unit off, connect it at the clamp L1/L2 and at the free M clamp and switch it on again.

The current limitation must not be in action. The output voltage must show a stable value of 30 V. Otherwise there is a defect of the feeder diodes.

Step 3: Checking of the Feeder Diode at L1 potential in inverse direction

Disconnect the supply cable at L1, strain the clamp L1 with a resistor of 1 k Ω (\geq 1 W) to M and measure the reverse current of the L1 feeder diode through the load resistor (see figure 20).

The reverse current must not exceed 10 mA.

Connect the supply cable to L1 again.



Figure 20: Checking the feeder diode in reverse-biasing



Note:

The supply cable at L2 must be connected during the whole test step for the supply of the neighbor cabinet!

Step 4: Checking of the Feeder Diode at L2 potential in Reverse-Biasing

Disconnect the supply cable at L2, strain the clamp L2 with a resistor of $1 \text{ k}\Omega (\geq 1 \text{ W})$ to M and measure the reverse current of the L2 feeder diode through the load resistor (analog to figure 20).

The reverse current must not exceed 10 mA.

Connect the supply cable to L2 again.

Note:

The supply cable at L1 must be connected during the whole test step for the supply of the neighbor cabinet!

Step 5: Disconnecting the auxiliary power supply

Turn the auxiliary power supply unit off and disconnect it from L1/L2 and M. Connect the feeding cable to M again.

8.4 Repair

Repairs of the SIPLUS PSU are not provided. A defective SIPLUS PSU must be replaced by a new unit (see subsequent chapter)

8.5 Replace of an Equipment



CAUTION

Risk to be burnt!

The heat sink and housing parts may be highly heated causing risk of injury in case of touch.

Before touching the metal parts these have to cool down sufficiently.



Arcing!

At separation of an energized conductor from a terminal dangerous arcs may arise.

Before replacing the equipment the concerned SIPLUS PSU has to be deenergized.

In case of two cascaded SIPLUS PSU for feeding a neighboring cabinet a power supply fault in the post-connected cabinet can be prevented when replacing the first SIPLUS PSU (see figure 21). For that the following procedure is recommended:



Figure 21: Cascaded SIPLUS PSU

1

SIPLUS PSU × Faulty equipment, whose replacement will be described

SIPLUS PSU Installed in neighboring cabinet supplied from SIPLUS PSU 1 2

Step 1: Preparation of the auxiliary voltage

According to figure 21 a de-activated and re-feeding protected PELV (according to EN 50178) auxiliary voltage source U3 has to be connected to SIPLUS PSU 2 terminals L1/L2. The power supply should have sufficient power and the current limitation must be adjusted to 60 A.

Before activation it has to be adjusted to a permissible voltage according to chapter 5.3.

NOTICE

Danger of property damage!

The SIPLUS PSU as well as post-connected equipments and voltage sources may be damaged in case of false polarity.

Please observe the correct polarity before connecting the auxiliary supply.

NOTICE

Danger of property damage!

The power supply may be damaged in case of feeding back.

The used power supply must be re-feeding protected.

Step 2: Load assumption by U3

U3 has to be activated and the voltage has to be adjusted according to chapter 5.3 so that a slight voltage raise compared with the de-activated U3 can be measured at the X105 resp. X106 terminals. This shows a reduced current flow through the diode of the SIPLUS PSU 2 and thus an entire supply of the SIPLUS PSU 2 from U3.

The procedure is described in chapter 8.3 "Checking of the Feeder Diodes" step 2.

Step 3: De-energizing SIPLUS PSU 1

The voltage sources U1 and U2 are deactivated. The SIPLUS PSU 1 is now entirely de-energized because U3 is blocked by the SIPLUS PSU 2 diodes.

Step 4: Exchange

The leads to the SIPLUS PSU and the fixing screws at the mounting rack can be loosened now and the equipment can be replaced according to chapter 5.3 "Feeding". Please observe the correct blade fuses.



Note

Do not reuse bonding means, such as self locking screws or special contact disks for the assembly at coated and anodized cabinet bars. You have to replace these by new parts.

Step 5: Restart

After the corresponding installation of the replaced SIPLUS PSU the voltage sources U1 and U2 can be activated again.

Step 6: Load assumption by U1 and U2

U3 has to be deactivated so that SIPLUS PSU 1 as well as 2 are supplied by the voltage sources U1 and U2.

U3 can be removed afterwards. The replace of the equipment is completed.

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9 Order Designations

No.	Exemplary picture	Name	Order- designation
1		SIPLUS PSU (incl. 20 fuses 15 A, without plugs) feeding diode in Schottky-type	6DL3500-8BA
2		Plug set for SIPLUS PSU (21 pieces/set) (not included in the scope of delivery of the SIPLUS PSU)	6DL9904-8AA
3		Fuse set blade fuses 15 A for SIPLUS PSU (20 pieces/set)	6DL9905-8AA
4		Fuse set blade fuses 8 A for SIPLUS PSU (20 pieces/set)	6DL9905-8BA
5		Fuse set blade fuses 4 A for SIPLUS PSU (20 pieces/set)	6DL9905-8CA

Scope of supply SIPLUS PSU (6DL3500-8BA)

No.	Exemplary picture	Name	Quantity
1		SIPLUS PSU equipment feeding diode in Schottky-type	1
2		Mounting angle (pre-assembled) without fixing screws	2
3	1	Contact bushing (pre-assembled, M and housing connected)	1
4		Blade fuses 15 A	20

Order address:

Siemens AG Breslauer Str. 5 DE-90766 Fürth

Manufacturer address:

Siemens AG Breslauer Str. 5 DE-90766 Fürth

10 Annex

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