### Editions and Statuses

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<th>Edition</th>
<th>Description</th>
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<tr>
<td>1</td>
<td>Subrack SR24.x</td>
<td>05.95</td>
</tr>
<tr>
<td>2</td>
<td>Subrack SR24.x</td>
<td>04.97</td>
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</table>

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We have checked the contents of this Manual to ensure that they coincide with the described hardware and software. However, deviations cannot be completely ruled-out, so we cannot guarantee complete conformance. However, the information in this document is regularly checked and the necessary corrections included in subsequent editions. We are thankful for any recommendations or suggestions.
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NOTE!

The information in this Manual does not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser’s purposes, please contact your local Siemens office.

Further, the contents of this Manual shall not become a part of, nor modify, any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties nor modify the existing warranty.

WARNING!

Electrical equipment has components which are at dangerous voltage levels.

If these instructions are not strictly adhered to, this can result in severe bodily injury and material damage.

Only appropriately qualified personnel may work on this equipment or in its vicinity.

This personnel must be completely knowledgeable about all the warnings and service measures according to this User Manual.

The successful and safe operation of this equipment is dependent on proper handling, installation, operation and maintenance.
Definitions

- **QUALIFIED PERSONNEL**
  For the purpose of this User Manual and product labels, a „Qualified person“ is someone who is familiar with the installation, mounting, start-up and operation of the equipment and the hazards involved. He or she must have the following qualifications:
  1. Trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety procedures.
  2. Trained in the proper care and use of protective equipment in accordance with established safety procedures.
  3. Trained in rendering first aid.

- **DANGER**
  For the purpose of this User Manual and product labels, „Danger“ indicates death, severe personal injury and/or substantial property damage will result if proper precautions are not taken.

- **WARNING**
  For the purpose of this User Manual and product labels, „Warning“ indicates death, severe personal injury or property damage can result if proper precautions are not taken.

- **CAUTION**
  For the purpose of this User Manual and product labels, „Caution“ indicates that minor personal injury or material damage can result if proper precautions are not taken.

- **NOTE**
  For the purpose of this User Manual, „Note“ indicates information about the product or the respective part of the User Manual which is essential to highlight.

---

**CAUTION!**

This board contains components which can be destroyed by electrostatic discharge. Prior to touching any electronics board, your body must be electrically discharged. This can be simply done by touching a conductive, grounded object immediately beforehand (e.g. bare metal cabinet components, socket protective conductor contact).

---

**WARNING!**

Hazardous voltages are present in this electrical equipment during operation.

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

It is especially important that the warning information in all of the relevant Operating Instructions are strictly observed.
1. Ordering information and supplementary components

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Supply voltage</th>
<th>Cooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>6DD1682-0BC0</td>
<td>24 V DC</td>
<td>Integrated fan</td>
</tr>
<tr>
<td>6DD1682-0BE0</td>
<td>24 V DC</td>
<td>Self-convection</td>
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<tr>
<td>6DD1682-0CE3</td>
<td>115/230 V AC</td>
<td>Integrated fan</td>
</tr>
<tr>
<td>6DD1682-0CE4</td>
<td>115/230 V AC</td>
<td>Self-convection</td>
</tr>
</tbody>
</table>

The SR24.x subrack is available in 4 versions. They differ by the power supply. The power supply is supplied in the subrack and is **not separately ordered**. However, it can be individually ordered as spare part.

6DD 1683 - 0AC0 Lithium battery, pack of 5
6EW 1000 - 7AA Lithium battery, pack of 1
6DD 1682 - 0AJ1 SR81 slot cover
6DD 1682 - 0AJ2 SR82 slot cover
6DD 1682 - 0AJ3 SR83 slot cover

2. Function description

2.1. Overview

The SR24.x subrack is used for mounting SIMADYN D PC boards and the SPx. power supply. The ES902 packaging system for a 233.4 × 220 mm board format according to IEC 297 is used.

The subrack has 24 slots each separated by 1 1/3 SPS and a multi-layer mother board as backplane wiring. All of the slots are clearly labelled.

The SP8, SP9, SP8.5, and SP9.5 power supplies are used as system power supply. They are part of the SR24.x subrack and are inserted in the upper subrack section. The SP8 (in the SR24.1) and SP8.5 (in the SR24.3) power supplies have a fan assembly to force ventilate the SIMADYN D boards.

A battery insert is part of the power supply which is used to buffer the power supply when the voltage fails so that no data is lost.
2.2. Bus system

A local bus (L bus) and a continuous communications bus (C bus) for all of the subrack slots is established through the backplane board. These buses have a 20-bit address/16-bit data bus, control signals and the power supply for the SIMADYN D PC boards.

The power supply is connected to the backplane via an 8-pin high-current connector (X227) and via a 15-pin sub-D connector (X300).

The system ground for the backplane is connected to the subrack via two H07V-K 2.5mm (X225, X226) cables.

2.3. Bus arbitration

A bus cycle is divided into two phases. During the request phase, each processor module which needs to transmit data via the bus, generates a request via the common open-collector line. The distribution phase is started when at least one request has been made.

Bus allocation is implemented according to the principle of daisy chain priority, i.e. in the sequence of the slot numbers. Bus priority is immediately switched to the next processor module when bus access has been completed or the bus request has not been made by the current bus master. The distribution cycle is completed when the request from the processor with the highest slot number has been processed.

New requests can only be made when the common open-collector line has become inactive.

This arbitration technique ensures that each processor module is processed once within a distribution cycle. The maximum wait time for a processor with the highest slot number can be up to 14 bus accesses. (P8 missed the request phase, P1-7 becomes active and immediately requests the next cycle). A bus access is generally approximately 1 μs (without continuous request or LOCK).

The complete arbitration will only function if the daisy chain line is correctly looped from the first to the last processor of a bus section. Two connector pins (slot 24 has no pins), are located for this purpose on the righthand side of the bus board next to the 96-pin socket connector. They must always be jumpered when a SIMADYN D processor board is not inserted in the corresponding socket connector (jumper on the system board or active bus node). The jumper plugs must be removed when a SIMADYN D processor board is inserted in the corresponding socket connector.

The subrack is supplied with a complete set of jumper plugs.

2.4. Bus termination

The bus lines at the L- and C-buses must be correctly terminated in order to achieve defined voltage levels on the bus lines when the bus is accessed at the buffer memory or periphery. The bus terminating resistors are provided on the SR17 system boards. The subrack is supplied with 2 equipped SR17 boards. They are inserted on the L- and C buses at slot 24. If slot 24 is used to insert another board, the boards can be inserted in unused slots. It is possible to insert a double-width CPU board at the 2nd slot.

The MM11 and MM21 boards also have bus terminating resistors, but they are not sufficient for operation of the subrack. The SR17 boards are not listed in the master program.

A maximum of 2 boards with bus terminating resistors can be inserted. The subrack may not be operated without SR17 bus termination.
3. Power supply

3.1. Front panel

The power supplies belong to the subrack. They are inserted into the upper section of the subrack and screwed into place. The power supplies are supplied, installed in the subracks.

All of the connecting terminals required for the subrack, are accessible at the front panel.

<table>
<thead>
<tr>
<th>X1 pin 1</th>
<th>X1 pin 2</th>
<th>X1 pin 3</th>
<th>SP8 and SP9</th>
<th>SR24.1 and SR24.2</th>
<th>24V DC input voltage</th>
<th>SP8.5 and SP9.5</th>
<th>SR24.3 and SR24.4</th>
<th>115/230V AC input voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>+24 V</td>
<td>GND</td>
<td>PE</td>
<td>SP8</td>
<td>and SP9</td>
<td>SR24.1 and SR24.2</td>
<td>24V DC input voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1</td>
<td>N</td>
<td>PE</td>
<td>SP8.5</td>
<td>and SP9.5</td>
<td>SR24.3 and SR24.4</td>
<td>115/230V AC input voltage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The subrack can also be reset by jumpering pins 1 and 2 at X4.

There is also a RESET button which allows the switch-on/-off routines to be activated. It is recessed to prevent accidental actuation.

The 5 V, +15 V, -15 V power supply voltages and ground are accessible at 4 test points. They have series resistors for short-circuit protection.

The two LEDs indicate correct operation (GREEN LED) and faulted operation (RED LED) of the power supply.
3.2. Input voltage

3.2.1. 24 V DC for SR24.1 and SR24.2

The 24 V input voltage is connected at connector X1. The protective conductor must be connected at terminal 3. It is not sufficient to just connect a protective conductor to the subrack.

A series fuse should be provided with the following data.

\[
\begin{align*}
I_n &= 32 \, \text{A max} \\
I_{\text{in}+t} &= 10 \, \text{A}^2\text{s} \\
I_s &= 64 \, \text{A (inrush)}
\end{align*}
\]

The subrack is powered-up when the input voltage is connected. To prevent faults at power-on, all interface modules must be supplied with power at least 300 ms prior to the system boards. This is guaranteed by simultaneously connecting the power supply voltage for the subrack and interface modules.

3.2.2. 115/230 V AC for SR24.3 and SR24.4

The 115/230 V input voltage is connected at connector X1. The protective conductor must be connected at terminal 3. It is not sufficient to just connect a protective conductor to the subrack. A switch is provided on the front panel, which can be used to select the supply voltage - either 115 V or 230 V supply voltage. This is factory set at 230 V.

The series fuse should be dimensioned according to the following operating data.

\[
\begin{align*}
I_n &= 2.7 \, \text{A max} \\
I_{\text{in}+t} &= 1 \, \text{A}^2\text{s} \\
I_s &= 9 \, \text{A (inrush)}
\end{align*}
\]

The subrack is powered-up when the input voltage is connected. To prevent faults at switch-on, all interface modules must be supplied with power at least 300 ms prior to the system boards. This is guaranteed by simultaneously connecting the power supply voltage for the subrack and interface modules.

3.3. Fan assembly in the SR24.1 and SR24.3 subracks

The power supplies have a fan assembly with 3 individual fans. The speed of each fan is monitored. The pulses supplied from the fans are evaluated by the power supply. When a fault condition occurs, a signal is output via the front panel through a relay contact (24 V, 100 mA) at connector X2, pin 3 and pin 4.

Contact closed: fault-free operation
Contact open: faulted operation

It is not permissible that the subrack is used when a fault condition exists, as safe operation of the boards is no longer ensured due to the danger of overtemperature. At power-up, the monitoring function is delayed so that the subrack can reliably run-up.

The power supply must be removed to replace the fans. The bottom plate assembly is completely changed with the three fans. At 50°C ambient temperature, it is recommended that the fans are changed after 40,000 operating hours.

The subrack does not have an air filter. If a filter is required, this must be provided at the cabinet.
3.4. Battery

The 3.6 V Lithium battery is inserted in the compartment provided and is used to maintain the power supply for the RAM memory of the SIMADYN D boards.

The battery is monitored by the power supply. If the voltage falls below 3.2 V, the fault is displayed with a flashing „b“ on the 7-segment display of processor module „1“.

The battery can be changed „online“. A battery fault can be acknowledged after it has been rectified. The battery should be changed every year.

3.5. Line filter

The power supply has a line filter, which limits radio interference voltages to limit value class A according to VDE 0871.

3.6. Ground connections within the subrack

3.6.1. Subracks SR24.1 and SR24.2 (SP8, SP9)
4. Installation guidelines

4.1. Noise immunity

All SIMADYN D housings must be connected to the cabinet ground through the shortest possible cable - at least 6 mm$^2$.

Potential equalization via the „PE“ power supply connection is not adequate.

Shielded cables should be connected with the shield on the grounding - or shield rails, and routed to the terminal module, shielded.

All of the cabinets networked for SIMADYN D drives should be connected using a potential equalization cable, at least 16 mm$^2$ cross-section.

Empty slots must be provided with SIMADYN D slot covers (SR81, SR82,SR83).

All boards must be tightly screwed to the subrack.

It is not permissible to use undamped contactors together with SIMADYN D in a cabinet.

If undamped contactors (i.e. no RC elements) are used in cabinets next to SIMADYN D, a panel must be mounted between the cabinets.

The protective conductor is connected at the subrack and power supply.
5. Technical data

5.1. General data

INSULATION GROUP A acc. to VDE 011 PARAGRAPH 13 GROUP 2 AT 24V DC, 15V, 5V DC

AMBIENT TEMPERATURE 0 TO 55 DEGREES C. WITH FORCED VENTILATION

STORAGE TEMPERATURE -40 TO +70 DEGREES C.

HUMIDITY CLASS F acc. to DIN 40050

ALTITUDE RATING S acc. to DIN 40040

MECHANICAL STRESSING MOUNTED IN STATIONARY EQUIPMENT WHICH IS NOT NECESSARILY VIBRATION-FREE

PACKAGING SYSTEM ES 902 C

WEIGHT 17.3 kg

Output voltage/current

<table>
<thead>
<tr>
<th>Va1:  +5.1V ± 0.1V</th>
<th>Base load, min.: (5% of Ia1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Va2:  +15V ± 0.300V</td>
<td>Base load, min.: (5% of Ia2)</td>
</tr>
<tr>
<td>Va3:  -15V ± 0.300V</td>
<td>Base load, min.: (5% of Ia3)</td>
</tr>
</tbody>
</table>

Base load, min.: (5% of Ia1)

Base load, min.: (5% of Ia2)

Base load, min.: (5% of Ia3)

Residual ripple (measurement bandwidth, 30 MHz)

< 50 mVpp Va1 (probe 1:1)
< 150 mVpp Va2, Va3

Commuter spikes (% of VaN) ± 5%

Current limiting

Ia1max = approx. 1.2 x Ia1
Ia2max = approx. 1.2 x Ia2
Ia3max = approx. 1.2 x Ia3

Shock/vibration stressing acc. to SN29010

Stationary application: Severity 12
Transport: Severity 22

Degree of protection: IP00

VDE 0110 Pollution level 2
VDE 0110 Air- and creepage distances

Radio interference suppression VDE0871 limit value class “A”
5.2. Electrical data SR24.1 (SP8) and SR24.2 (SP9)

1. Input voltages:
   DC power supply according to SN 26555 Part 8, DIN IEC 38 Draft
   \( Ve: 24V \)
   
   Static upper limit: \( Ve \times 1.25 \) (=30V)
   Static lower limit: \( Ve \times 0.833 \) (=20V)
   
   Max. input voltage ripple 5%
   
   Non-periodic overvoltages acc. to DIN VDE160, A5.3.1.1.2
   \( V \text{ max.}: +35V \)
   Duration: 500 ms
   Recovery time, min.: 50 s
   
   Brief voltage dips acc. to DIN VDE 0160, A5.3.1.1.3
   \( V \text{ min.}: +14.25 \)
   Duration: 5 ms
   Recovery time, min.: 10 s

   \( Vcc: Va1 \) - voltage drop across the switching element

   2 Overvoltage protection for \( Va1 \) via suppressor diode
   3 Input voltage protection fuse
   4 Safety regulations (Standard, VDE 0160 December 1990; IEC)
   5 Rated insulation voltage: 500 V AC

   Test voltage: acc. to VDE 0160

   Protective separation: The higher-level power supply has the function of ensuring „protective separation“ of the 24 V power supply voltage for the subracks.

5.3. Electrical data, SR24.3 (SP8.5) and SR24.4 (SP9.5)

1. Input voltages: for \( Ve = 230V \)
   DC power supply according to SN 26555 Part 8, DIN IEC 38 Draft
   
   Static upper limit \( Ve \times 1.1 \) (=253V)
   Static lower limit : \( Ve \times 0.85 \) (=195.5V)
   Frequency: 50/60 Hz +/-2.5 Hz
   
   Non-periodic overvoltages according to DIN VDE160, A5.3.1.1.2
   \( V \text{ ref. peak value: } Ve \times 1.3 \) (460V)
   Duration: 0.3 ms
   Recovery time, min.: 0.1 s
   Events per hour: 10 max.
   
   Brief voltage dips according to DIN VDE 0160, A5.3.1.1.3
   \( V \) : 0
   Duration: 5 ms
   Recovery time, min.: 0.1 s
   Events per hour: 10 max.

   \( Vcc: Va1 \) - voltage drop across the switching element
2 Overvoltage protection of Va1 via suppressor diode

3 Input voltage protection fuse

4 Safety regulations (Standard, VDE 0160 December 1990; IEC)

5 Rated insulation voltage: 3750 V AC

Test voltage: according to VDE 0160

Protective separation: Safety extra-low voltage according to VDE 0805 / EN 60950 with protective separation

6. STRUC L-mask in the master program

All 4 subracks have, in version 4.2, the same STRUC L mask. Subrack „SR24“ should be called-up.

: SR24 "Subrack 24 slots, L+C bus"
  L01 6S = `.
  L07 6S = `.
  L13 6S = `.
  L19 6S = `.
  S01 8N = ? "Slot 1: Board (sub-assembly)"
  S02 8N = 0
  S03 8N = 0
  S04 8N = 0
  S05 8N = 0
  S06 8N = 0
  S07 8N = 0
  S08 8N = 0
  S09 8N = 0
  S10 8N = 0
  S11 8N = 0
  S12.8N = 0
  S13 8N = 0
  S14 8N = 0
  S15 8N = 0
  S16 8N = 0
  S17 8N = 0
  S18 8N = 0
  S19 8N = 0
  S20 8N = 0
  S21 8N = 0
  S22 8N = 0
  S23 8N = 0
  S24 8N = 0
7. Connector assignment

7.1. Signal assignment, backplane bus

X101 to X124  96-pin socket connector DIN 41612, type of construction C (C bus)
X201 to X224  96-pin socket connector DIN 41612, type of construction C (L bus)

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Row a</th>
<th>Row b</th>
<th>Row c</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5V</td>
<td>5V</td>
<td>5V</td>
</tr>
<tr>
<td>2</td>
<td>AUX2</td>
<td>AB20</td>
<td>AB22</td>
</tr>
<tr>
<td>3</td>
<td>AUX1</td>
<td>AB21</td>
<td>AB23</td>
</tr>
<tr>
<td>4</td>
<td>+15V</td>
<td>15V+</td>
<td>15V+</td>
</tr>
<tr>
<td>5</td>
<td>AUX0</td>
<td>-15V</td>
<td>-15V</td>
</tr>
<tr>
<td>6</td>
<td>*LOCK</td>
<td>*CSPER</td>
<td>*CSINI</td>
</tr>
<tr>
<td>7</td>
<td>5VEXT</td>
<td>5VEXT</td>
<td>*RSERQ</td>
</tr>
<tr>
<td>8</td>
<td>Vcc</td>
<td>AB12</td>
<td>AB0</td>
</tr>
<tr>
<td>9</td>
<td>*BATAL</td>
<td>0V</td>
<td>AB1</td>
</tr>
<tr>
<td>10</td>
<td>*DSAD</td>
<td>AB13</td>
<td>AB2</td>
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<tr>
<td>11</td>
<td>*DSAVE</td>
<td>PLC0</td>
<td>AB3</td>
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<td>12</td>
<td>AB19</td>
<td>AB14</td>
<td>AB4</td>
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<tr>
<td>13</td>
<td>*OUTDS</td>
<td>PLC1</td>
<td>AB5</td>
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<td>14</td>
<td>*RESET</td>
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<td>*BHE</td>
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<td>*BCLR</td>
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<td>*IR0</td>
<td>AB18</td>
<td>DB0</td>
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<tr>
<td>21</td>
<td>*IR1</td>
<td>0V</td>
<td>DB1</td>
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7.2. High-current contact

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7.3. Control leads connected at the 15-pin sub-D plug connector

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8. Others

8.1. Attachments

Dimension drawing: 3SE.465 682 9012.00 MB
Drawing, bus board: 1SE.465 682 0012.00

8.2. Terminology/abbreviations

SV power supply
BGT subrack
9. ESD instructions

Components which can be destroyed by electrostatic discharge (ESD).

Generally, electronic boards should only be touched when absolutely necessary.

The human body must be electrically discharged before touching an electronics board. This can be simply done by touching a conductive, grounded object directly beforehand (e.g. bare metal cubicle components, socket outlet protective conductor contact).

Boards must not come into contact with highly-insulating materials - e.g. plastic foils, insulated desktops, articles of clothing manufactured from man-made fibers.

Boards must only be placed on conductive surfaces.

When soldering, the soldering iron tip must be grounded.

Boards and components should only be stored and transported in conductive packaging (e.g. metalized plastic boxes, metal containers).

If the packing material is not conductive, the boards must be wrapped with a conductive packing material, e.g. conductive foam rubber or household aluminum foil.

The necessary ESD protective measures are clearly shown in the following diagram.

---

a = Conductive floor surface  
b = ESD table  
c = ESD shoes  
d = ESD overall  
e = ESD chain  
f = Cubicle ground connection