2.2 Subracks SR12 and SR24

Order No.

Subracks SR12.x and SR24.x are available for different supply voltages and with or without fan.

	Order No.	Supply voltage	Fan	Power supply type
SR12.1	6DD1682-0CC0	24 V DC	yes	SP22
SR12.2	6DD1682-0CD0	24 V DC	no	SP23
SR12.3	6DD1682-0BC3	115/230 V AC	yes	SP22.5
SR12.4	6DD1682-0BC4	115/230 V AC	no	SP23.5

SR24.1	6DD1682-0BC0	24 V DC	yes	SP8
SR24.2	6DD1682-0BE0	24 V DC	no	SP9
SR24.3	6DD1682-0CE3	115/230 V AC	yes	SP8.5
SR24.4	6DD1682-0CE4	115/230 V AC	no	SP9.5

Description

The subracks accommodate SIMADYN D modules with the format (H×T) 233.4 × 220 mm².
An integrated power supply provides the necessary voltages for the modules via 2 backplane buses **(L bus, C bus)** and permits data transfer between them.

Number of slots

SR12.x: **12**
SR24.x: **24**
The slots are identified by a labeling strip.

2.2.1 Power supply

The power supply plugs into the SIMADYN D rack.

Line filter

The power supply has a line filter which limits the radio interference voltage to limit value class A in accordance with VDE 0871.

Front panel elements

- Green LED: Error-free operation
- Red LED: Fault condition
- Compartment for the back-up battery
- Supply voltage connection (screw/plug-in terminal X1)
- Connection for an external back-up battery via screw/plug-in terminal X3 (this is optional to a back-up battery which can be inserted in the subrack itself)
- Reset (cold restart of the modules) by
  - Depressing the reset button
  - Jumpering pins 1 and 2 at connector X4

- Test sockets to check the 3 output voltages 5 V, +/-15 V (short-circuit proof)

Supply connection

The line supply voltage is connected through the 3-pole screw/plug-in terminal X1.
The connection assignment is printed on the front panel:
Above the voltage selector switch (Slide switch) can be switched to between an input nominal voltage from 230 V and 115 V.

The in each case valid value becomes visible with transfer of the switch.

	SR12.1 and SR12.2 **SR24.1 and SR24.2**	**SR12.3 and SR12.4** **SR24.3 and SR24.4**
Input voltage	**24 V DC**	**230 V AC** (default setting of voltage selector switch) 115 V AC (change over voltage selector switch)
X1 Pin 1	+24 V	Phase conductor L
X1 Pin 2	Ground (0 V)	Neutral conductor N
X1 Pin 3	Protective ground conductor PE	Protective conductor PE
External fuse (rating)	For SR12.x: In = 16 A max.. I^2t= 6 A^2s Is = 32 A (inrush peak) For SR24.x: In = 32 A max.. I^2t= 10 A^2s Is = 64 A (inrush peak)	For SR12.x: (AC230V) In = 1.2 A max.. I^2t= 0.6 A^2s Is = 6 A (inrush peak) For SR24.x: (AC230V) In = 2.7 A max.. I^2t= 1 A^2s Is = 9 A (inrush peak)
X2 pins 1 - 4	Monitoring the power supply and fan assembly (relay)	
X3 pins 1 - 2	Feed for an external back-up battery	
X4 pins 1 - 2	Reset: A reset is initiated by jumpering the contents (optional to using the reset button)	

The specified current In is the current that can occur at a maximum insertion of the subrack. The power supplies are in part oversized, and have a higher maximum input current (Chapter: Technical dates).

NOTES

The **protective conductor** must be connected at connector X1, pin 3.
It is not sufficient to connect a protective conductor at the subrack.

It must be a slightly accessible circuit breaker in the supply circuit.

Interface modules with binary output function **SB70, SB71** should be powered-up approximately 200 ms before the modules are powered-up to prevent power-on effects.
This is achieved by **simultaneously powering-up** the subrack power supplies (this requires approximately 200 ms to establish the voltages) and the interface modules.

There are following fuses on the printed circuit board of the power supplies:

Power supply	Fuse	Type	Voltage rated value
SP22.5/SP23.5	F601	T4A H	250 V
SP8.5	F400	T8A H	250 V

NOTE The power supply PC boards are suitable for the connection to IT systems.

2.2.2 Voltage monitoring functions

Input voltage

The input voltage is monitored for undervoltage and overvoltage conditions.

Input voltage	Response
Undervoltage: SRx.1/SRx.2: **< 20 V** or SRx.3/SRx.4: **< 170 ...175 V**	Green OK-LED goes dark The output voltages are shutdown; CPU stop (DSAVE signal) The system automatically restarts when the input voltage increases to approx. 196 V.
Overvoltage SRx.1/SRx.2: **> 32 V** or SRx.3/SRx.4: **> approx. 265 V**	Red fault LED is lit; The output voltages are shutdown, CPU stop (DSAVE signal) Automatic restart

Output voltage

All of the output voltages are monitored for an undervoltage condition (e.g. as a result of overload/short-circuit)

Undervoltages at the output	Response
V (5 V) < 4.7 ... 4.85 V (for t>100-200 µs)	Red fault LED is lit The output voltages are shut down; (CPU stop) No automatic restart (the line supply voltage must be disconnected)
V (+ 15 V) < approx. 14 V **V (- 15 V)** > approx. -14 V	Red fault is lit 5V voltage remains System failure message

System failure message

The associated module (under the „STOP“ tab) is configured in HWConfig under "object properties" to define how the module behaves when a system failure message is output (bus signal *RDYIN=low):

- Modules can reset their binary and analog outputs
- CPU modules can go into the "stop" condition ("H")

2.2.3 Battery back-up

Battery connection

A back-up battery can be installed in the power supply to save configured values during a power failure (using function block SAV) (nominal voltage, approx. 3.6 V).

Current load: approx. 10 µA depending on the particular CPU module

It is recommended that the battery is changed every year.

When removing the power supply (the defect, changing the fan) back-up is no longer possible. If required, the back-up voltage must be provided through the appropriate contact of the backplane connector.

Battery type

Lithium battery 3,4 V, 5 Ah

Design C (Baby element)

Battery voltage monitoring

The monitoring CPU module identifies if there is no back-up battery or if the back-up battery is discharged (at slot 1; flashing "B").

Battery change

The battery should be changed with the subrack powered-up to prevent data loss. If a supply voltage is not available, then a voltage must be applied via connector X3!



WARNING

For safety reasons, it is not permissible that lithium batteries are in the equipment when it is transported unless the battery manufacturer permits this expressly using an appropriate declaration.



DANGER

- When the equipment is stored and shipped, the batteries must be individually and separately packed in a non-conductive material.
- There is a danger of explosion if they are not correctly handled. We can accept no liability for incorrectly handled batteries.
- Used batteries must be disposed of in compliance with national and European legislation and regulations.
- The lithium batteries must be removed from the battery holder before the subrack or power supply is disposed of.

2.2.4 Backplane buses

All of the inserted modules receive their voltages and exchange data via 2 parallel backplane buses:

- **L bus** („local bus“, below)
- **C bus** („communications bus“, top)

Daisy chain-jumpers

The bus uses the daisy chain principle where a CPU module accepts the token signal and then transfers it to the next CPU module.

Thus, a daisy chain jumper must be **inserted** in all backplane bus PC board slots where there is **no CPU module** (or EPx signal processor module).

If another module is inserted, the jumper is unimportant.
The jumper must be correctly inserted up to the last (righthand) CPU module.
A jumper is required if a module is not located at a connector.

The two pins to insert the jumpers are located to the right of the backplane bus connector (96-pin socket connector).

All of the jumpers are inserted **when the equipment is shipped**.

Signal assignment, backplane connector

X101 to X124 96-pole socket connector DIN 41612 Type C (C bus)

X201 to X224 96-pole socket connector DIN 41612 Type C (L bus)

The L- and C buses are essentially assigned the same.
The signals with **grey** background are **only available at the L bus**.

Pin No.	Row a	Row b	Row c
1	5V	5V	5V
2	AUX2	AB20	AB22
3	AUX1	AB21	AB23
4	+15V	+15V	+15V
5	AUX0	-15V	-15V
6	*LOCK	*CSPER	*CSINI
7	5VEXT	5VEXT	*RSERQ
8	Vcc	AB12	AB0
9	*BATAL	0V	AB1
10	*DSAD	AB13	AB2
11	*DSAVE	PLC0	AB3
12	AB19	AB14	AB4
13	*OUTDS	PLC1	AB5
14	*RESET	AB15	AB6
15	*BHE	PLC2	AB7
16	*BRQ	AB16	AB8
17	*BGIN	PLC3	AB9
18	*BGOUT	AB17	AB10
19	*BCLR	PLC4	AB11
20	*IR0	AB18	DB0
21	*IR1	0V	DB1
22	*IR2	DB11	DB2
23	*IR3	0V	DB3
24	*RDYIN	DB12	DB4
25	*RDY	PRIVAT	DB5
26	*WR	DB13	DB6
27	*RD	0V	DB7
28	CLK	DB14	DB8
29	*CLK.M	0V	DB9
30	*DEN	DB15	DB10
31	*HWE	RES	SBR
32	DT/*R	0V	SBT

2.2.5 Ventilation/cooling

The power supplies for SR12.1 and SR12.3 have 1 fan.
The power supplies for SR24.1 and SR24.3 have 3 fans.

The subracks do not have an air filter. If a filter is required, this must be provided at the cabinet.

Fan monitoring

The fans are monitored by the power supply (fan speed). At power-up, the monitoring is enabled with a time delay to ensure that the subrack reliably runs-up.

If a fault condition develops, a message is output via a relay contact (24 V, 100 mA) at connector X2, pins 3 and 4:

- Relay contact closed: Fault-free operation
- Relay contact open : Faulted operation; or the subrack has no fan

WARNING

The subrack may not be used if the fan has a fault, as reliable operation of the boards cannot be guaranteed due to the danger of excessive temperature rise.

Fan change

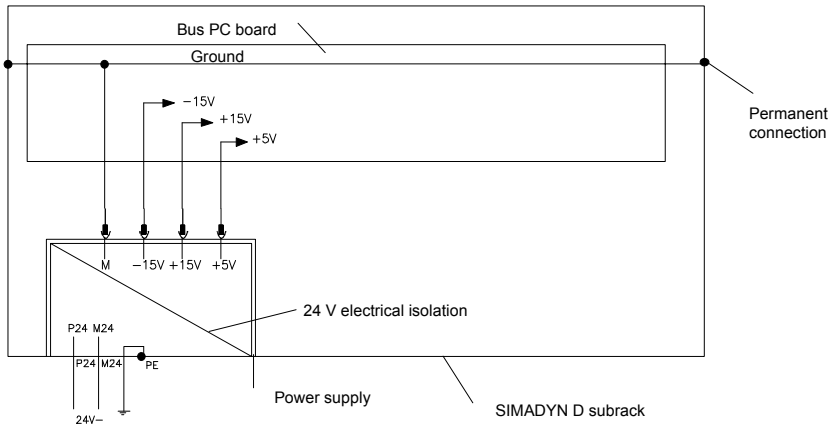
It is recommended that the fan is changed after approximately **40,000 operating hours** at a 50° C ambient temperature. The power supply must be removed. The bottom panel is completely changed, together with the fans.
The battery back-up is interrupted when the fan is changed (refer to the appropriate section.

Self-convection

The cabinet must have cooling air slots if the subracks are not equipped with fans.

2.2.6 Mounting guidelines and noise immunity

Ground connections



EMC

- The subrack must be connected to the grounding rail via the connecting studs through a min. 6 mm² cable which should be kept as short as possible.
  Potential bonding using the PE pin of supply connector X1 is not sufficient!
- All of the cabinets associated with networked SIMADYN D drives must be connected with one another through a potential bonding conductor of at least 16 mm².
- Empty slots must be provided with SIMADYN D slot covers (SR81, SR82, SR83).
- All modules must be screwed into the subrack.
- No undamped contactors may be used in a cabinet together with SIMADYN D.
- If undamped contactors are mounted in a cabinet next to SIMADYN D, the cabinet must have a metal partition between them.
- The protective contactor is connected at the subrack and at the power supply. Both components must be at protective conductor potential.
- Before removing the power supply, the connecting cables must be disconnected. The connecting cables must first be disconnected from the supply so that they are in a no-voltage condition!
- The screens of screen cables must be directly connected to the grounding- or screen rails and fed to the interface modules, still screened.

NOTE Additional information regarding EMC and the ambient conditions, refer to Section „General technical data“!

2.2.7 Technical data

Input voltages

DC-input

	Supply voltages	
	24 V DC SR12.1 SR12.2	**DC 24 V** SR24.1 SR24.2
Input voltage range	20 ... 30 V	20 ... 30 V
Input current	16 A	32 A
Non-periodic overvoltages acc. to DIN VDE160, A5.3.1.1.2		
Max. voltage	35 V	
Duration	500 ms	
Recovery time, min.	50 s	
Events per hour	-	
Brief voltage dips acc. to DIN VDE 0160, A5.3.1.1.3		
Voltage	0 V	
Duration	5 ms	
Recovery time, min.	0.1 s	
Events per hour	max. 10	

Input voltages

AC-input

	Connecting voltages	
	AC 115/230 V SR12.3 SR12.4	**AC 115/230 V** SR24.3
Input voltage range	+ 10% / - 15%	+ 10% / - 15%
Input frequency	47.5-62.5 Hz	47.5-62.5 Hz
Input current	4 / 2 A	9 / 4 A
Aperiodic overvoltages acc. to DIN VDE160, A5.3.1.1.2		
Max. voltage	460 V	
Duration	1.3 ms	
Recovery time at least	0.1 s	
Events per hour	max. 10	
Short-term voltage drops acc. to DIN VDE 0160, A5.3.1.1.3		
Voltage	0 V	
Duration	10 ms	
Recovery time at least	10 s	
Events per hour	-	

Output voltages

Output voltage 5 V	+5.1 V +/- 0.1 V
Output current	SR12: 0 to **26 A** SR24: 0 to **52 A**
Ripple	< 50 mV_{pp}
Commutating spikes	< 5% (of 5V)
Base load	Guaranteed when a CPU module is inserted
Overvoltage protection	With suppressor diode, to protect the modules
Stabilization time	< 80 ms after U_{in}= 230 V; <1 ms after a load step (0.5 ->1)*I_{rated}

Output voltage +15 V	+15 V +/- 0.3 V
Output current	SR12: 0 to **3.3 A** SR24: 0 to **6.5 A**
Ripple	< 150 mV_{pp}
Base load	Guaranteed by an inserted module which requires this voltage

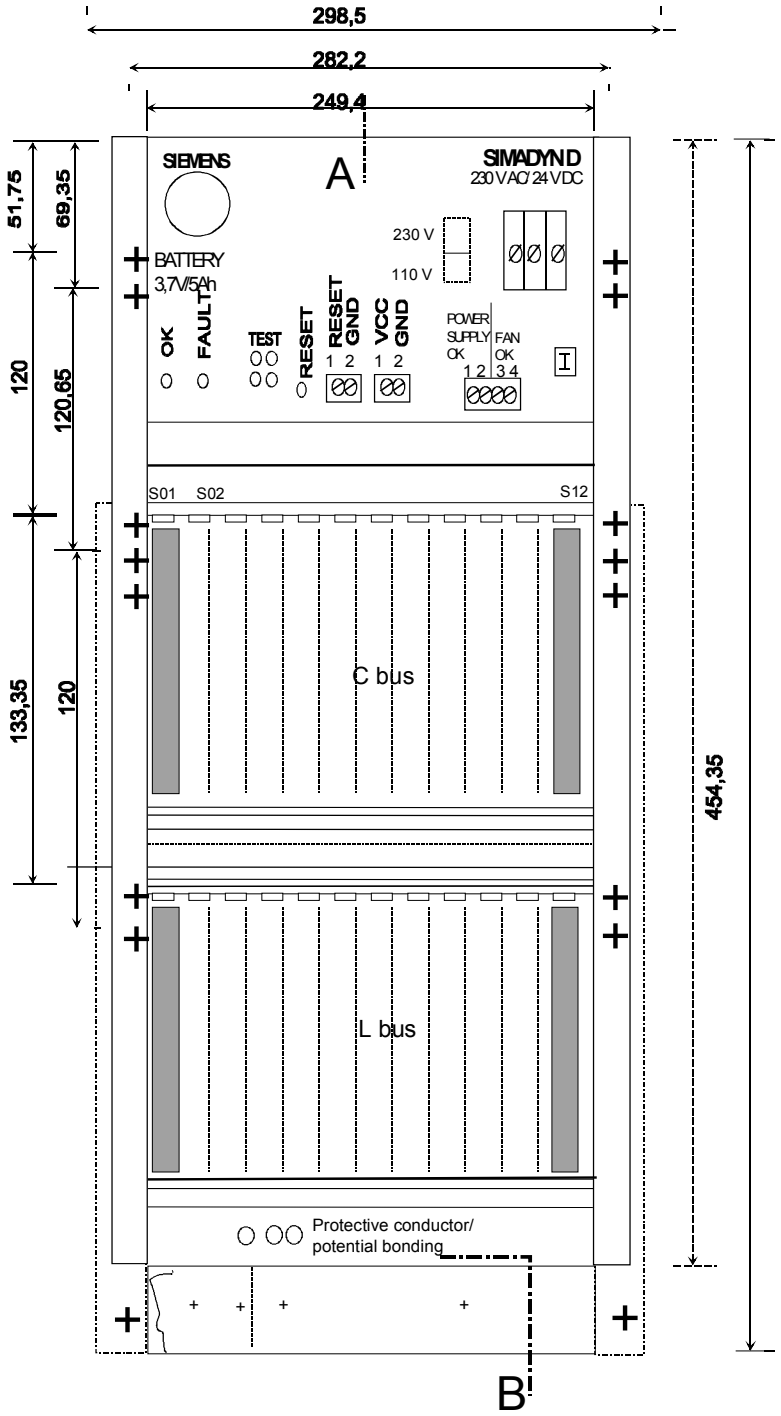
Output voltage -15 V	-15 V +/- 0.3 V
Output current	SR12: 0 to **3.0 A** SR24: 0 to **6.0 A**
Ripple	< 150 mV_{pp}
Base load	Guaranteed by an inserted module which requires this voltage

General data

	SR12	**SR24**
Dimensions in mm (W x H x D)	298.5 x 508.5 x 320	542 x 508.5 x 320
Weight	10.5 - 11 kg	16.2 - 17.3 kg

Radio interference suppression level	Limit value class B acc. to VDE 0871

2.2.8 Dimension drawings



Explanation: Subrack SR12 (Front view)

I Cable retention