

Rack

3.1 Rack UR6021 (6DD1682-0CH3)

3.1.1 Areas of application

Rack UR6021 with 21 slots forms the mechanical base for SIMATIC TDC

The system power supply is installed in the rear area of rack.

There is a fan tray in the upper part of the rack, which includes the monitoring and signaling functions in addition to the fans.

The fan tray can be ordered as spare part (6DD1683-0CH3) and can be replaced by qualified personnel.

A high-performance 64-bit backplane bus supports high-speed data exchange between the inserted modules.

The CPU555 used in UR6021 supports P0 functionality.

For fast, direct communication between CPU555 modules, the rack UR6021 has a P0 connector in slots 01, 02, 03, 04, 09, 11, 13 and 15. Each CPU555 can communicate with up to 7 additional CPU555 by means of the PCIe interface via the backplane bus (P0 connector). This means that a point-to-point connection always exists between any two CPU555 modules.

See also

Ventilation/cooling (Page 49)

3.1.2 Mechanical layout

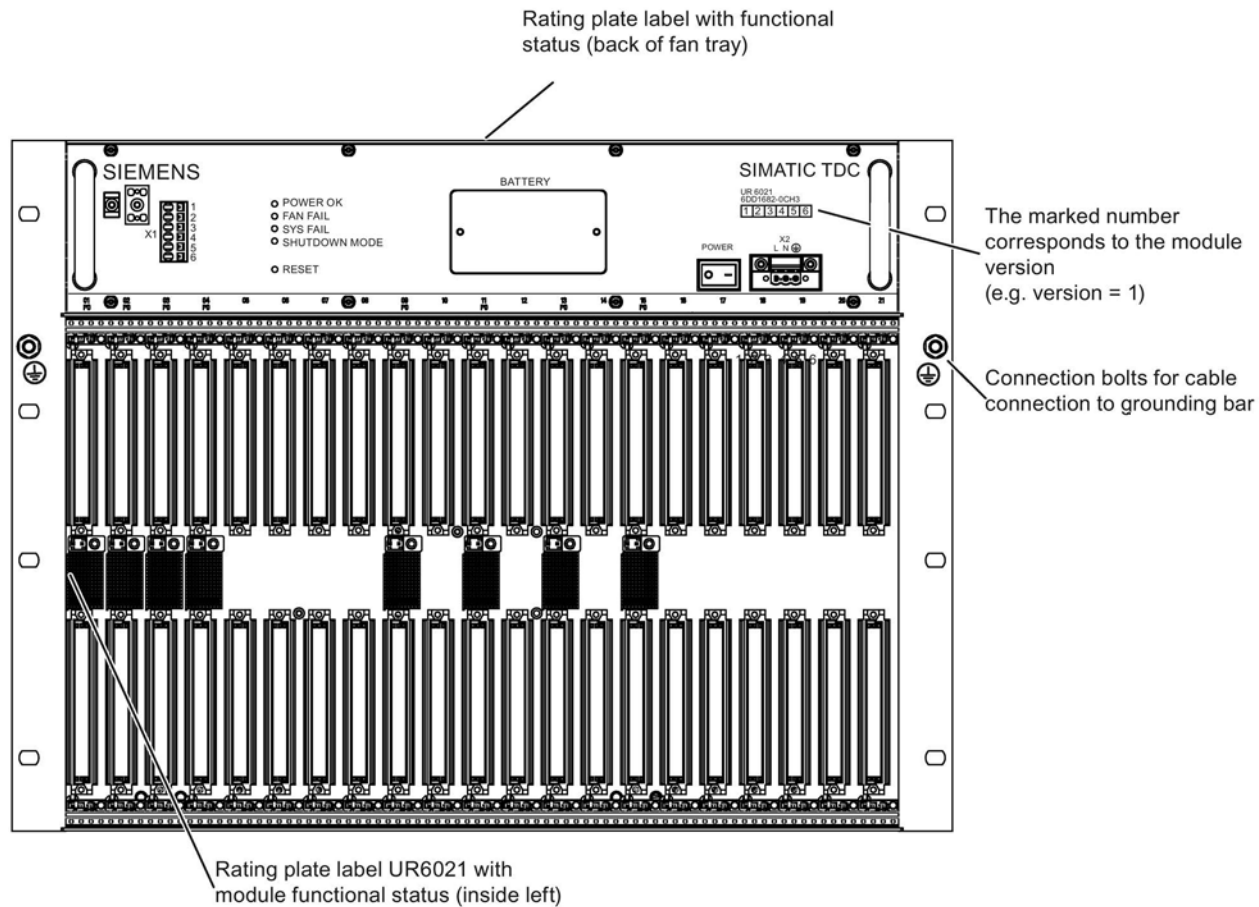


Figure 3-1 Rack UR6021 (front view)

Fan tray (6DD1683-0CH3)

The fan tray is inserted and screwed into the upper part of the rack. The fan tray contains six fans and the control and monitoring functions for the rack.

3.1.3 Control and display elements

X1

3 signaling relays, 230 V AC floating potential (3 x 2 contacts)

Note

Mixed assignment

Contacts consisting of combinations of safety extra-low voltage and hazardous voltages are not permitted.

SHUTDOWN MODE

A system shutdown mode can be set in accordance with the switch position S1.1 (in the battery compartment) as response to the failure of one or two fans.

- OFF = Shutdown on failure of two fans (SHUTDOWN MODE LED = on)
- ON = Shutdown on failure of one fan (SHUTDOWN MODE LED = flashes)

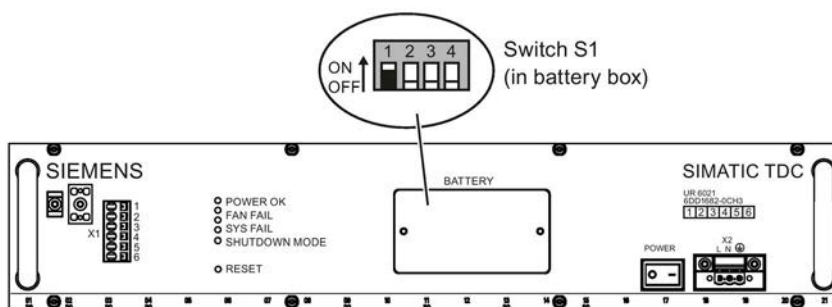


Figure 3-2 Front view of the fan tray

LED

The four LEDs signal the operating state of the rack.

RESET

You can restart all modules by pressing the submerged pushbutton (rack RESET).

BATTERY

Backup battery compartment (1 x AA lithium battery)

X2

Line voltage connection

3.1.4 Status and fault displays

Table 3- 1 Status displays for UR6021

LED	Display	Rack state
POWER OK (green or red)	green is on	fault-free operation
	red is on	fault (refer to voltage monitoring)
FAN FAIL (red)	Off	fault-free operation
	On	fault (at least one fan has failed)
SYSFAIL (red)	Off	fault-free operation
	On	System was stopped
SHUTDOWN MODE (yellow)	On	Shutdown on failure of two fans (corresponds to the OFF position of switch S1.1)
	Flashes	Shutdown on failure of one fan (corresponds to the ON position of switch S1.1)

3.1.5 Power supply

Mains connection

Mains is connected to the 3-pin screw terminal block on the right side of the power supply unit.

Note

Always use the integrated strain relief for the mains cable on the 3-pin screw terminal block.

The pin assignment is printed onto the front panel.

Input voltage	120/230 V AC 110/220 V DC
Test voltage Primary ↔ PE	1500 V AC
Power consumption	800 W (apparent power approx. 835 VA)
Cable cross-section	3 x 1.5 mm ² (copper stranded wires dressed with wire end ferrules with ISO insulating collars; stripped length: 10-12 mm according to the used wire end ferrule)
Input current	I _n = 9 A I _s = < 40 A (inrush peak)
External fuse (dimensioning)	The power supply is equipped with an internal 20 A fuse. This means that only the mains supply has to be fused. It is recommended to use a standard 16 A thermo magnetic circuit-breaker (B characteristic). Alternatively, a slow-acting fuse may be used.

Note

A mains disconnect unit must be provided during installation of the rack.

3.1.6 Wiring diagram

X2	Pin	Function
Screw terminal with screw lock (3x1.5 mm ² , stranded wires dressed with wire end ferrules with insulating collars) Make sure that the strain relief is properly mounted.	L	Line conductor
	N	Neutral conductor
		PE/ground conductor

X1	Pin	Function
Cage clamp terminal (0.5 mm ² —1.5 mm ² , stripped length 7 mm, stranded wires dressed with wire end ferrules with insulating collars) Make sure that the strain relief is properly mounted.	1, 2	SYSFAIL signaling contact
		NC contact
	3, 4	POWER signaling contact
		NO contact
	5, 6	FAN FAIL signaling contact
		NO contact

 WARNING
PE terminal The PE/ground conductor must be connected to the power supply. The PE/ground terminal on the rack (min. 6 mm ²) is inappropriate. The PE/ground conductor must be green with yellow stripe (green/yellow).

Ungrounded installation of the rack is not planned.

3.1.7 Voltage monitoring

Input voltage

The input voltage is monitored for low level.

Input voltage	Reaction
Undervoltage < approx. 85 V	ACFAIL signal and CPU STOP, shutdown of output voltages <85 V

Voltage dips ≤ 20 ms are buffered.

The power supply unit and therefore the system are restarted automatically on recovery from a voltage dip below the permissible mains voltage.

The power on/off sequence (e.g. generation of a RESET or SYSFAIL signal) corresponds to the reaction to manual operation of the mains switch.

Output voltage

All output voltages are monitored (e.g. for overload/short-circuit).

Voltage monitoring functions at the power supply outlet	Reaction
+5 V in the range from 4.75 V to 5.35 V	"POWER OK" LED is lit green;
+ 3.3 V in the range from +3.18 V to +3.5 V	
+ 12 V in the range from +11 V to +13 V	
- 12 V in the range from -11 V to -13 V	

In all other cases, the "POWER OK" LED is lit red.

System failure alarm

Select the "Object properties" in the "STOP" tab of **HW Config** to configure the response of the relevant module to a system failure alarm (bus signal *SYSFAIL=low):

- The other modules also change to STOP
- The other modules remain in RUN

3.1.8 Battery backup

Battery connection

A backup battery must be installed in the battery box to enable the backup of configured values on power failure (using SAV function blocks).

Technical specifications of the battery

Backup battery	
Article number	6ES7971-0BA00
Type	1 x Lithium AA
Rated voltage	3.6 V
Rated capacity	2.3 Ah

You may only use batteries that have been approved by Siemens!

 WARNING
Handling lithium batteries Risk of injury, damage to assets, and emission of pollutants. Improper handling of a Lithium battery may cause its explosion and incorrect disposal of used lithium batteries may lead to emission of pollutants. For these reasons, you should strictly observe the following notes: • Do not throw new or waste batteries into an open fire, or perform any soldering work on the cell body (max. temperature 100° C) • Do not recharge waste batteries - risk of explosion! • Do not open the battery. • Always replace battery with one of the same type. Always order replacements from Siemens. This ensures that you are in possession of a short circuit-proof type. • You should return waste batteries to the battery manufacturer, dispose of the batteries as special waste at a recycling facility.

Backup time

Sample calculation:

Capacity of the backup battery: 2.3 Ah, 63 % is assumed for calculation.

Backup current: 200 µA (monitoring 20 µA + max. 180 µA for the slots, CPU555/CPU551 needs 3 µA)

Backup time = $2.3 \text{ Ah} * 0.63 / 200 \text{ µA} = 7,245\text{h} = 300 \text{ days}$

This time is valid for a rack that is switched off. Only the battery monitoring function draws a current of 20 µA while the rack is powered on.

It is recommended to replace the batteries at annual intervals. The backup function is deactivated when the fan tray is removed.

Battery voltage monitoring

The CPU module inserted in slot 1 detects missing or low backup batteries and signals these states with a flashing "b".

Battery replacement

Unscscrew and remove the lid of the battery compartment to remove the battery.

Observe correct polarity when inserting the battery. You should also take care not to bend the connection tabs of the battery holder during replacement.

To prevent data loss, you should always replace the battery while the rack is powered on.

See also

Ventilation/cooling (Page 49)

3.1.9 Modules

Make sure that the modules you insert are properly aligned in their relevant slot.

NOTICE

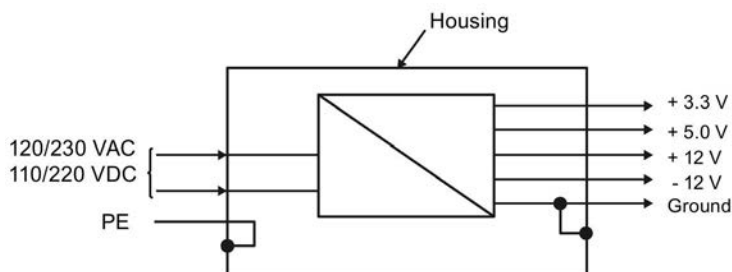
Damaging of the ESD braid

Do not push the modules towards the left when inserting these, because you would risk damage to the ESD braid of the modules already inserted. Observe this particularly at slot 1, as a metal spring has been installed in this slot.

If the ESD braid or a metal spring is severely damaged, the module can no longer be used because there is a risk of a short circuit with the potentials of a neighboring module.

3.1.10 Power supply potentials

In SIMATIC TDC, the ground connections of all secondary voltages are grouped and bonded to the rack enclosure in order to improve the signal to interference ratio and to ensure proper grounding.



3.1.11 Ventilation/cooling

The rack is equipped with a fan tray with 6 fans for forced convection of the modules and the system power supply.

Since the rack is not equipped with an air filter, you should provide a filter on the cabinet if necessary.

Note

For more information, refer to section "Control cabinet (Page 20)".

Note

FANOPH

Using the FANOPH function block, you can read out the operating hours counter of the fan from the first CPU555 and monitor it for a limit.

Fan monitor

The fans are monitored (speed). Activation of the monitoring function is delayed in order to enable the reliable startup of the rack after you switched on power.

On failure of one or two fans, the power supply is shut down depending on the operating mode in order to prevent thermal destruction of the modules.

The operating mode (SHUTDOWN MODE) is selected using switch S1.1, which is integrated in the power supply. The power supply is shut down if one fan has failed and switch position "ON" is set, or if two fans have failed and switch position "OFF" (default) is set.

NOTICE
Safe isolation from supply
Switch off power to the rack before you remove the screws of the battery compartment.

The battery compartment cover must be unscrewed to actuate switch S1.

NOTICE
ESD Directives
Observe the corresponding ESD directives.

The operating mode setting is indicated by the "SHUTDOWN MODE" LED on the front panel.

See section "Status and fault displays (Page 44)".

NOTICE
Forced cooling
If the modules require forced cooling (e.g. CPU555), always set the "SHUTDOWN MODE" slide switch S1.1 to "ON" for air intake temperatures from 0 °C to 60 °C.
You may only set the position of switch S1.1 to "OFF" if it can be ensured that the air intake temperature at the rack does not exceed 50 °C.
The power supply is not shut down on failure of a single fan, but the corresponding backplane bus signal (FANAL*) is activated and can be detected by the configuration software.

Replacing the fan tray

The fan tray is can be ordered as a replacement part and be replaced.



Fan try	
Article number	6DD1683-0CH3

Electrostatic sensitive components can be destroyed by voltages and power levels far below human perception. Components or modules are possibly exposed to such voltages when touched by humans who have not been not electrostatically discharged. Following such voltage peaks, it is usually impossible to identify malfunction of the component immediately, as it needs an extended operating time before such malfunctions are disclosed.

NOTICE

Replacing the fan tray

If the fan tray is damaged, it may not be installed.

Proceed as follows to replace the fan tray:

1. Make sure that the leads to X2 and possibly X1 are de-energized and secure them against reconnection.
2. Ensure that adjacent live parts cannot be touched.
3. Remove the power connector X2.
4. If necessary, remove the wires to X1 (including the strain relief and shield connection).
5. Loosen the 8 screws on the top and bottom of the fan tray.
6. Pull the fan tray out of the rack by the handles.

CAUTION

Sharp-edged front panel

The edges and corners of the front plate of the fan tray may cause injury. Use suitable protective gloves to remove and install it.

7. Slide the new fan tray into the rack until it clicks and the faceplate is flush to the front panel.
8. Fasten the fan tray (8 screws on the top and bottom of the fan tray).
9. Insert a new backup battery; see section "Battery backup (Page 47)".
- 10.If necessary, connect the wires to X1 (including the strain relief and shield connection).
- 11.Connect the power connector X2.
- 12.Switch on the power again.

Signaling relay

Three 230 V signaling relays with floating potential facilitate external evaluation of the rack system states.

NOTICE**Assignment of the contacts**

Contacts consisting of combinations of safety extra-low voltage and hazardous voltages are not permitted.

Signaling relay	Terminal X1	Contact in switched off state	Contact in error-free operation	LED in error-free operation
SYSFAIL	1.2	Closed	Closed	Off
POWER	3.4	Open	Closed	green is on
FAN FAIL	5.6	Open	Closed	Off

3.1.12 Technical specifications

Article number

Rack UR6021	6DD1682-0CH3
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General data

Safety	EN 61131-2
Degree of protection	IP 20
Protection class	Protection class 1 with PE/ground conductor

Storage temperatures	-40 °C to +70 °C
Operating temperatures	0 °C to +60 °C
Relative air humidity	5 % to 95 %, no condensation
Atmospheric pressure	Operation: 1080 hPa to 795 hPa Storage: 1080 hPa to 660 hPa

Power input

Rated input voltage	
- Rated value - Permissible range	120 V AC to 230 V AC 110 V DC to 220 V DC 85 V AC to 264 V AC (wide-range input) 93.5 V DC to 253 V DC
Rated input current	
- At 120 V AC - At 230 V AC - At 110 V DC - At 220 V DC	6.7 A 3.5 A 7.3 A 3.7 A
Max. inrush current	< 40 A
Line frequency	
- Rated value (AC) (DC) - Permissible range	50/60 Hz (0 Hz) 47-63 Hz
Power factor	EN 61000-3-2
Pollution degree	2
Overvoltage category	II
Power failure backup	min. 20 ms

Output voltages of the power supply

Rated output voltage	Output current	
	Total	for the modules
+5 V	120 A	79 A
+3.3 V	60 A	36 A
+12 V	17 A	5 A
-12 V	17 A	5 A

Note

Make sure that you do not exceed a total of 600 W (continuous load at 60 °C). This must be ensured in your configuration.

The output currents of the individual modules are listed in the respective description.

All outputs are sustained short circuit-proof and **do not** need a basic load.

Battery

Current load	Approx. 20 µA for the monitoring and max. 180 µA for the slots 1-21
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Relay contacts (X1)

Rated voltage (AC)	230 V (max. 264 V)
Rated current	2 A

NOTICE

Assignment of the contacts

Contacts consisting of combinations of safety extra-low voltage and hazardous voltages are not permitted.

Dimensions

Number of rack slots	21
Dimensions W x H x D [mm]	approx. 482.6 x 354.9 x 343
Weight	Approx. 20 kg

Dimensional drawing

Dimensions in mm

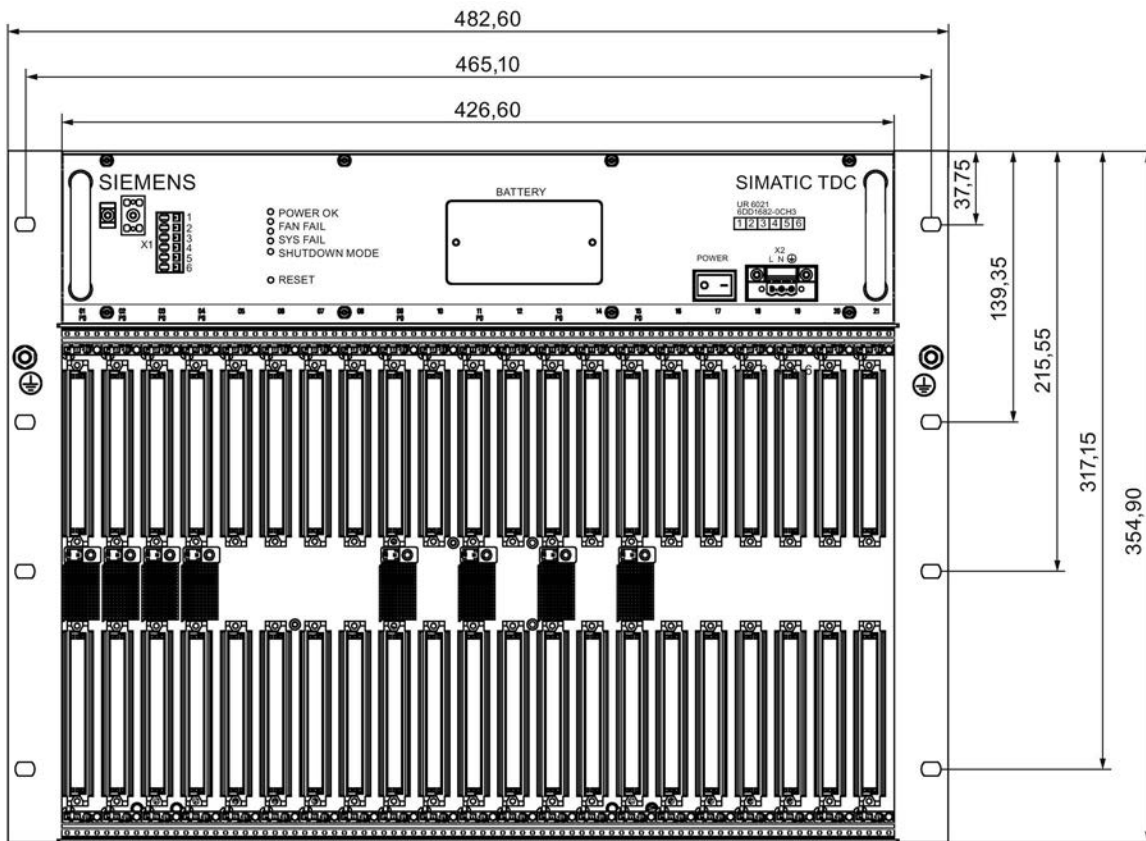


Figure 3-3 Dimension drawing of rack UR6021