

Resistive load bank case study 3600kW 950VAC 50/60Hz.

A 950 VAC, 3600 kW resistive load bank is an essential device for large-scale energy-storage systems, particularly in full-power discharge testing of battery packs configured with PCS (Power Conversion System). When integrated into the test platform, the load bank simulates real-world electrical consumption and enables operators to safely verify system performance under controlled and repeatable conditions.







Deyang Rata Technology Co. Ltd



Description	
Model No.	S3600L
Country of origin	China
Rated power capacity(PF 1.0)	3600 kW
Rated testing voltage	950 Vac
Frequency	50/60Hz.
Phases	3
Wires(Delta connection)	4
Load step resolution	60kW
Voltage Tolerance (Short Term Operation)	+5%
Load Element Tolerance	≤+2.5%
Insulation Test To Earth	2000 Vdc
Load Connections	Copper busbars
Protection	Thermal emergency cut out
	Air flow switch
	Fan overload protection
	Emergency stop
Control voltage(Auxiliary power supply)	380Vac (3P5W) 50HZ.
Airflow volume(Approx.)	75m³/kW/H
Airflow direction	Vertical upwards air forced cooling
Fans Nos.	10 pcs. (4kW each)
Load switching contactor type	AC contactors
Rated maximum ambient temp. operation	+50°C/+122°F
Rated minimum ambient temp. operation	-20°C/-4°F
Altitude rating	≤2000 [m.a.s.l] or customized
Control chamber IP rating	IP 54 outdoor
Enclosure material	Containerised carbon steel with marine grade painting.
Portabality	Standard ISO lifting points
Enclosure dimentions	
Length(mm)	5500
Width(mm)	2200
Height(mm)	2200
Weight of load bank with wind-shields (KG)	9,500 Maximum

Load bank control system	
Manual control	HMI touch screen
Remote control	Remote host PC software control
Communication	Modbus TCP



Details& parts



Load Switch & Protection.

Generally choosing **Siemens Syrius** series LV AC-1 contactors for resistive circuit. AC-4 contactors for reactive circuit.

Over current. fuse protection added.





Mains Copper Busbars

At the testing circuit. from the mains connection busbars till the fuse. copper busbars are used to **prevent over-heating** issues. avoid of high temp. effect.

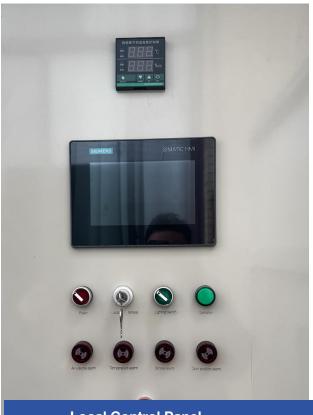


Industrial Axial Cooling Fans
700mm diameter. 3kW motor with
27000m³/hour air volume to blow resistor
blocks 360kW. Ensuring efficient air
dissipation.



Air-Exhaust Wind Chimney
10 wind chimney mounted on the top of load bank. to change air direction,
meanwhile weatherproof for the load bank container.





Local Control Panel
The control board is assembled with
Siemens HMI touch screen, buttons, alarm
indicators& Emergency stop. To simplify
the operations during load testings.



Resistive Load Element.
Finned stainless heating tubular.
Ni-chrome resistance core.
temperature tolerance @1200°C

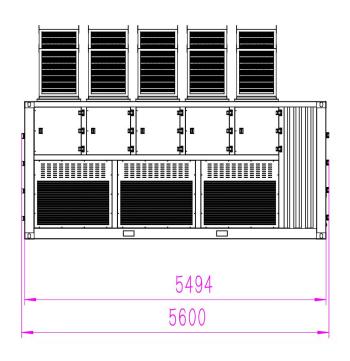


Resistors Mounting Process
Considering the voltage is 950Vac.
Resistors moutning board are using
high voltage insulation and
heat-resistant material (Multiple Epoxy
board L360).

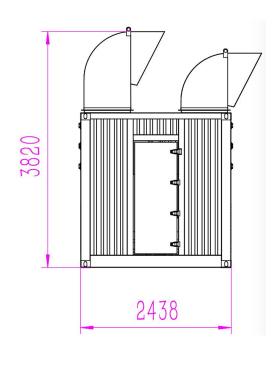
Resistors are serial connected by copper busbars and insulated by heating-shrikable tube.



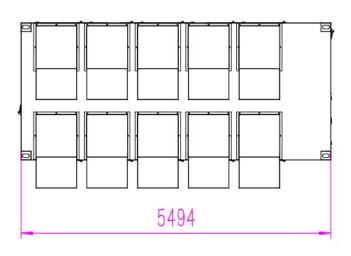
Engineering drawing



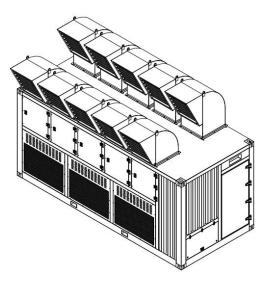
Front view



side view



Top view



General view



Understanding circuit of load banks

Overview of Load Bank Operation

A load bank receives electricity from a power source, converts it to heat, then ejects this heat from the unit. By consuming power in this way, it places a corresponding load on the power source. To do so, load banks absorb a massive amount of current. A 1000 kW, 480V load bank will continuously absorb more than 1200 amps per phase and will produce 3.4 million British Thermal Units of heat per hour. Load banks are typically used to

- (1) stress a power source for testing purposes, such as periodic testing of a generator;
- (2) affect the operation of the prime mover, such as providing minimum load to prevent the buildup of unburned exhaust residues in the diesel engines of gensets;

and/or (3) adjust the power factor of an electrical circuit. Load banks apply load by directing current through load elements that use resistance or other electrical effects to consume power.

Regardless of purpose of operation, any developed heat must be removed from the load bank to avoid overheating. Heat removal is typically accomplished using an electrically powered blower, which ejects hot exhaust out of the load bank.

Essential Load Bank Circuits

Separate circuits are used to operate the load elements, the blower system, and the devices that control them. Figure 1 provides a simplified one-line diagram of the relationship of these circuits. Each is further described in the following sections.

