Additional Examples

Consider the Renology AGM 200 battery with capacity table shown below. Compute the discharge current corresponding to the 5-hour rate.

Hour Rate	3 hr	5 hr	10 hr	20 hr
Capacity	152.9 Ah	172.3 Ah	190.5 Ah	200 Ah

Additional Examples

Consider the Renology AGM 200 battery with capacity table shown below. Compute the discharge current corresponding to the 5-hour rate.

Hour Rate	3 hr	5 hr	10 hr	20 hr
Capacity	152.9 Ah	172.3 Ah	190.5 Ah	200 Ah

$$\text{Discharge Current (A)} = \frac{\text{Charge Capacity (Ah)}}{\text{Hour Rate (h)}} = \frac{172.3}{5} = 34.46\text{A}$$

Additional Examples

Consider the Renology AGM 200 battery. How long will the battery be able to supply a constant current load of 25A before reaching its cut-off voltage? Assume the Peukert Exponent is 1.17.

Hour Rate	3 hr	5 hr	10 hr	20 hr
Capacity	152.9 Ah	172.3 Ah	190.5 Ah	200 Ah

Additional Examples

Consider the Renology AGM 200 battery. How long will the battery be able to supply a constant current load of 25A before reaching its cut-off voltage? Assume the Peukert Exponent is 1.17.

Hour Rate	3 hr	5 hr	10 hr	20 hr
Capacity	152.9 Ah	172.3 Ah	190.5 Ah	200 Ah
Current	50.97A	34.46 A	19.05 A	10 A

Computing the current for each capacity in the table, we see that 25A lies between the 5 hour and 10 hour rates, but is closer to the 10 hr rate. Apply Peukert's equation based on the 10 hour rate

Additional Examples

Consider the Renology AGM 200 battery. How long will the battery be able to supply a constant current load of 25A before reaching its cut-off voltage? Assume the Peukert Exponent is 1.17.

Hour Rate	3 hr	5 hr	10 hr	20 hr
Capacity	152.9 Ah	172.3 Ah	190.5 Ah	200 Ah
Current	50.97A	34.46 A	19.05 A	10 A

$$C_{25} = C_{x_r}\left(\frac{x_r}{x}\right)^{k-1} = 190.5\left(\frac{19.05}{25}\right)^{1.17-1} = 181.9 \text{ Ah}$$

This looks believable because it should be between 172.3Ah and 190.5 Ah

Additional Examples

- Consider the battery bank shown consisting of six 12V, Renology AGM 200 batteries. Compute the battery bank voltage, charge capacity, and energy capacity at the 20 hour rate.

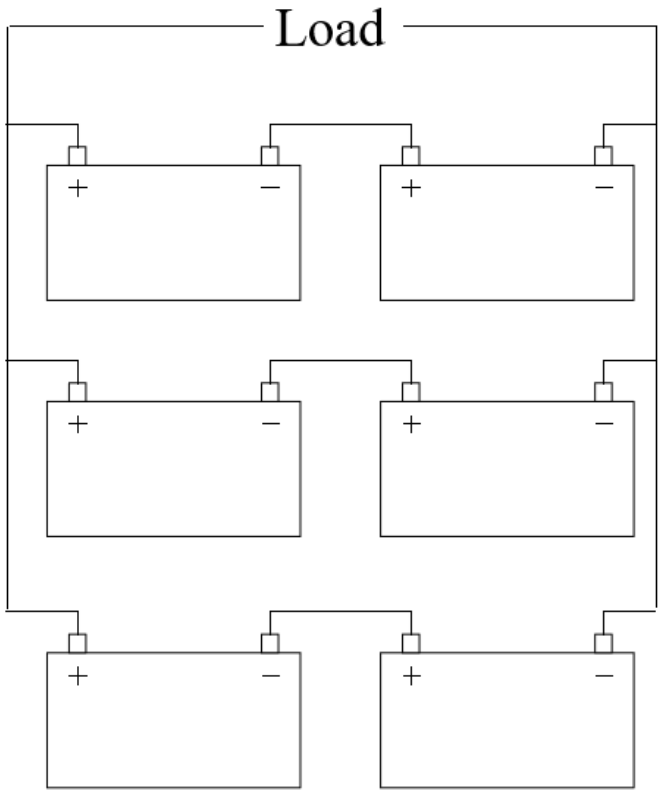
Hour Rate	3 hr	5 hr	10 hr	20 hr
Capacity	152.9 Ah	172.3 Ah	190.5 Ah	200 Ah
Current	50.97A	34.46 A	19.05 A	10 A

$$\text{Hour Rate (h)} = \frac{\text{Charge Capacity (Ah)}}{\text{Discharge Current (A)}} = \frac{181.9}{25} = 7.28\text{hr}$$

Additional Examples

- Consider the battery bank shown consisting of six 12V, Renology AGM 200 batteries. Compute the battery bank voltage, charge capacity, and energy capacity at the 20 hour rate.

Hour Rate	3 hr	5 hr	10 hr	20 hr
Capacity	152.9 Ah	172.3 Ah	190.5 Ah	200 Ah
Current	50.97A	34.46 A	19.05 A	10 A

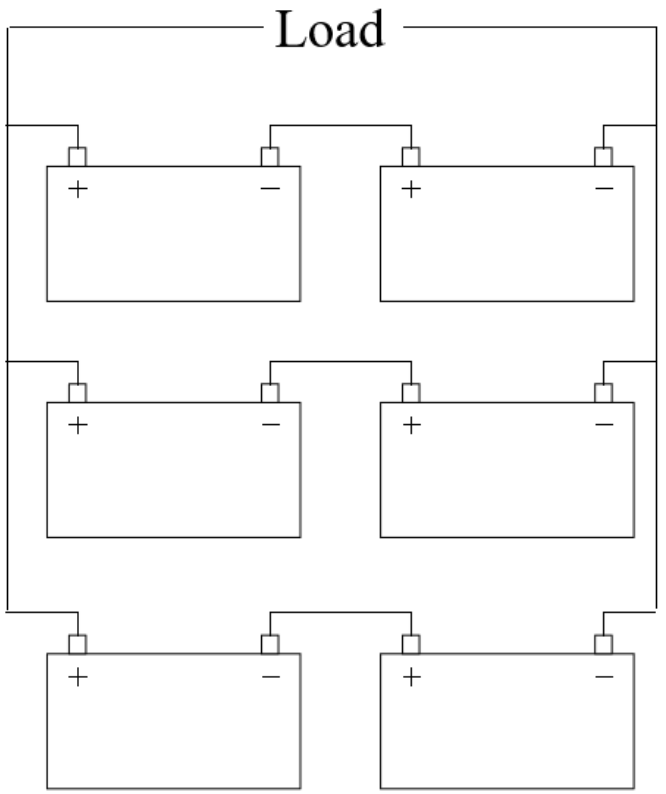


Additional Examples

- Consider the battery bank shown consisting of six 12V, Renology AGM 200 batteries. Compute the battery bank voltage, charge capacity, and energy capacity at the 20 hour rate.

Hour Rate	3 hr	5 hr	10 hr	20 hr
Capacity	152.9 Ah	172.3 Ah	190.5 Ah	200 Ah
Current	50.97A	34.46 A	19.05 A	10 A

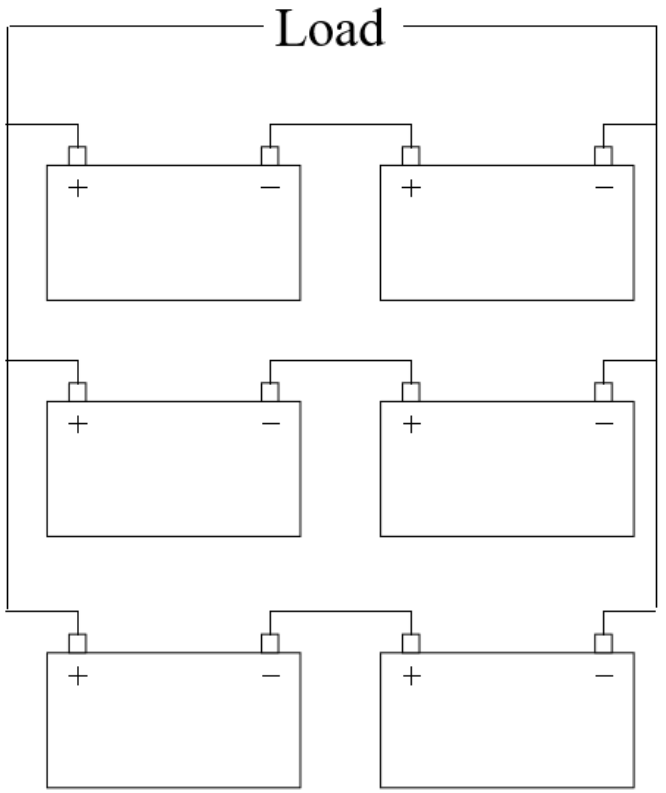
Battery bank voltage: 2 x 12 V =24 V (two in series)
Charge Capacity: 200 Ah x 3 = 600 Ah (three strings)
Energy Capacity: 6 x 12V x 200 Ah = 14.4 kWh (six batteries total)



Additional Examples

- Estimate how long the battery bank can supply a 60 A load until the cut-off voltage is reached?

Hour Rate	3 hr	5 hr	10 hr	20 hr
Capacity	152.9 Ah	172.3 Ah	190.5 Ah	200 Ah
Current	50.97A	34.46 A	19.05 A	10 A

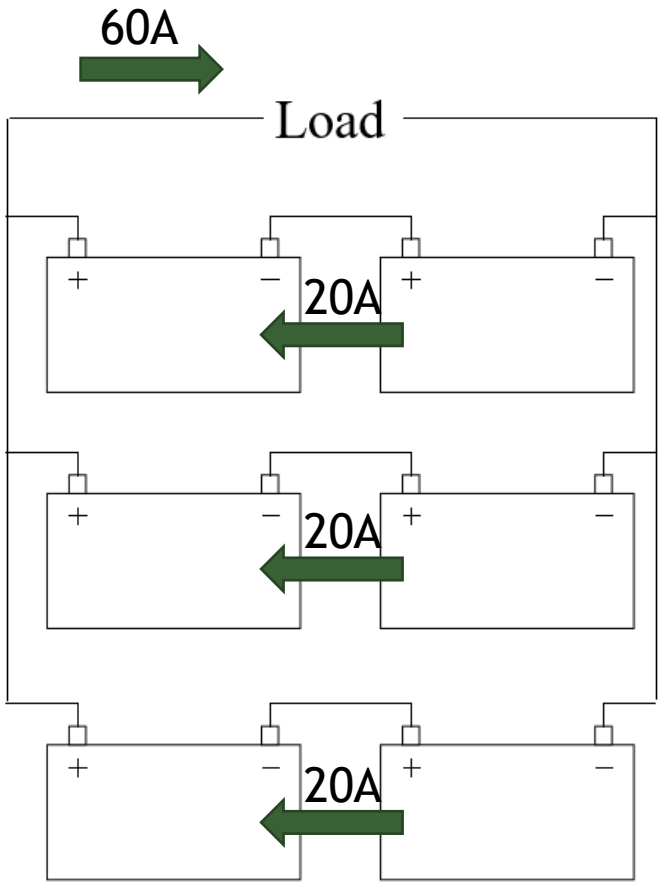


Additional Examples

- Estimate how long the battery bank can supply a 60 A load until the cut-off voltage is reached?

Hour Rate	3 hr	5 hr	10 hr	20 hr
Capacity	152.9 Ah	172.3 Ah	190.5 Ah	200 Ah
Current	50.97A	34.46 A	19.05 A	10 A

The current is divided evenly between the three strings. Each string (and battery) supplies 20 A.

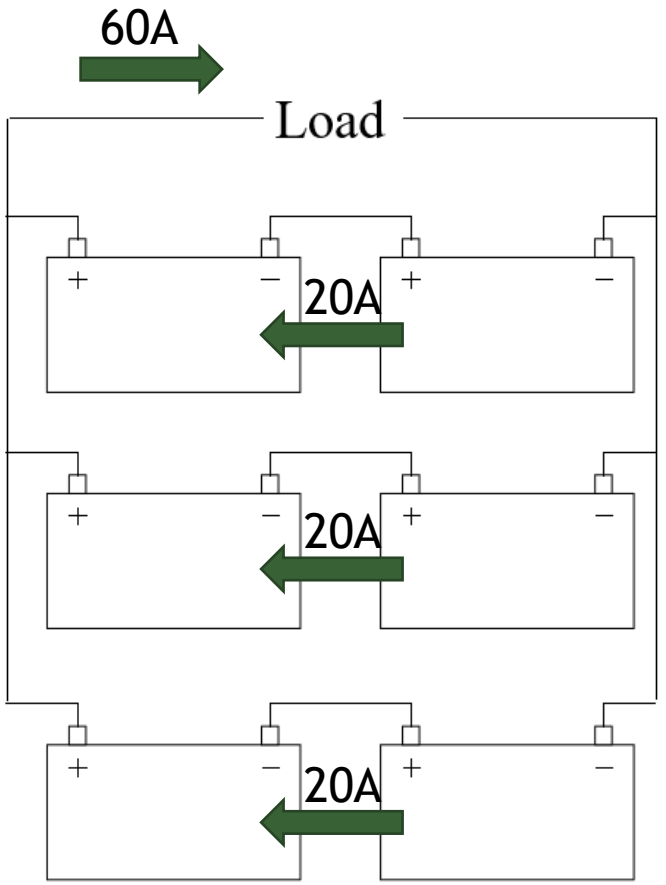


Additional Examples

- Estimate how long the battery bank can supply a 60 A load until the cut-off voltage is reached?

Hour Rate	3 hr	5 hr	10 hr	20 hr
Capacity	152.9 Ah	172.3 Ah	190.5 Ah	200 Ah
Current	50.97A	34.46 A	19.05 A	10 A

The capacity at a discharge current of 20A is not in the table, so estimate the capacity using Peukert's equation. The result should be close to the 10-hour rate since this rate corresponds to 19.05A.



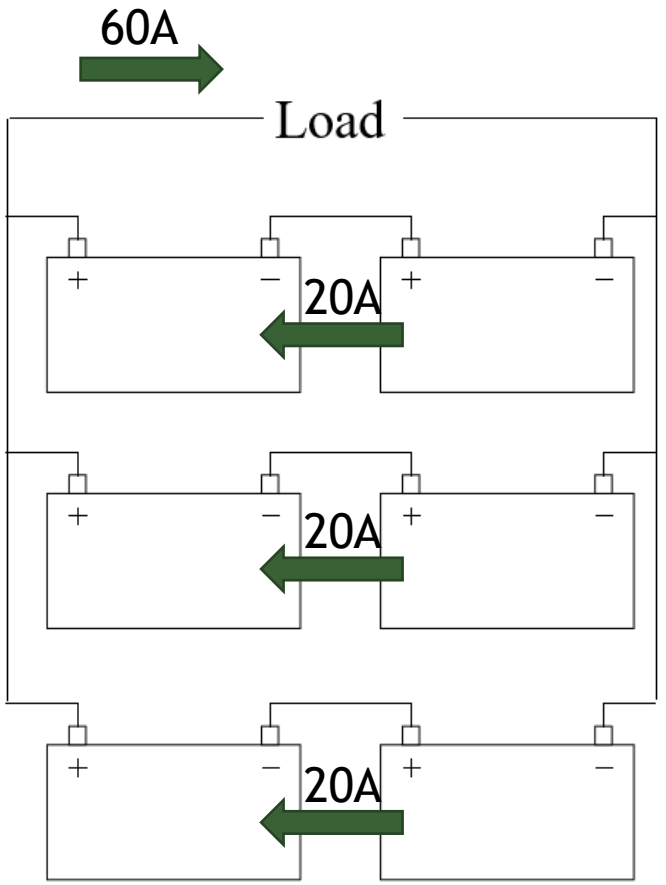
Additional Examples

- Estimate how long the battery bank can supply a 60 A load until the cut-off voltage is reached?

Hour Rate	3 hr	5 hr	10 hr	20 hr
Capacity	152.9 Ah	172.3 Ah	190.5 Ah	200 Ah
Current	50.97A	34.46 A	19.05 A	10 A

$$C_{20} = C_{x_r}\left(\frac{x_r}{x}\right)^{k-1} = 190.5\left(\frac{19.05}{20}\right)^{1.17-1} = 188.9 \text{ Ah}$$

$$\text{Hour Rate (h)} = \frac{\text{Charge Capacity (Ah)}}{\text{Discharge Current (A)}} = \frac{188.9}{20} = 9.44\text{hr}$$



Additional Examples

- What is the energy capacity when the battery bank is discharged at 60A?

Hour Rate	3 hr	5 hr	10 hr	20 hr
Capacity	152.9 Ah	172.3 Ah	190.5 Ah	200 Ah
Current	50.97A	34.46 A	19.05 A	10 A

Energy Capacity: 6 x 12V x 188.9 Ah = 13.6 kWh (six batteries total)