

## SolarTech Power Solutions

# Energy storage system backup time requirements



## Overview

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How to calculate backup time for a 3 kW load?

Estimate backup duration for a 3 kW load using a 12 V, 150 Ah battery bank. Calculating UPS backup time involves understanding battery capacity, load power, and system efficiencies. The following formulas are essential for precise estimation. 1. Basic Backup Time Formula Battery Voltage (V): Nominal voltage of the battery bank.

How long does a data center need a UPS backup?

A data center requires a UPS backup for a 5,000 W load. The battery bank consists of 48 V nominal voltage and 100 Ah capacity. The system uses lead-acid batteries with a DoD of 0.6, battery discharge efficiency of 0.9, and UPS efficiency of 0.95. Calculate the expected backup time. Step 1: Identify known values Calculate numerator:  $48 \times 100 = 4,800$ .

How to calculate UPS backup time?

Calculating UPS backup time involves understanding battery capacity, load power, and system efficiencies. The following formulas are essential for precise estimation. 1. Basic Backup Time Formula Battery Voltage (V): Nominal voltage of the battery bank. Battery Capacity (Ah): Ampere-hour rating of the battery bank.

How to calculate battery backup time?

The battery bank consists of 48 V nominal voltage and 100 Ah capacity. The system uses lead-acid batteries with a DoD of 0.6, battery discharge efficiency of 0.9, and UPS efficiency of 0.95. Calculate the expected backup time. Step 1: Identify known values Calculate numerator:  $48 \times 100 = 4,800$   $4,800 \times 0.6 = 2,880$ .

How long can an industrial ups provide backup power?

The UPS can provide backup power for approximately 29.5 minutes under the

given conditions. An industrial UPS supports a 3,000 W load. The battery bank is 12 V nominal with 150 Ah capacity. Peukert's exponent is 1.15. Calculate the backup time considering Peukert's effect. Calculate  $250^{1.15}$ :  $250^{1.15} \approx 250 \times (250^{0.15}) \approx 250 \times 2.24 \approx 560$ .

What is a battery energy storage system (BESS) & an uninterruptible power supply (UPS)?

Figure 1: A simplified project single line showing both a battery energy storage system (BESS) and an uninterruptible power supply (UPS). The UPS only feeds critical loads, never losing power.

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