solar requirement for ev charging need of min volage why?

To calculate **Amp-hours (Ah)** from **kilowatts (kW)** and **voltage (V)**, follow these steps:

**Step 1: Convert kW to Watts**

Since 1 kW = 1000 W, multiply the power in kW by 1000 to get watts (W).

P(W)=P(kW)×1000*P*(*W*)=*P*(*kW*)×1000

**Step 2: Calculate Current (Amperes, A)**

Use the formula:

I(A)=P(W)V(V)*I*(*A*)=*V*(*V*)*P*(*W*)​

Where:

* I*I* = Current in Amperes (A)
* P*P* = Power in Watts (W)
* V*V* = Voltage in Volts (V)

**Step 3: Calculate Amp-hours (Ah)**

If you have a **time duration (hours)**, multiply the current (A) by time (h) to get Ah:

Ah=I(A)×t(h)*Ah*=*I*(*A*)×*t*(*h*)

If you're calculating for **1 hour**, then Ah=I(A)×1=I(A)*Ah*=*I*(*A*)×1=*I*(*A*).

**Final Formula:**

Ah=kW×1000V×t(h)*Ah*=*VkW*×1000​×*t*(*h*)

**Example Calculation:**

**Given:**

* Power = 5 kW
* Voltage = 48 V
* Time = 2 hours

**Solution:**

1. Convert kW to W:

5 kW×1000=5000 W5 kW×1000=5000 W

1. Calculate current (A):

I=500048=104.17 A*I*=485000​=104.17 A

1. Calculate Ah:

Ah=104.17×2=208.33 Ah*Ah*=104.17×2=208.33 Ah

**Final Answer:**

208.33 Ah208.33 Ah​

This means a **5 kW system at 48 V running for 2 hours** consumes **208.33 Ah**.

Let me know if you need further clarification!

i have a solar cell 750 watt and 48 volt max can i charge battery of 120 volts through using boost converter

**Can You Charge a 120V Battery with a 750W, 48V Solar Panel Using a Boost Converter?**

**Short Answer:**  
**Yes, but with limitations.** You can use a **boost converter** to step up the 48V from the solar panel to 120V to charge the battery, but the **power (750W) and current limits** will affect charging speed and efficiency.

**Key Considerations:**

**1. Power (W) vs. Voltage (V) & Current (A)**

* Your solar panel provides **750W at 48V** (max).

Iinput=750W48V=15.63A(input current)*Iinput*​=48*V*750*W*​=15.63*A*(input current)

* To charge a **120V battery**, the **output current** will be lower due to higher voltage:

Ioutput=750W120V=6.25A(output current)*Ioutput*​=120*V*750*W*​=6.25*A*(output current)

* + This means the **charging current** to the battery will be **only 6.25A** (before losses).

**2. Boost Converter Efficiency**

* A typical boost converter is **~90% efficient**, meaning:

Poutput=750W×0.90=675W(usable power)*Poutput*​=750*W*×0.90=675*W*(usable power)

* + Now, the **actual charging current** drops further:

Icharging=675W120V=5.63A*Icharging*​=120*V*675*W*​=5.63*A*

**3. Battery Capacity & Charging Time**

* If your battery is **120V, 100Ah**, it needs:

Total energy=120V×100Ah=12,000WhTotal energy=120*V*×100*Ah*=12,000*Wh*

* + At **675W**, the **theoretical charging time** (0% to 100%) would be:

t=12,000Wh675W≈17.78 hours*t*=675*W*12,000*Wh*​≈17.78 hours

* + In reality, charging slows as the battery fills, so expect **longer times**.

**4. Solar Panel Real-World Performance**

* Solar panels rarely produce **full 750W continuously** (due to weather, angle, etc.).
* You may need **MPPT (Maximum Power Point Tracking)** to optimize power extraction.

**Practical Solution:**

1. **Use a Boost Converter with MPPT**
   * A **48V to 120V DC-DC boost converter** (rated for at least **750W input**) is needed.
   * MPPT ensures maximum power transfer from the solar panel.
2. **Check Battery Compatibility**
   * Ensure the battery can handle **~5.6A charging current** (slow charging).
   * Lithium batteries usually support variable voltage charging, but lead-acid may need a charge controller.
3. **Consider Higher Power or Series Panels**
   * If faster charging is needed, you might need:
     + **More solar panels (higher total wattage)**.
     + **Series connection** (e.g., two 48V panels in series = 96V, reducing boost needed).

**Final Verdict:**

✅ **Yes, it’s possible** with a **750W → 120V boost converter**, but:

* Charging will be **slow (~5.6A at 120V)**.
* Efficiency losses reduce usable power to **~675W**.
* Solar panel output fluctuates (expect longer charging in real conditions).

⚠️ **For faster charging, increase solar power (e.g., 1500W) or use a higher-voltage panel setup.**

Would you like help selecting a suitable boost converter or designing a better system? 🚀

i have 48 volts battery pack and i am using mppt tech. for charging it throught solar cell my solar cell has 700 watt capacity and it has max. current of 56 volts what is min. current at which charging starts

**Minimum Current for Charging a 48V Battery with a 700W, 56V Solar Panel (Using MPPT)**

**1. Key Parameters:**

* **Solar Panel:**
  + Max Power (Pₘₐₓ) = **700W**
  + Open-Circuit Voltage (Vₒₖ) = **~56V** (likely higher under no load)
  + Maximum Power Voltage (Vₘₚ) = **~48V–52V** (typical for MPPT operation)
  + Maximum Power Current (Iₘₚ) = **~700W / 52V ≈ 13.5A** (at optimal conditions)
* **Battery Pack:**
  + Nominal Voltage = **48V**
  + Charging Voltage Range = **~54V–58V** (depending on chemistry: LiFePO₄, Lead-Acid, etc.)
* **MPPT Charge Controller:**
  + Converts excess panel voltage into additional current for the battery.
  + Operates only when solar input exceeds battery voltage + MPPT overhead (~5–10V).

**2. Minimum Current to Start Charging:**

The **MPPT will start charging** when:

1. **Solar Voltage > Battery Voltage + MPPT Minimum Overhead**
   * Typically, **Vₛₒₗₐᵣ > Vᵦₐₜₜ + 5V** (e.g., 48V battery → **panel must provide ≥53V**).
   * Your panel's **Vₘₚ (~52V)** may be too close to the battery voltage, meaning charging starts only under **strong sunlight**.
2. **Solar Current > MPPT Threshold Current**
   * Most MPPTs require **at least 5–10% of Iₘₚ** to begin charging.
   * For your panel (Iₘₚ ≈ 13.5A), the **minimum current is usually ~1–2A**.

**Formula:**

Imin≈PminVbatt*Imin*​≈*Vbatt*​*Pmin*​​

* If the MPPT needs **~20W** to start:

Imin=20W48V≈0.42A*Imin*​=48*V*20*W*​≈0.42*A*

* In practice, **~1A** is a common threshold.

**3. Real-World Scenario:**

* **Dawn/Dusk/Low Light:**
  + Panel voltage may exceed 53V, but current drops to **<1A** → **MPPT may not activate**.
* **Morning/Evening (Partial Sun):**
  + Panel provides **2–5A** → **charging starts slowly**.
* **Full Sun:**
  + Panel delivers **13.5A** → **MPPT runs at full efficiency (~700W)**.

**4. How to Improve Low-Light Charging:**

1. **Check MPPT Specifications:**
   * Some controllers (e.g., Victron, EPEVER) allow adjustment of the **startup current threshold**.
2. **Tilt Solar Panel Toward Sun:**
   * Improves early-morning/late-evening light capture.
3. **Use a Higher-Voltage Panel:**
   * A panel with **Vₘₚ ≥ 60V** ensures excess voltage for MPPT to work even in low light.

**Final Answer:**

✅ **Charging typically starts at ~1–2A (48W–96W)**, but depends on:

* MPPT controller model (some need as low as **0.5A**).
* Solar panel voltage (must stay **>53V** to overcome battery voltage + MPPT overhead).

⚠️ **In very low light (e.g., clouds/dawn), the current may drop below 1A, preventing charging.**

Would you like help selecting an MPPT with a low startup current?

means 1am min . current needed

**Short Answer:**

**Yes, typically ~1A or more** is needed for your **48V battery + MPPT solar charger** to start charging from a **700W (56V max) solar panel**.

But the **exact minimum current** depends on:

1. **Your MPPT's startup threshold** (usually **1–2A** for most controllers).
2. **Battery voltage** (if the battery is deeply discharged, charging starts at lower current).
3. **Solar panel voltage** (must stay **>53V** to overcome MPPT overhead).

**Detailed Explanation:**

**1. MPPT Minimum Operating Current**

Most MPPT charge controllers require:

* **Minimum solar voltage:** **Vₛₒₗₐᵣ > Vᵦₐₜₜ + 5V**
  + Example: For a **48V battery**, panel must supply **>53V** (your panel hits **56V**, so this is fine).
* **Minimum solar current:** **~1A or higher** (varies by MPPT model).

If the solar panel produces **<1A**, the MPPT may **not activate** charging, even if voltage is sufficient.

**2. When Does Your System Start Charging?**

| **Condition** | **Solar Voltage** | **Solar Current** | **Will Charging Start?** |
| --- | --- | --- | --- |
| **Dawn/Dusk (Weak Light)** | ~54V | **<0.5A** | ❌ No (current too low) |
| **Cloudy/Overcast** | ~55V | **0.5–1A** | ⚠️ Maybe (depends on MPPT) |
| **Morning/Evening (Partial Sun)** | ~56V | **1–2A** | ✅ Yes (charging starts) |
| **Full Sun (Peak Power)** | ~52V (Vₘₚ) | **13.5A** | ✅ Yes (full power) |

**3. How to Improve Low-Light Charging?**

If your system struggles to start charging in low light:

1. **Use an MPPT with a lower startup current** (e.g., Victron SmartSolar can start at **~0.5A**).
2. **Tilt the solar panel** toward the sun for better early/late light capture.
3. **Check battery voltage** – if it’s very low (e.g., **<45V**), charging may start easier.

**Final Verdict:**

* **✅ Charging starts at ~1A (48W) or higher** in most cases.
* **❌ Below 0.5A**, the MPPT likely won’t activate.
* **⚡ For best results**, ensure strong sunlight or use an MPPT with a low-current startup.

Would you like recommendations for **low-current-start MPPT charge controllers**? 🚀