Application Note:
Time of Use (TOU)

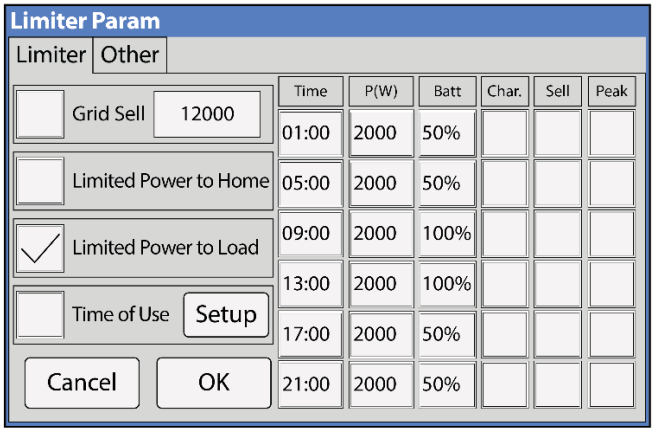
Follow these guidelines for setting up **Time of Use** (TOU) on your residential Sol-Ark inverter.

Introduction

TOU settings let you choose when the battery supplies power while connected to the grid. This means that you can use your batteries for more than emergency backup. TOU can also control a generator in some off-grid systems.

Set Up Time of Use

Go to **Grid Param > Limiter** to see the **Limiter Param** screen.



The **Limiter** tab controls battery charge and discharge when the inverter is connected to grid power or other AC power sources.

The settings on the **Limiter** tab are explained below.

Time

The **Time** setting shows when each time block starts.

- The day has six time blocks. After Time 6, the schedule starts again at Time 1.
- Time settings must be in chronological order from 0000 to 2400.
- You can change the time format to 12-hour AM/PM in **Basic Setup > Display.**

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Power (W)

The **Power (W)** setting limits how much power the battery can supply during each time block.

- If there is no solar power and the loads exceed the **Power (W)** setting, the Sol-Ark will use another available source, such as grid power, to supply the remaining loads.

Batt (% / V)

The **Batt** setting shows the battery voltage (V) or percentage (%) limit for each time block.

- This value depends on the settings in **Batt Setup > Batt menu > Use % / Use V**.
- This value changes depending on whether the **Charge** or **Sell** check boxes are selected.

Charge

The **Charge** check box lets an AC source charge the battery during a time block. Charging stops when the battery reaches the **Batt %** setting.

- Solar power will *always* charge the battery regardless of whether **Charge** is selected.

Sell

The **Sell** check box sends battery power to the grid at the **Power (W)** setting until the battery reaches the **Batt %** setting.

NOTE: DO NOT ENABLE BOTH CHARGE AND SELL BOXES DURING ANY TIME BLOCK, BECAUSE IT MAY CAUSE UNINTENDED BEHAVIOR.

Different Operating Modes Affecting TOU

Grid Sell + Time of Use

*This mode uses solar and battery power to send the set **Power (W)** through the **GRID** terminals.*

If solar power reaches the **Max Sell** value (the number next to **Grid Sell**), the inverter will not discharge the battery.

You do not need to select the **Charge** boxes to sell battery power. The inverter sends the set **Power (W)** through the **GRID** terminals until the system reaches **Max Sell** or the battery reaches the **Batt %** setting.

- Solar production will try to match the **Max Sell** value.
- Power production depends on the loads being supplied.
- Power sent back to the **GRID** terminals may not all be sold to the grid.
- Loads in the main service panel may use some or all of this power.
- To monitor the actual amount of power sold to the grid, use **Limited Power to Home** mode with the supplied CTs.

Example 1 for 12K-2P-LV

10 kW Solar Array | Max Sell Value = 9,000 W | Crit Loads = 2,000 W | Home Loads = 1,000 W | Power (W) value = 4,000 W for all time slots.

*Assume full sun.

1. Solar power first supplies the 2,000 W critical loads. The battery is not needed.
2. After the power leaves the **GRID** terminals and arrives at the Main Service Panel, home loads use 1,000 W.
3. The Sol-Ark inverts 6,000 W more than the loads require.
4. The system sells 9,000 W to the grid. This includes 6,000 W of solar power left after supplying the loads and an additional 3,000 W based on the 4,000 W TOU setting.

Example 2 for 12K-2P-LV

10 kW Solar Array | Max Sell Value = 9,000 W | Crit Loads = 2,000 W | Home Loads = 1,000 W | Power (W) value = 4,000 W for all time slots.

*Assume half sun (only 5 kW of solar power available).

1. The Sol-Ark inverts the 5 kW and supplies the 2,000 W critical load on the Load Breaker.
2. After the power leaves the **GRID** terminals and arrives at the Main Service Panel, home loads use 1,000 W.
3. Because the **Max Sell** value is 9,000 W, the system uses 4,000 W from the battery.
4. The system sells 6,000 W to the grid. This includes 2,000 W of solar power left after supplying the loads and 4,000 W from the battery based on the TOU setting.

Example for 15K-2P-LV with Whole-Home Backup

15 kW Solar Array | Max Sell Value = 15,000 W | Home Loads = 9,000 W | Power (W) value = 4,000 W for all time slots.

*Assume full sun.

1. The inverter produces enough to cover the loads (9,000 W of solar) and powers the home's whole 9,000 W load.
2. The inverter produces enough power to reach the **Max Sell** value without going over its 15 kW limit.
3. The loads use 9,000 W, and the remaining 6,000 W is sold to the grid. The battery cannot supply more power because the inverter has reached its power limit. All power sent through the GRID terminal is sold to the grid because the terminal is directly connected to the grid.

Limited Power to Home + Time of Use

Install the CT sensors in the correct location and with the correct polarity to use this mode.

This combination uses solar power to charge the battery and power the whole-home load when available.

1. The battery powers the home when PV is not available or cannot supply the full load.
2. The battery keeps supplying power until it reaches the **Batt %** setting. Its output cannot exceed the **Power (W)** setting for that time slot.
3. If there's not enough solar and battery power to meet the loads, the inverter draws from the grid to power the remaining loads.
   - Charge boxes use the grid to charge the battery.
   - Sell boxes sell battery power back to the **GRID** terminal up to the **Power (W)** setting until the battery SOC reaches the **Batt %** setting.

Limited Power to Home + Time of Use + Grid Sell

This mode is similar to Limited Power to Home + Time of Use and requires CT sensors in the correct location and with the correct polarity.

1. Instead of matching the home's load, the PV system produces as much power as possible.
2. The inverter uses PV power for the loads and to charge the battery. It sells extra power to the grid.

Limited Power to Load + Time of Use

In this mode, PV power charges the battery and powers the critical-load subpanel when available.

1. When PV power is not available or cannot supply the full load, the battery powers the critical-load subpanel.

   The battery stops discharging when it reaches the **Batt %** or **V** limit in the TOU table. Battery output cannot exceed the Power (W) setting.

2. If PV and battery power cannot supply the loads, the inverter uses grid power to supply the critical-load subpanel.

Note: Some installations have upstream loads that use part of the power produced. If you want to monitor this usage, set up **Limited Power to Home** mode with the proper CTs.

Limited Power to Load + Time of Use + Grid Sell

This mode is similar to **Limited Power to Load + Time of Use**. Instead of matching the critical-load subpanel, the PV system produces as much power as possible. PV power supplies the critical-load subpanel and charges the battery. Any remaining power is sold to the grid.

Note: Some installations have upstream loads that use part of the power produced. If you want to monitor this usage, set up **Limited Power to Home** mode with the proper CTs.

Off-Grid Generator Control Function

TOU is not normally used off-grid. However, you can use it to control a generator while charging batteries.

- For an off-grid system with a two-wire auto-start generator, select the **Charge** boxes. The generator control relay opens the circuit and shuts down the generator when the battery SOC reaches the **Batt** setting.
- The generator starts based on the settings in **Batt Setup > Charge**, not the TOU settings. Select all **Charge** check boxes so the generator can charge the battery during any time slot.

Grid Peak Shaving

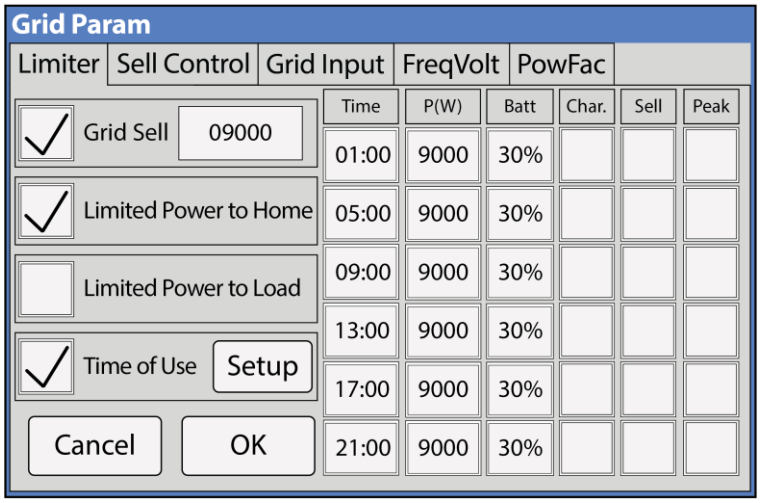
If you're using the **Grid Peak Shaving** option on the inverter, TOU will automatically turn on. TOU must be on during grid peak shaving.

Do not make any changes to the TOU setup menu when using **Grid Peak Shaving**. Doing this may cause unexpected issues with the Sol-Ark inverter.

TOU Setup Examples

On-Grid: Offset Loads Overnight, Charge During the Day Without Buying from Grid, and Sell Excess PV

This is the most common use of TOU. The Sol-Ark inverter limits how much power is imported from the grid.



Time

You can adjust the **Time** value to match sunrise and sunset in your area.

Power (W)

The **Power (W)** setting will depend on the Ah rating of your battery bank.

For example, if your **Max A Charge/Discharge** (**Batt Setup menu > Batt**) is 185 A, then you can set the **Power (W)** value to 9,000 W.

Batt

Set the **Batt** value (**V** or **%)** based on the battery bank's Ah rating and the manufacturer's recommendation.

Lithium batteries

Generally, lithium (LiFePO4) batteries can be deeply cycled each day (30% in the example above).

Charge

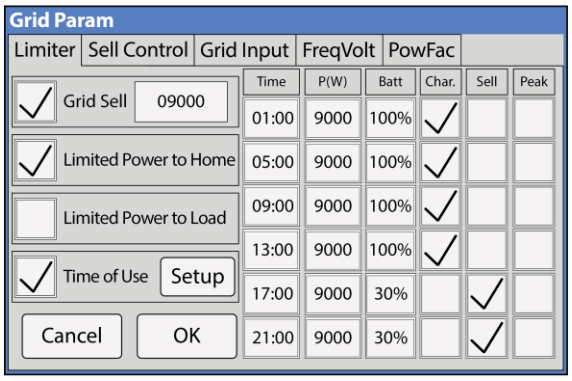
If you select the **Charge** check box, the grid or generator charges the battery until it reaches the selected **SOC** % or **V**.

- If the battery is below the **Batt** value when the charge time period begins, the grid charges it until it reaches the **Batt** value.
- The generator starts charging at the **Gen/Grid Start %/V** setting and stops when the battery reaches the **Batt** value.
- Charging can start again at the **Gen/Grid Start %/V** setting or at the start of a new time slot.

Sol-Ark does not recommend enabling the **Sell** check box in this case.

On-Grid: Utility Charges Higher Rates During Peak Hours (4:00-9:00 p.m.) — Sell Power from Batteries to Ensure No Grid Import at Chosen Time

This setup is common in California, where some utilities charge higher rates during certain times, such as 4:00 to 9:00 p.m.



Time

You can adjust the **Time** value to match your utility provider's charge period.

Power (W)

The **Power (W)** setting depends on the Ah rating of your battery bank. For example, if your **Max A Charge/Discharge** (**Batt Setup menu > Batt**) is 185 A, then you may set the **Power (W)** value to 9,000 W.

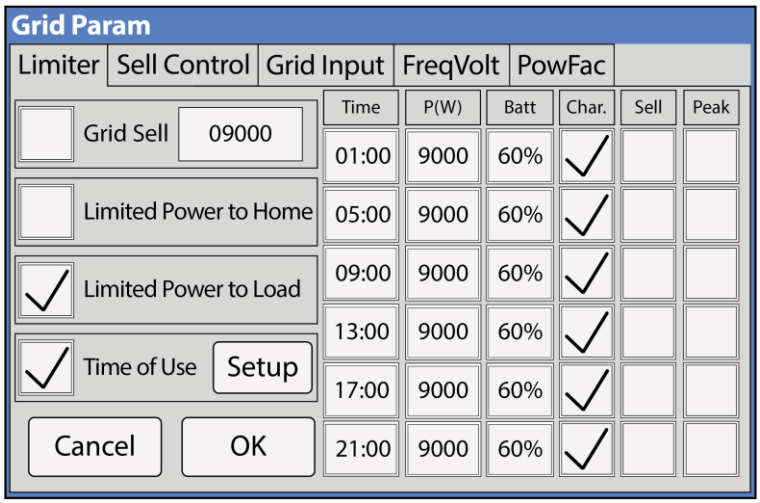
Batt

Set the **Batt** value (V or %) based on the battery bank's Ah rating and the manufacturer's recommendation. In general, LiFePO4 batteries can be deeply cycled each day. The example above uses a **Batt** value of 30%.

Off-Grid: Precise Generator Control to Conserve Fuel

*Use this setup for an off-grid system with a generator connected to the **GRID** or **GEN** breaker on the Sol-Ark inverter.*

TOU lets you control when a compatible two-wire start generator turns on and off.



Time

You can adjust the **Time** value to match your preferred schedule.

Power (W)

The **Power (W)** setting depends on the Ah rating of your battery bank.

For example, if your Max A Charge/Discharge (**Batt Setup menu > Batt**) is 185 A, then you can set the **Power (W)** value to 9,000 W.

The **Power (W)** setting does not control how fast the generator charges the batteries. The charging rate is controlled by the **GEN/GRID Start A** (**Batt Setup menu > Charge**).

Batt

The Batt value sets when generator charging stops. While off-grid, the battery can discharge to the **Shutdown %/V** (**Batt Setup menu > Discharge**). In the example, the generator will stop charging at 60% battery SOC.

Sell

DO NOT select the **Sell** check box for any time period. If the generator is connected to the **GRID** breaker, selecting **Sell** will send battery power into the generator.

TOU Pro Tips

Here are some additional tips for Time of Use:

- TOU controls only the battery's discharge while the grid is available.
- During a grid outage or while off-grid, the battery can discharge to the **Shutdown %/V** (**Batt Setup > Discharge**).
- To use as much battery power as possible while the grid is available, set the **TOU Batt** value to the **Low Batt %/V** value (**Batt Setup > Discharge**).

Low Batt is the lowest possible value allowed while the grid is available.

- To save battery power for a grid outage, set the **TOU Batt** value to keep the needed backup reserve.
- If you set the **Batt** value equal to **Low Batt %/V**, little battery power may remain before the battery reaches **Shutdown %/V**.
- A two-wire start generator may not have enough time to start and charge the batteries before shutdown. These battery faults often happen during a grid outage in bad weather or at night.

Some installations have upstream loads that use part of the power produced. To monitor this power, set up **Limited Power to Home** mode with the proper CTs.

Document Revision History

Rev.	Date	Author	Description of Changes
0	03/01/2022	Fernando Flor	Document created.
1	03/06/2025	Genaro Marquez	Minor updates and examples added.
2	06/19/2025	Jan Falcona	Removed references to lead-acid batteries.
3	08/27/2026	Itzel Sanchez	Minor updates and clarifications to some examples.