Document version 01
Release Date 2025-06-30

Swatten AC Couple Solution

CONTENTS

# 1. Introduction to AC couple

The AC coupling solution allows customers to easily add a hybrid power system based on existing grid-connected inverters. This solution enables users to easily retrofit their existing photovoltaic (PV) systems.

Hybrid inverters configured in AC Couple mode can monitor real-time power consumption, coordinate PV power generation, and optimize battery charging and discharging. By monitoring the power generated by multiple connected string inverters in real time, energy can be transferred from the AC side to charge the battery, thereby improving the overall efficiency of the system. All Swatten hybrid inverters are designed for this configuration.

2. AC Couple Solution
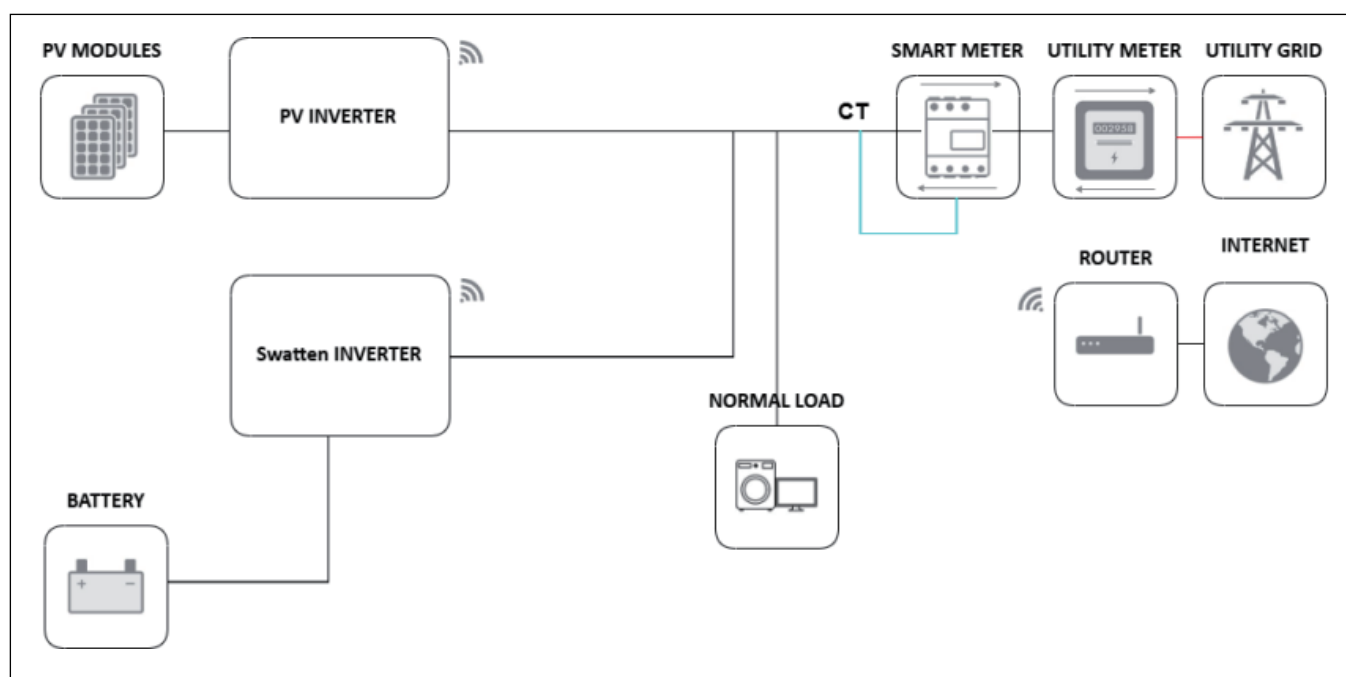
· The grid-connected inverter system is connected to the Grid port of the hybrid inverter, as well as to the power grid and public loads.
· The energy meter is connected to the grid to collect data from the grid point.

3. Working Modes

3.1. During Sufficient Daylight

· PV modules prioritize power supply to loads: PV modules convert solar energy into DC power, which is converted into AC power by the PV inverter to directly supply power to AC loads, meeting real-time power demand.
· Excess power is stored in the battery: If the power generated by the PV system exceeds the load consumption, the excess power is converted into DC power by the Swatten inverter and stored in the battery for efficient energy storage.
· Surplus power is fed back to the grid: If the PV system's power meets both load consumption and battery storage needs, the surplus power is fed back to the grid.

3.2. At Night or in Insufficient Light

· Battery discharges to supply loads: When the PV system cannot generate power normally, the Swatten inverter controls the battery to discharge, converting stored DC power into AC power to supply loads.
· Grid as standby: When the load is too high or the battery energy is insufficient, the grid can provide stable power to AC loads to ensure uninterrupted operation.

3.3. Grid Connection and Interaction

· Grid-connected operation: In grid-connected mode, the PV system is connected to the grid. When the PV system generates more power than local loads and battery storage can accommodate, excess power is fed back to the grid for shared energy and economic benefits. When local load demand exceeds the supply from the PV system and battery, the grid supplements the power to ensure normal supply.
· Grid outage transition: When the grid power is cut off, the Swatten inverter automatically switches to off-grid operation mode to ensure continuous power supply to local loads. When the grid resumes, the system automatically detects and switches back to grid-connected operation.
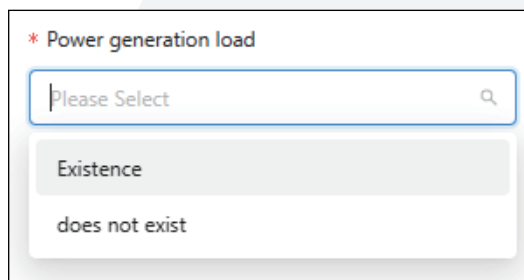
4. System Setup

4.1. Account Preparation

Before installing equipment, ensure that you have registered and logged in to a Solarman official platform account. If not registered, complete the registration process via the official website or mobile APP.

4.2. Equipment Connection

· Confirm that equipment such as inverters have been physically installed and electrically connected, and are in a power-off state. Configure the provided communication device (e.g., WiFi module) according to the manual to ensure network connectivity.

· For plug-and-play supported equipment, the communication device will automatically bind to the inverter after power-on without manual binding. Scan the QR code on the communication device via the Solarman client to complete device binding with the platform.

4.3. Power Station Configuration

· Log in to the Solarman platform, enter the power station management interface, click "New Power Station," and fill in basic information such as the station name, location, installed capacity, and project affiliation as prompted.

· In the device management page, set and adjust operating parameters for bound inverters and energy storage devices, such as power limits, charge-discharge thresholds, and protection function switches. Configure the linkage relationship between devices according to the actual system topology to ensure coordinated operation.

· Set system parameters to ensure normal reading of electrical parameters in AC Couple mode, specifically under the "Power generation load" entry. (This parameter is only supported by Solarman Business.)

4.4. Data Monitoring and Debugging

· After configuration, start the equipment and observe platform data updates to check if operating data (e.g., power generation, port voltage, current, operating temperature) is accurately uploaded. If data is abnormal, inspect device communication, parameter settings, and sensor status to resolve faults promptly.

· Conduct simulation operation tests: remotely control equipment start/stop and adjust operating modes via the platform to verify normal device response. Observe system stability under different working conditions (e.g., light changes, load fluctuations) to ensure it meets design requirements.

4.5. Permission Management and Sharing

Set different user permissions on the platform according to the roles of project participants (e.g., administrators can perform all operations, while maintenance personnel can only view data and perform equipment maintenance). To share power station data with owners or partners, generate exclusive data viewing links or authorized accounts via the platform's sharing function for real-time access.

5. System Monitoring - Solarman Monitoring Platform

· Real-time data collection: The Solarman monitoring platform collects real-time data on power generation, voltage, current, power, etc. Data is transmitted via communication networks to Solarman servers for storage and processing, allowing users to view real-time system operation status and equipment power generation/consumption at any time.

· Mobile device monitoring: Users can monitor the AC Couple system via the Solarman mobile app on smartphones or tablets. The app provides an intuitive interface displaying real-time data, operation status, power generation, energy storage, load consumption, and fault alarm notifications.

· Remote operation and control: Users can perform remote operations via the Solarman platform, such as adjusting inverter parameters, controlling energy storage charge-discharge modes, and restarting equipment, enabling flexible system management, improving operation and maintenance efficiency, and reducing on-site maintenance costs.

· Data visualization: The Solarman platform displays collected data in intuitive charts (e.g., line graphs, bar charts, pie charts), helping users clearly understand system operation and indicator trends for data analysis.

6. Advantages

· Easy installation: When retrofitting existing PV systems to add energy storage, there is no need for major modifications. Simply add energy storage inverters, batteries, and related equipment, reducing installation costs and complexity.
· High flexibility: The AC coupling system supports simple access to multiple energy sources, allowing flexible adjustment of system configurations (e.g., adding/removing PV modules, adjusting battery quantity and capacity) for easy expansion and upgrading. It can also switch flexibly between grid-connected and off-grid modes to adapt to different scenarios.
· Enhanced safety: AC coupling inverters effectively prevent risks of high DC voltage on the battery and PV sides, ensuring safe operation of the entire electrical system.
· Flexible charge-discharge control: The Swatten inverter flexibly controls battery charge-discharge processes based on grid conditions, load demand, and battery status, enabling effective battery management and protection to extend service life.

7. Application Scenarios

· Residential PV energy storage systems: Improve household energy self-sufficiency, reduce electricity costs, and provide emergency power during outages to ensure basic living needs.
· Commercial PV energy storage systems: Help commercial venues reduce grid power purchases, lower electricity expenses, improve energy efficiency and economic benefits, and serve as backup power to ensure business continuity.