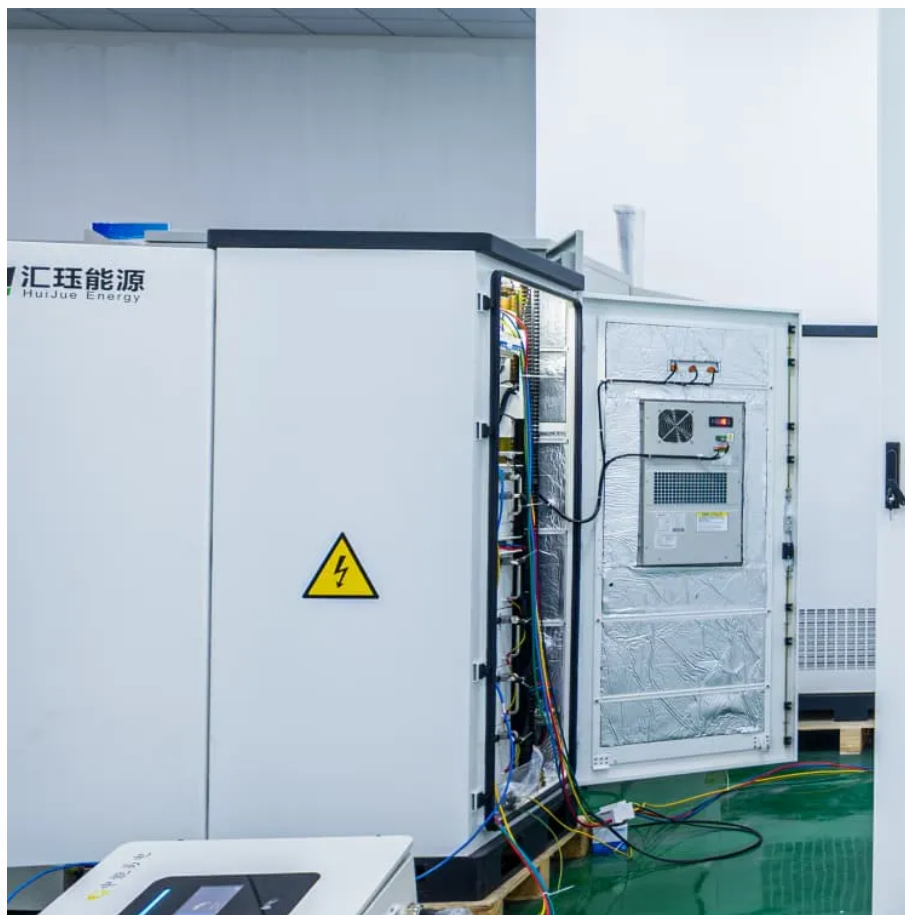


# Three-phase dq axis control inverter





## Overview

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How a three phase grid connected inverter is driven?

Three phase grid connected inverter is driven using Sine PWM. The sine references are generated using a PLL and Harmonic oscillator. The closed loop control is implemented in synchronous reference frame. The inverter is fed by a dc source and the current is injected into the grid as per the reference command. Rajesh Farswan (2025).

What is three-phase grid tie inverter simulation with DQ control?

The Three-Phase Grid Tie Inverter Simulation with DQ Control provides a reliable environment for analyzing inverter performance in grid-connected systems. By combining SPWM, DQ transformation, and PLL synchronization, the simulation ensures precise power control, improved power quality, and fast dynamic response.

What is DQ axis current decoupling?

Aiming at the topology of three phase grid-connected inverter, the principle of dq-axis current decoupling is deduced in detail based on state equation. The current loop regulation and the three phase grid-connected control system based on grid voltage orientation are simulated by using Matlab/Simulink.

What is DQ axis theory?

The dq axis theory is used here as it is easy to implement, active and reactive current can be controlled separately. One more reason to use this theory is all control variable are in DC frame, so by using simple PI controller, the complete control algorithm can be implemented . SPWM technique is used to provide the gate signal to the 3- $\phi$  GCI.



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### Vector current control

General Principles of Vector Current Control  
Inverter Current Control Example B-Box / B-Board Implementation  
In this note, it is proposed to study the vector current control of a two-level inverter. This example features two state variables: the grid current on the d-axis  $I_{g,d}$  and on the q-axis  $I_{g,q}$ . Using general Kirchhoff circuit laws, the fundamental voltages generated by the inverter are expressed as:  $E_a = R_g I_{g,a} + L_g \frac{dI_{g,a}}{dt} + V_{g,a}$   
 $E_b = R_g I_{g,b} + L_g \frac{dI_{g,b}}{dt} + V_{g,b}$   
 $E_c = R_g I_{g,c} + L_g \frac{dI_{g,c}}{dt} + V_{g,c}$   
See more on imperix IEEE Xplore

### Design of Three Phase Grid-Connected Inverter Based on

...

Jul 30, 2019 · Aiming at the topology of three phase grid-connected inverter, the principle of dq-axis current decoupling is deduced in detail based on state equation. The current loop ...

### [Advanced Grid Tie Inverter Simulation with DQ Control](#)

Nov 8, 2025 · Experience real-time simulation of grid-tied three-phase inverters using DQ control and SPWM for precise power regulation, grid synchronization, and enhanced stability.



### [Design of Three Phase Grid-Connected Inverter Based on ...](#)

Jul 30, 2019 · Aiming at the topology of three phase grid-connected inverter, the principle of dq-



axis current decoupling is deduced in detail based on state equation. The current loop ...

### Comparison of Direct Digital Control and DQ-Based Control for a Three

Aug 23, 2024 · Abstract: This research compares the performances of direct digital control (DDC) and DQ-axis control for a 12-kW three-phase three-wire (? W) LCL grid-connected inverter, ...



### Optimized control strategy for a three-phase grid connected inverter

Dec 1, 2024 · This paper provides a proportional-integral (PI) controller and direct-quadrature (DQ) frame transformation-based optimum control method for a three-phase grid-connected ...

### **Vector current control**

Mar 23, 2021 · Vector current control (also known as dq current control) is a widespread current control technique for three-phase AC currents, which uses a rotating reference frame, ...





### [Nikhil-Raj-Singh/-3-phase-GCI-with-DQ-Control](#)

Aug 25, 2024 · Mathematical Modeling of 3-phase GCI with DQ control Project Overview  
This project involves the development of a mathematical model for a 3-phase grid-connected ...

### [Sliding-mode control in dq-frame for a three-phase grid ...](#)

Oct 1, 2020 · The three-phase LCL-filter-based grid-connected inverter (LCL-GCI) is a third-order and multi-variable system, and claiming a higher demand to the control system design. Aiming ...



### [Control of Three-Phase Grid-Connected Inverter Using ...](#)

Jun 15, 2022 · Different methods, including dq theory, power balance control theory and pq theory are mentioned in the literature for control of the grid converters. The dq axis theory is used ...

### [Grid connected three phase inverter control using DQ frame](#)

Sep 10, 2019 · Three phase grid connected inverter is driven using Sine PWM. The sine references are generated using a PLL and Harmonic oscillator. The closed loop control is ...





## [Control of Three-Phase Grid-Connected Inverter Using dq Axis ...](#)

May 27, 2022 · In this paper, the controller design and MATLAB Simulation of a 3- $\phi$  grid-connected inverter (3- $\phi$  GCI) are implemented. Sinusoidal pulse width modulation (SPWM) ...

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