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Global Dilution Refrigerator for Quantum Computing Supply, Demand and Key Producers, 2026-2032

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Abstracts

The global Dilution Refrigerator for Quantum Computing market size is expected to reach $ 1237 million by 2032, rising at a market growth of 30.1% CAGR during the forecast period (2026-2032).

In 2025, global Dilution Refrigerator for Quantum Computing production reached approximately 290 units with average price of 697,000 USD/Unit.

A dilution refrigerator for quantum computing is an ultra-low-temperature refrigeration system specifically designed to provide a millikelvin operating environment for superconducting quantum processors, quantum chips and associated cryogenic electronics. It generally uses a mechanical pulse-tube cryocooler for initial precooling, followed by the endothermic dilution of helium-3 into helium-4 to continuously cool the quantum-processor stage to below 10 mK. This ultralow-temperature environment suppresses thermal noise and unwanted thermal excitation, enabling superconducting qubits to retain the quantum states, coherence and controllability required for computation. IBM notes that superconducting qubits depend on the ultracold environment of a dilution refrigerator to prevent thermal noise from disrupting fragile quantum states.

Compared with general-purpose scientific dilution refrigerators, quantum-computing systems place greater emphasis on large experimental volume, high mixing-chamber cooling power, high-density microwave and direct-current wiring, low vibration, low electromagnetic noise, magnetic shielding and extended automated operation. A typical system includes a vacuum vessel, pulse-tube cold head, radiation shields, helium-3/helium-4 circulation loop, mixing chamber, gas-handling system, temperature-control system, quantum-processor mounting stage, microwave attenuators, filters,

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isolators, low-noise amplifiers and interfaces to room-temperature control electronics. Microwave signals are transmitted through the refrigerator to control the quantum device, while weak readout signals are amplified at cryogenic stages before returning to room-temperature electronics.

The upstream segment includes helium-3 and high-purity helium-4, pulse-tube cryocoolers, helium compressors, vacuum pumps, oxygen-free high-conductivity copper, stainless steel, cryogenic heat exchangers, low-temperature valves, temperature sensors, vacuum gauges, superconducting materials, microwave coaxial cables, flexible cryogenic wiring, attenuators, filters, isolators, cryogenic amplifiers, magnetic shielding and control electronics. As qubit counts increase, conventional coaxial wiring creates growing challenges in occupied volume, thermal loading and installation complexity. High-density low-thermal-conductivity wiring, flexible interconnects, microwave multiplexing and cryogenic electronics are therefore becoming increasingly important parts of the supply chain.

The midstream segment consists of dilution-refrigerator manufacturers, cryogenic measurement-system integrators and quantum-control infrastructure suppliers. Their activities include thermodynamic design, vacuum-vessel fabrication, helium-mixture circulation integration, heat-exchanger and mixing-chamber manufacturing, temperature and flow control, microwave-line installation, magnetic shielding, software development, system calibration and reliability testing. Representative suppliers include Bluefors, Oxford Instruments NanoScience, FormFactor/JanisULT, Maybell Quantum and several Chinese manufacturers. Leading companies are moving beyond standalone refrigeration toward complete measurement infrastructure integrating wiring, filtering, cryogenic amplification, control hardware, software and quantum-processor mounting platforms. Oxford Instruments, for example, offers integrated quantum-control products with its Proteox systems to streamline quantum-laboratory deployment.

Downstream customers include superconducting quantum-computing companies, quantum-chip developers, universities, national laboratories, quantum-cloud operators, research institutes and government-supported national quantum centers. Procurement is generally project-based and covers technical specification, customized design, factory acceptance, transportation, installation, cooldown commissioning, quantum-chip integration and long-term maintenance. Oxford Instruments has installed multiple dilution refrigerators at the UK National Quantum Computing Centre for the development of superconducting-circuit hardware architectures, illustrating the growing importance of national-scale research facilities as end users.

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The market for dilution refrigerators used in quantum computing will continue to benefit from investment in superconducting quantum research, expansion of quantum-processor scale and increasing demand for quantum-chip testing. Superconducting quantum computing remains one of the most important commercial applications for dilution refrigerators. As qubit counts, control channels and readout lines increase, users require larger cryogenic volumes, greater cooling capacity and higher wiring capacity. Major quantum-computing companies and national laboratories are moving from individual research installations toward parallel deployment for chip design, post-fabrication testing, qubit characterization, system integration and cloud-based quantum-computing services. Bluefors expanded its U.S. manufacturing facilities in 2024, stating that the project would raise capacity at the location by approximately 45%, indicating that suppliers are preparing for continued quantum-technology demand.

Future products are expected to develop in both large-scale and compact directions. Large systems will support high-qubit-count processors and require greater experimental volume, higher cooling power around 100 mK, high-density input-output capacity and modular expansion. Compact and benchtop systems will primarily serve quantum-chip screening, device validation and rapid research workflows. Oxford Instruments? compact ProteoxS emphasizes rapid cooldown and experimental turnaround, while Bluefors has also introduced an integrated ultra-compact system, demonstrating that shorter sample-exchange and testing cycles are becoming important competitive attributes.

Competition will gradually shift from minimum base temperature alone toward overall system capability, including cooling power, sample space, wiring density, vibration and noise control, automated operation, remote monitoring, rapid maintenance and integration with quantum-control platforms. As conventional wiring creates greater thermal loads and space constraints in larger quantum systems, flexible cryogenic interconnects, signal multiplexing and cryogenic control electronics will become important upgrade areas. Partnerships involving Bluefors and cryogenic interconnect specialists are intended to support expansion from hundreds toward thousands of qubits.

The market nevertheless faces constraints such as limited helium-3 availability, high equipment prices, long lead times for critical components, shortages of specialized installation personnel and uncertainty over the pace of commercial quantum-computing adoption. In addition, growth in qubit count may not require a proportional increase in conventional control wiring because readout multiplexing, cryogenic electronics and new interconnect technologies can reduce the refrigeration and cabling requirement per

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qubit. Overall, suppliers with scalable production, experience in large quantum-system projects, comprehensive cryogenic measurement portfolios and global service networks are expected to achieve the strongest long-term positions.

This report studies the global Dilution Refrigerator for Quantum Computing production, demand, key manufacturers, and key regions.

This report is a detailed and comprehensive analysis of the world market for Dilution Refrigerator for Quantum Computing and provides market size (US$ million) and Year-over-Year (YoY) Growth, considering 2025 as the base year. This report explores demand trends and competition, as well as details the characteristics of Dilution Refrigerator for Quantum Computing that contribute to its increasing demand across many markets.

Highlights and key features of the study

Global Dilution Refrigerator for Quantum Computing total production and demand, 2021-2032, (Units)
Global Dilution Refrigerator for Quantum Computing total production value, 2021-2032, (USD Million)
Global Dilution Refrigerator for Quantum Computing production by region & country, production, value, CAGR, 2021-2032, (USD Million) & (Units), (based on production site)
Global Dilution Refrigerator for Quantum Computing consumption by region & country, CAGR, 2021-2032 & (Units)
U.S. VS China: Dilution Refrigerator for Quantum Computing domestic production, consumption, key domestic manufacturers and share
Global Dilution Refrigerator for Quantum Computing production by manufacturer, production, price, value and market share 2021-2026, (USD Million) & (Units)
Global Dilution Refrigerator for Quantum Computing production by Type, production, value, CAGR, 2021-2032, (USD Million) & (Units)
Global Dilution Refrigerator for Quantum Computing production by Application, production, value, CAGR, 2021-2032, (USD Million) & (Units)

This report profiles key players in the global Dilution Refrigerator for Quantum Computing market based on the following parameters - company overview, production, value, price, gross margin, product portfolio, geographical presence, and key developments. Key companies covered as a part of this study include Bluefors Oy, Oxford Instruments NanoScience, Shanghai Q-One Technology Co., Ltd., Hefei Zhileng

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Cryogenic Technology Co., Ltd., Leiden Cryogenics B.V., FormFactor, Inc. / JanisULT, Maybell Quantum Industries, The 16th Research Institute of CETC, Origin Quantum Computing Technology Co., Ltd., CSIC Pride (Nanjing) Cryogenic Technology Co., Ltd., etc.

This report also provides key insights about market drivers, restraints, opportunities, new product launches or approvals.

Stakeholders would have ease in decision-making through various strategy matrices used in analyzing the World Dilution Refrigerator for Quantum Computing market

Detailed Segmentation:

Each section contains quantitative market data including market by value (US$ Millions), volume (production, consumption) & (Units) and average price (K US$/Unit) by manufacturer, by Type, and by Application. Data is given for the years 2021-2032 by year with 2025 as the base year, 2026 as the estimate year, and 2027-2032 as the forecast year.

Global Dilution Refrigerator for Quantum Computing Market, By Region:

United States

China

Europe

Japan

South Korea

ASEAN

India

Rest of World

Global Dilution Refrigerator for Quantum Computing Market, Segmentation by Type:

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Ultimate Temperature Range > 20 mK

Ultimate Temperature Range 5?20 mK

Ultimate Temperature

Global Dilution Refrigerator for Quantum Computing Market, Segmentation by Power Range:

Low-Power Benchtop Models (0?10 ?W)

Medium-Power Standard Models (10?100 ?W)

High-Power Industrial-Grade Models (> 100 ?W)

Global Dilution Refrigerator for Quantum Computing Market, Segmentation by Structure:

All-In-One Integrated Design

Modular and Expandable Design

Global Dilution Refrigerator for Quantum Computing Market, Segmentation by Application:

Quantum Processor Development & Testing

Quantum Computing Systems

Quantum Computing Cloud Infrastructure

Research Institutions

Others

Companies Profiled:

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Bluefors Oy

Oxford Instruments NanoScience

Shanghai Q-One Technology Co., Ltd.

Hefei Zhileng Cryogenic Technology Co., Ltd.

Leiden Cryogenics B.V.

FormFactor, Inc. / JanisULT

Maybell Quantum Industries

The 16th Research Institute of CETC

Origin Quantum Computing Technology Co., Ltd.

CSIC Pride (Nanjing) Cryogenic Technology Co., Ltd.

QuantumCTek Co., Ltd.

CAS Quantum Measurement Instrument Co., Ltd.

Taiyo Nippon Sanso Corporation

ICEoxford Ltd.

ULVAC CRYOGENICS INC.

Key Questions Answered:
1. How big is the global Dilution Refrigerator for Quantum Computing market?
2. What is the demand of the global Dilution Refrigerator for Quantum Computing market?
3. What is the year over year growth of the global Dilution Refrigerator for Quantum Computing market?
4. What is the production and production value of the global Dilution Refrigerator for Quantum Computing market?

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5. Who are the key producers in the global Dilution Refrigerator for Quantum Computing market?
6. What are the growth factors driving the market demand?

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Contents

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3 WORLD MANUFACTURERS COMPETITIVE ANALYSIS

4 UNITED STATES VS CHINA VS REST OF THE WORLD

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info@marketpublishers.com

5 MARKET ANALYSIS BY TYPE

6 MARKET ANALYSIS BY POWER RANGE

7 MARKET ANALYSIS BY STRUCTURE

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8 MARKET ANALYSIS BY APPLICATION

9 COMPANY PROFILES

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List Of Tables

LIST OF TABLES

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List Of Figures

LIST OF FIGURES

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