HITACHI



Solution Profile

Connecting Data, Control, and Reliability for HVDC

Smarter HVDC Operations with Hitachi

Deliver Speed and Scale

High-performance storage for operational data and scalable capacity for adherence to IEC data storage standards

Trust in Reliability

Cyber resilience, redundant storage and failover mechanisms for grid security and stability

Integrate for Control

Compatibility with SCADA, EMS, and digital twin platforms for seamless monitoring and control

The Data Challenges for HVDC Systems

High-Voltage Direct Current (HVDC) routing helps ensure safe, efficient, and flexible power flow across modern grids. HVDC produces large volumes of real-time operational data; power flow measurements, voltage and current levels, converter station status and fault detection, environmental and temperature sensors, grid synchronization and phase angle data is continuously collected and processed to ensure stable, efficient power transfer and to detect faults or inefficiencies.

- Performance and Scale: Modern HVDC systems can send thousands of data points per second from multiple sensors.
- Control and Monitoring: Real-time SCADA, phasor measurement units (PMUs), and AI-driven analytics are essential for tracking current flow, detecting faults, and optimizing routing in multi-terminal systems.
- Cybersecurity: As HVDC control systems become more connected, protecting against cyber threats to routing and power flow control is critical.
- Data Integration: HVDC systems must integrate with grid management platforms, renewable forecasting systems, and market data, requiring interoperable IT architectures. They must also support advanced IT tools (e.g., finite element analysis, power flow solvers) to simulate current distribution, insulation performance, and fault scenarios.

Hitachi Data Solutions for High-Voltage DC Current Routing

The Hitachi solution IT infrastructure runs the Operational Support System (OSS) and consists of:

Category	Components	Specification / Role
Servers	Three HA810 G6 servers per rack	Configured with Intel Xeon processors, memory, high-speed Ethernet connectivity, boot drives, VMware vSphere Foundation licensing, and HDPS backup protection for virtual machines.
Networking	Five Cisco Nexus 9000 switches	Includes two spine switches, two leaf switches, and one management switch to support redundant, high-speed connectivity across the rack.
Storage	VSP One Block 24	Provides 15 TB of usable capacity and resilient block storage for operational and control data.

Hitachi VSP One

VSP One Block provides enterprise-class block storage for mission-critical workloads, from legacy databases to modern applications. Its scalable architecture, symmetric active/active controllers, and global-active device help ensure continuous data availability, even during major disruptions. Hitachi Thin Image Advanced snapshots create instant point-in-time copies for data protection, testing, and analytics, while helping defend structured data against ransomware. Backed by cyber resilience and 100% data availability guarantees, VSP One Block delivers proven reliability for mission-critical environments.

Modular Advanced Control for HVDC (MACH™)

The control system is the brain in HVDC transmission systems. The Modular Advanced Control for HVDC (MACH™) control system provides unequalled calculation capacity and enables a high degree of integration and handling for all control and protection functions. MACH™ provides advanced fault registration and remote-control functions and is designed to run 24/7 for thirty years or more, allowing the HVDC system to be controlled and protected in the most reliable way throughout its lifetime.

Hitachi IdentiQ® for HVDC

IdentiQ® for HVDC is an All-in-One digital solution for the complete life cycle (Plan-Build-Operate-Maintain) of Hitachi Energy products and solutions. It combines Digital Twin technology with Hitachi Energy's unique domain expertise and installed base to help monitor and optimize the system it replicates to improve the operational and lifecycle management of diverse electrical power systems, including HVDC installations.

Where Data Resilience Meets Grid Reliability

For energy organizations modernizing high-voltage transmission, Hitachi helps turn HVDC data complexity into operational confidence. By combining high-performance, resilient data infrastructure with advanced HVDC control, cyber resilience, and digital twin integration, Hitachi enables utilities and transmission operators to move power more efficiently, monitor grid conditions in real time, protect critical systems from disruption, and connect operational data across the energy ecosystem. The result is a more secure, scalable, and intelligent foundation for delivering reliable energy while supporting the transition to a more flexible and sustainable grid.

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HV-BTD-SP-HVDC-Current-Routing-6Nov26-B