ABB HVDC Care
Lifetime support
HVDC Care
Services based on your needs

Customized service

ABB provides a broad portfolio of services that can be adapted to your needs.

HVDC Service offers different levels and options of service depending on the type of installation and its position in the product lifecycle.
## HVDC Care
### Service level agreements

1. **Level 1**
   - Gives you direct access to our support team during daytime office hours, GMT+01, 07:30-16:30. Corrective maintenance is included.

2. **Level 2**
   - Gives you 24/7 phone support of our technical experts, including corrective maintenance and basic training.

Optional

- There is an option to add more comprehensive and customized services. Upgrade projects are handled as separate agreements.

<table>
<thead>
<tr>
<th>Services</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Optional</th>
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</thead>
<tbody>
<tr>
<td>Daytime phone support</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Corrective maintenance</td>
<td>✓</td>
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<tr>
<td>24/7 phone support</td>
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<td>✓</td>
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<td>Basic training - Control systems &amp; valves</td>
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<td>Supervision</td>
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<td>Remote access</td>
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<td>Advanced training</td>
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<td>Preventive maintenance</td>
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<td>Life cycle management</td>
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<td>Condition assessment</td>
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<td>Advanced services</td>
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<tr>
<td>Spare parts management</td>
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HVDC Care
Phone support

Direct access to HVDC experts
Daytime or 24/7 phone support based on your specific requirements and needs

Phone support offerings
- Available 24/7
- Access to technical experts regardless of location
- Prompt response times
- Remote access for flexible support
- Emergency on-site support
HVDC Care
Corrective maintenance

Emergency on-site support
- Corrective maintenance support
- On-site support in case of an emergency
- Support during difficult maintenance actions

Key benefits
- Minimized downtime
- Qualified ABB support staff on standby
Increased availability by remote access

Possibility to troubleshoot and operate the converter station from a secure remote location within the ABB network

- Reduced downtime
- Ensures the right support within two hours
- Full or limited remote access to the control system HMI
- High security
HVDC Care
Training

Ensure the competence

- Basic and advanced courses
- User training programs
- Technical seminars
- Customer specific training
- Customized training packages on request
- Experienced and certified trainers

Customer training
HVDC Care
Condition assessment

**Condition assessment service**
- Historical analysis of an individual asset, or an entire HVDC converter station
- Evaluation of actual equipment
- Recommended actions
- Summary/report

**Key benefits**
- Improved availability and reliability
- Reduced major outages/failures and unplanned maintenance costs
- Life extension
Preventive Maintenance

- Preventive maintenance is key to ensuring the availability and reliability of the HVDC link during its entire lifetime.

Key benefits

- Inspections to identify impending problems
- Planned and scheduled repairs
- Recommended time intervals for specific maintenance activity
HVDC Care
Spare part management

Minimum outage time with maximum spare part support

- Single point of contact for deliveries of spares to the HVDC stations
- Inventory for most of the special circuit boards, Thyristors and IGBT´s
- Other tasks may involve system improvements and/or equipment upgrades

Key benefits

- Minimal production loss and reduced risk
- Recommended storage methods
HVDC Care
Successful service agreement

Long-term service agreement

- The Caithness-Moray HVDC installation will benefit from a full range of ABB HVDC services, including training, spare parts management, preventive maintenance, phone support, remote access, and corrective maintenance

Benefits

- The service agreement provides a plan for future support, spare parts, and regular servicing
- Ensures operators will get the most out of their investment and an efficient way to prolong equipment lifetime and maximize performance.
HVDC Care
Upgrades

Driving forces

- Extending system lifetime
- Technology development
- Higher availability and reliability
- Better cost efficiency
- Improved performance
- Reduced maintenance
- Reduced losses
- Easier technical support
- Solving potential spare parts problems
- Increased power transfer capability
ABB is world leading in upgrading of existing HVDC stations and has significant experience in delivering HVDC system upgrades around the world.

In order to upgrade plants ABB can adapt modern systems/equipment to be built into existing plants, for example replacement of old relay-based or analogue control equipment with modern digital equipment.

- East Station, Sylmar, USA
- Skagerrak, Denmark - Norway
HVDC Care
Successful upgrade

Project description
- Highgate back-to-back station is a 200 MW HVDC link between two radial distribution grids in Vermont and Quebec. The station was taken into service in September 1985. In 2011, ABB received the order for a refurbishment of the Highgate station. The delivery was successfully commissioned in 2012.

Scope of supply
- Control and protection system MACH2
- Thyristor valve refurbishment
- New valve cooling system

Key challenges
- Fast installation during short outage time in 21 days
- Complex refurbishment of both controls and valves
- Facilitate the connection of renewable energy
- Improve stability
- Provide a more secure electricity supply

Successful upgrade
- Ability to succeed commissioning in time, cost and satisfaction
- Increased lifetime
- Increased overload capacity
HVDC Care
Globally developed, locally executed

Worldwide customer support, with over 200 service centers