Contact us

ABB AS
Marine
Bergenveien 12
P.O. Box 94
NO-1375 Billingstad
Norway
Phone: +47 03 500
Fax: +47 22 35 36 80

ABB Oy
Marine
Merenkuljärkkäkatu 1
P.O. Box 185
FI-00981 Helsinki
Finland
Phone: +358 10 2211
Fax: +358 10 222 2350

ABB Pte. Ltd.
Marine & Cranes
2 Ayer Rajah Crescent
SG-139935
Singapore
Phone: +65 6776 5711
Fax: +65 6778 0222

www.abb.com/marine

Remote Diagnostic Services (RDS)
Always on-site with you
An ABB remote service concept
Supporting our marine power and automation solutions

ABB is a leading system supplier to the marine industry and has a long track record of providing timely, high-quality service to our customers around the globe. To enhance the quality and efficiency of our services while lowering service costs, ABB offers a remote service concept, Remote Diagnostic Services.

The RDS Concept
Remote Diagnostic Services (RDS) is a tried and tested ABB service concept that has been tailored to the marine segment. This standardized diagnostics and maintenance solution is functionally advanced yet secure and simple to implement. By making expert knowledge available in the shortest possible time and drastically reducing the need for costly on-site visits, RDS helps ensure safe and efficient vessel operations and contributes significantly to lower OPEX costs.

Simplifying the problem solving process
The root causes of most technical problems onboard a vessel are often very clear. However, identifying them can be a difficult and overly complex process due to lack of consistency in data or poor quality of available information. To simplify this process, RDS furnishes the user – whether a local operator or a remotely connected service engineer – with accurate and relevant information from the start of the fault-finding process. The high quality data provided by RDS greatly reduces the time required to identify and correct the source of the problem, resulting in higher vessel uptime.

The RDS concept comprises three main components:
- Remote Connection
- Diagnostic Solutions
- Service Agreements

ABB Remote Diagnostic Services provides system monitoring and expert services to our customers - any time, any place. This reduces the need for costly on-site service visits and improves system performance, uptime and overall vessel profitability.
Remote Connection
Stay in touch – wherever you are

With RDS Remote Connection, our marine customers can connect with a qualified ABB service engineer while at sea for remote system monitoring, analysis and troubleshooting from land. At the heart of the RDS Remote Connection are the Service Center and the Virtual Service Engineer (VSE).

The Service Center
The Service Center is a central network of high-availability servers at the ABB Computer Center located onshore. These servers manage all the customers’ systems which can be accessed via RDS and their authorized users. Corresponding rights and roles are defined for each user, including determination of the target systems which the user can access.

The Virtual Service Engineer
The VSE is a software package that is installed on one of the ABB computers on the customer’s side and acts as a software-site-manager. The VSE has many roles, the most important of which is to set up a secure, encrypted communication with the Service Center and signal its availability and readiness for a remote maintenance session. With the VSE-installed PC connected to the internet from anywhere in the world, the VSE will automatically contact the Service Center to make remote connection possible.

When required, an authorized ABB service engineer can log on to the Service Center and request permission to connect to a vessel’s installed diagnostics system. If granted access, connection can be made and maintenance or troubleshooting can proceed by using the installed diagnostics systems.

With RDS, an ABB Virtual Service Engineer is always onboard to ensure that the ship is remotely connected to the RDS Operations Center and prepared for remote diagnostics and troubleshooting.
Diagnostic Solutions
For system monitoring, analysis and troubleshooting

When connected to a remote system, a range of specialized RDS Diagnostic Solutions are available to help the operator determine the status of the equipment and, in the event of a problem, identify the problem source.

Diagnostic hardware and software platform
ABB has developed a modular hardware and software platform, DriveMonitor™ (DM), to collect and correlate data for condition monitoring and troubleshooting from ABB frequency converters and other components. The core function of DriveMonitor™ is to serve as an OPC client that can read information made available to it on OPC and store it in a database. This basic functionality can be complemented by a range of more sophisticated functions such as event-based triggering of actions and complex analysis of systems or their components.

Key features of the DriveMonitor™ platform include:
- Sharing of data collected from individual components or sub-systems. If a system comprises enough monitored components to make sense of the system, analysis on a system level is possible.
- Simple and intuitive functions for on-demand monitoring of signals
- Storage of all recorded data in the database for later reference
- A data export function allows for export of data from the database, in full or in part, to be viewed in a DriveMonitor™ Light application that can be installed on any Windows-based PC.

Add-on DriveMonitor™ modules may be retrofitted into existing ABB equipment such as our marine drive products.

The ABB DriveMonitor™ received the prestigious Frost & Sullivan Award for Excellence in Condition Monitoring in 2008.

Diagnostic Solutions
For drives and switchboards

To address the individual needs of each vessel or offshore facility, DriveMonitor™ provides a range of advanced function modules for full monitoring and diagnostics functionality for specific components and sub-systems.

Drive- and PLC-based systems
The award-winning DriveMonitor™ solution for the ABB Variable Frequency Converters (VFD) has a long and proven track record in the land-based industry and is becoming increasingly popular in marine applications.

Most marine VFD systems are controlled by PLC-based automation systems, and ABB offers DriveMonitor™ add-on modules that integrate monitoring information from both the VFD’s and the PLC’s into a single monitoring and diagnostics solution. This is invaluable for the DM user as it complements the existing data collected from the drive and provides a broader systems perspective to help determine the cause of an alarm or fault due to system behavior. PLC systems currently covered are the DCU (thruster control applications) and Drilling Drive Applications.

Key features of these solutions are:
- Monitoring of parameter changes in the drive
- Uploading of data loggers from the drive in the event of a fault
- On-demand monitoring of drive and PLC signals
- Common Alarm and Event list for drive and PLC
- Alarms and events originating from the drive appear with explanations and tips for rectification
- Simple data export functions
- Event-based monitoring of signals based on predefined rules

Switchboard Solutions
The DriveMonitor™ solution for MV switchboard relays offers unprecedented access to detailed information and history on events and signals in the MV switchboards.

Key features include:
- Alarm and Event list
- Automatic uploading of transient recorders from the switchboard relays in the event of a fault
- On-demand monitoring of relay signals
- Simple data export functions
- Event-based signal monitoring based on predefined rules

DriveMonitor™ contributes to close monitoring and enhanced reliability and safety in medium voltage switchboards.
For Azipod® propulsion

The RDS Diagnostic Solution for Azipod® is the Propulsion Condition Management System (PCMS), which comprises both VFD and PLC DriveMonitor™ solutions as well as a unique bearing asset monitoring system, BeAM.

Advanced condition monitoring
With PCMS, all vital parts of the Azipod® propulsion system are monitored. For one of the most critical components in the entire Azipod® system - a set of bearings mounted on the motor shaft that drives the propeller – PCMS includes a dedicated bearings monitoring system called BeAM. During Azipod® operations, data is gathered and stored by the DriveMonitor™, which can then be used for simplified troubleshooting and enhanced preventive maintenance.

The bearings monitored by the BeAM module within the DriveMonitor™ are exposed to extreme, dynamic loads from the propeller. For early detection of bearing defects, a set of diagnostic algorithms has been developed which are simple in concept yet incorporate advanced techniques. Vibrations diagnostic algorithms have been developed which are simple in concept yet incorporate advanced techniques. Vibrations at the bearing housing are collected by a data acquisition unit mounted inside the Azipod®. From here, the data is transferred wirelessly to an access-point and further to the entire Azipod® system - a set of bearings mounted on the motor shaft that drives the propeller – PCMS includes a dedicated bearings monitoring system called BeAM. During Azipod® operations, data is gathered and stored by the DriveMonitor™, which can then be used for simplified troubleshooting and enhanced preventive maintenance.

The entire cycle of data flow, from measurements to calculations, is automatically triggered at regular intervals and an accurate assessment of the bearings can be made. Trending of selected parameters can also help expose deteriorating bearings at an early stage. Key features of the Azipod® diagnostic solution are:
- Continuous monitoring of critical signals from all system components
- Complete alarm and event list for system components
- VFDs, PLCs and bearings monitoring
- Condition reports
- Condition monitoring of shaft bearings
  - Vibration – broad bandwidth
  - Temperature
  - Lubrication oil
  - Humidity
  - Contamination
  - Metal particles

By standardizing on one platform, the stand-alone component diagnostics systems can be seamlessly integrated into a singular, time-synchronized system without little or no need to alter the component systems. Joining the systems together drastically simplifies troubleshooting on a system level. The high quantity of harmonized, quality data - both current and historical - enables a multitude of advanced system condition monitoring opportunities.

DriveMonitor™ solutions for individual system components are valuable in their own right, but the full benefits of this modular system are truly realized when the various sub-systems are woven together in a single multi-discipline diagnostic system.

The figure below represents a possible hardware architecture of a diagnostics system for a drillship.
Service agreements
Remote services from shore

To the marine industry, ABB offers an extensive scope of supply encompassing a broad span of technologies and competencies. For fast and efficient remote support of our full marine technology portfolio, ABB has developed a single-source, tri-level remote service agreement concept.

Service contracts
The 3-tiered service program includes the following levels:
- Troubleshooting: on demand connection by an ABB Service Engineer
- Preventive: in addition to the above, an ABB Service Engineer periodically connects to the remote system, performs a detailed health-check and advises corrective measures
- Continuous*: in addition to the above, critical alarms and process statuses are relayed to an ABB Service Center from where counter-measures can be launched immediately.

Support process
Scheduled and unscheduled cases are handled by the ABB Marine RDS Operations Center in Norway. The center is manned 24/7/365 and members of the RDS Team are trained to support all ABB Marine Systems included in the RDS program. All incidents and requests are logged by the engineer on duty and on-call service initiated by remote support is performed by qualified service personnel from the closest ABB Marine Services Center.

The table above describes the three distinct levels of services provided by RDS service agreements.

<table>
<thead>
<tr>
<th>RDS Service Levels</th>
<th>Troubleshooting</th>
<th>Preventive</th>
<th>Continuous*</th>
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</thead>
<tbody>
<tr>
<td>Troubleshooting</td>
<td>On-demand connectivity to assist in diagnosing a specific system event or failure, via a secure high-speed remote connection. Includes Support Line telephone support.</td>
<td>During scheduled ABB system audits, data is collected and measured against established benchmarks. Quarterly health check reports are provided. Includes Troubleshooting.</td>
<td>Critical alarms and process status onboard the vessel are transmitted to the ABB Service Center, enabling continuous proactive response from an ABB Service Engineer. Includes Preventive and Troubleshooting.</td>
</tr>
</tbody>
</table>

* This service is currently unavailable.

ABB Marine global services network

The ABB RDS Operations Center provides the 1st line service.

When 2nd line service is necessary, on-site personnel are dispatched from the closest ABB Marine Services Center.