ABB Ability™ Digital Powertrain

Condition monitoring of HV motor and generator powertrains fitted with ABB Ability™ MACHsense-R

ABB Ability MACHsense-R is a key element of the Digital Powertrain. It turns high voltage induction motors and synchronous motors and generators and their driven equipment into smart, wirelessly connected assets and helps to detect potential asset disturbances and plan maintenance before reliability, productivity and safety are impacted.

ABB Ability Digital Powertrain

The ABB Ability Digital Powertrain is a suite of digital solutions that enables you to remotely monitor the health and performance of powertrains, including drives, motors, generators and applications, such as pumps.

It combines data collected by MACHsense-R with data from other connected equipment. This data can be accessed and analyzed remotely, providing a better understanding of the maintenance needs and energy efficiency of the entire process.
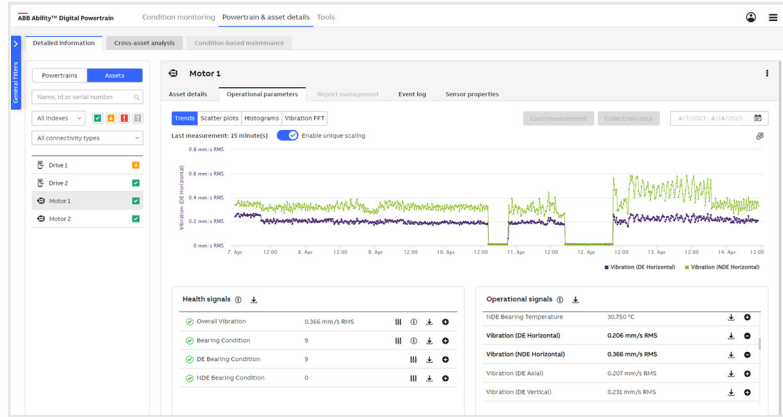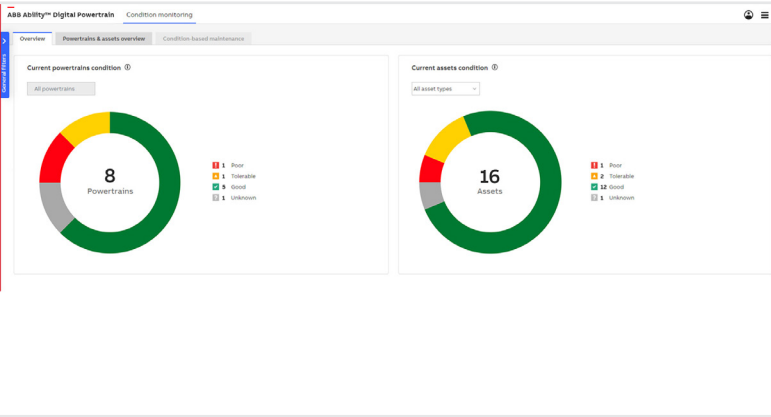
ABB Ability MACHsense-R

ABB Ability MACHsense-R is a key element of the Digital Powertrain. It enables remote condition monitoring of high voltage induction motors and synchronous motors and generators and their driven equipment.

MACHsense-R collects data and transmits it to a secure cloud service. Advanced algorithms analyze the data, providing deeper insights into the condition and performance of the monitored asset. Potential machine disturbances and energy savings can be detected and actions taken to make operations more efficient, predictable and safe.

Benefits

- **Higher uptime** – Maintenance activities can be planned in advance to avoid unplanned downtime

- **Reduced maintenance costs** – Maintenance time and effort can be reduced with early warning system

- I**mproved safety** – Enables safe access to equipment located in dangerous or hard to reach areas

- **Longer equipment lifetime** – Advanced maintenance planning supports longer powertrain lifetimes

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01 ABB Ability Digital
Powertrain web portal

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02 ABB Ability Digital
Powertrain condition
monitoring solution:
MACHsense-R transmits
the data to a secure
cloud service. Advanced
algorithms analyze the
data and convert it into
meaningful informa-
tion, which is sent to
the user's smartphone
and customer portal.

The solution can also be
integrated into your own
systems.

Accessing information

Details on the asset's status can be accessed through:

- **Web portal** – dashboard for operators to view condition and performance trends, access historical data, manage user access rights and set alerts and alarm.

- **App** – interface to the asset's status for technicians on the factory floor. A 'traffic light' display gives an easy overview of the condition of all monitored assets.

- **Other systems** – MACHsense-R data can be easily integrated via API into other systems, such as ERP and SCADA systems.

Expert advice

While the data is always at your disposal, ABB can provide support to analyze the data and define the steps for improving your operations.

MACHsense-R

ABB Ability MACHsense-R is a premium data acquisition unit for HV motor and generator power-trains that can be configured with different sensor setups depending on the application.
- Vibration accelerometers (simultaneous sampling on eight channels)
- Magnetic field sensors
- Temperature measurements

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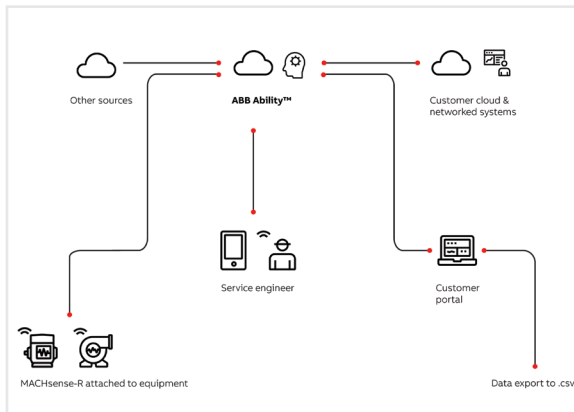
Intended use
Motors and generators and their driven equipment, such as pumps and fans.

Motor and generator specifications
- 3-phase AC induction motors
- 3-phase synchronous motors and generators
- Continuous or intermittent duty
- Fixed speed or variable speed
- For shaft heights of 355 mm and higher

Monitored motor and generator health parameters
- Overall vibration (velocity rms)
- Drive end bearing condition
- Non-drive end bearing condition

Monitored motor and generator operating parameters
- Vibration in 3 axis on drive end and 1 axis on non-drive end
  - Acceleration RMS
  - Velocity RMS
  - Displacement RMS
  - Acceleration peak to peak
  - Acceleration kurtosis
- Speed (RPM)*
- Operating time
- Number of starts
- Motor supply frequency (Hz)
- Output power (hp/kW)*
- Operating load*
- Bearing temperatures (drive end, non-drive end)
- Winding temperatures (U, V, W)

* only available for motors

Driven equipment specifications
- Rotating equipment, such as pumps and fans, in which temperature and vibration need to be measured and monitored

Monitored driven equipment health parameters
- Bearing condition

Monitored driven equipment operating parameters
- Vibration
  - Acceleration RMS
  - Velocity RMS
  - Displacement RMS
  - Acceleration peak to peak
  - Acceleration kurtosis
- Temperature

SPECIFICATIONS

Vibration measurements

Frequency range	1 Hz to 50 kHz (configurable)
Resolution	24 bit A/D converter
Number of channels	up to 16
Sampling rate (simultaneous sampling on 8 channels)	25.6 kHz
Frequency bandwidth	0.4 Hz - 13 kHz
Vibration sensors	100 mV/g accelerometer
Sensor positions (horizontal motor)	DE Horizontal, DE Vertical, DE Axial, NDE Horizontal

Temperature measurements

Number of channels	up to 8
Winding temperature (if internal RTDs are available)	2/3/4 wire PT100 inputs
Bearing temperature (external RTD required)	2/3/4 wire PT100 inputs

Communication

WLAN	Wi-Fi 802.11 a/b/g/n/ac Bluetooth® Low Energy 5.0 (IEEE 802.15.4)
WWAN	Mobile LTE 4G, HSPA+ 3G
LAN	10/100 MBPS

Power supply

Voltage range	110 - 240 VAC
Frequency range	47 - 63 Hz

Environmental

Temperature	-40 °C to +60 °C
IP class	IP65
Vibration	MIL810

Certification/Standards

	CE, RED, FCC, IC
	Safe areas only; no hazardous area certification

Physical

Dimensions (WxHxD)	459x240x173 mm
Data acquisition unit mounting	On or near motor
Vibration and temperature sensor mounting	E.g. bearing positions, motor body, driven equipment
Magnetic field sensor mounting	Motor body

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For more information, please contact your
local ABB representative or visit:

solutions.abb/digital-powertrain

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