VibraOne Hydro
Analyzer

Condition Monitoring System

AQTech
Power Prognostics

The solution

VibraOne is a data acquisition device developed to meet the needs of the electric power generation sector.

The system comprises processing functions, analogue inputs, digital inputs, digital outputs, communication interfaces, and other features.
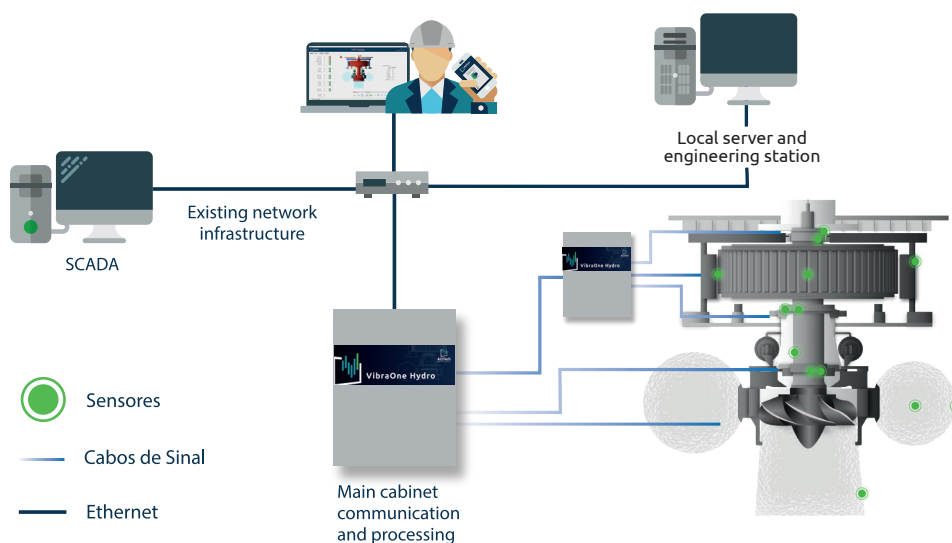
The solution conducts continuous monitoring and records the operational conditions of the generating units. It detects faults and disturbances, allowing for ongoing validation of asset operation and performance.

Our equipment is CE marked, indicating compliance with the electromagnetic compatibility, safety, and environmental requirements of the European Union.
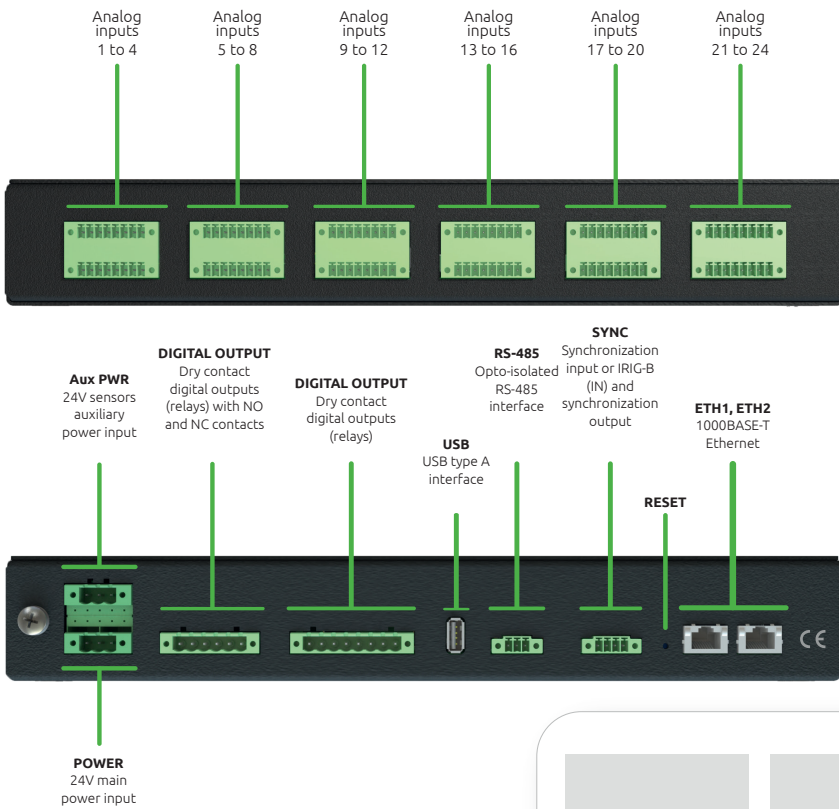
Architecture

Designed for Hydro Application

Local server and engineering station

Existing network infrastructure

SCADA

Sensores

Cabos de Sinal

Ethernet

Main cabinet communication and processing

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Analyzer

Real-time features

High-performance hardware and software that allows real-time visualization of vibration data. With a supervision screen, you can monitor global values, vibration level alarms (ISO 20816), and operating data, received through industrial protocols via the Local SCADA integration. Additionally, our real-time visualization tool provides waveforms, FFT spectrum, and orbitals, making it ideal for field testing, such as machine commissioning, operating range tests, index tests, and more. You can also configure the signal acquisition rate, monitor multiple variables in real-time, and generate records for later analysis in specific operating conditions of the generating unit.

Analysis Tools

Our post-processing software offers advanced vibration analysis tools, including waveform, orbital (XY), FFT cascade, and spectrogram analysis according to ISO 13373-2 standards. With additional mathematical and statistical operations, our software enables specialized engineering professionals to conduct in-depth evaluations. Long-term trend records and analysis tools support vibration diagnosis, as recommended in ISO 17359 and ISO 13373-2 standards. Additionally, the software includes an air gap analysis tool, which helps prevent failures such as rubbing between the rotor and stator, and a magnetic flux measurement tool.

Automatic Diagnosis

Automatic machine fault diagnosis is performed by detecting specific harmonic frequencies associated with the nominal rotation of the generating unit. The Analyzer is equipped with pre-registered failure modes, including unbalance (mechanical, magnetic, hydraulic), misalignment (angular, parallel), failures in the generator stator, turbine failures (rotor blades, guide vanes), problems in the hydraulic flow, pressure actuation, clearance, oil whirl, and bearing shoe failures, in accordance with ISO 13373-1, ISO 13373-3, and ISO 13373-7. The diagnostic tool also allows users to create new failure modes through logical blocks, mathematical operations, constant inputs, output blocks, text boxes, boolean operation blocks, and notifications resulting from algorithms.

Trend and Diagnosis

In the context of predictive maintenance, estimating remaining machine life (RUL) and end-of-life (EOL) is crucial. AQTech software uses the ISO 13381-1 standard to extrapolate global vibration data and values associated with frequency spectrum ranges that are closely linked to fault diagnosis. AQTech has extensive expertise in applying predictive models based on statistical and machine learning (ML) techniques, including Auto-Regressive (AR) models such as ARIMA (Autoregressive Integrated Moving Average).

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Interface

Analog inputs 1 to 4 • Analog inputs 5 to 8 • Analog inputs 9 to 12 • Analog inputs 13 to 16 • Analog inputs 17 to 20 • Analog inputs 21 to 24

Aux PWR — 24V sensors auxiliary power input

DIGITAL OUTPUT — Dry contact digital outputs (relays) with NO and NC contacts

DIGITAL OUTPUT — Dry contact digital outputs (relays)

USB — USB type A interface

RS-485 — Opto-isolated RS-485 interface

SYNC — Synchronization input or IRIG-B (IN) and synchronization output

RESET

ETH1, ETH2 — 1000BASE-T Ethernet

POWER — 24V main power input

VibraOne Datasheet

Model	
Mechanical Specifications	Aluminum enclosure
	Dimensions (HxWxD): 45 x 350 x 160 mm
	DIN-rail mounting option
	Interface Connectors
	Electrical Ethernet: RJ45
	Power, analog inputs, digital, inputs/outputs and SYNC: Terminal Block Headers
Power	Base board: from 8 to 36 VDC
	Sensors: 24 VDC
Processing and storage	Intel FPGA SoC Cyclone V (built-in ARM-9 dual-core 900 MHz)
	1GB DDR3 RAM
	32GB non-volatile Flash memory
Communication	2 1000BASE-T Ethernet ports
	1 isolated RS-485 port
	1 USB interface
MTBF (Mean Time Between Failure)	MTBF: 370,000 hours * Estimation by project
Analog inputs	24 DIP-configurable analog inputs for: • IEPE (± 5V with blocked DC level) • 0-20 mA (with 24V sensor supply) • ± 10V (with 24V sensor supply) • ± 30V
	24-bit ADC resolution
	Sampling rate up to 50 kHz
	24V sensor output
	8mA IEPE sensor current output
Operating conditions	Operating temperature range - From -40°C to 70°C (from -40°F to 158°F)
	Storage/transportation temperature range - From -40°C to 85°C (from -40°F to 185°F)
Synchronization	Ethernet synchronization
	SYNC input/output synchronization (optically isolated input, buffered output)
Digital Interfaces	6 digital outputs with dry contact (2 NO/NC and 4 NO) *
Signaling	Signaling LEDs
	24 bicolor ch annel status LEDs

* option for 4 digital inputs with optocouplers and 2 digital outputs with dry contact NO/NC, upon request.