

Online Vibration Monitoring Solution for Cooling Towers

Industrial fans provide important cooling to a variety of processes throughout the power generation and oil and gas industries. Production is often reduced or curtailed when fans fail and cooling capacity is reduced. Two very common types of fan categories are the mechanical induced-draft, evaporative type (commonly referred to as cooling tower fans) and the air-cooled heat exchanger type (ACHE or fin fans). Both asset types present unique challenges when selecting the proper solution for fan assembly monitoring, commonly evaluating the overall cost of the investment across many units becomes a significant roadblock to install modern technology.



Many cooling towers are equipped with “earthquake” or “vibration switches” that would drive relay contacts if the structure shakes above a predetermined setpoint and shutdown the unit. These switches react to catastrophic events to prevent further damage, but lack the ability to inform operators of impending failures that could drive predictive maintenance strategy. Cooling tower fans can be challenging to monitor with a portable data collection program as access to the gearbox and/or motor can be restricted while under normal operation, therefore impacting the ability to capture repeatable trend data on emerging issues. The good news is there are comprehensive, robust, and competitive continuous monitoring solutions now available to monitor these important assets.

Accelerometers provide the proper frequency range to detect many different failure modes on the gearbox, while providing a low-profile design to accommodate the tight clearances in the cooling towers. Velomitor CT (Cooling Tower) sensors can be provided if detecting fan imbalance is the main desire. Regardless of your choice, the 2300 can integrate acceleration to velocity and provide both condition monitoring capabilities as well as machinery protection in an all-in-one solution. Sealed cables are provided with this solution due to harsh operating environment of cooling towers. Optional weatherproof enclosures can be provided to mount this solution in an accessible location near the cooling tower, providing a local display for operations when doing their regular rounds.



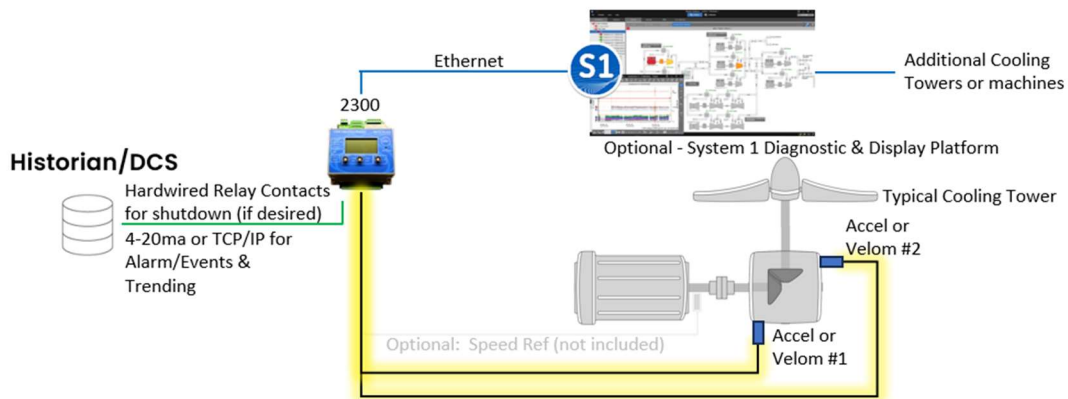
Accelerometer w/ weatherproof cable



Velomitor CT w/ weatherproof cable

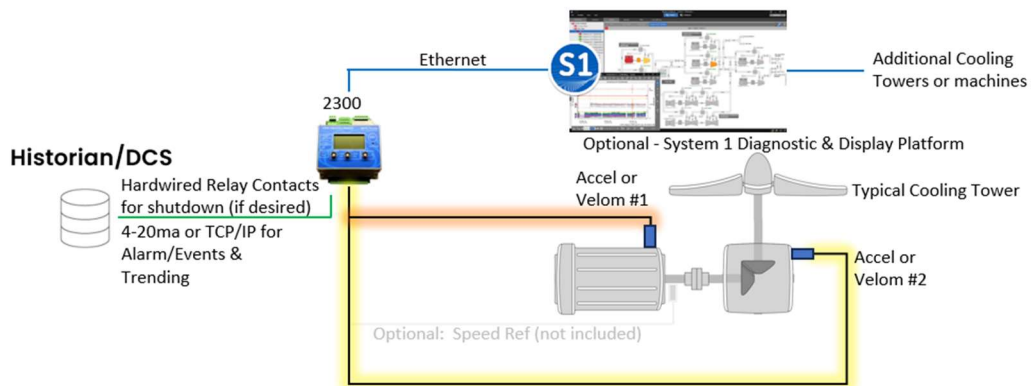
Configuration Type A

Cooling Tower Monitoring (Dual Sensor Gearbox Monitoring)



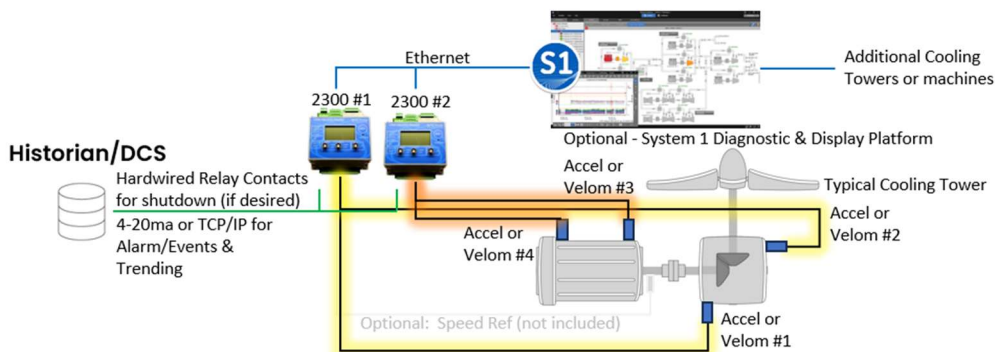
Configuration Type B

Cooling Tower Monitoring (Single Sensor Motor & Single Sensor Gearbox)



Configuration Type C

Cooling Tower Monitoring (Motor and Gearbox Monitoring Option)



The solutions outlined here can detect bearing wear, gear wear, misalignment, imbalance, coupling failures, loose mounting, and lubrication issues to name a few. Optional System 1 Diagnostic and Condition Monitoring platform connectivity can be achieved to bring the data direct to your fingertips in your office, preventing safety related concerns with technicians climbing on the cooling tower structure to obtain results and troubleshoot.

2300 Wired Continuous Monitoring Protection and Condition Monitoring Sensor Package

- [2300 Protection and Condition Monitoring System](#) with real-time continuous data collection to identify quickly developing faults. 2300 has 24vdc input power.
- 100mv/g right angle sensors with protected cables (32ft default) rated for harsh environments for gearbox, 100mv/g standard sensors with protected cables (32ft default) for motor, max distance is 100ft
- As an alternative to the accelerometers above, Velomitor CT's can be installed
- Relay outputs to replace existing vibration switches to provide machinery protection/shut down
- 4–20mA and/or Modbus over Ethernet output for alarms and events to DCS, replacing existing vibration switches
- Software configurable platform (Configuration Software Included)
- BNC buffered outputs for portable vibration collection
- Onboard display to visualize alarm set points and real-time vibration values
- Tach/Speed input for diagnostics for *variable frequency/speed machines (quoted as option)*
- *Optional – Weatherproof enclosures (Either fiberglass or Stainless steel), shipped loose or pre-wired with all equipment installed*
- *Optional – Offsite configuration of system to arrive ready for installation*
- *Optional – Wiring diagram for you application*
- *Optional – Turn key electrical sub-contractor services to support installation*



Quick Order Package Options

Base Machinery protection package options with Velomitores (replacing vibration or earthquake switches)

CTPackage-01 - Gearbox and/or motor condition monitoring AND protection – 1x 2300, 2x right angle accels and 2x cables (default 32 feet) with System 1 import license

CTPackage-02 - Advanced gearbox and motor condition monitoring AND protection – 2x 2300, 4x right angle accels, and 4x cables (default 32 feet) with System 1 import license

CTPackage-03 - Gearbox and/or motor protection – 1x 2300, Velomitor and 1x cables (default 32 feet)

CTPackage-04 - Gearbox and/or motor protection – 1x 2300, 2x Velomitor and 2x cables (default 32 feet)

Package options with enclosure and assembly/drawings

CTPackage-05 - Gearbox and/or motor condition monitoring AND protection – 1x 2300, 2x right angle accels and 2x cables (default 32 feet) with System 1 import license. NEMA 4X enclosure, drawings and remote configuration

CTPackage-06 - Advanced gearbox and motor condition monitoring AND protection – 2x 2300, 4x right angle accels, and 4x cables (default 32 feet) with System 1 import license. NEMA 4X enclosure, drawings and remote configuration

CTPackage-07 - Gearbox and/or motor protection – 1x 2300, Velomitor and 1x cables (default 32 feet). NEMA 4X enclosure, drawings and remote configuration

CTPackage-08 - Gearbox and/or motor protection – 1x 2300, 2x Velomitor and 2x cables (default 32 feet). NEMA 4X enclosure, drawings and remote configuration

Technical Specifications:

2300 Monitoring System

Power Input: 18–36Vdc, max 7.5 W

Inputs:

- ICP Accelerometer Input: Scale Factor 5 to 1000 mV/g, bandpass .2 Hz to 20kHz, Full scale ranger 2 to 80g peak
- Velomitor Input: Scale Factor 5 to 1000 mV/g, bandpass .2 Hz to 20kHz, 0–50 in/sec peak

Outputs:

- 3 Buffered Outputs are available (2 vibration and 1 speed output)
- Modbus TCP/IP Ethernet output to provide alarm and event and trending information
- 4–20mA hardwired output for each channel
- System 1 Ethernet connectivity
- Two dry contact relay outputs (may be normally energized or de-energized)

Physical:

- Operating Temperature: -22°F to 149°F
- Mounting: Panel or Din-rail mount
- Dimensions: 5" x 5" x 3"
- Class I, Div 2, Groups A, B, C, D

Accelerometers

Sensitivity, $\pm 5\% - 100\text{mV/g}$

Acceleration range: 80 g peak

Frequency response $\pm 10\% - 5,000\text{ Hz}$

316 Stainless Steel

MIL-C-5015 style 2 pin connector

Class I, Div 2, Groups A, B, C, D

Velomitor CT

Sensitivity, 3.94 mV/mm/s (100 mV/in/s) $\pm 5\%$

Frequency Response 3.0 Hz to 900 Hz (180 to 54,000 cpm) $\pm 1.0\text{ dB}$, 1.5 Hz to 1.0 kHz (90 to 60,000 cpm) $\pm 3.0\text{ dB}$

Velocity range: 63.5 mm/s pk (2.5 in/s pk) Vibration components in excess of 10g pk above 1 kHz can significantly reduce this range

316 Stainless Steel

MIL-C-5015 style 2 pin connector

Class I, Div 2, Groups A, B, C, D

Weatherproof cable

Connectors: MIL-C 5015, 2 Socket, Splash Proof, Premium, isolated to blunt cut, Cable: 20 AWG, twisted pair, shielded, yellow Teflon jacket. LOCKING RING, ADAPTER SEAL, AND O-RING ARE INCLUDED.

Weatherproof Enclosures

NEMA 4X Stainless Steel Type 304 weatherproof enclosures available with viewing window, mounting panel and necessary room to mount the 2300 components. Two sizes are available, one for single 2300 and one for dual 2300 installations.

Custom Requests

We can modify these kits to align with the individual needs for each site, for example a 64ft cable option is available. Reach out at any time to your sales manager or at sales@reliabilitycontrols.com or 281-771-3137.

