



Instrument Diagnostic Tools **Failure Detection, Optimized**

In today's industrial landscape, failure detection is critical to operational safety and efficiency. Yet conventional methods often fail to diagnose key issues — keeping maintenance teams in the dark and operations at risk. CCC's precise instrument diagnostic tools help operators identify failures before they arise, providing the information required to not only avoid catastrophic breakdowns but continually optimize compressor performance. Our experts have designed these tools to minimize process disturbance and maximize reliability.

Valve Exerciser

Verify the health of the most important valves surrounding the compressor in less than one minute — without disturbing the process.

Applications:

Anti-surge valve and steam turbine main control valve

Anti-surge valves are key to preventing highly destructive compressor surge events. But even the most high-quality mechanical devices lack 100% reliability, and anti-surge valve failures often go undetected because the device is designed to stay closed when the compressor is loaded.

If mechanical failure prevents the valve from moving when requested or a deposit buildup prevents flow from going through the recycle line, the compressor could surge and cause devastating effects. This scenario also applies to steam turbine main control valves, which stay in the same position for long periods but must move precisely to avoid mechanical damage and process instability.



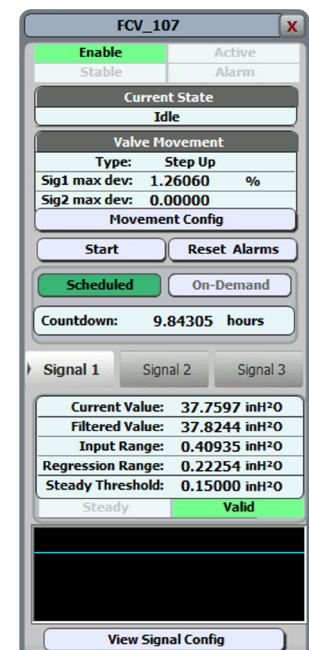
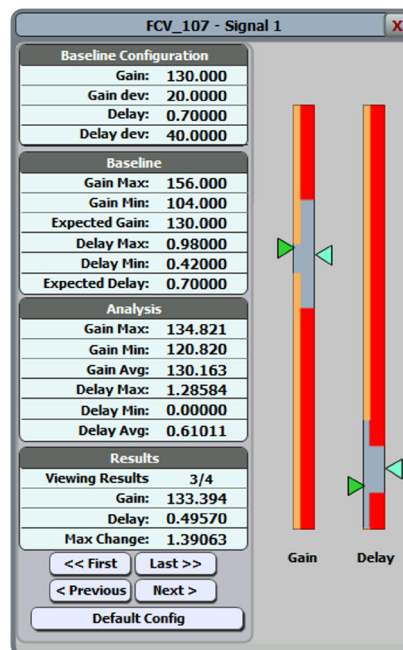
CCC's Valve Failure Detection Tool

With high execution speed and I/O channels precision, CCC is uniquely positioned to sense all the data involved with even the smallest valve movements. To test valve performance, the Valve Exerciser generates a partial stroke test in the steady-state condition. This test evaluates three configurable signals spanning both process parameters and valve position feedback:

- Flow (dP)
- Proximity to Surge Control (DEV)
- Position Feedback

If the Valve Exerciser detects that the process response is below the baseline or the positioning is not fast enough, it generates an alarm that alerts operators to address the valve condition and plan maintenance. This test is designed to have minimal effect on the process, all while verifying valve health in less than one minute.

- Permissive only when process is stable
- Can be implemented on actuators without position feedback signals
- Algorithm harmonizing Antisurge and Performance Control actions eliminate any potential disturbance



With automated scheduling at desired intervals, the Valve Exerciser makes it easier than ever to continually ensure the health of the critical valves surrounding your compressor.

Transmitter Drift Detection

Avoid process disturbances by precisely detecting transmitter drift in a dual redundant pair.

Applications: Dual redundant transmitters

When transmitter signals drift, it can trigger a control system reaction that leads to process upsets such as unnecessary recycling or even a trip. In systems with dual redundant transmitters, one signal's drift can cause unwarranted actions, despite nominal signal redundancy. This drift can occur for many reasons — impulse line blockages, leakage, transmitter malfunction or electrical issues — but typically goes undetected by conventional solutions. Because industry practice is to utilize minimum or maximum values for the selection method, the signal often stays within a valid range even when drift is present.

CCC's Drift Detection Tool

When the signals in a redundant pair disagree, CCC's Transmitter Drift Detection identifies which one is valid through correlation with numerous measurements, including pressure ratio and flow. This gives operators the information required to prevent the control system from acting based on a malfunctioning signal, which could trigger a process disturbance.

Transmitter Freeze Detection

Identify transmitter freeze even when the signal remains within a valid range, and automatically alert maintenance personnel to the issue.

Applications: All transmitters

Transmitter freeze can be caused by plugged or closed impulse lines, or a transmitter malfunction that causes the signal to remain at a constant value. But no matter the cause, this significant failure prevents the control system from reacting to process changes, leading to unsafe conditions that require immediate intervention from operation personnel. Despite the significant safety risks of transmitter freeze, the issue often goes unnoticed by conventional detection methods because a frozen signal can stay within a valid range.

CCC's Freeze Detection Tool

CCC's Transmitter Freeze Detection tool helps operators overcome the failures of conventional methods. The tool precisely calculates the amplitude of variations in the signal content, generating an alarm if the figure falls below normally expected values. This timely, effective detection method alerts maintenance personnel to the instance of transmitter freeze and triggers an applicable feedback algorithm that keeps the compressor safe and efficient while operators fix the problem.

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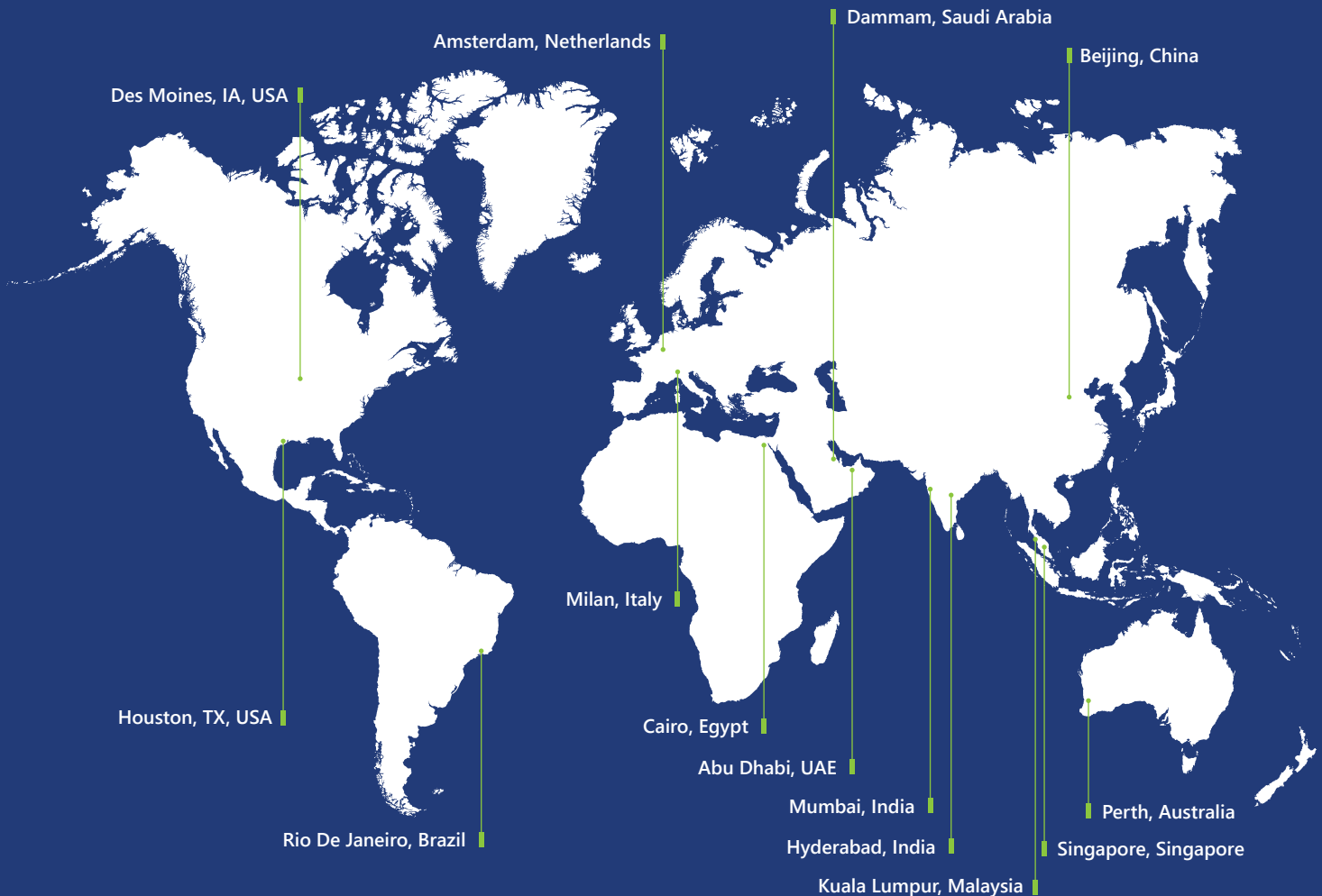
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