Mechanical Component and Design Durability Test
Explore NI’s Solutions

Quality
Have confidence in your test data with hardware designed by a company known for quality with more than 40 years of experience.

Simplicity
Set up your test with turnkey data-logging software that automatically detects hardware and has a real-time UI so you can check your connections.

Flexibility
Use modular hardware and open data formats to get any measurement you need into any analysis software you want to use—now or in the future.

03 GAIN CONFIDENCE FROM QUALITY TEST EQUIPMENT
04 SIMPLIFY SETUP SO YOU CAN FOCUS ON DESIGN VALIDATION
05 CUSTOMIZE YOUR TEST SYSTEM TO YOUR NEEDS
06 GET DATA YOUR WAY AND MINIMIZE CHANGE WITH FLEXLOGGER
07 OUTDOOR-RATED DATA ACQUISITION WITH FIELDDAQ
Gain Confidence from Quality Test Equipment

More complex, but not more delicate, today’s electronic devices need to survive the rigor of daily use. Acquiring data from sensors is a foundational step for validating mechanical components, but physical tests present several challenges such as multiple sensor types, costly setup time, and expensive prototype construction. You need quality instrumentation to get data you can trust from these expensive tests.

You can integrate NI’s modular data acquisition hardware with turnkey data-logging software to cover a variety of test types including:

- Environmental
- HALT/HASS, operational cycling
- 4-corner thermal
- Drop, load, impact, fatigue
- Noise, vibration, harshness
- Mechanical reliability and durability
- Pressure (seal, gasket, O-ring)
- Power (consumption, peak, harmonics, quality)
- Mechanical components (compressor, motor, and so on)

NI Solution Overview for Mechanical Component Test

**Configuration Options:**
1. Star, Ring, or Daisy Chain with Synchronization over Ethernet
2. Direct Connection to PC over USB (2.0/3.0)

![Diagram](image)

**FIGURE 01**
Combine CompactDAQ™ systems with FlexLogger™ software to manage multiple mechanical component validation tests.
Simplify Setup So You Can Focus on Design Validation

Preparation is key for mechanical tests because they are costly to repeat. NI solutions for mechanical component test help you spend more time on design validation with features that reduce setup effort, including:

- Rugged design for installation close to the device under test to reduce sensor wire lengths
- USB and Ethernet chassis options in a variety of sizes to scale as your project grows
- More than 70 sensor and I/O modules so you can get the measurements you need from one vendor
- Synchronization over Ethernet to simplify deploying networked systems

“FlexLogger makes it easier to troubleshoot and verify that the raw data from different sensors is correct before I start my test. This helps shorten test development by saving time typically wasted on redoing configurations.”

Andy Tarman
Lab Test Engineer, CNH Industrial
Customize Your Test System to Your Needs

Choose the accuracy, sensor types, connectivity, sample rates, and more that you need to meet test requirements today. Change them as your needs change or as you move to the next project. See Table 1 for measurements.

<table>
<thead>
<tr>
<th>SIGNAL TYPE</th>
<th>CHANNEL COUNTS</th>
<th>MEASUREMENT TYPES</th>
<th>MAX SAMPLE RATE</th>
<th>OPTIONAL FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog Input</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>2, 3, 4, 8, 16</td>
<td>±100 mV, ±500 mV, ±1 V, ±5 V, ±10 V</td>
<td>20 MS/s/ch</td>
<td>Ch-ch isolation, anti-aliasing, filtering</td>
</tr>
<tr>
<td>Current</td>
<td>3, 4, 8, 16</td>
<td>±20 mA, 0–5 A RMS, 0–50 A RMS</td>
<td>200 kS/s</td>
<td>Ch-ch isolation</td>
</tr>
<tr>
<td>Voltage and current</td>
<td>16</td>
<td>±10 mA, ±10 V</td>
<td>500 S/s</td>
<td>Channel-earth isolation, noise rejection</td>
</tr>
<tr>
<td>Universal input</td>
<td>2, 4</td>
<td>V, mA, TC, RTD, strain, Ω, IEPE</td>
<td>51.2 kS/s/ch</td>
<td>Ch-ch isolation, bridge completion, anti-aliasing filters, amplification</td>
</tr>
<tr>
<td>Thermocouple</td>
<td>4, 8, 16</td>
<td>J, K, T, E, N, B, R, S types</td>
<td>95 S/s/ch</td>
<td>Ch-ch isolation, filtering, CJC</td>
</tr>
<tr>
<td>Bridge (strain, force, load, torque, pressure)</td>
<td>4, 8</td>
<td>¼, ⅛, full bridge (120 or 350 Ω)</td>
<td>50 kS/s/ch</td>
<td>External excitation, anti-aliasing filters</td>
</tr>
<tr>
<td>RTD</td>
<td>4, 8</td>
<td>100 Ω, 1000 Ω</td>
<td>400 S/s</td>
<td>50/60 Hz filtering, bank isolation</td>
</tr>
<tr>
<td>Sound and vibration</td>
<td>2, 3, 4, 8</td>
<td>±5 V, ±30 V</td>
<td>102.4 kS/s/ch</td>
<td>IEPE, anti-aliasing filters</td>
</tr>
<tr>
<td>Analog Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>2, 4, 6, 16</td>
<td>3 V RMS ±10 V, ±40 V (stacked)</td>
<td>1 MS/s/ch</td>
<td>Bank isolation</td>
</tr>
<tr>
<td>Current</td>
<td>4, 8</td>
<td>±20 mA</td>
<td>100 kS/s/ch</td>
<td>Ch-earth isolation, built-in open-loop detection</td>
</tr>
<tr>
<td>Digital I/O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input/output</td>
<td>4, 6, 8, 16, 32</td>
<td>TTL (3.3/5 V) RS422, 5 V, 12 V, 24 V, 48 V, 72 V, 96 V, 120 V AC/DC, 240 V AC/DC</td>
<td>55 ns</td>
<td>Ch-ch isolation, sinking or sourcing input, bidirectional options</td>
</tr>
<tr>
<td>Relay</td>
<td>4, 8</td>
<td>60 V DC, 30 V RMS, 250 V RMS</td>
<td>1 switch/s</td>
<td>Ch-ch isolation, SPST or SSR relays</td>
</tr>
<tr>
<td>Counter module</td>
<td>8</td>
<td>5 V differential, 24 V single-ended</td>
<td>1 MHz</td>
<td>Ch-earth isolation</td>
</tr>
<tr>
<td>Counter function</td>
<td>See digital input/output</td>
<td>See digital input/output</td>
<td>See digital input/output</td>
<td>Digital modules can access 4 counter/timers in CompactDAQ chassis</td>
</tr>
</tbody>
</table>

**TABLE 01**

Customize your data acquisition system with the 70 sensor modules for CompactDAQ.
Get Data Your Way and Minimize Change with FlexLogger

FlexLogger data-logging application software is designed to get data from a sensor to an open data format without programming. You can export to a .csv file format for ASCII text that is compatible with any software tool (such as Excel) off the shelf. For higher-speed waveform acquisition (common to sound and vibration or power measurements), use a .tdms file format to optimize stream-to-disk performance. TDMS is an open binary file format, so you can import and parse the data using programs written in LabVIEW, MathWorks MATLAB® software, Visual Basic .NET, or Python.

A Solution that Evolves with You

01 Simplify cabling with synchronization over Ethernet

02 Reduce sensor wiring with rugged hardware installed close to your DUT. 50 g shock, 5 g vibration, -40º C to 70º C temp range

03 Scale to your needs with 1-, 4-, 8-, and 14-slot USB or ENET chassis. Connect any sensor with more than 70 I/O modules

FlexLogger and CompactDAQ were designed to help simplify the job of acquiring data. With the configuration-based workflow, validation engineers and technicians can change sensors, sample rates, displays, and more without programming.

Rudy Sengupta
Sr. Director, NI Product Planning
Outdoor-Rated Data Acquisition with FieldDAQ

Have a test that’s too big for the lab? FieldDAQ™ incorporates NI measurement quality in a brick-like device rated for use outdoors, even without an enclosure. FieldDAQ is compatible with the same software as CompactDAQ systems, including FlexLogger, so you can mix and match equipment based on test requirements and take advantage of the same workflow as you move from the lab to the field.

FIELDDAQ SPECIFICATIONS

- IP65/IP67 rated to be dust tight and waterproof
- Withstands 100 g shock and 10 g vibration
- Operating temperature from -40 °C to 85 °C
- Standard M12 cable connectors (power, ENET, sensors)

Why NI for Mechanical Component Test?

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>BENEFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnkey data-logging software</td>
<td>Enjoy easier test setup and software configuration</td>
</tr>
<tr>
<td>Flexible software support options: Python, C/C#, Visual Basic .NET, LabVIEW, MATLAB</td>
<td>Program a more robust test system with software support for the language of your choice</td>
</tr>
<tr>
<td>Open file formats: .csv and .tdms</td>
<td>Choose to export to Excel with a .csv format or stream-to-disk with a .tdms format</td>
</tr>
<tr>
<td>Quality design from a test and measurement industry leader with over 40 years in business</td>
<td>Have confidence in your test system performance and data repeatability</td>
</tr>
<tr>
<td>More than 70 measurement modules</td>
<td>Match sensor to channel count for a cost-effective solution to mixed-signal and higher-channel-count tests</td>
</tr>
<tr>
<td>Built-in synchronization over Ethernet</td>
<td>Simplify cabling and installation for large, distributed tests</td>
</tr>
<tr>
<td>Rugged hardware design</td>
<td>Spend more time taking care of your test needs and less time working around instrumentation needs</td>
</tr>
</tbody>
</table>
System Integration on Your Terms

NI offers a variety of solution integration options customized to your application-specific requirements. You can use your own internal integration teams for full system control, or leverage the expertise of our worldwide network of NI Partners to obtain a turnkey system.

Contact your account manager or call or email us to learn more about how NI can help you increase product quality and accelerate test timelines at (888) 280-7645 or info@ni.com.

NI Services and Support

- Consulting and Integration
- Turnkey Solution Delivery and Support
- Repair and Calibration
- Global Support
- Prototyping and Feasibility Analysis
- Training and Certification

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