

STACIS[®] 4

Active Piezoelectric Vibration Control

The STACIS[®] 4 Advantage

- ➔ **Reduces floor vibrations by 4 to 5 VC levels**
- ➔ **Hundreds of times stiffer than air isolators**, STACIS suffers from none of the limitations of air vibration isolation systems. There is no “soft” suspension and, unlike active air systems, STACIS can be placed beneath a tool with an internal active air isolation system with both systems fully optimized.
- ➔ **The unique serial design and proprietary high-force piezoelectric technology** results in a wide active bandwidth from 0.2 Hz to 150 Hz and unmatched, truly active vibration cancellation with up to 99.9% reduction at 2 Hz.



A STACIS[®] System, incorporating a non-ferromagnetic, highly damped, aluminum platform, provides a second stage of vibration isolation for a Bruker BioSpin 600 MHz NMR Spectrometer. Photo courtesy of Bruker BioSpin and Memorial Sloan Kettering Cancer Center.

STACIS[®] 4 is the most advanced active vibration isolation system commercially available. Employing inertial vibration sensors, sophisticated control algorithms, and state-of-the-art piezoelectric actuators, STACIS cancels vibration in real time by continuously measuring floor activity, then expanding and contracting piezoelectric actuators to filter out floor motion. The all new STACIS 4 builds upon the success of our proven STACIS technology, which is used by 9 of the top 10 semiconductor manufacturers worldwide.

Initially designed to isolate precision microlithography, metrology, and inspection equipment in advanced semiconductor factories, STACIS is now the industry standard solution for the most sensitive instruments in noisy environments, including but not limited to applications such as, failure analysis, nanotechnology, nanofabrication, structural biology, and materials research.

STACIS 4 includes a new and improved, lower noise, digital controller, the DC-2020 with a dual-core processor. This advanced control system provides the user with an easy to use Graphical User Interface.

STACIS 4 Improves on the advanced architecture of our previous generation STACIS product by adding advanced control algorithms and new patented technology. The results are previously unachievable cancellation of building floor vibration at all frequencies, but particularly below 10Hz, where high resolution imaging and metrology is most sensitive. When combined with patented FloorSense[™] technology, STACIS 4 reduces building floor vibration by up to 60 dB at 2 Hz and 27 dB at 1Hz.

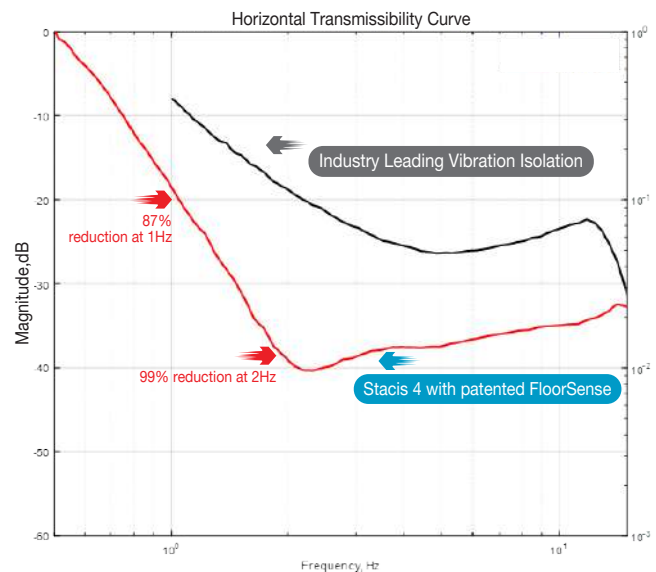
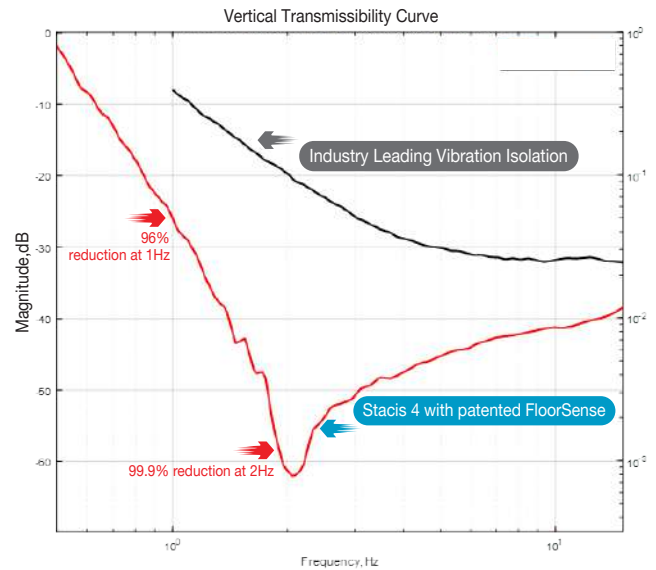


STACIS[®] System on “risers” installed as a custom designed TMC Quiet Island[®] subfloor platform to support an eBeam lithography tool

Features and Performance



- ➔ Reduces floor vibrations by 4 to 5 VC levels
- ➔ Vibration isolation starts at 0.2 Hz, with 85% to 96% isolation at 1 Hz and greater than 96% isolation at 2Hz, vertical and horizontal
- ➔ Active bandwidth, 0.2 Hz to 150 Hz
- ➔ Reduces fab floor construction costs, allows tools to be installed in higher vibration environments
- ➔ 6 degree-of-freedom active hard mount design, no soft air suspension
- ➔ Robust control system requires no scheduled re-tuning
- ➔ A point-of-use solution compatible with all internal tool vibration isolation systems
- ➔ Ensures tool vibration criteria will be met as vibration levels increase over time
- ➔ Uses TMC's STACIS® technology to cancel vibration using piezoelectric actuators
- ➔ Digital Controller with PC-Based Graphical User Interface (GUI)
- ➔ Enables older and noisier floors to accommodate state-of-the-art tools
- ➔ Compatible with various floor heights and sub-floor geometries in fabs
- ➔ Increases throughput, quality and yield
- ➔ RoHS Compliant

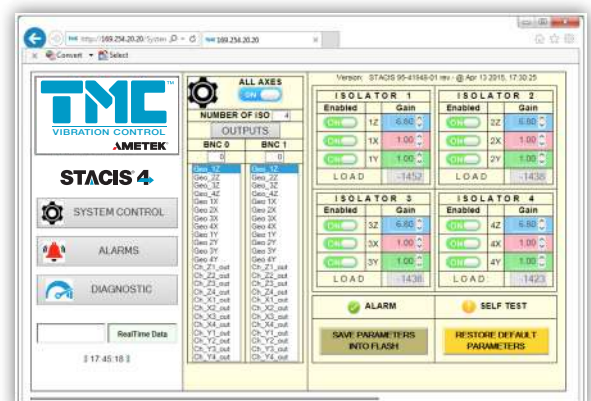


4500 lbs (2045 kg) payload tested with simulated vibration at VC-C (500 μ m/s, 12.5 μ m/s RMS)

The DC2020 electronics are specifically designed around TMC's proprietary STACIS technology. The DC2020 sets the standard for control of active vibration cancellation with enhanced capabilities for system optimization and performance monitoring with unmatched processing speed.



DC-2020e and PC-Based Graphical User Interface





Installation of a TMC Quiet Island® with a high stiffness, highly damped stainless steel platform on STACIS®. (Photo courtesy of Texas Instruments' Kilby Center)



STACIS® Floor Platform supporting a JEOL JEM-2100F Transmission Electron Microscope (TEM).



A Cameca NanoSIMS 50L on a TMC 65 Series Floor Platform supported by STACIS® isolators. This tool is a 5,000-pound secondary ion mass spectrometer with a spatial resolution of 50 nanometers. Photo courtesy of the Planetary and Space Sciences Research Institute (PSSRI) at The Open University, Milton Keynes, U.K.



Thermo Fisher Titan Krios Cryo Transmission Electron Microscope supported by a STACIS platform at Oregon Health Sciences University.

Specifications



STACIS 4 Performance Specifications

| | |
|---|--|
| Active degrees of freedom | 6 |
| Active bandwidth | 0.2-150Hz |
| Isolation at 1 Hz | 85-96% |
| Isolation at 2 Hz | 96-99.9% |
| Settling time | 20ms |
| Internal noise | <0.05nm RMS |
| Operating load range per isolator | Low capacity: 400-1100 lbs (181-499 kg) Med capacity: 900-2100 lbs (408-953 kg) Hi capacity: 1900-4500 lbs (862-2041 kg) |
| Stiffness (1000 lb./454 kg mass Med capacity isolator) | 40,000 lbs/in (73 x 105 N/m) |
| Magnetic field emitted at max 4 inches (102 mm) from isolator | <0.2 µG broadband RMS |

DC-2020 Controller Specifications

| | |
|--------------------|---|
| Dimensions (WxDxH) | 19 x 8.5 x 1.75 in. 483 x 216 x 45 mm |
| Weight | 6.3 lbs (2.9 kg) |
| Processor | 150/75 MHz dual core |
| Sampling rate | 10 kHz |
| Analog outputs | 16 channels |
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| Status light | single LED |
| Front panel ports | 1x serial USB 2.0 1x serial Micro-USB 1x Ethernet RJ-45 2x BNC |
| Rear panel ports | 1x serial USB 2.0 1x Ethernet RJ-45 1x RS-232 DB-9 legacy serial for legacy STACIS 2100 isolators |
| User interface | Front panel LCD display Character menu on HyperTerminal Extended GUI for Microsoft Windows Embedded Ethernet GUI |

Design, Dimensions, Environmental

| | |
|---------------------------|---|
| Environmental and safety | CE and RoHS compliant |
| Active isolation elements | Piezoelectric actuators with minimum 3300 lb. (1500 kg) capacity receive signal from a high-voltage amplifier with an output of up to 800 VDC. Vertical actuators support the isolated payload. |
| Passive isolation element | Single stiff isotropic elastomer (no compressed air supply required) |
| Vibration sensor elements | Downward facing geophone type inertial sensors that measure floor vibration below the isolator and deliver voltage proportional to the velocity of vibration motion |
| Active feedback control | Floor vibration is measured, processed and attenuated below the spring supporting the isolated surface |
| Isolator dimensions | 11.75 x 12.5 x 10.8 in. 300 x 320 x 275 mm |
| Isolator weight | 75 lbs (34 kg) |
| Operating temperature | 50° - 90° F 10° - 32° C |
| Storage temperature | -40° - 130° F -40° - 55° C |
| Humidity | <80% @ 68° F (20° C) |
| System power requirements | 100, 120, 230, 240 VAC 50/60 Hz AC; <600 W |
| Isolator count per system | minimum of 3 |
| Options | laminated stainless steel platforms, frames, risers, leveling devices, earthquake restraints, lifthoods |

Distribution in the UK & Ireland



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