To achieve consistent transfer functions in experimental modal tests, an excitation source with repeatable force level is key. Compared to manual modal hammers, the SAM Scalable Automatic Modal Hammer meets this requirement. Its unrivalled reproducibility perfectly matches Scanning Laser Doppler Vibrometers. Two models featuring different force ranges allow for excitation of small and large structures. An optional trigger module adds control by external signal as required in quality assurance applications.

Highlights

- Repeatable excitation avoids double hits
- Precise force level control enables structural linearity checks
- Reproducible position and angle for consistent transfer functions
- Bandwidth > 20 kHz for light-weight structures
- Force levels up to 22 kN also excite large structures
- Adjustment of the operational hit angle to excitation from all directions

SAM Scalable Automatic Modal Hammer

Precise excitation without mass-loading

Datasheet

Technical data

Scalable Automatic Modal Hammer type SAM1

Tripod mountable actuator for sample excitation in experimental modal analysis and acoustic quality assurance with force levels up to 200 N. The software controlled stepper motor allows for a high definition control of all relevant parameters and the travel of the hammer arm featuring the integrated force transducer.

General specifications

- Excitation bandwidth: > 20kHz [1]
- Max. excitation force: 200 N
- Output force signal: BNC
- Configuration: SAM-GUI via USB interface
- Weight: 1.1 kg/2.4 lbs
- Operating temperatures: 0 ° ... 50 °C/32 ... 122 °F
- Power supply: 100 - 240 V/50 - 60 Hz (incl. AC adaptor)

[1] value depends on sample

Accessories included

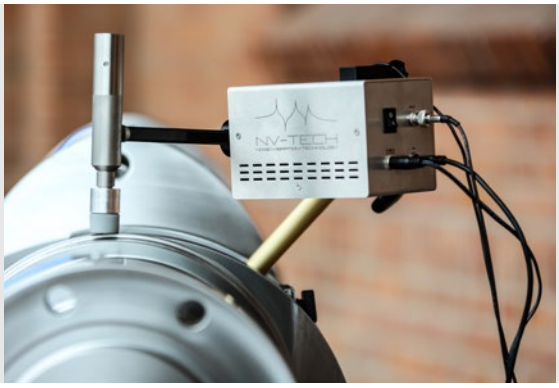
- Instrumented ICP® Impact Hammer with integrated force transducer, mass 4.8 g/0.17 oz for a max force of 200 N, sensitivity 22.5 mV/N (100 mV/lbf)
- Exchangeable tips and extender mass (1.25 g/0.044 oz)
- Configured connection cable for force sensor, BNC connector
- AC adaptor
- Storage case for all components and the optional stand
- NV-TECH SAM-GUI professional software

Metrological specifications SAM1	
Sensitivity (±20%) [2]	22.5 mV/N (100 mV/lbf)
Measurement range	200 N_{pk} (45 lbf_{pk})
Non-linearity [3]	≤ 1 %
Excitation voltage	20 ... 30 V_{DC}
Constant current excitation	2 ... 20 mA
Output impedance	< 100 Ω
Output bias voltage	8 ... 14 V_{DC}
Discharge time constant [3]	≥ 100 s
Hammer mass	4.8 g (0.17 oz)
Head diameter	6.3 mm (0.25 in)
Tip diameter	2.5 mm (0.10 in)

[2] steel tip with no extender mass

[3] typical

General accessories and options for all SAM models
Adjustable magnetic stand and precision adaptor
Trigger Module - TTL input for releasing hammer hit by external triggers



Scalable Automatic Modal Hammer type SAM3

Tripod mountable actuator for excitation of larger samples in experimental modal analysis and acoustic quality assurance with force levels up to 2200 N. The software controlled stepper motor allows for a high definition control of all relevant parameters of the impact of an instrumented modal hammer.

General specifications

- Excitation bandwidth: > 10kHz [1]
- Max. excitation force: 2200 N
- Configuration: SAM-GUI via USB interface
- Weight: 2.6 kg/5.7 lbs (actuator only)
- Operating temperatures: 0 ° ... 50 °C/32 ... 122 °F
- Power supply: 100 - 240 V/50 - 60 Hz (incl. AC adaptor)

[1] value depends on sample

Accessories included

- Instrumented ICP® Impact Hammer with integrated force transducer, mass 0.16 kg/0.35 lbs for a max force of 2200 N or on request 22 kN, sensitivity 2.25 mV/N (10 mV/lbf)
- Exchangeable tips and extender mass (75 g/2.6 oz)
- AC adaptor
- Tripod adaptor 1/4 "
- Storage case for all components
- NV-TECH SAM-GUI professional software

Metrological specifications SAM3	
Sensitivity (±20%)	2.25 mV/N (10 mV/lbf)
Measurement range	± 2224 N_{pk} (± 500 lbf_{pk})
Non-linearity	≤ 1 %
Excitation voltage	20 ... 30 VDC
Constant current excitation	2 ... 20 mA
Output impedance [2]	< 100 Ω
Output bias voltage	8 ... 14 VDC
Discharge time constant [2]	≥ 2,000 s
Hammer mass	0.16 kg (0.34 lb)
Head diameter	1.57 cm (0.62 in)
Tip diameter	0.63 cm (0.25 in)

[2] typical

Compliance with standards	
Electrical safety	2014/35/EU Low voltage directive
EMC	89/336/EWG Directive of electromagnetic compatibility

SAM-GUI Software

Graphical user interface for controlling all SAM models
System requirements: Microsoft Windows® 7 or 10; USB 2.0 interface

The SAM GUI supports a convenient parametrization of the automatic modal hammer. The version PROFESSIONAL comes with additional features and a remote control supporting even more a quick set-up and a precise excitation.

Software parameter	
Set zero position	Precise adjustment of the zero position of the hammer tip by mouse or by remote control [1]
Velocity of excitation	Adjustment of the impact velocity
Hit angle	Limits the operational hit angle for confined spaces
Stop angle	Parameter to avoid double hits. Adjustment of the angle at which the hammer stops before reaching its zero position.
Time interval	Adjusts waiting time between 2 hits
Maximum number of hits	Adjustment of the max. number of hits per experiment
Trigger [1]	Hammer hit triggered by external hardware TTL trigger pulse
Software functions	
Single hit	For test measurements
Start	Start continuous operation
Stop	Cancles continuous operation
Load / save setting	Save and retrieve parameter settings
Remote control	Handheld control (Logitech®) to remotely adjust angle and speed of the hammer during set-up

[1] requires optional trigger module