ECON

Premax

Test EngineX

Technical Specifications

Overview

MI-8 series innovatively presents the next-generation higher channel account vibration control and measurement system. It integrates various acquisition module, on-board multi-DSPs technology, Ethernet connectivity on PXI bus, and creates a solid platform for shaker control, vibration and noise measurement and analysis. MI-8 series also adapts embedded-in host controller with real-time operating system, taking charge of effective data management and transmission. MI-8 series is especially suitable for higher input channel account needed test and measurement, like vehicles, rockets, missiles, and airplanes.

Features

✧   *High precision*: No less than 120dB dynamic range, 24-bit ADC and DAC, 32-bit floating point DSP, and low noise design process.

✧   *Real time:* Based on the real-time systems, PXI, through multi-DSP parallel processing and high-speed transmission for data logging and real-time signal analysis.

✧   *Scalability:* From 16 to 1,024 synchronized channels via Ethernet without degrading performance of each..

✧   *Versatility:* Multiple functions, including data collection, a single input multi-output and multi-input multi-output signal analysis.

Applications

✧   Multi-channel data acquisition and real-time analysis

✧   Multi-channel data record

✧   Modal data acquisition

✧   Shock analysis

✧   Shock response spectrum analysis

System Specifications

Hardware	MI-8008	MI-8014	MI-8018
Slots	Max. 16	Max. 16	Max. 16
Input Channels	**Max. 28**	**Max. 52**	**Max. 68**
Output Channels	1-16		
Digital I/O	Supportable and optional		
Sensor Compatible	Voltage, IEPE, TACHO, Temp. & Hum.,Strain, CAN, GPS, TEDS (Optional)		
PC Connectivity	1000 MB LAN		
Single Shaker Control Software Sine, Random, Mixed mode random, Kurtosis, RSTD, Classical Shock, SRS, FDR-TTH, FFR-LTH, Notching, Vibro-shock	✓	✓	✓
Multi-shakers/Multi-axis Shaker Control Software MIMO Random, MIMO Sine, MIMO Classic Shock, MIMO Transient Time History, MIMO Road Simulation	✓	✓	✓

Measurement and Analysis Software Vibration and Noise Analysis, Enhanced Waveform Generator, Data Recorder and Playback and Offline Analysis, Modal Analysis	✓	✓	✓

I/O Specifications

Input, Output and I/O Modules

Input module	Each input module has four input channels
Output module	Each output module has four input channels

Outputs

Channels	1 to 16 Channels (waveform sources)
Input channel	BNC
Filtering	Independent analog anti-alias filter and 160dB/Octave digital filter for each channel to eliminate phase distortion and imaging
Resolution	24-bit DA converter (DAC)
Voltage range	±10 V_{PEAK}
Dynamic range	> 100dB
Frequency range	20kHz(sine)
Amplitude accuracy	0.1%(1kHz sine)
Frequency accuracy	0.001%(Sine)
Output impedance	30 Ω
Output Load	Max.30mA$_{PEAK}$
Harmonic distortion	<-95dB

Inputs

Channels	Up to 64 synchronized of each
Input channel	BNC
Filtering	Independent analog anti-alias filter and 160dB/Octave digital filter for each channel
Resolution	24-bit ADC
Voltage range	±10 V_{PEAK}
Coupling mode	AC, DC, IEPE,TEDS(option)
Maximum input	±36 V_{PEAK} without damage
Dynamic range	>110dB
Channel match	Amplitude within 0.05 dB Phase within 0.5 degree (DC to 21 kHz) (within one chassis) Maximum phase difference <1.5° (within one chassis, between two wide apart modules)
Signal-to-noise	>100dB
Amplitude accuracy	0.1dB(at 1kHz sine)
Frequency accuracy	0.001%
Input impedance	220kΩ
IEPE	Internal (+24V/+4mA)
Harmonic distortion	<-100dB
Channel cross talk	<-105dB

System Software

System Functions

- ➢ Real time signal analysis
- ➢ Data record
- ➢ Modal data collection
- ➢ Impact measurement and analysis
- ➢ Shock response spectrum analysis

Accessibility

- ➢ Data management
- ➢ Offline analysis
- ➢ Instrument self-calibration
- ➢ Signal generator
- ➢ Quickly generate reports (Word/PDF)
- ➢ Data and file management
- ➢ Signal calculation
- ➢ Cursor mark
- ➢ MATLAB interface

Real-time Signal Analysis

The analysis of time domain, FFT, auto power spectrum, cross power spectrum, auto correlation, cross correlation, FRF, coherence and histogram result, which will satisfy your requirements in real-time analysis. Up to 96 kHz sampling rate covers a wide range of analysis for vibration and noise. Averaging and triggering make your work more effective. And you can view test result through varies plots, such as, polar coordinates plot, etc. Detailed specifications are given below.
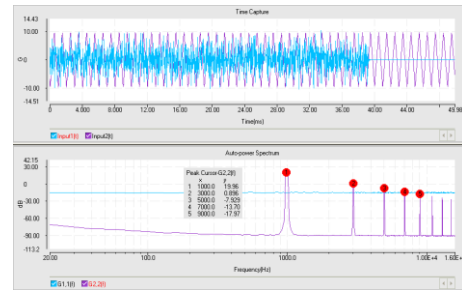
Real-time signal processing

Signal Analysis

Time domain	Time capture, auto correlation, cross-correlation, orbit plot, oscilloscope
Frequency domain	FFT, Auto Power Spectrum Density, Cross Power Spectrum Density ,FRF, coherence, polar plot
Statistical analysis	Histogram
Channel calculation	Single/double integral and differential

Averaging

Domain	Time domain or Frequency domain
Types	Exponential, Linear, Peak hold, N frame peak hold
No. of averages	1 to 100,0000 frames

Spectrum Analysis

Span	Up to 75000Hz
Lines	50, 100, 200, 400, 800, 1600, 3200, 6400, 12800
Window	Rectangle, Hanning, Hamming, Exponential, Bartlett, Welch, Tukey, Blackman, Blackman Maximum, Blackman Minimum, Flat-Top, Kaiser-Bessel

Capture

Sampling frequency	Up to192kHz
Points	128, 256, 512, 1024, 2048, 4096, 8192, 16384, 32768
Overlap	12.5%, 25%, 37.5%, 50%, 62.5%, 75%, 87.5%

Triggering

Source	Input channel or no trigger
Slopes	Positive, negative or bi-polar
Level	Voltage level within voltage range
No trigger mode	Free run or manual run, time delay is available
Trigger mode	Pre-trigger or post-trigger
Run mode	Free Run after First Trigger Manual Trigger Every Frame Auto Trigger Every Frame

Waveform Source

Type	DC, Sine, Square, Triangle, Impulse, Swept Sine, White Noise, Chirp, Linear Sweep, Logarit Sweep, Step Sine ,Pseudo Random, Burst Random, Shaped Random and Double Sine
Setup parameters	Amplitude, Frequency etc.

Measurement Controls

Controls	Start/stop, pause/continue, next frame
Status displays	Running time, frames, running status

Data saving

Save modes	On-line save and auto save
Save contents	Signals and panes
Signal file formats	ECON binary/ASCII or UFF binary/ASCII
Data export	Excel, MATLAB
Data recording	Used for offline analysis

Signal calculator

Feature	Allows you to create customized signals. All signals are calculated and displays on line during test
Operations	Add/subtract/multiply/divide, square, histogram, window, correlation etc.

Signal display

Window format	Single pane, two pane, four pane, thumbnails
Display content	signals, color and line for signal, marks etc.
Time domain signal average of input signal	Display maximum, minimum value, RMS,
Cursors	Single or dual with X1, Y1, X2, Y2, power, Δ RMS
Cursor linkage	Cursors in different panes synchronized moving
Harmonic cursor	Marks and auto-calculate THD
Peak/valley cursor	Auto-detection and marks

Test Report

Content	customized, contains parameters, panes etc.
Report template	customized
Report format	Word ,PDF or direct print

Shock Measuring and Analysis

You can capture the shock pulses easily and simultaneously when shock or impact event happens. Besides time domain analysis, you can use shock response spectrum (SRS) to estimate the potential damage due to peak values on different natural frequencies in shock. ISO, MIL-STD-810 and user-defined criterions of tolerance are available.

Shock Type

Shock Measuring and Analysis (SMA) takes ideal time waveform as the standard, for example, ideal half-sine pulse, ideal saw tooth pulse and ideal trapezoidal pulse; it is used for shock equipment which can generate ideal pulse and require the pulse measured from UUT on the table of shock equipment to be in the tolerance band of the ideal pulse according to the test standard.

Detailed specifications are given below.

Other Analysis

SRS analysis, SR demo, rotation shock analysis, force & distortion analysis
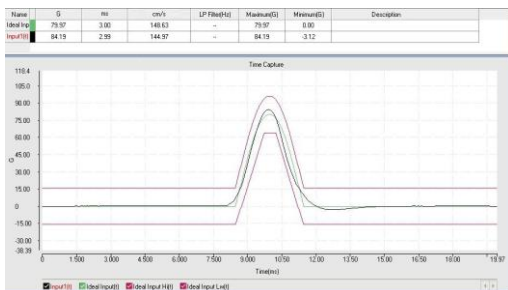
Transient Capture

|	
Sampling frequency	Up to 192kHz
Acceleration range	Up to 100,000gn
Pulse duration	0.1 to 1000ms
Sampling time	1, 2, 5, 10, 20, 50, 100, 200, 500, 1,000, 2000, 4000, 7000, 10000, 13000, 16000, 20000ms
Direction	positive, Negative

Ideal waveform

Waveform	Half-sine, trapezoid, terminal peak saw tooth
Standard	GB, GJB, ISO, MIL810, User defined
Tolerance	According to each standard
Auto-match	the acquired data matches ideal waveform
Comparison	Compare acquired data with ideal waveform
Display	Show the consistency of Capture waveforms and setting waveform

RRS

SRS type	Primary, Residual, Composite
Resolution	1/1,1/2,1/3,1/6,1/12,1/24 octave analysis
Parameters	Damp coefficients and Q, lower/upper/reference frequency
SRS definition	Calculate SRS automatically from ideal waveform or set RRS manually, and the tolerance can be set
Comparison	Compare measured SRS with RRS

Transient Capture
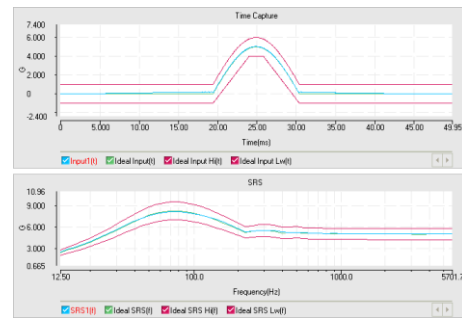
Transient Capture and SRS analysis

Filtering

Filters	Low-pass and high-pass filters
Filtering features	Set different filters for each channel
Low-pass filters	Optional ;Set cutoff frequency or filter rate
High-pass filters	Enable or disable

Triggering

Source	Input channel (Auto Trigger Every Frame) no trigger(Free Run)
Slopes	Positive, negative or bi-polar
Level	1 to 99% of ideal waveform
Trigger mode	Pre-trigger or post-trigger ,Setting negative delay indicates leading trigger, positive delay indicates lag
Remove DC	Enable or disable
Remove noise	Enable or disable , Set demising percentage

Measurement Controls

Controls	Start/stop
Status displays	Current Frame, Total Frames, Running status

Data saving

Save modes	On-line save and auto save
Save contents	Signals and panes
Signal file formats	ECON binary/ASCII or UFF binary/ASCII
Data export	Excel, MATLAB
Data recording	Used for offline analysis
Playback	Replay shock waves manually

Test Report

Content	Customized, contains parameters, panes etc.
Report template	Customized
Report format	Word ,PDF or direct print

SRS

You can capture the shock pulses easily and simultaneously when shock or impact event happens. Besides time domain analysis, you can use Shock Response Spectrum (SRS) to estimate the potential damage due to peak values on different natural frequencies in shock.

SRS takes reference SRS as the standard; it is used for shock equipment that can generate pulse according to the reference SRS and requires the SRS measured from UUT on the table of shock equipment to be in the tolerance band of the reference SRS. Detailed specifications are given below.

Transient Capture and SRS analysis

Shock Type
In shock response spectrum waveform as the standard , for shock response spectrum that can be set ,and produce the corresponding pulse shock device based on the shock response spectrum. Test requires the shock response spectrum that specimens withstand shocks to be at a set tolerance band.

Other Analysis
SR demo, rotation shock analysis, force & distortion analysis

SRS Profile
SRS type	Composite SRS
Resolution	1/1,1/2,1/3,1/6,1/12,1/24 octave analysis
Parameters	Damp coefficients and Q, and reference frequency lower/upper frequency
Profile definition	Setup frequency, amplitude, lower/upper tolerance of breakpoints with unlimited in the profile table
Comparison	Compare measured SRS with SRS profile

Transient Capture
Sampling frequency	Up to 192kHz
Acceleration range	Up to 100,000gn
Sampling time	Customized, limited by SRS profile
Sampling number	Customized
Direction	positive,Negative

Filtering
Filter s	Low-pass and high-pass filters
Filtering features	Set different filters for each channel
Low-pass filters	Optional ;Set cutoff frequency or filter rate
High-pass filters	Enable or disable
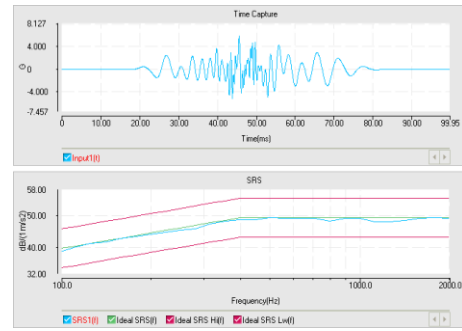
Triggering
Source	Input channel (Auto Trigger Every Frame) no trigger(Free Run)
Slopes	Bi-polar
Level	Acceleration level
Trigger mode	Pre-trigger or post-trigger , Setting negative delay indicates leading trigger, positive delay indicates lag
Remove DC	Enable or disable

Measurement Controls
Controls	Start/stop
Status displays	Current Frame, Total Frames, Running status

Data saving
Save modes	On-line save and auto save
Save contents	Signals and panes
Signal file formats	ECON binary/ASCII or UFF binary/ASCII
Data export	Excel, MATLAB
Data recording	Used for offline analysis
Playback	Replay shock waves manually

Test Report
Content	Customized, contains parameters, panes etc.
Report template	Customized
Report format	Word ,PDF or direct print

Modal Data Acquisition

This tailored module is available for both impact hammer and shaker excitation. With flexible triggering and a graphically adjustable Force/Exponential window, it is easy to set up and acquire data using an impact hammer. For shaker excitation, a variety of source waveforms, including shaped random and burst-random, pseudorandom, and chirp, can provide the optimal signal for the best FRF measurements. Moreover, this module supports various data saving formats which are compliable with popular modal packages.

FRF Data Acquisition for Modal

Analysis

FRF/Coherence	Between excitation and response channels
Spectrum analysis	auto power spectrum, cross power spectrum
Excitation	From impact hammer or shaker excitation
Sampling frequency	Up to 192kHz
Frame size	Up to 32768
Specified window	Force/Exponential window, set different windows for each channel
Modal coordinate	Set number, direction, window for each point
Auto-increment	Auto-calculate numbers of next group
Playback analysis	Replay data frame one-by-one, re-edit and select data

Triggering

Source	Input channel or no trigger
Slopes	Positive, negative or bi-polar
Level	Voltage level within voltage range
No trigger mode	Free run or manual run, time delay is available
Trigger mode	Pre-trigger or post-trigger
Run mode	Free Run after First Trigger
	Manual Trigger Every Frame
	Auto Trigger Every Frame

Averaging

Domain	Time domain or Frequency domain
Types	Exponential, Linear, Peak hold

Filtering

Low-pass filters	Set cutoff frequency or filter rate

Measurement Controls

Controls	Start/stop, pause/continue, next frame
Status displays	Current Frame, Test Time, Running status

Data saving

Save contents	Time Capture, FFT, Coherence Function, Correlation, FRF and Power Spectral Density
Save formats	ECON binary/ASCII or UFF binary/ASCII ME 'Scope ASCII Spreadsheet
File formats	Save the file according to single signal, signal type or test point

Compatibility

Compatible with Modal Genius ,ME 'Scope etc.
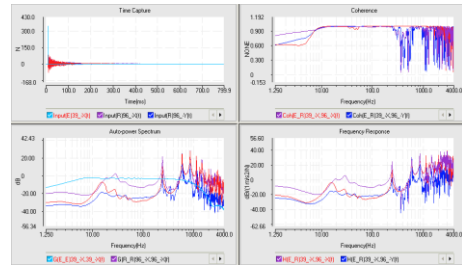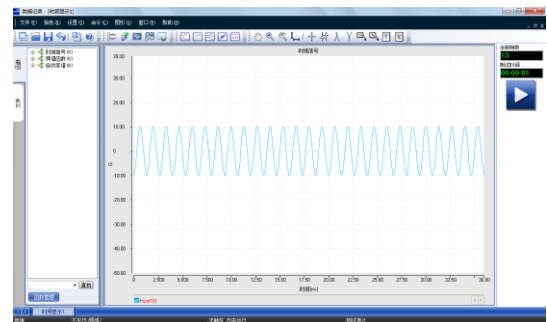
Data Record

Recording channel	Optional
Data format	ECON binary or txt
Online display	The time history of all channels
Channel status	Including voltage magnitude and overload
Post-processing	Analyze on the offline Analyzer software

Data Management

Mainly used to upload and manage the data log files, support to connect several Premax to upload the data simultaneously.

Data format :	ECON binary or txt, UFF binary, UFF txt, Matlab mat etc
File Path:	Amend the path (option)
Post-processing	Analyze by using the offline Analyzer software

Data Playback & Offline Analysis

Offline analysis software can be installed on any computer for playback, display, analysis of the data stored on the hard disk.

Function	Offline signal analysis, offline impact analysis.
Data Format	ECON binary dar , XY ASCII (txt), Y only ASCII (txt)
Source	Data logging or raw data records; data from data record need to use data management software, through a network analyzer to obtain.
Analysis Content	FFT, power spectrum, frequency response coherent signal, correlation signal, histogram
Analysis parameters	Sampling points, the trigger parameter settings (with real-time signal analysis)
Windowing parameters	The same as real-time signal analysis
Average parameters	The same as real-time signal analysis
Signal display	The same as real-time signal analysis
Auxiliary Setting	The same as real-time signal analysis
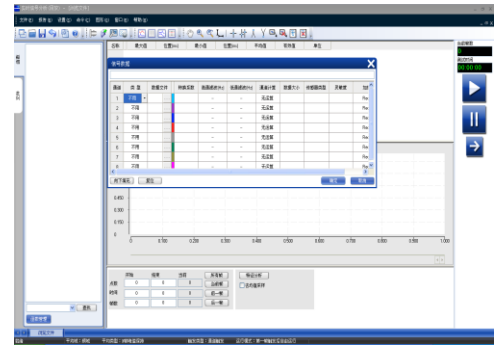
Post Processing

Using the providing interface function to call the stored data files into MATLAB for processing and display, signal data can also be directly output to an Excel spreadsheet.

Ordering Guide

Higher Channel Account Measurement System Hardware

Item	Part. NO	Description
1	MI-8008	Premax 8-slot PXI based Acquisition/Control Peripheral (PACP-8)
2	MI-8014	Premax 14-slot PXI based Acquisition/Control Peripheral (PACP-14)
3	MI-8018	Premax 18-slot PXI based Acquisition/Control Peripheral (PACP-18)
4	MI-1204	4-channel Voltage/IEPE analog input module
5	MI-2204-01	One extra enabled Drive analog output channel
6	MI-2204-02	One extra enabled COLA analog output channel
7	MI-2204-03	One extra enabled Waveform Generator analog output channel
8	MI-3232	Synchronization module for multi-chassis synchronized working, with one DB37 Digital I/O port connectivity and cable
9	ACC-8000	Accessories

Higher Channel Account Measurement System Application Software

Item	Part. NO	Description
1	8711	Dynamic Signal Analysis
2	8711-01	Standard Waveform Generator for all enabled output channels
3	8711-02	Extension of Dynamic Signal Analysis for chained Premax
4	MI-8712	Data Recorder
5	MI-8713	Playback And Offline Analysis
6	8741	Modal Data Acquistion
7	8742	Modal Genius Modal Analysis Software
8	8751	Shock Data Capture
9	8751-01	Shock Pulse Analysis
10	8751-02	Shock Response Spectrum Analysis
11	8752	Shock Response Spectrum (SRS)
12	8754	Offline Mode Shock Data Analysis
13	8800	Software Development Kit (SDK)
14	80CAL	Self Calibration software for Premax hardware with permanent license.

About Us

ECON is a leading designer and manufacturer of instruments and equipment for test and measurement, headquartered in Hangzhou, China.

With more than 10 years experiences, ECON is also a comprehensive solution supplier for Vibration Test, Vibration and Noise Measurement and Analysis, Structural Model Test, Transducer Calibration, and Environmental Reliability Test.

- Leading role in design and manufacturing of instrument and equipment for test and measurement in China
- A global sales and marketing network.
- Over 2,000 instruments installed worldwide: China-Mainland, Taiwan, Europe, USA, Russia, Mid-east, India, Korea, Japan……
- Customers among Aerospace, Aviation, Automotive, Electronics, IT & Computers, Packaging, transportation, Institutes and Universities…...
- 70 employees, with an experienced and innovative R&D Team.
- A subsidiary company specialized in environmental test service

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