Instrumented Sensor Technology

## MODEL EDR-5 SERIES

# SHOCK & VIBRATION RECORDER

- New, full featured recording package
- Completely self-contained
- Built-in Tri-axial accelerometer +/-10 to +/-200 g fs range
- DC response
- Acceleration Waveform Recording
- Temperature and RH (opt.) measurement
- Programmable digitization to 50k sps/channel
- 12-bit/16-bit digitization
- Nonvolatile memory to 64GB
- Programmable triggering schemes
- Amplitude, delta-v, time, external triggering options
- High speed USB and Bluetooth PC interface
- External accelerometer input channels
- Up to six 50kHz Accel channels
- Re-chargeable lithium-ion batteries
- Battery life to 90 days
- Network triggering capability
- Real time data output capability
- Advance memory management features
- Patented sliding window overwrite mode
- IP67 enclosure ingress protection rating
- Designed for high shock/vibration environments
- Powerful Windows software included

## TYPICAL APPLICATIONS

HIGH-VALUE TRANSPORT MONITORING
AIR DROP TESTING
AIRBORNE VIBRATION MEASUREMENT
MACHINERY MONITORING
CRASH RECORDING
STRUCTURAL VIBRATIONS
LAUNCH VEHICLE VIBRATION
ENVIRONMENTAL TEST LEVEL QUALIFICATION
VIBRATION TEST SPEC DEVELOPMENT
IN-USE ENVIRONMENTS


## Description

The Model EDR-5 series data recorders are self-contained, completely user programmable acceleration sensor/recorders. The instruments are designed for stand-alone measurement and recording of shock and vibration over extended time periods ranging from hours to months. The “5” series offers numerous improvements over earlier models including higher digitization speeds, substantially larger memory, 12 bit/16-bit ADC, USB and Bluetooth data communications, re-chargeable lithium ION batteries, support for external PE ICP accelerometers, real time output capability, and more. The instruments still offer users the time-tested reputation for proven performance and reliability with hundreds of successful installations of predecessor models worldwide since the late 1990s.

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## Description

The recorders are set up using a standard USB port along with IST's DynaMax suite DMW-base software module. After field recording, data is transferred back to the host PC for processing and analysis. Each recorder is powered by a specially designed, re-chargeable, lithium-ion battery pack.

The instrument's recording function is controlled by a custom designed digital recording and data management engine. The design is optimized for minimal power consumption while running at high, multi-channel digitization rates and large data storage capacity. The recorder features a special low power "sleep mode" when no acceleration activity is present with a fast wake-up feature whenever acceleration levels exceed a very low minimum level. During active recording acceleration signals from internal accelerometers are captured to 12-bit resolution and stored in onboard memory. Each event is also date and time stamped. For typical ground transportation bandwidth applications, the EDR-5 series recorder is capable of recording over an entire year of acceleration data. For high speed 10kHz acquisition the instrument is capable of capturing over 24 hours of acceleration data.

### ACCELEROMETERS

Each EDR-5 instrument can be supplied with a specially designed and calibrated internal MEMs-type triaxial accelerometer. These accelerometers are available in several different user selectable range options. The MEMs device offers excellent low frequency response characteristics while providing frequency response up to 3.2kHz. Signals from the internal accelerometers are digitized to 12-bit precision.

The EDR-5 external accelerometer input channels are designed for use with voltage mode piezoelectric accelerometers. The external channel inputs provide power and constant current excitation for compatibility over a wide range of voltage mode PE accelerometers. The external input channels offer the user a software selectable low pass filter and digitization to 16-bit precision.

### BLUETOOTH INTERFACE

The EDR-5 features a wireless Bluetooth interface for receiving recorder status information on a handheld iPhone as well as mode change capabilities. Recorder status information such as number of triggered events, memory used, and battery voltage can be read from the Bluetooth interface.

### ADVANCED PROGRAMMABILITY

The EDR-5 is completely user programmable for accurate recording of either (transient) shock and/or vibration data. The instrument may be set up to operate under amplitude based, time periodic or external input triggering, or any combination thereof. Considering the extremely large onboard memory, the instrument can simply be set up to run in continuous record mode as well. In this fashion, the unit can be set up to effectively use the external trigger input as a start/stop input for recording.

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# EDR-5 RECORDING TIME

**Below are tables showing the total equivalent recording time for the EDR-5 internal accelerometers as well as the external input channels.**

| ANALYSIS BANDWIDTH (NYQUIST) 12-BIT INTERNAL ACCELEROMETERS | BANDWIDTH | SAMPLE RATE (S/sec) | RECORDING TIME (Days) |
|---|---|---|---|
| | 60 Hz | 120 | 734 |
| | 100 Hz | 200 | 459 |
| | 500 Hz | 1000 | 88 |
| | 1,000 Hz | 2000 | 44 |

| ANALYSIS BANDWIDTH (NYQUIST) 16-BIT EXTERNAL ACCELEROMETERS | BANDWIDTH | SAMPLE RATE (S/sec) | RECORDING TIME (Days) |
|---|---|---|---|
| | 2,000 Hz | 4,000 | 15 |
| | 5,000 Hz | 10,000 | 6 |
| | 15,000 Hz | 30,000 | 2 |
| | 25,000 Hz | 50,000 | 1.2 |

# EDR-5 RECORDER SPECIFICATIONS

| DATA ACQUISITION | EDR-5 | EDR-5D |
|---|---|---|
| #Selectable High Speed CHs: | 6 | 6 (6) |
| #Simultaneous High Speed CHs: | 3 | 6 |
| Digitization | 12-bit/16-bit | 12-bit/16-bit |
| #Low Speed CHs: | 4 | 8 |
| #Simultaneous Low Speed CHs | 4 | 8 |
| Temperature Sensor CHs | 1 | 2 |
| Humidity Sensor CHs | (1) | (2) |
| Battery Voltage CHs | 1 | 2 |
| #Trigger CHs | 1 | 1 |
| High Speed Digitization Rate | 10-3200/10-50,000 | 10-3,200/50,000 |
| Low Speed | 1 sample every 15 sec to 1 sample every 166 hours all models | |

| DATA STORAGE | | |
|---|---|---|
| GByte | 32 | 64 |

| DATA MANAGEMENT | | |
|---|---|---|
| Fill & Stop Memory Mode | ✓ | ✓ |
| Overwrite Memory Mode | ✓ | ✓ |
| Sliding Window Overwrite Mode™ | ✓ | ✓ |
| Sliding Window Size | Selectable 1 min to 30 days | |
| #Separate Time Windows | Selectable 1 to 100 | |

( ) = Optional  Overwrite™ (SWO) are trademarks of Instrumented Sensor Technology, Inc.

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# EDR-5 RECORDER SPECIFICATIONS

| DATA COMMUNICATION | EDR-5 | EDR-5D |
|---|---|---|
| High Speed USB 3.0 + Bluetooth | 5gbps | 5gbps |

| SENSORS | | |
|---|---|---|
| Internal Accelerometer: MEMS Triaxial | ✓ | ✓ |
| Accelerometer fs Range Choices | ±10, ±20, ±40, ±200 all models | |
| Accelerometer Frequency Responses | | |
| 20g, 40g fs | DC-1500Hz | |
| 10g fs | DC-1500Hz | |
| 200g fs | DC-3200Hz | |
| Signal Filtering: 4th order anti-aliasing | | |
| Standard 3dB cutoff choices 10g, 20g, 40g, 200g | 200Hz to 3200 Hz | 2Hz to 1500 Hz/<br>2Hz to 5kHz |
| Automatic Auto-Zero Offset Correction 200g | 1%fs/sec all models | |
| External Accelerometers: Voltage mode piezoelectric | 3.4V bias, 0.5mv/g to 1000 mv/g, all models<br>0.5 mA to 5mA excitations | |

| PROGRAMMABILITY | | |
|---|---|---|
| High Speed Sample Rate | ✓ | ✓ |
| Trigger selection | Internal or external channels and/or external trigger input, all models | |
| Triggering | ✓ | ✓ |
| Amplitude Threshold | ✓ | ✓ |
| Separate channel thresholds | ✓ | ✓ |
| Duration (time at level) threshold | ✓ | ✓ |
| Separate channel thresholds | ✓ | ✓ |
| Trigger latch | ✓ | ✓ |
| Trigger duration threshold | *1 to 34463 samples all models* | |
| Time trigger delay<br>(*forced time delay between triggered recordings)* | *0 to 35000 seconds all models* | |
| Time triggered recording | *1 sample every 15 sec to 1 sample every 166 hours all models* | |
| Maximum number of events | *65,535* | *65,535* |
| Event length: | *Fixed or data dependent* | |
| Pre-trigger samples | *2 to 20,000* | |
| Post-trigger samples | *1 to 20,000* | |
| Maximum event length cutoff | *50,000 samples all models* | |
| Memory modes: | *FS,OW, SWO* | FS, OW, SWO |

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# EDR-5 RECORDER SPECIFICATIONS

| OPERATIONAL | EDR-5 | EDR-5D |
|---|---|---|
| Temperature Recording | Internal & external all models | |
| Range/Resolution | -40 to +70°C all models | |
| Humidity Recording | Internal & external all models | |
| Range/Resolution | 0 to 100% RH / ± RH all models | |
| Usable Temperature Range | 1 to 60°C all models | |
| Digital Clock | Month/Day/Year, Hour:Min:Sec all models | |
| Date & Time tagged to each acceleration event | | |
| Resolution/accuracy | 53 msec/ ± 3 min/Mo all models | |
| Auto ON and OFF times | ✓ | ✓ |
| Connectors | *Micro-USB for high speed USB, all models* | |
| | *(10-32 microdot for external accelerometers)* | |
| Push button | *Recorder status, mode change* | |
| Bluetooth | *Recorder status, mode change* | |
| Battery Life (Typical) Alkaline C-cell Batteries | *30-40 days* | 15+ days |
| Data Memory Backup | *Indefinite* | |

| PHYSICAL | | |
|---|---|---|
| Size | *4.2" x 4.4" x 2.2"* | 4.2" x 4.4" x 2.2" |
| Housing | *IP-67, red anodized aluminum, watertight, gasket sealed* | |
| Weight | *2.2lbs* | 2.6lbs |
| Operating Temperature Range | -40 to +70°C all models | |
| Shock Fragility | 500g or 20 x fs, all models | |

| STANDARD ANALYSES | |
|---|---|
| (with DMW-BASE software package) | 3-Channel acceleration waveform graphics, histograms, temp/hum process |
| | Resultant acceleration waveforms |
| | Spreadsheet tabulation of max, min, peak, duration, RMS, crest factor, velocity change, temperature, humidity, dew point, battery volt |
| | Data editing and sorting by selected event parameters, statistical summaries |
| | Digital filtering- low pass, high pass, bandpass |

| OPTIONAL ANALYSIS SOFTWARE | |
|---|---|
| | *DMW-int* Velocity and Displacement Waveforms |
| | *DMW-psd* Power Spectral Density (PSD) calculation and analysis |
| | *DMW-srs* Shock Response Spectrum (SRS) calculation and analysis |
| | *DMW-drop* Packaging Drop Height - Equivalent impact, Zero-G free fall, package trajectory animation, impact direction & type. |
| | *DMW-deriv* Jerk Waveform calculation and display |

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# EDR-5 RECORDER SPECIFICATIONS

| HARDWARE OPTIONS | | |
|---|---|---|
| Relative humidity sensor | *internal and/or external* | |
| Auxiliary battery pack | ✓ | ✓ |
| Hand-held remote trigger (HRT-1) | ✓ | ✓ |
| Remote alarm module (RALM-1) | ✓ | ✓ |


Instrumented Sensor Technology

4704 Moore Street | Okemos, MI 48864-1722

P: 517-349-8487 | F: 517-349-8469

info@isthq.com | www.isthq.com


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