



**TRIO®**

## Machine Data Acquisition

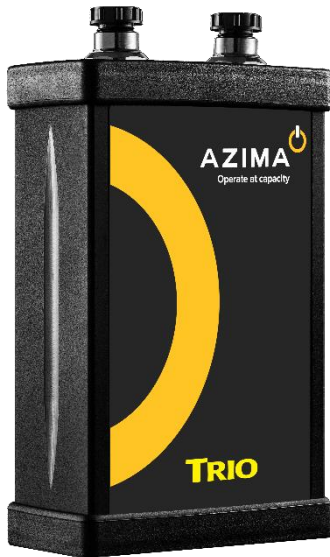
Powerful vibration data collectors, controllers,  
sensors, and field analyzers







# POWERFUL, ERGONOMIC, AND SAFE MACHINE DATA ACQUISITION WITH THE **TRIO**® BRAND FIELD ANALYZERS



## TRIO C-Series

### COMMERCIAL INDUSTRIAL VIBRATION DATA COLLECTOR / FIELD ANALYZER

- ✓ Modular system with rugged IP-65 rated Windows 10 tablet PC
- ✓ 8" and 10" screen size options available
- ✓ Full-day, hot-swappable battery, standard-life or extended-life

## TRIO H-Series

### HAZLOC-RATED VIBRATION DATA COLLECTOR / FIELD ANALYZER

- ✓ Modular system with Class 1, Division 2 HAZLOC approvals
- ✓ 9", Ultra-rugged Windows 10 tablet PC
- ✓ Extra-long battery life, optional Snap-back battery packs

### TRIO Feature Highlights

- ✓ Modular, Bluetooth® connectivity, separates tablet from instrumentation
- ✓ 4 simultaneous channels of data plus dedicated tachometer channel
- ✓ Capacitive touchscreen, sunlight readable, brilliant screen resolution
- ✓ Safest vibration device on the market

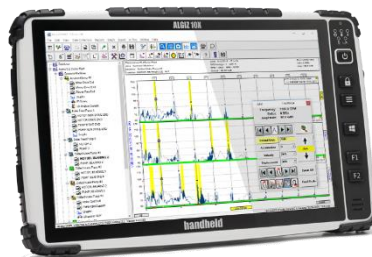
### TRIO Model Options

- ✓ ExpertALERT™ / Collector X applications for full automated diagnostic functions
- ✓ ViewALERT™ / Collector application for simple in field data collection
- ✓ ALERT RTA™ - Real-time Analyzer application for advanced troubleshooting
- ✓ ALERT™ Multi-plane Balance application for multi-plane, multi-speed balance

### CHOOSE THE PERFECT **HARDWARE DESIGN** SUITED FOR YOU



TRIO C8-Series



TRIO C10-Series



TRIO H8-Series



# TOTAL TRIO<sup>®</sup>

## BRAUN, BRAINS AND BEAUTY

### TOTAL TRIO IS A COMPLETE PACKAGE INCLUSION

Total TRIO ensures your equipment is operational, hardware and software is up-to-date, and technical and analytical support is there if needed.

With Total TRIO, the TRIO Controller is renewed every 3 years which keeps the technology always fresh.

Analysts have access to Azima's domain experts to get second opinions on tough recommendations

Support will give you head-of-line for repairs and provide loaners if repair will take longer than 2 weeks.



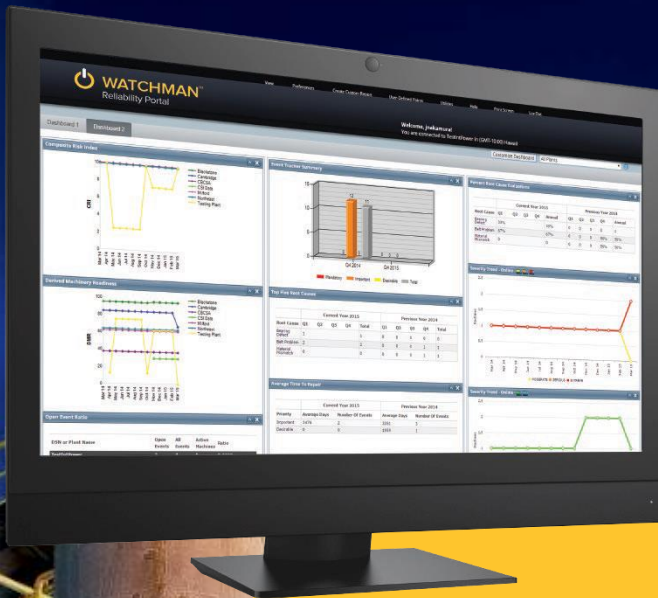


## TRIO EMBRACES THE INDUSTRIAL INTERNET OF THINGS

Total TRIO includes the WATCHMAN Data Center for database management and security. No IT capital expenses are required.

An included use license of ExpertALERT-Cloud is provided to work through Azima's cloud application.

Key decision makers and program contributors can all gain insights into your PdM program through the included WATCHMAN Reliability Portal™.



**TRIO  
MACHINE DATA  
ACQUISITION**

**WATCHMAN  
DATACENTER  
IN THE CLOUD**  
PORTAL | WEBTOOLS | ANALYTICS



**EXPERT  
ASSISTANCE**



**BIG DATA  
ANALYTICS**



**PLANT OWNERS,  
OPERATORS,  
MANAGERS,  
CUSTOMERS**

# HOW COULD TRIO<sup>®</sup> BE SO MUCH BETTER, YOU ASK?

## Powerful User Interface



The TRIO<sup>®</sup> line of data acquisition products includes the powerful, Windows OS industrial tablet computers. TRIO uses a robust Bluetooth<sup>®</sup> connection and includes a solid state hard drive, bright sunlight readable touch screen and Wi-Fi access allowing TRIO to communicate

with your desktop or networked PCs and servers. TRIO's user interface provides you more capabilities, better ease of use, and allows you to bring your other Windows PDM and Office productivity applications into the field

## Lower Cost and Flexibility of Ownership

TRIO<sup>®</sup> recognizes that computer technology is rapidly changing. Its distributed system configuration allows the tablet PC component to be replaced or upgraded for a small fraction of the cost of replacing a traditional vibration data collector.

## Improved Ergonomics and Safety



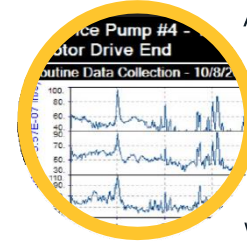
There is no safer vibration data collector on the market. TRIO's ergonomic design allows more efficient and safer use of the data collector around dangerous and difficult to access machinery. Machines can be tested from safe and secure distances from

rotating machine locations using the integral Bluetooth<sup>®</sup> communication. Its modular design helps keep technicians hands-free and untethered from the machine for improved safety.

## Collection Automation

TRIO automatically queues multiple frequency ranges of FFT, time, overall and demodulated vibration tests for a single machine location and collects X, Y and Z axis data simultaneously with a single command. You will collect more quality data in less time with TRIO.

## Automated Diagnostics



ALERT provides critical machinery health information in addition to vibration data, by rapidly screening vibration measurements and applying over 6000 unique rules to identify over 1200 individual faults in a wide variety of machine types.

## Variety of Configurations



TRIO offers several ergonomic-designed, in-field carrying options, including the convenient utility belt, shoulder-worn soft case and the shoulder strap/belt configurations. Depending on your specific use model, you can wear it, carry it or sling it over your shoulder.

## TRIO<sup>™</sup> and WATCHMAN<sup>™</sup> Reliability Services

Our combination of TRIO and WATCHMAN Reliability Services offer a new level of efficiency and capability to the predictive maintenance market. WATCHMAN provides business level and enterprise performance metrics for transparent visibility. Advanced dashboards ensure managers and executives are informed on maintenance decisions, risks to production and readiness of operations

## Proof Comes from the Field Experts



Azima's WATCHMAN users prefer using the TRIO systems. They have found that route-based data collection is easier and more productive. Also, whether your predictive maintenance program is implemented in-house, outsourced or hybrid in-between, TRIO can be integrated with online and other service programs for flexibility and sustainability.







# Machine Data Acquisition

## TECHNICAL SPECIFICATIONS

### Overview

- Triaxial vibration data collector system
- Industrial Windows 10CSTablet PC Controllers
- Wireless, Bluetooth®, IP-65 rated Data Processing Unit (TRIO DP)
- Optional HAZLOC-rated North American Class 1, Division 2
- Portal-enabled connectivity to the hosted WATCHMAN Data Center
- Handheld laser tachometer for speed and phase measurement optional
- Flexible carrying options including utility belt, should straps, courier bags, hard transit case
- Sybase 12 SQL database onboard allows full PdM database to be mobile on unit
- Database synchronization for collaboration with multiple TRIOs or analysts
- Ergonomic designs allow more efficient and safer use
- 4-plane balancing and advanced real-time analysis software options
- HX- or CX-Series includes embedded ExpertALERT onboard analysis software (no host software required)
- HA- or CA-Series includes embedded ViewALERT onboard software (Requires host system: ExpertALERT (desktop, embedded, cloud- subscription) or StandardALERT)

### ALERT™ Capabilities

- Intuitive graphical user interface that is simple to learn and operate
- Setup wizards reduce set up time and increase configuration accuracy
- Enhanced management and visualization of dynamic data
- Automated vibration data screening using narrow-band vibration techniques for early faults detection
- Automated bearing fault identification without requiring bearing make and model number
- Multi-level fault severity and prioritized repair recommendations improve repair planning
- Advanced reporting tools produce professional reports
- Included 75,000 bearing asset library and 15,000 motor asset library
- Better machine performance determination through ALERT's calculated process points feature
- Integration of multiple PdM technologies, reports, documents, spreadsheets, inspections, and data
- Online monitoring, walk-around vibration collection and operating log collection in one system
- Close loop reporting with ALERT's Event Tracker

### Graphical Capabilities

- Amplitude Alarm Triggering
  - o Impact Demod Spectra and Waveform
  - o Overall Values
  - o Spectrum
  - o Waveform
- Automated Peak Locator o Harmonics
- o Order Normalization
- o Sidebands
- Average Baseline Comparison
  - o Synthesized Average
  - o Average plus sigma
- Bode Plot
- Bump Test
  - o Equipment ON
  - o Equipment OFF
- Customized Real-time Setup
- Graphical Remote Control Window
- Hotkeys & Hotspots
- Integration & Differentiation
- Long-time Data Capture
- Markers
  - o Reference Cursor Delta
  - o Harmonics
  - o Sidebands
  - o Fault Frequencies
- Nyquist Plot
- Order Tracking

- Peak Analysis and Identification Functions
- Phase Analysis
  - o Cross Channel
  - o Polar Phase Plot
- Run-up/Coast-down plotting o Spectral/Waterfall
  - o Bode-Peak & Phase
  - o Peak Hold
- Spectrum
  - o Single Axis
  - o Triaxial
  - o Double-Triax
  - o Demodulation
  - o Waterfall
  - o Native, Integrate, Double integrated, Decibel
- Time Synchronous Averaging
- Waveform
  - o Autocorrelation
  - o Single Axis
  - o Triaxial
  - o Double-Triaxial
  - o Orbit, Filtered Orbit
  - o Poincare Map
  - o Single Circular Graph
  - o Triaxial Circular Graph
  - o Waterfall with Correlation Factor
  - o Native, Integrated, Double-integrated
- Long time Data Capture
- Cross Channel Phase Analysis

## TRIO Data Acquisition / Processor (DP-2, DP-2H)

### Inputs

- 4 simultaneous sampled, fully phase matched, ICP programmable
- Other Coupling: AC (for proximity probe connections)
- AC Input Voltage Range: +/- 10V
- AC Bandwidth: 0.5Hz to 40 kHz
- DC Bias/Gap Measurement: +/- 25V range for ICP bias voltage check and proximity probe gap measurement
- Measurements: Acceleration, velocity (by hw integration), bearing demodulation (accelerometers), and displacement (proximity probes)
- Gain Ranges: Gain steps 1, 2, 4, 10, 20, and 50
- Digital trigger input: External trigger, tachometer speed, ordered data (by phase-lock-loop)

### Processing

#### AC MEASUREMENTS

- ADC: 24-bit sigma-delta, simultaneous on four AC channel inputs, better than 104 dB dynamic range
- Sampling Rates: 64Hz to 102.4kHz
- Bandwidth Ranges: 0.5Hz-25Hz, 0.5Hz-40kHz, protected by anti-alias filters
- Data Block Lengths: 64 to 400,000 samples
- Spectral Lines: Up to 25,600
- Noise Floor: Less than 0.2 micro-volts per root Hz from 0.5 to 1000kHz

#### DC MEASUREMENTS

- ADC: 16-bit multiplexed for bias voltage, process, and probe gap measurements, 0-10kHz Bandwidth

### Analysis Capabilities

- Dynamic Analysis: Overall, Spectra, Waveform, Phase and Speed
- Cross-channel: Cross-power, Transform Function, Coherence, Phase and Magnitude
- Demodulation Function: Digital amplitude demodulator and Impact Demodulation for low speed detection
- Averaging: RMS, Exponential, Peak Hold, Order Tracking, Synchronous Time, and Negative Averaging
- Number of averages: 1 – 1000
- FFT Window Function: Hanning, Hamming, Rectangular, Flattop

#### Communications with Tablet Controller

- Wireless: Bluetooth v2.0 with EDR (1.5Mbps max)
- Wired: USB user port (includes data stream and remote power to DP)

### Power

- Charging rate: 0.5A from USB PC input (4 hrs), 1.0A from USB wall power adapter (2 hrs)
- Battery life: 8 hours, continued use

### Physical

- Dimensions: 6.18" x 3.62" x 1.81" (157 mm x 92 mm x 46 mm)
- Carrying options: Belt holster or courier bag
- Weight: 1.0 lb (0.45kg)
- Operating Temperature: -10C to +60C
- Humidity: MIL-STD-810G
- Drop: 4 feet per MIL-STD-810G
- Sealing: IP-65; polycarbonate and nylon
- Compliance: CE, ETL Listed
- IP65 rated; dust tight, protected from water jet





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