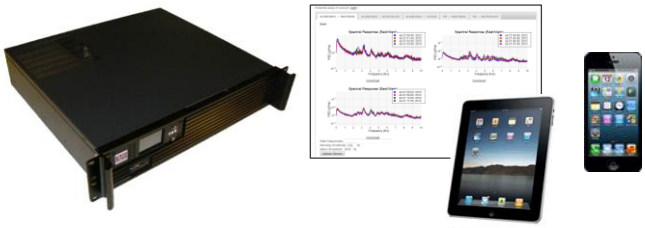
3rd Generation Black Diamond Rackmount Data Acquisition System

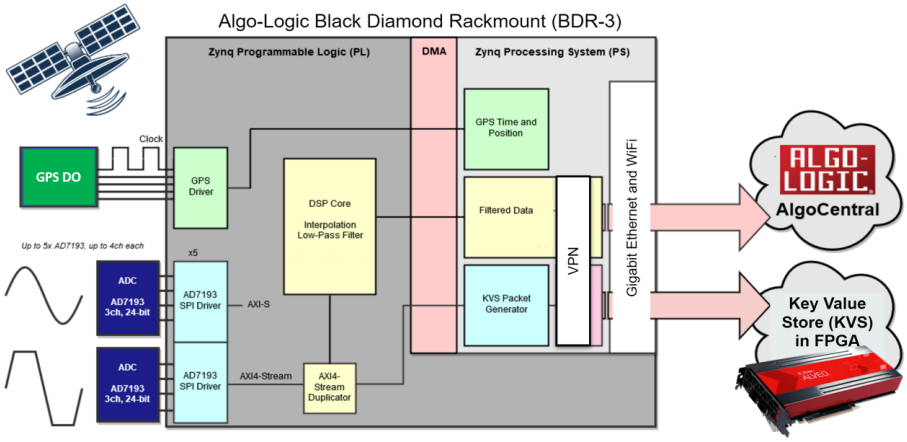
Description

The Third Generation Black Diamond Rackmount (BDR-3) is a real-time data acquisition system. It collects data from multiple analog sensors with high resolution and minimal noise, streams live data to a Key Value Store (KVS), and archives data to the AlgoCentral cloud.

Leveraging Field Programmable Gate Array (FPGA) technology, the BDR-3 deterministically collects, time-stamps, and processes data with low latency. The resulting data is archived and streamed over the network to the cloud.

The BDR-3 works with AlgoCentral to provide a complete data monitoring solution. AlgoCentral is a cloud service that executes algorithms to perform analytics, process data, graph results, automate tasks, and send notifications when critical events occur.





Applications

- Real-time sensor monitoring
- Data collection for smart cities
- Risk and failure analysis
- Manufacturing process control
- Oil and gas exploration / mining research
- Continuous structural monitoring
- Sensing pressure (fluid), temperature, strain, power (current and voltage)
- Other time-sensitive applications

Key Benefits

BDR-3 Rackmount System:

- Records data from up to 15 precisely synchronized channels
- Collects data from a wide range of sensors
- Operates without a fan for use in cleanrooms and outdoors
- Runs from DC, AC, battery, or solar power
- Accelerates algorithms in FPGA hardware
- Time-stamps data with GPS accuracy

Online AlgoCentral:

- Provides real time access to data from laptops, tablets, and smart phones
- Runs algorithms to perform continuous analytics
- Provides dashboards to view graphs
- Notifies about events via email alerts
- Receives sensor data securely from devices in the cloud
- Automates generation of reports
- Includes easy-to-use web interfaces to dramatically reduce time to set up and analyze key results

www.algo-logic.com
Solutions@Algo-Logic.com
+1 (408) 707-3740

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Third Generation Black Diamond Rackmount (BDR-3) System Specifications

Input range	Analog voltage range: ± 5V differential, ± 2.5V differential , 0-5V single-ended
ADC resolution	24 bit (17 to 18 ENOB)
Filter	Phase aligned and 10th order Butterworth low-pass at 48Hz
Analog input channels	3 to 15
Local storage	250 GB SSD with optional flash storage device including failover
Data output	AlgoCentral, Key Value Store (KVS), and/or local user interface
Data retrieval	Retrieval from browser and network API
Available sensors	Acceleration, tilt, mass flow, optical, piezo, temperature, torque, chemical, electric current, electric potential, magnetic, moisture, humidity, fluid velocity, position, angle, strain, pressure, force, density, fluid level, proximity
Additional I/O controls	GPIO, & digital (additional analog customizations available on request)
Input impedance	1MΩ
Input Power	9 to 18V DC, 120/240V AC, or Power over Ethernet (PoE)
Communication	Gigabit Ethernet, b/g/n WiFi
Sensor connection interfaces	Shielded RJ-45
Time accuracy	GPS disciplined oscillator: 300 nanosecond resolution, sub microsecond accuracy
Form factor	1U Rack chassis
Heterogeneous computation	Xilinx Zynq Field Programmable Gate Array (FPGA) with embedded ARM CPU
Local user interface	Client browsing on laptop, tablet, or smart phone

Online AlgoCentral Features

Cloud interface	Secure access worldwide
Project dashboard	Real-time live data views
Data intake API	AMQP, MQTT, RESTful API
Security	Secure client access
Data visualization	Advanced charting capabilities
Data processing	Preprocessing, post processing, and real-time processing
Data analytics	Data mining analyses, anomaly detection, predictive analytics
Storage	Archival storage and backup
Process alarms	User configurable upper and lower control limits
Customizable algorithms	Octave

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