Hummingbird^{32}

32 Channel Ruggedized Portable Acquisition

HGL Dynamics

Connect | Condition | Acquire

Key Features

- Highly portable, standalone acquisition unit
- 16/24-bit ADC, >114dB SNR, 5-256kHz Sample Rates
- Gigabit Ethernet Connectivity
- Twin, high speed, Intel Core i7 processors
- Multiple Signal Conditioning Options
- Multi-unit Synchronisation (GPS, IRIG, LVDS, IEEE-1588)

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Introduction

Hummingbird is a rugged 32 channel data acquisition system designed to provide a world class, highly portable solution for dynamic data recording and real time monitoring.

The Hummingbird series features multiple gigabit Ethernet connections, allowing remote control from remote laptops or PCs, as well as data streaming for monitoring / archiving. The system can also operate autonomously, acquiring vast amounts of data using the built -in high performance CPU's and substantial solid state disk drive.

The Hummingbird has proven itself worldwide in numerous flight tests with engine and air frame manufacturers. It has also seen service worldwide for vibration monitoring in the power generation industry.

Hardware Overview

Rugged Chassis

The unit can be supplied in a steel chassis or an ultra rugged milled aluminium housing for use in the close proximity to the test article.

Independent Inputs

Equipped with 32 channels
One Sigma-delta ADC per channel.
Multiple Conditioning Options.
Simultaneous Sampling.
>120dB SNR.

32CH

Connector Compatibility

Standard options available are BNC, Fischer LEMO, or 15-way D-Type. HGL can also provide customer specific connectors on request.

Processing Power

The Hummingbird is supplied, as standard, with two powerful Intel i7 processors, providing all the processing power necessary to acquire data at a high sampling rates (256KHz @ 24-bit, to down-sample individual or multiple channels., and to monitor all channels in real-time.

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Hardware Overview

USB Connectivity

Four USB Ports provide the user with the flexibility of using additional Windows compatible peripherals with the system.

Display Outputs

When required the Hummingbird can be hooked up to a screen using the VGA display outputs. A valuable feature for setting up a configuration, or monitoring the statuses of the system.

VGA

LVDS Synchronisation

- LVDS (Low Voltage Differential Signalling) Synchronisation Interface
- <10nS Unit to Unit
- 0-200m Unit to Unit cable lengths
- Daisy-Chain, Star or mixed topologies

Remote Access

Using the wired Ethernet, Wi-Fi or optional GSM interface users can remotely operate the acquisition software and access the data stored on the SSD drive.

IEEE1588 Synchronisation

Both ports and internal switches are IEEE1588 compatible.

Calibration

Hummingbird facilitates quick on-board correction with the use of standard bench signal generators/ multi-meters.

Data Storage

The Hummingbird has an internal 1TB SSD for storing the acquired data, and with the USB ports this can be expanded to much greater volumes using USB connected external media .

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Software Overview

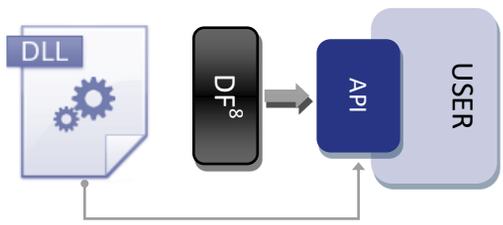
HGL Dynamics provides multiple software platforms for Hummingbird Acquisition systems; these range from low level Network APIs, Windows® DLL, LabVIEW™ Drivers, Single Instrument Applications (Apps), and full Measurement System software. This flexibility allows users to choose the best platform for their particular applications and / or increases the utilisation of the hardware for multiple uses.

Network API

All HGL Dynamics hardware modules are Ethernet connected to each other and their host PC(s); a fully documented Programmer's API is available for integrators / customers who wish to access the modules at this level or need to integrate the modules with a non-Windows operating system.

Microsoft Windows DLL

HGL provides (as standard) a Windows DLL with every Hummingbird Acquisition System; for Microsoft Windows users this provides a simpler method to access all the functions of the hardware.



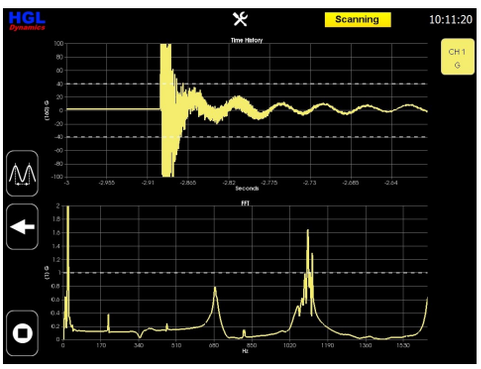
LabVIEW™ Driver

HGL can provide a LabVIEW™ driver for the Hummingbird Acquisition System; this driver allows full access to the functionality of the hardware, and is available for the Microsoft Windows Operating System.

Single Instrument Apps

HGL has developed a number of Single Instrument Apps, primarily for its Firefly system. These apps can be operated on a Hummingbird and Laptop / PC system equally well. The Apps are intended to provide a family of simple, easy to use applications which turn the Hummingbird into a single instrument, examples include:

- FFT Analyser
- Oscilloscope
- Chart Recorder
- Rotating Machinery Analyser
- Trim Balance
- Power Dip & Rise
  (requires isolation amplifier hardware)



Full Measurement System Software

For the past 15 years, HGL has providing a fully integrated, modular, network distributed Dynamics Measurement System; this software is intended for wide variety of applications and for systems ranging from small portable units to large multi-site systems with hundreds or thousands of channels.
The System comprises four main parts, Acquisition, Monitoring, Analysis and Data Management, and is focused on providing robust, flexible, fixed or mobile operation with ease of use as a primary consideration.

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Software Overview

Data Acquisition - Hawk

HGL's Hawk acquisition software provides everything a user needs to configure, calibrate and acquire data from the acquisition hardware. Full control and feedback of the system is provided by the Hawk GUI Client application; this provides an intuitive instrument-like interface that allows even novice users to operate large channel count systems, even from remote locations.

Real-Time Monitoring - Hawkeye

Hawkeye allows one or more users to monitor the signals being acquired in real-time (<0.1s latency).
Fully customisable displays such as FFTs, Waterfalls, Oscilloscopes, Numerical, Speed and Tracked-orders, Phase, Bode, Orbit, nth Octave etc, provide a rich monitoring environment.
Hawkeye also provides Time, Frequency, Order and Phase domain alarming facilities for all channels simultaneously, with support for many different alarms types per channel. Hawkeye is also client / server based with the 'thin' Hawkeye Client allowing local or remote monitoring (performance dependent on network infrastructure).

Analysis - Aurora

Aurora provides an in-depth analysis tool for acquired data; this is usually required post-test, but can be operated simultaneously with testing if useful. Post-test analysis can pinpoint areas of interest / problems to be further investigated, and for this purpose Aurora provides a range of client / server based tools to analyse, investigate, mine, summarise and report on acquired data.
Multiple users can use Aurora simultaneously, and in common with HGL software portfolio access is via a network connected thin-client (Aurora Client) application, thus allowing both local and (potentially widely) remote users to access data simply and efficiently.

Data Storage & Archiving - Hercules

Prolonged or large-scale data acquisition generates a lot of data, 10's and 100's of TBytes are not unusual for large enterprises. Data is expensive to collect and the functionality to efficiently store and retrieve legacy data is essential for in-service investigations, product development etc.
HGL's Hercules software provides an integrated, low-cost, yet highly scalable and safe data management solution for any sized data acquisition operation. The key to the system's success is support for virtually any common media type (SD cards, HDD/SSDs, LTO tapes etc.) combined with a unique database architecture providing simple, yet highly efficient data storage information, and a client/server architecture which allows data to be managed across multiple remote sites from a single intuitive Graphical User Interface.

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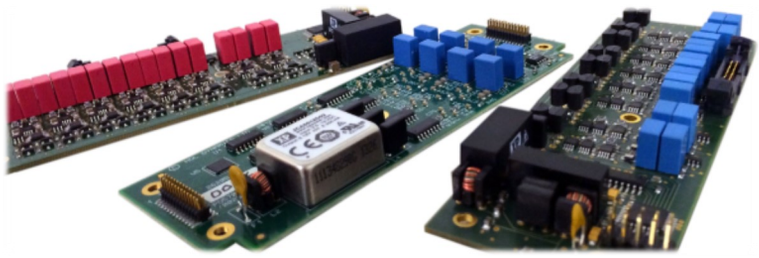
Condition

Signal Conditioning



The Hummingbord[32] module can be fitted with a wide range of internal signal conditioning cards which further extend the Hummingbird's capabilities. Single or multiple conditioning functions are possible depending on card choice.

HGL has designed a set of conditioning cards that fulfil most industry standard requirements. However more cards are developed as clients' requirements change. The signal conditioning options currently available for the Hummingbird[32] module are:

- FE-1404-DFY: Voltage, IEPE, and Proximeter Probe conditioning card
- FE-1407-IA: 4-Channel High voltage isolation amplifier
- FE-1408-APC All-purpose conditioning card including Voltage, IEPE, Bridge, Dynamic Strain, and Charge. On-board sensor health check and buffered dual analogue outputs.
- FE-1409-DFY: Voltage and IEPE (ICP) multi-range conditioning card. On board sensor health check and buffered analogue outputs
- FE-1410-BRG / DYN Voltage & Bridge Only and IEPE & Dynamic Strain only variants of FE-1408-APC card
- FE-1411-MIC Voltage, IEPE & 200V Excited Microphone Conditioning
- HGL-HiZ: AC/DC Voltage only conditioning with gain

	Voltage		IEPE	Bridge	Dynamic	Charge	Temperature	Proximeter Probe	Speed
Cond. Card	AC	DC	Accel / Mic	Strain (¼, ½, full)	Strain (SG, Press)	Accel	Therm. & PT100		
FE-1404-DFY	✓	✓	✓					✓	✓
FE-1407-IA	✓	✓							✓
FE-1408-APC	✓	✓	✓	✓	✓	✓	✓#		✓
FE-1409-DFY	✓	✓	✓						✓
FE-1410-BRG	✓	✓		✓		✓	✓#		✓
FE-1410-DYN	✓		✓		✓	✓			✓
FE-1411-MIC	✓	✓	✓			✓			✓
HGL-HiZ	✓	✓							✓

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Specification

General

Dimensions (W x H x D):	435 x 158 x 123 mm
Weight:	7.0 kg (typical)
Supply Voltage:	12 V DC
Power:	80 W (typical)

Computer

Processors:	Intel® Core™ i7 Dual Core 3.0GHz (typ.)
Memory:	16.0 GB (typ.)
Storage:	1 TB SSD (typ.)
O/S:	Windows® 7 Professional

Input Configuration (with standard 1408 signal conditioning car

Input Channels:	32
ADC Type:	Sigma-Delta
Quantization:	24-bit / 16-bit*
Input Ranges:	±10 V, ±1 V, ±0.1 V *
DC Offset:	±0.15 mV
Input Coupling:	AC, DC *
Input Impedance:	>100 kΩ
SNR:	>120 dB
Anti-aliasing:	<-100 dB
Sample Rate:	5 - 256 kHz *
Frequency Response:	DC to >100 kHz ±0.017 dB
Dynamic Range:	140 dBFS / √Hz, 114 dB (broadband)
Inter-Channel Δ Phase:	< 20 nS (< 0.36° @ 10 kHz output signal)
Crosstalk:	< 100 dB @ 5 kHz, < 95 dB @ 10 kHz, < 87 dB @ 20 kHz, < 82 dB @ 40 kHz, < 70 dB @ 100 kHz
Distortion:	< -80 dB, 0 to 80 kHz
DC Linearity:	< 0.01%
Drift:	< 25 ppm/°C (with no correction applied)

*Software configurable parameter

Synchronisation

LVDS:	10 ns per unit
LVDS (max distance)	200 m # (node to node)
IRIG A/B:	±100 ns
GPS:	< 5 ns

#If longer distances are require please contact HGL

Environmental

Operating Temp.:	-25 to 70°C
Storage Temp:	-40 to 85°C
Relative Humidity:	< 90% RH non condensing

Other Inputs (using any standard input)

IRIG-A and IRIG-B
Audio Voice Annotation
Tachometer

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Training

Training

HGL Dynamics offers a wide variety of training workshops and courses. Workshops are conducted at one of our global offices or at the client's site by our training team, all of whom have many years' of industry experience and knowledge.
Typical training courses include: Vibration Fundamentals, Signal Processing, Rotating Machinery, Advanced use of HGL Software and Analysing Large Datasets.

Information

About HGL Dynamics

HGL Dynamics is a world-leading supplier of services and high specification equipment for the integrated capture, monitoring, analysis, storage and management of high bandwidth data.

Purchasing & Availability

The HGL Dynamics Hummingbird[32] Data Acquisition Module is now available for purchase or lease. Please contact one of our HGL Dynamics offices below for further information or to request a quote.

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