DaqScan/2000 Series

Ethernet-Based Data Acquisition System Components

Features

- Adds analog I/O, digital I/O, and frequency I/O to Ethernet-based test systems
- All I/O can be synchronous, enabling precise timing between various I/O functions
- 8 differential, or 16 single-ended inputs, expandable up to 256 voltage or 896 TC channels using signal conditioning and expansion options
- Up to 40 built-in TTL-level digital I/O, expandable up to 256 channels of isolated I/O using low-cost isolation modules
- Convenient 1U high 19" rack mount package minimizes rack space in test systems

Software

- Includes DaqView *Out-of-the-Box* software application for effortless data logging and analysis
- Comprehensive drivers for DASYLab®, LabVIEW® , MATLAB®*, Visual C++®, Visual C#®, Visual Basic®, and Visual Basic® .NET
- DaqCal software application for easy user calibration
- Supported Operating Systems: Windows 7/Vista/XP SP2, 32-bit or 64-bit

The DaqScan/2000 Series provides compact data acquisition capability for Ethernet-based test systems

DaqScan/2000 Series Selection Chart					
Model	Analog Inputs SE/DIFF	Digital I/O	Frequency/Pulse Inputs	Timer Outputs	Analog Outputs
DaqScan/2001	16/8	40	4	2	4
DaqScan/2005	16/8	40	4	2	0

The DaqScan/2000 Series of Ethernet-based system components provide analog, digital, and frequency I/O capability for Ethernet-based test systems. The DaqScan Series builds on IOtech's IEEE 488-based predecessors.

All DaqScan models are packaged in 1U high full-rack package, and include a rack-mount kit that can attach to either the front or the rear of the enclosure. Multiple DaqScan models can be combined in the same system and synchronized using a simple SYNC connection between units. All I/O is accessed via male DB37 connectors located on the rear of the unit, making cabling easy from the DaqScan to your device under test.

Two models in the DaqScan Series are available, and include the full-featured DaqScan/2001 which provides 16 analog inputs, 4 analog outputs, 40 digital I/O, 4 frequency inputs, and 2 timer outputs.

The DaqScan includes comprehensive drivers for all popular Windows-based environments, including DASYLab, LabVIEW, MATLAB*, Visual C++, Visual C#, Visual Basic, and Visual Basic .NET. Also included with the DaqScan is DaqView, an interactive spreadsheet-style software application that is ideal for verifying signal connections during system integration.

The DaqScan/2000 Series has the same signal I/O, synchronous scanning, triggering, and signal expansion capability as our DaqBook/2000 Series. The compact 1U high 19" rack packaging of the DaqScan make it a compact component for rack-based systems.

In addition to the built-in I/O provided by the DaqScan/2000 Series, a wide variety of signal conditioning and expansion options are available. The following page features sample systems that can be derived from the DaqScan along with DBK options.

DaqScan/2000 Series
General Information

High-Channel Count Thermocouple Measurements

When combined with the DBK90 thermo-couple input module, the DaqScan can measure up to 896 channels of TC input. In the example system to the right, any TC type can be installed into any channel using standard mini TC connectors. Each 56 channel DBK90 option consumes 2U of rack space, and can be mounted on the front or rear of the rack chassis. Built-in cold junction compensation coupled with TC conversion algorithms built into the software make temperature measurements easy. Thermocouples are measured at 1 ms/channel in a system based on the DBK90.

The 168 TC channel system consists of one DaqScan/2005 plus three DBK90 modules with rack-mount kits

High-Isolation Voltage & Thermocouple Measurements

The DaqScan can be combined with DBK207/CJC options to create an iso-lated system capable of measuring up to 256 channels of voltage, thermocouple, RTD and strain gage inputs. All input channels can be scanned up to 200 kHz, and are isolated by 500V from other channels and from system common. Any combination of input signals are possible by selecting the appropriate 5B signal conditioning module for the DBK207/CJC. DBK207/CJCs can be mounted in the front or rear of the rack, and attach to the DaqScan via a simple CA-37-x cable.

The 32-channel isolated system includes a DaqScan/2005 plus two DBK207/CJC boards. The system is capable of scanning all channels at 5 μsec per channel, and provides 500V isolation for all inputs.

Isolated Digital I/O System

When a DaqScan/2002 is combined with the DBK208 or DBK210 options, up to 256 channels of isolated digital I/O are possible, capable of controlling AC or DC voltages up to 250V, or sensing the pres-ence of AC or DC voltages. All channels are isolated from one another and from the system by up to 500V. Inputs can be scanned in 16-bit increments at speeds up to 200 Kreadings/s. The DBK208 and DBK210 can be mounted in the front or rear of the rack.

The 64-channel isolated discrete I/O system consists of one DaqScan plus two DBK210 boards with rack-mount kits

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DaqScan/2000 Series
General Information & Specifications

High-Speed Voltage Measurement System

The DaqScan/2005 can be combined with DBK85 16-channel voltage input modules to build a 5 µs/channel voltage measurement system up to 256 channels. All inputs can have a different, software programmable input range, from 156 mV FS to 10V FS, programmable on a per-channel basis. The 16 BNC inputs on the DBK85 can be accessed from either the front or the rear of a rack system.

The 80 channel high-speed scanning system consists of one DaqScan/2005 plus five DBK85 16-channel voltage scanning modules. All channels can be measured at the maximum rate of 5 µs/channel.

Multifunction I/O System

All of the afore-mentioned capabilities can be combined into one system, using one DaqScan/2001 as the heart of the system.

The system provides 56 non-isolated TC inputs, 16 isolated voltage inputs, 16 low-voltage inputs, 4 analog outputs, 4 frequency inputs, and 32 isolated discrete high-voltage outputs

Specifications

General

Supply Voltage Range: 90 to 250 VAC
Power Required: 15W (assuming no DBK options)
Operating Temperature: 0 to +50 ˚C
Storage Temperature: -40 to +80 ˚C
Relative Humidity: 0 to 95%, non-condensing
Signal I/O Connector: DB37 male for P1, P2, and P3
Dimensions: 425 mm W x 220 mm D x 45 mm H (16.75" x 8.5" x 1.75")
Weight: 2.3 kg (5 lbs)
Power Available for External DBK Options: 10W
Maximum Ethernet Cable Length: 100 meters (can be increased with standard Ethernet switch device)

A/D Specifications

Type: Successive approximation
Resolution: 16 bit
Conversion Time: 5 µs
Maximum Sample Rate: 200 kHz
Nonlinearity (Integral): ±1 LSB
Nonlinearity (Differential): No missing codes

Analog Inputs

Channels: 16 single-ended or 8 differential, programmable on a per-channel basis as single-ended or differential, and unipolar or bipolar
Expansion: Up to 896 TC channels when used with DBK90 expansion option (1 ms/channel), or up to 256 channels when used with all other expansion option (5 µs/channel)
Settling Time: 5 µs to 1 LSB for full-scale step
Temperature Coefficient: ±(0.002% reading + 0.03 mV) or ±(0.002% reading + 0.6 LSB), whichever is larger, per ˚C outside of temperature range of 18 to 28 ˚C
Input Impedance: 10M Ohm (single-ended), 20M Ohm (differential)
Bias Current: <1 nA (0 to 35 ˚C)
Common Mode Rejection: 86 dB, DC to 60 Hz for gains < =8; >100 dB for gains > =16
Maximum Input Voltage (without damage): ±11V relative to analog common
Over-Voltage Protection: ±35V
Ranges: Software or sequencer selectable on a per-channel basis
Crosstalk: -100 dB DC to 60 Hz; 86 dB @ 10 kHz

Voltage Range*	Accuracy** One Year, 23° ±5°C	
	% reading	+ millivolts
0 to 10	0.015	0.80
0 to 5	0.015	0.40
0 to 2.5	0.015	0.20
0 to 1.25	0.015	0.12
0 to 0.625	0.015	0.10
0 to 0.3125	0.015	0.08
-10 to 10	0.015	1.50
-5 to 5	0.015	0.80
-2.5 to 2.5	0.015	0.40
-1.25 to 1.25	0.015	0.20
-0.625 to 0.625	0.015	0.12
-0.3125 to 0.3125	0.015	0.10
-0.156 to 0.156	0.015	0.08

* Specifications assume differential input single channel scan, 200-kHz scan rate, unfiltered
** Accuracy specification is exclusive of noise

DaqScan/2000 Series
Specifications & Ordering Information

Input Sequencer

Analog, digital, and frequency inputs can be scanned synchronously, based on either an internal programmable timer, or an external clock source.

Scan Clock Sources: 2
1. Internal, programmable from 5 µs to 5.96 hours in 1 µs steps
2. External, TTL level input up to 200 kHz max

Programmable Parameters per Scan: Channel (random order), gain, unipolar/bipolar

Depth: 16,384 locations

On-Board Channel-to-Channel Scan Rate: 5 or 10 µs per channel, programmable

Expansion Channel Scan Rate: 5 µs, 10 µs, or 1000 µs per channel, programmable

External Acquisition Scan Clock Input

Maximum Rate: 200 kHz
Clock Signal Range: 0V to +5V
Minimum Pulse Width: 50 ns high, 50 ns low
External SYNC Port: Available on rear panel, allows multiple DaqScan units to be scan-synchronous (post trigger)

Triggering

Trigger Sources: 6, individually selectable for starting and stopping an acquisition. Stop acquisition can occur on a different channel than start acquisition; stop acquisition can be triggered via modes 2, 4, 5, or 6 described below.

1. Single-Channel Analog Hardware Trigger

Any analog input channel can be software programmed as the analog trigger channel, including any of the 256 analog expansion channels.

2. Single-Channel Analog Software Trigger

Any analog input channel, including any of the 256 analog expansion channels, can be selected as the software trigger channel. If the trigger channel involves a calculation, such as temperature, then the driver automatically compensates for the delay required to obtain the reading, resulting in a maximum latency of one scan period.

3. Single-Channel Digital Trigger

A separate digital input is provided for digital triggering.

4. Digital Pattern Triggering

8- or 16-bit pattern triggering on any of the digital input ports. Programmable for trigger on equal, above, below, or within/outside of a window. Individual bits can be masked for "don't care" condition.

5. Counter/Totalizer Triggering

Counter/totalizer inputs can trigger an acquisition. User can select to trigger on a frequency or on total counts that are equal, above, below, or within/outside of a window.

6. Software Triggering

Trigger can be initiated under program control.

Analog Output (Model /2001)

The four analog output channels are updated synchronously relative to scanned inputs, and clocked from either an internal onboard clock, or an external clock source. Analog outputs can also be updated asynchronously, independent of any other scanning in the system.

Channels: 4
Resolution: 16 bits
Data Buffer: 256 Ksample divided by number of analog outputs
Output Voltage Range: ±10V
Output Current: ±10 mA
Offset Error: ±0.0045V max
Digital Feedthru: 50 mV when updated
Gain Error: ±0.01%
Update Rate: 100 kHz max, 1.5 Hz min (no min with external clock)
Settling Time: 10 µsec max to 1 LSB for full-scale step
Clock Sources: 4, programmable
1. Onboard D/A clock, independent of scanning input clock
2. Onboard scanning input clock
3. External D/A input clock, independent of external scanning input clock
4. External scanning input clock

Digital I/O

Channels: 40, expandable up to 272 with external digital DBK options
Input Scanning Modes: 2
1. Asynchronous, under program control at any time relative to input scanning
2. Synchronous with input scanning
Ports: 3 x 8-bit (82C55 emulation), and 1 x 16-bit; each port is programmable as input or output
Input Protection: ±8 kV ESD clamp diodes parallel
I/O Levels: TTL
Sampling Rate: 200 kHz max
Update Rate: Asynchronous under program control

Frequency/Pulse Counters

Counter inputs can be scanned synchronously along with analog and digital scanned inputs, based either on internal programmable timer, or an external clock source. Counters can be configured to clear when read, or to totalize and clear under program control.

Channels: 4 x 16-bit; cascadable as 2 x 32-bit
Frequency Measurement Rate: 10 MHz max
Input Signal Range: -15V to +15V
Trigger Level: TTL
Minimum Pulse Width: 50 ns high, 50 ns low

Frequency/Pulse Generators

Channels: 2 x 16-bit
Output Waveform: Square wave
Output Rate: 1 MHz base rate divided by 1 to 65,535 (programmable)
High-Level Output Voltage: 2.0V min @ -3.75 mA; 3.0V min @ -2.5 mA
Low-Level Output Voltage: 0.4V max @ 2.5 mA

Ordering Information

Description	Part No.
All DaqScan models include 10/100BaseT Ethernet interface, DaqView; drivers for DASYLab®, LabVIEW®, MATLAB®, Visual C++®, Visual C#®, Visual Basic®, and Visual Basic® .NET; plus DaqCal software application; DB37 connectors, external SYNC, and rack-mount kit	
Analog I/O, digital I/O, and frequency I/O	DaqScan/2001
Analog input, digital I/O, and frequency I/O	DaqScan/2005