



DATASHUTTLE EXPRESS

HIGH SPEED PORTABLE DATA ACQUISITION SYSTEM FOR MULTIPLE SENSOR-TYPE APPLICATIONS



Systems From
\$2490

- ✓ Up to 100 kHz Sampling Rate
- ✓ 0.012% of Range Resolution
- ✓ Automatic Averaging
- ✓ Low Noise Mode Provides Noise Reduction
- ✓ Expandable
- ✓ Multiple Input Types
- ✓ Provides Digital I/O, Analog Output and Counter/Timer

Whether measuring vibration, sound, temperature, pressure, or virtually any input type, the DataShuttle Express accommodates all of these in a compact and flexible format, supporting data acquisition speeds of up to 100 kHz using the parallel port of a laptop or desktop PC.

The design incorporates surface mount components for robustness, a DSP chip for increased acquisition and analysis speed, screw terminal and BNC connectors for termination flexibility, and signal conditioning for thermocouple, accelerometer, RTD, strain gage devices, and many others. Modular packaging makes the DataShuttle Express ideal for large applications with low cost and reduced system size.

MULTIPLE SENSOR INTERFACES

Two slide-out termination drawers provide 16 channels for thermocouples, RTDs, current loops, strain gages, or accelerometer sensors. The DataShuttle Express also counts high speed pulses,



Laptop computer not included



Model DS-EXP



measures frequency or can calculate time intervals. Most sensor types can be measured on a single terminal drawer which eliminates the need for multiple components and accessories.

SOFTWARE SELECTED AVERAGING

The DataShuttle Express samples at maximum rate and averages multiple samples to pass a single sample at the chosen sample rate. Works with single or multiple channels. Noise is as low as 2 microvolts at 390 Hz. Automatic, continuous self-calibration and self-testing provide accurate, stable readings. Factory calibration is guaranteed for two years.

EASY CONFIGURATION

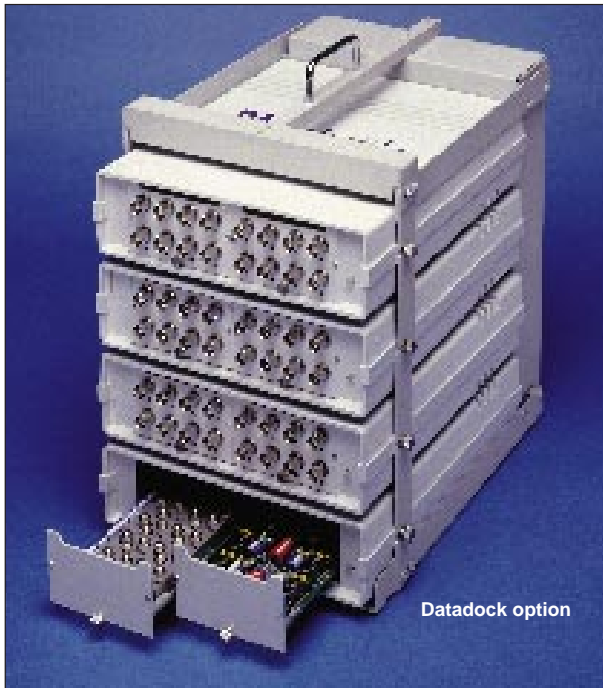
There are no potentiometers to turn. Change ranges for each channel, alter sampling speed, and select noise filtering/averaging via software. The DataShuttle Express features built-in signal conditioning and power. No external batteries or additional conditioning modules are needed. Just terminate the sensor

on the appropriate power source, connect the inputs to screw or BNC terminals and start collecting data. Slide drawers out to make sensor connection changes, calibrate strain gages, test hardware, select ground references or current measurement mode. No screws or panels to remove. Field wiring has never been easier!

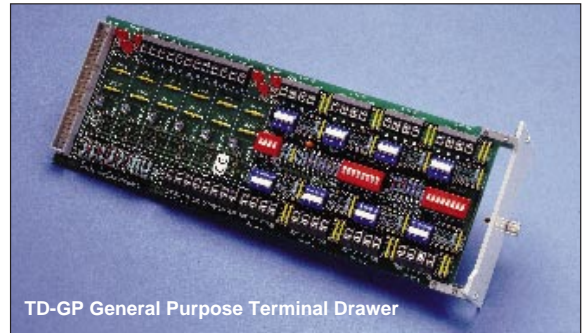
EXPANDABLE

Connect multiple units to a single PC for 240 analog inputs, 30 analog outputs, 30 counter/timers and 180 digital I/Os. All supported software can address up to 15 DataShuttle Express units on any given PC. Each unit has a parallel port for connection to the PC or previous DataShuttle Express unit, and a pass-through port for connection to the following unit in the system. Each unit is powered by an AC Adapter, which is included.

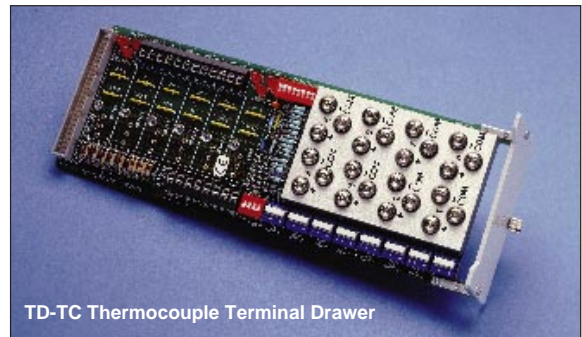
Each terminal drawer is individually calibrated, allowing Terminal Drawers to be interchangeable between slots or between DataShuttle Express units. Different terminal drawers can be used in a single DataShuttle Express unit for different applications.



Datadock option



TD-GP General Purpose Terminal Drawer



TD-TC Thermocouple Terminal Drawer

DATADOCK OPTION

The DATADOCK optional rack system includes a built-in power supply for connection to 120/240 wall power and the ability to power up to four fully loaded DataShuttle Express units without external batteries or power supplies. Each DataShuttle Express unit slides in and locks securely, automatically connecting to the power and communication port. Each DATADOCK can connect directly to the PC itself or to the next DATADOCK in the system, for a total of 15 DataShuttle Express units.

TERMINAL DRAWERS

Each DataShuttle Express will contain up to two terminal drawers that will easily slide out for easy connection from all sensor wiring. The terminal drawers will accept up to 8 inputs each, for a total of 16 sensor inputs per DataShuttle Express. There are eight different terminal drawers to choose from.

TD-GP GENERAL PURPOSE TERMINAL DRAWER

This is the most flexible drawer. It will measure all sensor types except accelerometer. Includes a cold junction sensor, voltage/current switches, test switches, floating ground reference switches, digital line LEDs and a full compliment of analog

auxiliary push-ins for signal conditioning. Stable 10 V or 2.5 V reference voltage provides up to 230 mA excitation current per drawer for strain gages, RTDs, etc. The General Purpose Terminal Drawer does not have an isothermal terminal block so it is recommended that the thermocouple terminal drawer be used for accurate thermocouple measurements instead. The TD-GP has screw terminals for eight analog inputs, one analog output, six digital inputs, six digital outputs, one counter/ timer and a trigger input. Up to 6 isolated solid-state switch modules may be installed.

TD-GP/AAF General Purpose/Anti-Aliasing Filter Drawer

Similar to the General Purpose Terminal Drawer, with additional, user-selectable, low-pass anti-aliasing filters on each of 8 analog input channels. Includes one analog output, one counter/timer and six non-isolated digital inputs. No digital outputs and no digital auxiliary area for installation of digital isolation modules.

TD-TC THERMOCOUPLE TERMINAL DRAWER

The Thermocouple Terminal Drawer contains an isothermal plate with cold junction sensor that attenuates temperature differences by a factor of 15. Increases thermocouple accuracy and stability. It will accept voltage and millivolt inputs as well. An auxiliary area for a current-measurement resistor installation, full-bridge strain gage and 2-wire RTDs is provided. The TD-TC has screw terminals for eight analog inputs, one analog output, six digital inputs, six digital outputs, one counter/ timer and a trigger input. Up to 6 isolated solid state switch modules may be installed.

TD-PE PIEZOELECTRIC (ACCELEROMETER) TERMINAL DRAWER

A switching power supply gives 23 V, 4 mA per channel via included BNC connectors. (AC/DC Coupled Switch replaces Voltage/Current Switch.) Ground reference connection is made by the user. An auxiliary area for current-measurement resistor installation and full-bridge strain gage is provided. The TD-PE has screw terminals for eight analog inputs, one analog output, six digital inputs, six digital outputs, one counter/timer and a trigger input. Up to 6 isolated solid-state switch modules may be installed.



TD-PE/AAF Piezoelectric/Anti-Aliasing Filter Draw

Similar to the Piezoelectric Terminal Drawer, with additional, user-selectable low-pass anti-aliasing filters on each of the 8 analog input channels. Includes one analog output, one counter/timer and six non-isolated digital inputs. No digital outputs and no digital auxiliary area for installation digital isolation modules.

TD-ISO ISOLATION TERMINAL DRAWER (REQUIRES DS-EXP-ISO)

The TD-ISO allows installation of up to eight industry standard, OMEGA OM5 isolated signal conditioner modules. It also has 5 digital inputs, 5 digital outputs. Up to 5 isolated solid state switch modules may be installed.

TD-GP/LC GENERAL PURPOSE/LOW COST TERMINAL DRAWER

Designed for the price conscious user or VAR. Measures all sensor types except piezoelectric and thermocouple. No switches or LEDs are available, and all analog auxiliary components must be soldered. No sockets are provided for isolated solid-state switch modules.

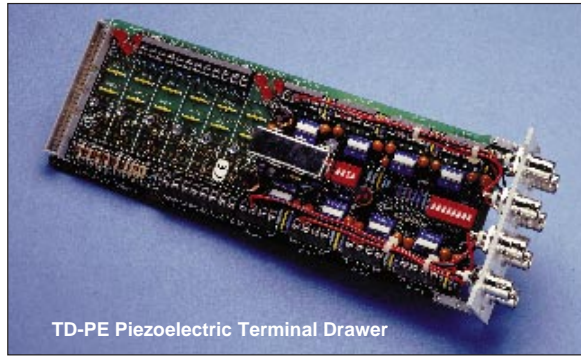
SOFTWARE

WorkBench PC for Windows (from \$995)

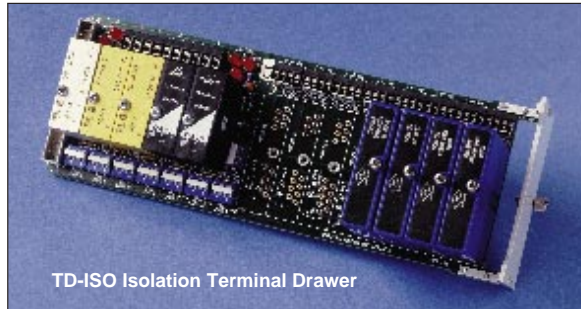
WorkBench is a graphically-oriented, configurable system using drag-and-drop icons with full functionality. No programming is required. Workbench offers application flexibility and in-depth functionality for data acquisition, analysis and control with an intuitive and easy-to-use interface. (See Software Section for more information)

QUICKLOG PC FOR WINDOWS

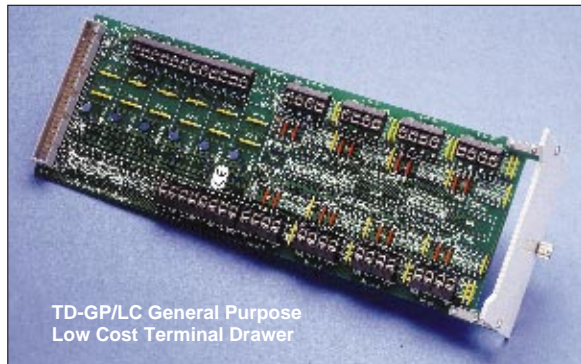
Included with hardware purchase, QuickLog allows low-speed data acquisition, charting and logging with built-in scaling capabilities and DDE input/output. Data may be collected up to 3 Hz in the Polled mode and 100 Hz in the Interrupt mode.



TD-PE Piezoelectric Terminal Drawer



TD-ISO Isolation Terminal Drawer



TD-GP/LC General Purpose
Low Cost Terminal Drawer

ACWDS Windows Development Software

Create your own applications in C, C++ or VisualBasic. Built-in examples for all functions are included. For Windows 3.1 or Windows 95 only.

SPECIFICATIONS

Analog Inputs: 16 differential inputs

per unit; 8 per drawer

Resolution: 0.012% of range,
1 part in 8092; 12-bit plus sign bit

Voltage Ranges:
12 ranges from ± 2.5 mV to ± 10 V

Current Ranges:
10 ranges from ± 100 μ A to ± 100 mA

Noise: As low as 60 μ V RMS, less than
5 μ V RMS with averaging

Input Impedance: >1000 M Ω

Common Mode Range: ± 10 V

Input Protection:
 ± 35 V powered; ± 20 V unpowered

Counter/Timers: Two independent
16-bit counter/timers; one per drawer

Digital Inputs:

12 digital inputs; 6 per drawer (max.)
TTL-compatible, Schmitt triggers for
clean transitions

Maximum input = 5 V
Maximum rate = 100 kHz

Digital Outputs:

12 open collector outputs; 6 per drawer
(max.)
30 V maximum

40 mA maximum sink current
Maximum rate = 100 kHz

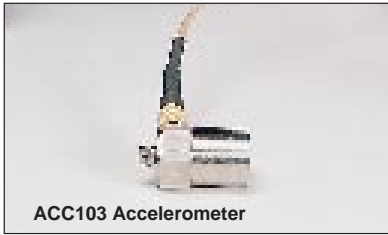
Trigger Inputs:

Digital: positive or negative slope,
TTL-compatible, Schmitt triggers for
clean transitions

Analog: positive or negative slope from
an analog input channel

Analog Outputs:
2 Channels (12-bit resolution)

Output Rate: up to 100 kHz



ACC103 Accelerometer



LCGD-50 Load Cell



5TC Thermocouple Pack

The Datashuttle Express is compatible with a broad range of sensors and transducers from OMEGA

Ranges: ± 5 V, ± 2.5 V, ± 1 V, 0-2 V, 0-5 V, 0-10 V, 4-20 mA

Protected from shorts to ground

Output Impedance: $< 2\Omega$

Strain Gages: 10 V or 2.5 V power for up to 16 gages

Bridge Resistance: 350 Ω switch selected to 100 Ω

Bridge Completion: for quarter bridge, 3-wire quarter bridge, half bridge and full bridge shunt calibration

Piezoelectric Sensors:

BNC connectors, 0-10 mA per channel

Compliance voltage: 23 V

Noise: < 500 μ V RMS

Thermocouple Types:

E, J, K, T, B, R, S, C, D, G, or N types, on any channel

Built-in cold junction and linearization

RTDs:

Resistance: 50 Ω to 1000 Ω Pt.

$\alpha = 0.00385$ or 0.00392

Auxiliary Power Output:

For +10 V (switchable to 2.5 V)

Current: 230 mA max. per drawer

Accuracy: $\pm 0.6\%$

Stability: < 40 mV change

Noise: < 5 mV RMS for +5V

Current: 1A total, both drawers

Accuracy: $\pm 5\%$ below 100 mA

Power Requirements:

90 to 264 Vac, 47 to 63 Hz or

+5 Vdc regulated voltage

Power Dissipation:

8.0 W unloaded, 20 W max. load,

12 W max user load

ENVIRONMENTAL

Operating Temperature:

32-122 $^{\circ}$ F, 0-50 $^{\circ}$ C

Humidity: 0 to 95%, non-condensing

Physical Dimensions:

8.7" x 10.75" x 2.8" (22 x 27.4 x 7.2 cm)

Typical Weight: 3.3 lb.

(1.52 kg) - with both drawers

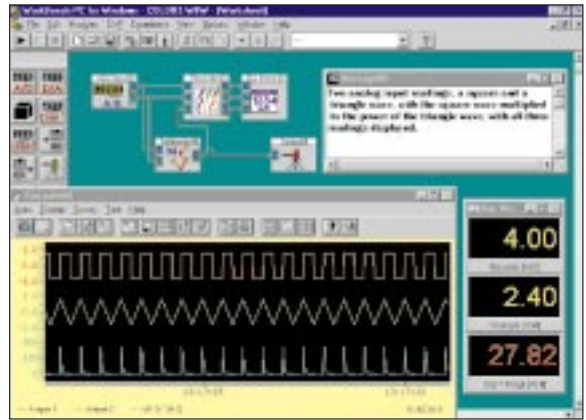
Voltage Ranges and Accuracy

Range	Accuracy(%) at 25 $^{\circ}$ C	Resolution (μ V)	Noise(μ V) Low Noise Mode
± 10 V	0.18	2,400	400
± 5 V	0.11	1,200	200
± 2.5 V	0.11	600	100
± 1 V	0.18	240	30
± 500 mV	0.11	120	15
± 250 mV	0.11	60	8
± 100 mV	0.18	24	4
± 50 mV	0.11	12	3
± 25 mV	0.11	6	2
± 10 mV	0.23	2.4	1
± 5 mV	0.35	1.2	1
± 2.5 mV	0.65	0.6	1

RTD Resolution and Accuracy ($^{\circ}$ C)*

Range	Accuracy(%) @ 25 $^{\circ}$ C	Resolution ($^{\circ}$ C)
100 Ω RTD, -200 to 408 $^{\circ}$ C	0.7	0.2
100 Ω RTD, -200 to 850 $^{\circ}$ C	1.4	0.3

*Accuracy based on ambient temperature @ 25 $^{\circ}$ C, Alpha = 0.00385



Optional Workbench For Windows Software from \$995 (see software section for more details. Demonstration software available. Call Engineering for details or visit <http://www.omega.com>

Current Ranges and Accuracy

Range	Accuracy(%) at 25°C:	Resolution (µV)	Noise(µV) Low Noise
±100 mA	1.3	24	4
±40 mA	1.3	10	1.2
±20 mA	1.3	5	0.6
±10 mA	1.3	2.4	0.3
±4 mA	1.3	1.0	0.16
±2 mA	1.3	0.5	0.12
±1 mA	1.3	0.24	0.08
±0.4 mA	1.4	0.10	0.04
±0.2 mA	1.5	0.05	0.04
±1.0 mA	1.8	0.024	0.04

Per Channel Sample Rate

Number of Channels	Maximum Sample rate*
1	100 kHz
2	50 kHz
4	25 kHz
16	6.25 kHz

Maximum sample rate is the same for all ranges at or above 25 mV or 1 mA. Maximum sample rate on lower ranges is 50 kHz

*Note: The DataShuttle Express has an internal 32kbyte buffer, and will sample at 100 kHz for approx 22,000 readings. If more datapoints are required, data may be stored on the PC's RAM and streamed to disk, however, data rates will be less than listed above, and are dependent on your parallel port type and settings. For example, some non-EPP parallel ports will only be able to sample at 15 kHz. ECP ports can sample at 60,000 Hz.

Thermocouple Resolution and Accuracy (°C)*

Thermocouple Range	Temperature Being Measured								Usable Range (°C)
	-200°C		25°C		600°C		1200°C		
	Accuracy	Resolution	Accuracy	Resolution	Accuracy	Resolution	Accuracy	Resolution	
E	1.7	0.2	1.0	0.1	1.2	0.2	-	-	-270 to 670
J	1.8	0.3	1.1	0.1	1.5	0.2	-	-	-270 to 770
K	2.4	0.4	1.2	0.3	1.2	0.3	2.1	0.3	-270 to 1260
T	2.3	0.4	1.2	0.3	-	-	-	-	-270 to 400
C	-	-	2.5	0.4	1.9	0.3	2.2	0.4	0 to 2320
D	-	-	3.3	0.6	1.9	0.3	2.0	0.3	-18 to 2315
G	-	-	14	3.0	2.1	0.3	1.9	0.3	-18 to 2315
R	-	-	5.1	1.1	3.1	0.6	2.5	0.4	-50 to 1768
S	-	-	5.1	1.0	3.3	0.7	2.8	0.5	-50 to 1768
B	-	-	-	-	5.1	1.0	3.3	0.6	100 to 1820
N	3.3	0.6	1.5	0.2	1.3	0.2	2.0	0.3	-270 to 1300

*Accuracy based on ambient temperature @ °C



QuickLog for Windows Software is included with the DataShuttle Express



Laptop computer not included



DataShuttle Express shown installed in a DataDock accessory

C

To Order (Specify Model Number)

Model Number	Price	Description
DS-EXP	\$2295	DataShuttle Express, 16 analog inputs, 2 analog outputs
DS-EXP-ISO	2795	DataShuttle Express with isolation
TD-GP	395	General purpose terminal drawer
TD-GP/BNC	480	General purpose terminal drawer: same as TD-GP with 8 BNC connectors
TD-GP/AAF	2500	General purpose/anti-aliasing filter drawer, with 8 BNC connectors
TD-PE	550	Piezoelectric terminal drawer
TD-PE/AAF	2900	Piezoelectric/anti-aliasing filter drawer, with 8 BNC connectors
TD-TC	420	Thermocouple terminal drawer
TD-ISO	695	OM5 signal conditioner terminal drawer
TD-GP/LC	195	Low cost terminal drawer
DD-DS-EXP	1095	DataDock for housing up to 4 DS-EXP or DS-EXP-ISO
PWR-DC-DSE	395	Optional DC power adapter for DataShuttle Express
ACWDS	249	Windows Development Software

Each DataShuttle Express is shipped with one power adapter (with IEC universal power connector) and one parallel cable (DB-25 M-F) and QuickLog for Windows software, and features room for two terminal drawers, which are sold separately.

Ordering example: DS-EXP plus one TD-GP and one TD-TC, \$2295 + \$395 + \$420 = \$3110