



DataShuttle™

High-Accuracy Temperature & Voltage Measurement Modules



Features

- 8 differential analog inputs, with 6 software programmable ranges
- Integrating V-F converter for 12 to 20 bits of resolution and 1 μ V sensitivity
- 100% digital calibration — no potentiometers
- Universal inputs measure thermocouples, RTDs, and isolated inputs
- Measurement rates up to 1500 Hz
- 8 digital I/O, individually selectable as input or output
- 2 optional analog outputs; 12 bit, 1500 Hz
- AC line or DC (5 to 9V) operable

DataShuttle™ products provide accurate, low-noise, high-resolution measurements in a compact module that simply attaches to a PC's standard parallel port. The device uses an integrating voltage-to-frequency converter for low-noise measurements with up to 1 μ V sensitivity, along with programmable resolution from 12 to 20 bits. The DataShuttle's integrating A/D provides a high degree of AC line rejection, making it ideal for accurate, low-noise measurements, including volts, thermocouples, and RTDs, even in noisy industrial environments.

The DataShuttle's convenient on-board signal conditioning provides voltage, thermocouple, RTD or isolated inputs. Each channel can have a different software-selectable range and resolution. The thermocouple version has an aluminum isothermal block, providing accurate and stable TC measurements.

Analog Input

Four different models of the DataShuttle are available, depending on the desired signal conditioning (see p. 218). Up to 15 DataShuttles can be cascaded to one or more parallel ports, for a total analog input capacity of 120 channels.

Highly accurate DataShuttle modules easily attach to a PC's parallel port



Icon-based DASyLab® software allows users to quickly build applications without programming

Optional Analog Output

Either model of DataShuttle (DS-16-8-GP or DS-16-8-TC) can be ordered with two channels of analog output (must be ordered with product—not user installable).

Software

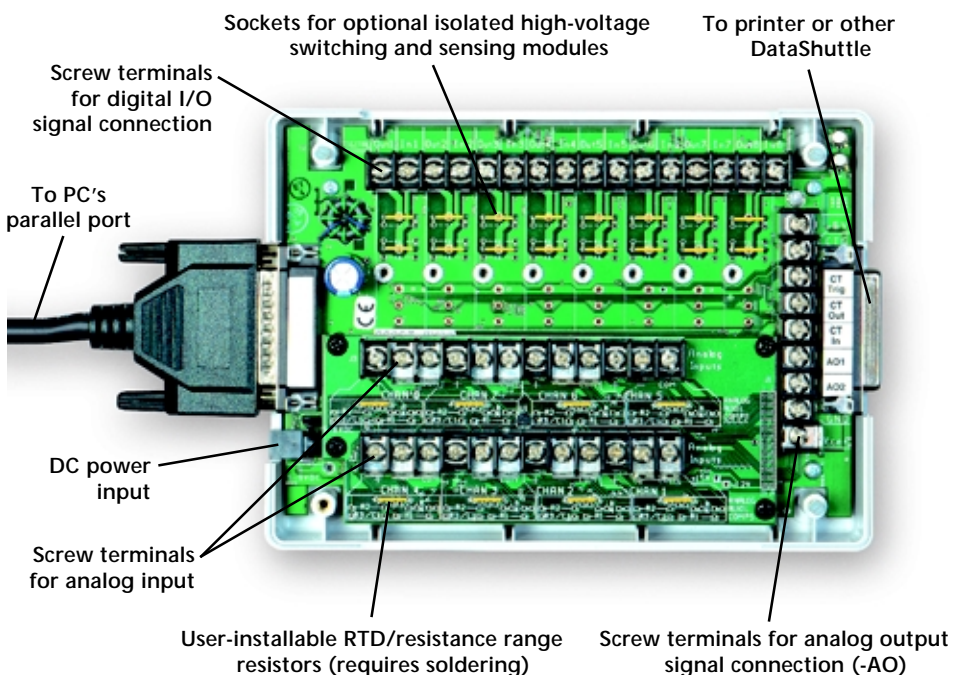
DataShuttle users require DASyLab® software with its intuitive icon-based user interface. Within a few hours of installation, DASyLab applications can be up and running without any programming (see p. 223).



DataShuttle™

Signal Conditioning

General Purpose Model DS-16-8-GP

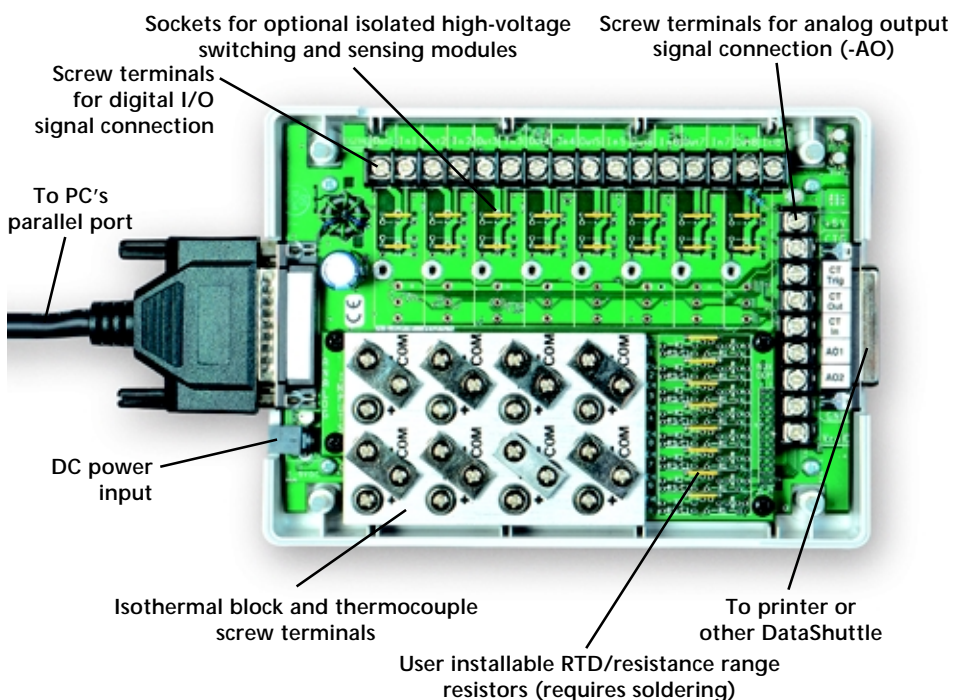


The General Purpose DataShuttle accepts eight differential voltage inputs, offering six input ranges, from ± 25 mV to +10V full scale. Signal connections are made via convenient screw terminal connections. A built-in cold-junction sensor allows thermocouples to be attached to any channel, although for the most accurate TC measurements, the Thermocouple model described below is recommended. RTD/resistance measurements are also possible by simply installing appropriate range-determining resistors in specified locations on the board.

The General Purpose model includes eight TTL-level digital I/O, and built-in sockets for optional isolated high-voltage switching and sensing modules.

A version of this DataShuttle is also available with built-in analog output (DS-16-8-GP-AO).

Thermocouple Model DS-16-8-TC



The Thermocouple DataShuttle includes an Isothermal Block for eight channels of TC measurements as accurate as 0.3°C. All channels are differential and can accommodate the same voltage measurements as the General Purpose model described above. Thermocouple types E, J, K, T, B, R, S, C, D, G, and N are supported, and are software selectable on a per-channel basis. RTD/resistance measurements are also possible by simply installing appropriate range-determining resistors in specified locations on the board.

The Thermocouple model includes eight TTL-level digital I/O, and built-in sockets for optional isolated high-voltage switching and sensing modules.

A version of this DataShuttle is also available with built-in analog output (DS-16-8-TC-AO).



DataShuttle™

Specifications & Ordering Information

Specifications

General

Power Requirements: +5 to +9 VDC @ 300 mA; AC adaptor included

Operating Temperature: 0° to 50°C

Resolution*	Speed
20 bits**	45/55 Hz†
18 bits	45/55 Hz†
16 bits	200 Hz
14 bits	550 Hz
12 bits	1000 Hz
11 bits	1500 Hz

Dimensions: 190 mm W x 140 mm D x 50 mm H (7.5" x 5.5" x 2.0")

Voltage Measurements

(Applies to General Purpose version, Thermocouple version)

8 differential inputs with screw terminal signal connections

Ranges:

6 ranges, individually software selectable: -5 mV to +50 mV, -25 mV to +25 mV, -50 mV to +500 mV, -250 mV to +250 mV, -1V to +10V, -5V to +5V

Input Protection: 50V continuous, 150V for one second

Input Resistance: >10⁹ Ohm (Ω)

Input Current: <3 nA

Accuracy: 0.05% of reading, +0.01% of range (15° to 35°C)

Temperature Coefficient: ±(40 ppm + 1 μV), 0° to 15°C, and 35° to 50°C

Common Mode Rejection Ratio (CMRR): >80 dB, ±5V and 10V ranges, >100 dB on all other ranges

Normal Mode Rejection Ratio (NMRR): 50 or 60 Hz, 40 dB min @ 18-bit resolution

Thermocouple Measurements

Thermocouple Types: E, J, K, T, B, R, S, C, D, G, N

Thermocouple Model (DS-16-8-TC)

Isothermal Block insures accurate readings even under thermally dynamic conditions

Accuracy: 0.3°C (with environment @ 15° to 35°C)

Resolution: 0.01°C

General Purpose Model

(with range resistor removed)

Accuracy: 0.8°C

Resolution: 0.01°C

Digital I/O

8 I/O lines, individually programmable as input or output

Each I/O line can be TTL-compatible, or open-collector

Optional modules can be installed on each channel, providing high-isolation and high-voltage switching and sensing on a per-channel basis

Input Voltage Range: 0 to +7V max

Input Voltage Logic Levels: TTL-compatible

Output Voltage Range: 0 to 30V max (with user-supplied pull-up resistors)

Output Current Sink: 50 mA/channel continuous, 400 mA max per 8 channels

Speed: Up to 1500 Hz (maximum is the same as the selected analog input measurement speed)

Analog Output (Models with -AO)

Two independent 12-bit programmable channels

Voltage Output Ranges (software selectable):

0 to +10V, 0 to +5V, 0 to +2V, -5V to +5V, -2.5V to +2.5V, -1V to +1V

Voltage Output Speed: Up to 1500 Hz (maximum is equal to maximum analog input speed)

Current Output Range: 4 to 20 mA (5 to 15V compliance)

Speed: Up to 1500 Hz (maximum is the same as the selected analog input measurement speed)

Accuracy: ±0.024% of full scale

Output Protection: -12V to +15V in volts mode, 0 to +15V in current mode

Ordering Information

Description	Part No.
General Purpose DataShuttle including 6 ft. parallel cable; AC power adapter	DS-16-8-GP
General Purpose DataShuttle plus analog output including 6 ft. parallel cable; AC power adapter	DS-16-8-GP-AO
Thermocouple DataShuttle including 6 ft. parallel cable; AC power adapter	DS-16-8-TC
Thermocouple DataShuttle plus analog output including 6 ft. parallel cable; AC power adapter	DS-16-8-TC-AO

Related Products

Expansion Hardware Switching/Sensing Modules	p. 207
Software DASyLab	p. 223

High-Voltage Switching Modules

A wide selection of isolated high-voltage and current switching and sensing modules are also available. These modules allow AC or DC loads to be switched, and also AC or DC voltages to be sensed. For a complete list of available modules, see p. 207.

* Resolution refers to full-scale readings; up to 10 times more resolution is provided at the lower 10% span of each range

** 20 bits of resolution are possible in the 18 bit resolution mode for inputs <10% of full scale

† 45 Hz when in 50 Hz low-noise mode, 55 Hz when in 60 Hz low-noise mode