

## **BLACK LAB SPECIFICATIONS**

Combines the performance of a 16 Bit A/D with a Pocket PC for an exceptionally effective Portable Data Acquisition System.

### **GENERAL FEATURES**

6 analog inputs: High Impedance, differential inputs  
DC volts, milliamps and thermocouples  
Ice point Reference included for thermocouple inputs

5 digital inputs: Optically isolated

Sensor excitation: 12V, 24V or adjustable excitation provided at the Connector Interface Modules.

Sampling Rates: Selectable in groups of 1/10/100, 5/50/500, or 10/100/1000, samples/sec on 6 channels

Acquisition Modes: Standard, Trigger, Capture Mode, View Only

Real Time Display: Readings update on the Pocket PC screen during each test.

Analog triggering: Triggering can be configured for any analog channel.  
Settings include pre- or post trigger times, rising or falling edge, type (threshold or rate of change), trigger value, and enable

Digital Triggering: Dedicated digital trigger channel opto-isolated.  
Settings include rising or falling edge, external wait (for arming & saving), and enable.

Data Storage Capacity: Can record 6 channels at 100 samples/sec indefinitely up to the memory capacity of the Pocket PC.  
Can record 6 channels at 1000 samples/sec for 70 seconds.

Data Transfer: Microsoft ActiveSync, Infrared, SD or CF card (any supported interface on Pocket PC)

Power: Removable, rechargeable Lithium ion battery or external AC/DC power supply, or other 7-9 volt DC power source provided by user. Low battery indicator and automatic discharged battery cutoff provided.

Communication: RS232 9 pin female D sub at 115 K baud.

Software: DataPocket™ software is provided for the Pocket PC that will record, display, replay, and analyze data directly in the Pocket PC. Each channel can be assigned unique equations from a simple  $y=mx + b$  to 5<sup>th</sup> order polynomials for conversion of raw data (volts) to engineering units. Data files are easily exportable in .CSV format to Excel or other 3<sup>rd</sup> party software for further analysis if desired.

### **ANALOG INPUTS**

6 differential analog inputs  
16-bit Analog to Digital Converter. Up to 500k samples per second maximum conversion rate  
Programmable Gain Instrumentation Amplifier

Frequency Response: 250 KHz typ.

Slew Rate: 20 V/ $\mu$ sec

Settling Time: 10 $\mu$ sec

### **DC VOLTAGE ACCURACY** (Accuracy applies for 1 year, $\pm 5^{\circ}\text{C}$ from calibration temperature)

GAIN	RANGE	RESOLUTION	ACCURACY
1	$\pm 10$ VDC	$\pm 300$ $\mu$ V	$\pm 0.025\%$ of Full Scale
10	$\pm 1$ VDC	$\pm 30$ $\mu$ V	$\pm 0.025\%$ of Full Scale
100	$\pm 100$ mVDC	$\pm 3$ $\mu$ V	$\pm 0.05\%$ of Full Scale
1000	$\pm 10$ mVDC	$\pm 0.3$ $\mu$ V	$\pm 0.2\%$ of Full Scale

Input Impedance: 10G ohm / 3pf

Common Mode Voltage:  $\pm 40$  VDC active over voltage protection without damage (total signal range of either input to gnd). Protection also active when system power is off.

Common Mode Rejection Ratio: 80-db min., 100 db Typ.

Temperature Effect: Gain = 1 & 10:  $\pm 0.0015\%$  of reading/ $^{\circ}\text{C}$   
Gain = 100:  $\pm 0.006\%$  of reading/ $^{\circ}\text{C}$   
Gain = 1000:  $\pm 0.015\%$  of reading/ $^{\circ}\text{C}$

On-board voltage references are provided to ensure long-term stability. By using the references, the Black Lab system is self calibrating.

## **TEMPERATURE ACCURACY**

All standard industrial thermocouple types (J,K,R,S,T,B,E) can be accommodated. An Ice Point reference is included in each of the Connector Interface Modules. Temperature measurement accuracy is the combination of the DC Voltage measurement accuracy, the temperature conversion conformity, and the reference temperature measurement accuracy. Refer to Technical Notes TN113 and TN114 (available on web site under Technical Information) for more information.

## **DIGITAL INPUTS**

5 optically isolated digital inputs (5-12 VDC). See the manual for input connections  
5-volt short circuit protected opto-isolator excitation is available.

## **INPUT CONNECTIONS**

The Black Lab has available three types of Connector Interface Modules that are used to connect sensor inputs directly to the Black Lab.

**CIM 1** - This module provides for the simple and convenient terminal strip connection of 6 analog inputs and 4 digital inputs. It connects to the Black Lab with a 1-foot ribbon cable. An ice point reference sensor is provided by a wire pigtail and is connected to the terminal strip.

**CIM 2** – This module provides screw terminal plug-in connection of 4 analog inputs and 3 digital inputs. Its main feature is that analog inputs are carried back to the Black Lab in a shielded, twisted paired cable permitting long cable lengths. Cable length must be specified at time of order. 12 volt sensor excitation is available to power sensors. The ice point reference sensor is embedded inside the module.

**CIM 3** – This module provides for screw terminal plug-in connection of 6 analog inputs and 4 digital inputs. Plus, it provides switch selectable 12 Vdc sensor excitation or optional 24 Vdc excitation, or either of two 1.2 to 10 Vdc independently adjustable regulated power outputs. It connects to the Black Lab with a 1-foot ribbon cable. The ice point reference sensor is embedded inside the module. Two fuses protect the 12 and 24 volt power outputs.

**CIM 4** - This module comes with a six pair cable with one end terminated with a Black Lab input connector and the other end with bare wires. It is available in standard lengths of 10, 25, or 50 feet.

## **PHYSICAL**

Size:	6.5" X 3.1" X 1.75"
Weight:	1 lb. (2.3 lb with battery option)
Operating Range:	0°C to 70°C, 5 to 95% R.H. (non-condensing)
Storage Range:	-65°C to 150°C
Power:	External 240/120 VAC to 9VDC power module provided.
Operating Current:	Approximately 280 mA with 9V input.
* Optional Battery:	Removable 7.2 volt, 4 Ahr Lithium Ion battery, holder, and charger.
Case Material:	Rugged Extruded Aluminum Enclosure
Accessories:	Belt Clip Rugged Case for HP Pocket PC's

\* If battery option is desired, Black Lab Model BL510 must be ordered.