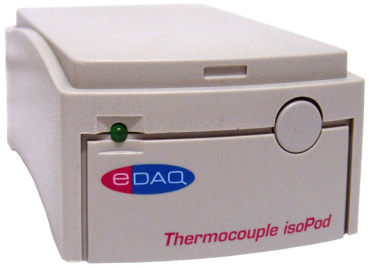
USB Thermocouple isoPod™ (Model EPU356)



- Software controlled
- Plug and play with Pod-Vu software
- Use with most thermocouple types
- NIST ITS-90 polynomial calibration
- Electrical isolation minimizes noise and crosstalk

Description

An electrically isolated, compact signal conditioner with a USB/ virtual serial port connection, enabling continuous recording of temperature from thermocouple probes.

Compatibility

The Thermocouple isoPod can be used with most thermocouple types (B, E, J, K, N, R, S, and T). Suitable probes include:

- ET405 K–type Thermocouple Probe
- ET1400 T–type Thermocouple Probe (±0.1 °C accuracy between 0 – 50 °C)

It can also be used as a high sensitivity voltmeter between ±20 mV.

Use with serial compatible software (RS232) or later, on Windows XP or later computers with USB port. A virtual serial port is created. Can be used with serial compatible software such as such as:

- Connect™, www.labtronics.com/DI/RS232_Software.htm
- WinWedge®, www.taltech.com/products/winwedge.html
- Tera Term, http://logmett.com/
- Pod-Vu, http://www.edaq.com/

or with your own software written in LabView, Visual Basic or C++ etc.

Applications

The isoPod can be used as a general purpose laboratory thermometer for both research and teaching, including melting and boiling point determinations, measurements of heats of reaction, and calorimetric kinetic experiments. High temperature furnaces can be monitored with B, R, or S–type thermocouples. Biological temperatures can be monitored with accurate T–type thermocouple probes

Calibration

The raw signal from the probe is ice point corrected, and then linearized by applying an idealized polynomial correction as described by the NIST ITS-90 thermocouple database, at:

- http://srdata.nist.gov/its90/main/

This calibration is at least as good as the stated accuracy of the thermocouple probe.

Pod-Vu Software

A demonstration version of eDAQ Pod-Vu software is included on the isoPod Installer USB stick. If you have purchased Pod-Vu then a license code will also have been provided to enable all Pod-Vu features.

Pod-Vu will automatically configure the virtual serial ports and locate all connected USB isoPods. Refer to the Pod-Vu manual for operating instructions. Pod-Vu will communicate with up to eight isoPod units, calibrate sensors, log data, and graphically display the signals in real time.

Specifications

Thermocouple types:	B, E, J, K, N, R, S, T, and raw millivolt
Input connector:	Miniature thermocouple socket (copper)
Input impedance:	> 20 MΩ (differential) > 10 GΩ (common mode)
Input range:	±20 mV
Cold junction compensation:	±0.1°C over 0 – 40°C ambient
DC drift:	< 0.1 µV/°C
Gain error:	< 0.05%
Zero error:	< 5µ V
ICMRR:	> 140 dB
Calibration:	ITS-90 polynomial
Response time (@ 100 Hz):	~13 ms for 0 – 90% of final value. Probe size will limit response time.
Amplifier noise:	< 0.2 µV rms (0 – 10 Hz)
Isolation:	> 250 V rms
Output data:	ASCII or 32 bit binary IEEE floating point
Output rate:	Up to 100 /s
Power:	< 50 mA from USB connection
Dimensions (l x w x h):	108 x 58 x 35 mm
Weight:	~200 g

eDAQ Pty Ltd reserves the right to alter these specifications at any time.

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Serial Communications

The isoPod is fitted with a USB port. This can be used as a virtual serial port with Windows, Mac OSX, and Linux computers. USB drivers for Windows XP and later computers are located on the eDAQ USB stick supplied with the isoPod. Otherwise you can download a suitable driver from

http://www.ftdichip.com/Drivers/VCP.htm

Software can then be written to communicate with the isoPod as a serial (RS232) device, for example using LabView, Visual Basic, or C++.

The serial port number must first be established. Serial Ports 1 and 2 on Windows computers are reserved for the mother board. Thus it is common to find that the isoPod is located on serial port 3 (COM3) or greater.

The virtual serial port should be configured as 115200 baud, 8 bits, 1 stopbit, no parity. Set the flow control to NONE.

When correctly configured the unit will send the prompt **EPU356>** to indicate that a new command can be sent.

Interactive Communication

You can use terminal emulation software (eg Tera Term) to manually interact with the isoPod:

1. Download the Tera Term installer from http://logmett.com
2. Install Tera Term choosing the 'Compact Installation' option to reduce unnecessary extras.
3. Connect the isoPod and provide the computer with the isoPod Installer USB stick if a USB driver is requested.
4. Open the Windows device manager and find the isoPod and its corresponding COM port listed under 'Ports (COM & LPT)'. On first use there is no way to know in advance what COM port will be assigned to the isoPod, except that it will be COM3 or greater.
5. Start the Tera Term software, go to the Serial port... command in the Setup menu and configure the serial port as above. Click OK to return to the main Tera Term window and use the Return key to get the **EPU356>** prompt.

Once interactive communication is established you can be confident that the serial communications are working and can proceed to write your own software.

Serial Protocol

EPU356> help
EPU356> ?
Returns a list of commands

EPU356> set mode <TC>
Set the thermocouple probe used, ie **<TC>** = B, E, J, K, N, R, S, T and an ice point correction is performed, the signal linearized according to the appropriate ITS-90 polynomial and the corrected temperature output. No further calibration is required for most operations and the accuracy will be as good as the specification for the thermocouple probe. If **<TC>** = mV then the raw millivolt signal is output (no ice point correction). If **<TC>** = ipc then the internal isoPod temperature (used for ice point correction) is output.

EPU356> get mode
Returns selected mode of the isoPod.

EPU358> set dp <n>
Set the number, **<n>** , of decimal places to be displayed from 0 – 3.
If **<n>** = auto then a default will be selected according to the thermocouple type. A confirmation string is returned.

EPU358> get dp
Returns the decimal place setting.

EPU356> r -
Return a single reading.

EPU356> v -
Return a single value. That is the reading is returned as a number, without extraneous text such as unit name etc.

EPU356> sample ascii <freq> [N]
EPU356> sample binary <freq> [N]
Return readings at a frequency of **<freq>**, an integer between 1 and 100 Hz. Readings are returned as ASCII or 32 bit binary IEEE floating point data. Specify an optional integer, **[N]**, to return that number of samples. Send ! to exit this mode. If **<freq>** is the character # the a single sample is returned every time a # is sent, or send ! to exit this mode.

EPU356> interval ascii <time> [N]
EPU356> interval binary <time> [N]
Return one sample every **<time>** seconds. Specify an optional integer, **[N]**, to return a fixed number of samples. Send ! to exit this mode.

EPU356> version
Returns the firmware version number.

EPU356> prompt off
Turns off the **EPU356>** prompt.

prompt on
Reinstates the **EPU356>** prompt.

How to start

If you intend to write your own software using these protocols then it is a good idea to commence by sending each command manually to the isoPod using a terminal emulation program for example Tera Term, see above. This will confirm the responses expected, so that you can be sure that any recent changes in the protocols will be accounted for.