

# UEIPAC 700

## 7-slot Programmable Automation Controller

- Powerful stand-alone embedded controller
- Flexible, compact and rugged
- Standard Linux OS (2.6.x Kernel)
- Xenomai RTOS support
- Program in C on Linux
- Eclipse IDE support
- **New:** EPICS CAS software included
- **New:** Web/HTML/HTML5 Web Socket interface support.
- Flexible: Over 50 I/O boards available
- SD cards up to 32 GByte
- 100Base-T, 100Base-FX (fiber)
- Up to 576 kilosamples/sec
- High speed PID loops (e.g., 8 channels > 20 kHz)
- Ideal for HIL (Hardware In the Loop) applications
- Ideal local controller/RTU in SCADA systems



In addition to the 7-slot UEIPAC 700 Cube, the UEIPAC is available on 3 and 6 slot PPC Cubes, GigE Cubes and RACKtangle platforms!

## General Description:

The UEIPAC offers an unprecedented combination of flexibility, high performance, low cost and small size. The unit is an ideal solution in a wide variety of measurement and control applications including: Temperature control, Remote vehicle control (UAV and ULV), Hardware in-the-loop (HIL) and more. The UEIPAC is also an ideal solution for a host of embedded DAQ applications as it allows systems to be developed without the cost or the additional space required by an external host computer. The new Xenomai Real-Time OS support greatly enhances the PAC's capabilities in control environments.

The UEIPAC is an ideal solution in applications that require a standalone controller than runs independent of any host PC. It is also a great choice as a local controller connected to a supervisory host or as a local data accumulator that feeds processed data to a host PC.

The UEIPAC 700 offers 7 slots I/O slots in a rugged and compact 4.1" x 4.1" x 6.6" Cube. In addition to the Cube form factors the UEIPAC is also available in UEI's popular RACKtangle for factor. The RACKtangle-based UEIPAC 1200R and UEIPAC 600R offer 12 and 6 slots respectively in a front-loading rack configuration. The UEIPAC uses the same I/O boards as our popular PowerDNA family and includes analog input (with up to 24 bit resolution), analog output, digital I/O, Serial and CAN communications, ARINC-429, MIL-STD-1553, LVDT/RVDT, synchro/resolver, counter/timer, quadrature encoder input and more. With over 50 different I/O boards available there is sure to be a configuration perfect for your application.

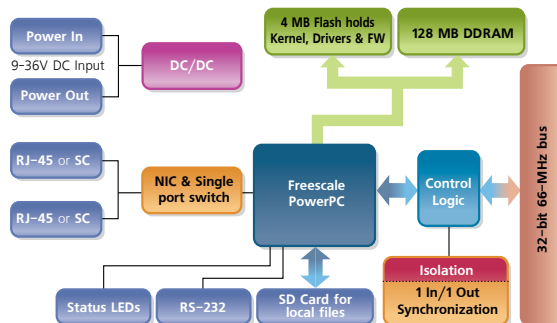
The UEIPAC 700 is rugged, robust and is tested from -40° to +85° C, at 50 g shock, 5 g vibration, altitudes up to 120,000 feet and are tough enough for the most challenging applications. All I/O is fully isolated from the controller so the UEIPAC is largely immune to the glitches and spikes so commonly seen in the grounds of an industrial environment.

The heart of every UEIPAC is a PowerPC processor running a standard (2.6.x) Linux OS kernel. Flash memory contains the OS Kernel and drivers for each of the I/O boards. The CPU board also provides an SD Card slot, Ethernet interface, Inter-cube trigger/sync interface, RS-232 serial port as well as the power supply inputs and a variety of annunciator LEDs. The file system which is contained on the SD card, includes the other components of the operating system such as libraries, utilities, init script and daemons.

As compared to a host PC based system, the UEIPAC allows for a smaller, faster, more reliable and higher performance system. It also eliminates the cost of the dedicated host PC and guarantees long term availability of the identical hardware. This is critical when certifying products through FAA, CE or FDA etc.

Using the UEIPAC, Linux (Fedora, Suse, etc.) applications written on your PC in C or C++ are deployed on the cube and run fully standalone. You may also develop your application on a Windows PC using the Cygwin environment. You are also free to develop in the popular Eclipse IDE.

## Hardware Block Diagram: (UEIPAC 300/600)



## General Description: (continued)

Your application runs as a regular Linux process giving you access to the standard POSIX API provided by the GNU C runtime library (glibc) as well as any other library that can be compiled for Linux (for example: libxml, libaudio file...).

New software provided with the UEIPAC includes an EPICS (Experimental Physics and Industrial Control System) Channel Access Server (CAS). Our new LibSharedData software allows easy connection of the UEIPAC to HTML/HTML5 browsers via Web Sockets or other PCs via TCP/IP Sockets.

Whether your application requires a few I/O channels or a few thousand, the UEIPAC is an ideal solution. The UEIPAC's unique combination of Linux operating system, real-time Xenomai support, I/O flexibility, compact size, mechanical and electrical ruggedness, and ease of use is unparalleled.

## UEIPAC Linux TK Programmer's Toolkit

The programmer's toolkit provides the software tools necessary to create an embedded application targeting Linux on the UEIPAC's PowerPC processor. This includes most popular versions of Linux such as Fedora and Suse. The development environment runs on a Linux PC or in the Cygwin environment on a Windows PC. The UEIPAC is also supported by the popular Eclipse IDE. Applications requiring hard real-time functionality are possible using the Xenomai Linux extension.

The UEIPAC development environment includes:

- GCC to cross-compile an application targeting the UEIPAC PPC module
- GNU toolchain tools such as make
- Standard Linux libraries such as glibc
- UEIPAC library for the various I/O boards/devices

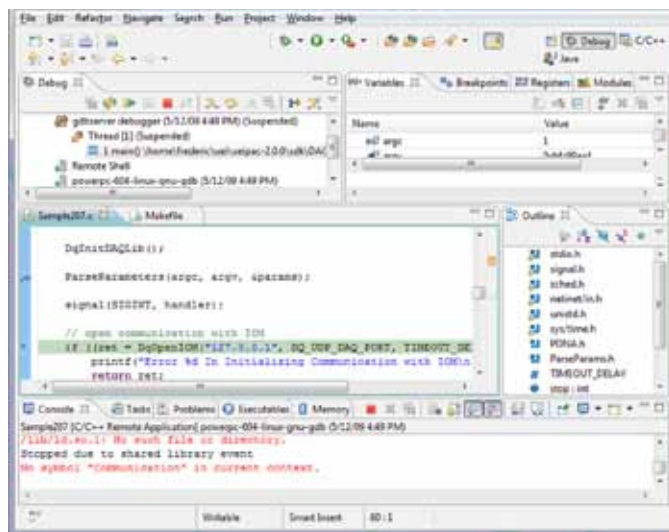
The UEIPAC Linux TK is not included with the UEIPAC and must be purchased as a separate item. *Only one Linux toolkit must be purchased, regardless of the number of UEIPAC systems you will deploy.*

The toolkit uses the same API as our popular PowerDNA Cubes, allowing you to reuse existing programs that were designed to run with a PowerDNA Cube over the network. This allows you to develop your application on your desktop, working directly with a "slaved" PowerDNA Cube. Once you are satisfied with your system, you may port the programs to run directly on the UEIPAC Cube with few modifications.

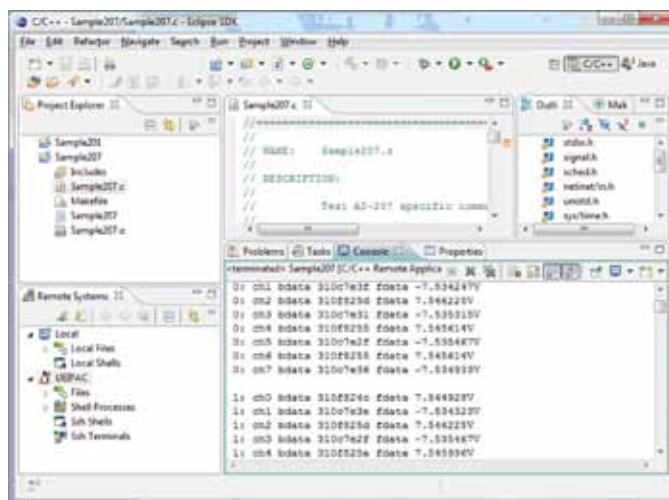
After the UEIPAC power-up, you have a ready to go Linux operating system with FTP and web servers as well as a command line shell accessible from either the serial port or telnet and SSH over the network. You can configure the UEIPAC I/O module to execute your application after booting-up.

## Eclipse IDE support

The UEIPAC is now supported by the Eclipse IDE. Programmers may now take advantage of the many powerful Eclipse tools to build their UEIPAC applications.



The Eclipse IDE debug screen.



A typical Eclipse IDE run-time screen.

## New Software Support

**EPICS:** (Experimental Physics and Industrial Control System) is popular standard in high-energy physics laboratories. Our new EPICS server provides the source code to set up the UEIPAC as an EPICS CAS (Channel Access Server), allowing you to configure any I/O input or output as a PV (Process Variable).

**Web Browser Interface:** Our new LibSharedData API/library allows easy connection of the UEIPAC to HTML/HTML5 browsers via Web Sockets or other PCs via TCP/IP Sockets. The HTML5 interface is fully compatible with many "mobile" browsers including Safari for iOS and iPhones and iPads and the Android web browser. Of course the standard HTML interface is provided to interface to more general purpose web browsers such as Internet Explorer®.

# UEIPAC 700: Specifications

Computer Interface		UEIPAC 700 Cubes	
Primary Ethernet Port	10/100Base-T, RJ-45 connector		
Diagnostic Port	not applicable		
Daisy chain output	10/100Base-T, RJ-45 connector		
Optional Interface	100Base-FX Fiber (single or multi mode)		
Config/Serial Port	RS-232, 9-pin "D"		
USB Port	not supported		
Synchronization Options	1. DNA-SYNC series cables/boards provide system clock or trigger synchronization. 2. DNA-IRIG-650 board provides IRIG and GPS time synchronization.		
I/O Board Support			
Series supported	All DNA-series boards		
Software / Operating System			
Embedded OS	Linux, kernel 2.6.x (VxWorks Available)		
Real-time support	Xenomai RTOS support		
Dev Language	C/C++, Eclipse IDE support,		
Dev Environments	Linux PC or Cygwin Windows environment		
EPICS CAS interface	Yes		
SNMP Library	Yes		
Processor/system			
CPU	Freescale MPC5200, 400 MHz, 32-bit		
Memory	128 MB (64 MB available for appl. SW)		
FLASH memory	4 MB (0 MB available for user apps)		
SD card interface	SD cards up to 32 GB (8 GB included)		
USB drive interface	n/a		
Physical Dimensions			
7 I/O slots	UEIPAC 700: 4.1" x 4.0" x 6.6"		
Environmental			
Electrical Isolation	350 Vrms		
Temp (operating)	-40 °C to 85 °C (70 °C with FAN option)		
Temp (storage)	-40 °C to 100 °C		
Humidity	0 to 95%, non-condensing		
Vibration			
(IEC 60068-2-64)	10–500 Hz, 5 g (rms), Broad-band random		
(IEC 60068-2-6)	10–500 Hz, 5 g, Sinusoidal		
Shock			
(IEC 60068-2-27)	50 g, 3 ms half sine, 18 shocks at 6 orientations; 30 g, 11 ms half sine, 18 shocks at 6 orientations		
Altitude	70,000 feet (special version to 120,000')		
Power Requirements			
Voltage	9 - 36 VDC (115/220 VAC adaptor incl.)		
Power	3.5 Watts (not including I/O boards)		
Reliability			
MTBF	>300,000 hours		

## Ordering Guide:

UEIPAC Chassis (include installed Linux OS, Universal AC power supply, Serial and Ethernet cables and 2 or 8 Gbyte SD Card)	
Part Number	Description
UEIPAC 700	Linux-based, Programmable Automation Controller with 7 available I/O slots
DNA-FAN9	Rear mount cooling fan option. (Recommended if Cube power dissipation to exceed 25 Watts_
UEIPAC-Linux TK (Software Only)	UEIPAC Linux Programmer's Toolkit. Only one toolkit is required, regardless of the number of UEIPACs deployed

## Typical Applications:

- Embedded Controller
- Hardware-in-the-loop controller
- Unmanned vehicle controller
- Wind energy and turbine controller
- Smart, Flexible data loggers
- Slaved controller with fail-safe local control and/or shut-down if communication is lost
- HVAC / Environmental controller
- Modern replacement for obsolete VME systems
- Solar Energy system controller
- Machine Health Monitor
- DUT simulator
- In-vehicle test systems
- Avionics simulator
- Single and multiple PID loop controller
- Rugged and remote DAQ

## System Block Diagram:

