UEIModbus Cubes and RACKs

Modbus TCP based I/O Chassis

- Uses industry standard Modbus TCP interface
- Flexible, rugged and compact
- Easy-to-use web-browser based configuration
- Standard 100Base-T, 100Base-FX, or Gigabit Ethernet interface
- Optional 8347E offers IPSec encryption (coming soon)
- Flexible: Over 50 I/O boards available
- Solid-State Drive, Flash or SD Card-based boot disk
- AC or DC powered
- Available on all Cube and RACKtangle platforms including the MIL chassis

The UEIModbus is available on all UEI's chassis!

General Description:

The UEIModbus Cube/RACKtangle is a compact, rugged, Ethernet based data acquisition and control interface that communicates with a host computer or PLC over Modbus TCP. Its flexibility allows you to configure one or more chassis to match the specific I/O requirements of your application. The UEIModbus is ideally suited for a wide variety of industrial monitoring and control applications.

The Modbus messaging protocol was developed by Modicon in 1979 and is used to establish client-server communication between intelligent devices. It is a defacto standard, truly open and the most widely used network protocol in the industrial manufacturing environment.

Modbus devices communicate in a client-server configuration. Only one device (the client) can initiate transactions (called queries). Other devices (server) respond by supplying the requested data to the master, or by taking the action requested in the query.

The UEIModbus chassis functions as a Modbus server that is easily accessed by any software client acting as a Modbus client. Most popular HMI software supports the Modbus protocol. Configuration is done with an easy-to-use web-browser interface.

The UEIModbus supports all of UEI's popular Cube/RACKtangle based AI, AO, DI, DO and CT interfaces. (Other Cube/RACKtangle-based products include the PowerDNA®, UEISIM™ and UEIPAC™ families.) Analog input channels are read using two input registers encoded as a single 32-bit floating point value. Analog output channels are written to using two holding registers encoded as one 32-bit floating point value. Digital input ports are read using one or two input registers (depending on the port width). Each digital input line is also available as a discrete input register. Digital output ports are written using one or two holding registers (depending on the port width) and similar to the digital inputs, each digital output line is also available as a coil register. Counter or quadrature encoder inputs are read using one or two input registers (depending on the counter resolution).

The heart of every UEIModbus system is the Cube or RACKtangle chassis, which are available in a wide variety of configurations. You select the I/O boards installed in the chassis to match your application. There are currently over 50 different I/O boards supported by the UEIModbus, covering analog input and output, digital I/O, counter/timers, and quadrature encoders.

Each I/O chassis consists of two primary subsections: a CPU Module and I/O slots or layers. The CPU Module provides the PowerPC CPU running the Modbus TCP server software. The core modules also provides the Ethernet Network Interface Controller (NIC), indicator lights, timing/trigger interface, configuration ports and internal power supply. It's the brains of the chassis and controls the unit's operations including reading and writing to the I/O boards.

The remainder of the UEIModbus Cube is dedicated to I/O slots or layers. These slots are populated with I/O modules selected to match your application. With over 50 different I/O boards available, we're sure to have just what your application requires. We offer: Analog input boards to measure voltage, current, strain gages, thermocouples and more, Analog output boards with outputs to ±40V or ±50 mA, Digital I/O interfaces for logic and "real-world" signal levels, counters/timers, and quadrature encoder inputs.

The UEIModbus cubes offer a wide variety of mounting options. A flange kit is available that allows the cubes to be mounted to a wall or other flat surface. Rack kits and DIN Rail kits are available to allow mounting in 19" racks or on DIN rails, respectively. The UEIModbus RACKtangles are designed to install directly in standard 19" racks.

Whether your application requires a few I/O channels or a few thousand, the UEIModbus chassis are an ideal solution in your Modbus based application. The UEIModbus chassis' unique combination of flexibility, compact size, mechanical and electrical ruggedness, and ease of use is unparalleled.

Hardware Block Diagram: (UEIModbus 300/600)
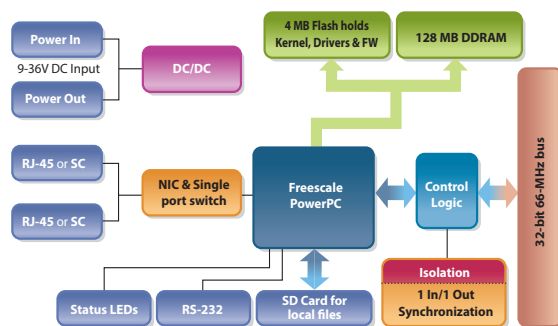
UEIModbus: Technical Specifications

Computer Interface	UEIModbus xxx series Cubes	UEIModbus xxx-1G series GigE Cubes	UEIModbus RACKtangle Chassis
Primary Ethernet Port	10/100Base-T, RJ-45 connector	10/100/1000Base-T, RJ-45 connector	10/100/1000Base-T, RJ-45 connector
Diagnostic Port	Not applicable	10/100/1000Base-T, RJ-45 connector	10/100/1000Base-T, RJ-45 connector
Other Port Functions	Daisy chained single port switch provided	Ports may optionally be bonded/teamed	Ports may optionally be bonded/teamed
Optional Interface	100Base-FX Fiber (single or multi-mode)	n/a	n/a
Config/Serial Port	RS-232, 9-pin "D"	RS-232, 9-pin "D"	RS-232, 9-pin "D"
USB Port	Not supported	Not supported	Not supported
I/O Board Support			
Series supported	DNA-series boards	DNA-series boards	DNR-series boards (DNF for FLATrack)
Software / Operating System			
Embedded OS	Linux, kernel 4.4.89	Linux, kernel 4.4.89	Linux, kernel 4.4.89
Processor / System			
CPU	Freescale MPC5200, 400 MHz, 32-bit	Freescale 8347 or 8347E, 400 MHz, 32-bit	Freescale 8347 or 8347E, 400 MHz, 32-bit
RAM Memory	128 MB, 100 MB available to user apps	128 MB standard / 256 MB optional 100 MB / 228 MB available to user apps.	128 MB standard / 256 MB optional 100 MB / 228 MB available to user apps.
FLASH Memory	4 MB (0 MB available for user apps)	32 MB standard / 128 MB optional 16 MB / 112 MB available for user apps.	32 MB standard / 128 MB optional 16 MB / 112 MB available for user apps.
Solid-State Hard Drive	not available	Optional 8 or 16 GB drives available*[1]	Optional 8 or 16 GB drives available* [1]
SD Card Interface	SD cards up to 32 GB (8 GB included) [1]	SD cards up to 32 GB (8 GB included) [1]	SD cards up to 32 GB (8 GB included) [1]
USB Drive Interface	n/a	Standard USB 2.0 port	Standard USB 2.0 port
Physical Dimensions			
1 I/O slot		UEIModbus 100-1G: 4.1" x 4.0" x 2.7"	
3 I/O slots	UEIModbus 300: 4.1" x 4.0" x 4.0"	UEIModbus 300-1G: 4.1" x 5.0" x 4.0"	n/a
4 I/O slots			UEIModbus 400R: 1.75" x 7.8" x 16" (1U)
6 I/O slots	UEIModbus 600: 4.1" x 4.0" x 5.8"	UEIModbus 600-1G: 4.1" x 5.0" x 5.8"	UEIModbus 600R: 5.25" x 6.2" x 10.5" (3U)
7 I/O slots	UEIModbus 700: 4.1" x 4.0" x 6.6"	UEIModbus 700-1G: 4.1" x 5.0" x 6.6"	
12 I/O slots	n/a	n/a	UEIModbus 1200R: 5.25" x 6.2" x 17.5" (3U)
Environmental			
Electrical Isolation	350 Vrms	350 Vrms	350 Vrms
Temp (operating)	-40 °C to 85 °C	-40 °C to 70 °C	-40 °C to 70 °C
Temp (storage)	-40 °C to 100 °C	-40 °C to 85°C	-40 °C to 85 °C
Humidity	0 to 95%, non-condensing	0 to 95%, non-condensing	0 to 95%, non-condensing
Vibration			
(IEC 60068-2-64)	10–500 Hz, 5 g (rms), Broad-band random	10–500 Hz, 3 g (rms), Broad-band random	10–500 Hz, 3 g (rms), Broad-band random
(IEC 60068-2-6)	10–500 Hz, 5 g, Sinusoidal	10–500 Hz, 3 g, Sinusoidal	10–500 Hz, 3 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	100 g, 3 ms half sine, 18 shocks at 6 orientations; 30 g, 11 ms half sine, 18 shocks at 6 orientations	100 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')	70,000 feet, maximum	70,000 feet, maximum
Power Requirements			
Voltage	9-36 VDC (115/220 VAC adaptor included)	9-36 VDC (115/220 VAC adaptor included)	9-36 VDC (115/220 VAC adaptor included)
Power	3.5 Watts (not including I/O boards)	7 Watts (not including I/O boards)	10 Watts (not including I/O boards)
Reliability			
MTBF	>300,000 hours	>160,000 hours	>130,000 / 160,000 hrs DNR-12 / DNR-6

* The UEIModbus does not support local data storage. Though the hardware is capable of drives larger than 8 GByte, the is little value in selecting a larger hard drive.

[1] The SD cards and SSD devices used are not built by UEI. As we do not control the source, we cannot offer our 10-year availability guarantee on

UEIModbus Advantages:

Easy to configure and deploy
- Uses standard Modbus TCP protocol
- Over 50 different I/O boards available
- Web browser based configuration
- Built-in signal conditioning
- Cube, RACKtangle and MIL configurations
- Standard "Off-the-shelf" products and delivery

Flexible Connectivity
- 100Base-T or GigE with Cat-5 cable
- 10/100Base-FX Fiber interface available
- Supports WIFI / GSM / Cell networks

Compact Size: UEIModbus 600 @ 4" x 4" x 5.8" allows:
- 175 analog inputs per cube
- 224 analog outputs per cube
- 336 digital I/O bits per cube
- 48 counter/timer channels per cube
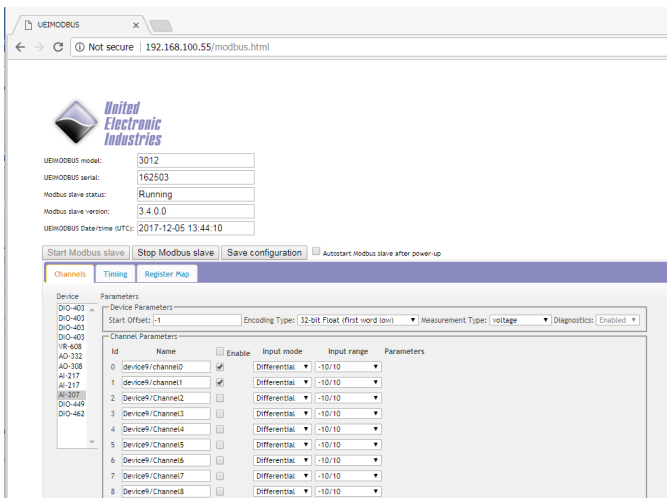- 48 quadrature encoder inputs per cube

Low Power:
- As low as 15 watts per chassis
- AC, 9-36 VDC or battery powered

Rugged and Industrial:
- Operation tested from -40°C to 85°C
- Vibration tested to 5 g, (operating)
- Shock tested to 100 g (operating)
- All I/O isolated from chassis and host PC

UEIModbus channels are configured using an intuitive, easy-to-use web browser interface!

UEIModbus Technical Specifications:

Computer Interface	MIL series ruggedized chassis
Primary Ethernet Port	10/100/1000Base-T, 38999 connector
Diagnostic Port	10/100/1000Base-T, 38999 connector
Net Teaming/bonding	Supported
Config/Serial Port	on LAN/COM 38999 connector
USB Port	n/a on UEIModbus
I/O Board Support	
Series supported	DNA/DNR-series
Software / Operating System	
Embedded OS	Linux, kernel 4.4.89
Real-time support	Standard Linux kernel
Processor/system	
CPU	Freescale 8347 or 8347E, 400 MHz, 32-bit
Memory	256 MB, 228 MB available to user apps
FLASH memory	32 MB standard / 128 MB optional 16 MB / 112 MB available for user apps
Solid-State Hard Drive	*Optional 8 or 16 GB drives available
SD card interface	SD cards up to 32 GB
Physical Dimensions	
4 I/O slots	UEIModbus 400-MIL: 6.2" x 7.1" x 8.7", 11 lbs.
12 I/O slots	UEIModbus 1200-MIL: 17.5" x 8.1" x 7.0" 22 lbs. (Std 3U)
Environmental	
Temp (operating)	-40 °C to 85 °C (power dissipation of actual system may require derated max temp.)
Temp (storage)	-40 °C to 85 °C
Humidity	0 to 95%, non-condensing
Vibration	MIL-STD-810G plus the IEC specs below
(IEC 60068-2-64)	10–500 Hz, 5g (rms), Broad-band random
(IEC 60068-2-6)	10–500 Hz, 5 g, Sinusoidal
Shock	MIL-STD-810G plus the IEC specs below
(IEC 60068-2-27)	100 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, maximum
EMI / RFI	Designed to meet MIL-STD-461
Sealing	Default unit sealed to IP 66 or better. Pressure relief valves support continuous altitude changes of 5000 fpm. Units can be configured with bottom weep holes if desired.
Power Requirements	
Voltage	9 - 36 VDC designed to meet MIL-STD-1275 / 704
Reliability	
MTBF 1200-MIL	> 100,000 hours
MTBF 400-MIL	> 130,000 hours

* The UEIModbus does not support local data storage. Though the hardware is capable of drives larger than 8 GByte, the is little value in selecting a larger hard drive.
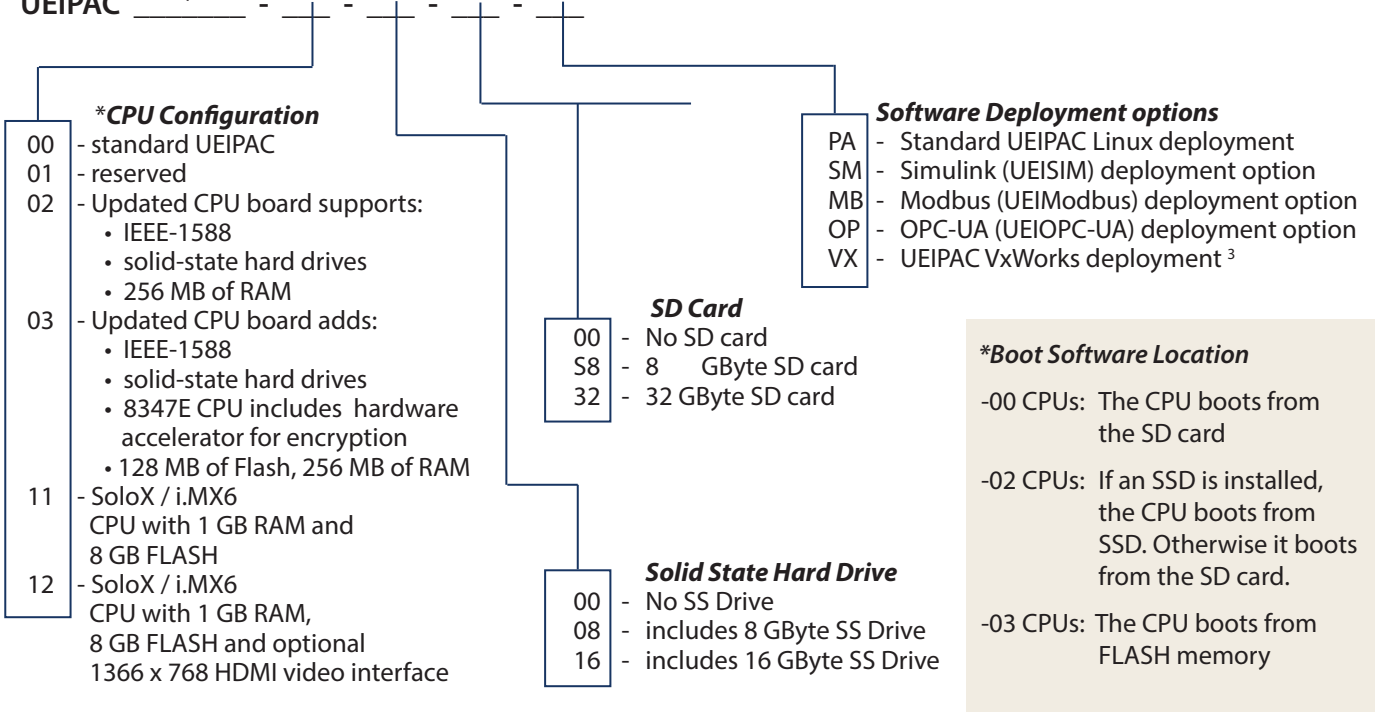
Please see the UEIModus ordering guide onthe following page.

Ordering Guide: (All chassis include: Universal AC power supply, Serial and Ethernet cables.)

Chassis Configuration

300[1,2]	100Base-T Linux-based, Modbus TCP I/O chassis with 3 available I/O slots
600[1,2]	100Base-T Linux-based, Modbus TCP I/O chassis with 6 available I/O slots
700[1]	100Base-T Linux-based, Modbus TCP I/O chassis with 7 available I/O slots
100-1G	Gigabit Ethernet, Modbus TCP I/O chassis with 1 available I/O slots (a.k.a. UEINET-Modbus)
300-1G	Gigabit Ethernet, Modbus TCP I/O chassis with 3 available I/O slots
600-1G	Gigabit Ethernet, Modbus TCP I/O chassis with 6 available I/O slots
700-1G	Gigabit Ethernet, Modbus TCP I/O chassis with 7 available I/O slots
600R	Gigabit Ethernet, Modbus TCP I/O chassis, RACKtangle with 6 available I/O slots
1200R	Gigabit Ethernet, Modbus TCP I/O chassis, RACKtangle with 12 available I/O slots
400F-AC	1U FlatRACK, rack mountable 4 slot chassis with Gigabit Ethernet and 100-240 V AC power
400F-DC	1U FlatRACK, rack mountable 4 slot chassis with Gigabit Ethernet and 9-36 VDC power
400-MIL	Military style, 4 slot Cube with GigE Ethernet ports and 38999 connectivity
1200-MIL	Military style, 12 slot RACKtangle with GigE Ethernet ports and 38999 connectivity

UEIPAC _____ - ___ - ___ - ___ - ___

*CPU Configuration

00	- standard UEIPAC
01	- reserved
02	- Updated CPU board supports: • IEEE-1588 • solid-state hard drives • 256 MB of RAM
03	- Updated CPU board adds: • IEEE-1588 • solid-state hard drives • 8347E CPU includes hardware accelerator for encryption • 128 MB of Flash, 256 MB of RAM
11	- SoloX / i.MX6 CPU with 1 GB RAM and 8 GB FLASH
12	- SoloX / i.MX6 CPU with 1 GB RAM, 8 GB FLASH and optional 1366 x 768 HDMI video interface

SD Card

00	- No SD card
S8	- 8 GByte SD card
32	- 32 GByte SD card

Solid State Hard Drive

00	- No SS Drive
08	- includes 8 GByte SS Drive
16	- includes 16 GByte SS Drive

Software Deployment options

PA	- Standard UEIPAC Linux deployment
SM	- Simulink (UEISIM) deployment option
MB	- Modbus (UEIModbus) deployment option
OP	- OPC-UA (UEIOPC-UA) deployment option
VX	- UEIPAC VxWorks deployment [3]

*Boot Software Location

-00 CPUs: The CPU boots from the SD card

-02 CPUs: If an SSD is installed, the CPU boots from SSD. Otherwise it boots from the SD card.

-03 CPUs: The CPU boots from FLASH memory

For example a 3-slot GigE UEIModbus Cube with 8347E encryption, no SS Drive, and no SD card would be:

UEIPAC 300-1G - 03 - 00 - 00 - MB

For example a 12-slot UEIModbus RACKtangle without 8347E encryption, a 8 GB SS Drive, and no SD card would be:

UEIPAC 1200R - 02 - 08 - 00 - MB

[1] There are no CPU or Solid State Drive options available on the UEIModbus 300, 600 and 700.

[2] The UEModbus 300/600 are available with 100Base-FX fiber connections or a DB-15 power connector. Contact UEI for details.

[3] The UEIModbus does not support local data storage. Though the hardware is capable of drives larger than 8 GByte, the is little value in selecting a larger hard drive.